DECISION NOTICE/DESIGNATION ORDER

Decision Notice
Finding of No Significant Impact
Designation Order

By virtue of the authority vested in me by the Secretary of Agriculture under regulations 7 CFR 2.42, 36 CFR 251.23, and 36 CFR Part 219, I hereby establish the Cave Hill Research Natural Area. It shall be comprised of lands described in the section of the Establishment Record entitled "Location".

The Regional Forester has recommended the establishment of this Research Natural Area in the Record of Decision for the Shawnee National Forest Land and Resource Management Plan. That recommendation was the result of an analysis of the factors listed in 36 CFR 219.25 and Forest Service Manual 4063.41. Results of the Regional Forester's Analysis are documented in the Shawnee National Forest Land and Resource Management Plan and Final Environmental Impact Statement which are available to the public.

The Cave Hill Research Natural Area will be managed in compliance with all relevant laws, regulations, and Forest Service Manual direction regarding Research Natural Areas. It will be administered in accordance with the management direction/prescription identified in the Establishment Record.

The Shawnee National Forest Land and Resource Management Plan is hereby amended to be consistent with the management direction identified in the Establishment Record and this Decision Notice/Designation Order. This is a non-significant amendment of the Shawnee National Forest Land and Resource Management Plan. (36 CFR 219.10(f)).

The Forest Supervisor of the Shawnee National Forest shall notify the public of this decision and will mail a copy of the Decision Notice/ Designation Order and amended direction to all persons on the Shawnee National Forest Land and Resource Management Plan mailing list.

Based upon the Environmental Analysis, I find that designation of the Cave Hill Research Natural Area is not a major Federal action significantly affecting the quality of the human environment. (40 CFR 1508.27).

This decision is subject to appeal pursuant to 36 CFR Part 217. A Notice of Appeal must be in writing and submitted to:

The Secretary of Agriculture
14th & Independence Ave., S.W.
Washington, D.C. 20250

And simultaneously to the Deciding Officer:

Chief (1570)
USDA, Forest Service
P.O. Box 96090
Washington, D.C. 20090-6090

The Notice of Appeal prepared pursuant to 36 CFR 217.9(b) must be submitted within 45 days from the date of legal notice of this decision. Review by the Secretary is wholly discretionary. If the Secretary has not decided within 15 days of receiving the Notice of Appeal to review the Chief's decision, appellants will be notified that the the Chief's decision is the final administrative decision of the U.S. Department of Agriculture (36 CFR 217.17(d)).

Chief	Date

Figure 1. Location of Cave Hill Research Natural Area shown (with arrow) on copy of J. A. Bier's Landforms of Illinois map, Ill. State Geol. Surv., Urbana, 1980

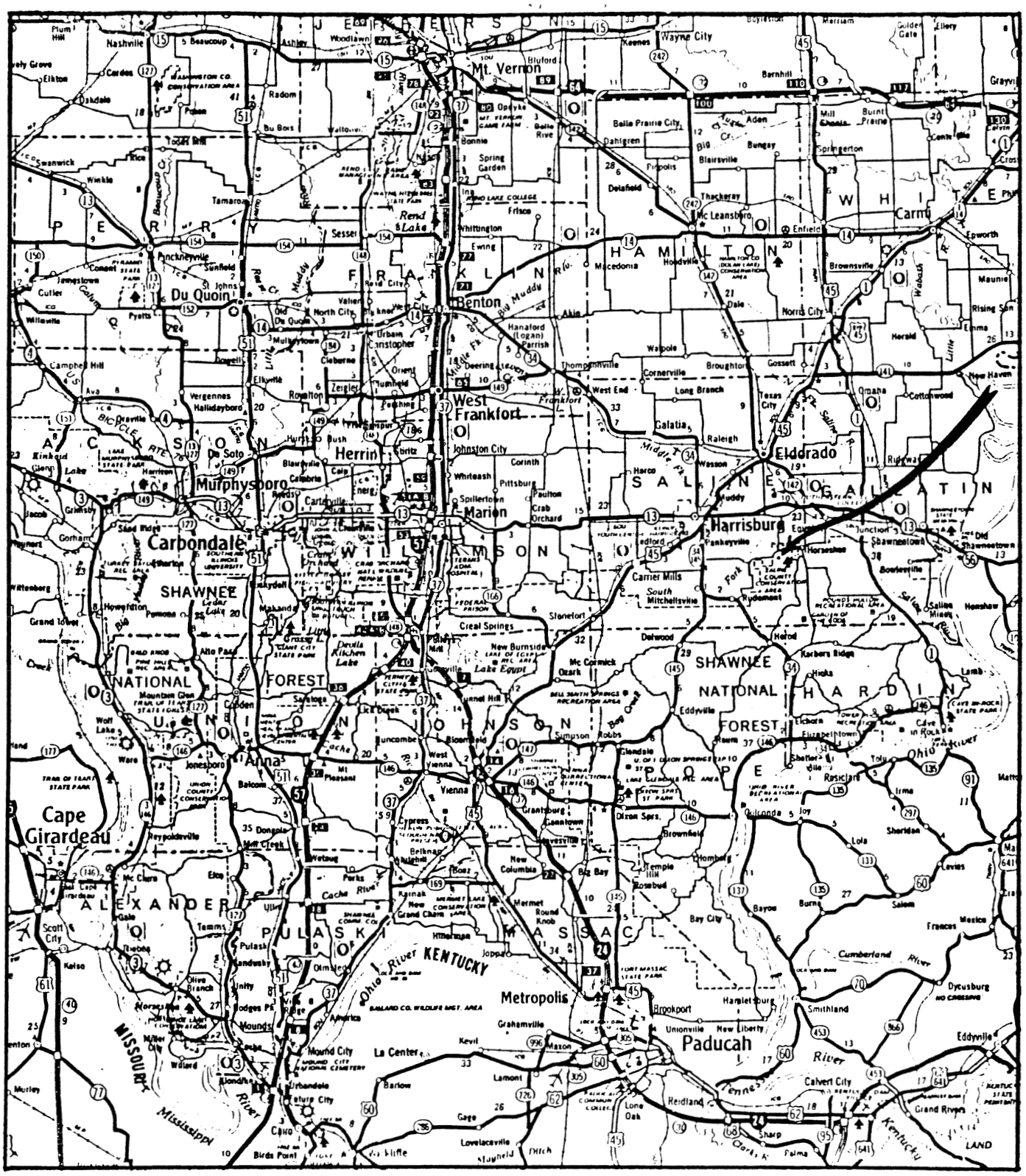


Figure 2. Location of Cave Hill Research Natural Area shown (with arrow) on copy of Illinois Official Highway Map, 1985-86, Department of Transportation, Springfield

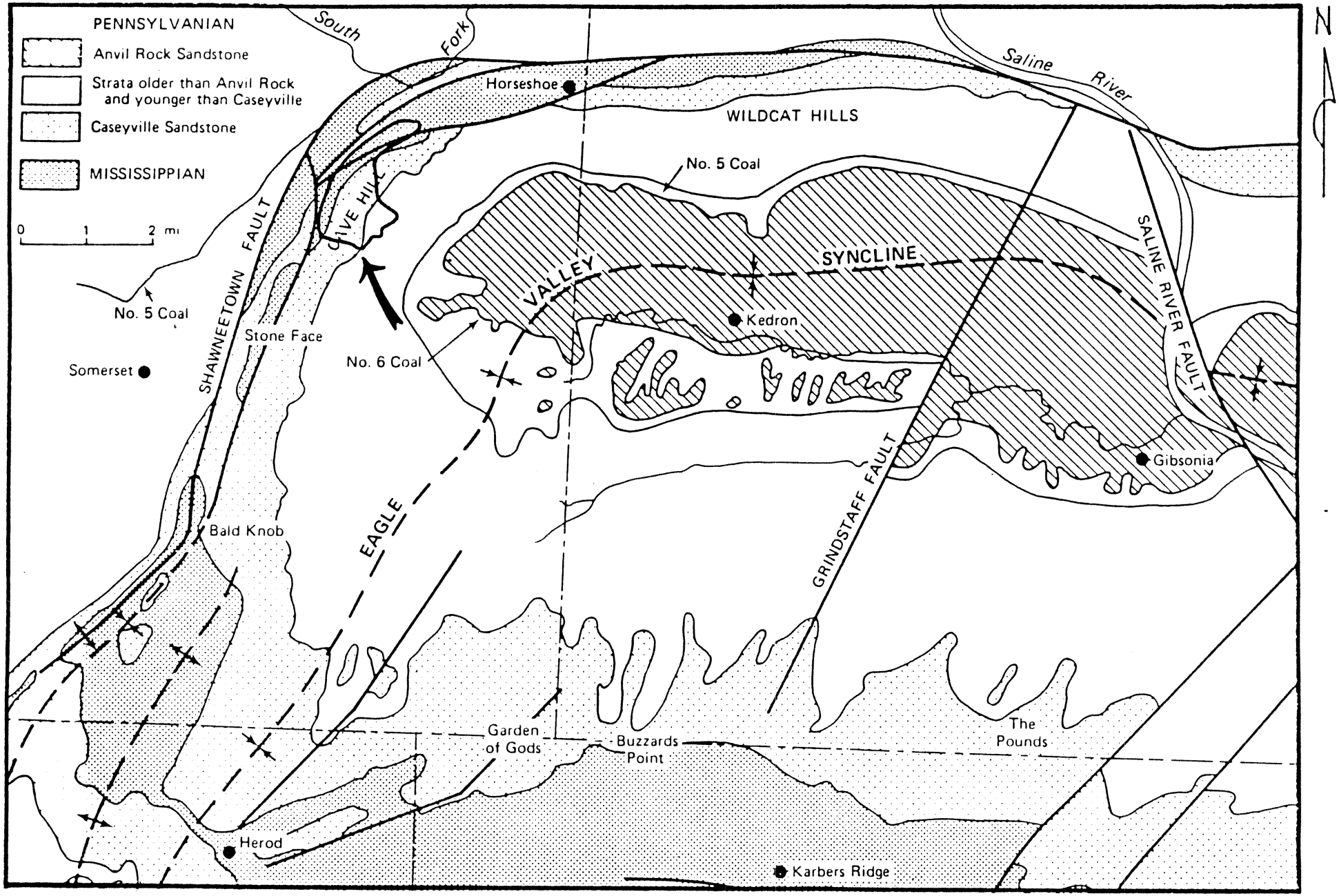


Figure 5. Location of Cave Hill Research Natural Area shown (with arrow and bold line) on copy of map in A guide to the geology of the Equality area by D. L. Reinertsen, Ill. State Geol. Surv., Field Trip Guide Leaflet 1980A

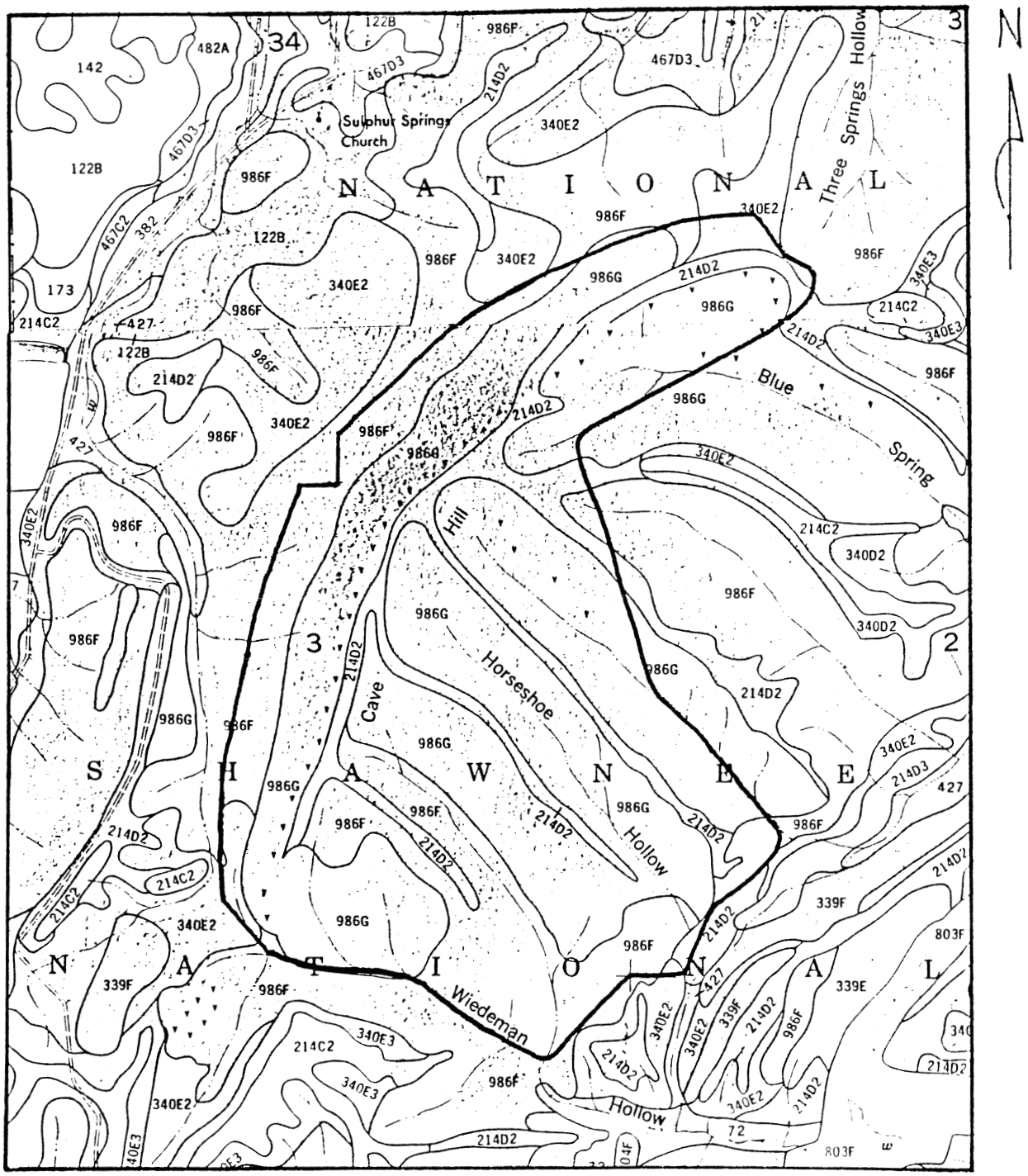


Figure 7. Location of Cave Hill Research Natural Area shown on map of soils taken from Soil survey of Saline County, Illinois by C. Miles and B. Weiss, SCS and USFS, in cooperation with Ill. Agr. Exp. Sta., Urbana, 1978

