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ROSCOE PRAIRIE
SCIENTIFIC AND NATURAL AREA

MANAGEMENT PLAN
AND
RESOURCE INVENTORY

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The Scientific and Natural Areas Program...
Protecting and Managing the Best of Minnesota's Natural World

ROSCOE PRAIRIE SCIENTIFIC AND NATURAL AREA

MANAGEMENT PLAN AND RESOURCE INVENTORY

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Division of Fish and Wildlife
Minnesota Department of Natural Resources

ROSCOE PRAIRIE

MANAGEMENT PLAN

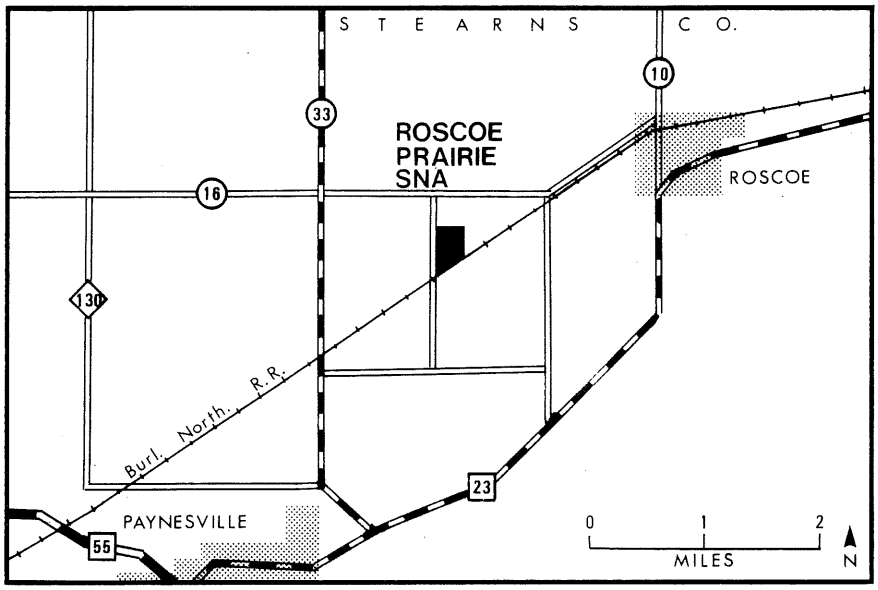
MINNESOTA CHAPTER

OF

THE NATURE CONSERVANCY

December, 1979

Draft Copy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INTRODUCTION

Roscoe Prairie was acquired by The Nature Conservancy (TNC) because knowledgeable individuals reported that the prairie and prairie flora were important elements of Minnesota's natural heritage. The 1977 inventory has documented the occurrence of these elements and provided the basis for developing a site management plan.

The purpose of this part of the master plan is to describe the specific management actions which will be taken in managing Roscoe Prairie. Section I. describes general considerations which affect the management of Roscoe Prairie. First, management implementation strategies are addressed. Then TNC management guidelines are outlined followed by a description of the Minnesota Scientific & Natural Area (SNA) Program, its policies, objectives, rules and regulations. State laws and The Nature Conservancy-Department of Natural Resources (TNC-DNR) lease are also outlined. Section II. describes the site-specific actions to be implemented on Roscoe Prairie. Finally, guidelines for modifying and reviewing the plan are noted in Section III.

I. MANAGEMENT CONSIDERATIONS

Introduction

Presently Roscoe Prairie is being managed by The Nature Conservancy staff and volunteers. TNC's strategy for Roscoe Prairie is to explore mechanisms by which public agencies and institutions can be included in management implementation. Our goal here is not to relinquish active TNC stewardship, but rather to develop a cooperative alliance consisting of TNC, local citizens, and one or more public agencies or institutions for preserve stewardship. This combination, we believe, provides maximum assurance that proper stewardship will be provided in perpetuity for Roscoe Prairie.

The Scientific and Natural Area (SNA) Program of the Minnesota Department of Natural Resources (DNR) was created by legislative statute in 1969. It's goal is to:

> Preserve and perpetuate the ecological diversity of Minnesota's natural heritage, including landforms, fossil remains, plant and animal communities, rare and endangered species, or other biotic features and geological formations for the scientific study and public edification as components of a healthy environment.
> (DNR Policy on Scientific & Natural Areas 7/6/79)

(The SNA Program is described in detail below.)

Since the Scientific & Natural Area Program objectives and philosophy so closely parallel those of The Nature Conservancy, it is appropriate to involve the Scientific & Natural Area Program as one member of the cooperative alliance in the stewardship of Roscoe Prairie. In order to enable state and federal funds to be expended for evaluating and managing Roscoe Prairie a ten year renewable leased was signed by TNC on 25 July 1979 and by the Department of Natural

Resources on 9 August 1979. This lease calls for the review of Roscoe Prairie by the Minnesota Natural Heritage Program for possible designation as a Scientific & Natural Area. If Roscoe Prairie is not designated a Scientific & Natural Area within two years of the signing of the lease either party may terminate the agreement. If Roscoe Prairie is designated a SNA it will be managed in accordance with SNA rules and regulations. The lease also specifies procedures for the review and approval of a management plan and describes other aspects of administering the property.

Presently the Minnesota Natural Heritage Program is in the preliminary stages of reviewing Roscoe Prairie as a possible SNA. A decision will not be made on the site until at least June, 1980.

Since it is not presently known whether Roscoe Prairie will be designated a SNA, and since implementation concerns are dependent on this decision, this plan does not examine the means of implementing specific management actions. Until such time as public resources are made available, management actions will be undertaken by The Nature Conservancy staff and volunteers, and funded out of the Minnesota Chapter's preserve management account. All annual reports, survey data, research proposals, registration sheets, information requests, etc., should be directed to:

Mr. Mark Heitlinger
Minnesota Coordinator of Preserve Management
The Nature Conservancy
328 East Hennepin Ave.
Minneapolis, MN 55414 (612-379-2134)

If Roscoe Prairie is designated a SNA, implementation responsibilities will be specified in a letter of agreement between TNC and the DNR, as called for in the lease. If the preserve is not designated a SNA then other disposition and management options must be explored by TNC.

The Nature Conservancy's Management Guidelines

The Nature Conservancy's management guidelines govern what management actions will be implemented on Roscoe Prairie.

The two primary Nature Conservancy stewardship objectives are as follows:

> The primary objective is to maintain areas so that they sustain species, communities, and natural features that make significant contributions to the preservation of natural diversity. The secondary objective is to determine and promote land uses compatible with the preservation of natural diversity on the preserve, in order to foster local support for individual preserves and recognition by the general public of the values of natural diversity preservation.
>
> (Stewardship guide for preserve committees, 1978)

The primary or ecological objective is closely tied to determining which of the preserve's resources are most significant for preservation. The Minnesota Heritage Program will play a major role in identifying which elements are most significant. This assessment in turn determines how the preserve will be managed. For example, if an endangered species is the most significant element on the tract and that species requires a successional plant community, then management might be directed at perpetuating the successional stage in order to preserve the endangered species. If, on the other hand, a climax plant community is the most significant element on the tract then a different management program is necessary.

Management may be directed at species, communities, natural features, etc. In January 1978 the Minnesota Chapter of The Nature Conservancy developed a manual for stewardship of TNC lands in Minnesota. The following guidelines are taken from this document.

If the occurrence of one or more species is determined to be significant on a preserve TNC will:

1. MAINTAIN POPULATION LEVELS SO THAT THE SPECIES' CHANCES OF LONG-TERM SURVIVAL ON THE TRACT REMAIN STABLE OR ARE IMPROVED.

Management to increase the population of any species should be integrated with perpetuating other native species and maintaining the tract as a diverse and naturally functioning system. There may be important ecological factors regulating the population size of significant species and it may not be desirable in all cases to attempt to increase populations.

2. MANAGEMENT OF SPECIES' POPULATIONS WILL BE ACCOMPLISHED PRINCIPALLY THROUGH MANAGEMENT OF THE SPECIES' NATURAL HABITAT AND THROUGH PROTECTION OF THE SPECIES FROM VANDALISM, POACHING AND SIMILAR THREATS.

Thus managers generally will not use artificial means, such as direct control of natural predation, manipulation of food supply through food plots, or improvement of nesting habitat through plantings or artificial shelters to manage populations. Exceptions to this policy should only be made in certain circumstances when special actions are necessary for the survival of a species (e.g., endangered or threatened species) or to redress an imbalance due to a factor such as preditor extinction.

Management of plant communities should also be guided by an assessment of the preserve's communities. Where management is directed toward plant communities TNC will:

3. MAINTAIN OR RESTORE SELECTED PLANT COMMUNITIES AS NEAR AS POSSIBLE TO THE CONDITIONS THEY WOULD

BE IN TODAY HAD NATURAL ECOLOGICAL PROCESSES NOT BEEN DISRUPTED. THIS GUIDELINE WILL BE ACHIEVED, TO THE EXTENT FEASIBLE BY:

A) PERPETUATING AND AS NECESSARY RE-ESTABLISHING NATURAL ECOLOGICAL PROCESSES; AND
B) MINIMIZING IMPACTS OF CHEMICAL, MECHNICAL AND SIMILAR ARTIFICIAL PROCESS ASSOCIATED WITH HUMAN INFLUENCES.

Some preserves will be protected because they contain significant geological, hydrological or other natural features. The same Heritage Program methodology used to evaluate species and plant communities should be used to assess the importance of these features. TNC will:

4. MAINTAIN NATURAL FEATURES IN PRISTINE CONDITION AND PROTECT THEM FROM UNNATURAL CORROSION AND DETERIORATION. THIS WILL BE ACCOMPLISHED PRIMARILY THROUGH REGULATING THE LEVELS AND TYPES OF HUMAN USE AND IMPACTS THAT ACCELERATE CORROSION AND DETERIORATION.

In special instances steps may be taken to prevent or diminish even natural processes of deterioration in order to perpetuate significant natural features and other natural elements.

The secondary or social objective of TNC stewardship is to foster local support for preserves and recognition by the general public of the value of natural diversity preservation. The future preservation of natural areas depends upon a constituency of users and supporters. TNC should foster the development of such a constituency by encouraging the appropriate use of preserves by educators, students, researchers and other members of the general public. The management plan should identify appropriate types and levels of use, and specify programs to facilitate such use.

To achieve the above stewardship objective TNC will:

5. INVOLVE LOCAL RESIDENTS, USERS, AND OTHER INTERESTED MEMBERS OF THE PUBLIC IN DISCUSSIONS ABOUT STEWARDSHIP PLANNING AND IMPLEMENTATION.

6. PROVIDE INFORMATION ABOUT THE PURPOSE AND NATURAL QUALITIES OF THE PRESERVE TO THE LOCAL COMMUNITIES AND PRESERVE USERS.

7. KEEP THE PRESERVE AS FREE FROM HAZARDS TO USERS AS POSSIBLE.

8. CONDUCT STEWARDSHIP ACTIVITIES IN A WAY THAT MINIMIZES UNNECESSARY ANNOYANCES AND HAZARDS TO RESIDENTS NEAR THE PRESERVE.

9. UTILIZE PRESERVE DESIGN, SUCH AS THE PLACEMENT OF TRAILS, SIGNS, AND PARKING AREAS, TO BOTH OPTIMIZE ACCESSIBILITY OF THE PRESERVE AND MINIMIZE UNDESIRABLE HUMAN IMPACTS TO THE EXTENT THAT SUCH DESIGN MEASURES DO NOT CONFLICT WITH OTHER PRESERVE OBJECTIVES.

10. PROMOTE APPROPRIATE RESEARCH AND EDUCATIONAL USE OF THE PRESERVE.

The two major stewardship goals -- ecological and social -- may at times conflict with each other. People crush vegetation, erode and compact soil, alter the behavior of wildlife and transport onto preserves the seeds of unwanted plants that stick to shoes and clothing. It is The Nature Conservancy's position that:

11. ECOLOGICAL CONSIDERATIONS SHOULD BE WEIGHED MORE HEAVILY THAN HUMAN CONSIDERATIONS WHEN THERE IS A THREAT THAT SIGNIFICANT NATURAL ELEMENTS ON A PRESERVE WILL BE ALTERED OR SIGNIFICANTLY DAMAGED.

The Minnesota Scientific & Natural Area (SNA) Program

Since the SNA Program may also be involved in the stewardship of Roscoe Prairie a description of the SNA Program management policies, rules and regulations,and pertinent legislation is included here. If and when Roscoe Prairie is designated a SNA it will be managed in accordance with these statutes, policies and rules and regulations.

The SNA Program is located in the Minnesota Department of Natural Resource's (DNR) Division of Parks. The SNA Act (M.S.A. 84.033) of 1969 created the Program. It authorized the Commissioner of the DNR to acquire, designate and maintain SNAs,and to adopt pertinent rules and regulations governing the use of the areas.

The DNR issued rules and regulations governing the SNAs (Minnesota Reg. NR 300-303) in 1973. The rules and regulations, still in effect, cover permitted and restricted uses of SNAs, provide for environmental protection, prohibit certain uses and acts, and establish legal penalties for violations. The rules and regulations also state that the Commissioner of the DNR can restrict: 1) travel within the unit; 2) the hours of visitation; and 3) the number of visitors within the area at any given time.

In 1975 the SNA Act was ammended by the Outdoor Recreation Act (ORA; M.S.A. 86A.05). This statute further defined and more adequately funded the program. It included SNAs within the Minnesota's Outdoor Recreation System, delineated resource and site qualifications, provided for administration of the units, and classified SNAs into one of three "use

designations": Research, Education and Public Use. The law states that only scientific, educational or public uses which do not impair or threaten the preservation objectives are to be allowed. Physical development is limited to facilities absolutely necessary for protection, research and education project, and when appropriate for interpretive services. Finally, the Outdoor Recreation Act requires plans be drawn up for each SNA. No development funds can be spent by the DNR until these plans have been approved.

In order to be designated as a SNA a site must: 1) contain elements of "exceptional scientific and educational value," and 2) "be large enough to preserve their inherent natural values and permit effective research or educational functions." The SNA designation process begins when an individual or group nominates an area. The SNA staff notifies the DNR Commissioner's Advisory Committee (CAC) on SNAs and the Minnesota Heritage Program of all new nominations. The SNA staff then is responsible for conducting a field survey of the site to determine the site's qualities, vulnerability, extent of man-made disturbances and management practices which may be needed. The results of this field survey are forwarded to the Heritage Program which then evaluates the significance of the site's elements. Using the field survey data and the Heritage Program evaluation, the CAC assesses the site and sends a recommendation to the SNA Program. Based on the CAC recommendation, the priorities for protection as established by the Heritage Program, and on other considerations, such as the opportunity to acquire the area, the SNA Program sets

a priority for designating the area as a SNA. Recommended proposals are next sent to the Director of the Division of Parks for approval. Finally the proposal is passed on the the Commissioner of the DNR. If the Commissioner approves the site the land is acquired either by fee simple purchase, lease (as is the case with Roscoe Prairie), donation or conservation easement. Once the DNR Commissioner determines sufficient land rights have been acquired to administer the area as a SNA it is formally designated. The formal designation includes the classification of the site as either a Research, Educational or Public Use unit.

If and when Roscoe Prairie is designated a SNA the Outdoor Recreation Act requires that a master plan for the area be completed and approved. The SNA Program is responsible for completing this plan. After the SNA draft plan is completed the CAC and DNR review and approve it. An announcement is then made to the public and other state agencies regarding the existence of the plan. Interested persons and agencies are invited to review and comment on the plan within thirty days of the announcement. Comments received by the DNR are reviewed and appropriate changes are made in the plan. Finally the revised plan is submitted to the State Planning Agency for review. After the DNR reviews this agency's recommendations, and makes the necessary changes, the plan is officially approved.

In July 1979 the DNR issued a policy statement on SNAs. These policies will affect the management of Roscoe Prairie if and when it is designated. The policies are divided into

Designation, Resource Management and Human Use Management.

To ensure the preservation of the SNA's elements of natural diversity it is the DNR's policy to:

1. IDENTIFY AND CATALOG THE NATURAL FEATURES OF THE AREA.

2. ENSURE THAT RESOURCE MANAGEMENT IS DIRECTED TOWARD PRESERVATION AND MAINTENANCE OF ALL SIGNIFICANT ELEMENTS OF THE AREA.

3. MANAGE THE AREA IN SO FAR AS POSSIBLE, TO PERPETUATE OR ESTABLISH NATURAL PROCESSES AND LIMIT THE EFFECTS OF HUMAN ACTIVITIES.

4. PROMOTE WISE STEWARDSHIP WITH USERS, LOCAL RESIDENTS AND SPECIAL INTEREST GROUPS.

To fulfill these general policies the DNR will:

5. MONITOR AND EVALUATE SNA MANAGEMENT PERIODICALLY TO DETERMINE IF MANAGEMENT OBJECTIVES ARE BEING ACHIEVED.

6. USE MANAGEMENT METHOD(S) CONSIDERED MOST NATURAL AND APPROPRIATE TO THE TOTAL ENVIRONMENT OF THE AREA AND:
   A. NOT USE COST ALONE TO DICTATE SELECTION OF THE APPROPRIATE MANAGEMENT METHODS.
   B. DESIGN MANAGEMENT PLANS TO ADDRESS THE ECOLOGICAL INTEGRITY OF THE AREA TO PREVENT MISMANAGEMENT.
   C. REMOVE EXISTING DEVELOPMENTS OR UNNATURAL OBJECTS UNLESS THEY ARE UNOBTRUSIVE AND NOT DETRIMENTAL TO THE PURPOSES FOR WHICH THE AREA WAS DESIGNATED OR OF HISTORIC VALUE.

7. PROHIBIT THE FOLLOWING:
   A. CUTTING OF GRASS, BRUSH, OR OTHER VEGETATION, THINNING OF TREES, REMOVAL OF DEAD WOOD AND WINDFALLS, OPENING OF SCENIC VISTAS, OR PLANTING EXCEPT AS PROVIDED FOR IN THE MANAGEMENT PLAN.
   B. INTRUSIONS OF DEVELOPMENT ON, THROUGH OR OVER SNAs UNLESS ESSENTIAL TO THE MANAGEMENT OF THE UNIT.
   C. MINERAL EXTRACTION, PEAT HARVESTING AND WATER INUNDATION OR APPROPRIATION.
   D. COLLECTION OF PLANT, ANIMAL, HISTORIC OR GEOLOGICAL SPECIMENS (EXCEPT BY PERMIT) OR ANY CONSUMPTIVE USE OF NATURAL RESOURCES.
   E. INTRODUCTION OF PLANT, ANIMAL OR OTHER OBJECTS, INCLUDING LIVE SEEDS OR DISEASE ORGANISMS, UNLESS EXPRESSLY PROVIDED FOR IN THE MANAGEMENT PLAN.

8. PROVIDE THE FOLLOWING:
   A. SPECIAL MANAGEMENT TO TRANSIENT SPECIES ONLY WHEN THERE IS A WELL DEFINED NEED.
   B. SPECIAL MANAGEMENT FOR BALD EAGLE NESTS AND COLONIAL WATER BIRD NESTING SITES WHERE APPROPRIATE.
   C. REVIEW OF DNR PERMITS AND ACTIONS TO MINIMIZE ADVERSE EFFECTS ON A DESIGNATED SNA.

9. INVOLVE USERS, LOCAL RESIDENTS, AND SPECIAL INTEREST GROUPS IN THE MANAGEMENT OF THE SNA AND ENFORCEMENT OF RULES.

10. ESTABLISH A WORKING RELATIONSHIP WITH ADJACENT LANDOWNERS SO AS TO MINIMIZE OR ELIMINATE THOSE LAND USE PRACTICES HAVING AN ADVERSE IMPACT ON THE SNA.

To ensure the preservation of SNA resources and provide for use of the area it is the DNR's policy to:

11. LIMIT HUMAN USE ON SNAs TO THE AMOUNT THE RESOURCE CAN TOLERATE WITHOUT DAMAGE TO SPECIAL FEATURES.

12. PROVIDE FOR THE INTERPRETATION OF THE SPECIAL FEATURES AND THEIR MANAGEMENT.

13. SEEK INPUT FROM USERS, LOCAL RESIDENTS AND SPECIAL INTEREST GROUPS IN DECISIONS REGARDING MOST SUITABLE USE(S).

14. REQUIRE USERS ENGAGED IN SCIENTIFIC STUDY TO MAKE INFORMATION OBTAINED ON THE SNA AVAILABLE TO THE DNR AND ENCOURAGE USERS TO MAKE THEIR STUDIES AVAILABLE TO THE SCIENTIFIC COMMUNITY THROUGH REPORTS OR PUBLISHED ARTICLES.

To fulfill these general policies the DNR will:

15. ENCOURAGE:
   A. ACTIVITIES WHICH CAN OCCUR EQUALLY WELL ON LESS VULNERABLE OUTDOOR AREAS TO BE CONDUCTED ELSEWHERE.
   B. SCIENTIFIC STUDIES, PHOTOGRAPHY, AND KEEPING OF PHENOLOGICAL RECORDS AND FAUNAL AND FLORAL LISTS FOR LONG TERM RESEARCH AND EDUCATIONAL BENEFITS.
   C. APPROPRIATE USERS AND PUBLIC SUPPORT RATHER THAN UNRESTRICTED PUBLIC USE.

16. PROHIBIT THE FOLLOWING ACTIVITIES UNLESS NECESSARY FOR MANAGEMENT PURPOSES OR SPECIFICALLY AUTHORIZED BY THE MANAGEMENT PLAN: COLLECTING PLANTS AND ANIMALS,

HUNTING, FISHING, CAMPING, PICNICKING, HORSEBACK RIDING, MOTORIZED VEHICLE USE WITH THE EXCEPTION OF PARKING FACILITIES AND SIMILAR ACTIVITIES.

17. ASSURE STRUCTURES, TRAILS AND SIGNS ARE AS SPECIFIED IN THE MANAGEMENT PLAN AND IN KEEPING WITH THE NATURAL SURROUNDINGS AND PRESENT ONLY SO FAR AS REQUIRED FOR RESOURCE PROTECTION AND PROVISION OF BASIC USER NEEDS.

18. ADAPT INTERPRETIVE TECHNIQUES AND MATERIALS TO THE USER.

19. LIMIT OR EXCLUDE USE FROM AN AREA FOR AN APPROPRIATE PERIOD OF TIME WHEN IMPORTANT NATURAL FEATURES ARE THREATENED AS A RESULT OF SUCH USE.

