

UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

Establishment Record for Buffalo Beats
Research Natural Area within Wayne National Forest,
Athens County, Ohio



Buffalo Beats 1999

Cover Page Information for RNA Establishment Record

Name: Buffalo Beats RNA

Region: 9

Station: NE

State: OH

County: Athens

National Forest: Wayne

List page number in Establishment Record where Boundary is Certified 3-1

TMIS #: _____

Date Regional Forester signed: 20 May 1999

Latitude: 39° 27' 18"

Longitude: 82° 4' 35" W

1980 SAF	Acres	Ha	1966 Kuchler	Acres	Ha	1993 ECOMAP*	Acres	Ha
52	18.34	7.4	94	18.34	7.4			
non-forest	0.98	0.4	73	0.98	0.4	221Ef West Hocking Plateau		
Totals:	19.32	7.8		19.32	7.8	Subsection		

Access (under "location"): is access shown on map or described? yes, page 8

Maps--are they original or photocopies? Photocopies - GIS Maps

Photos --are any included? Digital Images

Abutted by non-FS land? No

SAF & Kuchler types consistent? Yes

Climate records: length of record? 1974-1993 (19 years) Distance to weather station? 8 miles

Fauna & Flora authorities: Trees, Little 1979.

Do land use conflicts exist? No Grazing? No Trails? No Recreation? No

Commercial Forest Land: [how much taken from timber base?] 19.32 acres; this information can be found on page 11 in ER.

 * Classify at Subsection level if possible (i.e., a 5-digit code (or 6-digit, if beginning with "M"). If not possible, then at Section level.

DECISION NOTICE/DESIGNATION ORDER
BUFFALO BEATS RESEARCH NATURAL AREA

USDA Forest Service, Eastern Region
Wayne National Forest
Athens Ranger District
Athens County, Ohio

T10N R14W SW Section 36

Introduction

The purpose of this Decision Notice/Designation Order is to document my decision to establish the Buffalo Beats Research Natural Area (RNA). It shall be comprised of a parcel totaling 19.32 acres (7.8 hectares) of land in Athens County, Ohio, on the Athens Ranger District of the Wayne National Forest, as described in the section of the Establishment Record entitled "Location". My decision also amends the Wayne National Forest Land and Resource Management Plan (Forest Plan) by changing the Management Area (MA) designation and standards and guidelines of the unit to better meet RNA objectives. The area will change from MA 8.2/9.2 to MA 8.1.

Purpose

Research Natural Areas (RNAs) are established to preserve ecologically significant areas for research, education and maintenance of biological diversity (Forest Service Manual 4063.02). Buffalo Beats was included as a Candidate RNA in the Wayne National Forest Land and Resource Management Plan (Forest Plan), which was approved in 1988. Several ecologically significant resources occur in the RNA, including a tall grass prairie, which is the eastern most extension of the prairie peninsula, and several rare plant species.

Decision and Rationale for the Decision

I have examined the environmental effects of designating Buffalo Beats RNA and amending the Forest Plan. This analysis is documented in the Buffalo Beats Environmental Assessment (EA), which is attached to the Establishment Record as Appendix 2. Based on the analysis in the EA, it is my decision to select the Proposed Action. Associated Purpose, Desired Future Condition, Management Prescription, and standard and guidelines are also amended. See Appendix 1 of the Establishment Record.

The basis for my decision came from the Environmental Assessment for Buffalo Beats dated Spring, 1998 (Appendix 2). I also relied on my knowledge of the Forest Plan, as well as Forest Service regulations and policy.

I have taken into account issues identified on pages 2-3 of the EA and comments received during the public review of the EA in the spring of 1998. I realize my decision may not completely satisfy all concerns, however I am selecting the Proposed Action because it provides the best long-term protection and recognition of the relict prairie and rare species found in the area. In addition, I believe it best meets the objectives described in the Purpose of and Need for Action (EA, page 1). The primary reasons for my decision are based on the environmental effects section of the EA, which was drafted by an interdisciplinary team of resource specialists. The effects were analyzed based on the issues developed in response to public comment.

Public Involvement

Public issues and management concerns related to this project were identified by contacting interested or affected individuals or groups, as well as Forest Service employees. Two formal letters describing the project were mailed. The first letter was mailed in May, 1994 and did not include any description of management activities. It was mailed to approximately 60 individuals. Nine responses were received. Based upon these responses, it became apparent that a Management Plan was necessary in order for all the issues raised to be addressed. A draft Management Plan was prepared jointly by The Nature Conservancy - Ohio Chapter and Ohio Department of Natural Resources - Division of Natural Areas and Preserves. The second formal letter was sent in October of 1995 to approximately 60 individuals or organizations. This letter described the management which would occur under the Proposed Action. Six responses were received. After the EA was completed, it was sent out in May, 1998 for review to those who had previously commented. Eight written comments were received.

Other Alternatives Considered and Reasons Why They Were Not Selected

Based on comments received, a total of four different alternative were analyzed. The No Action alternative would not have designated the RNA, leaving the area to be managed under the existing Forest Plan standards and guidelines. This alternative was not selected because I felt its management of doing nothing would threaten the existence of the prairie.

Alternative C would not have designated this area as an RNA but would have allowed manipulative management. I did not choose this alternative because Buffalo Beats, being such a unique and biologically important natural community, is very worthy of the RNA designation.

Alternative D would have allowed manipulative management but prohibited the use of herbicides. It also would have designated the area as an RNA. I felt that this alternative limited the options available to managers if vegetative threats become a problem.

Findings Required by Other Laws

Endangered Species Act and related laws and regulations

Biological evaluations were completed to determine the effects on threatened, endangered or sensitive plant and animal species. The proposed action would result in a determination of "not likely to adversely affect" for any federally listed animal species and "no impact" for any regionally sensitive plant and animal species.

Section 106 of the National Historic Preservation Act

Heritage resources were reviewed to determine the effects to heritage resources. The proposed action would be beneficial to any heritage resources existing within the boundaries of the RNA.

Forest Plan Consistency

The decision amends the Forest Plan to change the Management Area designation and associated standards and guidelines for Buffalo Beats from MA 9.2/8.2 to MA 8.1. Therefore, the management of the RNA will be consistent with the Forest Plan.

Finding of No Significant Impact

I have determined that designation of Buffalo Beats, using the Proposed Action, is not a major Federal action significantly affecting the quality of the human environment (40 CFR 1508.27). In addition, I have determined that an amendment to the Wayne National Forest Land and Resource Management Plan, as described in this decision, will not significantly alter the multiple use goals and objectives of the forest Plan (36 CFR 219.10(f)). Therefore, an environmental impact statement is not needed. The following factors were considered in this finding:

1. Impacts that may be both beneficial and adverse.

Effects associated with RNA designation and amending the Forest Plan are discussed on pages 18-23 of the EA. There are no impacts that are directly, indirectly or cumulatively significant in their effect upon other resources.

2. The degree to which the proposed action effects public health or safety.

These activities do not constitute a threat to public health or safety. The project does not involve National Defense or Security.

3. Unique characteristics of the geographic area

Buffalo Beats RNA is a very unique geographic site. The management plan would protect the unique character of this remnant prairie. There are no Wilderness areas or Wild and Scenic Rivers within the vicinity of the RNA.

4. The degree to which the effects on the quality of the human environment are likely to be highly controversial.

Based upon the involvement of the Forest Service specialists, and specialists in other agencies, universities and organizations, I do not expect the effects of this action on the quality of the human environment to be highly controversial. There is disagreement as to the use of herbicides on the prairie.

5. The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

The actions prescribed include the cutting of some trees, the use of prescribed fire and herbicides containing glyphosate and tri-clopyr. The EA concluded that these actions would not significantly negatively effect animals (including humans).

6. The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

Each candidate RNA described in the Forest Plan may be studied individually on its own merits for designation, or may be studied as part of an analysis of several candidate RNAs. Designation of the Buffalo Beats RNA does not influence decisions on future RNA designation.

7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts.

Cumulative effects were discussed in the effects section of the EA. No significant impacts were determined as a result of designation or amending the Forest Plan. The loss of opportunity to manage the area for timber, wildlife or recreation resources is minor in relation to the existence of these opportunities on adjacent lands.

8. The degree to which the action may adversely affect eligibility for listing in the national Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

The effects section of the EA determined that there would be no adverse effect upon scientific, historical or cultural resources.

9. The degree to which the action may adversely affect an endangered or threatened species or its critical habitat.

Both the plant and animal biological evaluations found no adverse effects on endangered or threatened species or their critical habitat from selection of the Proposed Action alternative.

10. *Whether the action threatens a violation of Federal, State or local law or requirements imposed for the protection of the environment.*

This action does not violate Federal, State or local laws or requirements for protecting the environment, including the National Forest Management Act of 1976 and associated implementing regulations (36 CFR 219.10(f) and (g)) which provide for amendments and revision of Forest Plans. Analysis has been conducted to determine possible violations of federal and State Endangered Species Acts, heritage resource protection laws, and other resource protection requirements. These analyses are documented in the EA and biological evaluations and show that these activities are in compliance with laws, statutes, and regulations imposed for resource protection.

This action is consistent with the Forest Plan and with the Final Environmental Impact Statement (FEIS) and associated appendices for the Forest Plan.

Appeal Rights

This decision is subject to appeal pursuant to 36 CFR Part 217. A copy of the Notice of Appeal must be sent to:

Chief
Forest Service
United States Department of Agriculture
Auditors Building
201 14th St., SW at Independence Ave., SW
Washington, DC 20250

A copy of the Notice of Appeal must also be sent to:

Regional Forester
Eastern Region
310 West Wisconsin Ave., Suite 500
Milwaukee, WI 53203

The Notice of Appeal must meet content requirements of 36 CFR 217.9 and must be submitted within 45 days from the date of legal notice of this decision in the *Milwaukee Journal-Sentinel*.

Implementation Date

Implementation of this decision may begin 7 days after publication of the legal notice of this decision in the *Milwaukee Journal-Sentinel*.

Contact Person

For additional information concerning this decision, please contact Rosemarie Boyle, Team Leader at Wayne National Forest, 219 Columbus Road, Athens, Ohio 45701.

Approved by:

fr 
ROBERT JACOBS
Regional Forester
Eastern Region

5/20/99
Date

SIGNATURE PAGE

for

RESEARCH NATURAL AREA ESTABLISHMENT RECORD

Buffalo Beats Research Natural Area

Wayne National Forest

Athens County, Ohio

The undersigned certify that all applicable land management planning and environmental analysis requirements have been met and that boundaries are clearly identified in accordance with FSM 4063.21. Mapping and Recordation and FSM 4063.41 5.e(3) in arriving at this recommendations.

Prepared by Rosemarie Boyle Date March 24, 1999
Rosemarie Boyle
Wayne National Forest and

Marilyn W. Ortt Date March 31, 1999
Marilyn Ortt, Ecologist
Marietta, Ohio

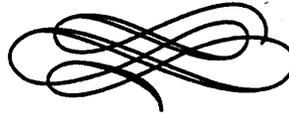
Recommended by Sharon Nygaard-Scott Date March 23, 1999
Sharon Nygaard-Scott, District Ranger
Athens Ranger District

Recommended by Jose Zambrana Date March 24, 1999
Jose Zambrana, Forest Supervisor
Wayne National Forest

Recommended by Bov B. Eav Date May 10, 1999
Bov B. Eav, Station Director
Northeastern Forest Experiment Station
Research

TABLE OF CONTENTS

Introduction	3
Land Management Planning	4
Objectives	4
Justification Statement.	4
Principal Distinguishing Features	5
Location Description	8
Cover Types	8
Physical and Climatic Conditions	8
Description of Values	10
Impacts and Possible Conflicts	11
Management Prescription	12
Adminstration Records and Protection	12
References	14
Appendix 1: Management Plan	16
Appendix 2. Environmental Assessment	2-1
Appendix 3: Boundary Certification	3-1



TITLE PAGE

Establishment Record for Buffalo Beats
Research Natural Area within Wayne National Forest,
Athens County, Ohio

**ESTABLISHMENT RECORD FOR BUFFALO BEATS RESEARCH
NATURAL AREA WITHIN WAYNE NATIONAL FOREST
ATHENS COUNTY, OHIO**

INTRODUCTION

Buffalo Beats Research Natural Area (RNA) is a 0.98 acre (0.4 ha) tall grass prairie relict (Anderson 1982) surrounded by deciduous forest for a total of 19.32 acres (7.8 ha). This RNA is significant as an eastern outlier of the prairie peninsula (Transeau 1935) and also as a prairie remnant surrounded by forest in unglaciated southern Ohio (Hirsh 1983). The RNA also includes a second area that formerly was prairie, based upon the pattern of clay lens in the soil.

In the RNA, there are no known Federally Threatened or Endangered Species but there are the following Forest Species of Concern: yellowish gentian (*Gentiana alba* Muhl.)*, ranked Endangered by the State of Ohio; slender blazing-star (*Liatris cylindracea* Michx.), ranked Threatened; and rattlesnake master (*Eryngium yuccifolium* Michx.), ranked Potentially Threatened.

*Herbaceous plant nomenclature follows Fernald (1950)

Historical Background:

This site with its assemblage of plants has been recognized as unique in southeastern Ohio for many years. It first appears in the literature in Transeau (1935). Jones (1944) and Porter (1956) did early floristics studies. Wistendahl (1975 and 1981) published extensive ecological studies of the prairie and surrounding woods. Buffalo Beats is listed in Cusick and Troutman (1978) as the only reported prairie in Athens County. Hardin (1988) has gathered a summary of 22 years of research on the area. Establishment of Buffalo Beats as an RNA was first proposed by Hirsh (1983).

There is no evidence of soil disturbance for agricultural purposes in the prairie opening. The surrounding forest was apparently used to obtain mine timbers for use in near-by coal mines during the early half of this century but was never clear-cut according to long-time nearby residents (Ortt, unpubl.). There are few if any stumps in the adjacent forest.

Although natural fires in hardwood forests in southern Ohio are rare, fires were frequently set by Native Americans and later by European settlers to keep the woods open. Interviews with area residents yielded similar information from all: no one bothered to put out the frequent small fires that moved through the leaf-litter. During the 1930's, the use of fire suppression by the Wayne National Forest was considered unusual and, perhaps, not well informed because it made the woods more difficult to walk through. (Ortt, unpubl.)

The entire Sec. 36 in which Buffalo Beats RNA is located was owned by absentee landowners from the first deed issued in 1796 until the land was acquired by the U.S. Forest Service in 1942 (Ortt, unpubl.). There is no known record or sign of human habitation in the section during the past 198 years. A footpath across the prairie opening was a short-cut from Happy Valley and Utah Ridge to Buchtel in the early part of this century.

Uses:

Annual floristic and human-use monitoring is done by the Wayne National Forest Ecosystem Staff.

Permanent study plots were established in 1956 by Dr. Stephen Boyce and expanded upon by Dr. Warren Wistendahl 1960-1970. Hardin replicated Wistendahl's study in 1984. When it became apparent the size of the prairie was shrinking because of encroachment of trees, vegetative management in the form of cutting of invading trees and prescribed burns of the prairie were carried out. Monitoring has occurred in recent years (1994-1998) and prescribed fires have been set in 1996 and 1998.

Ownership:

Buffalo Beats RNA is owned by the U.S. government and is administered the Wayne National Forest.

The mineral rights are owned by the Elias M. Poston Trust. There are no known plans to mine coal in this area. Minerals are reserved until December 31, 2040. After that date these rights will belong to the Forest Service.

LAND MANAGEMENT PLANNING

Buffalo Beats is listed as a Candidate Research Natural Area in the Wayne National Forest Environmental Impact Statement and in the Land and Resource Management Plan (LRMP). The area was recommended as a Candidate Research Natural Area by the Wayne National Forest RNA Evaluation Group on 14 July 1986. The Nature Conservancy proposed the prairie be designated an RNA in 1983 (Hirsh 1983).

Buffalo Beats was designated a Special Area by Amendment 7 to the Wayne National Forest LRMP (January, 1992).

Designation of Buffalo Beats changes the Management Area from 9.2/8/2 to 8/1.

OBJECTIVES

The objectives for establishing Buffalo Beats RNA are to:

1. Maintain the existing tall grass prairie community by minimizing the threat of the invasion of woody and non-native species.
2. Expand and maintain the size of the tall grass prairie at the full extent of the calcareous clay soil in both the northern and southern prairie sites.
3. Provide a site for low-impact educational and research opportunities.

JUSTIFICATION

Buffalo Beats RNA is a prairie relict on a ridgetop in the hills of unglaciated Ohio and, as such, is one of the easternmost outliers of the Prairie Peninsula (Transeau 1935). The ridge-top prairie is especially significant for being totally surrounded by hardwood forest which is the dominant plant community for southeastern Ohio. This relict plant community may represent vegetation of a xerothermic period during which prairie species expanded eastward.

The site is now designated a Special Area by Amendment 7 to the Wayne National Forest LRMP. The Tall Grass Prairie Plant Community is rare in Ohio and especially so on this type of unglaciated terrain which is located approximately 25 miles (40 km) southeast of furthest southward glacial movement.

Phytolith analyses of the soils from Buffalo Beats RNA prairie opening and from surrounding forest indicate a significant difference in vegetation through time. The 0.98 (0.4 ha) opening was apparently dominated by forbs and not by woody vegetation throughout much of its history (Kalisz 1990).

Many of the species that grow on this small prairie opening are rare in southeastern Ohio and some are not found elsewhere in that part of the state. Buffalo Beats RNA is the only known example of Tall Grass Prairie known to occur in southeastern Ohio. The genetic composition of these species may vary significantly from that of plants growing in the center of their geographic range. This may have additional consequences in the event of climatic change.

Forest Species of Concern known to grow within Buffalo Beats RNA are yellowish gentian (*Gentiana alba* Muhl.), ranked Endangered by the State of Ohio; slender blazing-star (*Liatris cylindracea* Michx.), ranked Threatened; and rattlesnake master (*Eryngium yuccifolium* Michx.), ranked Potentially Threatened.