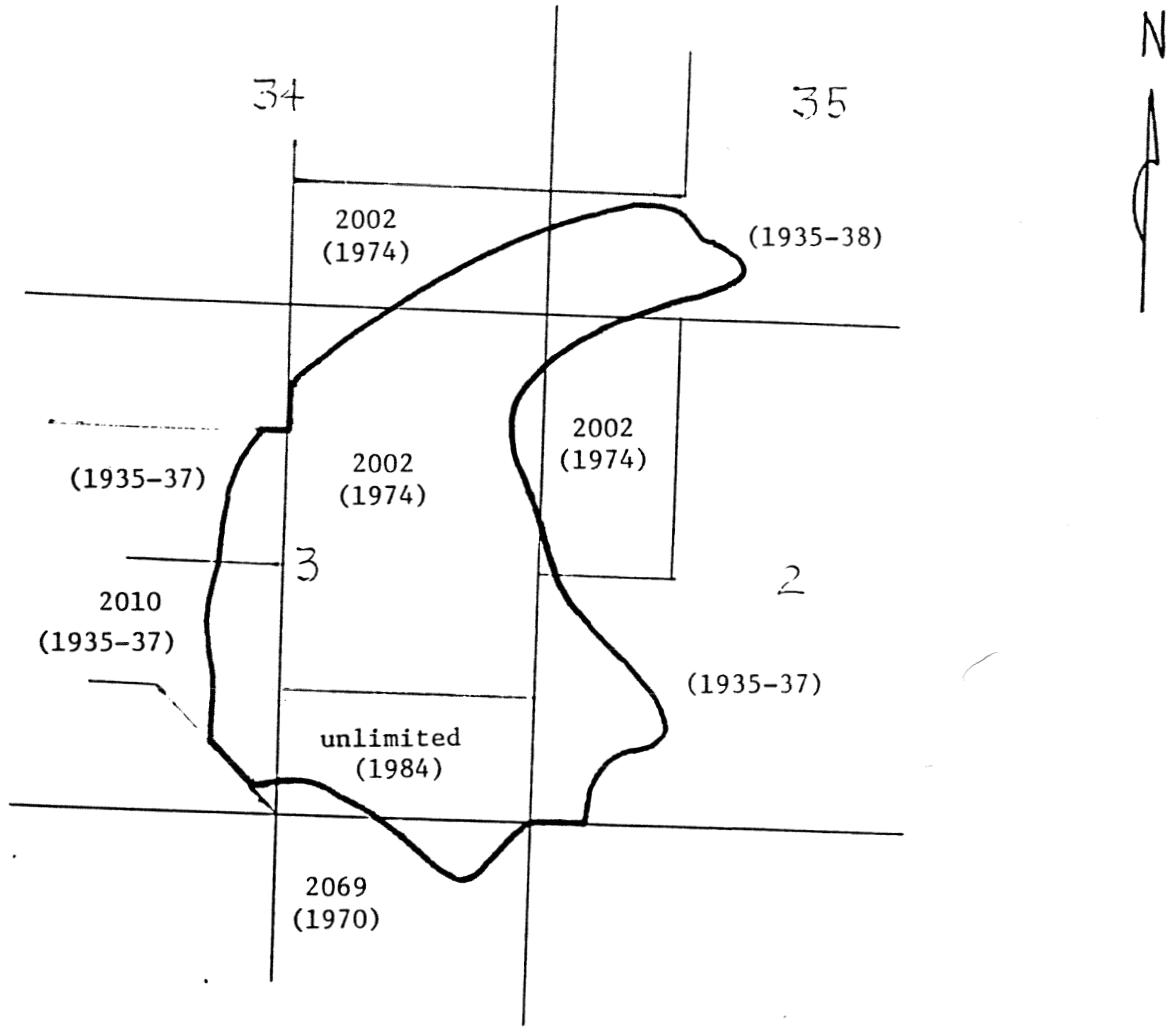
scale 4" = 1 mile

214 - Hosmer silt loam

340 - Zanesville silt loam

986G - Berks-Wellston complex

986F - Wellston-Berks complex



scale 1:24000

Figure 8. Map of Cave Hill Research Natural Area showing dates of mineral reservation expirations per tract; dates of acquisition by U. S. Forest Service are shown in parentheses; tracts with no mineral reservation expiration date shown have no outstanding mineral rights

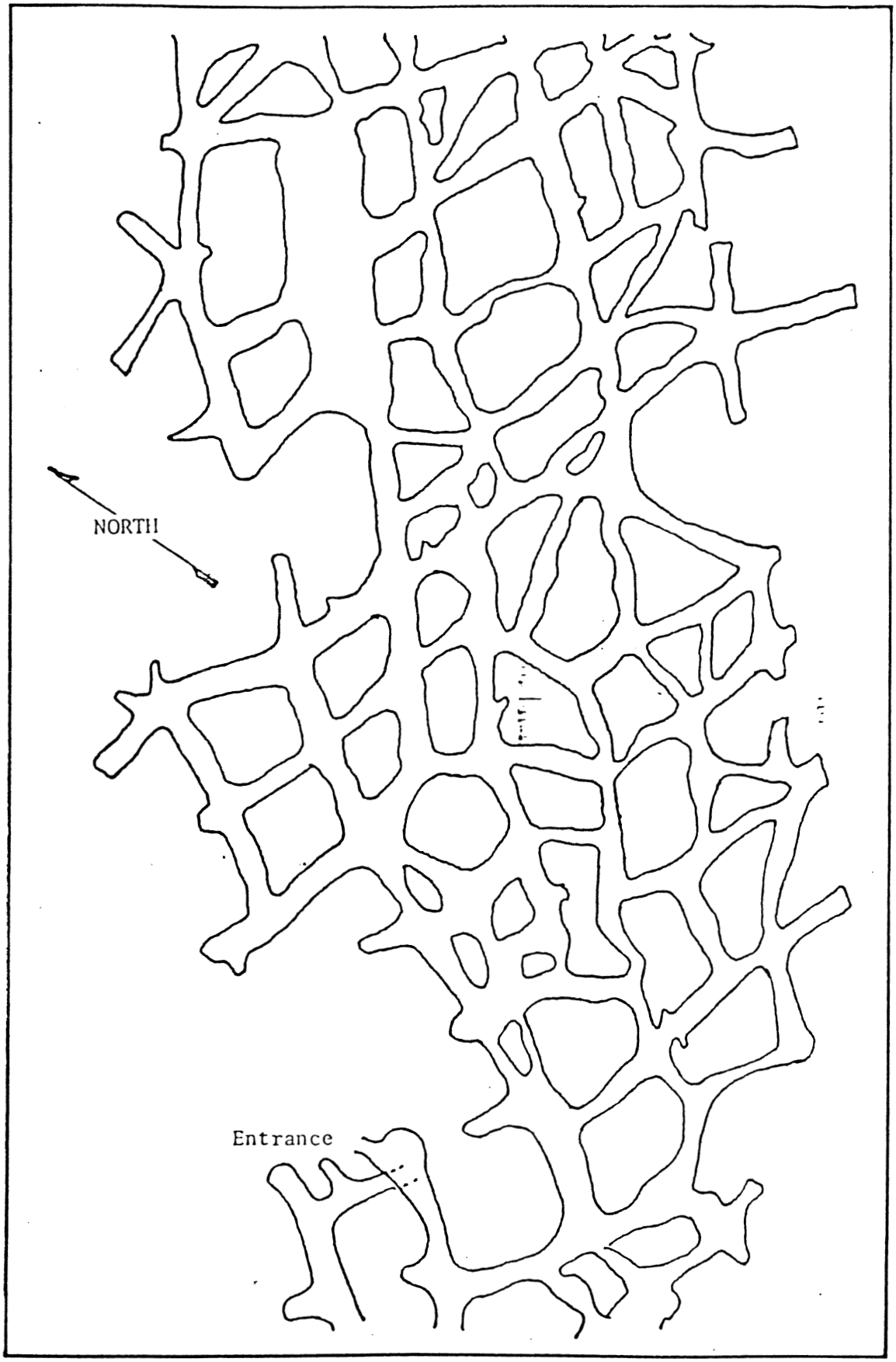


Figure 9. Map of a segment of Equality Cave northeast of the entrance, surveyed by John White, Don Coons, and others in 1971 (Kerr and White, 1980) scale 1:480