20. CLEARLY POST THE PROCESS FOR OBTAINING A VISITOR USE PERMIT, WHEN REQUIRED, AT THE ENTRANCE TO THE SNA.

21. NOTIFY ADJACENT LANDOWNERS AND INTERESTED PARTIES PRIOR TO IMPLEMENTING MAJOR MANAGEMENT ACTIONS.

22. ERECT BOUNDARY SIGNS AS SPECIFIED IN THE MANAGEMENT PLAN TO DISCOURAGE ENCROACHMENT AND TRESPASS ONTO THE SNA AND ONTO ADJACENT PROPERTY BY SNA USERS.

23. REQUIRE A "PACK OUT WHAT YOU BRING IN" LITTER PHILOSOPHY AND ENFORCE LITTER REGULATIONS.

24. FENCE ONLY WHEN NECESSARY TO CORRECT PERSISTENT ENCROACHMENT OR TRESPASS PROBLEMS TO SNA OR ADJACENT PROPERTY.

25. REGULATE USE BY EMPLOYING, SINGLY OR IN COMBINATION, METHODS THAT INCLUDE BUT ARE NOT LIMITED TO THE FOLLOWING:
    A. NO ACCESS RESTRICTIONS.
    B. ACCESS BY PERMIT ONLY.
    C. ACCESS ON DESIGNATED TRAIL ONLY.
    D. TEMPORAL OR SPATIAL ZONING.

26. REQUIRE:
    A. REVIEW OF ALL RESEARCH PROPOSALS FOR THE SNA WITH EMPHASIS ON THE PROPOSED RESEARCH METHODOLOGY.
    B. IF NECESSARY, BONDING OF RESEARCHERS TO GUARANTEE CLEAN UP FOLLOWING COMPLETION OF THE PROJECT(S).

Other Management Considerations

The Roscoe Prairie lease will also affect management while the lease is in effect (for at least the next two years). Under the provisions of The Nature Conservancy-DNR lease:

1. Management planning is a joint and cooperative responsibility of the DNR and TNC.

2. The DNR will notify TNC thirty days prior to any proposed change in the rules and regulations. The Conservancy will then notify the DNR within thirty days if the change is acceptable or not.

3. The DNR will not cause or permit to be caused any act constituting waste or destruction of the unit.

4. The DNR shall not apply or permit application of any chemicals, including herbicide and insecticide, unless it has been provided for in the management plan or unless written permission has been first obtained from the Conservancy.

5. If consistent with the management plan a permanent recognition sign shall be erected by the DNR on the unit.

6. Upon request the DNR shall provide TNC with an annual report on use and management of the unit.

7. The Conservancy shall have access to the unit at any time.

8. TNC may, with the consent of the DNR, lease all or any portion of the unit for purposes consistent with the management plan.

9. Both TNC and the DNR can terminate the lease when there is a breach of the lease contents or if there is an irreconcilable difference regarding management of the area.

Finally, several Minnesota statutes may affect the management. They include:

1. Collecting and taking of wild animals: Under state law (M.S. 98.48) special permits are required from the Division of Fish & Wildlife for the collection or taking of protected wild animals.

2. Endangered species:
The Endangered Species Act (M.S. 97.488) states that no endangered wild animal may be taken except under special circumstances. The Division of Fish & Wildlife may undertake program or promulgate rules and regulations which also affect the management of endangered or threatened species.

3. Conservation of certain flowers:
Under state law (M.S. 17.23) no member of the Orchid or Trillium families, or any species of Lotus (Nelumbo lutea) Gentian (Gentiana), Arbutus (Epigaea repens), or lily (Lilium) can be taken or gathered in any manner from public land without the permission of the Commissioner of Agriculture - and then only for scientific and herbarium purposes.

4. Control of noxious weeds:
It is the duty of all land owners, according to state law (M.S. 18.181), to eradicate or otherwise destroy all noxious weeds. Section 18.315 also states that towns and cities may take steps to control noxious weeds on state lands within the territorial limits of the towns or cities provided that the managing agency fails to take action within fourteen days of receiving notice to cut or control the weeds. The following plants are considered noxious weeds statewide: Field Bindweed; Hemp; Poison Ivy; Leafy Spurge; Perennial Sowthistle; Bull Thistle; Canada Thistle; Musk Thistle; and Plumeless Thistle. In addition, about thirty plants are considered noxious weeds in particular counties. In Stearns County Cockleburr, Wild Mustard, Sunflower and Velvet Leaf are all classified as noxious weeds.

II. MANAGEMENT ACTIONS FOR ROSCOE PRAIRIE

Introduction

This section describes the specific actions to be implemented on Roscoe Prairie. The actions are grouped into three broad categories: resource management actions, use management actions, and monitoring actions.[1] The resource management actions, in general, are primarily directed at preserving, perpetuating and restoring the tract's natural resources. Use management actions are directed primarily at the problems caused by, and needs of, the visitors. Monitoring actions are directed at insuring that both resource and use management actions are being effectively implemented, identifying unforeseen changes occurring on the site, and recording the results of management implementation. Under each management action there is a brief statement expanding on the action and the need for the action. In parentheses there is a numerical reference to the various TNC guidelines and SNA policies each action is designed to carry out. Since the actions usually implement more than one guideline or policy there are usually several numbers in parentheses.

Within each of the resource, use and monitoring action categories the actions are subgrouped when possible according to function. The actions are <u>not</u> listed in order of priority.

1. It should be noted that these categories are artificial: use management actions affect resource management actions and vice versa. However, for the purposes of discussion it is convenient to follow this convention.

Ownership modifications are of special concern to adjacent land owners, managing agencies, users and interested parties. Ownership modifications, including fee title purchase and conservation easements,are therefore noted separately after the management actions have been outlined. The purpose of these ownership modifications is either to protect resources, facilitate management, enhance use on the tract, or protect "new" resource(s) outside the tract.

RESOURCE MANAGEMENT ACTIONS

Action 1. Re-build a four-strand barbed wire fence on the tract's north boundary and maintain the east boundary fence (TNC guidelines 3,4 and 9; SNA policies 2,3,7(E), 17 and 24).

This action is necessary to protect the prairie from grazing by livestock on the north and east sides, and to prevent people from inadvertently wandering into or out of the tract. In order to rebuild the fence on the north side an extensive amount of brush will have to be removed. Steel studded T-posts, 6 or 6-1/2 feet long and set at one rod intervals should be used with wooden posts at corners and as braces for stretching. The adjoining land owners could be asked to share in the expense of building the fences, as per state law (Chapter 344: Partition Fences), or alternatively the managing agency could pay the full cost. Brush should also be removed from the fence on the east side. Fences should be inspected monthly to determine that no objects are leaning on the fences, vegetation is not covering the fences, posts are firm and wires are adequately strung.

Action 2. Develop and implement a wild fire suppression plan (TNC guidelines 4 and 8; SNA policies 3 and 4).

Local fire authorities, the fire chief of the nearest fire department and the DNR area forester, should be contacted annually about control methods to use should a wild fire start on or spread into the area. Fire control should be to prevent the spread of the fire outside of the tract's boundaries and be designed to minimize the damage produced by fire suppres-

sion activities -- the practices used to suppress the fire may be more damaging than the fire to the natural resources. During extreme fire danger periods visitors and neighbors should be alerted to prevent man-caused fires. In the event a fire does occur natural fire breaks or backfires should be used to keep the fire from spreading outside of the tract. Heavy equipment and fire plows should not be used on the tract.

Action 3. Periodically burn segments of Roscoe Prairie (TNC guidelines 3 and 4; SNA Policies 2,3 and 6).

Areas like Roscoe Prairie are thought to have burned frequently before white settlement.[1] After white settlement, however, fire was suppressed. Prescription burning is necessary to: reinstate a natural ecological process and regulate plant succession; maintain an open character; thin woodland and suppress brush; restore disturbed areas; remove built-up fuel and reduce the wild fire hazard;suppress alien (non-native) species; perpetuate fire-dependent native plants; and maintain the habitat for prairie animals. Roscoe Prairie is divided into three fire units (See Figure 1).[2] Units I and II each cover approximately eight acres of the Bluestem/ Indian Grass Prairie. Unit II should be burned in the spring

1. See for instance: J.T. Curtis & M.L. Partch, Effect of fire on the competition between blue grass and certain prairie plants, American Midland Naturalist 39(1948): 437-443. J.T. Curtis, The Vegetation of Wisconsin (Madison: University of Wisconsin Press, 1959); R. Daubenmire, Ecology of fire in grasslands, Advanc. Ecol. Res. 5(1968): 209-266.
2. This prescription burn plan was developed by Mark Heitlinger, TNC Minnesota Coordinator of Preserve Management, and was based on: 1)his knowledge and experience in burning similar areas; 2)an assessment of the tract's vegetation and species composition; and 3)the conditions required to safely burn the area.

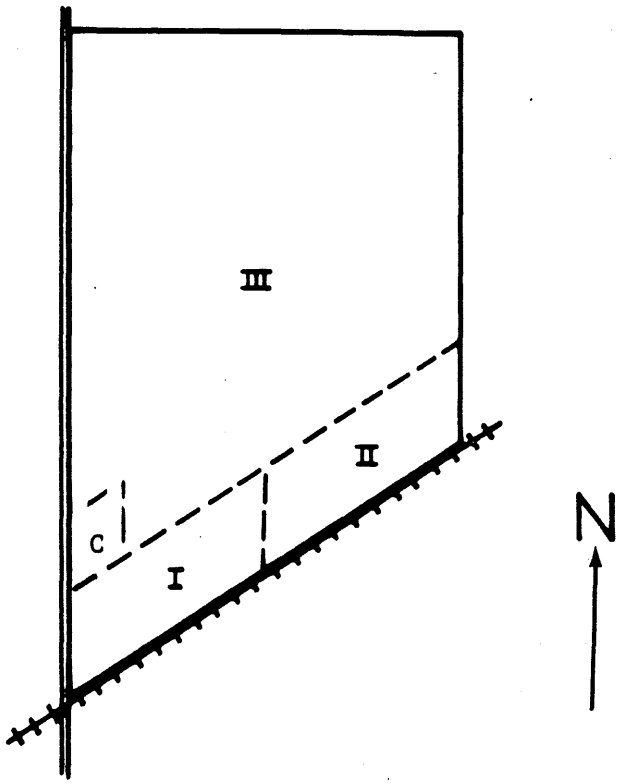


Figure 1. Roscoe Prairie's prescribed burn plan. The prairie is divided into three burn units: I, II, and III. 'C' is a control area which will not be burned. (See text for the burn schedule.) Scale is 8": 1 mile.

of 1981. Thereafter, Units I and II should be burned once every three to four years as soon after snow melt as possible; both units should never be burned in the same year however. Unit III extends from the Bluestem/Indian Grass Prairie up to and including the wet Sedge Marsh and Willow Shrub community. This unit should be burned every fall until three burns through the Willow area (ideally in consecutive years) have been accomplished. Thereafter, the unit should be burned approximately once every five years. A small approximately two acre plot on the west side of Unit III, extending from the road about 416 feet, should not be burned. This area will be set aside as a control plot for comparative purposes.

TNC procedures for prescription burning should be followed for all planned burns: 1) a prescribed burning proposal must be prepared and approved by authorized TNC personnel; 2) all conditions described in the proposal, including the crew, fire boss, equipment, weather, fire breaks, DNR permits, notifications, and publicity, must be in effect for the burn to occur. Following the burn a prescribed burning report must be submitted to the Nature Conservancy office (See Appendix III, Procedures for prescription burning, in the Manual for stewardship of Nature Conservancy lands in Minnesota, for more information). When possible, hay from fire break mowing should be scattered on the formerly cultivated areas to aid in vegetation restoration.

Action 3. Control the Leafy Spurge growing on the tract (TNC guidelines 3,4 and 8; SNA policy 3).

Leafy Spurge is a non-native, noxious weed and should be controlled before it spreads, as required by state law. The weed has been identified on the southwest corner of the tract. If left uncontrolled it will spread over the tract. Fire apparently isn't an effective means of controlling this plant. Therefore, the plant should be controlled using an effective, biodegradable herbicide. The herbicide should be applied every year, until the plant is no longer observed, with an adjustable nozle sprayer. The spray should be applied in large droplets, not in a mist which can drift. Under no circumstances should broadcast spraying be conducted on the area.

Action 4. Control Sweet Clover growing on the tract (TNC guidelines 3,4 and 8; SNA policy 3).

Sweet Clover is another non-native plant growing on the prairie which if left uncontrolled will spread over the area. It occurs on the southwest corner of the tract, scattered through out the Bluestem Prairie, and along the roadside. Hopefully, the prescribed burns will eventually eliminate the Sweet Clover, but in the meantime action needs to be taken. The plants were hand pulled in 1979; if Sweet Clover is identified in the future it should be controlled by hand pulling before seed development.

Action 5. Each spring the Burlington Northern Railroad roadmaster should be contacted and reminded that the Roscoe Prairie area is not to be sprayed with herbicides (TNC guidelines 3 and 4; SNA policies 3 and 10).

In the past the railroad has sprayed herbicide in the area. This spraying may have affected vegetation growing on Roscoe Prairie. The Conservancy has requested this practice be stopped and the railroad has agreed to stop spraying the area (See the 8 July 1977 letter in the Minnesota Chapter files). The roadmaster should be annually contacted to insure that no spraying occurs in the future.

Action 6. Inventory Roscoe Prairie's amphibians and reptiles (SNA policy 1).

Actions 6-9 are necessary in order to identify significant and sensitive resources, obtain baseline data, and identify opportunities, problems and trends for management. The data are also valuable for research purposes. The 1977 inventory did not examine the tract's amphibians and reptiles. This information will result in a more complete resource baseline for Roscoe Prairie. The inventory should follow the methodology and procedures outlined in the 1979 SNA inventories.

Action 7. Collect additional information on the tract's bird population (SNA policy 1).

The 1977 inventory did not adequately distinguish between which bird species pass through the area and which species actually reside on the site. It also may have missed some birds due to a limited field season. This supplementary inventory will provide a more complete resource baseline for the tract. The inventory shall follow the methodology and procedures outlined in the 1979 SNA inventories.

Action 8. Collect additional information on Roscoe Prairie's flora (SNA policy 1).

The prairie flora is probably larger than indicated by the 1977 inventory. Additional information needs to be collected on the site's sedges and non-vascular plants, such as the lichens, and early spring flora. Thus this supplementary inventory will focus on those plants which the 1977 inventory did not thoroughly survey. Species which are identified in this new inventory, and not observed in 1977, should be added to the tract's annotated plant list.

Action 9. Survey Roscoe Prairie's water quality and hydrology (SNA policy 1).

Presently there is no information on the site's surface and sub-surface water quality, hydrology, or the effect of the drainage ditches on the site. The depth of the groundwater can be measured using the method described by Turnock & Lawrence (1953).[1] Water quality data can be obtained using the Hach Chemical Company's DR-EL/1 and DR-EL/1a Environmental Laboratory Water Test Kits, or similar equipment. It would also be desirable to test the water periodically for pesticides. Data obtained from this research will provide a more complete resource baseline and will help alert managers to the effect of human activities on the tract's natural resources.

1. William Turnock & Donald B. Lawrence, Measurement of the level of the groundwater at the Cedar Creek Forest (Mimeo, 1953). For more information, contact the Sherburne National Wildlife Refuge where this method was also used.

USE MANAGEMENT ACTIONS

Action 10. Conduct litter clean-up operations (TNC guidelines 4 and 7; SNA policies 3,6(C) and 23).

Litter is unsightly and detrimental to the purposes the area serves. Presently there is not a litter problem in Roscoe Prairie. However, users and managers will be encouraged to look for and dispose of litter properly.

Action 11. Post all boundaries of the tract and maintain the posts and signs (TNC guidelines 4,7,8 and 9; SNA policies 3,7,16 and 22).

The signs are necessary to prevent inadvertent encroachment by adjacent land owners, minimize unauthorized activities (e.g., hunting), identify the area's boundaries to managers, and prevent users from inadvertently wandering onto adjacent property. Presently posting is needed along the east and north boundaries of the tract. TNC posts and signs must meet the State of Minnesota's legal requirements. For posting two inch letters must be on the signs. Posts should be set no more than one-tenth mile apart; if visability is obscured they should be set closer together. At corners, posts should be set so that the signs are nearly touching and at the same angle as the boundary lines. After the additions to Roscoe Prairie's boundaries have been made (See Ownership Modifications) posts will have to be moved to the new boundaries. If and when Roscoe Prairie is designated a SNA official SNA signs should be placed on all the boundaries; all TNC signs will be phased out. The signs and posts should be checked annually and repaired or replaced when necessary.

Action 12. Maintain the main recognition sign, registration box (and its supplies), and the gate (TNC guidelines 4,6,7,9 and 10; SNA policies 3,4, 7,9,12,13,15,16,23 and 26).

The registration box should be checked weekly during the spring, summer and fall to see that adequate copies of maps, brochures, registration sheets and other relevent information notes (including notes on upcoming special events, the nearest DNR or volunteer information source, the SNA rules and regulations (if appropriate) and/or TNC rules and regulations) are present. It is particularly important that registration sheets be collected and kept for analysis. When the parking area is completed (See Action 14) the registration box should be moved 200 feet from the parking area into the unit. The main recognition sign, registration box and gate should all be annually touched up with Olympic wood stain; the recognition sign's letters should be repainted. Other maintenance actions should be taken as required.

Action 13. Develop and distribute a map showing the tract's boundaries, and general features of interest (TNC guidelines 6,7,9, and 10; SNA policies 4,9,12 and 15(C)).

Maps should be distributed to users, adjacent owners and interested parties until a Roscoe Prairie brochure is developed.

Action 14. Develop and distribute a brochure on Roscoe Prairie (TNC guidelines 4,6,7,9 and 10; SNA policies 3,4,7,9,12,15,16 and 23).

The brochure should include an accurate map of the area, a description of Roscoe Prairie's history, natural features,

and significance, and a discussion of the impacts caused by people. It shall describe The Nature Conservancy-Scientific & Natural Area Program (if appropriate), note conducted tours, promote a "pack out what you bring in" litter philosophy, identify people to contact for more information about the site, and encourage visitors to register, provide comments and become involved in managing the area. Finally, it should note TNC and/or SNA rules and regulations governing use, including the requirement that all researchers obtain a permit prior to conducting research on the area.

Action 15. Develop and implement a parking plan for Roscoe Prairie (TNC guidelines 9 and 10; SNA policies 12,15(C) and 25).

Visitor access is an important management consideration. Presently there is no place to park except on the gravel road. In order to provide safe access for users and help prevent parking on the prairie, a parking area is needed. A parking area would be best located on land adjacent to the tract's west boundary. This parking area should be kept small (i.e., space for six to ten cars) to keep acquisition and design costs down, minimize negative impacts on the tract, and discourage inappropriate public use. The DNR's Bureau of Engineering should be consulted about the parking area design and surfacing. (Gates or fencing may be needed to keep visitors from driving beyond the parking area.)

Action 16. Conduct field walks on Roscoe Prairie (TNC guidelines 5,6 and 10; SNA policies 4,12,13 and 15(C)).

This action will help acquaint and involve people with the area and its management. The number of conducted tours depends on time and money limitations, and the impact of the tours on the site. Late May through October are ideal times to lead walks on Roscoe Prairie. News releases should be sent to the local media to publicize the walks, and a reporter(s) should periodically be asked to come along. In addition to educating visitors about Roscoe Prairie's resources, guides should make a special effort to answer questions, inform visitors about The Nature Conservancy-Scientific & Natural Area Program (if appropriate), obtain feedback on management, and make visitors feel like land stewards -- involved in managing the site and responsible for its well-being.

Action 17. Inform local middle and secondary schools about the site (TNC guidelines 6 and 10; SNA policies 4,9,12 and 15).

All secondary schools in the vicinity of Roscoe Prairie should at least know of the existence of the site and its educational potential for teaching such topics as native flora and fauna, soils and ecology. An effort should be made to annually meet with all teachers who express an interest and encourage them to use the site if appropriate (i.e., if such use cannot occur equally well on other less vulnerable areas). The sensitivity of the resources and teacher responsibility in caring for the land must be stressed in these meetings. Before a school group comes to the site teacher workshops should be held so that the teachers are trained and well-informed about the area. When the class comes to the tract scientists or

managers should if possible also be present to assist the teachers.

Action 18. Consult with and inform regional higher education institutions and researchers on the site's resources and management (TNC guidelines 4,6, and 10; SNA policies 1,2,3,5,12,13,14,15 and 26).

St. Cloud State and St. John's Universities, the College of St. Benedict, Willmar Community College and other scientific research groups or individuals who express a research interest in Roscoe Prairie should be annually contacted. The purpose of these meetings is to inform the researchers about the area (including TNC's rules and regulations; all researchers should know that a permit is required for all research conducted on the area), and to promote research possibilities. Data gathered from scientific studies are also important for monitoring the site. Thus all researchers conducting studies are to be consulted about their data and conclusions. Researchers should inform managers immediately of important natural changes and human impacts they discover. Researchers should furthermore be consulted and encouraged to offer input into managing the tract. Finally, research information should be accumulated, stored in a site file, and shared with interested researchers.

MONITORING ACTIONS

Action 19. Maintain contact with Mr. James Muggli and Mr. Norman Dahlman, the volunteer managers, of the area (TNC guidelines 4,5,6,7,8 and 10; SNA policies 1,2,3,4,5,7,9,10,13,15,16 and 21).

The volunteer managers must have the time, interest and commitment to become intimately involved with the protection and management of the site. Their job is primarily to: 1) periodically monitor the tract for signs of misuse or management problems and communicate them to managers (a "watchdog" function); 2) facilitate communications between managers, adjacent land owners and other parties; 3) maintain the registration box supplies and collect registration sheets; 4) aid managers when requested; and 5) orient new managers to the site and local community. If and when either of the present volunteer managers does not feel he can adequately serve in this role then another volunteer manager should be recruited. The new volunteer manager will preferably live within four miles of the site.

Action 20. When necessary, contact the local DNR Conservation Officer (C.O.) and request his assistance in managing the site (TNC guidelines 2,3, and 4; SNA policies 3,4,7,16 and 23).