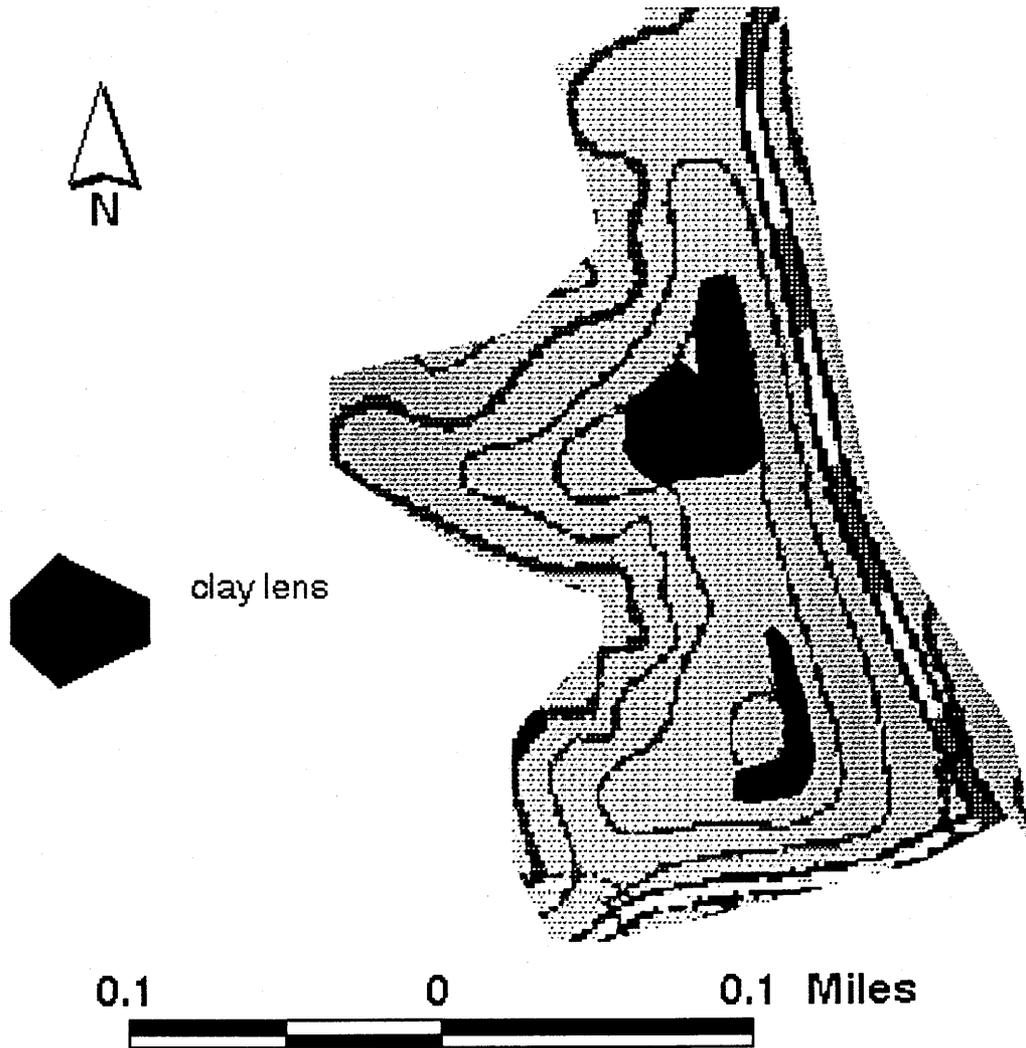
PRINCIPAL DISTINGUISHING FEATURES

Buffalo Beats currently has one small prairie that is dominated by prairie forbs and grasses. Underlying this small prairie is a clay lens. Approximately 70 to 100 feet south of the existing prairie is another clay lens. The two clay lenses are illustrated in Figure 1.

Buffalo Beats RNA is a small relict prairie surrounded by deciduous forest. The prairie is dominated by big bluestem (*Andropogon gerardii*). Other prairie species include Indian grass (*Sorghastrum nutans*), yellowish gentian (*Gentiana alba*), blazing star (*Liatris cylindracea*, *L. aspera*), rattlesnake master (*Eryngium yuccifolium*), stiff goldenrod (*Solidago rigida*), whorled rosinweed (*Silphium trifoliatum*) and New Jersey tea (*Ceanothus americanus*).

The prairie opening covers the central 0.98 acres (0.4 ha) of the RNA. Originally, prairie vegetation possibly covered the entire 2.15 acres (0.87 ha) of calcareous clay perched upon the shale-derived acidic soils found throughout the area (Wistendahl 1975). The configuration of this clay is apparently somewhat lens-shaped ranging up to 12.47 feet (3.8 m) thick toward the center and tapering out all around the perimeter. (Ibid.)

Figure 1. Approximate Extent of the Northern and Southern Clay Lenses



LOCATION

A location map, boundary and contour map (Figure 2), a Stand Map (Figure 3) and cover type map (Figure 4) are attached to this report.

Buffalo Beats RNA is located within the Athens Ranger District of the Wayne National Forest at 39° 27' 18" latitude, and 82° 4' 35" W longitude. The RNA lies in the Southern 1/2, Section 36, Dover Township, Athens Co., Township 10 North and Range 14 West.

Boundaries:

Legal Description: Township 10 North, Range 14 West, Ohio River Survey, Dover Township, Athens County, Ohio

Section 36:

Beginning for Reference at a fence corner located at the approximate south 1/4 corner of Section 36:

thence N 12° 47'51" E a distance of 689.107 feet to the True Point of Beginning, an unmonumented point in the centerline of Dover Township Road No. 295;

thence N 69° 55'52" W a distance of 135.025 feet to a monument set and stamped "Mon. E";

thence N 28° 48'24" W a distance of 309.296 feet to a monument set and stamped "Mon. D";

thence N 28° 11'37" W a distance of 533.431 feet to a monument set and stamped "Mon. C";

thence N 49° 45'38" E a distance of 642.236 feet to a monument set and stamped "Mon. B";

thence N 42° 04'30" E a distance of 246.402 feet to a monument set and stamped "Mon. A";

thence N 45° 02'28" E a distance of 78.826 feet to an unmonumented point in the center of Athens County Road 29;

thence following the centerline of said County Road 29 the following seven (7) courses:

S 10° 26'04" E a distance of 347.696 feet ;

S 11° 23'23" E a distance of 308.221 feet;

S 24° 04'01" E a distance of 90.574 feet;

S 25° 04'15" E a distance of 76.864 feet;

S 25° 20'31" E a distance of 329.210 feet;

S 26° 02'41" E a distance of 82.864 feet to the intersection of Dover Township Road No. 295;

thence following the centerline of said Township Road No. 295 the following eight (8) courses:

S 60° 35'34" W a distance of 34.250 feet ;

S 58° 52'48" W a distance of 54.608 feet;

S 66° 09'50" W a distance of 115.475 feet;

S 72° 35'37" W a distance of 67.370 feet;

S 81° 05'45" W a distance of 107.516 feet;

S 87° 07'38" W a distance of 99.311 feet;

S 78° 00'14" W a distance of 87.110 feet;

S 68° 31'50" W a distance of 55.642 feet to the True Point of Beginning, and containing 19.320 acres, more or less and is contained entirely within National Forest Lands in Section 36.

This description was prepared by Terry A. Krasko, Wayne National Forest Land Surveyor, Ohio P.S. 6973, May 1, 1995, based upon field surveys executed in March 1995. Basis of Bearings was from Solar Observation with a Lietz SET 3 Total Station Theodolite using an SMI Co-op Module and HP41 Hand Computer on March 17, 1995. All Monuments set were 3/4" x 36" steel rebars with 2.5" forged aluminium caps that were stamped with pertinent corner identification, year of survey and Surveyor's Registration number. See Appendix 3.

Acreage:

The total acreage of Buffalo Beats RNA is 19.32 acres (7.8 ha), more or less.

Elevation:

The prairie community is situated on a ridgetop with an elevation of 951 ft. (289 m).

Access:

The area may be accessed with normal vehicle by State Route 685 from Buchtel to the north and then County Road 29 which are both all-weather roads. There are no constructed foot-trails to the prairie opening to avoid drawing attention to this small, vulnerable site. It is within three hundred feet of County Road 29.

AREA BY COVER TYPES

The second-growth forest surrounding the Tall Grass Prairie corresponds to Society of American Foresters (SAF) 52 (White oak-black oak-northern red oak) and consists of 13.02 acres (5.3 ha). Kuchler's type 73, a mosaic of types 66 (big bluestem prairie) and type 91 (oak-hickory forest) best describes the site using that classification system.

Society of American Foresters (SAF) Type	Kuchler's Type	Area of RNA
52 -	94	18.34 acres (7.4 ha)
<u>non-forested -</u>	73	<u>0.98 acres (0.4 ha)</u>
Total		19.32 acres (7.8 ha)

PHYSICAL AND CLIMATIC CONDITIONS

The following climatic information was prepared by the National Climatic Center, Asheville, North Carolina and was included in the "Soil Survey of Athens County, Ohio" (Lucht, 1985).

"Winters are cold and snowy at the higher elevations in Athens County. In the valleys it is also frequently cold, but intermittent thaws preclude a long-lasting snow cover. Summers are fairly warm on ridgetops and very warm with occasional very hot days in the valleys. Rainfall is evenly distributed during the year, but it is appreciably heavier on the windward, west-facing slopes than in the valleys. Normal annual precipitation is adequate for all crops, although summer temperatures and growing season length, particularly at higher elevations, may be inadequate.

Table 1 gives data on temperature and precipitation for the county as recorded at Athens in the period 1951 to 1978.

In degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F°). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and first freeze in fall.

The total annual precipitation is 38.6 inches. Of this, 21 inches, or 55 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 18 inches. The heaviest 1-day rainfall during the period of record was 3.65 inches on July 12, 1966. Thunderstorms occur on about 45 days each year, and most occur in summer.

The average seasonal snowfall is 14 inches. The greatest snow depth at any one time during the period of record was 5 inches. On the average, there is no day with an inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night and the average at dawn is about 80 percent. The sun shines 60 percent of the time possible in summer and 35 percent in winter. The prevailing wind is from the northwest. Average windspeed is highest, 8 miles per hour, in spring."

The following climatic data for the period 1974-1993 have been summarized from data furnished by the Scalia Laboratory for Atmospheric Analysis, Ohio University, Athens which is approximately 8 miles (12.8 km) southeast of Buffalo Beats.

Table 1. Temperature and Precipitation Data

Month	Avg. High (°F)	Avg. Low (°F)	Rain (inches)	**Snow (inches)
Jan.	35.1	21.0	2.5	5.4
Feb.	42.1	23.4	2.7	5.69
Apr.	*64.7	40.7	*2.7	0
May	74.5	50.9	3.8	0
June	81.2	*58.2	3.8	0
July	85.5	64.0	4.1	0
Aug.	*84.4	*63.3	*3.6	0
Sept.	*77.4	*54.3	*2.9	0
Oct.	*65.4	*44.4	*2.6	0
Nov.	*54.6	*35.3	*3.1	0.6
Dec.	*43.0	*26.4	*3.0	3.2

* 19 year data

** 9 year data

DESCRIPTION OF VALUES

FLORA:

There are no known Federally Threatened or Endangered Species, but there are the following Forest Species of Concern: yellowish gentian (*Gentiana alba* Muhl.), ranked Endangered by the State of Ohio; slender blazing-star (*Liatris cylindracea* Michx.), ranked Threatened; and rattlesnake master (*Eryngium yuccifolium* Michx.), ranked Potentially Threatened. Common species in the prairie are Big Bluestem (*Andropogon gerardii*) and Indian Grass (*Sorghastrum nutans*).

White oak (*Quercus alba**) is the dominant tree in the transition zone. The surrounding oak forest is composed of white oak, scarlet oak (*Quercus coccinea*), black oak (*Quercus velutina*), shagbark hickory (*Carya ovata*) with an understory of *Ostrya virginiana* and hawthorne (*Crataegus* sp.).

*Tree names follow Little 1979.

FAUNA:

No endangered or threatened animal species, vertebrate or invertebrate, are known for the area. No organized survey of animal species, vertebrate or invertebrate, has been done although the site was included in a butterfly survey of Athens County (Shuey 1983).

GEOLOGY:

Bedrock below the RNA is comprised of Pennsylvanian sandstones, shales, coal deposits and small amounts of limestone (Sturgeon *et al* 1958). Some small coal deposits are also present. Oil and gas are found in the area. Clay may have been deep-mined here in the past.

Within the Ecological Classification System, Buffalo Beats is in the Eastern Broadleaf Forest (Oceanic) Province [221], Southern Unglaciaded Allegheny Plateau Section [221E], West Hocking Plateau (aka Ohio/Kentucky Carboniferous Plateau) Subsection [221Ef].

SOILS:

The northern prairie opening and the southern clay lens are underlain by a clay deposit. The clay deposit may represent a portion of the Duquesne member of Pennsylvanian age (Wistendahl 1975).

Limestone nodules 22-24 inches (55.9-61 cm) below the surface are typical of residual prairies and do not form in woodlands. The nodules result from the leaching of calcium ions through small fractures in the soil to an impervious layer where the precipitate forms nodules (Miller, pers. comm. 1987). There is a lack of agreement whether the soil is derived from water-deposited or wind-deposited material.

The border around the prairie opening is referred to as the transition zone since trees had invaded there and are changing the character of the soil (Wistendahl 1975).

LANDS:

All lands in the RNA are owned and managed by Wayne National Forest. Mineral rights are owned by Elias M. Poston Trust. Minerals are reserved until December 31, 2040. After that date these rights will belong to the Forest Service.

CULTURAL:

No known historic sites exist within this area.

IMPACTS AND POSSIBLE CONFLICTS

Buffalo Beats is listed as a Candidate Research Natural Area (MA 9.2) in both the Wayne National Forest Environmental Impact Statement and the Land and Resource Management Plan. Buffalo Beats has been designated a Special Area (MA 8.2) by Amendment 7 to the Land and Resource Management Plan of the Wayne National Forest.

After designation as an RNA, the area will be managed with the standards and guidelines for MA 8.1 as well as the management plan for Buffalo Beats (Appendix 1).

MINERAL RESOURCES:

Mineral rights are owned by Elias M. Poston Trust.

There are no active coal or other mineral leases within Buffalo Beats RNA. There are no known plans to mine coal in the area. Minerals are reserved until December 31, 2040. After that date these rights will belong to the Forest Service.

GRAZING:

No areas in the RNA are grazed by domestic livestock.

TIMBER:

All but the central 0.98 acre (0.4 ha) of the center portion of the proposed 14 acres (5.7 ha) are wooded. Thus 13.02 acres (5.3 ha) of commercial forest are withdrawn from timber production. The stand is mixed oak, well-stocked sawtimber, year of origin 1899.

Area removed from timber management = 13.02 acres (5.3 ha).

WATERSHED VALUES:

No streams run through the RNA. Three small intermittent streams drain from the ridgetop where the prairie opening occurs and to the northwest, drains into Monday Creek watershed and to the southeast, drains into the Sunday Creek watershed.

RECREATION VALUES:

The area has not been used for organized recreation. No such activities would be planned in the future. After establishment as an RNA no recreation activities would be allowed.

An unauthorized Off Road Vehicle trail was successfully closed ca. 1985 by felling a tree across it.

There is presently a closure order to all public access on the RNA. Exceptions to this order are for persons with a permit authorizing use or any federal, state, or local law enforcement officer or fire fighting force in the performance of an official duty.

WILDLIFE AND PLANT VALUES

The following Forest Species of Concern occur within the opening: yellowish gentian (*Gentiana alba* Muhl.), ranked Endangered by the State of Ohio; slender blazing-star (*Liatris cylindracea* Michx.), ranked Threatened; and rattlesnake master (*Eryngium yuccifolium* Michx.), ranked Potentially Threatened.

Without monitoring and vegetative management (See Appendix 1, Management Plan) this unique assemblage of plants will be lost to the encroaching forest.

Plant collecting would be allowed only by qualified researchers with permission of the proper authority.

At establishment, exotic plant species are not a significant problem in the prairie opening. After the southern half of the opening had a prescribed burn in 1987, a quantity of sweet yellow clover (*Melilotus officinalis*) germinated in the eastern portion. Pulling of plants before they flowered provided control of this species during the following season. Since then, this species has been seen only infrequently.

SPECIAL MANAGEMENT AREA VALUES:

No Congressionally designated areas occur within or near Buffalo Beats Research Natural Area.

TRANSPORTATION PLAN:

There are no official state, county, township or Forest Service roads which traverse the RNA nor are there plans to build roads within the boundaries. Roads were used in the boundary survey as boundary markers. Since the center of the road was used in the description, portions of roads exist within the RNA. Access will be on existing public roads.

MANAGEMENT PRESCRIPTION

The primary objective of Buffalo Beats RNA management is to restore and maintain the Tall Grass Prairie Plant Community with its values of biodiversity. For complete management prescriptions see Appendix 1, Management Plan. If the management needs to change, a revised Management Plan will be produced and reviewed by consulting with other scientists. An RNA Permit Application will also be submitted following the internal RNA review process.

ADMINISTRATION RECORDS AND PROTECTION

The Buffalo Beats Research Natural Area is administered by the Athens Ranger District of the Wayne National Forest. The contact person responsible for this area is:

Athens District Ranger
Wayne National Forest
219 Columbus Rd.
Athens, Ohio 45701

The research coordinator is:

Station Director
Northeastern Research Station
100 Matsonford Rd.
Radnor, PA 19087

The research data file is maintained by the Northeastern Research Station, and the Wayne National Forest Headquarters, Athens, Ohio 45701.

The Division of Natural Areas and Preserves of the Ohio Department of Natural Resources, Fountain Square, Columbus, Ohio, 43224, also maintains a file for this natural area as does The Nature Conservancy - Ohio Field Office, 6375 Riverside Drive, Suite 50, Dublin, Ohio 43017.

Most specimens that have been collected in this area, both botanical and zoological, are housed in the collections at Ohio University, Athens, Ohio and The Ohio State University, Columbus, Ohio.

REFERENCES

- Anderson, D.M. 1982. Plant communities of Ohio: a preliminary classification. Ohio Department of Natural Resources, Division of Natural Areas & Preserves. Columbus, Ohio.
- Eyre, F.H. ed. 1980. Forest Cover Types of the United States and Canada. Washington, D.C.; Society of American Foresters.
- Fernald, M.L. 1950. Gray's Manual of botany. Eighth edition. American Book Co.
- Hardin, E.D. 1988. Buffalo Beats Prairie and Surrounding Forest after 22 Years Bull. Torrey Bot. Club. 115:13-24.
- Hirsh, D.W. 1983. Buffalo Beats: A proposal for designation as a Research Natural Area. Ohio Chapter, The Nature Conservancy. Columbus, Ohio.
- Jones, C.H. 1944. Studies in Ohio floristics - III. Vegetation of Ohio prairies. Bull. Torrey Bot. Club. 71:536-548.
- Kalisz, P.J. and S.E. Boettcher. 1990. Phytolith analysis of soils at Buffalo Beats, a small forest opening in southeastern Ohio. Bull. Torrey Bot. Club. 117: 445-449.
- Kulcher, A.W. 1966. Potential Natural Vegetation. U.S. Department of the Interior, Geologic Survey. 1969. Washington, D.C.
- Little, Elbert L. 1979. Atlas of United States Trees. Volumes 1-6. United States Government Printing Office, Washington, D.C.
- Lucht, T.E, D.L. Brown and N.H. Martin. 1986. Soil survey of Athens County, Ohio. U.S.D.A., Washington, D.C.
- Moseley, R.E. 1985. Recommendations for designation of special areas within the Wayne National Forest. ODNR-Division of Natural Areas & Preserves, Columbus, Ohio.
- Ohio Division of Natural Areas & Preserves. 1992. Rare species of native Ohio wild plants: 1992-1993 status list. Ohio Department of Natural Resources, Columbus, Ohio.
- Porter, W.P. 1956. Notes on some unusual flora found in Athens County, Ohio. Ohio Journal of Science. 56:121-123.
- Shuey, J.A. 1983. An annotated checklist of the butterflies of Athens County, Ohio. Ohio Journal of Science. 83:262-269.
- Sturgeon, M.T. and associates. 1958. The geology and mineral resources of Athens County, Ohio. Ohio Division of Geological Survey, Bulletin 57.
- Transeau, E.N. 1935. The prairie peninsula. Ecology. 22:398-407.
- Wistendahl, W.A. 1981. Buffalo Beats, a prairie remnant in unglaciated southeastern Ohio, supports Transeau's Prairie Peninsula concept. Proc. Sixth North American Prairie Conf., Ohio Biological Survey. Biol. Notes No. 15, Columbus, Ohio.
- Wistendahl, W.A. 1975. Buffalo Beats, a relict prairie within a southeastern Ohio forest. Bull. Torrey Bot. Club. 102:178-186.