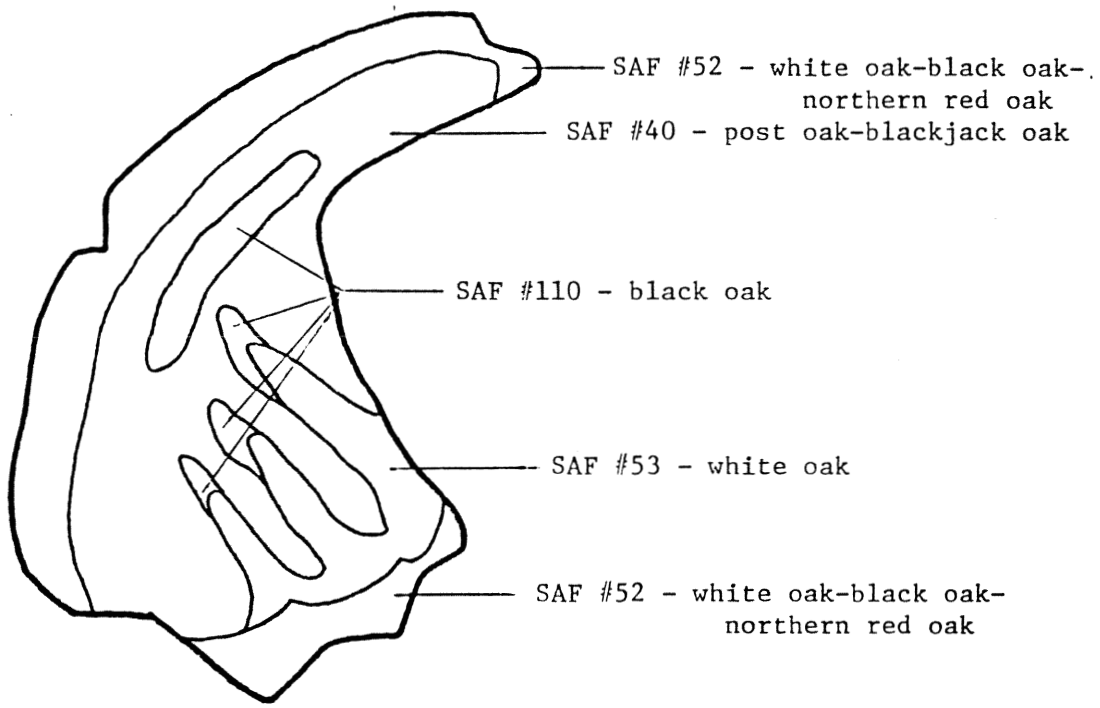


Figure 11. Map of Cave Hill Research Natural Area showing area cover types

scale 1:24000

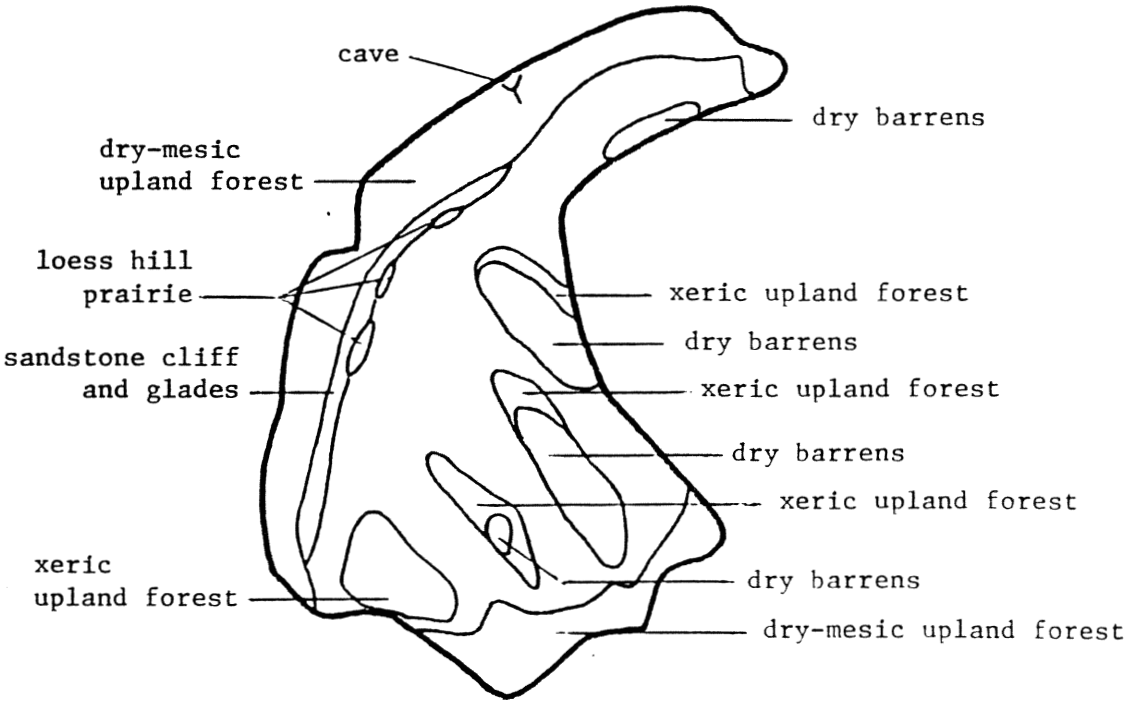


Figure 12. Map of Cave Hill Research Natural Area showing natural communities

scale 1:24000

Cave Hill Summer

USDA-FOREST SERVICE

PHOTOGRAPHIC RECORD

(See FSM 1643.52)

PHOTOGRAPHER: Copy of ASCS photo (Copy made by M. D. Hutchison)

DATE SUBMITTED: July, 1987

HEADQUARTERS UNIT:

LOCATION:

INITIAL DISTRIBUTION OF PRINTS AND FORM 1600-1:

☐ WO ☐ RO ☐ DIV. ☐ FOREST ☐ DISTRICT ☐ PHOTOGRAPHER Date _____

INSTRUCTIONS: Submit to Washington Office in quadruplicate. Permanent numbers will be assigned and the forms will be distributed as follows: (1) Washington Office, (2) RO or Station, (3) Forest or Center and (4) Photographer.

PHOTOGRAPH NUMBER TEMP. (1)	PHOTOGRAPH NUMBER PERMANENT (To be filled in by the WO) (2)	SELECTED FOR W.O. PHOTO LIBRARY (3)	DATE OF EXPOSURE (4)	LOCATION (State, Forest, District and County) (5)	CONCISE DESCRIPTION OF VIEW (6)	NEGATIVE (Show size and BW for black and white or C for color) (7)
Fig. 13			June 29, 1938	Illinois, Shawnee National Forest, Elizabeth-town Dist., Saline Co.	aerial view of Cave Hill Research Natural Area	35 mm. BW

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USDA-FOREST SERVICE

PHOTOGRAPHIC RECORD

(See FSM 1643.52)

PHOTOGRAPHER: Copy of ASCS photo (Copy made by M. D. Hutchison)

DATE SUBMITTED: July, 1987

HEADQUARTERS UNIT:

LOCATION:

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Fig. 14			Oct. 6, 1980	Illinois, Shawnee National Forest, Elizabeth-town Dist., Saline Co.	aerial view of Cave Hill Research Natural Area	35 mm. BW

☆ U.S. GOVERNMENT PRINTING OFFICE : 1973-730-157/208 3-1

1600-1 (8/67)

Figure 13. Copy of ASCS aerial photograph taken June 29, 1938 showing location of Cave Hill Research Natural Area

Figure 14. Copy of ASCS aerial photograph taken October 6, 1980 showing location of Cave Hill Research Natural Area

USDA-FOREST SERVICE

PHOTOGRAPHIC RECORD

(See FSM 1643.52)

PHOTOGRAPHER	DATE SUBMITTED
M. D. Hutchison	July, 1987

HEADQUARTERS UNIT	LOCATION

INITIAL DISTRIBUTION OF PRINTS AND FORM 1600-11

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Fig. 15			Dec., 1980	Illinois, Shawnee National Forest, Elizabeth-town Dist., Saline Co.	aerial view looking northeast along ridge with Cave Hill Research Natural Area in background	35 mm. C

☆ U.S. GOVERNMENT PRINTING OFFICE : 1973—730-157/208 3-1

1600-1 (8/67)

USDA-FOREST SERVICE

PHOTOGRAPHIC RECORD

(See FSM 1643.52)

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M. D. Hutchison	July, 1987
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INITIAL DISTRIBUTION OF PRINTS AND FORM 1600-1:

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TEMP. (1)	PERMANENT (To be filled in by the WO) (2)	(3)	(4)	(5)	(6)	(7)
Fig. 16			Nov. 18, 1986	Illinois, Shawnee National Forest, Elizabeth-town Dist., Saline Co.	view of dry upland forest on thin soil at Cave Hill Research Natural Area	35 mm. C

☆ U.S. GOVERNMENT PRINTING OFFICE : 1973—730-157/208 3-1

Figure 15. Aerial view looking northeast along ridge with Cave Hill Research Natural Area in background - photo taken by E. B. Trovillion, Dec., 1980

Figure 16. View of dry upland forest on thin soil at Cave Hill Research Natural Area; bedrock is Caseyville Sandstone - photo taken by S. Harris, Nov. 18, 1986

USDA-FOREST SERVICE

PHOTOGRAPHIC RECORD

(See FSM 1643.52)

PHOTOGRAPHER	DATE SUBMITTED
M. D. Hutchison	July, 1987
HEADQUARTERS UNIT	LOCATION

INITIAL DISTRIBUTION OF PRINTS AND FORM 1600-1:

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Fig. 17			April, 1981	Illinois, Shawnee National Forest, Elizabeth-town Dist., Saline Co.	view of barrens community at Cave Hill Research Natural Area	35 mm. C

☆ U.S. GOVERNMENT PRINTING OFFICE : 1973-730-157/208 3-1

1600-1 (8/67)

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Fig. 18			June, 1980	Illinois, Shawnee National Forest, Elizabeth-town Dist., Saline Co.	view of entrance to Equality Cave at Cave Hill Research Natural Area	35 mm. C

☆ U.S. GOVERNMENT PRINTING OFFICE : 1973—730-157/208 3-1

Figure 17. View of barrens community at Cave Hill Research Natural Area; trees are post oaks; grasses are little bluestem (Andropogon scoparius) and poverty oats (Danthonia spicata)
- photo taken by M. D. Hutchison, April, 1981

Figure 18. The entrance to Equality Cave at Cave Hill Research Natural Area; it is in a limestone unit of the Kincaid Formation (Mississippian) and is one of the few maze caves in the Interior Low Plateaus Physiographic Province
- photo taken by M. D. Hutchison, June, 1980

USDA-FOREST SERVICE

PHOTOGRAPHIC RECORD

(See FSM 1643.52)

PHOTOGRAPHER	DATE SUBMITTED
M. D. Hutchison	July, 1987
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Fig. 19			June, 1980	Illinois, Shawnee National Forest, Elizabeth-town Dist., Saline Co.	view of sandstone cliff looking northeast at Cave Hill Research Natural Area	35 mm. C

☆ U.S. GOVERNMENT PRINTING OFFICE : 1973—730-157/208 3-1

USDA-FOREST SERVICE

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(See FSM 1643.52)

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	TEMP. (1)	PERMANENT (To be filled in by the WO) (2)	(3)	(4)	(5)	(6)	(7)
Fig. 20				June, 1980	Illinois, Shawnee National Forest, Elizabeth-town Dist., Saline Co.	view of forbs and grasses in the dry upland forest community at Cave Hill Research Natural Area	35 mm. C

☆ U.S. GOVERNMENT PRINTING OFFICE : 1973—730-157/208 3-1

1600-1 (8/67)

Figure 19. View of sandstone cliff looking northeast at Cave Hill Research Natural Area; note the tilt of the bedrock along the escarpment
- photo taken by M. D. Hutchison, June, 1980

Figure 20. View of forbs and grasses in the dry upland forest community at Cave Hill Research Natural Area; note the hiking trail that crosses the area along the ridge crest
- photo taken by M. D. Hutchison, June, 1980

Fig. 13. Cave Hill
RNA
Saline Co, Ill.

Fig. 14. Cave Hill
RNA
Saline Co., Ill.

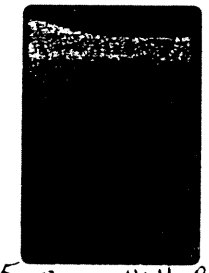

Fig. 15 Cave Hill RNA
Saline Co., Ill.

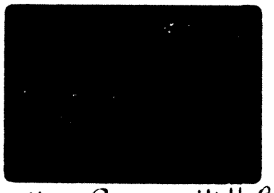

Fig. 16. Cave Hill RN
Saline Co., Ill.

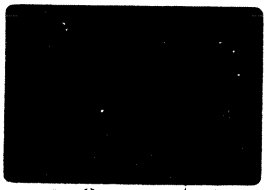

Fig. 17 Cave Hill RNA
Saline Co, Ill.

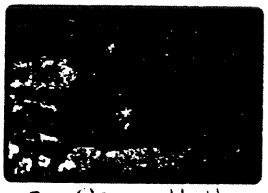

Fig. 18. Cave Hill
Saline Co., Ill

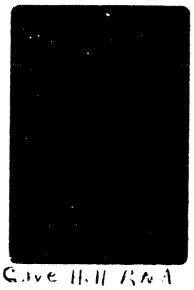

Fig 19. Cave Hill RNA
Saline Co., Illinois

Fig. 20. Cave Hill RNA
Saline Co., Ill.

SIGNATURE PAGE

for

RESEARCH NATURAL AREA ESTABLISHMENT RECORD

Cave Hill Research Natural Area

Shawnee National Forest

Saline County, Illinois

The undersigned certify that all applicable land management planning and environmental analysis requirements have been met[1] in arriving at this recommendation.

Prepared by Max D. Hutchison, Field Representative, Natural Land Institute; Steven Olson, Technical Assistant, Natural Land Institute; and Stanley Harris, Jr., Ph.D., Professor Emeritus, Department of Geology, Southern Illinois University

Recommended by _____ Date 3/21/88
Gary Sieren, District Ranger,
Elizabethtown District

Recommended by _____ Date 4/13/88
Kenneth Henderson, Forest Supervisor,
Shawnee National Forest

Recommended by _____ Date 6/26/90
Floyd Marita, Regional Forester,
Eastern Region

Recommended by _____ Date 7/9/90
Ronald D. Lindmark, Station Director,
North Central Station

[1] insert: and that boundaries are clearly identified in accordance with FSM 4063.21, Mapping and Recordation, and FSM 4063.41 5.e(3) PSE

TITLE PAGE

Establishment Record for the Cave Hill
Research Natural Area within the Shawnee
National Forest, Saline County, Illinois

ESTABLISHMENT RECORD FOR THE CAVE HILL RESEARCH NATURAL AREA WITHIN THE SHAWNEE NATIONAL FOREST SALINE COUNTY, ILLINOIS

INTRODUCTION

The Cave Hill Research Natural Area (RNA) is a 465-acre (188.3-hectare) tract owned by the federal government and managed by the U. S. Forest Service, Shawnee National Forest (Figure 4). It contains relatively undisturbed natural community types, e.g. xeric upland forest, dry upland forest, dry-mesic upland forest, barrens, sandstone glade, and sandstone cliff. There is a cave within the RNA known as Equality Cave (or Cave Hill Cave) that is a significant example of a maze cave in the Interior Low Plateaus Physiographic Province. The cave is also significant for its terrestrial cave community and aquatic cave habitats.