Since Mr. Norman Dahlman is presently both a volunteer manager and the local Conservation Officer this action is not presently needed. However, when a new C.O. comes into the area he should be contacted. This action should be taken at least once per year. It is important to bring the site to his attention and familiarize him with its resources and problems because

he is the primary natural resource enforcement officer. The action is also necessary to obtain advice on management, such as posting, and on enforcement activities.

Action 21. Periodic meetings will be held by managers for local residents (TNC guidelines 5,6,7,8 and 10; SNA policies 3,4,5,9,10,13 and 21).

Meetings will be publicized through news releases sent to the local media (A reporter might also be asked to attend). They will be held at least once per year at a time and place convenient for local residents, perhaps in conjunction with a field trip or other activity; special circumstances, such as the implementation of a major management action, may warrant more than one meeting. These meetings can be used to enlist support for project work (e.g., monitoring), as a forum to discuss management actions, decisions and problems, or to encourage land owners to adopt various practices. It is particularly important that adjacent land owners and frequent users be present at these meetings since their activities can have a large impact on the tract and vice versa. All comments regarding management should be recorded.

Action 22. Develop and implement a monitoring program for Roscoe Prairie's vegetation (TNC guidelines 1,2,3 and 4; SNA policies 1,2,3,5 and 11).

A monitoring program should be developed to record changes occurring on the tract, such as changes in plant succession or species diversity. Permanent releves and photopoints should be set up in each of the tract's vegetative communities following the guidelines and procedures described in the

1979 SNA inventories (the 1977 inventory permanent transect lines marking the prairie/marsh ecotone could be used here). Color IR aerial photographs should be taken once every five years of the site. The two acre unburned control plot should be periodically compared with the treated areas to evaluate the effect of management on such resources as the orchids.

Action 23. Periodically inspect the site (TNC guidelines 1,2,3,4,7 and 8; SNA policies 1,2,3,5,6(C), 7,11,16,19 and 23).

The tract shall be thoroughly inspected at least once per month for human impacts (e.g., vandalism, trampling of plants, unauthorized new trails, littering, the disturbance of sensitive resources like the orchids), signs of violations in rules and regulations (e.g., hunting, snowmobiling, horseback riding), natural changes in the tract (e.g., changes in plant succession, insect infestations), and the need for and effect of management actions (e.g., burning). The area near the Burlington Northern Railroad tracks should, in particular, be carefully inspected to determine if the railroad is affecting the tract. (If problems do arise Burlington Northern should be contacted and its cooperation solicited.) The inspection is also an opportunity to gather feedback from users in the area concerning the site and management actions. On randomly selected days of high use the number of visitors in the area could be counted for a comparison with the number that registered. Visitors observed violating rules and regulations should be tactfully asked to correct their behavior, e.g., remove rubbish dumped on the site. Serious problems

requiring immediate attention should be referred to the DNR Conservation Officer or County Sherrif. A report should be submitted to TNC if further action is advisable.

Action 24. Monitor the Dakota Skipper population (TNC guidelines 1 and 4; SNA policies 2,3 and 5).

The Dakota Skipper is a proposed nationally threatened species and warrants special attention. The Skipper population on the upland prairie, should be carefully monitored to determine whether the population size is changing and if so what factors are related to the population change (e.g., changes in the plants used as nectar sources or as larval foodplants; burning the tract). An annual record should be kept of the tract's population, its location, and size. Robert Dana should be contacted to determine exactly what techniques and procedures should be used to monitor the Skippers.

Action 25. Submit an annual written report to TNC and the SNA Program (if and when the site is designated a SNA). TNC guidelines 1,2,3 and 4; SNA policies 1,2,3,5,11,13,14,15 and 26).

The annual report shall note completed management actions, progress made in implementing other actions, number of users and violations (compared against preceeding years), solicited and unsolicited comments regarding management,research proposals and studies underway, changes in the resources, problems identified by managers, local residents, and researchers, and recommendations for changes in the master plan. Actions which are taken but which are not included in this plan should be described in detail in the report.

Action 26. Develop and maintain a close relationship with local and regional government officals, natural resource professionals and other appropriate individuals (TNC guidelines 5,6, and 8; SNA policies 4,5,9,13, and 21).

Local and regional governmental officals (e.g., the mayor, county assessor, county board members) and resource management professionals (e.g., the county extension agent, DNR area wildlife manager, Soil Conservation Service district conservationist, U.S. Fish & Wildlife managers) should be annually contacted and informed about the site. These individuals are all concerned with natural resources in their respective capacities. They should be aware of the site, its importance, and major management actions which are planned for or being implemented on the tract. This action can help eliminate public suspicions and misconceptions, build trust and rapport, and increase community support. It is also another way of monitoring what the public feels about the site and the managers.

Local and regional resource management professionals are another important group to keep in close contact with. These individuals, if they are aware of the site and interested in its preservation, can provide valuable expertise and manpower, and lend equipment if needed for management. As local residents they can help generate community support for the tract. Cooperative management efforts can also sometimes be used to solve problems which affect (or could affect) several sites in the area, including the preserve.

Action 27.. Maintain close contact with all scientists who are using the site for educational and research purposes (TNC guidelines 4, 5, and 6; SNA policies 1,2,3,4,5,9,12,13, and 15).

Scientists, as trained observers, can provide valuable information and insights for managing the site. Data gathered from scientific studies are also important for monitoring the site. Thus all scientists using the site will be annually contacted. Researchers conducting studies will be consulted about their data and conclusions. Researchers should inform TNC and the DNR (if appropriate) immediately of important natural changes and human impacts they discover. Researchers should furthermore be consulted and encouraged to offer input into managing the tract. Finally, research information should be accumulated, stored in a site file, and shared with interested researchers.

OWNERSHIP MODIFICATIONS

Two ownership modifications are called for in the Roscoe Prairie management plan. First, land should be acquired either by donation, purchase, or easement for parking and access on the site's west boundary (See Action 14). The second modification would be to acquire the small Cattail Marsh across the road to the west of the preserve. This acquisition would preserve a "new", desirable resource outside of the tract.

III. REVIEW OF THE PLAN

The actions outlined in this plan must be considered provisional, not definitive, and should be reviewed periodically to see that they are still relevant in light of current conditions. Changes in the site's resources, users and other management considerations are bound to occur. If warranted, the plan's management actions can and should be modified so that they more effectively and/or efficiently implement TNC guidelines and SNA policies (if the site is designated). All proposed actions should be primarily directed at protecting and preserving elements which are a significant part of Minnesota's natural diversity. In any event the plan should be thoroughly reviewed and updated at a minimum of every ten years.

1979

Management Plan Summary for Roscoe Prairie

TNC's strategy for Roscoe Prairie is to develop a cooperative management alliance, consisting of TNC, local citizens and the DNR Scientific & Natural Area (SNA) Program (See the Ripley Esker management summary). The following 28 management actions have been proposed for Roscoe Prairie. The actions are listed in outline form and are not listed in order of priority.

Resource Management Actions:

1. Rebuild a four-strand barbed wire fence on the tract's north boundary and maintain the east boundary fence. This action is necessary to prevent grazing.
2. Implement a wildfire suppression plan.
3. Periodically burn segments of Roscoe Prairie.
4. Control the Leafy Spurge growing on the SW corner. It should be controlled with an effective,biodegradable herbicide.
5. Control Sweet Clover growing in several areas on the site. The plants should be hand pulled before seed development.
6. Annually contact the Burlington Northern Railroad roadmaster and remind him that the Roscoe Prairie area is not to be sprayed with herbicies.
7. Inventory Roscoe Prairie's amphibians and reptiles (not done in 1977).
8. Collect additional information on the tract's resident bird population.
9. Collect additional information on the site's sedges,non-vascular plants and the early spring flora.
10. Survey Roscoe Prairie's water quality and hydrology (not done in 1977).
11. Verify whether the Le Sauk soil series is accurately mapped on the site.
12. Clear up ambiguities on the site's land use history concerning grazing, fence lines, and drainage ditches.

Use Management Actions:

13. Post new signs on all the tract's boundaries and maintain the signs. The new signs will be more attractive and less negative than the old TNC signs.
14. Maintain the main recognition sign, registration box (and its supplies,such as maps,brochures,comment cards,etc.) and the gate. When the parking area is completed the registration box and recognition sign may have to be moved.
15. Develop a map showing the tract's boundaries and general features of interest, and distribute it to users,potential users, and adjacent landowners.
16. Develop and distribute a brochure on Roscoe Prairie.

17. Develop and implement a parking plan. A small parking area would be best located on land adjacent to the tract's west boundary. (Gates or fencing may be needed to keep people from driving beyond the parking area.)

18. Conduct guided field walks on Roscoe Prairie.

19. Encourage local secondary schools, regional education institutions and researchers to use the site if appropriate.

Monitoring Actions:

20. Maintain contact with the present volunteer managers.

21. When a new DNR Conservation Officer comes into the area he should be contacted and his support enlisted (this action is not presently needed however).

22. Hold periodic meetings for local residents.

23. Develop and maintain a close relationship with local and regional government officals,natural resource professionals,and other appropriate individuals.

24. Maintain close contact with all scientists who are using the site.

25. Periodically inspect the site for human impacts,natural changes in the tract, and to evaluate the effect of management actions.

26. Develop and implement a vegetative monitoring program which includes setting up permanent releves and photopoints,and taking color IR aerial photographs.

27. Monitor the Dakota Skipper population. An annual record should be kept of the tract's population, its size, location,structure, and trends.

28. Submit an annual written report to TNC and the SNA Program (if appropriate) summarizing actions taken,problems,needs,comments,changes in the resources,etc.

Ownership Modifications:

Two ownership modifications are called for in the plan. First, land should be acquired on the site's west boundary for parking. Second, the small cattail marsh across the road, to the west of the preserve, should be acquired to protect this resource.

June, 1980

ROSCOE PRAIRIE INVENTORY ERRATA

Title Page, line 7: change "Great" to Burlington.

Page 3, Par. 1, line 2: change "twenty" to ten.

Par. 2, lines 2 & 4: change "Marsh" to Meadow.

Page 8, Footnote, line 3: add the following sentence to the end of the footnote: Alternatively, Dr. Max Partch notes the depression around the rock could be waterwashed, typical of outwash areas.

Page 9, Par. 1, line 2: change "into" to through.

Par. 2, lines 2-3 should read: "...slightly rolling. The tract has a maximum relief of approximately ten feet, the elevations ranging from about 1160 to 1170 feet."

(Delete all the remaining lines in the paragraph.)

Page 18: under the "Parent Material" column, change "till" to outwash for the LeSauk and Brooten soils.

Page 20, Par. 2, line 5: change "Roscoe Prairie" to LeSauk.

Page 22, Par. 3 should begin: "Surface and ground water from the hilly Alexandria and St. Croix moraine areas drains into the lower flat outwash plain...sits (See Figure 1).

Par. 3, lines 8-10: delete the sentence beginning "Two potholes...."

Par. 4, line 1: change "enter" to cross.

Page 25: the asterisk indicating Roscoe Prairie should be further in the middle of the Blue Hills region.

Page 26, Par. 2, line 4: change "Marsh" to Meadow.

Par. 4, line 1: change "Marsh" to Meadow.

Page 28, Key: change "Marsh" to Meadow.

Page 29, Par. 5, line 10: add footnote 2 to the end of this line:

2. Dr. Max Partch also notes it is significant that some species found in the Belgrade-Glenwood outwash region don't occur on other nearby outwash areas because of an alkaline condition. Indeed, according to Dr. Partch this is why Roscoe Prairie may be "unique" in central Minnesota.

Page 31, Par. 3, line 4: add footnote 2 to the period on this line:

2. J. Muggli, the volunteer manager, reported he found the following species on the tract in the past: Gentiana spp. (possibly procera); Pedicularis spp.; Cirsium hillii; Hierochlot oderata; Coreopsis spp.(most likely palmata); Spiraea alba; Comandra pallida; Besseya bulii; Linum spp. (most likely rigidum); Psoralea esculenta; and Caltha palustris. These species were not, however, recorded in the 1977 inventory. They are not included in the following discussion.

Page 32, bottom line: delete "Introduced".

Page 38, Par. 6 should read:

Roscoe Prairie has several other plant species of special interest. The Coneflower (Echinacea pallida) stand has been labelled "unique" by David Grether, and "...one of the finest in the state" by the DNR-SNA Program. Dr. Max Partch also observed that the presence of Echinacea pallida, Asclepias speciosa, Helianthus maximiliani, Astragalus crassicarpus and Psoralla argophylla are of special interest: these species are rare to non-existent further east in Stearns County.

Page 49, Par. 1, line 3: change "this year" to in 1977.

Par. 2, lines 4-5 should read: "...Banded Purples were also seen within the Aspen grove."

Page 51, footnote, line 2: add the following sentence to the footnote:"J. Muggli has also seen a Marsh Hawk on the tract. This species was not recorded on the tract in 1977, however, and therefore is not included in the table or discussion."

Page 60, Par. 4, line 8: change "annually" to on a regular basis.

Page 61, Par. 1, line 9: add footnote 1 to the period on this line:

1. Mr. James Muggli has some film, however, which may show the extent of the burn.

Par. 2, lines 4-6 should read: "...managing the tract. James Muggli generated the initial interest in the site when he contacted Dr. Gerald Ownbey and Dr. Tom Morley and showed them the prairie. The two scientists recommended the tract be preserved. On 28 June...."

Page 62: the dates for the spring burns in the figure are reversed: the left unit should read "Spring 1977 and 1979", while the right unit should be "Spring 1978".

PLEASE NOTE: Additional editorial, grammatical, spelling, and miscellaneous changes have been made in the inventory. A list of these changes is on file at TNC's Minnesota Chapter office.

June, 1980

ROSCOE PRAIRIE MANAGEMENT PLAN ERRATA

Page 2, Par. 3, lines 5-8+ should read: "...Roscoe Prairie. A ten year renewable lease was therefore signed by TNC on 25 July 1979 and by the DNR on 9 August 1979."

Page 15, Par. 1, lines 1-3 should read:"If Roscoe Prairie is designated an SNA the Nature Conservancy-DNR lease will affect management of the site. Under the provisions of the lease:"

Page 19, Par. 2: replace Action 2 with the following:

Action 2. Implement a wildfire suppression plan (TNC guideline 8;SNA policy 4).

Wildfires may threaten human health and property adjacent to the tract. However, the practices used to suppress wildfires may be more damaging to the site than the fire itself. Fire control should be to safely prevent the spread of the fire outside of the tract's boundaries, and be designed to minimize the damage produced by fire suppression activities. Several steps will be taken to achieve this goal.

Local fire authorities, the fire chief of the local fire department and the DNR area forester, should be contacted annually about control methods to use should a wildfire start on or spread into the tract. These authorities should be made aware of the nature of the tract and TNC's concern about what suppression methods are used on the site. They should be asked to consider using natural fire breaks and backfires, rather than heavy equipment and fire plows, to contain the fire. The fire authorities should have the names and telephone numbers of the local volunteer manager and TNC preserve management coordinator to contact for assistance in the event of a fire.

A map should be provided showing the tract's boundaries, access points, and fire breaks.

Adjacent landowners should also be provided with the names and phone numbers of the local fire department, volunteer manager, and TNC preserve management coordinator to contact in case of a fire. If a wildfire does occur on the tract the neighbors can serve as an "early warning network", alerting the proper individuals. During extreme fire danger periods neighbors, and visitors, should be alerted to prevent man-caused fires and to be on the lookout for fires.

Page 20, Par. 2, lines 12-14 should read: "...Figure 1).[2] The interior fire breaks separating the three fire units (and control plot) should be mowed and raked in the fall before a scheduled spring burn. Units I and II cover the upland Bluestem/Indian Grass Prairie. Unit II should be...."

Page 22, Par. 1, line 1 should read: "...of 1980.[1] Thereafter...."

Footnote 1: Unit II was not burned in the spring of 1980 due to a fire ban. The prescription schedule is being modified.

Par. 1, lines 2-3 should read: "...as possible. However, both units should never be burned in the same year. This leaves hunburned habitat for the indigenous animal species, especially the Dakota Skipper.

Unit III extends...."

Par. 3: Action 3 is incorrectly numbered--it should be Action 4. (NOTE: Actions 4-9 should be renumbered.)

Page 23 should begin: Action 4 must be approved by TNC's regional land steward before it is executed. Leafy Spurge is a non-native plant, classified as a noxious weed by the State. The plant should be con-...."

Par. 1, line 3: change "The weed" to Leafy Spurge.

Page 25, Par. 1, line 6: add footnote 1 to the sentence ending "spring flora":

1. Ned Bray suggests that the inventory be extended to before May 2 and after September.

Par. 2, line 7: renumber footnote #1 to #2. (the footnotes at the bottom of the page must also be renumbered.)

Pages 25-26: add the following two new actions after Action 10:

Action 11. Verify whether the Le Sauk soil series (#564) is accurately mapped on Roscoe Prairie (SNA policy 1).

The 1977 soil inventory identified this soil series on Roscoe Prairie (See Table 2 and Figure 4 in the inventory). The Le Sauk soil series is poorly drained. However, an area where it is supposed to occur on Roscoe Prairie appears to be well drained. Thus there is some question as to whether the Le Sauk soil series is accurately mapped on Roscoe Prairie.

Action 12. Clear up ambiguities on the tract's land use history (TNC guidelines 3 and 4; SNA policies 2 and 3).

The land use history reported in the 1977 inventory contains several ambiguities, namely: was part of Roscoe Prairie or land adjacent to the tract grazed, and if so when and where; was there a fence line on Roscoe Prairie, and if so when was it built and where was it erected; are the ditches shown in Figure 11 in the inventory drawn accurately? The answers to these questions will provide managers and users with insights on how natural the tract is, where disturbed areas are, and what restoration or other management actions may be needed.

Page 26, Par. 1: delete Action 10. (NOTE: action numbers 11-17 on pages 26-29 should be increased by two.)

Par. 2: Action 11 should be replaced by the following:

Action 13. Post new signs on all the tract's boundaries and maintain the signs (TNC guidelines 3,4,7,8,9,and 10;SNA policies 3,7,15,16 & 22).

All of the tract's boundaries should be posted to prevent inadvertent encroachment by adjacent landowners, to minimize unauthorized activities (e.g., hunting), and to identify the area's boundaries to users and managers. If the tract is not designated an SNA in the near future, new signs will be posted on an experimental basis on all the tract's boundaries. These new signs will be more attractive and less negative than the old TNC signs they replace. (TNC's present signs emphasize what activities are prohibited on the tract.) The new signs will help promote TNC's cause to the local community and help form a positive image of the tract and its managers. The signs should be set no more than one-tenth mile apart; if visibility is obstructed they should be set closer together. At corners posts should be set so that signs are nearly touching and at the same angle as the boundary line. All signs and posts should be checked annually and repaired and replaced when necessary. As noted above, the new signs are an experiment: if problems develop on the tract then the signs may have to be changed.

The above action does not apply if the site is designated an SNA. If this occurs, the SNA Program will determine what action should be taken on posting.

Page 27, Par. 1, line 5: change "weekly" to biweekly.

lines 11-12: delete the sentence beginning "It is particularly...."; insert the following new paragraph:

Two sets of standardized 5x7 comment cards will also be kept in the box.

One set of cards will be available for users to write comments on management and use of the tract (e.g., problems observed on the site, proposals for management, evaluation of the managers). The other set of cards will be available for visitors to write observations on the site's natural features. These cards will ask: the observer's name and address; what species were observed; the number of individuals seen; where the species were observed (space can be left for a sketch); and other remarks (e.g., presence of nesting activity, territorial behavior, identifying marks of unknown species). The back of the cards will have instructions and note the purpose of the cards. A list of those species which are of particular interest to managers and scientists could also be included here. The registration sheets and the comment/observation cards can provide valuable monitoring data to managers. It is therefore important to collect the cards and the registration sheets, and keep them for analysis.

When the parking area is completed (See Action 17) the registration box should be moved 50 feet....

Page 29, Par. 1, line 13: add to the end of the sentence: "(See also Action 22)."

Par. 2: Action 17 should be replaced with the following:

Action 19. Encourage local middle and secondary schools, regional education institutions and researchers to use the site if appropriate (TNC guidelines 6 and 10; SNA policies 4,12, and 15).

All local secondary schools, the Minnesota Environmental Education Board's regional coordinator, St. Cloud State and St. John's Universities, the College of St. Benedict, Willmar Community College, and other scientific research groups should at least know of the site's existence, its potential for teaching such topics as native flora and fauna, and whom to contact for more information (e.g., the local volunteer manager, TNC preserve management coordinator, DNR regional naturalist). An effort should be made to meet annually with all teachers and researchers who express an interest in the site. Educational and research opportunities can be promoted at these meetings. However, the sensitivity of the resources and user responsibility in caring for the land must be stressed at these meetings. Use should only be encouraged if appropriate, i.e., if such use cannot occur equally well on less vulnerable areas. All teachers and researchers should be aware of the site rules & regulations, such as the need to obtain a permit prior to

collecting or conducting research in the area, before they enter the site. Before a class comes to the tract teacher workshops should be held so that the teachers are trained and well-informed about the area. When the class comes to the site managers or scientists should, if possible, also be present to assist the teachers.

Page 30: delete Action 18.

Pages 31-36: the actions on these pages are incorrectly numbered and are out of order. The correct order is as follows:

Action 20. Maintain contact with Mr. James Muggli and....(See page 31).

Action 21. When necessary, contact the local DNR conservation....(See page 31).

Action 22. Hold periodic meetings for local residents....(See page 32).

Action 23. Develop and maintain a close relationship....(See page 35).

Action 24. Maintain close contact with all scientists....(See page 36).

Action 25. Periodically inspect the site....(See page 33).

lines 9-11 should read: "...riding) and natural changes in the tract (e.g., insect infestations). The area...."

line 12: add the following sentences to the end of this line:
"...solicited.) If urgent action is required on the site TNC should be contacted immediately. Otherwise, records should be kept of observations and recorded in the annual status report.
The inspections are also an opportunity...."

lines 15-17: delete the sentence beginning "On randomly selected...."

Action 26. Develop and implement a monitoring program....(See pages 32-3).

page 33, line 2: change "marsh" to meadow.

Action 27. Monitor the Dakota Skipper....(See page 34).

line 10 should read: "...its location, size, and trends. Robert...."

Action 28. Submit an annual written report....(See page 34).

lines 11-13: delete the sentence beginning "Actions which are taken...."