Figure 5. Southern Clay Lens - Forest



Figure 6. Northern Clay Lens - Prairie



Establishment Record - Buffalo Beats

Establishment Record - Buffalo Beats
Appendix 1: Management Plan

Contents:

1. Objectives of Management
2. Use of Prescribed Fire
3. Tree Removal
4. Use of Herbicides
5. Use of Volunteers
6. Public Uses
7. Monitoring
8. Other Resource Recommendations
- 9 Literature

NOTE: Management of Buffalo Beats must follow Forest Service Manual 4063 and Management Standard and Guidelines for RNAs (8.1) in the Forest Plan. It also must follow an **adaptive model**. Adaptations to this plan and adjustments to the management techniques may be necessary based upon the results of monitoring.

1. Objectives of Management

Buffalo Beats is significant because it is the easternmost extension of the prairie peninsula. It is a prairie relict within the oak-hickory forest of southeastern Ohio. Therefore, Buffalo Beats will be managed for the tall grass prairie community rather than for individual species or populations. As of April 1998, it is ranked as a G2 community by The Nature Conservancy. This ranking of "G2" means this community is imperiled globally because of extreme rarity (typically 6-20 occurrences or few remaining acres) or because of some factor(s) making it very vulnerable to extinction throughout its range. The Ohio Department of Natural Resources, Division of Natural Areas and Preserves has recognized Buffalo Beats as a state significant site as well.

The specific management objectives are:

1. Maintain the existing tall grass prairie community by minimizing the threat of the of invasion of woody and non-native species.
2. Expand and maintain the size of the prairie at the full extent of the calcareous clay soil in both the northern and southern prairie sites.
3. Education and Research
 - ◆ Provide limited visitation by small educational groups of the buffer oak-hickory forest accompanied by an employee of the Wayne National Forest.
 - ◆ Provide restricted access to the calcareous clay lenses to approved researchers whose studies will:
 - 1) improve management of the RNA
 - 2) result in better understanding of the ecological function of the tall grass prairie community

- 3) result in a better understanding of the relationship of Buffalo Beats to the prairie peninsula or
- 4) monitor the effects of management of Buffalo Beats

2. Use of Prescribed Fire

a. Background

Prairie species need high light levels for germination, growth and reproduction. Phytolith analysis of the entire northern clay lens concluded that this lens contained vegetation other than forest over much of its history. Most likely, the vegetation was forb dominated (Kalisz and Boettcher, 1990).

Herbaceous and woody vegetation data have been collected for a 35 year period from 1956 to 1991 (Porter, 1956; Wistendahl, 1975 and 1981). By 1956, only 27% of the northern lens was occupied by prairie vegetation; upland forest had invaded the remaining 73%. By 1984, the density of tree seedlings and saplings in the center of the prairie had increased seven-fold while the size of the prairie opening had decreased by 75%. After all saplings and shrubs and most trees were removed from 75% of the northern clay lens and the southern half of the northern prairie was burned, percent cover and frequency increased for many species.

In 1991, Wayne-Hoosier Soil Scientist Pat Merchant resampled the soil boundaries at Buffalo Beats. During this time, Merchant discovered a second clay lens south of the existing prairie opening. In 1995, Merchant surveyed the southern lens and marked the calcareous clay/acidic shale interface. His data indicate a southern clay lens of approximately 0.24 ha.

See Figure 1 for these two clay lenses.

b. Prescribed Fire Regime

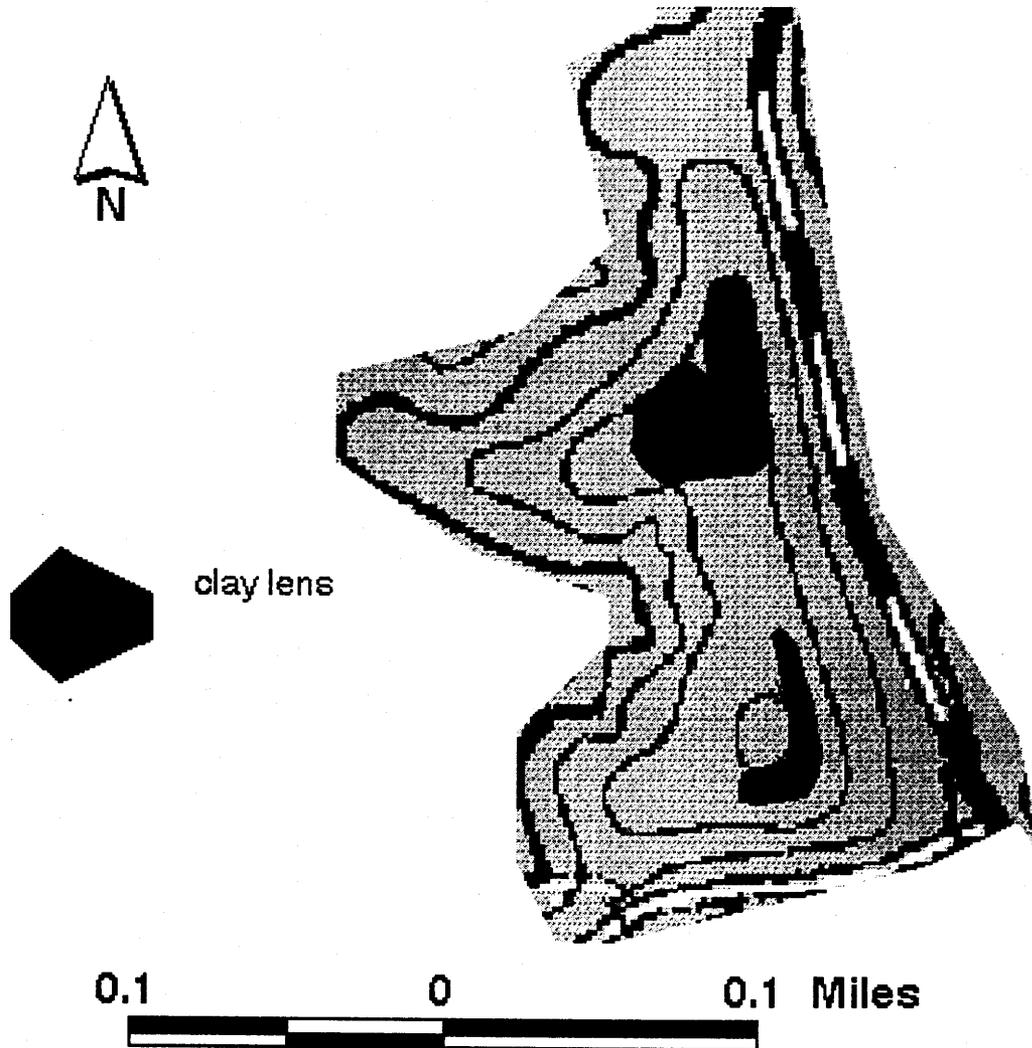
Because the clay lenses are small and the clay/shale interface is highly dissected, the entire RNA (including the oak/hickory forest) will be managed by prescribed burning. Since there are significant differences between vegetation on the northern and southern clay lenses, the RNA will be divided into a northern and southern burn unit. See Figure 2 for these regimes.

1. Northern Unit Regime

The northern unit, with its prairie relict, will be burned to maintain and expand the prairie vegetation. Initially, the prairie will be burned annually for two years to reduce litter accumulation, expose bare mineral soil and top-kill woody seedlings, saplings and sprouts. After two years, the northern unit will be put on a three year fire interval to maintain the prairie vegetation and suppress woody invasion.

Preferred timing of prescribed burns is between late February and mid-April.

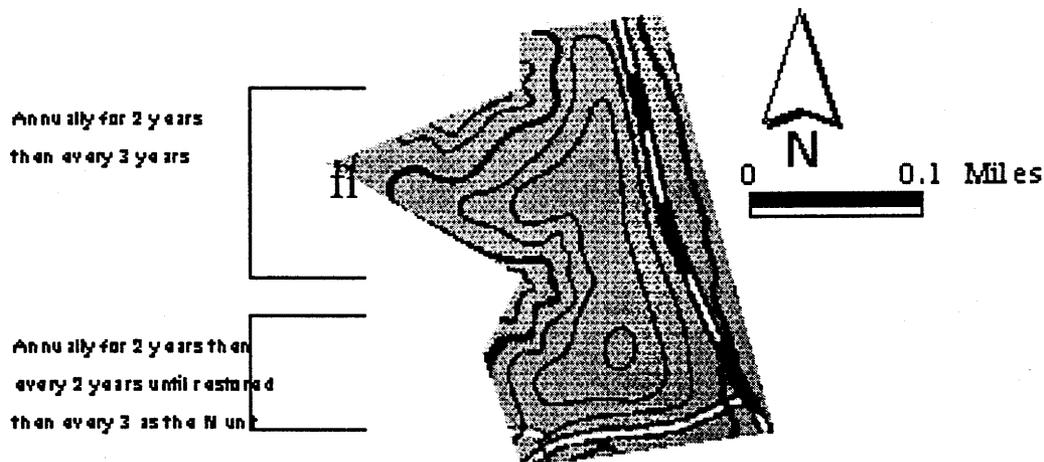
Figure 1. Approximate Extent of the Northern and Southern Clay Lenses



2. Southern Unit Fire Regime

The southern unit, containing the southern clay lens, does not currently (4/98) contain abundant prairie vegetation. There are a few plants of *Gentiana alba* (Yellow Gentian), *Eryngium yuccifolium* (Rattlesnake Master) and *Andropogon gerardii* (Big Bluestem). The southern unit will be put on a more intense burning regime. This unit will be burned annually for two years and then placed on a two year rotation. After prairie vegetation is restored (based upon monitoring results), the burn interval will be the same as the northern lens prairie.

Figure 2. Burn Units and Fire Regime for Clay Lenses at Buffalo Beats.



3. Tree Removal

a. Background

Because prescribed burning is not effective in top-killing trees greater than about 10 cm (2 inches) in diameter, trees of this size are difficult to kill without some mechanical intervention. In order to expand the prairie (both northern and southern clay lenses), some trees must be mechanically killed.

b. Method - Cutting

Trees will be cut. Once the trees fall, all woody debris will be removed from the clay lenses to minimize hot spots during burns that could result in soil sterilization. Downed trees will be cut if needed and rolled off the prairie into the adjacent woodland.

c. Which trees will be cut?

Dr. Jim McClenahan and Dr. Dan Houston conducted research regarding the ages of standing trees on both the northern (1996) and southern (1997) clay lenses. They found that most trees in the prairie had germinated in the late 19th century (1880's) and the 1930's.

Summarizing McClenahan and Houston's two reports: "there was a dramatic influx of trees on the prairies around the decades of the 1920's and 1930's, with periods of lesser recruitment extending over the latter half of the 1800's, especially the 1850's through the 1880's". See Figure 4.

Trees that originated from 1920 through the 1950's will be targeted for removal by cutting since they are more likely to be evidence of fire suppression efforts by the government than any other age class. A few trees (up to 10) that established during the 1800's will be cut on the southern clay lens. The oldest trees will be protected from cutting. The

southern lens is much more forested and will require more mechanical intervention to open up the site to light.

Figure 3. Distribution of trees by pith years for canopy (dominant and co-dominant crown positions) on the prairie sites (north & south). From McClelahen & Houston, 1998.

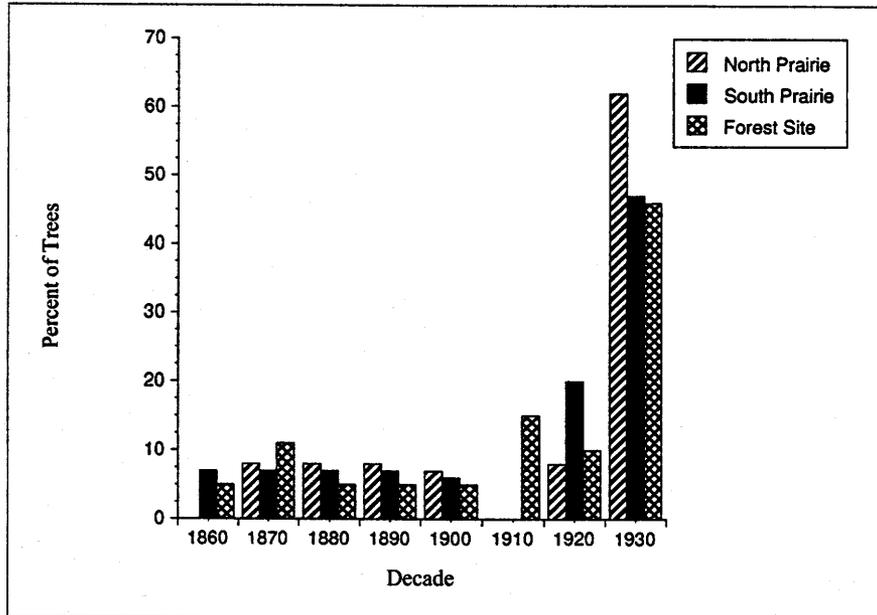
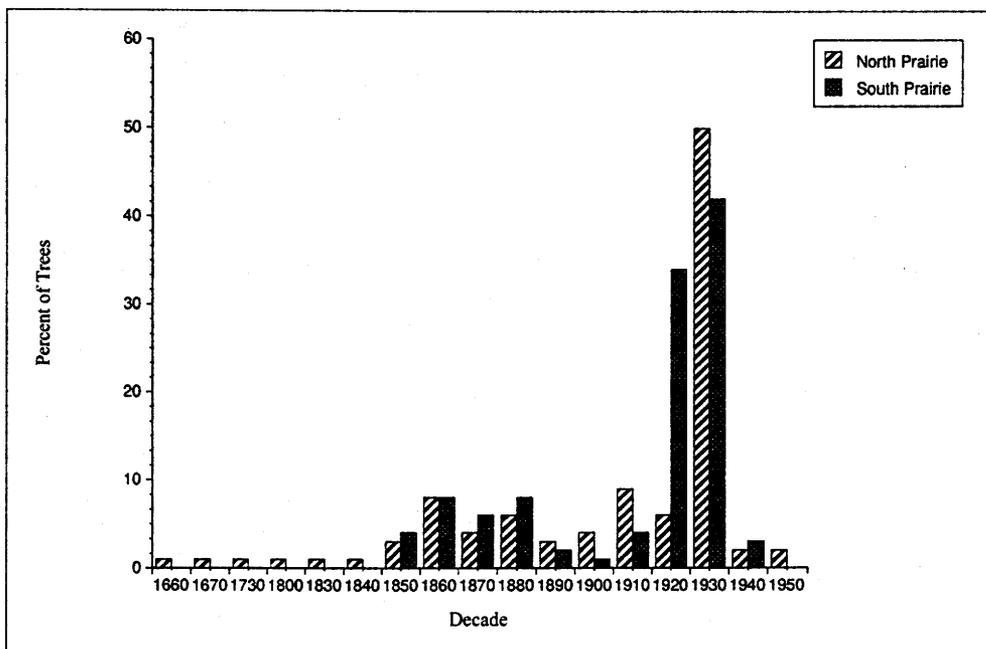


Figure 4. Distribution of all cored trees by pith years on the prairie sites at Buffalo Beats. From McClelahen & Houston, 1998.



4. Use of Herbicides

a. Background

Woody Vegetation: Most of the invading woody species are prolific sprouters. A recent survey (Sutherland, unpublished data) of the 40 stems cut in 1986 indicates an average of 9.4 sprouts per cut stem. For stems greater than 2.5 cm (1 inch) in diameter, the mean number of sprouts increased to 11.3. The effect of cutting a stem without removing sprouts is to lower the canopy and increase shading in a localized area which will reduce the amount of light on the prairie. This in turn limits the needed high light levels for germination, growth and reproduction of prairie species. Cut trees may also have stump sprouts after they've died standing and fallen.

Exotics & Introduced Plants: Currently (April 1998), there is no policy on the Wayne National Forest for the control of introduced and exotic species. Garlic Mustard (*Alliaria petiolata*), Japanese Knotweed (*Polygonatum cuspidatum*) and Tree of Heaven (*Ailanthus altissima*) are three species which are known to occur in the area and that repeated fires may not control. It is estimated that one-third of all plant species in Ohio are not native (Weishaupt, 1971). These exotic plants could become a very serious threat to the existing prairie should they become established. Currently (April 1998), exotic species are not a problem at Buffalo Beats. After the 1987 burn, *Melilotus officinalis* (Sweet White Clover) appeared in the prairie opening. Hand pulling the plants before flowering eliminated this species.

b. Herbicides to Control Woody and Non-native Species

If woody or exotic plant species become a threat to the prairie (based on monitoring analysis) and fire appears to not be able to control these species (again, based on monitoring analysis), then the use of herbicides may be necessary. Herbicides containing glyphosate or triclopyr would be used. Below lists some background information for these chemicals.

Glyphosate, marketed as Roundup, Accord or Rodeo, is a broad spectrum herbicide for the control of annual and perennial grasses, sedges and weeds plus many tree and woody species. It is absorbed by the foliage, translocating through the plant. It appears to hinder resprouting and regrowth. It is broken down by soil microbes and has a half-life of less than 50-60 days.

Triclopyr, marketed as Garlon, is a selective herbicide for control of many woody plants and broadleaf weeds. Most grasses are tolerant. It is considered to be effective on waxy-leaf brush species. It appears to be a growth inhibitor that may accumulate at the root collar. It has a half life of 46 days and undergoes rapid phot degradation. Microbes also break down this herbicide.

The Nature Conservancy - Ohio Chapter and the Ohio Department of Natural Resources, Division of Natural Areas and Preserves have used these herbicides in the restoration and maintenance of their preserves and have had no negative effects on prairie plant species or these communities in regard to their use (TNC, Sutherland, 1995).

c. Application of Herbicides

See Appendix C of the Buffalo Beats Environmental Assessment.