The Mead's milkweed (Asclepias meadii), a plant that is currently a candidate for listing as Federally Threatened, occurs within the RNA. It is also proposed for listing by the Regional Forester as a Sensitive Species. There are five Shawnee National Forest Listed Species known to occur at Cave Hill: the chestnut oak (Quercus prinus), Carolina thistle (Cirsium carolinianum), Bradley's spleenwort (Asplenium bradleyi), and two species of lichens, Usnea sp. and Ramalina sp. (Shawnee National Forest, Land and Resource Management Plan, 1986). The Mead's milkweed and Carolina thistle are listed as Endangered in Illinois, and the chestnut oak and Bradley's spleenwort are listed as Threatened in the State (Natural Land Institute, 1981).

The Cave Hill RNA is also significant for its features of interest to geomorphologists. The hogback-like ridge is a good example of an interesting geomorphic feature on a fault-line scarp. As the ridge is along a fault zone with a great amount of displacement, many bedrock formations are exposed, and the area is particularly suitable for interpreting the region's geology (Quarterman and Powell, 1978; and Kerr and White, 1980). The area is also significant in Illinois for its exposure of Tradewater chert (Illinois Natural Areas Inventory, 1978).

Four Society of American Foresters (SAF) cover types are present: Type 40 (post oak-blackjack oak), Type 52 (white oak-black oak-northern red oak), Type 53 (white oak), and Type 110 (black oak). Several variants and small stands with other dominants are also present.

The Cave Hill Natural Area was identified by the Illinois Natural Areas Inventory (1978) as being of significance because of its very high quality dry upland forest, sandstone glade, and sandstone cliff communities, its outstanding invertebrate cave fauna, and the Tradewater

chert (bedrock) outcrop (see Appendix I). The RNA boundaries closely follow the INAI natural area boundaries except for minor differences at the north and south ends.

Cave Hill is on the upthrown (south) side of the Shawneetown Fault, and its sandstone cap forms a continuous cliff a half mile (0.8 kilometers) long and up to 80 feet (24.4 meters) or more in height beneath the highest ridge. This hill rises abruptly from the flat Pleistocene lake plain. There are excellent views of this plain in a northwesterly direction from the cliffs. Drainage is north into the Saline River and west into tributaries of the Saline River. Exposed bedrock is mainly Pennsylvanian sandstones and shales with some Mississippian limestones and shales. The RNA is a part of the Greater Shawnee Hills Natural Division and is within the Interior Low Plateaus Physiographic Province (Schwegman, 1973).

The Public Land Survey surveyors described this area in 1807 and noted the "hills, quarries of stone, and rocky bluffs." The trees they mention include the post oak, white oak, and blackjack oak.

The cave was described as early as 1830 in an article in the United States Gazette, where it was called "Half Moon Mountain Cave." The Geological Survey of Illinois by Worthen (1875) referred to the area as "Prospect Hill." Comments recorded during the Rolfe topographical survey of Illinois in 1890-92 mention that:

> "Many prominent hills and divides are found in this township. The valleys are mostly deep, have very steep and prominent bluffs of hard sandstone and rocks . . . The hill in section 3 reaches a height of 874 feet . . . Stactalite [sic] cave is on the northern side of this large hill . . . All along the valleys and sides of these hills the country is covered with rocks of sandstone making it almost impossible for cultivation."

The Cave Hill RNA was mostly in private ownership prior to its acquisition by the federal government to become a part of the Shawnee National Forest (Figure 8). One 80-acre (32.4-hectare) parcel was acquired by exchange from the State of Illinois. The RNA has never been significantly disturbed by livestock or cultivation. There has been some selective logging in parts of the area but none of significance in recent years. Due to the rugged terrain and thin rocky soils, the area has never been suitable for agricultural use. Trees grow slowly and are of poor form and quality for lumber over most of the area.

The area is scenic, and local sites along the bluffs have been used by hikers and picnickers for many years. The

cave, in particular, has received a lot of public use during the last 150 years.

The significance of the natural area in the cave vicinity was recognized by the Illinois Nature Preserves Commission in 1967 (Thompson and Hutchison, 1967). A much larger natural area of significance was identified during the Illinois Natural Areas Inventory in 1976-78. Quarterman and Powell (1978) concluded that the Cave Hill area would qualify for inclusion in the National Natural Landmark program. In 1980, Kerr and White also recommended that the site be designated as a National Natural Landmark. It was first proposed for establishment as a research natural area by the Illinois Nature Preserves Commission in 1980 (Hutchison, 1980). Also, in 1980, it was recommended for RNA designation by the Illinois Department of Conservation (West, 1980). The area was recommended for RNA designation by the North Central Forest Experiment Station in 1981 (Rink, 1981).

LAND MANAGEMENT PLANNING

The Cave Hill natural area is recommended for designation as a research natural area in the Land and Resource Management Plan, Shawnee National Forest, approved November 24, 1986 (see SNF, Forest Plan, IV-3, Special Feature Management). The environmental analysis as a part of the planning process supports the recommendation to establish the RNA (SNF, Final EIS, 2-66, Identification and Management of Special Features). It is currently being protected under Management Prescription 8.2.

OBJECTIVES

The objectives of establishing the Cave Hill Research Natural Area are to:

1) preserve pristine forest, grassland, and geological natural situations for research, study, observation, monitoring, and educational activities that maintain unmodified conditions,

2) preserve and maintain genetic diversity,

3) protect against serious environmental disruptions,

4) serve as reference area for the study of succession,

5) provide onsite and extension educational activities,

6) serve as baseline area for measuring long-term ecological changes,

7) serve as control area for manipulative research,

8) monitor effects of resource management techniques and practices.

JUSTIFICATION

The most important natural features at the Cave Hill Research Natural Area are the Mead's milkweed, the old growth forest, the fault-line escarpment, Equality Cave, and the barrens community. The xeric upland forest/dry upland forest/barrens complex that occurs here is the largest of high quality in Illinois (Illinois Natural Areas Inventory, 1978). Over 150 acres (60.7 hectares) of this community complex are present at this site.

Mead's milkweed (Asclepias meadii), a plant that occurs at one site on Cave Hill, is currently a candidate for Federal listing as a Threatened Species. It is also proposed for listing as a Regional Forester's Sensitive Species. Shawnee National Forest Listed Species that occur at scattered locations within the RNA include the chestnut oak, Carolina thistle, Bradley's spleenwort, a lichen species of Usnea, and a lichen species of Ramalina (Shawnee National Forest, Land and Resource Management Plan, 1986).

Equality Cave is the only extensive maze cave developed in moderately dipping strata in the Interior Low Plateaus Physiographic Province of North America (Quarterman and Powell, 1978). Although superficially altered by human disturbance, its complex maze pattern and its setting in a strike ridge are important features of the cave (Kerr and White, 1980).

The hill has excellent examples of several geomorphic features along a fault-line scarp. The hogback and strike ridge are well-developed, and the many bedrock units exposed provide a site suitable for interpretive studies of the region's geology. The area is an outstanding site to illustrate the contrast due to north versus south slope orientation in erosion, soil thickness, and vegetation. There is also a contrast due to the strong dip of the sandstone layers between the cliffed scarp face and the back slope, as compared with the other more gently dipping cuestas of the Shawnee Hills.

The Cave Hill Research Natural Area includes SAF types 40, 52, and 53 that are listed as needed in the RNA system (Shawnee National Forest, Appendix E, Final Environmental Impact Statement, Land and Resource Management Plan, 1986).

There is a diversity of natural community types and species present that add to the value of the area for research purposes.

Cave Hill is a part of the prominent fault-line escarpment that rises above the flat Pleistocene lake plain characteristic of the region to the north and west (Figure 15). The hill rises 580 feet (176.8 meters) above the plain in a distance of just over a half mile (0.8 kilometers). A narrow continuous sandstone cliff outcrops beneath the highest ridge (Figure 19). On the back slope, there are several evenly spaced valleys more or less parallel to the structural dip. The topography reflects differential erosion of underlying bedrock layers. The thinness of the soils affects the vegetation, and much of the area is drouthy and thinly forested (Figure 16). There are assemblages of plant species in the glades, barrens, and xeric forests that are usually considered to be more characteristic of the prairies further to the north and west. These are remnants of community types that were common in the Shawnee Hills prior to settlement.

This area is suitable for research, demonstration, and/or learning experience opportunities. Conditions are ideal for research on prairie-forest successional and interface questions, for studies of rock weathering and pedalogical research dependent upon the presettlement quality of the site, and for studies of vegetational history and geography of plant species migrations.

PRINCIPAL DISTINGUISHING FEATURES

The Cave Hill Research Natural Area is a landform between a cuesta and a hogback along a prominent fault-line escarpment that rises some 580 feet (176.8 meters) above the surrounding Pleistocene lake plain. It has a continuous sandstone cliff with scenic vistas overlooking the flat plain to the west and north. The exposed bedrock is mostly Pennsylvanian sandstone. Some limestone and shale of the Mississippian System outcrop on the northwest-facing slope. The back slope is dissected by deep parallel valleys, and the soils are thin.

The entrance to a cave, known as Equality Cave, is on the northwest-facing steep slope near the lower edge of the RNA (Figure 18). It is one of the few maze caves in the Interior Low Plateaus Province (the only extensive maze cave on moderately dipping strata) and is nationally significant for its type and rarity (Quarterman and Powell, 1978).

Nearly all of the RNA is forested with a diversity of plant species and community types. The barrens, xeric upland forest, and dry upland forest communities are characterized by thin drouthy soils and an open canopy of

small limby trees and shrubby thickets (Figures 16 and 17). On some of the north-facing lower slopes and in the deep valleys, there are more mesic sites with deeper soils and larger trees. The ledges of exposed bedrock above the sandstone cliffs have glades with good assemblages of prairie plants. The drouthy sites, in particular, are of high natural quality and reflect little unnatural disturbance.

The Mead's milkweed, a candidate for listing as a Federally Threatened Species, occurs here. It is also proposed for listing as a Regional Forester's Sensitive Species. Five Shawnee National Forest Listed Species also occur here including the chestnut oak, Carolina thistle, Bradley's spleenwort, a lichen (Usnea sp.), and a lichen (Ramalina sp.). The Mead's milkweed and Carolina thistle are listed as Endangered in Illinois. The chestnut oak is listed as Threatened in the State.

LOCATION

The Cave Hill Research Natural Area is on the Elizabethtown Ranger District of the Shawnee National Forest. It is in Saline County, in the extreme southeastern tip of Illinois. Latitude is 37° 41' N, and longitude is 88° 25' W. The area is in sections 34 and 35, T. 9 S., R. 7 E. and in sections 2, 3, and 10, T. 10 S., R. 7 E. of the 3rd P. M. (Figures 3 and 4).

The RNA location is described as follows:

Beginning at the section corner to sections 2-3-10-11, thence;

S 47° W about 17 chains to the bottom of Wiedeman Hollow, thence;

Northwesterly and westerly along the bottom of Wiedeman Hollow crossing the section line to sections 3 and 10 to a point about 5 chains north of the section line near base of sandstone cliff and about 35 chains east of the west line of section 3, thence;

N 45° W 8 chains and N. 9° W 8 chains to a point on east edge of north flowing drainage, thence;

N. 18° E. 8 chains, N. 5° E 18 chains, and N. 35° E about 9 chains to a point on the north sixteenth line section 3, thence;

East along north sixteenth line to center north sixteenth corner section 3, thence;

North along north-south centerline section 3, a distance of 10 chains, thence;

Northeasterly to a point on the north section line of section 3 at 27 chains west of northeast corner of section 3, thence;

Northeasterly to a point on the east line of section 34 at 16 chains north of the southeast corner of section 34, thence;

Northeasterly, easterly and southeasterly along the 550 foot contour to a point in the bottom of Three Spring Hollow, thence:

Leaving Three Spring Hollow at S 20° E 3 chains and S 69° W to a point in the south section line of section 35 at 9 chains east of the southwest corner section 35, thence;

Southwesterly to a point in the bottom of Blue Spring Hollow on the west line of section 2 and being about 5.5 chains south of the northwest corner of section 2, thence;

Leaving Blue Spring Hollow at approximately S 46° W a distance of 10 chains, and approximately S 14° E to the quarter corner to sections 2 and 3, thence;

Continuing S 14° E to a point in the bottom of Horseshoe Hollow, thence;

Continuing along the bottom of Horseshoe Hollow about 22 chains, thence;

Leaving Horseshoe Hollow south a distance of 5 chains, thence;

S 75° W 8 chains and approximately S 18° W to a point on the south section line of section 2 being 9 chains east of the southwest corner of section 2, thence;

West along south line section 2 to point of beginning containing approximately 465 acres (188.3 hectares)

of the NE 1/4 of the NW 1/4 of section 3, 4 chains west of the southeast corner of said NE 1/4 of the NW 1/4;

Thence, running east along the south line of the NE 1/4 of the NW 1/4, 4 chains, to the point of beginning, the boundaries enclosing approximately 465 acres (188.3 hectares).