Page 37, line 3 should read: "...west boundary.(Across the road from the preserve. See also Action 17.) The second...."

PLEASE NOTE: Additional editorial, grammatical, spelling, and miscellaneous changes have been made in the plan. A list of these changes is on file at TNC's Minnesota Chapter office.

ERRATA

Action 2 . Implement a wildfire suppression plan (TNC guideline 8; SNA policy 4).

Wildfires may threaten human health and property adjacent to the tract. However, the practices used to suppress wildfires may be more damaging to the site than the fire itself. Fire control should be to safely prevent the spread of the fire outside of the tract's boundaries, and be designed to minimize the damage produced by fire suppression activities. Several steps will be taken to achieve this goal.

Local fire authorities, the fire chief of the local fire department and the DNR area forester, should be contacted annually about control methods to use should a wildfire start on or spread into the tract. These authorities should be made aware of the nature of the tract and TNC's concern about what suppression methods are used on the site. They should be asked to consider using natural fire breaks and backfires, rather than heavy equipment and fire plows, to contain the fire. The fire authorities should have the names and telephone numbers of the local volunter manager and TNC Preserve Management Coordinator to contact for assistance in the event of a fire. A map should be provided showing the tract's boundaries, access points, and fire breaks.

Adjacent landowners should also be provided with the names and phone numbers of the local fire department, volunter manager, and TNC Preserve Management Coordinator to contact in case of a fire. If a wildfire does occur on the tract the neighbors can serve as an "early warning network", alerting the proper individuals. During extreme fire danger periods neighbors, and visitors, should be alerted to prevent man-caused fires and to be on the lookout for fires.

Action 11 . Post new signs on all the tract's boundaries (TNC guidelines 3, 4,7,8,9,and 10;SNA policies 3,7,15,16,and 22).

All of the tract's boundaries should be posted to prevent inadvertent encroachment by adjacent landowners, to minimize unauthorized activities (e.g., hunting), and to identify the area's boundaries to users and managers. TNC's present signs only state what activities are prohibited on the tract; they do not state what activities are allowed or encouraged. Therefore, if the tract is not designated a SNA in the near future, new signs will be posted on an experimental basis on all the tract's boundaries. These new signs will be more attractive and less negative than the old TNC signs they will replace, helping to promote TNC's cause to the local community and forming a positive image of the tract and its managers. The signs should be set no more than one-tenth mile apart; if visability is obstructed they should be set closer together. At corners posts should be set so that signs are nearly touching and at the same angle as the boundary line. All signs and posts should be checked annually and repaired and replaced when necessary. As noted above, the new signs are an experiment: if problems develop on the tract then the signs may have to be changed.

The above action does not apply if the tract is designated a SNA. If this occurs, the SNA Program will determine what action should be taken on posting. All TNC signs will be phased out.

Actions 17-8. Encourage local middle and secondary schools, regional higher education institutions and researchers to use the site if appropriate (TNC guidelines 6 and 10; SNA policies 4,12,14,15 & 26).

All local secondary schools, St. Cloud State and St. John's Universities, the College of St. Benedict, Brainerd Community College, Willmar Community College, and other scientific research groups should at least know of the site's existence, its potential for teaching such topics as native flora and fauna, ecology and geology, and who to contact for more information (e.g., the local volunter manager, TNC preserve management coordinator, DNR regional naturalist). An effort should be made to meet annually with all teachers and researchers who express an interest in the site. Educational and research opportunities can be promoted at these meetings. However, the sensitivity of the resources and user responsibility in caring for the land must be stressed at these meetings. Use should only be encouraged if appropriate, i.e., if such use cannot occur equally well on less vulnerable areas. All teachers and researchers should be aware of the site rules & regulations, such as the need to obtain a permit prior to collecting or conducting research in the area before they enter the site. Before a class comes to the tract teacher workshops should be held so that the teachers are trained and well-informed about the area. When the class comes to the site managers or scientists should, if possible, also be present to assist the teachers.

Insert the following two actions in the resource management action section:

Action . Clear up ambiguities on Roscoe Prairie's land use history (TNC guidelines 3 and 4;SNA policies 2 and 3).

The land use history reported in the 1977 inventory contains several ambiguities, namely: was part of Roscoe Prairie or land adjacent to the tract grazed, and if so when and where; was there a fence line on Roscoe Prairie, and if so when was it built and where was it erected; are the ditches shown in Figure 11 drawn accurately? The answers to these questions will provide managers and users with insights on how natural Roscoe Prairie is, where disturbed areas are, and what restoration or other management actions may be needed.

Action . Verify whether the Le Sauk soil series (#564) is accurately mapped on Roscoe Prairie (SNA policy 1).

The 1977 soil inventory of Roscoe Prairie identified this soil series on Roscoe Prairie (See Table 2 and Figure 4 in the inventory). The Le Sauk soil series is poorly drained. However, an area where it is supposed to occur on Roscoe Prairie appears to be well drained. Thus there is some question as to whether the Le Sauk soil series is accurately mapped on Roscoe Prairie.

The 1977 Inventory
of
Roscoe Prairie
Stearns County, Minnesota

SW ¼ of the NW ¼ and
Part of the NW ¼ of the SW ¼
Lying north of the Great Northern Railroad
Right of way, Section 35,
Township 123 N., Range 32 W.
Paynesville Quadrangle

Prepared by
The Minnesota Chapter of The Nature Conservancy
and
The Scientific and Natural Areas Section
Division of Parks and Recreation
Minnesota Department of Natural Resources

December 1979 Draft

Aerial photograph of Roscoe Prairie taken in 1976. Scale: approximately 8": 1 mile.

TABLE OF CONTENTS

INTRODUCTION

Scope and Organization

The primary purpose of this document is to provide data necessary for the Heritage Program to evaluate the significance of Roscoe Prairie. This evaluation will be used to determine if the tract qualifies as a Scientific and Natural Area (SNA). In addition, the inventory provides information on the site's viability, notes man-made disturbances, identifies fragile, sensitive resources, and provides a temporal baseline from which changes in the area can be identified. This information is useful to the Heritage Program evaluators, to scientists who may study the area, and to SNA managers should the site be designated a SNA.

The Roscoe Prairie inventory is divided into nine sections covering climate, the unit's physical resources (geology, soils, water resources, plant communities and the various biological subdivisions (flora, butterflies, birds and mammals).[1] In addition to identifying and cataloging the tract's natural features each section describes the reasons for conducting the inventory, describes the inventory methods used, highlights elements which researchers have labled "significant", and points out additional inventory data which could be collected on the site.

The final two sections of the inventory are concerned with human activities on and adjacent to the site. The land use

1. No information was collected by the 1977 inventory team on the site's amphibians and reptiles. Thus no information is presented in this document on these animals.

history section describes how the tract has been changed through human activities, where known, and identifies adjacent land uses. The natural area visitor section points out regional population centers, educational and research centers and groups which may be sources of users.

The Roscoe Prairie inventory represents the culmination of many individual efforts. The inventory was completed in the summer of 1977 by six Nature Conservancy student interns: Kathryn Bolin, Robert Dana, Erik Englebretson, Steve Hansen, Ross Siemers and Hagdis Tschunko. These individuals did all the research and preliminary writing. Each member of the team was responsible for completing a part of the inventory in which they had expertise. Approximately 215 hours were spent on the unit by the researchers. At least two to three times that amount of time was spent in preparation of specimens, reseraching the literature, processing and analyzing data and writing. Mr. Mark Heitlinger, TNC Coordinatory of Preserve Management, Minnesota Chapter, helped supervise and edit the inventories. Michael Rees, Scientific and Natural Areas research writer, prepared the final document. Other individuals who assisted in the preparation of the inventory are noted in the appropriate sections. Their help is gratefully acknowledged.

Overview of Roscoe Prairie

Roscoe Prairie is a fifty-seven acre natural area in a predominately agricultural area. It is located in Stearns County, approximately two miles southwest of Roscoe and twenty-five miles southwest of St. Cloud in central Minnesota. The landscape,

shaped by glaciers, is flat to slightly rolling. Maximum relief of the area is approximately twenty feet. Ground water is generally high in the region and drainage is poor. Thus the tract's northern lowlands may be wet all year depending on the weather.

Six distinct vegetative communities are present on the site: Bluestem/Indian Grass Upland Prairie, Wet Sedge Marsh/Willow; Shrub-Aspen Woods, Brome Grass Field; Willow Shrubs; and Disturbance Pockets. The Upland Prairie and Marsh are the two largest communities present. One hundred and six vascular plant species were identified in the site's vegetative communities in 1977. Only nine of these species are not native to Minnesota. Thirty-seven butterfly species, thirty-eight bird species and nine mammal species were also observed in the area.

Roscoe Prairie sits on the eastern edge of what once was an unbroken expanse of prairie to the west. Today the tract is surrounded by agricultural fields and pastures. Roscoe Prairie also shows signs of past human activities. Drainage ditches were cut on part of the tract, and an old field road entered the site. About five acres of the northeast corner of the tract were plowed in the 1940's. Other impacts which have affected the tract in varying degrees include hay mowing, cattle grazing, the introduction of some non-native species, and most importantly the supression of fire. Except where plowing occurred, signs of past disturbance are now disappearing.

Roscoe Prairie is significant for many reasons. Relatively undisturbed native prairie is uncommon in the state. Furthermore it is uncommon in the state to have one site supporting such diverse prairie vegetation with so little variation in topography. This diversity is probably related to differences

in the soil texture. Roscoe Prairie is one of the few protected prairies on an outwash sand plain. The Dakota Skipper is perhaps the most significant element found on the site. Roscoe Prairie is only one of eight areas in the state known to support the skipper (one of three that are protected), and is the easternmost surviving colony known. The tract also supports four, possibly five, other uncommon butterflies. Seven plant species are noted as special and/or infrequent species occuring in Minnesota. One plant, Small White Ladyslipper (Cypripedium candidum), has been proposed as a nationally threatened species. Three bird species found on the tract are of special interest. American Woodcock and Eastern Meadowlark are near the edge of their ranges; and the Marbled Godwits have been listed as a species of concern in the state. Finally, Roscoe Prairie contains "mima-mounds", a biotic-topographic feature found only on prairies.

CLIMATE

Climate has a major influence on the biotic and physical resources of Roscoe Prairie. Species diversity, density and distribution, soil type, erosion, hydrology and land use are all affected by temperature, precipitation and wind.

Methods

Climatological data were gathered by researching National Oceanic and Atmospheric Administration and Minnesota Agricultural Experimental Station reports. Since Roscoe Prairie does not have a weather station, data were gathered from the St. Cloud NOAA weather station.

Regional Climate[1]

Roscoe Prairie's climate is subject to marked changes in temperature which characterize all of Minnesota. The area experiences frequent periods of cold Arctic air during the winter months. A typical winter has five to ten days with temperatures ranging from -20 to -30 degrees Fahrenheit. Although winters are cold, strong winds and high humidities are generally absent on the coldest days.

The region's growing season is fairly short, extending from mid-May to the end of September, averaging 140 days per year. Since the Gulf of Mexico air masses seldom reach this far northward, prolonged periods of hot and humid weather are infrequent in this area. Only once in every five to ten years does the temperature exceed 100 degrees Fahrenheit, and then usually for only one day.

Approximately 60% of the region's average 26.8 inches of precipitation (water equivalent) falls during the months of May through September; June is the wettest month of the year. The principal source of rain during this season is thunderstorms. Average annual snowfall is 43.1 inches, with the heaviest snow falls occuring in March.

Damaging storms such as severe blizzards, tornados and ice storms, occur infrequently in the region. The occurrence of ice storms, causing extensive damage to trees, averages less than once per year. However, heavy rains, winds and hail associated with thunderstorm line squalls occurs each year in the region.

1. The following information is taken from NOAA 1976 local climatological data: Annual summary. . . . . .

Table I is a summary of selected temperature and precipitation data for the St. Cloud area.

Sources of Information:

Baker, D.G. and J.H. Strub, Jr. 1963a. Climate of Minnesota: Part I. Probability of occurrence in spring and fall selected low temperatures. Minnesota Agr. Exp. Sta. Tech. Bull. 243. 40p.

_____1963b. Climate of Minnesota: Part II. The agricultural and minimum-temperature-free seasons. Minnesota Agr. Exp. Sta. Tech. Bull. 245. 32p.

_____1965. Climate of Minnesota: Part III. Temperature and its applications. Mn. Agr. Exp. Sta. Tech. Bull. 248. 64p.

National Oceanic and Atmospheric Administration, Environmental Data Service. 1976. Local climatological data: Annual Summary with Comparative Data, St. Cloud, Minnesota. National Climatic Center, Asheville, N.C.

GEOLOGY

The earth's rocks, minerals and topography form the physical landscape we see today. The type of bedrock and glacial drift affects the soil and groundwater, which in turn influence the vegetation. The land's relief, slope and aspect affect hydrology, microclimate, soil formation and the biotic community. Some geological formations are visually striking, illustrating geological processes; other features are more subtle, such as fossils showing how life has developed on the earth. Protecting examples of geological features is one important part of preserving natural diversity in Minnesota.

Methods

Geologic information was primarily obtained through a literature search. Field surveys using topographic maps and aerial photographs aided in interpretation.

Table I . Selected Weather Data for St. Cloud.[a]

TEMPERATURE	°F	°C
Mean annual temperature:	41.7	5.4
Mean annual daily maximum temperature:	52.4	11.3
Mean annual daily minimum temperature:	31.0	-0.6
Highest temperature recorded (July, 1940, Aug., 1947):	103.0	39.4
Lowest temperature recorded (Jan., 1951):	-40.0	-40.0
Average temperature warmest month (July):	70.2	21.2
Average daily maximum--July:	81.8	27.7
Average daily minimum--July:	58.6	14.8
Average temperature coldest month (January):	8.9	-12.8
Average daily maximum--January:	19.2	-7.1
Average daily minimum--January:	-1.4	-18.6
Average date last occurrence 32°F (0°C) or less (spring):	c. 5 May[b]	
Average date first occurrence 32°F (0°C) or less (fall):	c. 1 Oct.[c]	
Average number days in growing season (period free of 32°F (0°C) or less):	c. 140[d]	
Average growing degree days, T_b = 40°F (4.4°C):	4102[e]	
Average growing degree days, T_b = 50°F (10.0°C):	2377[e]	

PRECIPITATION	in.	cm.
Average annual precipitation (water equivalent):	26.84	68.17
Average annual snowfall:	43.10	109.47
Average precipitation wettest month (June):	4.64	11.78
Average precipitation (water equivalent) driest month (Jan.)	0.76	1.93
Average snowfall heaviest month (March):	9.9	25.15

[a]All data except that noted otherwise is from National Oceanic and Atmospheric Administration, Environmental Data Service. 1976. Local Climatological Data: Annual Summary with Comparative Data, St. Cloud, Minnesota. National Climatic Center, Asheville, N. C.

[b]Based on Figure 3. Baker, D. G., and J. H. Strub, Jr. 1963a. Climate of Minnesota: Part I. Probability of Occurrence in Spring and Fall of Selected Low Temperatures. Minnesota Agr. Exp. Sta. Tech. Bull. 243.

[c]Based on Figure 4. Baker and Strub, 1963a.

[d]Based on Figure 16. Baker, D. G., and J. H. Strub, Jr. 1963b. Climate of Minnesota: Part II. The Agricultural and Minimum-Temperature-Free Seasons. Minnesota Agr. Exp. Sta. Tech. Bull. 245.

[e]From Appendix Table 2. Baker, D. G., and J. H. Strub, Jr. 1965. Climate of Minnesota: Part III. Temperature and Its Applications. Minnesota Agr. Exp. Sta. Tech. Bull. 248.

Growing degree days = $\Sigma(\overline{T} - T_b)$ where $\overline{T}$ = mean daily temperature and T_b = selected baseline temperature (40° F or 50° F).

Historical Geology

Like all of central Minnesota, Roscoe Prairie's physical landscape owes much of its present configuration to the late Wisconsin glaciers of the Pleistocene Epoch. Approximately 34,000 years ago the Wadena Lobe descended from Canada and covered much of east central Minnesota. At its terminus the ice sheet formed a terminal moraine (a series of mounds or hills of till which mark the glacier's greatest advance) which forms part of the Alexandria Moraine Complex. This moraine is two to three miles distant from the site and is visable to the south, southwest and southeast.

Some fourteen thousand years later the Brainerd and Pierz Sublobes invaded west central Minnesota from the north. This ice sheet did not reach Roscoe Prairie, but came to within about five to eight miles of the tract. Another terminal moraine, part of the St. Croix Moraine, was formed here by these ice sheets. Thus another prominent ridge is visable from the tract to the north and northeast.

The Des Moines Lobe was the last ice sheet to cover Roscoe Prairie. It descended from Canada approximately 16,000 years ago. The Des Moines Lobe transported and deposited various sized boulders (eratics), many of which are still evident on the prairie today.[1] As the ice sheet slowly retreated meltwater deposited sediments and gray drift forming an outwash plain.

1. One of these eratics shows signs of being used as a bison rubbing rock; the rock is smooth and around the base of the rock is a depression where the bison walked around.

This geomorphic region is named the Belgrade-Glenwood Outwash Plain and extends from just southwest of Cold Spring into Meeker and Kandyiohi Counties. Roscoe Prairie lies in the northern tip of this area (See Figure 1). To the north of the tract, about two to three miles, this ice sheet deposited gray drift as it retreated and formed the Osakis Till Plain. Subsequent erosion through the years has resulted in the present landforms in and around Roscoe Prairie.

Topography & Bedrock of Roscoe Prairie

Figure 2 shows the topography of the site. Roscoe Prairie is level to slightly rolling. Elevation of the Prairie ranges from 1165-1175 feet at the southern end to 1150 feet at two pot holes on the northern part of the tract. Thus there is approximately twenty feet of relief. Two areas can be distinguished within the tract: a low area to the north and northeast, elevation approximately 1160 feet, and the slightly higher and drier prairie areas to the south and east, elevation approximately 1165-1175 feet.

One topographic-biotic feature which doesn't show up on Figure 2 is mimma mounds. Roscoe Prairie contains several of these mounds which are only found on prairies. Mimma mounds are sites for gopher activity and toad hibernation. The origin of the mounds, however, is unknown.

Roscoe Prairie's bedrock has been classified as part of the Keweenawan Sediments (See Figure 3). These sediments are of marine origin, laid down in the Cretaceous Period approximately 25-64 million years ago (Schwartz, 1954). The sediments

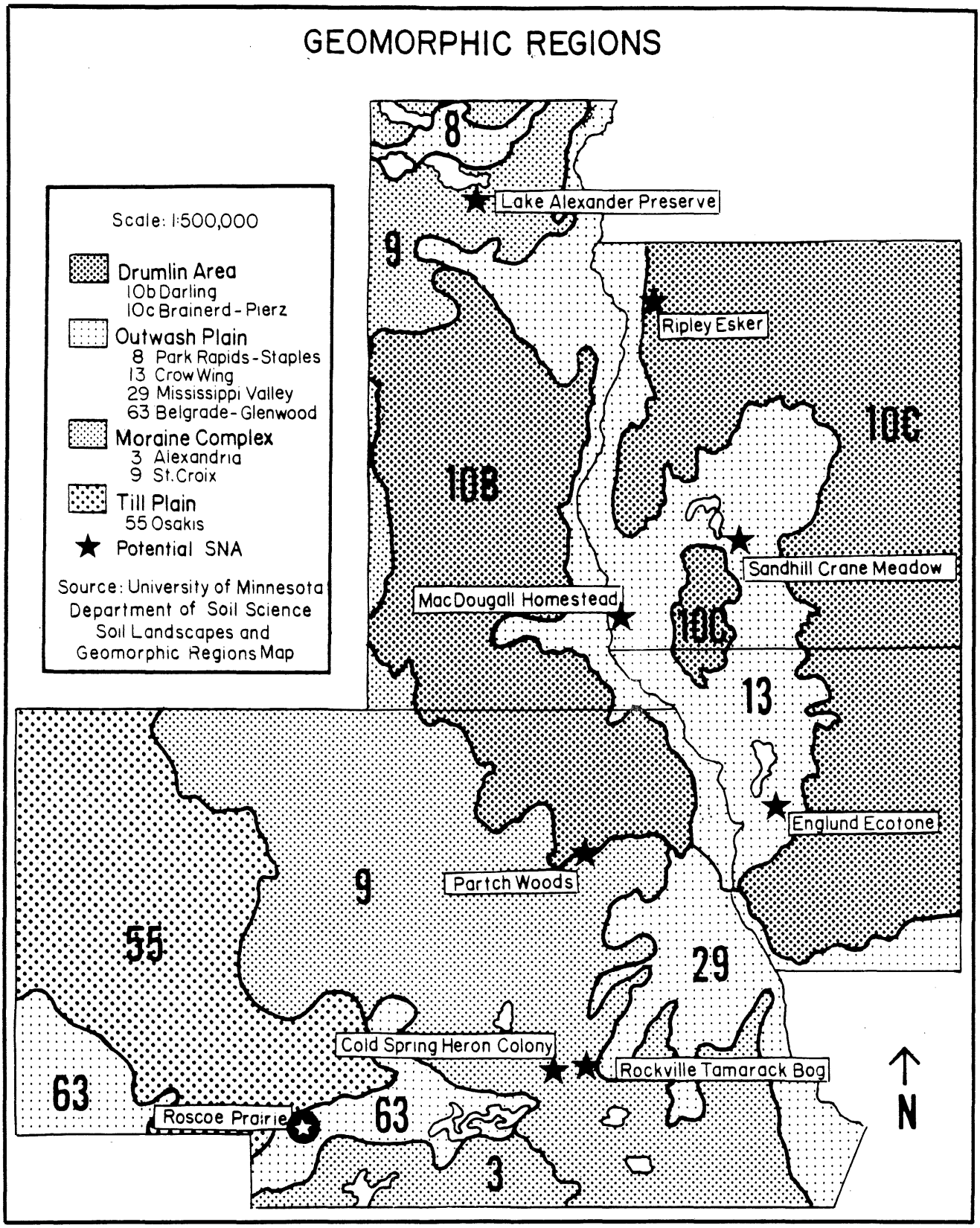
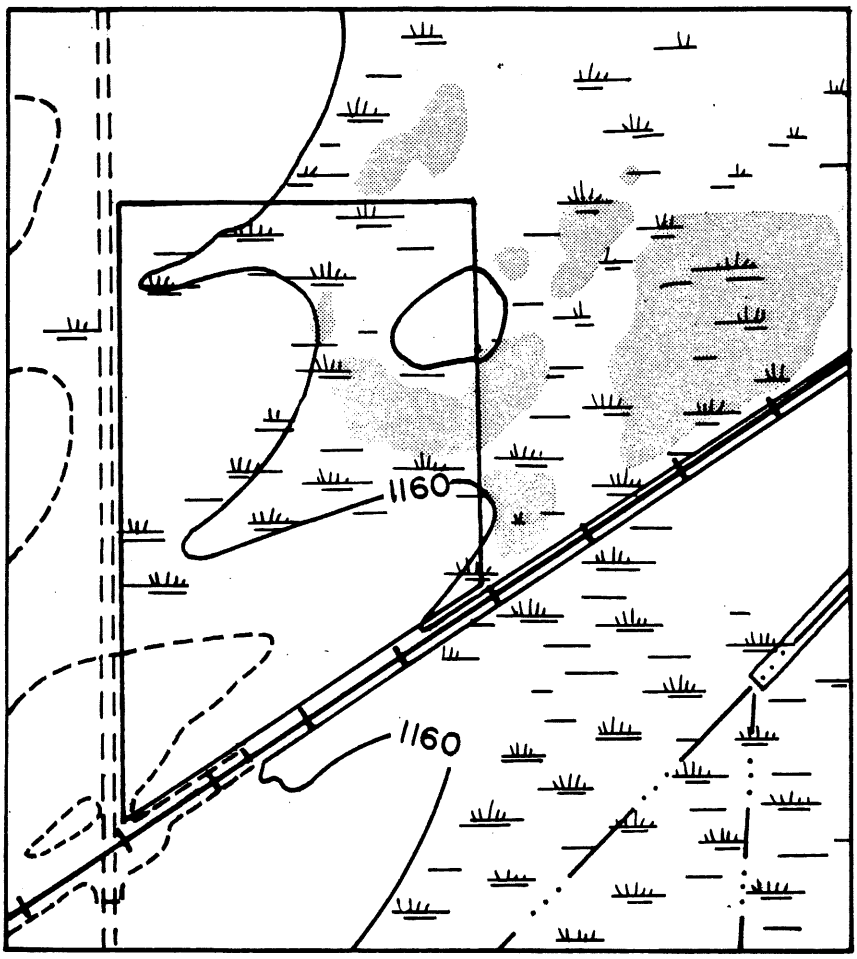


Figure 1. Roscoe Prairie and nearby potential Scientific & Natural Areas in relation to geomorphic regions in central Minnesota (Benton, Morrison and Stearns Counties).