5. Use of Volunteers

As an alternative to herbicides, the use of volunteers could control exotic plants and woody sprouts by pulling up and/or cutting. The number of volunteers would be limited to a small group (no more than five people) and would always be accompanied by a Wayne National Forest employee. Wayne National Forest personnel could be used for this work as well. The use of these volunteers would be based on the results of monitoring. If monitoring shows that control of exotics and stump sprouts is necessary for the health of the prairies, volunteers (internal or external) may be used.

6. Public Uses

a. Education

Access to Buffalo Beats will be restricted to authorized educational groups and researchers. Educational groups must apply for permission to visit the area and access will be limited to the forested area around the perimeter of the prairie. Educational groups must be accompanied by a Wayne National Forest employee. If monitoring indicates any negative effects due to public use, this policy will be revisited and possibly revised. Interested groups must coordinate with the Wayne National Forest RNA Coordinator for authorization and permission.

b. Research

Figure 5 shows the process which must be followed for any research that is proposed to be conducted at Buffalo Beats. Only authorized research is permitted.

7. Monitoring

a. Background

"Management objectives specify a standard, desired state, threshold value, or trend relative to one or more attributes of the ecosystem. They also specify where and by when this should occur. Monitoring objectives specify how you will assess success or failure in meeting your management objectives. Unlike a management objective, which sets a specific goal for some target or trend value, a monitoring objective sets a specific goal for the measurement of status or trend" (from The Nature Conservancy's course, Vegetation Monitoring in a Management Context: Monitoring Objectives.)

b. Management and Monitoring Objectives for Buffalo Beats

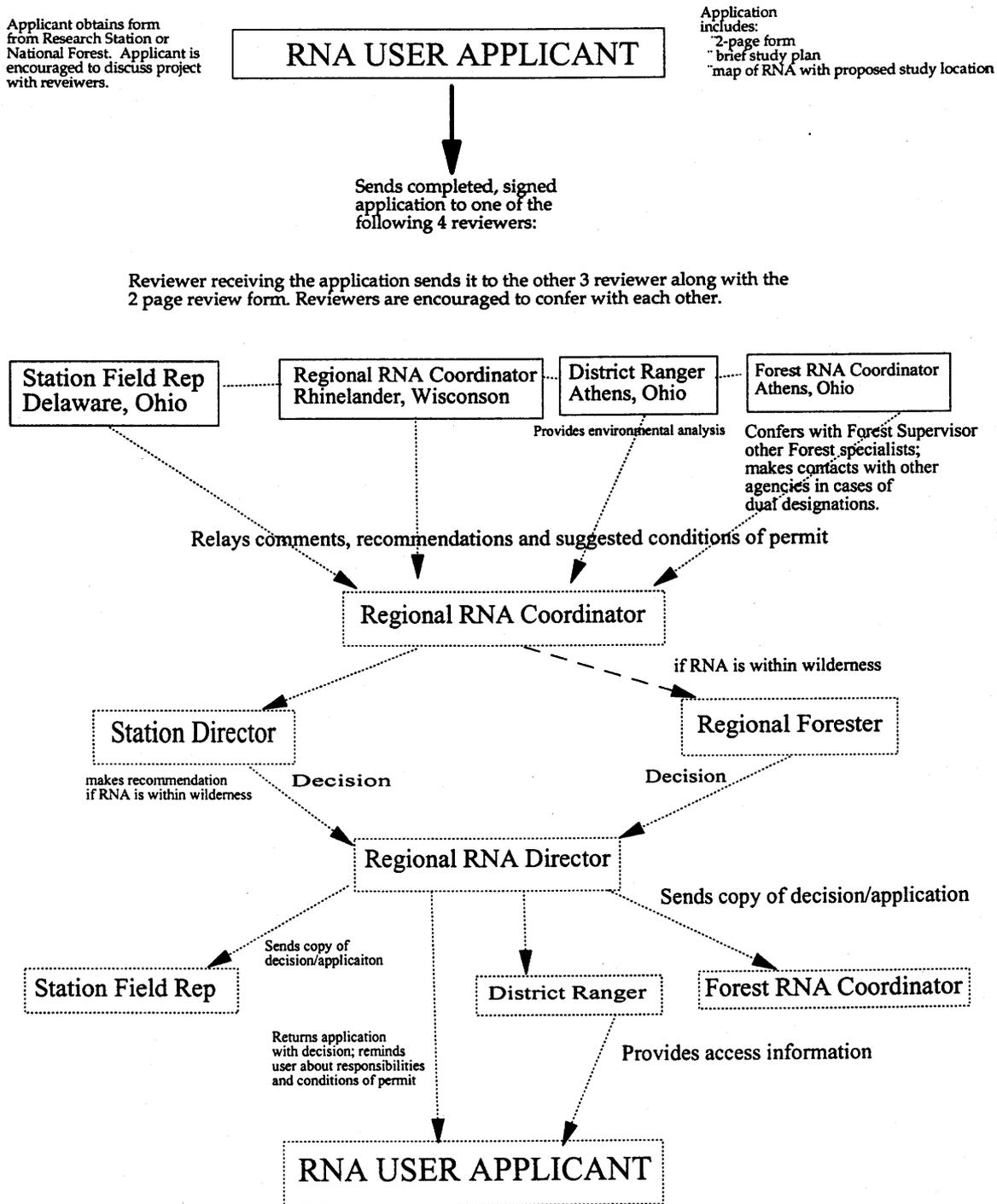
Management Objective No. 1: Maintain the existing tall grass prairie community (northern and southern clay lenses) by minimizing the threat of the invasion of woody and non-native species.

Monitoring Objectives for No. 1:

1. Increase the number of quadrats on the northern prairie to 30. Plot dimensions are 0.5m x 2m. This will be done by:

- extending the east-west transect to the east of the reference point and establishing new quadrats at 5m intervals

Figure 5. USDA Forest Service - Eastern Region. RNA User Permit Process for Research

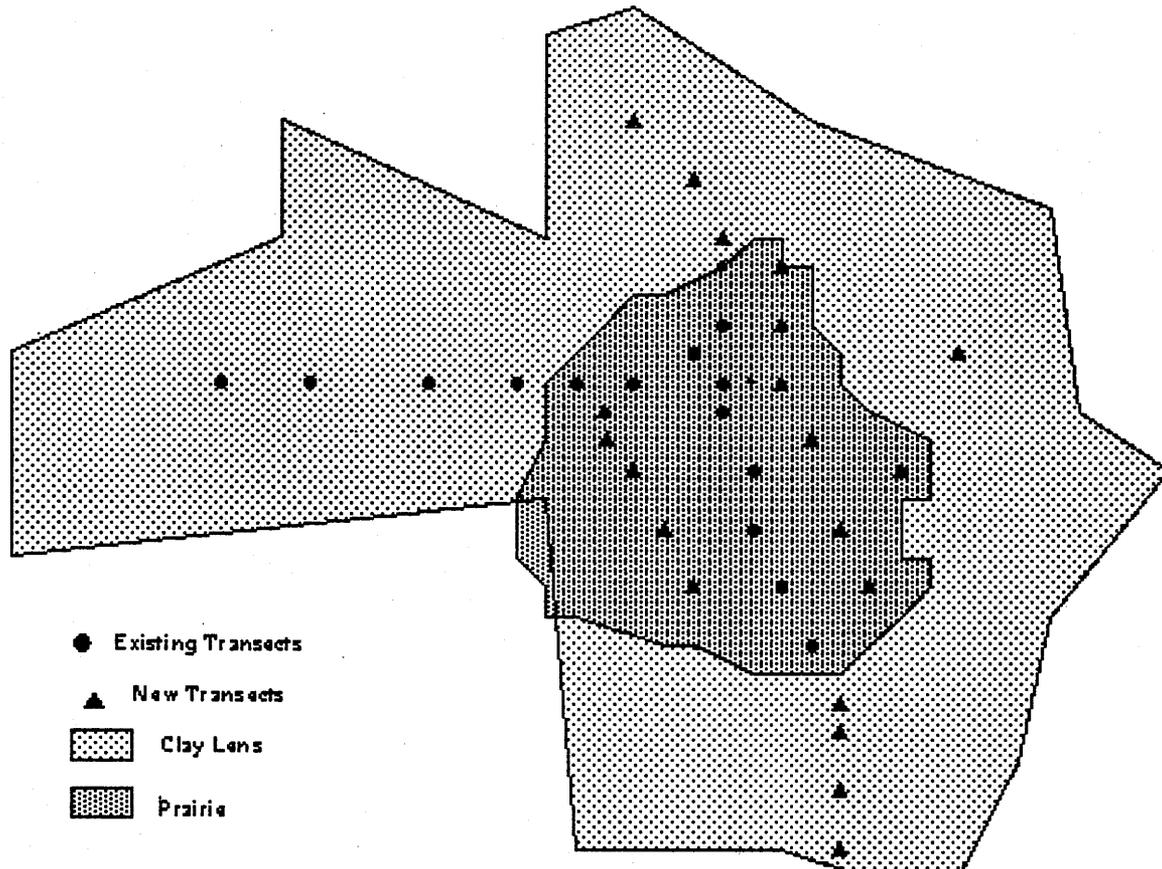


rb Boyle 12/98

- establishing a second north-south transect parallel to the existing transect with quadrats at 5m intervals (See Figure 6).

2. For each species, data will be collected as percent cover.
3. Measurements will be taken the year following any manipulation (includes prescribed fire, stump sprout or non-native species removal). The fire regime interval for the prairies is shown in Figure 2.

Figure 6. Existing and Additional Vegetation Transects at Buffalo Beats Northern Prairie. From Sutherland, 1995, unpublished.



Management Objective No. 2: Expand and maintain the size of the tall grass prairie to the full extent of the calcareous clay lenses in both the northern and southern sites.

Monitoring Objectives for No. 2:

1. The east-west and north-south transects will be extended to the limits of the clay lens and 0.5m by 2m quadrats established at 5m intervals at the northern prairie site. Percent cover data will be collected and analyzed. Measurements will occur the year following any manipulation (fire, stump sprout or exotic removal).
2. Counts of *Gentiana alba*, *Eryngium yuccifolium*, *Andropogon gerardii* and *Sorghastrum nutans* will be taken in August or September after any manipulation. Once the prairie vegetation becomes established and individuals so

numerous that total counts become too time consuming, then the area will be sampled using the same techniques used on the northern clay lens.

3. Photo points will be established at the center markers for the northern and southern clay lenses in August or September the year following manipulation.

Outcomes: If any management technique or visitation by publics has a significant negative impact on the prairie community, then the technique will be halted and the management plan reassessed to ensure that the management goals are met. Significant negative effects will include the introduction of any non-native species to the prairies or woodland or excessive trampling on the prairie causing death or damage to prairie plants.

c. **Storage Location of Monitoring Data**

The Photo Record and Monitoring Data will be held with the Wayne National Forest RNA Coordinator files. A copy of all photos and data will be kept in the corporate files of the Wayne National Forest at the Athens Ranger District under file code 4063 Buffalo Beats.

8. Other Resource Recommendations

Allow for ground penetrating research and stabilization of damaged heritage resources to occur.

9. Literature

Hardin, E.D. 1984. Vegetation of Buffalo Beats after 22 years. *Bull. of Torrey Botanical Club* 115:13-24.

Jones, C.H. 1944. Studies in Ohio Floristics: III. Vegetation of Ohio prairies. *Bull. of Torrey Botanical Club* 71:636-548.

Kalisz, Paul and S.E. Boettcher, 1990. Phytolith analysis of soils at Buffalo Beats, a small forest opening in southeastern Ohio. *Bulletin of Torrey Botanical Club* 117:445-449.

McClenahen, J.R. and D. B. Houston. 1998. Comparative age structure of a relict prairie transition forest and indigenous forest in Southeastern Ohio, USA. *Forest Ecology and Management* 112: 31-40.

McClenahen, James R. and Daniel B. Houston. 1997. Research Report: Comparative Forest Age Structure of Two Calcareous Clay Soil Sites within the Buffalo Beats Research Natural Area. Report contracted by The Ohio Chapter of the Nature Conservancy and the Wayne National Forest.

McClenahen, James R. and Daniel B. Houston. 1996. Research Report: Comparative Forest Age Structure and Growth Response within the Buffalo Beats Research Natural Area. Report contracted by The Ohio Chapter of the Nature Conservancy and Wayne National Forest.

The Nature Conservancy, 1995. Vegetation Monitoring in a Management Context. Arlington, VA: The Nature Conservancy [unnumbered, unpublished].

The Nature Conservancy - Ohio Chapter: Steve Sutherland. Draft TNC Management Plan for Buffalo Beats. Wayne National Forest Contract.

Porter, W.P. 1956. Notes on some unusual flora found in Athens County, Ohio. Ohio Journal of Science 56: 121-123.

Transeau, E.N. 1935. The Prairie Peninsula. Ecology 16: 423-437.

USDA Forest Service, Region 8. Vegetation Management Environmental Impact Statement. 1988. Atlanta, GA.

Weishaupt, C.G. 1971. Vascular Plants of Ohio: A Manual for Use in Field and Laboratory. Third Edition. Dubuque.

Wistendahl, W.A. 1975. Buffalo Beats, a relict prairie within a southeastern Ohio forest. Bull. of Torrey Botanical Club 102 (4): 178-186.

Environmental Assessment

Buffalo Beats

Candidate Research Natural Area



Wayne National Forest
Athens County, Ohio
Spring, 1998

Abstract:

Buffalo Beats, one of the easternmost extensions of the prairie peninsula, has been recognized as a very unique and ecologically significant plant community by The Nature Conservancy and the Ohio Department of Natural Resources - Division of Natural Areas and Preserves for years.

The Nature Conservancy has ranked this plant community as "G2" which means that this community type is imperilled globally because of extreme rarity or because of some factor(s) making it very vulnerable to extinction throughout its range.

Many people (professional ecologists, concerned citizens) have encouraged and supported the Research Natural Area classification for years.

For all of these reasons, the Wayne National Forest is proposing to change the Management Area [MA] classification of Buffalo Beats from candidate Research Natural Area (MA 9.2) Special Area (MA 8.2) to Research Natural Area (MA 8.1). Along with this designation change, an Establishment Record containing a Management Plan has been prepared. The goal of management is to 1) maintain the existing tallgrass prairie community by minimizing the threat of the invasion of woody and non-native species; 2) expand and maintain the size of the tallgrass prairie at the full extent of the clay lens soil on the northern and southern prairie sites and 3) provide opportunities for education and research under controlled, authorized conditions. Actions which are included in the Management Plan are 1) prescribed fire, 2) tree removal by cutting, 3) use of herbicides containing glyphosate and triclopyr, 4) volunteers to minimize non-native or woody native vegetation on the prairie(s), 5) appropriate public uses and 6) monitoring. No trees originating before the 1880's will be removed.

Three other alternatives are considered. They are:

No Action: This alternative is required under the implementing regulations of the National Environmental Policy Act (NEPA) and serves as a baseline for comparing all other alternatives. By "baseline" we mean it allows us and a reviewer to understand what would occur on the area if a decision was made not to treat the area at this time for the identified purpose and need. The area would remain a Special Area but would NOT have a Management Plan.

Alternative C: This alternative would allow management of the prairie(s) to occur [the same management as found in the Proposed Action] but would not require a change in Management Area designation--it would remain a Special Area. This would reduce the amount of paper work required for its designation and eliminate the oversight of research by the research division of the U.S. Forest Service. This alternative would allow for the management necessary for the maintenance and expansion of the prairie(s) per the Management Plan.

Alternative D: Alternative D would change the designation of Buffalo Beats to Research Natural Area. It would allow for management of the prairie to be maintained and expanded but would not use herbicides.



Buffalo Beats, Northern Prairie. July, 1997

Responsible Official: Bob Jacobs, Regional Forester

For More Information Contact:

Rosemarie Boyle, Forest Botanist
Wayne National Forest, Athens Ranger District
219 Columbus Road
Athens, OH 45701
Phone: 740-592-6644 ext 117
Fax: 740-593-5974

Table of Contents

	PAGE
List of Figures	ii
List of Tables	ii

CHAPTER 1
Purpose and Need

1. Purpose of and Need for Action	1
1.1 Introduction	1
1.2 Purpose and Need	1
1.2a Purpose	
1.2b Need	
1.3 The Proposed Action	1
1.4 Decision to be Made	1
1.5 Other Projects in the Proposed Area	2
1.6 Summary of Scoping	2
1.7 List of Significant Issues	2
1.7a Overview	
1.7b Significant Issues	
1.8 Forest Plan Direction and Relation to Other Planning Documents	3

CHAPTER 2
Alternatives

2. Alternatives	5
2.1 Introduction	5
2.2 Proposed Action	5
2.2a Objectives of the Proposed Action	
2.2b Methods to Meet Objectives	
2.2c Mitigation Measures	
2.3 No Action	7
2.3a Objectives of No Action	
2.3b Methods to Meet No Action	
2.4 Alternative C [No Action with Management]	7
2.4a Objectives of Alternative C	
2.4b Methods to Meet Alternative C	
2.4c Mitigation Measures	
2.5 Alternative D [Prescribe Fire and Volunteers]	8
2.5a Objectives of Alternative D	
2.5b Methods to Meet Alternative D	
2.5c Mitigation Measures	
2.6 Mitigation Measures Common to All Action Alternatives	8
2.6a For Prescribed Fire	
2.6b For Cutting of Trees	
2.7 Alternatives Considered but Dropped from Detailed Analysis	8
2.7a Girdling and Prescribed Fire	
2.7b Girdling, Prescribed Fire and Herbicides	
2.8 Comparison of Alternatives	9

CHAPTER 3
Affected Environment
[Current Condition]

3.1 Introduction . . . . .	.10
3.2 Current Conditions . . . . .	.10
3.2a Fire . . . . .	.10
3.2b Trees on the Clay Lenses . . . . .	.11
3.2c Volunteers . . . . .	.12
3.2d Herbicides . . . . .	.12
3.2e Exotic Plants . . . . .	.14
3.2f Soils . . . . .	.15
3.2g Mineral Rights . . . . .	.15
3.2h Skippers & Butterflies . . . . .	.15
3.2i Wildlife and Plants . . . . .	.16

CHAPTER 4
Effects by Alternative
[Environmental Consequences]

4.1 Introduction . . . . .	.18
4.2 Environmental Consequences by Significant Issue . . . . .	.18
4.2a Inclusion of a Management Plan . . . . .	.18
4.2b Introduction of Exotics by Management Techniques . . . . .	.20
4.2c Effects on Water by Herbicides . . . . .	.21
4.2d Effects on Soil . . . . .	.22
1. By herbicides	
2. Volunteers and Soil Compaction	
4.2e Impact of Reserved Mineral Rights on the Integrity of the Prairie . . . . .	.22
4.2f Effects of Prescribed Fire on Skippers and Butterflies . . . . .	.23
4.2g Effects of Herbicides on Wildlife and Plants . . . . .	.23

APPENDICES:

Appendix A: References . . . . .	.27
Appendix B: Person Consulted . . . . .	.29
Appendix C: Rates of Herbicide Application . . . . .	.29

LIST OF FIGURES

Figure 1. Buffalo Beats, Northern Prairie . . . . .	.5
Figure 2. Buffalo Beats, Southern Lens . . . . .	.6
Figure 3. Approximate extent of the northern and southern clay lenses . . . . .	.6
Figure 4. Distribution of trees by pith years for canopy trees on the prairie sites . . . . .	.11
Figure 5. Distribution of all cored trees by pith years on the prairie sites at Buffalo Beats . . . . .	.11

LIST OF TABLES

Table 1. Comparison of Alternatives by Significant Issue . . . . .	.9
Table 2. List of Butterflies and Skippers Documented at Buffalo Beats . . . . .	.16

CHAPTER 1
PURPOSE OF AND NEED FOR ACTION
(40 CFR 1502.13)

1.1 Introduction

This chapter contains the purpose and need for the action, a brief description of the proposed action, the decision to be made, other projects in the proposed area, a summary of scoping, a list of significant issues, a discussion of Forest Plan direction and this documents relationship to other planning documents.