Elevation ranges from 475 feet (144.8 meters) at the extreme south end of the area, to 923 feet (281.3 meters) at the highest point of Cave Hill.

The area is about 8 miles (12.9 kilometers) east-southeast of Harrisburg, the county seat of Saline County. It is about 4.4 miles (7.1 kilometers) northeast of the village of Rudement. Access to the RNA is from Illinois Rt. 34, north from Rudement, on Saline County Road 309. The area may also be reached from the Saline County Conservation Area and Saline County Road 324. Forest Service Road 112 crosses the Cave Hill area just to the west and south of the RNA. It is nearly impassible to four wheel vehicles, but one can walk from the Saline County Road 309, along Forest Service Road 112 about a quarter of a mile (402.3 meters), and then walk east from Forest Service Road 112 into the RNA. Forest Service Roads 108 and 1600A that are shown on the topo map (Figure 4) are now unsurfaced trails rarely used by vehicles.

AREA BY COVER TYPES

The Cave Hill Research Natural Area is nearly all forested. The following are SAF and Kuchler cover types represented within the RNA (Figure 11):

SAF Cover Type	Kuchler PNV Type	Acres	Hectares
#40 post oak-blackjack	#91 oak-hickory	180	72.9
#52 white oak-black oak-northern red oak	#91 oak-hickory	135	54.7
#53 white oak	#91 oak-hickory	90	36.4
#110 black oak	#91 oak-hickory	60	24.3

According to the Illinois Natural Areas Inventory (1978) data for the Cave Hill Natural Area, the following types were described:

Natural Community	Plant Community
Dry upland forest	post oak-black hickory-pignut hickory
Dry-mesic upland forest	white oak-black oak
Sandstone glade	post oak-redcedar/little bluestem
Sandstone cliff community	---
Terrestrial cave community	---

The following natural community types are mapped by the authors of this report (see descriptions under Flora):

dry barrens
xeric upland forest
dry upland forest
dry-mesic upland forest
loess hill prairie
sandstone glade
cliff
cave

PHYSICAL AND CLIMATIC CONDITIONS

The climatological data are from the collection station at Harrisburg. The period of record is 1931-60. Harrisburg is 8 miles (12.9 kilometers) west-northwest of the Cave Hill Research Natural Area. The following description is adapted from the Soil Survey of Saline County, Illinois (1978):

> The Saline County area has the continental climate typical of southern Illinois. The annual temperature range is about 100 degrees F. Summer maximums reach 100 F. (37.8° C.) or more during 8 out of 10 summers. Winter minimums are zero (-17.8° C.) or below during 6 out of 10 winters.
>
> Low pressure areas and their associated weather fronts bring frequent changes in temperature, humidity, cloudiness, and wind direction much of the year.
>
> Annual precipitation averages about 42 inches (106.7 centimeters) and ranges from about 25 to 72 inches (64 to 183 centimeters). Precipitation is fairly evenly distributed throughout the year. September and October are the driest months. Prolonged dry spells during the growing season are not unusual. Summer precipitation occurs mostly

in short showers or thunderstorms which are occasionally accompanied by hail and damaging winds. More than 7 inches (17.8 centimeters) of rain has fallen in a 24-hour period. Only light snows occur during an average winter. The average annual snowfall is about 12 inches (30.5 centimeters), and only rarely does a winter have as much as 20 inches (50.8 centimeters).

Summers are warm, and continuous warm periods can be prolonged. July is the warmest month; the average daily maximum temperature is near 90° F. for both July and August. The highest recorded temperature is 113° F. (45° C.). January is the coldest month, and both January and February have had temperatures as low as -20° F. (-28.9° C.).

The number of days between the average date of the last freezing temperature in spring and the average date of the first freezing temperature in fall is about 185 days. Temperatures vary consistently between ridge and valley locations during radiation freezes, the most common type of freeze in Illinois.

The Cave Hill RNA is on the north slope of the Shawnee Hills ridge that extends east-west across the southern tip of Illinois, and drainage is to the north and east into the Saline River, a tributary of the Ohio River (Figures 1 and 4). Cave Hill is a landform between a cuesta and hogback along a fault-line scarp where the rocks are dipping approximately 15° toward the east and southeast. It is on the upthrown (south) side of the Shawneetown Fault. The sandstone cap, dipping easterly, forms a continuous cliff a half mile (0.8 kilometers) long and up to 80 feet (24.4 meters) or more in height beneath the highest ridge along the east and northeast sides of the hill. The more gentle back slope is dissected by evenly spaced parallel valleys, which are V-shaped and without floodplains.

The area is nearly all forested. The cliffs along the escarpment have glades and natural openings (Figure 19), and some of the drouthy barrens have small openings in the forest canopy (Figure 17).

Most of the area is drouthy with thin soils, and the slopes have a thin cover of trees in many places with individuals that are often stunted and partly dead. The overstory trees are limby and short, and shrubs and vines form thickets in many places (Figure 16). Openings have clumpy grasses and forbs characteristic of dry woods in the region (Figure 20). Along the north-facing slopes and in the more mesic valleys, there are larger taller trees with a relatively dense canopy.

DESCRIPTION OF VALUES

Flora

The Mead's milkweed occurs at Cave Hill in the loess hill prairie. It is proposed for listing as a Regional Foresters Sensitive Species, and is a candidate for listing as Federally Threatened. Shawnee National Forest Listed Species that occur in the RNA are the Carolina thistle, chestnut oak, Bradley's spleenwort, a lichen species of *Ramalina*, and another lichen species of *Usnea*. The Mead's milkweed and Carolina thistle are listed as Endangered Species in Illinois. The Bradley's spleenwort and chestnut oak are listed as Threatened in the State.

The following natural community types are mapped by the authors of this report as occurring within the Cave Hill Research Natural Area: dry barrens, xeric upland forest, dry upland forest, dry-mesic upland forest, loess hill prairie, sandstone glade, cliff, and cave (Figure 12). The loess hill prairie, sandstone glade, cliff, and cave communities are so narrow and/or small in area, they are not separated as distinct SAF or Kuchler cover types (Figure 11). The dry barrens, xeric upland forest, and dry upland forest communities are difficult to separate and map as distinct entities because of the great deal of overlap in species composition among them. It is mainly the degree of drouthiness that influences structural differences, e.g. the sizes and shapes of trees, the density of stands, and the amount of groundcover. Typical examples of each of the natural communities mapped are found within the RNA boundaries.

The dry barrens and xeric forest communities are both dominated by blackjack oak (*Quercus marilandica*), the principal difference between them being the incomplete canopy and the grass dominated groundcover of the barrens. At this site, the barrens have short, limby trees, dense stands of farkleberry (*Vaccinium arboreum*), and openings with assemblages of prairie species, especially little bluestem (*Andropogon scoparius*), Indian grass (*Sorghastrum nutans*), and a panic grass, *Panicum microcarpon*. Forbs include goldenrods (*Solidago nemoralis* and *S. ulmifolia*),flowering spurge (*Euphorbia corollata*), and white prairie clover (*Petalostemum candidum*). Upslope from the barrens are the xeric forest sites, mainly oak thickets with poison ivy (*Rhus radicans*). These sites also have an understory of farkleberry and greenbriers (*Smilax* spp.). The groundcover in the xeric forest is predominantly poverty oats (*Danthonia spicata*).

Post oak (*Quercus stellata*) is the dominant tree of the dry upland forest, although blackjack oak is occasional. On the ridgetops, black oak (*Quercus velutina*) and white oak (*Q. alba*) are codominants, but there is considerable local

variation in species composition. Shadbush (Amelanchier arborea), farkleberry, and greenbriers are common in the understory. Pussytoes (Antennaria plantaginifolia) and dittany (Cunila origanoides) are indicator herbs of the drier sites on the ridges. The tree stands are denser, and the basal area is greater in the dry upland forests than in the barrens or xeric forest communities.

The dry-mesic forest community occurs on the lower portions of the southeastern slope of the hill, below the bluffline on the west and northwest sides, and up the northeast-facing side of valleys. These sites are dominated by red oaks (Quercus rubra) and white oaks, but hickories (Carya spp.) and chinkapin oak (Q. muhlenbergii) are also common. Redbud (Cercis canadensis) and flowering dogwood (Cornus florida) are frequent in the understory. Poison ivy dominates the groundcover in the summer, and toothworts (Dentaria laciniata) are exceptionally abundant in the early spring.

The loess hill prairies on the broad ledges just below the crest of the ridge on the west and northwest sides of Cave Hill are dominated by little bluestem, with big bluestem (Andropogon gerardii), Junegrass (Koeleria macrantha), and prairie dropseed (Sporobolus heterolepis) also being common. Conspicuous forbs include woodland sunflower (Helianthus divaricatus), blazing star (Liatris aspera), slender bushclover (Lespedeza virginica), and white prairie clover.

Sandstone glades are mostly exposed massive rock covered by lichens (Parmelia spp.) and mosses (Polytrichum spp.). The vascular vegetation grows in crevices and pockets of soil and includes poverty oats, pineweed (Hypericum gentianoides), and prickly pear (Opuntia compressa). Scattered stunted trees include oaks, hickories, and redcedars (Juniperus virginiana). Farkleberry is common here.

The exposed rocks along the sandstone bluffs are also covered with mosses and lichens, but several other plant species do occur in crevices on the rock ledges. These include American orpine (Sedum telephioides) and several ferns.

Fauna

No Federally Endangered or Threatened Species are currently known to be resident at Cave Hill, but habitat does exist for the Indiana bat (Myotis sodalis) and gray bat (M. grisescens). Bald eagles (Haliaeetus leucocephalus) and peregrine falcons (Falco peregrinus) pass through the area in migration.

Several Shawnee National Forest Listed bird species

occur in the area, including the red-shouldered hawk (Buteo lineatus), Cooper's hawk (Accipiter cooperii), Bewick's wren (Thryomanes bewickii), and loggerhead shrike (Lanius ludovicianus). Enough habitat exists in the vicinity for breeding of these species. The red-shouldered hawk and Cooper's hawk are listed as Endangered in Illinois. The loggerhead shrike and Bewick's wren are Threatened in the State (Natural Land Institute, 1981).

Equality Cave has a "scarce, but interesting" aquatic community highlighted by an otherwise soil inhabiting phreatobitic amphipod, Bactrurus mucronatus (Lewis, 1977). At the time of Lewis' study, this was the only cave locality for this species. Another undescribed amphipod (in the Crangonyx packardi complex) is also present. There are at least two species of cave crickets, a common cave spider, and a troglobitic linyphiid spider (Phanetta subterranea). Cave salamanders (Eurycea lucifuga), zigzag salamanders (Plethodon dorsalis), and slimy salamanders (P. glutinosus) occur near the entrance, and bats (usually Pipistrellus subflavus) are occasionally seen in the cave.

A dragonfly of note is the spear-backed spiketail (Cordulegaster obliqua) seen in Wiedeman Hollow. It is apparently associated with that stream.

The timber rattlesnake (Crotalis horridus) is occasional along the bluffs in the RNA. The eastern box turtle (Terrapene carolina) and the American toad (Bufo americanus) are common throughout the area.

Most of the animals common to the region probably occur in, or occasionally use, the RNA, especially the larger mammals such as the white-tailed deer (Odocoileus virginianus), coyote (Canis latrans), gray fox (Urocyon cinereoargenteus), raccoon (Procyon lotor), opossum (Didelphis marsupialis), and gray squirrel (Sciurus carolinensis).

Geology (Figures 5 and 6)

A relatively thin layer of silty loess covers the area. This is due to a lesser original thickness of deposition and more than average erosion since deposition.

Cave Hill itself is composed of 1) massive sandstone, some conglomeritic, 2) sandstone with alternating shale layers on the ridge crest and back slope, and 3) shale and limestone on the scarp face.

The Caseyville Sandstone of the Pennsylvanian System forms the resistant rock of the ridge crest and upper back slope. It is exposed both on the scarp face and in ledges and cliffs on the back slope, and along the headwaters of the larger hollows. Massive beds up to six feet (1.83

meters) thick, commonly crossbedded and with ripple-marked surfaces, are characteristic (Figure 16).

The Abbott and Spoon formations cropping out on the lower back slope are composed of alternating shale and sandstone units. The sandstones are not as coarse textured as those of the Caseyville, and they are not as resistant. Nevertheless, they form conspicuous ledges and the steep valley sides of the hollows. The lower part of the Spoon Formation correlates with the upper part of the Tradewater Group. The Tradewater name has been used in Illinois (Weller, 1940), but it is now generally restricted to Kentucky geological nomenclature. The upper part of the Abbott Formation correlates with the lower part of the Tradewater Group (Willman et al., 1975).