KEY

WOODS

WETLAND

SCALE: 8": 1 MILE

Figure 2. Roscoe Prairie's topography. Elevations are in feet above mean sea level. The countour line interval is ten feet; dotted lines represent 5-foot contours. Adapted from the U.S. Geological Survey, Paynesville Quadrangle (1:24,000), 1967.

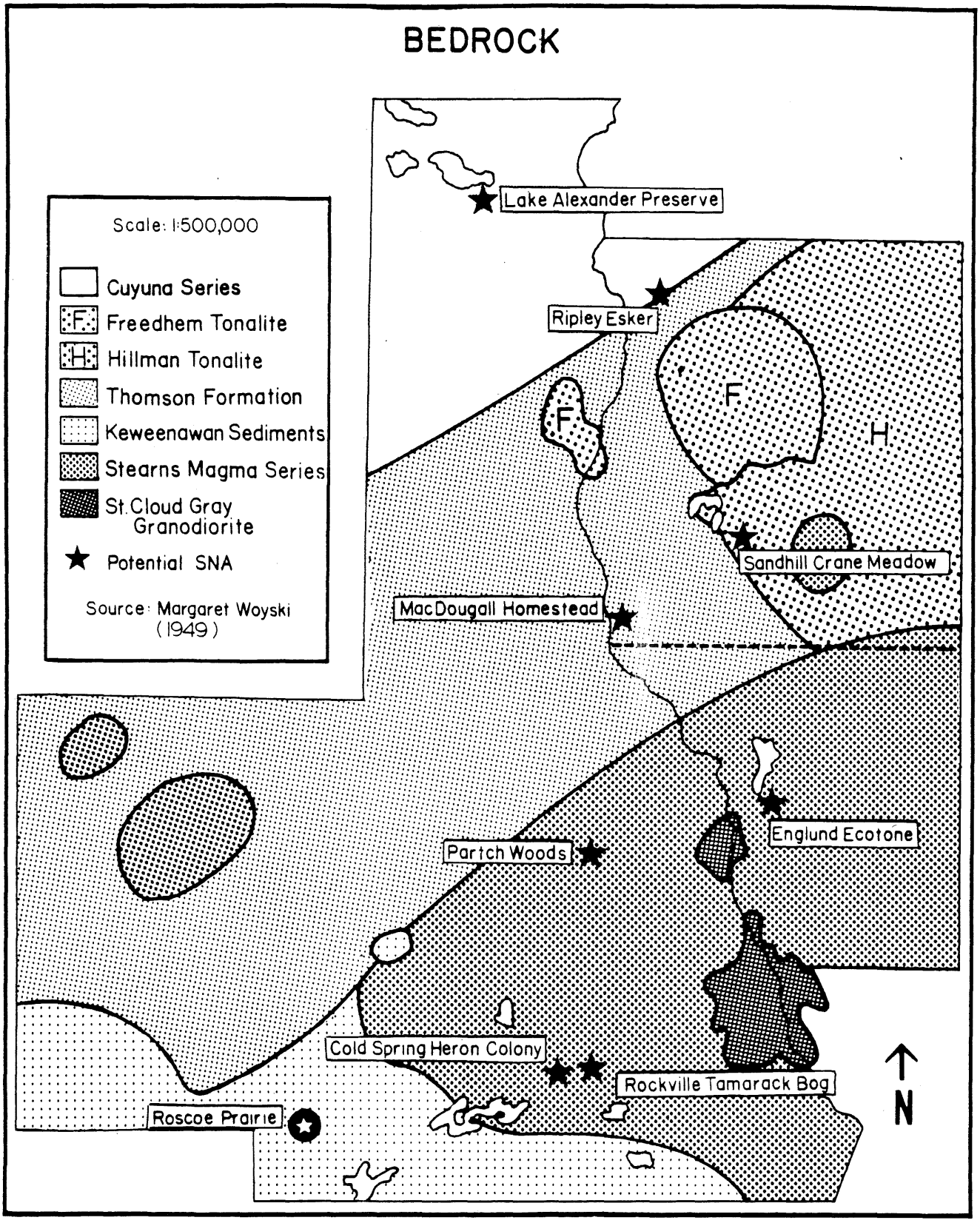


Figure 3. Bedrock formations in the area of Roscoe Prairie and nearby potential Scientific & Natural Areas in central Minnesota (Benton, Morrison, and Stearns Counties).

are composed of sand clay and conglomerates; some fossils are also present. However, no bedrock outcrops are evident on the tract because approximately one hundred feet of glacial drift covers the bedrock.

Sources of Information

Bray, Edmund C. 1977. Billions of Years in Minnesota. The Geological Story of the State. Science Museum of Minnesota. St. Paul, Minnesota. 102p.

Goldich, Samuel S. 1961. The Pre-cambrian geology and geochronology of Minnesota. Minnesota Geological Survey. Bulletin #40. University of Minnesota Press. Minneapolis.

Schneider, Allan F. 1961. Pleistocene geology of the Randall region, central Minnesota. Minnesota Geological Survey. Bulletin #40. University of Minnesota Press. Minneapolis.

Schwartz, George M. and George A. Theil. 1954. Minnesota Rocks and Waters. University of Minnesota Press. Minneapolis.

U.S. Dept. of the Interior, Geological Survey (USGS). 1967. Paynesville Quadrangle, Minnesota. 7.5 Minute Series (topographic) 1:24,000. Denver, Colorado.

University of Minnesota. Department of Soil Science, in cooperation with the Minnesota Geological Survey and the U.S. Department of Agriculture, Soil Conservation Service. 1975. Minn. Soil Atlas: Soil Landscapes and Geomorphic Regions - St. Cloud Sheet 1:250,000.

Woyski, Margaret S. 1949. Intrusives of central Minnesota. Geological Society of America. Bulletin #60: 999-1016.

SOILS

Soils are one of the earth's most important resources. The decomposition of organic material, recycling of nutrients, ground water recharge, erosion and drainage are all affected by the soils. Plants depend on the soils for their anchoring medium, water, and nutrients. Soils are also an indicator of past and present climate, bedrock, topography and vegetation. Soil inventories are necessary to help determine the above information, to identify rare soil types, and to establish a baseline so changes occurring in the soil over time can be monitored.

Methods

Soil information for this inventory was obtained from the literature and from a detailed soil survey.[1] The survey was conducted by the U.S. Soil Conservation Service on 28 July 1977. A hydraulically powered auger was used to make an initial core sample approximately thirty feet northwest of the driveway. A five foot bucket auger and a 3-1/2 foot hand probe were used to obtain core samples throughout the rest of the area. In addition, the site's soils were tested for the presence of free carbonates using a .1 M solution of hydrochloric acid. A detailed soil map was then drawn based on the survey data.

1. The following professionals were consulted and gave valuable help during the course of the inventory: Dr. Harold Arneman, Dept. of Soil Science, Univ. of Minnesota; H.R. Finney, Minnesota State Soil Coordinator; and Charles K. Sutton, Stearns County Soil Survey Team Leader, USDA Soil Conservation Service, St. Cloud, Minnesota.

Roscoe Prairie's Soils

Roscoe Prairie lies in an area of generally dark colored loamy over sandy and sandy over sandy soils. These soils formed from glacial outwash under prairie vegetation (USGS, Soil Conservation Service, University of Minnesota. 1975; Arneman, 1963).

Table 2 and Figure 4 show the site's soils and soil characteristics.[1] Seven soil series are evident. Five of the soil series are mineral soils derived from calcareous glacial outwash and stratified sediments of the Des Moines Lobe: the Rice, Regal and LeSauk Typic Haplaquolls, the Hononegah Entic Haplaquolls, and the Brooten Aquic Haploborolls.[2] These soils are found in the drier parts of the prairie, primarily the southern third of the site. Some difficulty was experienced in penetrating the hand probe and bucket auger to depths below 18-24 inches where these soils are located due to a cobble layer or lag line (a thin layer of small stones and coarse material deposited by the glaciers. The soils range in surface texture from fine sandy and sandy loam to loam and loamy coarse sand. Surface colors are black, permeability is moderately rapid to rapid, and pH ranges from slightly acidic to mildly alkaline. The soils' subsurface layers are dark brown, brown,

1. A table listing the soil characteristics of eight potential Scientific Natural Areas, including Roscoe Prairie, is on file, The Nature Conservancy, Minnesota Chapter.
2. The Rice, Regal and LeSauk series classifications are tentative: they are recognized within the state but have not yet been approved on the national level. No information was provided by the 1977 inventory on the Hononegah or Brooten soils except for the data listed in Table 2 and the response to HCL acid.

Table 2. Soil Characteristics of Roscoe Prairie

Key to Table 2

TEXTURE: Relative proportions of various soil separate (silt, sand, clay) in a soil.

Topsoil: "surface soil"; in uncultivated soils, a depth of 3 or 4 to 8 or 10 inches; in agriculture, refers to the layer of soil moved in cultivation.

Subsoil: soil below the topsoil, from 8 or 10 to 60 inches.

DRAINAGE CLASS: Soil drainage refers to natural frequency and duration of saturation which exists during soil development. Soil drainage classes are those used in making detailed soil maps (Arneman & Rust, 1975; USDA-SCS & Mn. Agr. Expt. Sta., 1977).

VPD - Very Poorly Drained--water table remains at or near surface (above 18 inches) greater part of the time. Soils wet nearly all the time, with or without mottling.

PD - Poorly Drained--water table seasonally near surface for prolonged intervals. Water table from 18 to 36 inches. Soils wet for long periods, generally with mottles.

MWD - Moderately Well Drained--water table usually below 5 feet. Soils are wet for small but significant part of time. Mottling in lower B horizon.

ED - Excessively Drained--water is removed very rapidly. Soils are without mottles.

COMPONENT IN STATE: Extent of acreage in state.

M - Major: 100,000 acres or more
I - Intermediate: 10,000 to 100,000 acres
m - Minor: 10,000 acres or less

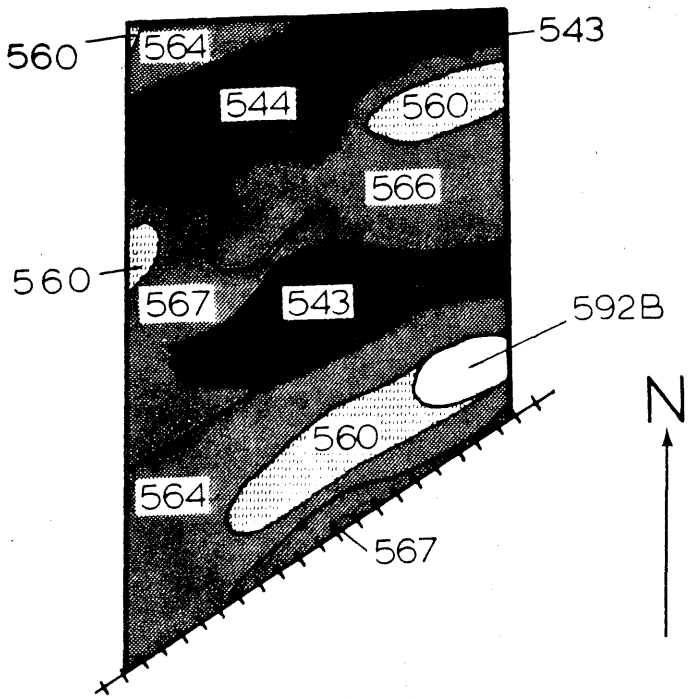
LOCATION IN STATE: Region in Minnesota where soil predominantly occurs.

Table 2. Soil Characteristics of Roscoe Prairie

	SOIL SERIES (Mapping Unit)	DRAINAGE CLASS	DEPTH TO WATER TABLE	PARENT MATERIAL	LANDSCAPE POSITION	TEXTURE		VEGETATION		COMPONENT IN STATE	LOCATION IN STATE
						Topsoil	Subsoil	Original	Present		
ORGANIC SOILS	CATHRO (544)	VPD	0-10"	organic	small depressions, till & outwash plains 2% slopes	sapric peat	sandy loam	Sedge Meadow	Sedge Meadow	M	North, West Central
ORGANIC SOILS	MARKEY (Mu) (83, 543)	VPD	0-2'	organic	outwash plain depressions, 2% slopes	sapric peat	sand	shrub, marsh, water tolerant grasses	Sedge-Willow shrub	M	Northwest, East Central
PRAIRIE SOILS	REGAL	PD	1-4'	Des Moines lobe outwash	depressions or flats in outwash plains 0-2% slopes	sandy loam	gravelly sand	tall grass prairie & water tolerant grasses	Bluestem Indian Grass	m	South Central
PRAIRIE SOILS	RICE (567)	PD	1-3'	Des Moines lobe outwash stratified with fine textured materials	depressions or flats in outwash plains 0-2% slopes	fine sandy loam	loam, silt loam	mixed tall grasses, deciduous woods	Sedge-Willow	m	Central

Table 2. Soil Characteristics of Rosco Prairie

SOIL SERIES (mapping unit)		DRAINAGE CLASS	DEPTH TO WATER TABLE	PARENT MATERIAL	LANDSCAPE POSITION	TEXTURE		VEGETATION		COMPONENT IN STATE	LOCATION IN STATE
						Topsoil	Subsoil	Original	Present		
PRAIRIE SOILS	LESAUK (564)	PD	2-4'	Des Moines lobe till	depressions or flats in outwash plains 0-2% slopes	loam to sandy loam	sandy clay loam	tall grass prairie, aspen, shrub	Bluestem, Indian Grass	m	Central
	BROOTEN (560)	MWD	4-8'	Rainy & Des Moines lobe till	level to concave areas of outwash plains 0-2% slopes	loamy sand	sandy loam	mixed prairie	prairie	m	Central
	HONONEGAH (592)	ED	6'	Des Moines lobe outwash	stream terraces & outwash plains 0-25% slopes 0-3% common	loamy coarse sand	gravelly loamy coarse sand	mixed prairie	Indian Grass	m	Southeast, East Central



SYMBOL		SOIL SERIES	DRAINAGE CLASS
	592	Hononegah	Excessively Drained
	560	Brooten	Moderately Well Drained
	564	LeSauk	Poorly Drained
	566	Regal	Poorly Drained
	567	Rice	Poorly Drained
	543	Markey	Very Poorly Drained
	544	Cathro	Very Poorly Drained
B	2-6% Slope		
	Railroad		SCALE: 8":1 MILE

Figure 4. Roscoe Prairie's soil series arranged according to drainage. The figure is based on information supplied by the USDA, Soil Conservation Service.

gray brown and olive gray, moderately acidic to moderately alkaline, gravelly loamy sands, sandy loams, loams, and sandy clay loams. The poorly drained Regal soils are characterized by black and dark gray bands of sandy clay loam over olive gray loamy sand and sand. The Rice soils are also poorly drained, and are characterized by bands of fine sandy loam over loam over silt loam and fine sandy loam.

The soils varied in reaction to the .1 M HCL solution. The Regal soils reacted strongly to the acid at the surface. Typically the LeSauk soils react to HCL at depth ranging from 24 to 48 inches. However, no reaction was observed on the Roscoe Prairie soils except along the ditch embankment near the driveway. Free carbonates from lower soil depths were probably pulled up here during road and ditch construction and maintenance. No reactions to the acid were observed in the Rice soils (typically these soils react to acid [i.e., contain free carbonates] at depths from 20 to 40 inches), in the excessively drained Hononegah or moderately well-drained Brooten soils.

The organic Cathro and Markey euic Terric Borosaprist soil series formed from highly decomposed (sapric) harbaceous materials. They are found in the wetter parts of the prairie, generally in the northern third of the site. The soils' black organic surface layers are slightly acidic to mildly alkaline. Both soils are also underlined by gray,mildly alkaline gray sands.

Additional Inventory/Research Needs

Soil fertility is one topic which could be investigated on Roscoe Prairie. Originally the tract's soils supported tallgrass prairie, but since European settlement apparently the

soils' fertility has been reduced and depleted. Researchers now have the opportunity to determine if Roscoe Prairie's soil fertility weill return to its original levels over time. This question is important to answer in order to manage prairies.

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WATER RESOURCES

Water is another of the key resources which affects the landscape. Besides adding diversity to the physical landscape water nourishes plants and animals, provides habitat for aquatic organisms, and affects soils and erosion. Possible changes in water chemistry, water table depth and drainage can drastically modify the biotic community. Water resources are studied to identify significant and fragile wet areas, and to help classify the areas.

Methods

The major source of information on water resources was the literature. Field surveys using maps and aerial photographs were also conducted on the unit.

Roscoe Prairie's Water Resources

Roscoe Prairie is bordered to the south and east by the hilly Alexandria and St. Croix moraines (See Figure 1). Surface and ground water from the higher areas drains into the lower flat outwash plain on which Roscoe Prairie sits. Water from the site eventually flows into the Sauk River and then into the Mississippi River. Ground water is abundant in the outwash plain and drainage is poor. The tract's northern lowland (swales) may be wet all year depending on weather conditions. Two potholes or ponds, each no larger than an acre in size, are present on the northern half of the tract.

Several drainage ditches also enter the site. Apparently county ditches on the north end of the tract drain into the northeast corner.

Additional Inventory/Research Needs

The 1977 inventory did not measure the site's surface and subsurface flow rates, the effect of the drainage ditches on the site, or the site's water quality. Data could be collected on these variables to obtain a more complete hydrologic baseline, and to determine the effect of human activities on the tract's resources.

Water quality tests conducted on streams in the general vicinity of Roscoe Prairie in the beginning of the 1970's indicate the use of fertilizers may be affecting the tract (Knutson, 1971). One useful research project would be to determine what effects, if any, neighboring farm practices are having on the site's water resources.

Sources of Information

Helgesen, J.O , D W. Ericson and G.F. Lindholm. 1969 - 1975. Water Resources of the Mississippi - Sauk Rivers Watershed -- Central Minnesota. Hydrologic Investigations Atlas. HA-534. U.S. Geological Survey. Reston, Virginia.

Knutson, K.M. 1971. Water quality investigations for Stearns County, Minnesota. Vol. I. St. Cloud State University, St. Cloud, Minnesota.

U.S. Dept. of the Interior, Geological Survey (USGS). 1967 Paynesville Quadrangle, Minnesota: 7.5 Minute Series (topographic) 1:24,000. Denver, Co.

VEGETATIVE COMMUNITIES

Vegetative communities are often one of the primary reasons for designating an area as a Scientific and Natural Area. The most significant plant communities are those that provide exceptional examples of the state's plant communities or natural processes, are relict communities persisting from an earlier period, and/or harbor significant species. Indeed, all significant biotic elements are dependent on the vegetative communities' characteristics: plant communities affect soils, hydrology, microclimate, and individual plant species. They also provide food, cover and shelter habitat for the area's animal populations. The primary means of holistically viewing and classifying an area's biotic elements is through the plant communities.

Methods

Roscoe Prairie's vegetative communities were catagorized according to their cover type. Color infrared 1976 aerial photographs were used to delineate the boundaries of each community. Each plant community was checked in the field by walking through the community and recording the dominant species present. (Dominance was determined by qualitatively noting which species were most abundant). Historical vegetative changes were determined through a literature review.

Overview of Regional Plant Communities

Roscoe Prairie is located in the upper southeast finger of the Blue Hills landscape region. (See Figure 5). The site is on the extreme eastern edge of Minnesota's contiguous prairie.