1.2 Purpose and Need

1.2a Purpose of:

The intent is to change the Management Area (MA) status of Buffalo Beats from candidate Research Natural Area/Special Area (MA 9.2/8.2) to Research Natural Area (RNA) which is MA 8.1. and actively manage the prairie.

1.2b Need for:

Several professional, recognized ecologists (public and private sector) have encouraged and supported the RNA classification of Buffalo Beats for years. Many feel that this highest form of protection is appropriate for this very unique ecosystem. Designating Buffalo Beats would 1) contribute to the protection of diversity of vegetative communities and wildlife habitat; 2) represent special or unique characteristics of scientific interest and importance and 3) protect and maintain this special potential natural vegetation and faunal community.

1.3 The Proposed Action

The Wayne National Forest is proposing to change the MA classification of Buffalo Beats from MA 9.2/8.2 to 8.1 during the 1998 calendar year. Along with this designation change, an Establishment Record containing a Management Plan as Appendix 1 has been prepared. Management actions are intended to enlarge the prairie. Actions which are included in the Management Plan are: 1) prescribed fire, 2) tree removal by cutting, 3) use of the herbicides glyphosate and triclopyr, 4) volunteers to minimize non-native or woody native vegetation on the prairie, 5) appropriate public uses and 6) monitoring.

1.4 Decision to be Made

The decision to be made by the Regional Forester is whether to designate Buffalo Beats as a Research Natural Area and proceed with the Proposed Action or another alternative and to determine whether or not this will result in significant effects. If an action alternative were chosen (designate as an RNA) this would require a Plan Amendment. Other decisions to be made are approval of the Establishment Record which contains a Management Plan that will involve active management (this is the Proposed Action). These decisions will be approved by the Region 9 Regional Forester, Northeast Forest Station Director, Wayne Forest Supervisor, Athens District Ranger and the Wayne RNA Coordinator.

1.5 Other Projects in the Proposed Area

Currently, there are no Special Use Permits, vegetation management, recreation projects/areas within the proposed area. There is a nearby wildlife opening [T10N, R14W, Section 30; Compartment 124, Stand 16] that contains Whorled Rosinweed (Silphium trifoliatum) and Little Bluestem (Schizachyrium scoparium var. scoparium) that may be burned in the coming years.

1.6 Summary of Scoping

Issues and management concerns related to the proposed action were identified by reviewing Forest Plan direction for the area and by contacting interested and affected publics and Forest Service employees.

Two letters were sent out. One May 13, 1994 to three mailing lists (timber, all, special areas/natural areas) and another October 13, 1995 to approximately 60 individuals and organizations requesting their comments about the proposed action.

Specific comments, issues and concerns were identified from these sources. Responses were received as written letters, telephone calls, and personal contacts.

1.7 List of Significant Issues

1.7a Overview

Three major issues were identified and served as the basis for developing the alternatives including the proposed action. The most commented upon area was the issue of how the prairie would be managed. The objective is to maintain the existing north prairie and expand both the north and south prairies to the extent of the clay lens. Specific management tools (actions) generated many comments, some in favor and some opposed, and therefore were analyzed separately under the effects section. These issues were also used to assess environmental consequences. These actions/tools that are under the Management Plan are listed below.

1.7b Significant Issues

1. Inclusion of a Management Plan in the Decision and Actions Included Under the Management Plan

- To designate Buffalo Beats without a Management Plan would not protect the fire adapted community of Buffalo Beats. Lack of management at Buffalo Beats would lead to the disappearance of this rare community.

Unit of Measure: Existence of a Management Plan

- Introduction of Exotics by Management Techniques
The proposed management techniques of fire, herbicide use, tree removal and use of volunteers and the disturbance they may create could create suitable habitat for exotics.

Unit of Measure: Estimated area of bare mineral soil created by each activity.

- Effects on Soil and Water by Herbicides and Volunteers
The proposed use of the herbicides glyphosate and triclopyr may get into the soil as well as the ground water which in turn could effect the growth and health of species. Also, excessive soil trampling by volunteers removing sprouts could be detrimental to the soil.

Unit of Measure:

Herbicides & soil/water issue: Duration of herbicide in soil and water. Risk of herbicide to contaminate soil and water.

Volunteers & soil compaction: Amount (square feet) of estimated compaction.

- Effects of Herbicides on Wildlife and Plants
The proposed use of the herbicides glyphosate and triclopyr may get into the soil as well as the ground water which in turn could effect the growth and health of species (wildlife and plants).

Unit of Measure:

Animals: Health risk to animals

Plants: Risk of herbicides to non-target plant species

2. Impact of Reserved Mineral Rights on the Integrity of the Prairie
As of April 1998, the mineral rights under Buffalo Beats are owned by the E. M. Poston Trust. The former leasee, Quaker State, agreed that they would not drill on or near Buffalo Beats. In August 1995, Quaker State sold all of their leases to Belden and Blake. There is no record for Quaker State release of Buffalo Beats, but it appears since all wells within the Buffalo Beats area have been abandoned, the lease has expired of its own terms. All minerals are reserved until December 31, 2040 by E.M. Poston Trust.

Unit of Measure: Existence of a Memorandum of Understanding, Agreement or transfer (or likelihood) of ownership to Wayne National Forest for the Poston Mineral Estate.

3. Effects of Prescribed Fire on Skippers & Butterflies
The proposed use of fire has the potential to impact some species of moths and butterflies known to occur at Buffalo Beats.

Unit of Measure: Likelihood and estimated loss of habitat (area).

1.8 Forest Plan Direction and Relation to Other Planning Documents

The 1988 Wayne National Forest Land and Resource Management Plan designated Buffalo Beats as a Candidate Research Natural Area (RNA). In January 1992, Forest Plan Amendment No. 7 classified Buffalo Beats as a Special Area (Management Area [MA] 8.2) and candidate Research Natural Area. The 1988 Plan states (p4-146) that the Plan will be amended to put RNAs in the RNA status (MA 8.1) when they are established.

In order to establish Buffalo Beats as an RNA, five official documents have been or will be prepared. They, collectively, will establish the RNA. These documents, with a brief description, follow.

Environmental Assessment: This document is required under the National Environmental Policy Act (NEPA) to 1) briefly provide sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement (EIS) or finding of no significant impact, 2) aid an agency's compliance with the Act when no environmental impact statement is necessary and/or 3) facilitate preparation of a statement when one is necessary [40 CFR 1508.9 (a)].

Establishment Record: Forest Service policy and procedures as directed and outlined in Forest Service Manual (FSM) 4063.00-4063.50 require an Establishment Record. This record contains pertinent information in regards to the specific RNA. In order to better understand the process involved, the definition of an RNA is defined (FSM 4063.05) as a "physical or biological unit in which current natural conditions are maintained insofar as possible. These conditions are ordinarily achieved by allowing natural physical and biological processes to prevail without human intervention. However, under unusual circumstances, deliberate manipulation may be utilized to maintain the unique feature that the RNA was established to protect" (Federal Committee on Ecological Reserves). In order to maintain the unique features of Buffalo Beats, a remnant tallgrass prairie, some type of management must occur or else the community will succeed to forest and the unique feature will be lost. For this reason, a Management Plan has been prepared and is Appendix 1 of the Establishment Record.

Decision Notice/Designation Order: This is a separate written instrument by which the Regional Forester with concurrence of the Station Director, officially designates a research natural area.

Forest Plan Amendment: Forest Plans shall include analysis of and recommendations for, any proposed research natural area establishment. Where proposals arise outside of the forest planning process, the affected Forest Supervisor shall prepare, as part of the Establishment Record, a forest plan amendment in accordance with land management planning regulations [36 CFR 219.10 (f); FSM 1922.5] and environmental analysis policy and procedures (FSM 1950.15).

CHAPTER 2

ALTERNATIVES (40 CFR 1502.14)

2. Alternatives

2.1 Introduction

This chapter contains a more detailed description of the proposed action noted in Chapter 1. It also describes the alternatives to the proposed action; mitigation measures that would be applied depending upon which alternative is selected; alternatives that were considered but dropped from detailed analysis; and finally a table which compares alternatives by significant issue.

2.2 The Proposed Action

2.2a Objectives of the Proposed Action

The objectives of the proposed action are to designate Buffalo Beats as an RNA and 1) maintain the existing tallgrass prairie community by minimizing the threat of the invasion of woody and non-native species; 2) to expand and maintain the size of the tallgrass prairie at the full extent of the calcareous clay soil in both the northern and southern prairie sites and 3) provide opportunities for education and research under controlled, authorized conditions.

The Proposed Action contains all the management techniques and ideas that are included in the Management Plan (Establishment Record, Appendix 1). The Proposed Action is the Management Plan. It must be clearly understood that this plan is adaptive and is subject to change if monitoring data, analysis and results indicate that a management tool or event is causing negative effects to the prairie.

Figure 1. Buffalo Beats Northern Prairie (Wayne National Forest. July, 1997).



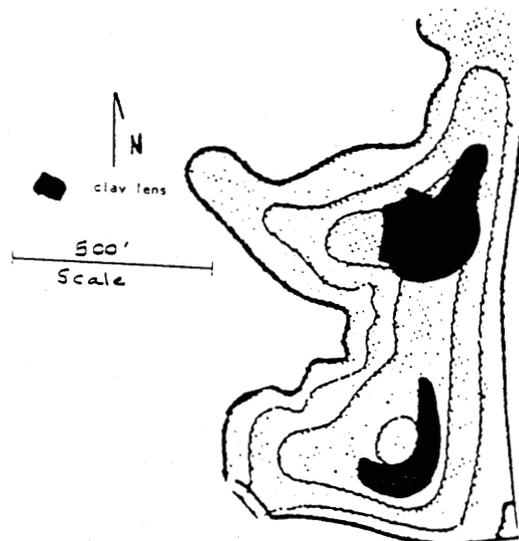
Figure 2. Buffalo Beats Southern Clay Lens (Wayne National Forest. July, 1997)



Buffalo Beats currently has one small prairie that is dominated by prairie forbs and grasses (see Figure 1). Underlying this small prairie is a clay lens. Approximately 70 to 100 feet south of the existing prairie is another clay lens. The two clay lenses are illustrated in Figure 3. This southern clay lens also contains some prairie plants. A photograph of this more forested southern lens is shown in Figure 2.

In this Environmental Assessment, the northern and southern names of prairie and clay lens are used interchangeably.

Figure 3. Approximate Extent of the Northern & Southern Clay Lenses



2.2b Methods to Meet Objectives

To meet management objectives, prescribed fire, cutting of trees, use of volunteers and use of the herbicides glyphosate and triclopyr would be used.

Prescribed fire would be used annually for two years then every third year on the northern prairie. On the south prairie, the burning frequency would be annually for two years then every two years until the prairie is restored. After this southern prairie is restored, it would be on the same burn frequency as the northern prairie - every three years. The entire Special Area/cRNA would be burned with the northern prairie regime. The cutting of trees would involve cutting trees younger than 67 years (birthdate in the 1920's). Some older trees (birthdates from the 1880's to the 1920's) would be cut from the southern prairie since it is much more forested and will require more intensive mechanical intervention than the northern prairie. (See Figure 1 and 2 for the existing conditions). In addition to prescribed fire and cutting, the use of herbicides and volunteers may be necessary if monitoring results indicate problems with woody or non-native plants invading the prairie sites. The primary method of removal for the woody or non-native plants would be volunteers. If monitoring results indicate that volunteer work is not effective at controlling these species, herbicides may be necessary. Herbicides used would be triclopyr (marketed as Garlon) and glyphosate (marketed as Roundup or Accord). In addition to the adoption of the adaptive Management Plan, the Research Natural Area designation process would proceed.

2.3 No Action

2.3a Objective of No Action

This alternative is required under the implementing regulations for the National Environmental Policy Act (NEPA) and serves as a baseline for comparing all other alternatives. By "baseline" we mean it allows us and a reviewer to understand what would occur on the area if a decision was made not to treat the area at this time for the identified purpose and need. By using this alternative as a comparison, it helps with understanding why burning and cutting are used in other alternatives.

2.3b Methods to Meet Objectives

In order to implement this alternative, the Management Plan would not be approved or implemented nor would the area be designated as an RNA. This alternative should not be taken to mean that no activities will take place in the area. We would continue to prescribe burn but no other management actions would occur. Other activities which are unrelated to the purpose and need stated for this analysis could be proposed for the area. Any new proposals would undergo environmental analysis prior to implementation.

2.3c Mitigation Measures

No mitigation measures would apply to this alternative since no actions would occur as a result of this alternative.

2.4 Alternative C

2.4a Objectives of Alternative C

This alternative would allow management of the prairie to occur [the same management as found in the Proposed Action] but would not require

a change in Management Area designation. The area would remain a Special Area. This would reduce the amount of paper work required for its designation yet allow for the management necessary for maintenance and expansion of the prairie.

2.4b Methods to Meet Objectives

As found in 2.2b, the proposed action except there will be no RNA designation; the area will remain a Special Area.

2.5 Alternative D

2.5a Objectives of Alternative D

Alternative D would change the designation of Buffalo Beats to Research Natural Area. It would also allow for management of the prairie to maintain and expanded the prairie but would not use herbicides.

2.5b Methods to Meet Objectives

This alternative would allow the use of prescribed fire, cutting of trees and use of volunteers. The use of prescribed fire, the cutting of trees and the use of volunteers would be the same as in the proposed action (see 2.2b). This alternative does not include the use of herbicides for the control of non-native or woody species but relies on volunteers to control these threats.

This alternative was developed to address the concerns of several commentors regarding their objections to the use of herbicides.

2.6 Mitigation Measures Common to All Action Alternatives

2.6a For Prescribed Fire

1. Do not relight any areas that did not burn. This will allow for refugia sites for moths and butterflies.
2. Preferred timing of burns is between late February and mid-April.

2.6b For Cutting

1. On the south prairie, do not remove any older trees with exfoliating bark; and cut trees between the dates of September 15 and April 15 in order to protect suitable habitat for Indiana Bat.

2.6c For Volunteers

1. Limit the number of volunteers to five per visit to prevent compaction. Do not conduct volunteer work during wet periods.

2.6d For Herbicides

1. Application will follow label recommendations.
2. Application will be by hand and foliar to prevent drift and hitting non-target plant species.

2.7 Alternatives Considered but Dropped from Detailed Analysis

2.7a Girdling and Prescribed Fire

Internal review of the draft EA resulted in many reviewers (Forester, Fire Crew Boss, Wildlife Biologist and Ecosystem Program Manager) objecting to the use of girdling. The most significant reason is the threat and danger of girdled trees to researchers, volunteers, fire fighters and Forest Service personnel.

2.8 Comparison of Alternatives

Table 1. Comparison of Alternatives by Significant Issue

Existence of a Management Plan Measure: Existence of a Mgmt Plan	Proposed Action		Alternative C		Alternative D	
	Exists	None	None	None	None	None
Exotic Plant Introduction Measure: Estimated bare mineral soil	<1%	None	<1%	None	<1%	None
Effects of Herbicides & Volunteers on Soil & Water	glyphosate: 60 days, 50% remaining					
- Herbicides & Soil	120 "	25% "	None	None	None	None
Measure: - Duration of herbicide in soil	180 "	12.5% "	See Proposed Action	See Proposed Action	No Effect	No Effect
- Risk to contaminate soil	240 "	6.25% "				
- Risk to contaminate soil	300 "	3% "				
- Herbicides & Water	inadequate soil. LOW					
Measure: - Duration of herbicide in water	Runoff unlikely due to mitigation measures (Application standards)					
- Risk to contaminate water	None					
- Soils & Volunteers (Compaction) Measure: - Estimated amount (ft ²) of compaction	Discountable (unlikely to occur)		None		None	
Impacts of Reserved Mineral Rights on the Integrity of the Prairie	Unlikely		As Proposed Action		As Proposed Action	
Measure: - Likelihood of purchasing mineral estate or Agreement	Possible		"		"	
- Likelihood of Agreement if not purchased						
Effects of Prescribed Fire on Skippers and Butterflies	None (due to mitigation measures)		As Proposed Action		As Proposed Action	
Measure: Estimated loss of habitat (acres)						
Effects of Herbicides on Wildlife	Very Low		None		None	
Measure: Health risk to animals						
Plants	None (due to mitigation)		None		None	
Measure: Risk to non-target species						

CHAPTER 3

AFFECTED ENVIRONMENT

(40 CFR 1502.15)

3.1 Introduction

This chapter presents the existing environment - that is, the baseline environment or what's out there now. Current environmental conditions found in the project area are discussed in this chapter for fire, trees growing on the clay lenses, volunteers, herbicides, exotic plants, soils, mineral rights, wildlife (includes a separate discussion on skippers and butterflies) and plants. Actions which have occurred in the past as well as current actions are included.

3.2 Current Conditions

3.2a Fire

Phytolith analysis of the entire northern clay lens at Buffalo Beats concluded that this lens contained vegetation other than forest over much of its history. Most likely, the vegetation was forb dominated (Kalisz and Boettcher, 1990). The fire adapted, prairie forbs and grasses Gentiana alba, Eryngium yuccifolium, Andropogon gerardii and Sorghastrum nutans occur in this northern lens prairie. These species, like other prairie species, need high light levels for germination, growth and reproduction.

In order to understand how these high light conditions came about, it is necessary to explain some history regarding American Indians.

There was a large settlement of American Indians near the Hocking River at a site called The Plains, Ohio. To the north of this settlement, across the river, is an extensive ridge system called Utah Ridge. Buffalo Beats is on Utah Ridge, roughly five miles north-northwest of The Plains.

American Indians were not passive occupants of the land. The landscapes of North and South America described by the first explorers and settlers had already been shaped by millions of people over thousands of years of use and management. (Crumley 1994; Deeven 1992; Fiedel 1987, Gomez-Pompa 1987; Gomez-Pompa and Kaus 1992; Rosevelt and other 1996; Shane and Cushing 1991; Williams 1989). American Indians had the incentive, technology and numbers to modify and maintain forests and other ecosystems.