The Kinkaid Formation of the Chester Series of the Mississippian System is the bedrock forming the scarp slope beneath the Caseyville Sandstone. Exposures are generally poor and discontinuous. The uppermost shale unit is exposed just above the cave entrance (Figure 18). It is friable and greenish. The cave has been dissolved from the highest limestone unit, which is more than 20 feet (6.1 meters) thick. Some limestone ledges outcrop lower on the slope.

The complex Shawneetown Fault system is responsible for the escarpment ridge. It rises abruptly from the flat Pleistocene lake plain whose sediments overlie the coal-bearing portion of Pennsylvanian strata (Figure 15). Great thicknesses of Pennsylvanian sediments have been eroded from both sides of the fault zone. However, the resistant Caseyville Sandstone "holds up" Cave Hill, whereas on the north and west sides, weak formations are at the surface. There is no evidence to indicate movement along the Shawneetown Fault in Recent Time.

The tilting of rocks into the Eagle Creek Syncline has produced three sets of joints most clearly displayed by the intersecting passages of Equality Cave. Most joints are nearly at right angles to the bedding (Figure 9). This is significant in that the great joint blocks on the massive cliffs are tilted into the cliffs. Thus, the blocks are relatively stable, and few have tumbled down.

Overhanging shelters beneath the sandstone cliffs are not well-developed due also to the structural dip of the rocks. Debris consists of loess and sandstone cobbles.

The effect of erosion by running water is well displayed in a variety of forms. Of considerable interest is the fact that there is no evidence of severe logging, significant land clearing, or cultivation in the RNA. Thus, the very thin soils on the slopes cannot be blamed on unnatural disturbances.

The hollows are V-shaped with rocky stream beds and steep rocky valley slopes. However, they cross alternating shale and sandstone bedrock layers, so their character is not uniform. Gradients are steep, rising some 500 feet (152.4 meters) in less than a mile (1.6 kilometers).

Groundwater has formed the extensive network system of Equality Cave. The cave trends parallel to the hillside as indicated by a line of sinkholes on the surface, and joint passages ending in collapses with many roots. The cave consists of three to five parallel passages with many intersecting cross passages (Figure 9). The deepest passage carries a stream of water. At the upstream (southwest) end, roof collapses obstruct the passages. At the downstream end, the passages become too narrow to traverse.

References: W. J. Nelson and D. K. Lumm. 1986. Geologic map of the Rudement Quadrangle, Saline County, Illinois. Illinois State Geological Survey, Map IGQ-3. Map plus explanation and discussion.

S. E. Harris, Jr., C. W. Horrell, and D. Irwin. 1977. Exploring the land and rocks of southern Illinois, a geological guide. Southern Illinois University Press, Carbondale. 240 pages.

Soils (Figure 7)

Most of the soils at Cave Hill are thin and stony. They are well drained, and runoff is rapid. They mostly formed in loess and underlying material weathered from shale or sandstone. Organic content is low, and the hazard of erosion is very severe.

The relative thickness of soil can be readily judged from the vegetation. On the broad upland ridges, the loess is thick enough to provide a good root medium and some water storage. Loess cover also extends down the slopes on north orientations. Loess is very thin, even absent, on many south-facing slopes where conditions of freeze-thaw and drought favor more rapid mass wasting and rainwash.

Rock outcrops occur along the upper northwest-facing slope, where a continuous sandstone cliff is prominent (Figures 15 and 19).

The Berks-Wellston complex (986G) is mapped on the upper slope of the escarpment and in the upper parts of the valleys on the back slope. These are very steep and drouthy soils. Areas of surface stones, boulders, and rock outcrops are common. They formed in loam weathered from sandstone, siltstone, and some shale, and are strongly acid. Berks soil makes up the major part of this complex, especially on

south-facing slopes. Berks soil has less clay than Wellston soil.

The Wellston-Berks complex (986F) is mapped on slopes that are slightly less steep than where the Berks-Wellston complex occurs. Here, the Wellston soil makes up 50 to 70 percent of the unit.

The Zanesville silt loam (340) is mapped on gentler slopes along the northwest edge of the RNA. It formed in loess and material weathered from sandstone, siltstone, and shale. It is mainly loam with some stones, is medium acid in reaction, and has a fragipan.

The Hosmer silt loam (214) occurs as very narrow bands along the main ridge and spur ridge crests in the area. It formed in loess, has a fragipan, and is usually strongly acid.

Reference: C. Miles and B. Weiss. 1978. Soil survey of Saline County, Illinois. Soil Conservation Service and Forest Service, in cooperation with the Illinois Agricultural Experiment Station, Urbana, Illinois. 94 pages plus maps.

Lands

All of the RNA is federal land acquired by the U. S. Forest Service as a part of the Shawnee National Forest. There are outstanding mineral rights on 425 acres (171.1 hectares) within the RNA boundaries (see Figure 8 for dates of acquisition and mineral reservations per tract). According to Appendix E of the Shawnee National Forest, Final Environmental Impact Statement, Land and Resource Management Plan (1986), there is medium potential for the presence of fluorite, lead, zinc, and coal, and low potential for the presence of oil and gas. Should exploration, development or extraction of minerals occur, those activities will be coordinated to protect RNA values. PJE

Cultural features

There are no known historical sites, cemeteries, or Indian features within the RNA.

IMPACTS AND POSSIBLE CONFLICTS

The Shawnee National Forest's Land and Resource Management Plan contains standards and guidelines for the management and protection of Special Areas, including the proposed research natural areas. These standards and guidelines provide the basis for conflict resolution.

Mineral resources

Mineral rights are outstanding on 425 acres (172.1 hectares) of the 465-acre (188.3-hectare) Cave Hill RNA (Figure 8). According to Appendix E of the Shawnee National Forest, Final Environmental Impact Statement, Land and Resource Management Plan (1986), there is medium potential for the presence of fluorite, lead, zinc, and coal, and low potential for the presence of oil and gas.

Coal is currently being mined in the Cave Hill vicinity, to the south of the RNA, but because of the faulting and displacement in the region, it is doubtful that mineable deposits are present within the RNA boundaries.

Grazing

This area is not under any range allotment and is unsuitable for livestock grazing. It is nearly all forested (Figure 14). There is no known interest in developing this area for livestock. The soils on the steep rocky slopes are subject to extreme erosion, and livestock use would have undesirable effects on the soils, natural plant communities, and rare species in the area.

Timber

All of the potential research natural areas identified in the Shawnee National Forest Land and Resource Management Plan (1986) were considered inappropriate for timber production. These lands were not included in the Shawnee National Forest timber base. Consequently, no additional withdrawals will be required.

Watershed values

The protection and management of Cave Hill as an RNA will maintain the minimal erosional condition of the watershed, and thus help protect the water quality of the recipient streams and rivers. There are several springs and seeps in the area. Protection of the natural vegetative cover in the area may be an important factor in maintaining the unpolluted character of their waters. High water quality is important for the protection of rare plants and animals which are directly associated with the springs and beds of streams. For example, the largest known Illinois population of a plant proposed for listing as a Regional Forester's Sensitive Species, the heartleaf plantain (*Plantago cordata*), occurs in a rocky streambed downslope from the north edge of the RNA.

Recreational values

There is a long history of public hiking, picnicking, and cave exploring in the area. Most of the use has

centered around the cave and a few of the scenic overlooks along the bluff. There is some hunting, horseback riding, and off road vehicle riding in the area. The trail along the ridge crest (part of which is shown as FS Road 108 on the map, Figure 4) has been used for many years by visitors to the area.

The rugged cliffs, spectacular views, and the cave are attractive features that will cause protection problems if public use is not controlled, and especially if such use increases significantly. Adequate supervision and management should prevent serious recreational use conflicts from developing.

Wildlife and plant values

Management of the area as an RNA will help to preserve habitats for all wildlife and plant species native to the site (for an example, see the discussion under Watershed values above).

Some maintenance is required to control exotics and keep woody invasion from eliminating the barrens, glade, and prairie communities, but such should not cause any significant impact or result in any conflict with other uses in the vicinity.

Wilderness, Wild and Scenic River, or National Recreation Area values

No designated or proposed Wilderness, Wild and Scenic River, or National Recreation Area would be impacted.

Transportation plans

There are no known transportation plans that are likely to be in conflict with, or adversely affect, the RNA. Existing SNF trails within the area ~~should~~ will be closed to vehicle traffic, and such should not impact the future transportation system of the Shawnee National Forest.

MANAGEMENT PRESCRIPTION

The primary objective of the Cave Hill Research Natural Area management is to protect and maintain its natural character, i.e., to preserve the area from unnatural disturbance.

The purpose of management is to provide an area to illustrate and typify for research and educational purposes, some of the important forest, barrens, glade, and prairie types characteristic of the Midwest, as well as other plant communities that have special and unique characteristics of scientific interest and importance.

Recreation management

Recreation will ~~not~~ be discouraged. Existing trails will be closed. Regulations which prohibit use of the area will be enforced ~~[illegible]~~. RJE

Vegetative management

Exotics are not a problem in the less disturbed parts of the RNA, and none of the significant cover types or rare plant species are threatened at the present time, but removal and control of agressive species, such as Japanese honeysuckle (*Lonicera japonica*), throughout the area would be desirable. The rare plant sites should be monitored closely, and invading exotics should be removed from their vicinities by hand or with hand tools.

Prescribed burning and hand removal of trees and shrubs are permitted to help control the invasion of woody vegetation into the naturally open areas, i.e. the glades, barrens, and hill prairies. It is assumed that the tendency of natural openings in the Midwest to succeed to forest will result in the disappearance of these communities without fire or the replication of control measures that kept them open in presettlement times. Periodic burning should not be necessary every year, and a regular schedule of burning will be developed as results are monitored. The Illinois Department of Conservation staff is currently developing a management plan for the rare plant species, particularly the Mead's milkweed. This should be the guide for management of those sites.

Management prescriptions will be developed in cooperation with the NCFES and will be approved by the Forest Supervisor and Station Director. PJE

ADMINISTRATIVE RECORDS AND PROTECTION

The administrator and protector of the Cave Hill Research Natural Area is:

District Ranger
Elizabethtown District
USDA - Forest Service
Elizabethtown, Illinois 62931

The research coordinator is :

Director
North Central Forest Experiment Station
1992 Folwell Ave.
St. Paul, MN 55108

The research data file is maintained by the North Central Forest Experiment Station and the Shawnee National Forest Headquarters, Harrisburg, Illinois 62946. The Natural Heritage Division of the Illinois Department of Conservation, 524 S. 2nd Street, Springfield, Illinois 62706 also maintains a file of the natural area. Plant species collected in the area have been deposited in the herbaria at Southern Illinois University at Carbondale, Illinois 62901, and at Illinois Natural History Survey, Champaign, Illinois.

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S. C. E. 1830. Half Moon Mountain Cave. The United States Gazette, Philadelphia, Pennsylvania.

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APPENDIX ITEM I

Computer printout of data collected for the Cave Hill Natural Area by the Illinois Natural Areas Inventory, 1976-78.

Note that the INAI is slightly larger than the RNA.