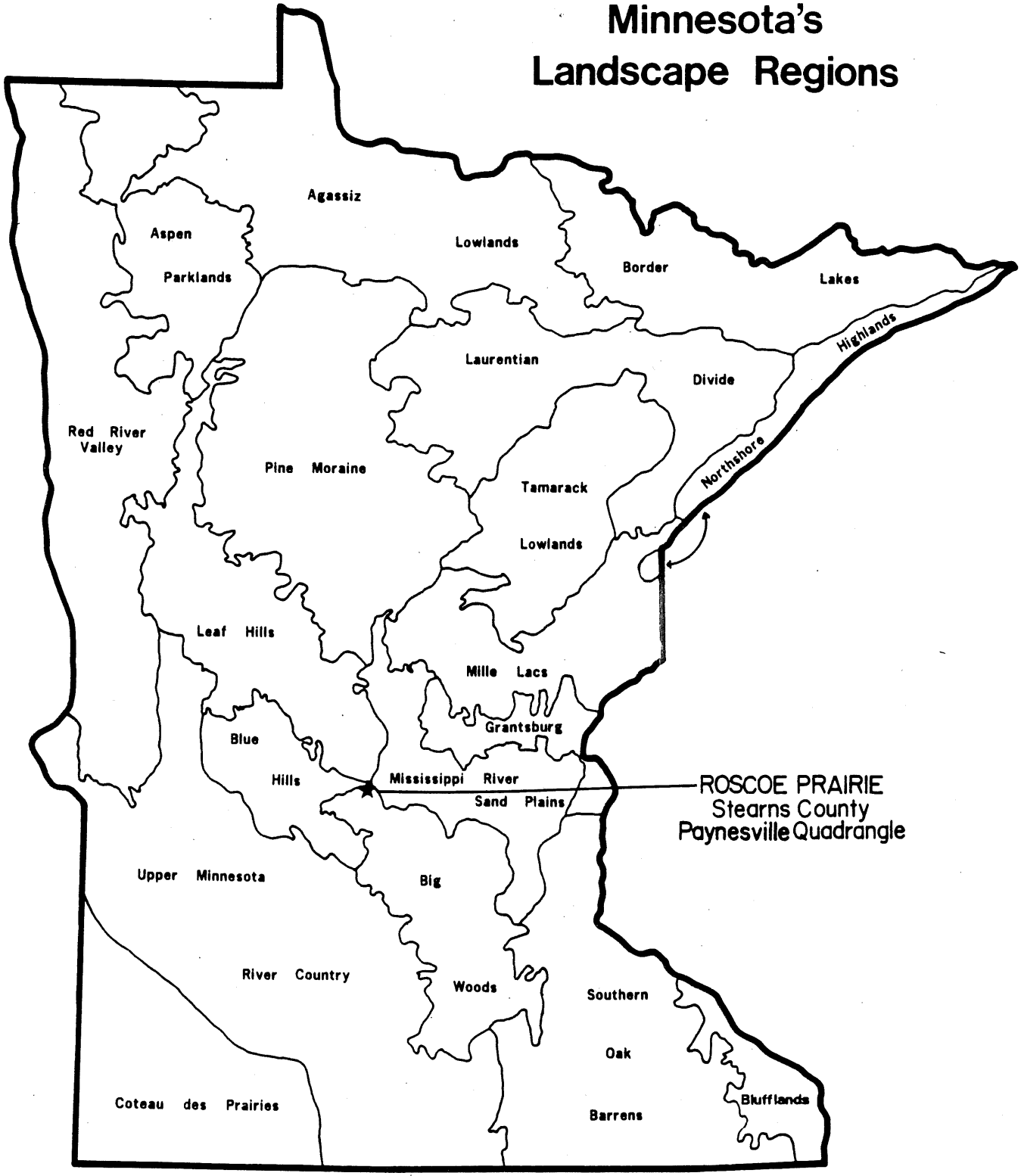


Figure 5. Roscoe Prairie in relation to Minnesota's landscape regions. Adapted from T. Kratz and G.L. Jensen, An ecological geographic division of Minnesota (Unpublished, 1977).

Figure 6 shows the vegetation of central Minnesota prior to European settlement . The area where Roscoe Prairie sits was prairie prior to European settlement largely because of the frequency of fires which controlled the invasion of trees from the deciduous forest region.

Roscoe Prairie's Vegetative Communities[1]

Roscoe Prairie's vegetative communities are displayed in Figure 7 . Six distinct vegetative communities are present on the site: Bluestem/Indian Grass Upland Prairie; Aspen Woods; Brome Grass Field; Willow Shrub; Wet Sedge Marsh/Willow Shrub; and Disturbance Pockets.

The Bluestem/Indian Grass Upland Prairie is the largest community present on the site, covering twenty-three acres or 40% of the site. The dominant grasses are Prairie Dropseed (Sporobolus heterolepus), Big Bluestem(Andropogon gerardi) and Indian Grass (Sorghastrum nutans), while abundant forbs include Goldenrod (Solidago sp.) and Leadplant (Amorpha canescens).

The Wet Sedge Marsh and Willow Shrub community is the second largest vegetative community on Roscoe Prairie. It accounts for 37% of the tract, covering twenty-two acres. Sedges (Carex sp.) are the dominant species. The Willow has only established itself within the last twenty years in this community.

1. The 1977 inventory team also conducted several detailed vegetative analyses of the site including a comparison of twenty burned versus unburned quadrats and a comparison of four permanent transect lines in the prairie-marsh transition zone. This information is not included in this report but it is on file, TNC Minnesota Chapter.

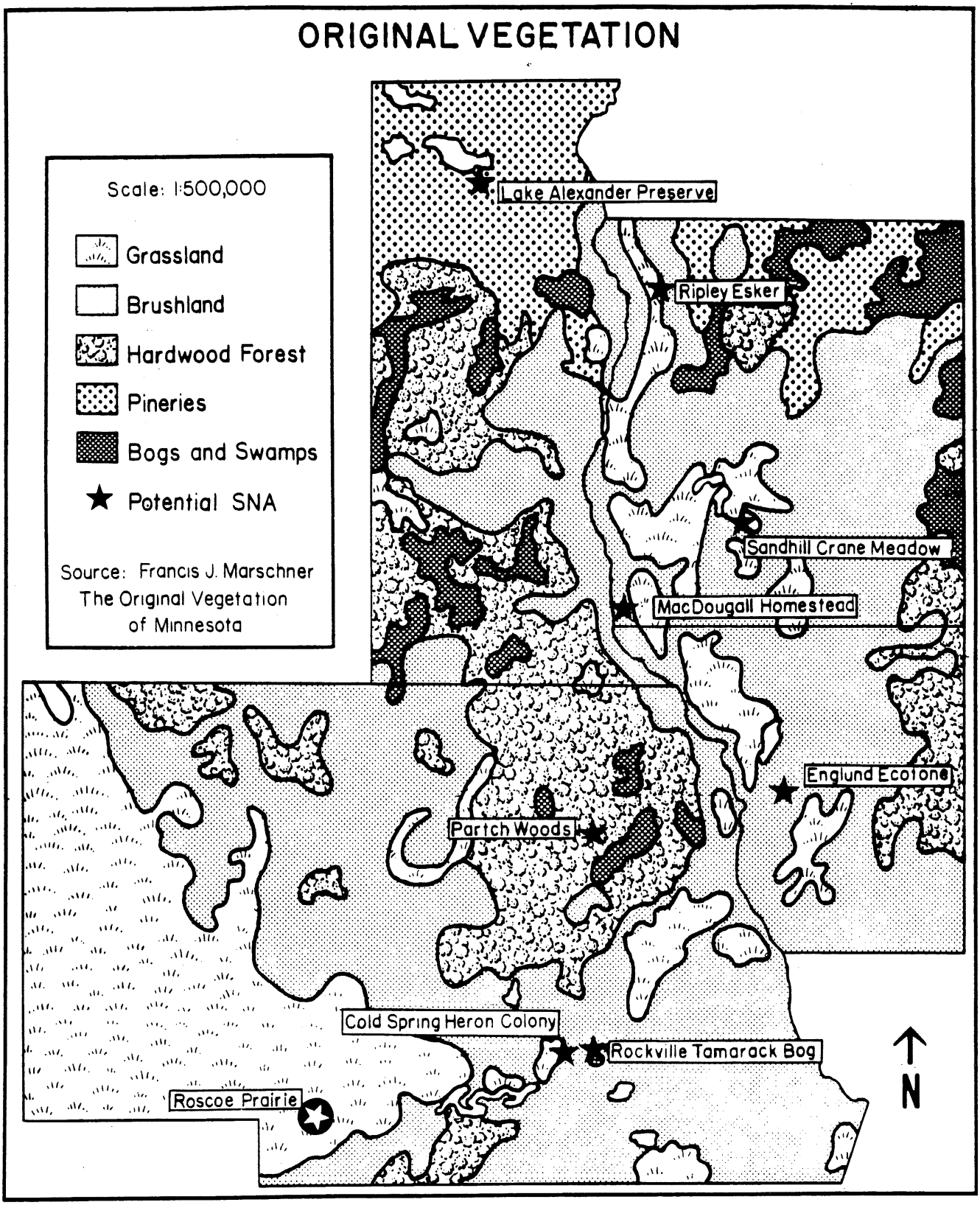
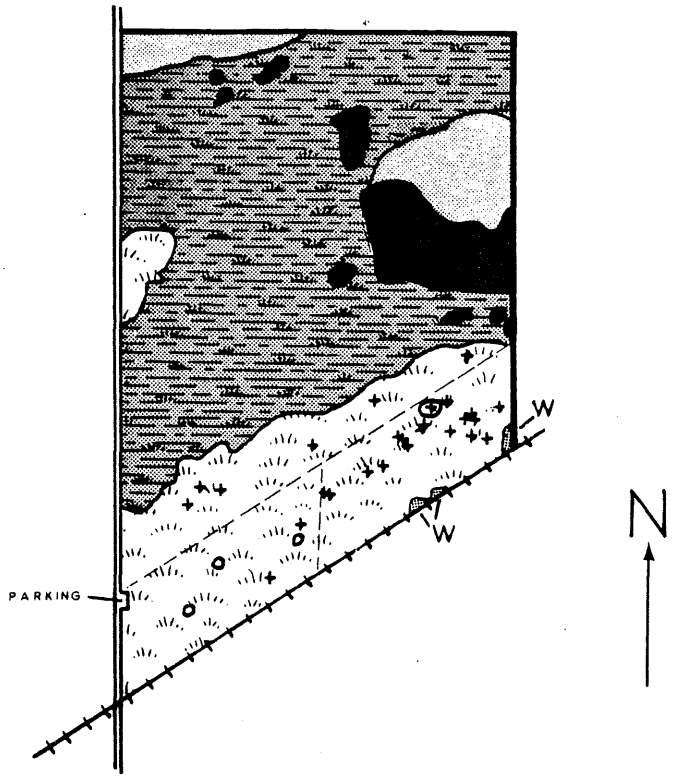


Figure 6. The original vegetation of Roscoe Prairie and nearby potential Scientific & Natural Areas in central Minnesota (Benton, Morrison and Stearns Counties).



KEY

- Bluestem/Indian Grass Prairie
- Brome Grass/Disturbed Upland Prairie
- W — Willow Shrub
- Wet Sedge Marsh/Willow Shrub
- Aspen Woods
- Rocks
- Disturbance Pockets
- County Road 16
- Railroad
- ----- Burn Units

Scale: 8": 1 Mile

Figure 7. Vegetative communities identified on Roscoe Prairie in 1977. The figure is based on a 1976 color infrared aerial photograph of the tract.

The Aspen Woods constitutes six acres or 10% of the tract. The dominant species is Aspen (Populus tremuloides). This community has increased markedly in area since mowing stopped.

The Brome Grass area is the one part of the tract which was plowed. It covers 5 acres, or 9% of the total area. The dominant grasses are Brome Grass (Bromus inermis) and Kentucky Blue Grass (Poa pratensis). Goldenrod (Solidago sp.) is the dominant forb.

A couple of small pockets in the southeastern corner of the site are covered with Willow (Salix sp.) These pockets account for one acre or 2% of the site .

Scattered throughout the southern third of the prairie are Disturbance Pockets (haystack sites and mima mounds). Dominant forbs here include Evening Primrose (Oenothera biennis) and and Goldenrod (Solidago sp.). Approximately one acre, or 2% of the site, is covered with these pockets.

Significance of Roscoe Prairie's Vegetative Communities

One of Roscoe Prairie's most significant elements is its prairie. Indications are that relatively undisturbed native prairie ,like Roscoe Prairie , is uncommon in the state. Furthermore, it is uncommon in the state to have one site supporting markedly different wet, mesic and dry prairie vegetation with minimal topographic variation. Roscoe Prairie is also one of the few protected prairies on a sandy outwash plain in the state outside of the Anoka Sand Plain and some river terraces. Finally the prairie is significant because it supports several plant species which are infrequent on Minnesota's prairies (See below).

Additional Research/Inventory Needs

Roscoe Prairie's wet/mesic/upland prairie transition zones offer wide opportunities for ecological research. The 1977 inventory team set up permanent transect lines marking the prairie/marsh ecotone. These transects could be sampled periodically to determine changes in the plant communities.

Sources of Information

Curtis, J.T. 1959. The Vegetation of Wisconsin. University of Wisconsin Press, Madison. 651 p.

Kratz, T.and Jensen G.L.1977. An ecological geographic division of Minnesota. Unpublished.

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FLORA

Plant species are one of the primary components of the state's natural heritages. Plants indicate the diversity of an area, the type of biotic community present, and changes occuring in that area including the degree of human disturbance. Rare plant species may be one reason for designating an area as a Scientific & Natural Area.

Methods

Roscoe Prairie was visited on a weekly basis, when weather conditions permitted, from 23 May to 2 September 1977. Each vegetative community was randomly sampled during these visits. Plants that were encountered in fruit or flower were collected, identified and pressed. Usually whole specimens were collected,but with some large plants only flowers and leaves were collected. Rootstocks of uncommon species were left undisturbed. After the plants had been positively identified they were given

a catalog number and housed in both the University of Minnesota Herbarium, Botany Department, St.Paul, and in St. John's University Herbarium, Collegeville.

A phenological record of the site's flowering plants was also kept. The phenological record began on thefirst visit and ended on the last visit to the area. The first time a species was encountered in flower was taken to be the start of the flowering period. These dates were then extended on subsequent visits until floral senescene was noted.

Plants were identified through several sources (cited at the end of this section). Dr. John W. Moore, retired botanist, University of Minnesota, verified seventy-eight species. Eleven species were observed but not collected. Seventeen specimens could not be verified because they were accidently lost.

Roscoe Prairie's Vascular Flora

Table 3 is an annotated list of the vascular plants identified on the tract.[1] For its size Roscoe Prairie supports a diverse flora: a total of 106 species, representing thirty-two families, were encountered during the 1977 inventory. Only nine of these species have been introduced and are not native to Minnesota. Eleven species had not been previously collected from Stearns County and deposited in the University of Minnesota Herbarium. The vast majority of species (94% of the total) grow on the Bluestem Upland Prairie. (Only two species other than sedges were found in the wet marsh: Lysimachia Thyrsi-

1. Nomenclature is according to Gleason and Cronquist (1963). Additional plant lists alphabetically organized by common name, scientific name and family are on file, TNC Minnesota Chapter.

Table. 3. Annotated Flora List of Roscoe Prairie.

Format: Scientific name. Common name. Collection number of voucher specimen. Collection number in parentheses indicates specimen was lost before verification. (Notes on nomenclature and taxonomy.) Designated "introduced" if not native to Minnesota. Community in Roscoe Prairie. Special significance of collection, if any. Asterisk (*) if this constitutes the first collection from Stearns County in the University of Minnesota Herbarium. A (+) indicates species was noted but not collected.

I. PTERIDOPHYTA - Spore-bearing Plants

Equisetum palustre L. - Horsetail, Scouring Rush. #12. Bluestem Prairie (*)

II SPERMATOPHYTA - Seed Plants

A. GYMNOSPERMAE - Gymnosperms

B. ANGIOSPERMAE - Angiosperms

1. MONOCOTYLEDONAE - Monocots

AMARYLLACEAE - Amaryllis Family

Hypoxis hirsuta Cov. - Yellow Star-Grass. (#2). Bluestem Prairie.

COMMELENACEAE - Spiderwort Family

Tradescantia bracteata L. - Long Bracted Spiderwort. (#13). Bluestem Prairie.

CYPERACEAE - Sedge Family

Carex brevior Mackenzie - Fescue Sedge. #39. Bluestem Prairie.

GRAMINAE - Grass Family

Andropogon gerardi Vitm - Big Bluestem. #72. Bluestem Prairie.

Andropogon scoparius Michx. -- Little Bluestem. #82. Bluestem Prairie.

Bromus inermis Leyss. - Brome Grass. #29. Introduced. Bluestem Prairie-disturbed areas.

Bromus kalmii Gray - Brome Grass. #65. Bluestem Prairie.

Muhlenbergia racemosa (Michx.) BSP - Muhly. (+). Bluestem Prairie-wetter areas.

Panicum leibergii (Vasey) Scribn - Lieberg's Panic Grass. #32. Bluestem Prairie.

Phalaris arundinacea L. - Reed Canary Grass. #45. Bluestem Prairie - planted.

Poa pratensis L. - Kentucky Blue Grass. #24. Introduced. Bluestem Prairie-disturbed areas.

Sorghastrum nutans Nash - Indian Grass. #80. Bluestem Prairie.

Spartina pectinata Link. - Cord Grass, Slough Grass. #68. Bluestem Prairie-wetter areas.

Sporobolus heterolepis Gray. - Prairie Dropseed. #73. Bluestem Prairie.

Stipa sp.. - Needle and Thread Grass. (+). Bluestem Prairie-uplands.

IRIDACEAE - Iris Family

Sisyrinchium angustifolium Mill. - Blue-eyed Grass. #20. Introduced.

LILIACEAE - Lily Family
Allium canadense L. - Meadow Garlic. #35. Bluestem Prairie-uplands.
Allium stellata Ker. - Prairie Onion. #71. Bluestem Prairie.
Lilium philadelphicum L. - Wood Lily. #49. Bluestem Prairie-wetter areas.
Lilium superbum L. - Turk's Cap Lily. #61. Bluestem Prairie.
Zygadenus elegans Pursh. - White Camus. #27. Bluestem Prairie.

ORCHIDACEAE - Orchid Family
Cypripedium calceolus L. - Yellow Lady's Slipper. (#23). Bluestem Prairie-wetter areas.
Cypripedium candidum Muhl. - White Lady's Slipper. (#25). Bluestem Prairie-wetter areas.
Spiranthes cernua Rich. - Lady's Tresses. #90. Bluestem Prairie-wetter areas.

TYPHACEAE - Cattail Family
Typha sp. - Cattail. (+). Sedge Marsh-scattered pockets.

2. DICOTYLEDONAE - Dicots

APOCYNACEAE - Dogbane Family
Apocynum androsaemifolium L. - Dogbane. #51. Bluestem Prairie-uplands.

ASCLEPIADACEAE - Milkweed Family
Asclepias incarnata L. - Swamp Milkweed. #56. Bluestem Prairie-wetter areas.
Asclepias ovalifolia Decne. - Oval Leaved Milkweed. #14. Bluestem Prairie. *
Asclepias speciosa Torr. - Showy Milkweed. #78. Bluestem Prairie. *
Asclepias syriaca L. - Common Milkweed. (+). Bluestem Prairie. *

BORAGINACEAE - Borage Family
Lithospermum canescens Lehm. - Hoary Puccoon. #3. Bluestem Prairie.

COMPOSITAE - Composite Family
Agoseris glauca (Pursh) D. Dietr. - Prairie Dandelion. #52. Bluestem Prairie.
Aster azureus L. - Azure Aster. #89. Bluestem Prairie.
Aster ptarmicoides (Nees.) T & G - Upland White Aster. #62. Bluestem Prairie. *
Echinacea pallida Nutt. var. angustifolia Cronq. - Purple Coneflower. #48. Bluestem Prairie-uplands.
Erigeron philadelphicus L. - Daisy, Fleabane. #17. Bluestem Prairie.
Eupatorium maculatum L. - Joe-Pye-Weed. (+). Sedge Marsh. *
Eupatorium perfoliatum L. - Boneset. (+). Sedge Marsh. *
Heliopsis helianthoides (L.) Sw. - Ox-Eye. #47. Bluestem Prairie.
Helianthes maximiliana Schrad. - Maximilian's Sunflower. #79. Bluestem Prairie.
Hieracium sp.,- Hawkweed. (#93). Bluestem Prairie.
Krigia biflora (Walt.) Blake - Dwarf dandelion. #34. Bluestem Prairie.
Liatris ligulistylis K. Schum - Large-Headed Blazing Star. #77, #83. Bluestem Prairie.
Liatris punctata Hook. - Dotted Blazing Star. #84. Bluestem Prairie.
Liatris pycnostachya Michx. - Prairie Blazing Star. #69. Bluestem Prairie.
Prenanthes aspera Michx. - Rough Rattlesnake Root. #85. Bluestem Prairie.
Rudbeckia hirta L. - Black-eyed Susan. #46. (Rudbeckia serrotina Nutt.). Bluestem Prairie.
Solidago missouriensis Nutt. var. fasciculata Holz - Missouri Goldenrod. #67. Bluestem Prairie. *
Tragopogon pratense L. - Goat's Beard. (#16). Introduced. Bluestem Prairie. *

CRUCIFERAE - Mustard Family
Lepidium densiflorum Schrader. Pepper Grass. (#91). Bluestem Prairie. *
Thlaspi arvense L. - Penny Cress. (#40). Introduced. Bluestem Prairie.

FABACEAE - Bean Family
Amorpha canescens Pursh - Lead Plant. #59. Bluestem Prairie.
Amorpha nana Nutt. - Dwarf False Indigo. #7. Bluestem Prairie.
Astragalus crassicarpus Nutt. - Prairie Plum; Buffalo Bean. #21. Bluestem Prairie.
Desmodium canadense (L.) DC - Tick Trefoil. #58. Bluestem Prairie.
Lathyrus venosus Muhl. - Vetch. #8. Bluestem Prairie.
Medicago lupulina L. - Alfalfa. #74. Introduced. Bluestem Prairie.
Melilotus alba Desr. - White Sweet Clover. #64. Introduced. Bluestem Prairie.
Petalostemun candidum Michx. - White Prairie Clover. #60. Bluestem Prairie.
Petalostemum purpureum Rydb. - Purple Prairie Clover. #70. Bluestem Prairie.
Psoralea argophylla Pursh - Silverleaf Scurf Pea. #63. Bluestem Prairie.
Trifolium procumbens L. - Low Hop Clover. #74B. Introduced. Bluestem Prairie.