Hunter-gathering peoples set fires which were less disruptive than lightning caused wildfires. These fires were relatively easy to control and initiated plant growth weeks or even months before new growth occurred naturally. Although the burning practices of hunting-gathering peoples varied from region to region, and within regions, and from one local habitat type to another, human ignitions primarily occurred in order to induce the early emergence of plant growth. That means that fires were set during the spring in northern and more temperate regions.

The prairie at Buffalo Beats is a fire dependent ecosystem. Mutch (1992) states "an ecosystem can be called fire dependent if periodic changes in the system due to fire are essential to functioning of the natural system. In such systems, fire is a significant environmental factor that initiates and terminates key vegetational successions, regulates the age structure and species composition of vegetation, produces the vegetation mosaic on the landscape, affects insects and plant diseases, influences nutrient cycles and energy flows, regulates the productivity, diversity and stability of ecosystems and determines the habitat of wildlife".

3.2b Trees at Buffalo Beats

Dr. Jim McClenahen and Dr. Dan Houston conducted research regarding the ages of standing trees on both the northern (1996) and southern (1997) clay lenses. They found that most trees had germinated in the late 19th century (1880s) and the 1940s. See Figure 4 below.

Figure 4. Distribution of trees by pith years for canopy (dominant and co-dominant crown position) on the prairie sites (north and south). From McClenahen & Houston, 1997, unpublished.

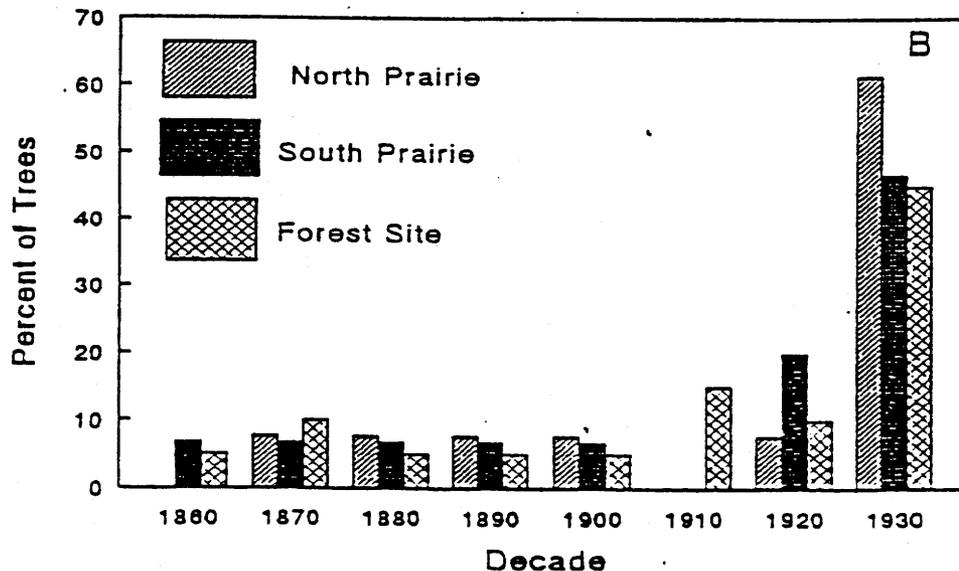
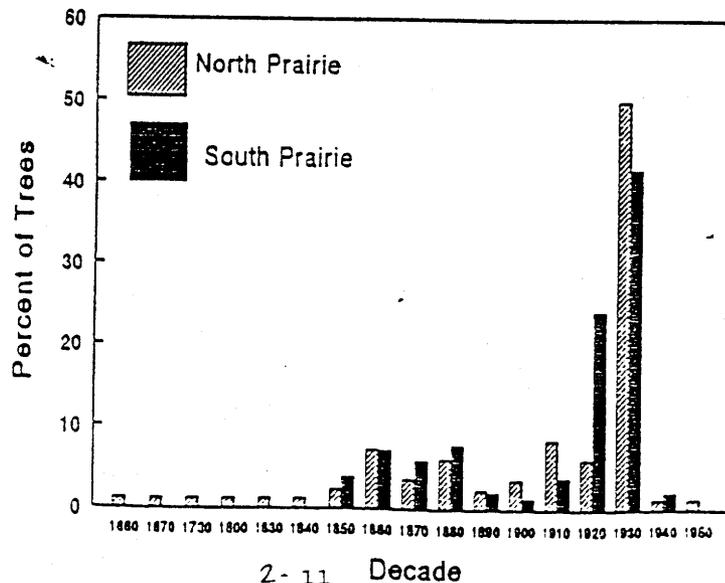


Figure 5. Distribution of all cored trees by pith years on the prairie sites at Buffalo Beats. From McClenahen & Houston, 1997, unpublished.



Summarizing McClenahan & Houstons report: "there was a dramatic influx of trees on the prairies around the decades of the 1920's and 1930's with periods of lesser recruitment extending over the latter half of the 1800's, especially the 1850's through the 1880's". See Figures 4 and 5.

It is very likely that the trees that germinated during the 1920's, 1930's and after were the results of fire suppression efforts by the Forest Service who purchased the site in the early 1940's.

3.2c Volunteers

1. And Soil Compaction

As the name, Buffalo Beats, implies this woodland opening of grasses and forbs was more than likely visited by woodland bison and other hooved animals. Present day hooved animal species that visit the opening include white tailed deer. All hooved animal species apply considerably more pounds per square inch of soil (soil compaction) than would a human foot. Animal species utilize the site during the full range of soil moisture conditions. Soils are more susceptible to compaction when they are saturated or in a wet condition. Five volunteers walking over the site during the mid-summer months when the soils are at field capacity or drier would result in no detrimental soil compaction. Soils usually reach field capacity one or two days following a rain event. In the unlikely chance that detrimental soil compaction would occur the normal shrinking and swelling of the clay soils during wetting and drying over the course of a season would alleviate any negative effects. The freezing and thawing over the winter months would also rectify any soil compaction that may occur.

Research indicates that the effect of trampling on plant biomass is complex: very light trampling can stimulate growth of some species of grasses and the biomass of the field layer can be increased by as much as one third as a result of one trampling per week for eight weeks (Liddle, 1975)

2. History at the Site

After the 1987 prescribed burn, Yellow Sweet Clover (Melilotus officinalis) appeared in the prairie opening. Hand pulling by volunteers of plants before flowering eliminated this species. There were no negative effects created by volunteers reported from this work.

3.2d Herbicides

Volunteers would be the first line of control for control of exotics or non-desirable woody species. In the event that monitoring indicates that volunteer control is not effective, herbicides may be used. Below is a summary of some characteristics of the two herbicides proposed for use.

For application rates and methods, see Appendix C.

The following information is from the Environmental Consultants, Final Environmental Impact Statement, Vegetation Management on Electric Utility Right-of Ways, Allegheny National Forest, June 1997:

Glyphosate

a. Formulation: Glyphosate-containing products are sold under the trade names Roundup, Rodeo, Compadre and Accord, in liquid form as a concentrate containing 4, 5, 1.61 and 4 pounds of active ingredient per gallon of concentrate respectively. The remainder of the concentrate consists of water, in the case of Rodeo, Compadre and Accord and water plus a surfactant in the case of RoundUp. The concentrate is normally stored and transported in 2.5, 15 or 30 gallon (or smaller) sealed containers.

b. EPA Approved Uses: Glyphosate is registered for use in agriculture and in residential areas by homeowners. Certain formulations are registered for use on orchard and vineyards and in weed control prior to planting grains, soybeans, corn and other food crops. It is also registered for forestry use, rights-of-way use and for controlling grass and weeds in recreation areas, around schools, in parking lots and on other public grounds.

c. Means of Entry into Plants: Glyphosate is a broad spectrum, relatively nonselective, post emergent herbicide. That is, it affects plants after they emerge from the ground and have green leaves. Glyphosate is absorbed primarily by plant foliage and is readily translocated throughout the plants to roots and rhizomes.

d. Mode of Action: Once glyphosate moves to plant growing points, it disrupts aromatic amino acid synthesis thereby inhibiting further plant growth and sprouting. Animals (including humans and insects) do not synthesize aromatic amino acids (so called essential amino acids) so they are not affected by glyphosate.

e. Environmental Fate: Glyphosate in plants is not metabolized by plant tissue. Glyphosate has a very low lipid solubility and thus has little tendency to bioaccumulate in animals. It is slightly toxic to mammals, with a toxicity less than table salt.

Glyphosate is completely and rapidly degraded in soil by microbiological activity. In the soil environment, it is resistant to chemical degradation, is stable to sunlight, is strongly adsorbed to soil particles, is relatively nonleachable, has a low tendency to runoff, has negligible volatility and has a minimal effect on soil microflora. Soil microflora degrade glyphosate to aminomethyl phosphoric acid, which is somewhat more stable than glyphosate.

Principal decomposition end products are carbon dioxide, water, nitrogen and phosphate. Decomposition occurs under both aerobic and anaerobic conditions. Glyphosate has an average half-life of 60 days in the soil. The half-life is shorter than average in silt-loam and longer in sandy soils.

In aquatic systems, glyphosate is strongly adsorbed to both organic and mineral matter and is degraded primarily by

microorganisms. The rate of degradation of glyphosate in water is generally slower than it is in most solids because there are fewer microorganisms in water.

In most cases, a significant portion of the applied herbicide is intercepted by the target plants or low growing plants below and never reaches the soil.

Triclopyr

a. Formulation: Using the trade names Garlon 3A and Garlon 4, triclopyr is sold as a liquid composed of 44.4 percent active ingredient (Garlon 3A) and as a liquid composed of 61.6 percent active ingredient (Garlon 4). It is normally stored in 2.5 or 30 gallon containers.

b. EPA Approved Uses: Common uses specified on the labels include control of unwanted woody plants and annual and perennial broadleaf weeds in forests and on industrial sites and rights-of-way.

c. Means of Entry into Plants: Triclopyr is readily absorbed by both foliage and roots. It is translocated throughout the plant and accumulates in meristematic tissue.

d. Mode of Action: The exact physiological mechanism of action is not known but it affects respiration, food reserves and cell division.

e. Environmental Fate: Triclopyr is very slightly toxic to mammals, the lowest EPA category of toxicity. It is not strongly absorbed. The degree depends on soil organic matter content and pH. Some leaching may occur in light soils under high rainfall conditions. Triclopyr is degraded by soil microbes and is rapidly degraded by photodecomposition. The average half-life in soil is expected to be approximately 45 days. In most cases a significant portion of the herbicide is intercepted by the target plants and low growing plants below and never reaches the soil.

3.2e Exotic Plants

Garlic Mustard (Alliaria petiolata), Japanese Knotweed (Polygonatum cuspidatum), Tree of Heaven (Ailanthus altissima), Japanese Honeysuckle (Lonicera japonica), Multiflora Rose (Rosa multiflora), Autumn Olive (Elaeagnus umbellata), Sweet Yellow Clover (Melilotus officinalis), White Sweet Clover (Melilotus alba), other clovers (Trifolium repens, Trifolium hybridum, Trifolium pratense f. leucochraceum), bush honeysuckles (Lonicera morrowii, Lonicera tatarica, Lonicera mackii), and other common old field or roadside exotics (Daucus carota, Chrysanthemum leucanthemum var. pinnatifidum, Glechoma hederacea, Lamium purpureum and Prunella vulgaris) are non-natives which are known to occur in the area and that repeated fires may or may not control. It is estimated that one-third of all the plant species in Ohio are not native (Weishaupt, 1971). These exotic plants could become a very serious threat to the existing prairie should they become established. Currently (4/98), exotic species and stump sprouts are not a problem at Buffalo Beats. After the 1987 burn, Melilotus

officinalis (Sweet Yellow Clover) appeared in the prairie opening. Hand pulling the plants before flowering eliminated this species.

3.2f Soils

"The prairie sites are underlain by a clay deposit at the north end of a barbell-shaped ridge (see Figure 3). The clay deposits may represent a portion of the Duquesne member of Pennsylvanian age (Wistendahl, 1975).

Limestone nodules found 22-24 inches below the surface are typical of residual prairies and do not form in woodlands. The nodules result from the leaching of calcium ions through small fractures in the soil to an impervious layer where the precipitate forms nodules. There is a lack of agreement whether the soil is derived from water-deposited or wind deposited materials.

The border around the prairie opening is referred to as the transition zone since trees had invaded there and are changing the character of the soil (Wistendahl)" [Ortt, 1995].

Soils in the surrounding woods are Westmoreland-Guernsey and Guernsey silt loams, derived from underlying sandstones and shales.

3.2g Mineral Rights

The entire Section (36) in which Buffalo Beats is located was owned by absentee landowners from the first deed issued in 1796 until the land was acquired by the U.S. Forest Service in 1942 (Tract #HV-1252). When the U.S. Forest Service purchased the land on October 5, 1942, the minerals were reserved by the Elias M. Poston Trust until December 31, 2040. After this date, the mineral estate will transfer to the U.S. Forest Service.

There have been several wells drilled on this Tract (640 acres) since 1975. There were no wells drilled prior to 1975. Currently (4/98), all wells have been plugged and abandoned; there are no active wells on this Tract. From 1990 to 1995, a Memorandum of Understanding existed between the U.S. Forest Service and Quaker State Oil Company that protected Buffalo Beats from any surface occupancy. In 1995, Quaker State sold/transferred all of their leases to Belden and Blake Company of Canton, Ohio. Tract# HV-1252 was not part of this transfer. This case has been turned over to the Lands Aquisition Staff of the Athens Ranger District of the Wayne to pursue mineral rights aquisition since there may be an opportunity now to purchase these reserved minerals, rather that wait until they revert in 2040.

There has never been any drilling or mining on or under any of the area designated as Buffalo Beats SA/cRNA.

3.2h Skippers and Butterflies

Buffalo Beats has been visited by many lepidopterists. Table 2 lists the species identified at Buffalo Beats.

Table 2. List of Butterflies and Skippers Documented at Buffalo Beats.

<u>Scientific Name</u>	<u>Common Name</u>	<u>Status</u>
<u>Thorybes</u> spp.	Cloudy Wing	
<u>Erynnis</u> spp.	Dusky Wing	
<u>E. martialis</u>	Mottled Dusky Wing	Resident-rare/prairie
<u>Polites</u> spp.,	Skipper	
<u>Atrvtone</u> <u>logan</u> ,	Delaware Skipper	
<u>Poanes</u> <u>hobomok</u> ,	Northern Golden Skipper	
<u>P. zabulon</u> ,	Southern Golden Skipper	
<u>Amblyscirtes</u> <u>hegon</u> ,	Pepper and Salt Skipper	
<u>Anthocharis</u> <u>midea</u> ,	Falcate Orange-tip	
<u>Incisalia</u> <u>henrici</u> ,	Henry's Elfin	
<u>Celastrina</u> <u>ladon</u> ,	Spring Azure	
<u>C. ebenina</u> ,	Dusky Blue	
<u>Glaucopsyche</u> <u>lydamus</u>	Silvery Blue	Resident-rare/disturbed areas
<u>Speyeria</u> spp.,	Fritillary	
<u>Enodia</u> <u>anthedon</u>	Northern Pearly Eye	
<u>Cyllopsis</u> <u>gemma</u>	Gemmed Satyr	Resident-rare/woodlands

The species listed as having a status of resident and rare are one for which Ohio populations are localized and usually occur at low densities. None of these resident-rare species are listed as rare by the U.S Fish and Wildlife Service, the State of Ohio or the Wayne National Forest.

The main concern regarding the protection of this group of invertebrates is in regards to prescribed fire. These organisms produce larvae that become active in the spring (March). Fire after March has the potential to burn up larvae. For this reason, it is very important that not every inch of the area be burned. If some areas, due to winds or dew, do not burn they must not be relit in order to provide some refugia for these species during the burns. A mosaic of burned and unburned patches within the burn unit would protect these species.

3.2i Wildlife and Plants

1. Wildlife

Within the small prairie, wildlife species which require early successional, grassland habitat would be found. This would include species such as the North American White Tailed Deer, Wild Turkey, Ruffed Grouse, Field Sparrow, and Eastern Bluebird. The remainder of the proposed boundaries of the Buffalo Beats SA/cRNA is mature hardwood forest dominated by oaks and hickories. Wildlife species which may be found in this older, forested habitat include the gray squirrel and pileated woodpeckers. Intensive surveys in 1995 and 1996 found a total of 102 wildlife species in mature oak forest on and around the Wayne National Forest (Vinton and Lawrence Counties, Ohio). About half of the 102 species were birds (54 species), one quarter were mammals (24 species) and the rest were amphibians (14 species) and reptiles (10 species). A complete list of these species is

located in the files of the Athens Ranger District (see Dorr Run Project File #169).

The list of known butterflies and skippers is found under section 3.2h above. During 1995 and 1996 surveys of mature oak forest (Vinton and Lawrence Counties, Ohio), 500 species of arthropods were found. A complete list of these species can also be found in the Athens District Files (see Dorr Run Project File, #166).

2. Plants

Buffalo Beats prairie is a small relict prairie that is surrounded by deciduous forest. It is one of the easternmost outliers of the Prairie Peninsula (Transeau, 1935). The existence of this relict plant community may date from a xerothermic period of about 4000 years before the present during which time prairie vegetation expanded eastward (Ortt, 1995). The prairie is nationally significant, both floristically and ecologically (The Nature Conservancy, 1983).

There are three species occurring in the prairie that are listed by the State of Ohio: Yellowish Gentian (Gentiana alba, Threatened), Slender Blazing Star (Liatris cylindracea, Threatened) and Rattlesnake Master (Eryngium yuccifolium, Potentially Threatened). An additional species, Stiff Goldenrod (Solidago rigida) was listed by the state prior to 1984. Other species that are characteristic of Ohio prairies (Cusick and Troutman, 1978) include Big Bluestem (Andropogon gerardii), Stiff-haired Sunflower (Helianthus hirsutus), Flowering Spurge (Euphorbia corollata), Blazing Star (Liatris scariosa), Heart-leaved Golden Alexander (Zizia aptera), Smooth Aster (Aster laevis), New Jersey Tea (Ceanothus americanus) and Pasture Rose (Rosa carolina).

The woodland surrounding the prairie and clay lenses would be classified as a Xeric Upper Slope under the Wayne National Forest Ecological Classification System. A complete list of species found in this land type is on file in the Athens District Office (Botanist files).

CHAPTER 4

EFFECTS BY ALTERNATIVE (Environmental Consequences) (40 CFR 1502.16)

4.1 Introduction

This section forms the scientific and analytic basis for the comparison of alternatives, including the Proposed Action. The environmental consequences, also referred to as effects by alternative, are discussed for fire, trees on the clay lenses, volunteers, herbicides, exotic plants, soils, mineral rights, skippers and butterflies, wildlife and plants.

The reader can use the table below for a quick overview of each Alternative.