Illinois Natural Areas Inventory
Natural Land Institute

AREA # 243

COUNTIES: 83 Saline

REFERENCE NUMBER: 5

AREA NAME: Cave Hill

NATURAL AREA CATAGORIES & SIGNIFICANT FEATURES:

CAT.	CODE / DESCRIPTION
I	A1.1 Dry upland forest
VI	Outstanding invertebrate cave fauna

EXCEPTIONAL FEATURES:

CAT.	CODE / DESCRIPTION
I	A5.9 Sandstone cliff community
IV	Sandstone cliff
VII	Intermittent stream
IV	Tradewater chert outcrop
I	A5.13 Sandstone glade

PRESERVATION VALUE SCORE: *

EVALUATOR: 4 Kurz

LEGAL LOCATION:

TWP	RNG	PM	SEC	QUARTER	QUARTER QUARTERS
10S	7E	3	2		4&12&13
10S	7E	3	3		A&3&6&11&14&D&10
10S	7E	3	10		1&2&3
10S	7E	3	11		4
9S	7E	3	34		15&16
9S	7E	3	35		13&14

TOPOGRAPHIC QUADRANGLES: 274b Rudement 7.5

SPECIFIC STREAM : Saline River

STREAM SYSTEM (Water Shed) :28 Saline River system

LEGISLATIVE DISTRICT: 59

MUNICIPALITY:- none

MINIMUM ALTITUDE: 460

MAXIMUM ALTITUDE: 920

TOPOGRAPHY:

PHYSIOGRAPHIC UNIT: 50 Shawnee Hills Section
MAJOR FEATURE: 48 Erosional hills in bedrock (medium loess)

INDIVIDUAL TOPOGRAPHIC FEATURES:
108 Fault-line scarp
111 Hogback
114 Ravine

GEOLOGIC FORMATIONS:
216 Peoria Loess
160 Caseyville Formation
161 Abbott Formation

SOIL ASSOCIATION (STATE) :
18 R Grantsburg-Robbs-Wellston

SOIL ASSOCIATION (COUNTY) :
Grantsburg-Robbs Upland Soils

NATURAL COMMUNITY
1.1
Dry upland forest

NATURAL DIVISION AND SECTION: 13a
Greater Shawnee Hills Section, Shawnee Hills Divis
COMMUNITY CLASS : 1 Forest
RARITY INDEX: 4 Rare
NATURAL QUALITY:
223 acres of grade A ;
Relatively undisturbed
30.0 acres of grade B ;
Old second growth
Unknown acres of grade C ;
Mature second growth

SAF COVER TYPE: 40 Post oak--black oak

PLANT COMMUNITY:
208 Quercus stellata,post oak
61 Carya texana,black hickory
57 Carya glabra,pignut hickory

NATURAL COMMUNITY
1.2
Dry-mesic upland forest

NATURAL DIVISION AND SECTION: 13a
Greater Shawnee Hills Section, Shawnee Hills Divis
COMMUNITY CLASS : 1 Forest
RARITY INDEX: 4 Rare
NATURAL QUALITY:
Unknown acres of grade C ;
Mature second growth

SAF COVER TYPE: 53 White oak

PLANT COMMUNITY:

195 Quercus alba,white oak
209 Quercus velutina,black oak

NATURAL COMMUNITY
5.13
Sandstone glade

NATURAL DIVISION AND SECTION: 13a
Greater Shawnee Hills Section, Shawnee Hills Divis
COMMUNITY CLASS : 5 Primary
RARITY INDEX: 3 Occasional
NATURAL QUALITY:
10.0 acres of grade A ;
Relatively undisturbed

SAF COVER TYPE: * Not collected

PLANT COMMUNITY:

208 Quercus stellata,post oak-
125 Juniperus virginiana,red cedar
/
14 Andropogon scoparius,little bluestem

NATURAL COMMUNITY
5.9
Sandstone cliff community

NATURAL DIVISION AND SECTION: 13a
Greater Shawnee Hills Section, Shawnee Hills Divis
COMMUNITY CLASS : 5 Primary
RARITY INDEX: 2 Common
NATURAL QUALITY:
Unknown acres of grade A ;
Undisturbed

SAF COVER TYPE: * Not collected

PLANT COMMUNITY: * Not collected

NATURAL COMMUNITY
5.3
Terrestrial cave community

NATURAL DIVISION AND SECTION: 13a
Greater Shawnee Hills Section, Shawnee Hills Divis
COMMUNITY CLASS : 5 Primary
RARITY INDEX: 5 Very rare
NATURAL QUALITY:
Unknown acres of grade C ;
Vandalized

SAF COVER TYPE: * Not collected

PLANT COMMUNITY: * Not collected

DIVERSITY INDEX: 5

TOTAL ACREAGE: 498

OWNERSHIP TYPE: 1 Private
2 Public

NUMBER OF OWNERSHIPS: 5

USE OF NATURAL AREA:
21 Low-intensity recreation

USE OF SURROUNDING LAND (% wildland): 60

USE OF SURROUNDING LAND (% farmland): 30

USE OF SURROUNDING LAND (% developed land): 10

NEAREST SMSA: 9 St. Louis (Madison and St. Clair counties)

DISTANCE TO SMSA: 84

NUMBER OF NEARBY SCHOOLS: 2

NEAREST SCHOOL: 87 Southeastern Illinois College, Harrisburg

NUMBER OF NEARBY D.O.C. FACILITIES: 3

MANAGEABILITY: 1

PRESERVATION STATUS:
7 Preservation status unknown

THREATS:
3 Threat likely within five years.
DESCRIPTION: Recreational development under study

SPECIES LISTS:
1 Woody plants
2 Ferns and fern allies
3 Summer birds
4 Amphibians, reptiles, and mammals
5 Other species list

SAMPLING FORMS:
1 Tree basal area
2 Tree density
3 Sapling and shrub density

DISCUSSION OF PRESERVATION VALUES:
Cave Hill rises 560 feet above the Saline River bottoms, along the

Shawneetown Fault. The south slope of the hill has an extensive, very high quality dry forest and sandstone communities. The intricate maze cave known as Equality Cave or Cave Hill Cave is near the top of the hill. The cave is the most outstanding maze cave in Illinois, and it has an outstanding invertebrate fauna.

PUBLICATIONS:

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APPENDIX II.

Copy of Page 21, Shawnee National Forest, Land and Resource Management Plan, Final Environmental Impact Statement, Appendix E illustrating the role of the Cave Hill Research Natural Area in natural diversity

SAF Cover Type

SAF cover types in relation to RNA's

SAF Type	ATWOOD RIDGE	BARKER BLUFF	BURKE BRANCH	KASKASKIA	LARUE/OTTER	MTN TOWNSHIP	OZARK HILL	PANTHER HOLLOW	WHOOPIE CAT	Needed	Comments
40	X	X	X	X	X	X	X			Yes	In RNA in Kentucky, 1968 RNA Directory
44	X									Yes	Midwest example
46		X								Yes	Not in any RNA
52	X	X	X	X	X		X		X	Yes	Midwest example
53			X	X		X				Yes	Midwest example
55								X		Yes	Central Midwest example
59				X	X					No	In RNA in Indiana
60	X				X		X			No	In RNA in Indiana
63			X							Yes	Not in any RNA, Northern Example
64				X			X			Yes	Not in any RNA
65					X					Yes	Not in any RNA
75			X							Yes	Northern example
87					X					Yes	Not in any RNA

This table is from a Regional Office 4060 memo dated October 27, 1983. The memo recommends that we provide minimum coverage of all SAF cover types indicated as needed in the above table.

A 4060/1920 memo from the Regional Office dated December 22, 1983, updates the above table. This memo places SAF cover types into three categories. One, in which there is no representative nationally; two, a category in which there is only one RNA representative; and three, a category in which there are two RNA's representing the cover type. These categories are as follows:

Not Represented	In one RNA	In two RNA's
SAF 46	SAF 40	SAF 55
SAF 65	SAF 53	
SAF 87		

Based on the above information, establishment of the following RNA proposals were recommended to provide minimum coverage of the needed SAF cover types.

	SAF Cover Types
Atwood Ridge	40, 44, 52, 60
Barker Bluff	40, 46, 52
Burke Branch	40, 52, 53
LaRue Pine Hills/Otter Pond	40, 52, 59, 60, 65, 75, 76, 87
Panther Hollow	40, 54, 55

APPENDIX III.

Copies of pages selected from the Shawnee National Forest, Land and Resource Management Plan documents describing the Cave Hill Research Natural Area and documenting the recommendations of the Forest for its designation and management

Murphysboro Ranger District

13. Oakwood Kite Site	53
14. Toothless Cave	8
15. Cave Spring Cave	120
16. Big Bayou Kite Site	80

Jonesboro Ranger District

1. Atwood Ridge	955
2. Clear Creek Swamp	4
3. LaRue Pine Hills/Otter Pond	3547
4. Opossum Trot Trail	3
5. Ozark Hill Prairies	535
6. Wolf Creek Area	495
7. Bald Knob Geological	7

Detailed descriptions of each of these sites is in the planning record. Analysis details are in Appendix F of this FEIS.

Research Natural Areas

Research Natural Areas are protected areas reserved for nonmanipulative research observation and study. Each area is part of a national network representing a full array of North American ecosystems, biological communities, habitats, and phenomena, and geological and hydrological formations and conditions. Research Natural Areas (RNA's) are established by the Chief of the Forest Service.

There are currently no RNA's established on the Shawnee National Forest; however, four separate proposals have been submitted to the Forest Supervisor for consideration.

As a result of the four proposals submitted to the Forest Supervisor, the following twelve areas were considered for Research Natural Area designation in the planning process:

Table 3-15
Recommended Research Natural Areas

AREA	ACRES 1/
Atwood Ridge	955
Barker Bluff	60
Burke Branch	300
Dennison Hollow	205
Kaskaskia	1,050
Panther Hollow	180
Whoopie Cat Mountain	17
Ozark Hill Prairies	535
LaRue Pine Hills	1,905
Otter Pond	680
Cave Hill	465
Stoneface	176

1/ The acreage shown is as originally proposed. Some modifications have been made in individual alternatives (see Appendix E).

Detailed descriptions of each area and the analysis of RNA proposals is in Appendix E of this FEIS.

Roadless Areas

The Shawnee National Forest does not currently have any areas designated as units of the National Wilderness Preservation System. It does, however, have nine roadless areas which are being considered for their potential as wilderness or for nonwilderness uses. These areas and their acreage are:

Table 3-16
Roadless Areas

Roadless Area	Size (Ac. NFS Land)
Bald Knob	5,888
Burden Falls	2,999
Burke Branch	6,230
Clear Springs	4,777
Garden of the Gods	3,844
Lusk Creek	6,055
Murray Bluff	4,172
Panther Den	722
Ripple Hollow	3,530

These nine areas were originally inventoried in 1977 during the second Roadless Area Review and Evaluation. This study came to be known as RARE II and was completed in 1979 with the issuance of a Final Environmental Statement. Four areas totaling 15,093 acres were recommended for wilderness study: Garden of the Gods, Bald Knob, Clear Springs, and Panther Den. Three areas totaling 13,143 acres were recommended for non-wilderness management: Murray Bluff, Burke Branch, and Ripple Hollow. Two areas totaling 8,883 acres were recommended for further evaluation: Lusk Creek and Burden Falls.

APPENDIX E
RNA Assignment by Alternative

Alternative I

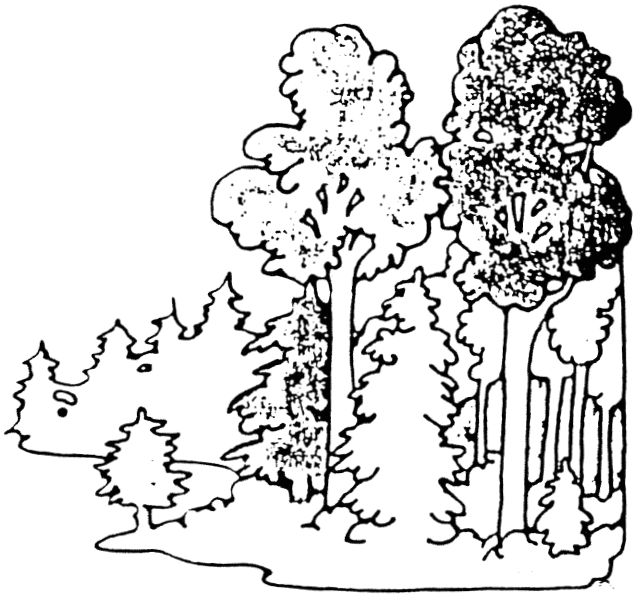
Alternative I emphasizes the maintenance and enhancement of wildlife habitat and preservation of unique natural features. A variety of motorized and nonmotorized recreation features are provided. All proposed Research Natural Areas are recommended for further evaluation.

Management Prescription 8.1

Kaskaskia Experimental Forest

Management Prescription 8.2

Barker Bluff
Atwood Ridge
Burke Branch
LaRue Pine Hills
Otter Pond
Dennison Hollow
Cave Hill
Stoneface
Ozark Hill Prairie
Whoopie Cat Mountain
Panther Hollow



INTRODUCTION

This appendix lists areas of significant physical, biological and cultural features. Where necessary, additional information is provided to assist in implementing management on an area by area basis.

INTENSIVE RESEARCH AREAS

The following areas are assigned to Management Prescription 8.1 to provide for on-going natural resource research and management.

Name	Size (Acres)
Palzo Reclamation Project	325
Dixon Springs Agricultural Research Station	4259
Kaskaskia Experimental Forest	2169
Sugar Creek Seed Orchard	105

NATURAL AREAS

The following areas are assigned to Management Prescription 8.2 (except as noted) to provide for the preservation and protection of their unique scientific or educational values. One or more natural area categories (National Natural Landmark, Research Natural Area Candidate, Botanical Area, etc.) may be assigned to an individual site as warranted.

National Natural Landmarks (existing)

These areas are managed for their landmark features in accordance with the Forest-wide Standards and Guidelines and those in the Management Prescription shown.