GENTIANACEAE - Gentian Family
Gentiana andrewsii Griseb. - Closed Gentian. #87. Bluestem Prairie-wetter areas. *
Gentiana puberula Michx. - Prairie Gentian. #88. Bluestem Prairie.

LABIATAE - Mint Family
Monarda fistulosa L. (var. mollus Benthum) - Wild Bergamot. #66. Bluestem Prairie.
Pycnanthemum virginianum Durand & Jackson - Mountain Mint. #81. Bluestem Prairie.
Scutellaria galericulata L. - Marsh Skullcap. (#37). Wet Sedge Marsh-isolated specimens.
Scutellaria parvula Michx. - Prairie Skullcap. #54. Bluestem Prairie.

LOBELIACEAE - Lobelia Family
Lobelia siphilitica L. var. ludoviciana DC - Great Lobelia. #92. Bluestem Prairie-wetter areas.
Lobelia spicata Lam. - Pale-spiked Lobelia. #57. Bluestem Prairie.

ONAGRACEAE - Evening Primrose Family
Oenothera biennis L. - Evening Primrose. #95. Bluestem Prairie-disturbed areas.
Oenothera serrulata Nutt. - Cut or Toothed Leaved Evening Primrose. #50. Bluestem Prairie.

OXALIDACEAE - Wood Sorrel Family
Oxalis stricta L. - Wood Sorrel. (#38). Bluestem Prairie. *
Oxalis violacea L. - Violet Wood Sorrel. #4. Bluestem Prairie.

POLEMONIACEAE - Phlox Family
Phlox pilosa L. - Prairie Phlox. #10, #94. Bluestem Prairie.

POLYGALACEAE - Milkwort Family
Polygala senega L. - Seneca Snakeroot. #18. Bluestem Prairie.

PRIMULACEAE - Primrose Family
Lysimachia quadriflora Sims - Prairie Loosestrife. #75. Bluestem Prairie.
Lysimachia thyrsiflora L. - Marsh Loosestrife. #36. Sedge Marsh.

RANUNCULACEAE - Crowfoot Family
Anemone canadensis L. - Canadian Windflower. (#11). Bluestem Prairie.
Anemone cylindrica Gray - Anemone. (#43). Bluestem Prairie.
Anemone patens L. - Pasque Flower. #97. Bluestem Prairie.
Delphinium virescens Nutt. - Prairie Larkspur. (#44). Bluestem Prairie-uplands.
Thalictrum dasycarpum Fisch & Ave-Lall. - Tall Meadow Rue. #26. Bluestem Prairie.

ROSACEAE - Rose Family
Fragaria virginiana Duchesne. - Strawberry. (#19). Bluestem Prairie.
Geum macrophyllum Willd. - Avens. (+). Bluestem Prairie.
Geum triflorum Pursh - Prairie Smoke. (#6). Bluestem Prairie.
Potentilla argentea L. - Silvery Cinquefoil. (+). Introduced. Bluestem Prairie-disturbed areas.
Potentilla arguta Pursh - Tall Cinquefoil. #42. Bluestem Prairie.
Rosa blanda Ait - Smooth Rose. #15. Bluestem Prairie.

RUBIACEAE - Madder Family
Galium boreale L. - Northern Bedstraw. #9. Bluestem Prairie.

SALICACEAE - Willow Family
Populus tremuloides Michx. - Quaking Aspen. #91. Aspen Woods.
Salix spp.- Willow. (+). Sedge marsh-intruding.

SAXIFRAGACEAE - Saxifrage Family
Heuchera richardsonii R. Br. - Alum Root. #28. Bluestem Prairie.

SCROPHULARIACEAE - Figwort Family
Veronicastrom virginicum (L.) Farw. - Culver's Root. #53. Bluestem Prairie.

SOLANACEAE - Nightshade Family
Physalis heterophylla Nees - Clammy Ground Cherry. #86. Bluestem Prairie-disturbed areas.

VIOLACEAE - Violet Family
Viola pedata L. - Bird's Foot Violet. (+). Bluestem Prairie.

UMBELLIFERAE - Parsley Family
Cicuta maculata L. - Water Hemlock; Spotted Cowbane. #53. Sedge Marsh.
Zizia aptera (Gray.) Fern. - Golden Alexanders. #1. Bluestem Prairie.

flora and Scutellagria galericulata. A few other species were found in drier areas of the marsh and on the degraded prairie). Well-represented families on the site include the composites with eighteen species (accounting for 17% of the total species), the grasses with twelve species (11% of the total), and the bean family with ten species (10% of the total). The sedges are also probably abundant, but due to problems in collection and identification few examples were found.

Figure 8 records when Roscoe Prairie's flora flowered in 1977.[1] Sixty-nine species were observed in flower. The peak blooming period was during the second week of June when twenty-eight species were in flower. A second smaller peak occured in the third week of July when twenty species were flowering.

Significance of Roscoe Prairie's Flora

Seven species encountered on Roscoe Prairie are noted as special and/or infrequent species occuring in Minnesota. Most of the plants have also been singled out for special consideration in other states; one of the species has been proposed as nationally threatened.

Amorpha nana (Fragrant Indigobush) and Asclepias speciosa (Showy Milkweed) have both been noted as infrequent species in Minnesota (Heitlinger, 1977).

Gentiana andrewsii (Closed or Bottle Gentian) has never been collected from Stearns County and deposited in the University of Minnesota Herbarium. It is noted as an infrequent species in Minnesota (Heitlinger, 1977). The plant has been class-

1. A list of the flowering periods of species found on the site is on file, TNC Minnesota Chapter.

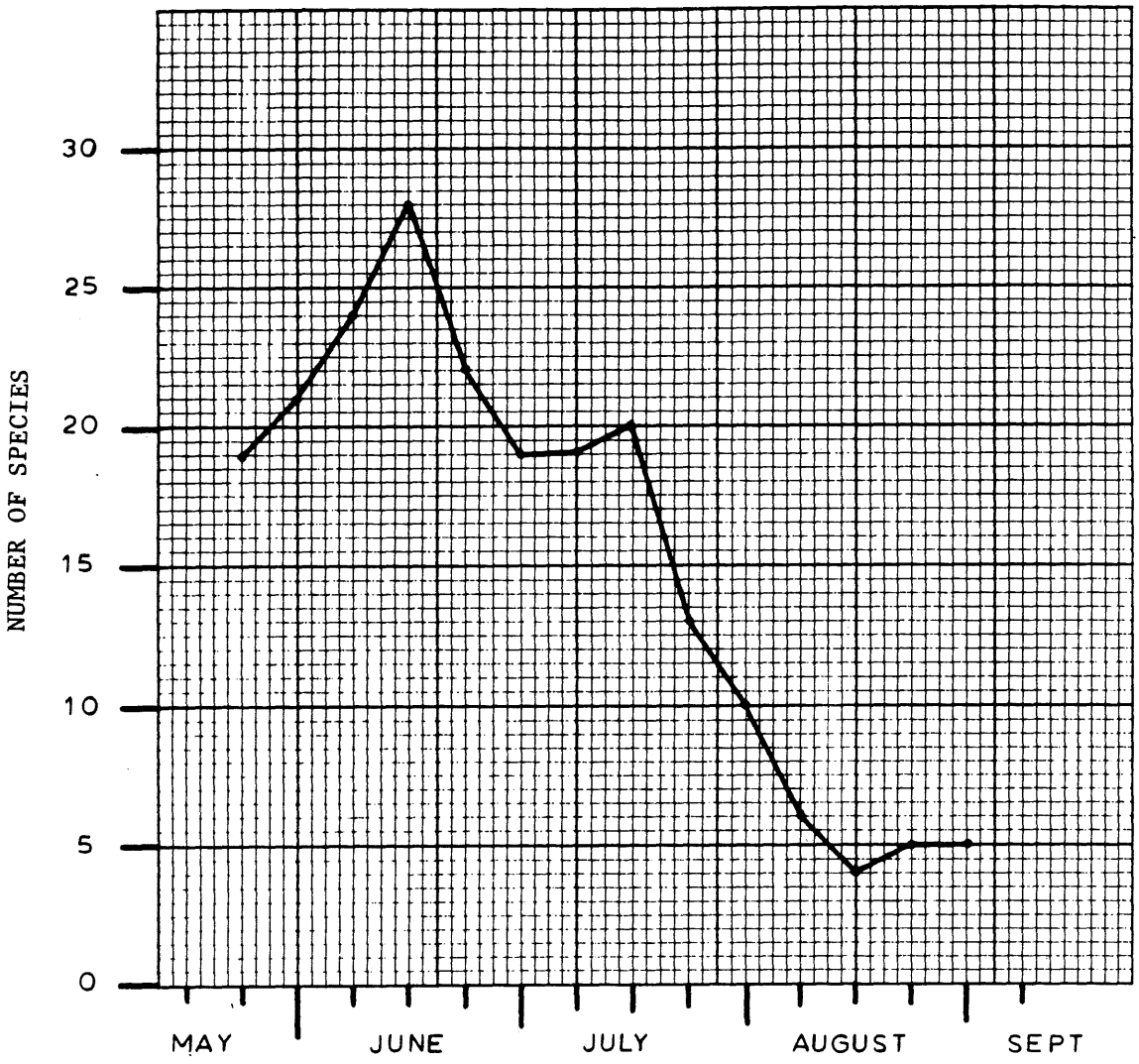

Figure 8. Numbers of plant species observed in bloom on Roscoe Prairie. Observations were recorded from 23 May to 2 September 1977.

ified as rare and endangered in South Dakota (Kartesz & Kartesz, 1977:126).

Gentiana puberula (Prairie Gentian) is an infrequent species in Minnesota (Heitlinger, 1977). This species is threatened in Michigan and rare in Manitoba (Kartesz & Kartesz, 1977: 126).

Heitlinger (1977) classified Lilium philadelphicum (Wood Lily) as a special species and listed it as an infrequent species in Minnesota. This plant is also protected in the state.

Spiranthes cernua (Lady's Tresses) is another infrequent species occuring in the state (Heitlinger, 1977). South Dakota has listed the plant as rare and endangered. (Kartesz & Kartesz 1977:268).

Cypripedium candidum (Little White Lady-slipper) was proposed as a nationally threatened species in the 1 July 1975 Federal Register. In the Midwest the species is endangered in Wisconsin, rare and endangered in South Dakota and rare in North Dakota. In Minnesota the species is protected and has been noted to be a special and infrequent species (Moyle, 1975; Heitlinger, 1977). Nine other states plus Manitoba and Ontario classify the plant's status as either threatened, probably extinct, rare, endangered or undetermined (Kartesz & Kartesz, 1977:85).

In addition to the above plants Roscoe Prairie's Purple Coneflower (Echinacea pallida) stands are of special interest. The Roscoe Prairie stands have been labeled "unique" by Dr. David Grether, and "...one of the finest in the state" by the DNR SNA program.

Additional Inventory/Research Needs

Although a fairly complete record of Roscoe Prairie's vascular flora is now on hand the 1977 inventory did not survey the site's non-vascular plants. A survey of the non-vascular plants, such as the lichens, could be done. The site's sedges could be re-inventoried since apparently the 1977 inventory is not complete. Also, the prairie flora is probably larger than indicated by the 1977 inventory.

Sources of Information

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BUTTERFLIES[1]

Butterflies are found in virtually all of Minnesota's natural areas. They are insect herbivores which feed on and pollinate plants and affect plant distribution and abundance. Butterflies as primary consumers provide sustenance for animals higher up on the food chains. A butterfly inventory is necessary to document an area's natural diversity, to identify rare species needing special protection, and to gain a better understanding of many species which are poorly known. Finally, some butterflies are sensitive ecological indicators, providing useful information on changes occuring in the area.

Methods

In 1977 a detailed inventory of Roscoe Prairie's butterflies was carried out.[2] Biweekly visits were made to the site from 3 May to 20 September 1977; twenty visits to the area were made during this time. The first intensive butterfly sampling, however, was begun during June. Visits were made when possible during hours and weather conditions favorable for butterfly activity. Sampling was focused along the central axis of the upland prairie. Other sampling was guided principally by the researcher's expectation of where significant butterfly activity was likely to be.

1. The term butterflies in this document refers both to the true butterflies (Papilionoidea) and the Skippers (Hesperiodea).
2. A more detailed report of this study is on file, TNC, Minnesota Chapter.

Observations of adult and immature butterflies were recorded together with the location, habitat type and associated plant species. A rough estimate of each species' frequency was also made.[1] Butterflies were usually identified by sight, but a standard butterfly net was employed to capture the insects for identification when necessary. All captured insects were released except when reliable identification required a prepared specimen, or when a voucher specimen was desired. All specimens were deposited in the Department of Entomology, Fisheries and Wildlife collection, University of Minnesota, St. Paul.

Scientific and common names used here are taken from Huber (1975a), with the addition of some subspecific names based on Howe (1975). Subspecific names are given only when the populations could clearly be assigned to a subspecies other than the nominate. In unclear classes the subspecific name is followed by "ssp" ("subspecies").

Butterflies of Roscoe Prairie

Table 4 lists in alphabetical order the butterflies observed on the site and two butterflies observed on immediately adjacent land.[2] Thirty-seven species of butterflies including eleven skipper species were observed at least once within the

1. An effort was made to quantitatively sample the Dakota Skipper population however. For further information see TNC Minnesota Chapter files and Robert Dana, Univ. of MN Dept. of Entomology, Fisheries and Wildlife, St. Paul.
2. Table 4 also includes two species recorded on the site by Dana and others in 1976 but which were not observed in 1977. One other species, the Silvery Checkerspot (Chlosyne nycetis) was observed on the site in 1976, but only on adjacent lands in 1977.

Table 4. Butterflies observed on Roscoe Prairie

Ancyloxypha numitor (Least Skipper)
Atrytone delaware (Delaware Skipper)
Boloria bellona (Meadow Fritillary)
Boloria selene (Silver Bordered Fritillary)
Celastrina argiolus (Spring Azure)
Cercyonis pegala (Wood Nymph)
[Chlosyne nyceteis (Silvery Checkerspot)]*
Coenonympha tullia (Inornate Ringlet)
Colias eurytheme (Alfalfa Butterfly)
Colias philodice (Common Sulphur)
Danaus plexippus (Monarch)
Euphyes dion (Dion Skipper)*
Euptoieta claudia (Variegated Fritillary)
Euptychia cymela (Little Wood Satyr)
Everes comyntas (Eastern Tailed Blue)
Hesperia dacotae (Dakota Skipper)
Limenitis archippus (Viceroy)
Limenitis arthemis (Beaded Purple)
Lethe eurydice (Eyed Brown)
Lycaena thoe (Bronze Copper)*
Nymphalis antiopa (Mourning Cloak)
Oarisma powesheik (Powesheik Skipper)
Papilio polyxenes asterias (Black Swallowtail)
Pholisora catullus (Common Sooty Wing)
Phyciodes tharos (Pearl Crescent)
[Pieris protodice (Checkered White)]
Pieris rapae (European Cabbage Butterfly)
Plebejus melissa melissa (Melissa Blue)
Poanes massasoit (Mulberry Wing)
Poanes viator (Broad-winged Skipper)
Polites coras(Peck's Skipper)
Polites mystic (Long Dash)
Pyrgus communis (Checkered Skipper)
Satyrium acadica (Acadian Hairstreak)
Speyeria aphrodite (Aphrodite Fritillary)
Speyeria cybele (Great Spangled Fritillary)
Speyeria idalia (Regal Fritillary)
Wallengrenia egeremet (Broken Dash)
Vanessa atalanta rubria (Red Admiral)
Vanessa cardui (Painted Lady)
Vanessa virginiensis (American Painted Lady)
Euphyes dion (Dion Skipper)*

* - Observed in 1976
[ ] - Indicate the species was observed adjacent to, but not on, the site in 1977.

boundaries of the tract during the 1977 study. The species and species diversity reflects the various types of vegetative communities found on the site and its surroundings.

The Upland Prairie harbored the largest number of butterfly species. The Dakota Skippers (Hesperia dacotae) were observed in small numbers over a period of about two weeks (23 June to 5 July 1977). An estimated twenty-five individuals were sighted during this time. These observations together with sightings made by Dana and others in 1976 and by Mr. Jim Muggil in 1966 (Huber, 1975b) establishes the presence of a small local population of Dakota Skippers on Roscoe Prairie. Figure 9 shows where the skipper was observed on the site in 1977. In almost all cases the butterfly was spotted on flower heads of the Purple Coneflower. Except for one sighting all the Dakota Skippers were observed on the highest, best-drained parts of the prairie.

Three other obligate prairie butterflies were identified on the site. The Powesheik Skipper was observed in about the same numbers as the Dakota Skipper. This insect appears to be rather generally distributed in the portion of Minnesota formerly prairie (not in prairies on sandy outwash in the central part of the state however), surviving along railroad rights of way and in larger prairie remnants (Dana pers. obs.; Huber, unpub. date).[1] The Regal Fritillary was observed on the site in modest

1. Mr. Ron Huber, Zoology Assistant with the Science Museum of Minnesota, St. Paul has for a number of years been collecting data on the state's butterflies. This considerable body of information is not published and Mr. Huber's generous assistance in making available this information to the researcher is gratefully acknowledged.

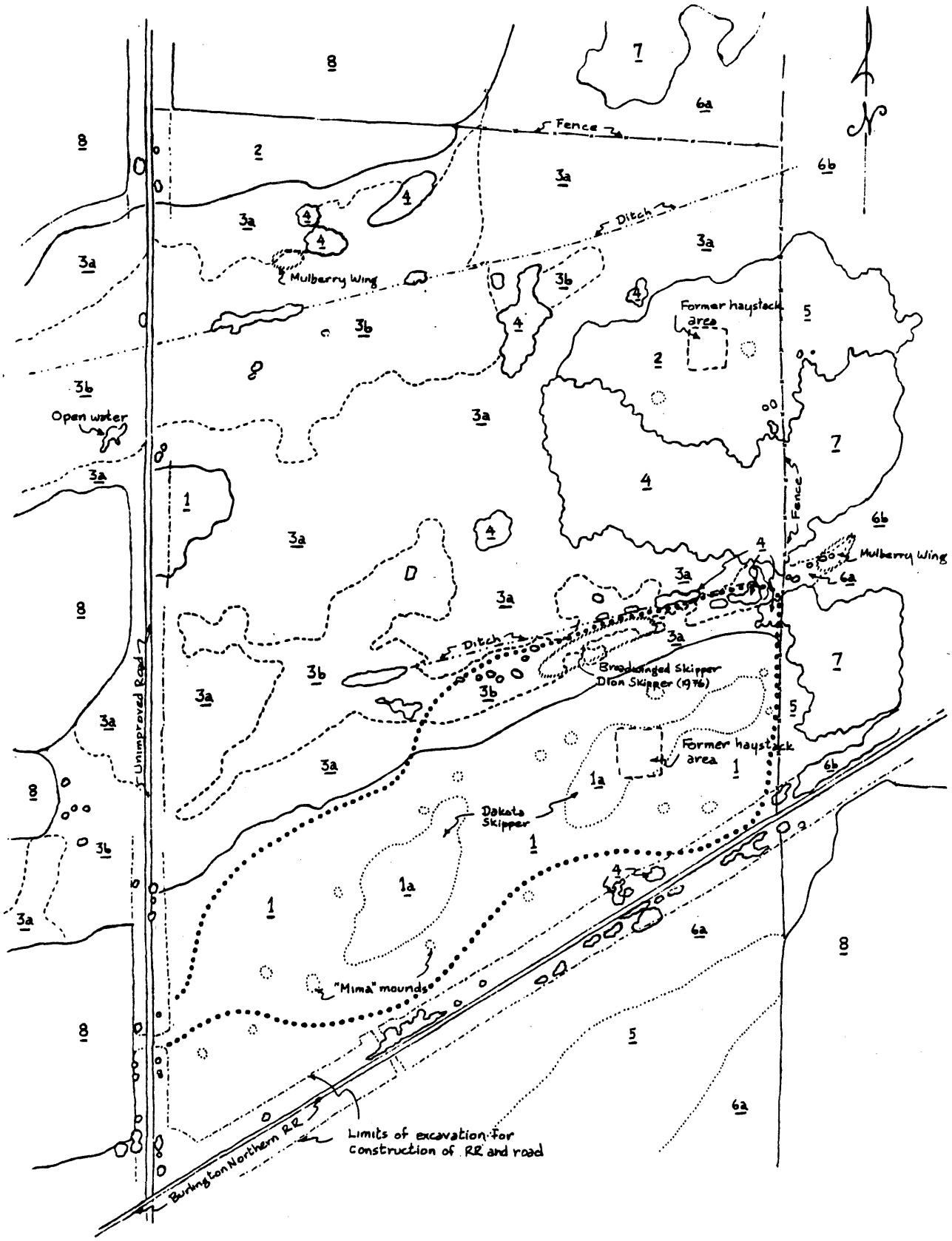

Figure 9. Approximate locations of four butterfly species observed in relation to Roscoe Prairie's major plant features in 1977. The key to the figure is on page 45.

Key to Figure 9.

Symbol	Major Plant Features
1	Native upland prairie
1a	Prairie, more xeric in character
2	Previously plowed upland prairie
3a	Wet prairie/ sedge-willow-dogwood community (predominantly shrubby)
3b	Wet prairie/ sedge-cattail community (predominantly open)
4	Aspen
5	Upland pasture (predominantly open)
6a	Wet pasture (predominantly open)
6b	Wet pasture (predominantly willow)
7	Wooded pasture (aspen)
8	Cultivated land

numbers. With one probable exception all were males flying above the upland prairie. The single probable female was flushed from the longer grasses on one of the "mima mounds", but it could not be captured for identification. This species is found only in association with native prairie remnants in Minnesota (including sand prairie in the southern part but not the central part of the state; Dana pers. obs.; Huber unpub. data). The third butterfly, the Melissa Blue appears to be expanding its range so that it is no longer confined to prairies. The nominate subspecies found on Roscoe Prairie is common throughout the western parts of Minnesota usually in association with prairie remnants (although these may be very badly degraded). Most of the adults observed on the site were in the limited part of the prairie where Ground Plum (Astragalus crassicarpus) grew.