	Prescribed Fire	Cutting of Trees	Volunteers	Herbicides	RNA Designation
Proposed Action	yes	yes	yes	yes	yes
No Action	no	no	no	no	no
Alternative C	yes	yes	yes	yes	no
Alternative D	yes	yes	yes	no	yes

4.2 Environmental Consequences by Significant Issue

4.2a Inclusion of a Management Plan

1. Environmental Impacts of the Alternatives

Proposed Action: Appendix 1 of the Establishment Record is the Management Plan for Buffalo Beats. This is an adaptive management plan and is subject to change depending on monitoring. The concepts and tools in the Management Plan have been taken largely from The Nature Conservancy's draft of a management plan for Buffalo Beats. This document was a collaboration between The Nature Conservancy-Ohio Chapter and Ohio Department of Natural Resources - Division of Natural Areas and Preserves. Both entities have been involved in the management and care of Buffalo Beats for 10 years or more. This Management Plan, with its built in flexibility of adaptiveness, would protect the existing prairie and expand the prairie to occupy the full extent of the clay lenses. Currently the prairie is managed piece by piece - when it appears to be in need of fire, the Forest Service conducts a prescribe burn. This Management Plan would formalize the burning, the maintenance, the enhancement, and the monitoring of the prairie for the future. It will change the appearance of Buffalo Beats because some trees will be cut and the prairie will become larger, especially the southern clay lens site, which is now forested (see Figure 2). The implementation of the Management Plan will strengthen the maintenance, enhancement and protection of the prairie as well as the Forest Service's relationship with other land management agencies within Ohio that work on restoring/protecting/enhancing prairies.

It is possible that without an approved adaptive Management Plan, the prairie community at Buffalo Beats may be negatively impacted indirectly and cumulatively. This would be due to lack of fire, spread of trees onto the prairie and increase of shading on the prairie - all of which would cause prairie species to fade away, likely to be replaced by woodland species adapted to lower light levels.

Along with the implementation of the Management Plan, Buffalo Beats would become a Research Natural Area (RNA). There are two broad categories for RNAs. One type is a community which is very unique and very significant for some natural feature(s). The other type are sites that contain excellent examples of a common community (or communities) within a region (subsection). Buffalo Beats, being a unique community with state and national significance ecologically, is well suited for designation status as an RNA.

No Action:

This alternative would not treat the area at this time for the identified purpose and need. The opportunity to implement management to maintain and restore the prairie would not occur. No burning or tree removal would cause increased tree cover and shading on the existing prairie. Lack of fire would not favor and encourage rare plants. The prairie would change from a prairie, open community to a forested, closed community. This rare community of local and regional value would begin to disappear. After several years (decades), it is likely one would never know that a prairie at Buffalo Beats existed. This alternative would have negative direct, indirect and cumulative effects on the rare plants found there and the prairie community itself by lack of fire and lack of tree removal.

Alternative C:

The effects of this alternative are identical to those found under the Proposed Action except the area would not become an RNA. The consequences of this are largely social effects, not environmental. The approval of the adaptive management plan would protect the rare natural community at Buffalo Beats. The social consequences of this area not becoming an RNA would be:

- loss of trust by the research/environmental community since it was not designated
- less paperwork for the government since the RNA review process will not have to be followed for research to occur
- less quality control oversight by Forest Service Research Scientists
- loss of opportunity for Buffalo Beats to be protected and recognized at this perpetual level of protection.

Alternative D:

The effects of this alternative are subtly different than those of the proposed action in that herbicides will not be used. In

their place, only volunteers would be used to control invasive woody plants and exotics.

The environmental effects of this will be analyzed in other significant issues. The effects of limiting herbicide use in the Management Plan would limit the tools available to managers, should woody or exotic plants become difficult to control.

4.2b Introduction of Exotics by Management Techniques

1. Environmental Impacts of the Alternatives

Proposed Action:

The use of prescribed fire, volunteers, cutting and herbicides all have the potential to create bare mineral soil from which exotic plants can become established.

Prescribed Fire- During 8/97 monitoring of the prairie, increases of Melilotus alba (White Sweet Clover) were found. This increase is likely due to the prescribed fire of 4/95. After the 1987 prescribed fire, Yellow Sweet Clover was found to increase but was successfully controlled by it being pulled up by volunteers. White Clover can be controlled by prescribed fire. Once the area has been burned, it should be burned again the following year before the plant has flowered and this will kill it (personal conversation w/Kelly Kerns, Wisconsin DNR). A few plants of Red Clover (Trifolium pratense f. leucochraceum) and Queen Anne's Lace (Daucus carota) were documented during 1997 monitoring. These were pulled up by hand and controlled. No other exotics were documented during 1997 monitoring. During 1997 monitoring of Fradd Hollow, a post-oak barren ridgetop on the Ironton District, no evidence of erosion or bare mineral soil was found following a prescribed fire in 3/97. Walk throughs after the 4/95 fire at Buffalo Beats showed no evidence of erosion or bare mineral soil either.

Cutting- If cut trees are not removed from the prairie after they fall, they can create habitat for exotic plants. This happens because the area burns very hot and sterilizes the soil, creating bare mineral soil.

Mitigation: Roll all fallen trees from the prairie. It may be necessary to buck the fallen tree, then roll them off into the woodland.

Volunteers- Too many people may cause excessive trampling and create bare mineral soil.

Mitigation: Limit the number of volunteers per visit to five.

Herbicides- Broad scale application of herbicides could kill more than just targeted species. These dead spots could be colonized by exotics.

Mitigation: Only foliar spray application (painted on by hand) will be used on targeted species.

No Action:

No prescribed fire, cutting, volunteers or herbicides would be used. Lack of these actions would not create bare mineral soil. But, exotics could still invade the prairie. Without any tools approved to control exotics, exotics could become a problem. If exotics became a serious threat to the existence of the prairie, management decisions to protect the prairie would need to be made at that time.

Alternative C:

Effects are the same as those described under the Proposed Action.

Alternative D:

Currently, exotics are not a threat. There is evidence of a large amount of woody stump sprouts (Sutherland, 1995). Another woody plant that is increasing on the prairie is poison ivy. The use of herbicides would assist in eradicating any large or aggressive populations of exotic plants, should they become established as well as controlling stump sprouts. Volunteers can do this work. The use of volunteers and Forest Service personnel to control woody and exotic species would build local support for stewardship of the prairie. However, there may be times when volunteers or Forest Service personnel are not available. Having the option to use herbicides would increase the flexibility for managers of the prairie.

All other effects are the same as those found under the Proposed Action.

Measurement of Effects:

It is estimated that there will be very little (<1%) bare mineral soil created following prescribed fires (two months post fire), cutting of trees, volunteer work or use of herbicides due to mitigation measures.

- 4.2c Effects on Water by Herbicides for Proposed Action and Alternative C
In order for there to be an effect by herbicides on water, water quality or water sources, the herbicide must pass through the soil into the water table. The herbicides must have the ability (physical properties) to pass through the soil. This depends upon specific properties of the herbicide including water solubility, the adsorption (soil bonding) tendency, the precipitation pattern and the soil type (Environmental Consultants, 1997).

Glyphosate adsorbs to the soil and will not move beyond the surface of the soil. Triclopyr has similar properties. Since these two herbicides adhere to the soil, they cannot move to the water table unless the soil particles move to the water table or source or the application of herbicide is so large that there is runoff downhill. In order for the soil particles to become mobile, there must be erosion. No erosion is expected to occur due to prescribed fire, cutting or volunteers since any potential negative effects by these management practices will be mitigated against. Without erosion, water cannot be contaminated.

If herbicides were applied in excess on a rainy day, herbicides could move downslope. These conditions are not likely to occur since mitigation measures state that only foliar, hand application be applied (no chance for excessive doses - unless some is spilled) and limit the amount that reaches the forest floor. If some herbicide were to be spilled, Buffalo Beats is a relatively flat area (less than 3% slope) and the chances of it running down hill are low. By controlling the application process through mitigation measures, negative cumulative or indirect effects will be prevented.

4.2d Effects on Soil by Herbicide and Volunteers for Proposed Action and Alternative C. Alternative D: Effect by Volunteers Only

1. Herbicides

Glyphosate is strongly adsorbed to soil particles and organic matter, essentially preventing movement. It has a moderate half life (about 60 days) and is decomposed by soil microbes. Half life is defined as the time required for half the amount of a substance (such as a herbicide) in or introduced into a living system to be eliminated, whether by excretion, metabolic decomposition or other natural processes. Most studies which have analyzed the effects on soils by herbicides have focused on site productivity and soil microbes. Overall, glyphosate's ill-effects to both were observed at concentration levels higher than recommended on the label and by the Environmental Protection Agency (EPA). Use at typical rates does not reduce activity of soil biota (Environmental Consultants).

Triclopyr is not considered to be soil active, but is absorbed by plant roots. Low mobility in soils, although gross applications of Garlon 3A (as in a spill situation) will move through the soil and affect plants through their root system. It has a moderately short half-life of 30-60 days; degraded both by soil microbes and by photolysis.

Since mitigation measures will prevent application levels higher than recommended on the label, there will be no direct, indirect or cumulative impacts to the soil.

2. Volunteers and Soil Compaction

Five volunteers walking over the site during the mid-summer months when the soils are at field capacity or drier would result in no detrimental soil compaction. Soils usually reach field capacity one or two days following any normal rain event. In the unlikely chance that detrimental soil compaction would occur, the normal shrinking and swelling of the clay soils during wetting and drying over the course of a season would alleviate any negative effects. The freezing and thawing over the winter months would also rectify any soil compaction that may occur.

4.2e Impact of Reserved Mineral Rights on the Integrity of the Prairie

As of 4/98, the mineral rights for Buffalo Beats are reserved until 2040. No Memorandum of Understanding exists between the Forest Service and the mineral estate owner (Poston Trust). This case has been

turned over to the Lands Division of the Wayne National Forest. It appears from conversations with Poston Trust they are not interested in selling these reserved minerals to the Forest Service at this time.

4.2f Effects of Prescribed Fire on Skippers and Butterflies

Of the species listed on page 17, three are considered residents and rare by the Ohio Lepidopterist Association. Discussions with Eric Metzler (Lepidopterist with the Ohio Lepidopterists) centered around these three species. General discussions regarding all insects were documented with Chris Stanton, Entomologist and Graduate Student with Dr. David Horn, Ohio State University. These discussions are the basis for this effects section.

Currently (4/98) researcher do not know the effects of prescribed fire on butterflies and skippers. It is known that prairie species (like the Mottled Dusky Wing) respond well to fire - but the best timing for the fires is not known. For the Gemmed Satyr, a woodland species, what is important is to allow habitat of burned area and unburned areas to be connected so that after a fire, the species can move from the unburned area to the burned area to repopulate the burned over area. The Silvery Blue's preferred habitat is more disturbed areas with recommendations of burned and unburned habitat connections the same as for the Gemmed Satyr. For all species of skippers and butterflies, it is very important to leave areas of refugia so that the entire habitat in an area is not burned at once. For this reason, any unburned areas will not be relit.

The mitigation measure listed above will prevent any loss of habitat for skippers and butterflies.

No negative effects have been reported from the "Effectiveness of Prescribed Burning in the Ecological Restoration of Mixed-oak Forest Ecosystems in Southern Ohio" research that is being coordinated by the Northeast Forest Experiment Station, U.S. Forest Service.

4.2g Effects of Herbicides on Wildlife and Plants for Proposed Action and Alternative C

1. Wildlife

The information in this section is taken from Appendix C, Final EIS, Vegetation Management on Electric Utility ROW's, Allegheny National Forest, 1997, pages C-3, C-4, C-6 and C-7 (Environmental Consultants, 1997).

"Both typical and maximum exposure estimates were calculated using three major exposure routes: inhalation, dermal and ingestion. Inhalation exposures were assumed to come from animals breathing in herbicide spray vapors. Dermal exposures were derieved from two sources: directly from spray and indirectly from contact with treated vegetation. Ingestion doses were calculated from estimates of treated vegetation and contaminated water consumed.

Glyphosate

"Glyphosate is generally recognized to be of a low toxicity in the environment. Acute oral LD₅₀'s are >5,000 mg/kg for the rat and 3,800 mg/kg for the rabbit. LD₅₀ is the median lethal dose in milligrams of toxicant per kilogram of animal body weight (mg/kg) lethal to 50% of the test animals to which it is administered under the conditions of the experiment. Based on these values, glyphosate can be considered slightly toxic.

Oral LD₅₀ values for the Roundup and Rodeo formulations in rats are 5,400 mg/kg and greater than 5,000 mg/kg, respectively. Glyphosate, Roundup and Rodeo are reported to be practically nonirritating or slightly irritating to the eyes and skin of rabbits. The NOELs (no observed effect levels) derived from chronic feeding studies in rats are 362 mg/kg/day for males and 457 mg/kg/day for females. In a one-year oral study with dogs, a NOEL of 500 mg/kg/day was determined. Glyphosate has caused no reproductive or teratogenic (an agent, as a chemical, disease, etc, that causes malformation of a fetus) effects in rats or rabbits.

Studies conducted on black-tailed deer in pens in the Pacific Northwest showed no gross adverse health effects caused by the use of glyphosate for vegetation management. Glyphosate-treated browse and commercial chow were as acceptable for consumption by deers as untreated food. Likewise, glyphosate-induced weed and shrub control did not adversely affect deer use of treated habitat areas for at least the first year after treatment.

Moose were found to browse preferentially in untreated areas of clearcuts treated with glyphosate. This would likely minimize their exposure to glyphosate.

In a study to evaluate the direct effects of glyphosate on small mammals, no adverse effects on reproduction, growth or survival were observed in populations of deer mice during the year following treatment.

In forest areas which had been clearcut then sprayed with glyphosate for reforestation, the body weights and the number of placental scars and foeti of deer mice were the same as in adjacent unsprayed forest areas, although the total number of animals was reduced in sprayed as opposed to unsprayed clear cut areas. The authors conclude that this is likely the result of habitat changes induced by the herbicide rather than direct toxic effects.

Glyphosate is slightly toxic to birds based on the acute oral LD₅₀ of greater than 4,640 mg/kg in bobwhite quail and mallard duck. The eight-day dietary LC₅₀ is more than 4,000 ppm for both mallard ducks and bobwhite quail. LC₅₀ is the median lethal concentration of a chemical at which 50 percent of the test animals will be killed. It is usually used in testing of fish or

reproductive effects at dietary exposure levels of up to 1,000 ppm.

Residue and metabolism studies have indicated that glyphosate is incompletely absorbed across the gastrointestinal membranes and that in the vertebrates tested, there is minimal metabolism or retention by tissues and rapid elimination of residues.

Yokoyama and Pritchard (1984) evaluated the effect of glyphosate on the mortality, fecundity and egg viability of an insect which is a common predator of other insects. They found no detectable effect and concluded deleterious long-term effects on predator populations would not occur if the insects survived the initial application (this latter comment reflecting the fact they were also testing some common insecticides). Glyphosate is relatively nontoxic to insects based on the 48-hour acute toxicity of greater than 100 micro grams/bee in honey bees.

Triclopyr

Triclopyr is moderately toxic to mammals based on LD₅₀ values that range from 310 mg/kg in guinea pigs to 729 mg/kg⁵⁰ in male rats. Triclopyr is slightly irritating to the eyes and skin of rabbits. The Garlon 3A and Garlon 4 formulations are slightly toxic, with oral LD₅₀s of 2,830 and 2,140 mg/kg in rats (males and females respectively). Garlon 3A and Garlon 4 may cause moderate skin irritation and is moderately to severely irritating to the eyes and Garlon 4 may cause slight skin irritation but no eye irritation. Ponies exposed to four daily doses of 60 mg/kg of triclopyr exhibited no adverse effects; however, exposure to four daily doses of 300 mg/kg caused depression, recumbency, decreased gastrointestinal activity and respiratory and muscular distress.

No teratogenic effects have been observed in rabbits but a rat study reported fetotoxic effects at the lowest dose of 10 mg/kg/day. Triclopyr is rapidly excreted, primarily as the parent compound, through the kidneys in animals. Small quantities of two other compounds (the metabolite trichlorophyridinal and conjugated form of the parent triclopyr acid) are also excreted. Triclopyr does not bioaccumulate in animal tissues in any significant amount.

Based on acute oral and dietary studies, triclopyr, Garlon 3A and Garlon 4 are slightly toxic to birds. The acute oral LD₅₀ of technical triclopyr is 1,698 mg/kg for mallard ducks and the dietary LC₅₀ ranges from 2,935 to greater than 5,000 ppm. The dietary LC₅₀ of Garlon 3A and Garlon 4 are all greater than 9,000 ppm. A one-generation reproduction study showed no reproductive effects, symptoms of toxicity or abnormal behaviour when mallards were given up to 500 ppm in their diet for a 20-week period, including 10 weeks prior to egg laying and 10 weeks during egg laying. A similar study reported no reproductive or toxic effects in bobwhite quail exposed to dietary levels of up to 800

ppm for a 20-week period, including 11 weeks prior to egg laying and 8 weeks during egg laying.

The acute contact LD₅₀ of triclopyr in honey bees is greater than 60 micrograms/bee, indicating that it is relatively nontoxic to insects. The contact LD₅₀ for honey bees is greater than 100 micrograms/bee based on a 1985 study."

2. Plants

Glyphosate

This herbicide is a growth inhibitor and hinders resprouting. It translocates throughout the plant and accumulates in the roots. It controls most grasses. Some plants are not affected by glyphosate. It is strongly adsorbed to soil particles and organic matter which essentially immobilizes it. It is deactivated by muddy water or water with a high calcium content (USDA, R8, 1995).

Potential adverse conditions caused by this herbicide will be mitigated against by application procedures and standards. Application of this chemical will be by hand and foliar. This will prevent any adjacent populations of plants from being affected.

Triclopyr

This herbicide is a growth regulator, readily absorbed by foliage, with some stem uptake. It translocates both up and down in the plant and accumulates in growing tissues and the root collar. It controls many woody and broad-leaf species, while grasses are tolerant. Triclopyr is not considered to be soil active, but is absorbed by plant roots. Low mobility in soils, although gross applications of Garlon 3A (as in a spill situation) will move through the soil and affect plants through their root systems (USDA, R8, 1995).

Potential adverse conditions caused by this herbicide will be mitigated against by application procedures and standards. Application will be foliar and by hand. The application rate will be as recommended on the label. These directions will prevent any negative effects on adjacent woody plants. Grasses are not affected by triclopyr.

APPENDIX A: REFERENCES

- Crumley, C.L. 1994. Historical ecology a multidimensional ecological orientation. In Crumley, C.L. (ed), Historical Ecology: Cultural Knowledge and Changing Landscapes, pp. 1-16. School of American Research Press, Santa Fe.
- Cusick, A. W. and K.R. Troutman. 1978. The Prairie Survey Project: A Summary of Data to Date. Ohio Biological Survey Information Circular No. 10. The Ohio State University, Columbus. 60 pages.
- Deneven, W.M. (ed.). 1992. The native populations of the Americans in 1492. 2nd ed. The Univeristy of Wisconsin Press, Madison.
- Environmental Consultants, Inc. 1997. Final Environmental Impact Statement, Vegetation Mangagement on Elecric Utility Rights-of-Way for the Allegheny National Forest. Report contracted by GPU Energy, Allegheny Power Company and The Allegheny National Forest. 301 Lakeside Drive, Southhampton, PA 18966-4050.
- Federal Committee on Ecological Reserves. 1977. A Directory of RNAs on Federal Lands of the United States of America. Washington, DC: USDA, Forest Service.
- Fiedel, S.J. 1987. Prehistory of the Americas. Cambridge University Press. 386 p.
- Gomez-Pompa, A. 1987. On Maya silviculture. Mexican Studies 3:1-17.
- Gomez-Pompa, A. and A. Kaus. 1992. Taming the wilderness myth. Bioscience 42 (4): 271-279.
- Iftner, David C. et al. 1992. Butterflies and Skippers of Ohio. Bulletin of the Ohio Biological Survey. 9:1. [The Ohio Lepidopterists Research Report #3]. Ohio State University, Columbus.
- Kalisz, Paul and S.E. Boettcher. 1990. Phytolith analysis of soils at Buffalo Beats, a small forest opening in southeastern Ohio. Bulletin of Torrey Botanical Club 117 (4): 445-449.
- Liddle, M. J. 1975. A selective review of the ecological effects of human trampling on natural ecosystems. Biol. Cons. 7(1):17-36.
- McClenahan, James R. and Daniel B. Houston. 1997. Research Report: Comparative Forest Age Structure on Two Calcareous Clay Soil Sites within the Buffalo Beats Research Natural Area. Report Contracted by The Ohio Chapter of the Nature Conservancy and the Wayne National Forest.
- Mutch, R.W. 1992. The big picture: fire management in the 1990's. unpublished report. 9 pages.
- Ortt, Marilyn. 1995. Establishment Report for Buffalo Beats: A Research Natural Area within Wayne National Forest, Athens County, Ohio. Wayne National Forest Contract.
- Roosevelt, A.C. et al. 1996. Paleoindian cave dwellers in the Amazon: the peopling of the Americas. Science 272:373-384.
- Shane, L.C.K., and E.J. Cushing (eds.). 1991. Quaternary landscapes. University of Minnesota Press, Minneapolis.

The Nature Conservancy, Ohio Chapter. 1983. "A Proposal for Designation as a Research Natural Area". Prepared by Donald W. Hirsh, Columbus, Ohio.

The Nature Conservancy, Ohio Chapter. 1984. Proposed Ecological Management Plan for Buffalo Beats Prairie, Athens Unit, Wayne National Forest. Prepared by E. Dennis Hardin, Ph. D. Columbus, OH.

Transeau, E.N. 1935. The prairie peninsula. Ecology 22:398-407.

Weishaupt, C. G. 1971. Vascular Plant of Ohio: A Manual for Use in Field and Laboratory. Third Edition. Dubuque, Iowa.

Wistendahl, W.A. 1975. Buffalo Beats, a relict prairie within a southeastern Ohio forest. Bull. Torrey Bot. Club. 102:178-186.

USDA, Forest Service, Wayne National Forest. 1988. Wayne National Forest Land and Resource Management Plan. Athens, OH.

USDA Forest Service, Wayne National Forest. 1997. Environmental Assessment: Dorr Run. Athens, OH.

USDA, Forest Service. Region 8. Draft Environmental Impact Statement, Vegetation Management in the Ozark/Ouachita Mountains, Appendices Volume II, Risk Assessment for the Use of Herbicides in the Southern Region. 1989. Forest Service Management Bulletin R8-MB-23, Contract Number 53-3187-4-22.

USDA, Forest Service. Region 8. Forestry Use Herbicide Labels and Safety Data Sheets. Atlanta, GA. 1995.

USDA Forest Service. Washington DC. 1994. Forest Service Manual 4063.

APPENDIX B: PERSONS CONSULTED

Kelly Kerns, Wisconsin Department of Natural Resources, Bureau of Endangered Resources, Madison, Wisconsin.

Jennifer Windus, Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Columbus, Ohio.

Chris Stanton, Entomologist and Graduate Student, Ohio State University, Columbus, Ohio.

Eric Metzler, Lepidopterist with The Ohio Lepidopterists, Columbus, Ohio.

APPENDIX C: RATES AND METHOD OF HERBICIDE APPLICATIONS

General Methods and Procedures:

Application of Herbicides: Herbicides would be applied manually, by hand painting leaves and stumps of targeted species for both triclopyr and glyphosate. Dosages (rates) would be as those given on the label and would not exceed recommended rates. Dosages of triclopyr (Garlon 4; rate = 4 lbs/acre) would be 3:1 (Surfactant:Garlon. Recommend Penevator Oil, vegetable base or JLB Oil Plus Improved-both vegetable oils)). Most application of herbicides would be made in the dormant season (November through March). Some foliar painting may occur in the growing season in order to be effective at eradicating targeted species.

Glyphosate

Roundup: Four pounds of active ingredient per gallon plus surfactant. Not labeled in or around ground water. Inert ingredients: 59% (85% water).

Accord: Four pounds active ingredient per gallon. Labeled for forestry and rights of way, including limited applications in and around water. Inert ingredients: 59% (100% water).

Triclopyr

Garlon 3A: Three pounds of active ingredient per gallon, amine formulation. Labeled for forestry, rights of ways and wildlife openings. Inert ingredients: 55.6%.

Garlon 4: Four pounds active ingredient per gallon, ester formulation. Labeled for forestry, rights-of-ways and wildlife openings. Inert ingredients: 38.4%.

Surfactants (added to herbicides to increase penetration and activation of herbicide)

P.V.O. (Penevator Vegetable Oil):

Used at dilution ratios of 1:4 (20%) or 1:3 (25%) when following the herbicide manufacturers' label recommendations.

EXAMPLE: To make a 1:3 (25%) mixture of Garlon 4 and PVO, use 1 part (25%) Garlon 4 and 3 parts (75%) of PVO.

Ingredients: Vegetable based non-crop spray oil

APPENDIX D: RESPONSE TO COMMENTS

Background: The Notice and Comment period for an EA is intended to allow for review of the analysis to see if there is information that was missed related to the analysis and alternatives.

A statement or questions is considered a comment if 1) it contains a cause-effect relationship and 2) it is a point of discussion, debate or dispute.

Comments Received from the Notice and Comment Period

Group 1: Issues Related to the Management Plan

1.A Comment: "Has an analysis of all the burns done on Buffalo Beats been done to see the results of these fires on exotic and prairie plants?"

Response: This comment was addressed under Effects: 4.2b page 20 of the EA for fires effects on exotic plants. The Management Plan (Appendix 1 of the Establishment Record) page 2. Currently, monitoring plots are done annually on the northern prairie. These monitoring results are analyzed each year for changes in plant populations.

1.B Comment: "I suggest that all woody species removal be conducted during the dormant season (November - March) to reduce trampling in this small prairie."

Response: Timing restrictions were set forth in the EA (page 8, 2.6b) between the dates of September 15 and April 15. The difference of 30 additional days will not cause an increase in trampling (EA, page 22, 4.2d #2).

1.C Comment: "The no action alternative would ultimately result in the loss of the prairie community to woody succession. This is an unacceptable alternative."

Response: This comment was addressed in the EA under Effects on page 19, No Action.

1.D Comment: "It is important to build in some flexibility in fire intervals and season; this helps to maintain environmental heterogeneity(...autumn fires should be allowed)."

Response: This comment is considered in the Management Plan, page 3: "preferred timing of prescribe burns is between late February and mid-April". This statement does not restrict the timing of burns to spring only. The management plan is an adaptive one. The fire intervals as stated in the Management Plan may be changed due to the adaptiveness of the Management Plan.

1.E Comment: "...there must be a safeguard against easy herbicide use any time in the future. An advisory committee made up of individuals who actually have a history of involvement with Buffalo Beats or have done research on the site or who have any experience in similar situations should be required."

Response: This comment was not considered or addressed in the analysis. This consideration may be forwarded and formalized in the Management Plan. As stated throughout the Management Plan and EA, the use of herbicides is a last resort. The Nature Conservancy and Ohio Department of Natural Resources - Division of Natural Areas and

Preserves have been involved in developing the Management Plan. Both agencies have years of experience of managing prairies. The Wayne National Forest would consult with them upon the use of herbicides.

Group 2: Issues Related to Herbicide Use

2.A Comment: "Why use herbicides? We'd rather not see the use of herbicides".

Response: This comment was addressed in the EA under Alternatives, pages 7 and 8; Affected Environment, pages 12; Effects by Alternative, pages 20 - 26. It is also discussed in the Management Plan on pages 5 and 6.

2.B Comment: "What is the rationale for using triclopyr when glyphosate would work as well? Triclopyr is absorbed by both leaves and roots whereas glyphosate is absorbed only by leaves. This could be quite important in the event of a spill, as nontarget plants, could be damaged through root uptake of spilled triclopyr".

Response: This comment was addressed in the EA under Alternatives, pages 7 and 8; Affected Environment, pages 12; Effects by Alternative, pages 20 - 26. It is also discussed in the Management Plan on pages 5 and 6.

2.C Comment: "...suggestion which I feel would decrease the risk of damage to non-target plants: add a mitigation measure restricting the application to periods when no rain is predicted for at least 48 hours."

Response: This comment is added to the Mitigation Measures Common to All Action Alternatives.

2.D Comment: "I strongly urged the Forest Service to include the use of herbicides (Roundup and Garlon) in the management plan."

Response: This comment was addressed in the EA under Alternatives, pages 7 and 8; Affected Environment, pages 12; Effects by Alternative, pages 20 - 26. It is also discussed in the Management Plan on pages 5 and 6.

2.E Comment: "Alternative D, RNA status without the use of herbicide, would protect Buffalo Beats but would reduce the effectiveness of biological management by excluding an accepted management tool."

Response: This comment was addressed in the EA under Alternatives, pages 7 and 8; Affected Environment, pages 12; Effects by Alternative, pages 20 - 26. It is also discussed in the Management Plan on pages 5 and 6.

2.F Comment: "Herbicide use should be considered as so essential to preserving the prairie that it would be worthwhile to amend the management plan."

Response: This comment was addressed in the EA under Alternatives, pages 7 and 8; Affected Environment, pages 12; Effects by Alternative, pages 20 - 26. It is also discussed in the Management Plan on pages 5 and 6.

Group 3: Issues Related to the Level of Protection

3.A Comment: "It is critical that this exceptional site be given the permanent protection that RNA status provides."

Response: This comment was addressed in the EA under Effects by Alternative, page 19.

3.B Comment: "I would like to express the Division of Natural Areas & Preserves support for the Proposed Action to designate Buffalo Beats as a Research Natural Area".

Response: This comment was addressed in the EA under Effects by Alternative, page 19.

3.C Comment: "The addition of the Northeast Forest Experiment Station would remove the local decision making process and give management control to an organization less familiar with Buffalo Beats."

Response: This comment was addressed in the EA under Effects by Alternative, page 19. It was also discussed on page 4 of the EA. In addition, historically RNAs have been areas of no management. The idea of no management is no longer valid since science now acknowledges that succession can and is set back periodically due to natural events (fires, floods, insect outbreaks, tornadoes, hurricanes). Furthermore, the concept of RNAs has changed and evolved in the past 10 years. RNAs are now nominated and declared based upon uniqueness or a very good example of a very common ecosystem - sort of like the Nature Conservancy's motto: "protect the last of the least and the best of the rest". Within the institution of the Forest Service, the management of these RNAs is formalized in the Establishment Record in the form of a Management Plan (an appendix). This Management Plan is reviewed and approved by the Research division. With the establishment of the RNA, the management plan enables the local level of Forest Service organization (typically the District) to manage the site without the need to consult with the Research division for concurrence or approval.

3.D Comment: "Alternative C, implementation of the management plan without RNA status, would ensure proper biological management by the organization most familiar with Buffalo Beats, the Wayne National Forest. This strategy would result in the most efficient management of Buffalo Beats at the cost of reduced protection status".

Response: This comment was addressed in the EA under Effects by Alternative, page 19. It was also discussed on page 4 of the EA. In addition, historically RNAs have been areas of no management. The idea of no management is no longer valid since science now acknowledges that succession can and is set back periodically due to natural events (fires, floods, insect outbreaks, tornadoes, hurricanes). Furthermore, the concept of RNAs has changed and evolved in the past 10 years. RNAs are now nominated and declared based upon uniqueness or a very good example of a very common ecosystem - sort of like the Nature Conservancy's motto: "protect the last of the least and the best of the rest". Within the institution of the Forest Service, the management of these RNAs is formalized in the Establishment Record in the form of a Management Plan (an appendix). This Management Plan is reviewed and approved by the Research division. With the establishment of the RNA, the management plan enables the local level of Forest Service organization (typically the District) to manage the site without the need to consult with the Research division for concurrence or approval.

3.E Comment: "The implementation of the management plan is critical to the protection of Buffalo Beats; the form of implementation (i.e. proposed action, alternative C, or alternative Do is less important. Because of the presence of a strong partnership between DNAP, TNC, and the Wayne NF, the existence of a comprehensive management plan, and the knowledge and dedication of the Wayne NF staff, I would recommend that Buffalo Beats be maintained as a special area and managed by the Wayne NF, as stated in Alternative C. "

Response: This comment was addressed in the EA under Effects by Alternative, page 19. It was also discussed on page 4 of the EA. In addition, historically RNAs have been areas of no management. The idea of no management is no longer valid since science now acknowledges that succession can and is set back periodically due to natural events (fires, floods, insect outbreaks, tornadoes, hurricanes). Furthermore, the concept of RNAs has changed and evolved in the past 10 years. RNAs are now nominated and declared based upon uniqueness or a very good example of a very common ecosystem - sort of like the Nature Conservancy's motto: " protect the last of the least and the best of the rest". Within the institution of the Forest Service, the management of these RNAs is formalized in the Establishment Record in the form of a Management Plan (an appendix). This Management Plan is reviewed and approved by the Research division. With the establishment of the RNA, the management plan enables the local level of Forest Service organization (typically the District) to manage the site without the need to consult with the Research division for concurrence or approval.

3.F Comment: "RNA designation is a means of recognizing and protecting such unique community-types."

Response: This comment was addressed in the EA under Effects by Alternative, page 19. It was also discussed on page 4 of the EA. In addition, historically RNAs have been areas of no management. The idea of no management is no longer valid since science now acknowledges that succession can and is set back periodically due to natural events (fires, floods, insect outbreaks, tornadoes, hurricanes). Furthermore, the concept of RNAs has changed and evolved in the past 10 years. RNAs are now nominated and declared based upon uniqueness or a very good example of a very common ecosystem - sort of like the Nature Conservancy's motto: " protect the last of the least and the best of the rest". Within the institution of the Forest Service, the management of these RNAs is formalized in the Establishment Record in the form of a Management Plan (an appendix). This Management Plan is reviewed and approved by the Research division. With the establishment of the RNA, the management plan enables the local level of Forest Service organization (typically the District) to manage the site without the need to consult with the Research division for concurrence or approval.

Group 4: Other Issues

4.A Comment: "...the Unit of Measure that you list in the EA under 'Effect of Prescribed Fire on Skippers and Butterflies: The issue is not whether habitat will be affected by fire (it should be enhanced) but loss of individuals (community) and the effect that will have on recolonization. I would propose that the Unit of Measure read: Effective recolonization of select lepidoptera species."

Response: The Unit of Measure is used in the Comparison of Alternatives table found in an EA. These Units are used to determine whether each alternative will or will not meet the measure. The existing Unit of Measure is estimated loss of habitat. If the unit

suggested were to be used, each alternative would be exactly the same (as it is at present): none due to mitigation measures. This idea of recolonization is a separate issue that could be addressed under the Wildlife Biologist Program of Work, not in the Buffalo Beats RNA Environmental Assessment. The mitigation measures stated on page 8 of the EA will protect habitat and possible communities of butterflies and skippers known to occur at Buffalo Beats [none of which are listed by the State of Ohio, or the U.S Fish and Wildlife Service]. Lepidopterists from Ohio have surveyed Buffalo Beats several times and have never found any listed species. Periodic inventory by Lepidopterists will be part of monitoring.

Appendix 3. Boundary Certification

2360 Wayne National Forest
Buffalo Beats Proposed Research Natural Area

LEGAL DESCRIPTION

TOWNSHIP 10 NORTH, RANGE 14 WEST, OHIO RIVER SURVEY DOVER TOWNSHIP, ATHENS COUNTY, OHIO

SECTION 36:

Beginning for Reference at a fence corner located at the approximate South 1/4 corner of Section 36;

thence N 12°47'51" E a distance of 689.107 feet to the True Point of Beginning, an unmonumented point in the centerline of Dover Township Road No. 295;

thence N 69°55'52" W a distance of 135.025 feet to a monument set and stamped "Mon. E";

thence N 28°48'24" W a distance of 309.296 feet to a monument set and stamped "Mon. D";

thence N 28°11'37" W a distance of 533.431 feet to a monument set and stamped "Mon. C";

thence N 49°45'38" E a distance of 642.236 feet to a monument set and stamped "Mon. B";

thence N 42°04'30" E a distance of 246.402 feet to a monument set and stamped "Mon. A";

thence N 45°02'28" E a distance of 78.826 feet to an unmonumented point in the center of Athens County Road 29;

thence following the centerline of said County Road 29 the following seven (7) courses:

S 10°26'04" E a distance of 347.696 feet;

S 11°23'23" E a distance of 308.221 feet;

S 19°10'36" E a distance of 106.531 feet;

S 24°04'01" E a distance of 90.574 feet;

S 25°04'15" E a distance of 76.864 feet;

S 25°20'31" E a distance of 329.210 feet;

S 26°02'41" E a distance of 82.864 feet to the intersection of Dover Township Road No. 295;

thence following the centerline of said Township Road No. 295 the following eight (8) courses:

S 60°35'34" W a distance of 34.250 feet;

S 58°52'48" W a distance of 54.608 feet;

S 66°09'50" W a distance of 115.475 feet;

S 72°35'37" W a distance of 67.370 feet;

S 81°05'45" W a distance of 107.516 feet;

S 87°07'38" W a distance of 99.311 feet;

S 78°00'14" W a distance of 87.110 feet;

S 68°31'50" W a distance of 55.642 feet to the True Point of Beginning, and containing 19.320 acres, more or less and is contained entirely within National Forest Lands in Section 36.

This description was prepared by Terry A. Krasko, Wayne National Forest Land Surveyor, Ohio P.S. 6973, May 1, 1995, based upon field surveys executed in March 1995. Basis of Bearings was from Solar Observation with a Lietz SET 3 Total Station Theodolite using an SMI Co-op Module and HP41 Hand Computer on March 17, 1995. All Monuments set were 3/4" x 36" steel rebars with 2-1/2" forged aluminum caps that were stamped with pertinent corner identification, year of survey and Surveyor's Registration number.

Terry A. Krasko
5-1-95