In addition to the above obligate prairie species twenty common species were observed on the moist meadows and prairie communities. Peck's Skipper and the Long Dash, two very common skippers often found together in a variety of moist meadow situations, were fairly common on the site. Both were encountered throughout the prairie parts, but they were most frequently observed in the disturbed prairie area and along the railroad. A small but typical number of the widespread Delaware Skipper were observed in the prairie and disturbed prairie areas. A single male Broken Dash was seen at the extreme east end of the prairie, and a single female Tawny Edged Skipper was observed on a Purple Coneflower blossom. These species are very widely distributed. Two grassland satyrid butterflies, Inornate Ringlet and Cercyonis pegala, were common throughout the prairie

parts including the disturbed area. The Monarch was common all summer. Also the Great Spangled Fritillary was common on the site; adults were encountered everywhere on the tract. The Aphrodite Fritillary was somewhat less common although it was seen all over the tract. Two of the small fritillaries, the Silver Bordered Fritillary and the Meadow Fritillary were observed in fair numbers mostly in the moister prairie areas and in the formerly cultivated part of the prairie. The Pearl Crescent was most commonly encountered in the moister areas although it was also common throughout the prairie. Only a few individuals of the American Painted Lady were positively identified, all on the drier prairie (but several butterflies were sighted that could have been this species). The tiny Eastern Tailed Blue was found to be modestly frequent on the prairie upland especially in the southeast part. The Black Swallowtail was seen in small numbers on the site, usually on the prairie areas. Two closely realted Sulphurs, the Alfalfa Butterfly and the Common Sulphur were recorded on the prairie, the former quite frequently and the latter only a few times. The introduced European Cabbage Butterfly was found in modest numbers mostly on disturbed soil near the road edge. The Common Sooty Wing was encountered once in the drier part of the prairie.

Four butterflies, catagorized as irregular migrants or "colonizers", were observed on the site. One female Checkered Skipper was encountered on the prairie relatively early in the season, but none were subsequently observed. The Variegated Fritillary was recorded several times on the prairie upland.

In the early part of the season there was an unusually heavy immigration from the south of the Red Admiral. Individuals were seen rapidly flying across the area in a northerly direction. The Painted Lady was positively identified only once on the prairie upland. This species is more of an open habitat butterfly than the above butterflies and also fluctuates greatly in numbers from year to year (Dana, pers. obs.).

The Mulberry Wing (Poanes massaoit), a small, intensely local skipper, was observed once in the sedge meadow near the tract's north boundary. A single individual was also encountered a few yards beyond the west boundary in pastured sedges where about four of the skippers had been seen during one visit in 1976 (See Figure 9). Only one specimen of the Broad Winged Skipper (Poanes viator) was encountered in the sedge slough just north of the prairie (See Figure 9). In this same area several of the Don Skipper (Euphyes dion) were observed in 1976, but none were observed in 1977. The status of the Broad Winged and Don Skippers is unclear from this data, but indications are that a small locally established population of both species is present.

Five common species were observed in the Sedge-Willow communities in 1977. The Eyed Brown was surprisingly very uncommon, with all sightings concentrated near the southern boundary of the Sedge-dominated community. The Viceroy and Acadian Hairstreak, two butterflies whose larva feed on Willows, were found primarily in or near the Sedge-Willow community in modest numbers. The Mourning Cloak was frequently encountered on the

tract, particularly along the railroad. The Spring Azure, a nearly ubiquitous butterfly, was seen a few times. Another species, the Bronze Copper, was not observed this year although it was recorded on the site in 1976.

Two butterflies were observed on the tract which are associated with forest communities. A couple Little Wood Satyrs were seen in the shrubby margin of the Aspen grove on the east side of the tract. A couple Banded Purples were also seen back in among the trees.

Finally, two butterflies were recorded next to the tract but not within its boundaries. The Silvery Checkerspot usually frequents the vicinity of woods. It was seen a few times along the railroad track a few yards east of the tract. In 1976 it was observed in the Shrub-Sedge area near the tract's east side. One Checkered White was also seen at the junction of the railroad and the road at the southwest corner of the tract. However, this area does not appear to provide favorable habitat for the butterfly.

Significance of Roscoe Prairie's Butterflies

The most noteworthy butterfly present on Roscoe Prairie is the Dakota Skipper. Almost nothing is known about this species, other than its rarity.[1] Roscoe Prairie is one of eight stations in Minnesota where the skipper has been reported since 1925.[2] The only other records of the species since 1925 come

1. Robert Dana is currently doing graduate research on the Dakota Skipper.
2. This includes one station discovered by Dana in addition to those noted in Huber's (1975b) observations summary.

from seven counties scattered in North and South Dakota and Iowa. The colony at Roscoe Prairie is on the edge of what was undoubtedly the original range of the insect and is the eastern-most surviving colony known. In the 3 July 1978 Federal Register the Dakota Skipper was proposed as a nationally threatened species.

Roscoe Prairie supports several other uncommon butterflies, including Powesheik Skipper; Regal Fritillary; Mulberry Wing and Broad Winged Skipper. (In 1976 another uncommon species, the Dion Skipper, was also observed on the site.) Of these butterflies the Powesheik Skipper is most in need of protection. The continuing destruction of the skipper's prairie habitat has raised concern for the survival of these species in the state. Already the skipper appears to be uncommon or rare in the rest of its limited range. (Howe, 1975).

Sources of Information

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BIRDS

Birds are another biotic component which adds to the natural diversity of an area and the state. Indeed, there are more bird species than all other vertebrates on Roscoe Prairie. An inventory is needed to record species diversity, identify endangered, rare or sensitive species, and recognize changes in species composition.

Methods

A bird census was made by walking through the area on five occasions: 24 May, 30 May, 6 June, 19 June and 6 July 1977. Birds were identified by sight, sound or a combination thereof. Identification was aided by the use of a pair of binoculars and a bird field guide.

Roscoe Prairie's Birds

Thirty-eight bird species were identified at least once on, near or over Roscoe Prairie during the 1977 inventory. Table 5 lists the birds in phylogenetic order.[1] Most of the birds are common residents of the state's wetlands, grasslands, open, semi-open and wooded areas. Two Upland Sandpiper nests were

1. The location and date the birds were observed are in a list on file, TNC Minnesota Chapter.

Table 5. Birds identified in 1977 on, near or over Roscoe Prairie

(Ardea herodias) Great Blue Heron*
(Butorides virescens) Green Heron+
(Anas platyrhynchos) Mallard*
(Phasianus colchicus) Ring-necked Pheasant
(Philohela minor) American Woodcock
(Capella gallinago) Common Snipe
(Bartramia longicauda) Upland Sandpiper
(Limosa fedoa) Marbled Godwit*+
(Chlidonias niger) Black Tern*
(Zenaida macroura) Mourning Dove
(Coccyzus erythropthalmus) Black-billed Cuckoo
(Tyrannus tyrannus) Eastern Kingbird
(Empidonax traillii) Willow Flycatcher
(Empidonax minimus) Least Flycatcher
(Eremophila alpestris) Horned Lark
(Hirundo rustica) Barn Swallow*
(Telmatodytes palustris) Long-billed Marsh Wren+
(Cistothorus platensis) Short-billed Marsh Wren
(Dumetella carolinensis) Gray Catbird
(Turdus migratorius) American Ribon
(Dendroica petechia) Yellow Warbler
(Geothlypis trichas) Common Yellowthroat
(Dolichonyz oryzivorus) Bobolink
(Sturnella magna) Eastern Meadowlark
(Sturnella neglecta) Western Meadowlark
(Xanthocephalus xanthocephalus) Yellow-headed Blackbird*+
(Agelaius phoeniceus) Red-winged Blackbird*+
(Icterus galbula) Northern Oriole
(Euphagus cyanocephalus) Brewer's Blackbird
(Quiscalus quiscula) Common Grackle +
(Molothrus ater) Brown-headed Cowbird
(Pheucticus ludovicianus) Rose-breasted Grosbeak
(Spinus tristis) American Goldfinch
(Passerculus sandwichensis) Savanna Sparrow
(Ammodramus savannarum) Grasshopper Sparrow
(Spizella pallida) Clay-colored Sparrow
(Melospiza georgiana) Swamp Sparrow
(Melospiza melodia) Song Sparrow

* Observed flying over the site
+ Observed on land adjacent to the site

found on the tract, and one nest adjacent to the tract. One species, the Marbled Godwit, is listed by Moyle (1975 as a species of concern. Four godwits were observed in aerial display over the tract and on grassland to the south in 1977. These birds are primarily residents of the northwestern part of the state. If Marbled Godwits are nesting in the area they are near the far eastern extent of their breeding range. Two other Roscoe Prairie birds are near the edge of their ranges: American Woodock and Eastern Meadowlark.

Additional Inventory/Research Needs

Due to a limited field season the 1977 bird inventory may be incomplete. Also, the inventory did not distinguish which birds actually resided on the site. Thus a more detailed bird inventory might be carried out to fill in these gaps.

Sources of Information

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Moyle, John. 1975. The uncommon ones. MN Dept. of Nat. Resources, St. Paul.

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MAMMALS

Mammals must be inventoried to: 1) record the unit's natural diversity; 2) to obtain baseline data so changes in species composition can be discerned; and 3) to identify rare or sensitive species.

Methods

Small mammals were censused using eighty live-traps placed on two parallel lines set fifty feet apart. Each line consisted of twenty stations set at intervals of fifty feet. Each station contained a 2x2x6 Sherman live trap and a Longworth live trap. A peanut butter-oatmeal mixture was used to bait the traps. The traplines ran from the southern upland prairie to the sedge meadow (which was dry during the trapping period). The end stations of the western line of traps were permanently marked with conduits; other stations in the same line were temporarily marked with bamboo stakes. On 8 August 1977 the traps were all set. At approximately 7:00 PM that evening, 8:45 AM on 9 August and 7:50 AM on 10 August the traps were checked. The traps were then pulled. Specimens were deposited in the James Ford Bell Museum of Natural History, University of Minnesota, Minneapolis.

Large mammals were censused only through direct or indirect observation during the bird census.

Roscoe Prairie's Mammals

Nine mammal species were identified visually, by trap, or by other signs in or adjacent to Roscoe Prairie. (See Table

6).[1] All of the mammals identified in the inventory are widespread in Minnesota. Whitetail Jackrabbit were seen in a field just west of the southwestern corner of the site. Plains Pocket Gophers were not seen but their presence was indicated by mounds on the tract.

Sources of Information

Gunderson, Harvey L. and James R. Beer. 1953. The Mammals of Minnesota. The University of Minnesota Press, Minneapolis.

Table 6 MAMMALS IDENTIFIED ON ROSCOE PRAIRIE IN 1977

(Citellus tridecemlineatus) Thirteen-lined Ground Squirrel
(Geomys bursarius) Plains Pocket Gopher
(Lepus townsendi) Whitetail Jackrabbit
(Mustela erminea) Shorttail Weasel
(Odocoileus virginianus) Whitetail Deer
(Peromyscus leucopus) White-footed Mouse
(Peromyscus maniculatus bairdi) Prairie Deer Mouse
(Sorex cinereus) Masked Shrew
(Sylvilagus floridanus) Eastern Cottontail

1. The location, dates and number of mammals recorded on Roscoe Prairie are on file, TNC Minnesota Chapter.

LAND USE HISTORY

Virtually all "natural areas" have been affected to some degree by the past activities of people. Farming, grazing, logging, hunting, drainage of wetlands and the prevention of fire are some of the ways people have affected the land. Knowledge of historical land use practices helps explain the present condition of the land and its resources, and the origin of human impacts on the area. Surrounding land use practices also affect the viability of all natural areas.

Methods

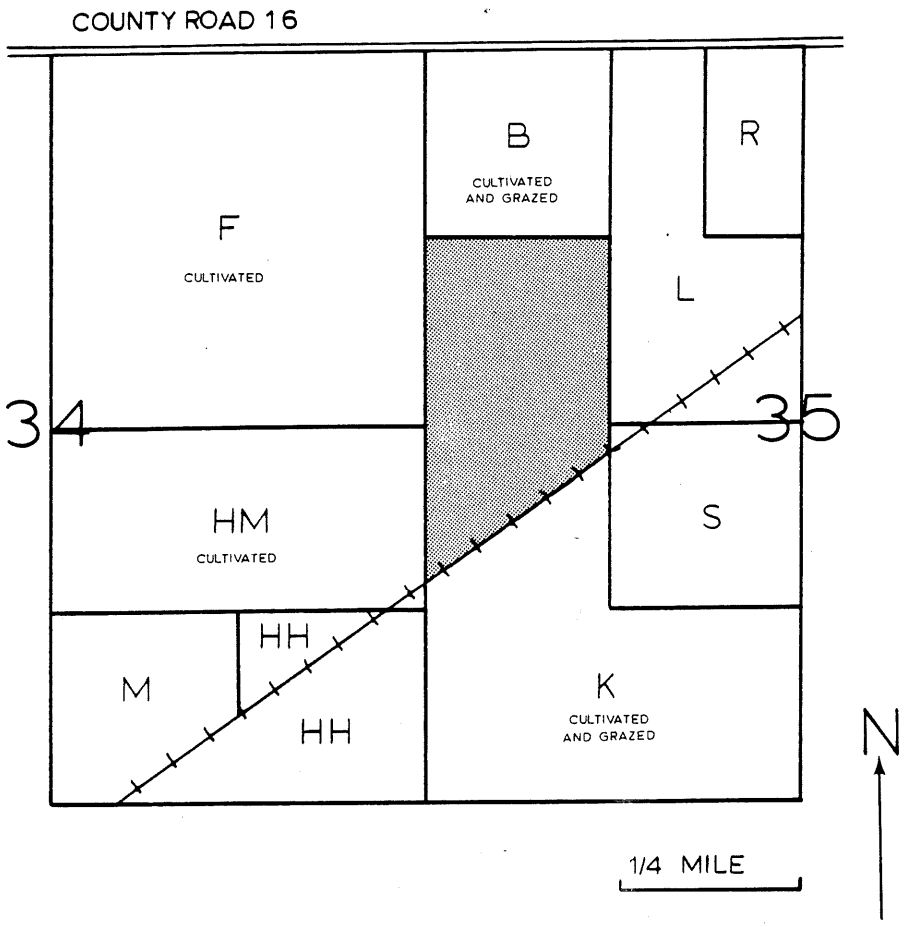
Most of the land use information presented here is based on interviews with local residents who are familiar with the area. Aerial photographs were also compared to determine changes in the land use over time.

Recent Land Use History

The St. Cloud region was first settled by Europeans in the middle of the nineteenth century. Most of the land was cleared for farming and grazing or used for timber production. Today Roscoe Prairie is surrounded by cultivated fields and pastures. Figure 10 shows the owners and some of the land uses adjacent to the Nature Conservancy land.

Roscoe Prairie has been affected in many ways by the activities of people. The father of one resident noted deer were rare in the area by the turn of the century. However, by the 1940's deer re-appeared and were present in fairly large numbers by the 1950's.

The area's hydrology has also been affected by people.



KEY

B Edmund M. & Viola Buerman, Paynesville, MN 56362

F James Fasbender, Rt. 1, Paynesville, MN 56362

HH H. & H. Farms Inc., Paynesville, MN 56362

HM Marjorie Heitke, Rt. 3, Paynesville, MN 56362

K Clifford E. & Donna Knebel, Rt. 1, Paynesville, MN 56362

L Clarence Lauer, Paynesville, MN 56362

M Harvey W. & Alvin W. Mills, Rt. 3, Paynesville, MN 56362

R Louis Roesner, 707 Doronis Ave. Paynesville, MN 56362

S Harvey F. & Fern Schultz, Rt.1, Paynesville, MN 56362

Roscoe Prairie

County Road 16

Railroad

Figure 10. Land uses and landowners adjacent to Roscoe Prairie. Names and addresses are from the Stearns County Auditor's records as of 7 July 1977.

When Europeans first settled in the area the land was much wetter than today. However,agriculture practices and drainage ditches have reduced the steady water and accelerated the run-off rate in the region.

A 1938 aerial photograph documents some of the changes which occured on the tract. The photograph shows several drainage ditches on the site (See Figure 11). In addition the photograph indicates a field road which appears to come into the tract from the east near the north boundary.

Hay mowing has occured on Roscoe Prairie. The 1938 aerial photography definitely shows the land was mowed for wild hay. Mowing also took place in the 1940's and 1950's. During this time mowing only occured when wild hay was needed and the land was sufficiently dry. Thus, for example, in the mid-1940's mowing was restricted to the upland and generally happened once per year. Wild hay was used to feed horses and when tractors replaced horses in the 1950's and 1960's hay mowing stopped. Signs of the past mowing still remain on Roscoe Prairie however: two square features on aerial photographs (See Figures 9 and 11) are the sites of former hay mounds. Furrows were dug around the haystacks to protect them from fires.

The railroad abutting Roscoe Prairie has had a definite impact on the tract. Railroads came in soon after the pioneers. Hot sparks and cinders flying out of locomotive coal stacks frequently ignited fires on adjacent lands. Fires were also set purposely along the tracks to clear vegetation. Many times these fires went out of control and the whole valley burned.

Figure 11. 1938 aerial photograph showing past uses of Roscoe Prairie. Source: U.S.D.A.

When the trains converted to oil in the 1940's the frequency of fires dropped although railroads have caused fires since then. In addition to causing fires the railroad also was responsible for disturbing the tract's southeastern corner. Although it did not own the land the railroad parked some equipment there (date undetermined). As a result of this practice there is Quackgrass, Thistle and Sweet Clover present in the area. Finally, the railroad has sprayed herbicide on its right-of-way to clear away the vegetation. This practice has probably affected the tract's plant and animal populations.

In the late 1940's Ervin Schultz plowed the upland in the tract's northeast corner. Although many rocks made it difficult to plow he did seed in Reed Canary Grass for better hay. However, this practice was not continued for very long.

About 1966 the tract was rented to a Mr. Miller who owned the adjoining land in the north. For about two years he grazed feeder cattle on the site. Cattle paths along the electric fence were one sign of this land use.

Two other noteworthy actions have affected Roscoe Prairie. About fifteen to twenty years ago someone deposited chicken manure on at least two "mima mounds" in the northwest and southwest portions of the tract. This manure was used to trap fox thought to be responsible for reducing the pheasant population. Many weeds were also brought into the prairie with the manure however. The second action is the supression of fire. Roscoe Prairie is thought to have burned annually before white settlement. With recent fire supression efforts the frequency of fires in

the area has been reduced, which in turn has affected the vegetation. Only six known fires have occured on Roscoe Prairie in the last twelve years. The only recent fire remembered by the secretary of the Paynesville Fire Department occured about 1967 along a portion of the tracks near the woods. One photograph taken by Dr. Max Partch, St. Cloud State University, on 20 August 1969 shows the edge of a burn Dr. David Grether conducted in both the upland and lowland. However, the exact date and extent of this burn couldn't be determined. The Nature Conservancy has done four more controlled burns on the tract. (See Figure 12). One burn was done on the southwest ten acres in late April 1977. Other controlled burns occured in the fall of 1978on the northern half of the upland prairie, in the spring of 1978 in the southeastern corner, and most recently in late May 1979 in the southwestern corner again.

History of Preservation Efforts

The preservation of Roscoe Prairie is largely due to the interest of the Muggli family of Roscoe. The Mugglis were responsible for alerting scientists to the area, helped to acquire the land, and have been involved in managing the tract. Dr. Gerald Ownbey of the University of Minnesota also recommended the tract be preserved. On 28 June 1968 the Nature Conservancy bought the land to protect and preserve the prairie and the significant elements of natural diversity it supports.

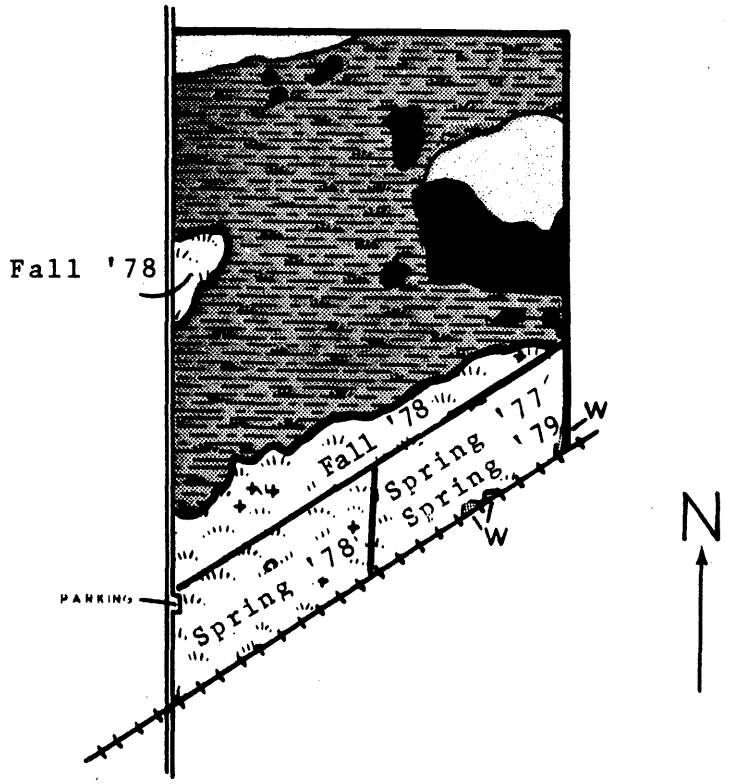


Figure 12. Controlled burns conducted by The Nature Conservancy on Roscoe Prairie, 1977 - 1979. See also figure 7.

NATURAL AREA VISITORS

Knowledge of the number of visitors and visitor characteristics is necessary to determine who is using the natural area and what problems (if any) are being caused by various user groups. Potential users should be identified to help predict future trends and problems.

Visitors were not surveyed in the 1977 inventory. However, Roscoe Prairie has apparently been visited for many years by local school classes. Also, on 25 June 1978 approximately fifty local residents visited the prairie on a field trip.

Many potential users exist for Roscoe Prairie. Due to its close proximity to St. Cloud a large increase in use could occur when certain segments of the population become aware of the area. Two universities, St. Cloud State in St. Cloud and St. John's University in Collegeville and two colleges, the College of St. Benedict in St. Joseph and Willmar Community College in Willmar, are within half an hour's drive of the area and could use the prairie for educational and research purposes. Eighteen public, middle and secondary schools in Stearns County, plus schools in Benton, Candiyohi and Meeker Counties, could utilize the area for environmental education purposes. Some users might also come up from the Twin Cities area which is approximately two hours driving time from the site.

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