Name	Mgmt. Prescription	Size (Acres)
Bell Smith Springs	8.2	1,260
LaRue Pine Hills	8.2	1,905
Little Grand Canyon	8.2	1,023
Lusk Creek	9.3	720
Total Acres		4,908

Candidate Research Natural Areas (RNA)

The following areas will be managed for the site specific features listed. Direction is found in the Forest-wide Standards and Guidelines and those in Management Prescription 8.2. If through evaluation at higher organizational levels and area(s) is not accepted into the National System, it will continue to be managed under Management Prescription 8.2 (or in case of Kaskaskia, 8.1) for the life of the plan.

APPENDIX E
Special Features

Name	Management Prescription	Size(acres)
Atwood Ridge	8.2	955
Barker Bluff	8.2	60
Burke Branch	8.2	300
Cave Hill	8.2	465
Stoneface	8.2	175
Dennison Hollow	8.2	205
Ozark Hill Prairie	8.2	535
Panther Hollow	8.2	180
Whoopie Cat Mountain	8.2	17
Kaskaskia Exp. Forest	8.1	1,050
LaRue Pine Hills/Otter Pond	8.2	2,811
Total		6,753

Atwood Ridge

Location:

The Atwood Ridge RNA proposal is located in portions of Sections 4, 5, 8, 9, 16, and 17, T13S, R2W, Jonesboro Ranger District, Union County.

Area:

955 acres

SAF Cover Types Identified in Area:

SAF 40, SAF 44, SAF 52, SAF 60.

General Information:

The area includes a relic stand of chestnut oak as well as Magnolia acuminata and azalea near the western edge of their respective ranges. In addition, the area includes a number of Indian burial sites. The area is an example of dry, upland Illinois forest. Portions of the northern part of Atwood Ridge have been clearcut. Aside from the clearcuts, the area could provide baseline information on succession in upland hardwood forests.

Selective logging has occurred on some portions of the area. There remains representative mature dry upland forest stands with chestnut oaks that are essentially undisturbed. In many places, the steep slope timber was left (including many chestnut oaks).

A hiking trail exists within the area.

Purpose and Special Features:

To maintain the natural character of a large upland area with a diversity of habitats and to protect the following special features:

-Dry upland forest dominated by the rock chestnut oak (Quercus prinus).

-Mesic barrens community.
-Beard grass (Gymnopogon ambiguus).
-Great chickweed (Stellaria pubera).
-Loosestrife (Lysimachia fraseri).
-Black cohosh (Cimicifuga rubifolia).
-Dry forest community.

Federal Threatened or Endangered Species:

No records documenting presence of a Federal T & E Species in this area.

Sensitive Species (proposed):

-Beard grass (Gymnopogon ambiguus).
-Black cohosh (Cimicifuga rubifolia).
-Loosestrife (Lysimachia fraseri).

Forest Listed Species:

-Great Chickweed (Stellaria pubera).
-Loggerhead Shrike (Lanius ludovicuanus).
-Bewick's Wren (Thryomanes bewickii).

Cave Hill

Location:

The area is located in Sections 34 and 35, T9S, R7E and in Sections 2, 3, and 10, T10S, R7E, Elizabethtown Ranger District, Saline County.

Area:

465 acres.

SAF Cover Types:

SAF 40, SAF 53.

General Information:

Cave Hill is a large sandstone cap with underlying limestone outcrops near its base. Glades are broken by the bluffs and have a discontinuous distribution being separated by stands of dry upland forest.

The dry upland forest of Cave Hill is an undisturbed forest community. There are no signs of logging or any other human disturbances.

Equality Cave is located in the area.

A system of trails traverse the area.

Purpose and Special Features:

To maintain the natural character of a large upland, mostly forested area, with a diversity of habitats and to protect the following special features:

-A dry upland forest community.
-Invertebrate cave fauna and cave.
-Meads milkweed (Asclepias meadii).
-Sandstone cliff community.
-Sandstone galde community.
-An outcrop of the Tradewater chert.
-A fault zone with a great amount of displacement.

The dry upland forest is the largest of its type and quality in Illinois.

The cave is one of two intensive maze-like caverns in the Interior Low Plateau Province and is the only one developed within moderately dipping strata adjacent to a fault zone.

Federal Threatened and Endangered Species:

No records documenting presence of a Federal T & E Species in this area.

Sensitive Species (proposed):

-Mead's Milkweed (Asclepias meadii).

Forest Listed Species:

-Loggerhead Shrike (Lanius ludovicianus).

Stoneface

Location:

The area is located in Sections 9, 10, and NE¼ Section 16, T10S, R7E, Elizabethtown Ranger District, Saline County.

Area:

175 acres.

SAF Cover Types:

SAF 40, SAF 53.

General Information:

This area includes high sandstone bluffs. The dry upland forest of the bluff tops and slopes appear to have little evidence of disturbance. Undisturbed sandstone glades occur along the bluff top. Savannah-like dry woods/glade community occurs on the southern exposure of the bluffs.

APPENDIX ITEM IV. List of plants collected by Steven Olson in the Cave Hill Research Natural Area and vicinity, 1986-87

R-coll. in RMA

* - Saline Co. Record

R-coll. in RMA

Botrychium virginianum
R Cheilanthes lanosa
R Polystichum acrostichoides
R Dryopteris marginalis
R Asplenium pinnatifidum
R A. bradleyi
R A. platyneuron
R Woodsia obtusa
* Pinus strobus
* P. echinata
Taxodium distichum
R Juniperus virginiana
Najas minor
Potamogeton diversifolius
~~* Echinodorus cordifolius~~
Sagittaria calycina
S. latifolia
R Vulpia octoflora
* Festuca arundinacea
R * F. paradoxa
R Poa annua
P. pratensis
Dactylus glomerata
R Koeleria macrantha
Sphenopholis obtusata
Agrostis hyemalis
Phleum pratense
R Elymus hystrix
R Elymus villosus
R Hordeum pusillum
R Melica nitens
R Glyceria striata
R Brachyelytrum erectum
R * Digitaria filiformis
* D. villosa
R Panicum anceps
R Dichanthelium linearifolium
R D. dichotomum
R D. polyanthes
R D. boscii
* Echinochloa crus-galli
E. muricata
Setaria glauca
R S. faberi
Sorghum halepense
* S. bicolor
R Andropogon gerardii
* A. ternarius
* Zea mays
R Eragrostis spectabilis
R Tridens flavus
R Muhlenbergia sobolifera
Eleusine indica
Leersia virginica
R Danthonia spicata
R Cyperus ovularis

C. erythrorhizos
C. strigosus
* Eleocharis obtusa
* E. acicularis
Scirpus pendulus
R * Carex rosea
C. muhlenbergii
R * C. normalis
* C. tenera
* C. albolutescens
* C. brevior
R * C. jamesii
R * C. torta
R C. hirsutella
C. caroliniana
R R C. bushii
* C. granularis
C. digitalis
C. blanda
* C. frankii
C. lurida
* C. grayi
R Arisaema dracontium
R A. triphyllum
R Tradescantia virginiana
R Luzula multiflora
R Juncus marginatus
R J. tenuis

J interior
R Allium canadense
A. vineale
R Nothoscordum bivalve
R Trillium recurvatum
Lilium michiganense
R Erythronium americanum
Uvularia grandiflora
R Smilacina racemosa
* Hymenocallis caroliniana
R Manfreda virginica
R Hypoxis hirsuta
R Smilax glauca
S. hispida
* S. pulverulenta
R Dioscorea villosa
R Sisyrinchium angustifolium
* S. albidum
Spiranthes cernua
R Corallorhiza wisteriana
Saururus cernuus
Salix nigra
Populus deltoides
Juglans nigra
R Carya texana
R C. ovalis
R C. glabra
R C. ovata

* C. laciniosa
Corylus americana
R Ostrya virginiana
Carpinus caroliniana
R Quercus marilandica
Q. falcata
* Q. pagoda
R Q. velutina "
R Q. rubra
Q. palustris
Q. shumardii
R # Q. coccinea
* Q. michauxii
R Q. prinoides
R Q. prinus
R Q. alba
R Q. stellata
Q. macrocarpa "
* Q. lyrata
~~U. rubra~~ Ulmus rubra
U. americana
R U. alata
R Celtis occidentalis
C. laevigata
R Morus rubra
R Boehmeria cylindrica
R Pilea pumila
R Parietaria pensylvanica "

R Aristolochia serpentaria (hastata*)
Rumex crispus
Polygonum punctatum
Chenopodium album
Amaranthus retroflexus
R Phytolacca americana
R Claytonia virginica
R Paronychia fastigiata
Dianthus armeria
R Silene stellata "
Nuphar luteum
R Ranunculus abortivus
R R. micranthus
R R. hispidus
R R. fascicularis
* Thalictrum dioicum
R T. thalictroides
R * Isopyrum biternatum
R Anemone virginiana
Myosurus minimus "
R Aquilegia canadensis
R Podophyllum peltatum
Cocculus carolinus
Menispermum canadense
R * Liriodendron tulipifera
R Asimina triloba
R Sassafras albidum
R * Lindera benzoin

R Sanguinaria canadensis
R Dicentra cucullaria
I Corydalis flavula
R Dentaria laciniata
R Arabis canadensis
A. laevigata
R Cardamine hirsuta
R C. parviflora
I Draba brachycarpa
R Lepidium virginicum
R Sedum pulchellum
R S. telephioides
R Hydrangea arborescens
Penthorum sedoides
R Heuchera americana
Liquidambar styraciflua
Platanus occidentalis
R Prunus serotina
R Amelanchier arborea
Crataegus crus-galli
* C. engelmannii
* C. mollis
* R. enslenii
R. pensylvanicus
* Rosa multiflora
R R. setigera
R R. carolina
Potentilla simplex

R Porteranthus stipulatus
R Geum canadense
R G. vernum
I Agrimonia parviflora
I A. pubescens
I A. rostellata
Desmanthus illinoensis
I Cassia fasciculata
R C. nictitans
R Cercis canadensis
I Gleditsia triacanthos
* Amorpha fruticosa
Robinia pseudoacacia
R Psoralea psoralioides
* Apios americana
I Dalea candida
R Tephrosia virginiana
Melilotus alba
M. officinalis
Trifolium pratense
T. repens
T. hybridum
Medicago lupulina
Baptisia lactea
I Clitoria mariana
R Stylosanthes biflora
Lespedeza procumbens
I L. repens

R L. hirta
R * L. cuneata
R L. virginica
Kummerowia striata
K. stipulacea
R * Galactea regularis
R Desmodium nudiflorum
R D. glutinosum
R * D. canescens
D. ciliare
R D. paniculatum
* Glycine max
Amphicarpa bracteata
R Oxalis violacea
R O. stricta
Croton capitatus
C. monanthogynus
R Croton elliptica
R Acalypha rhomboidea
R A. gracilens
R Euphorbia corollata
* E. obtusata
Poinsettia dentata
Chamaesyce supina
C. maculata
R Rhus copallina
R R. glabra
Ilex decidua

R * Celastrus scandens
* C. orbiculatus
R Staphylea trifoliata
R Acer saccharum
A. saccharinum
A. rubrum
Impatiens capensis
R Parthenocissus quinquefolia
R Ampelopsis cordata
R Vitis aestivalis
* V. cinerea
Hibiscus lasiocarpus
Sida spinosa
R Hypericum stragulum
H. mutilum
R H. gentianoides
R Lechea tenuifolia
R Viola pedata
R ? * V. pratincola
R V. sororia
R V. triloba
R V. rafinesquii
R Passiflora lutea
R Opuntia humifusa
* Pinea palustris
R * Elaeagnus umbellata
Cuphea viscosissima
Lythrum alatum

* Ammania coccinea
R Nyssa sylvatica
R Circaea lutetiana
R Ludwigia alternifolia
Oenothera biennis
R O. linifolia
R Sanicula canadensis
Daucus carota
R Cryptotaenia canadensis
Zizia aurea
R Taenidia integerrima
R Polytaenia nuttallii
R Cornus florida
R C. drummondii
R Vaccinium arboreum
R V. pallidum
R Dodecathion meadia
Samolus valerandi
Lysimachia ciliata
R L. lanceolata
R Diospyros virginiana
Fraxinus pennsylvanica
F. americana
Forestiera acuminata
Spigelia marilandica
Sabatia angularis
Amsonia tabernaemontana
R Apocynum cannabinum

* Trachelospermum difforme
Asclepias hirtella
A. tuberosa
A. verticillata
* A. viridiflora
A. syriaca
A. quadrifolia
R A. variegata
* A. perennis
A. incarnata
* Matelea obliqua
Cynanchum laeve
Calystegia sepium
Ipomoea pandurata
I. hederacea
I. lacunosa
* Cuscuta polygonorum
* C. gronovii
C. campestris
Polemonium reptans
R Phlox divaricata
P. pilosa
Cynoglossum virginianum
Myosotis verna
* Lithospermum canescens
Phyla lanceolata
Verbena stricta
V. hastata

R V. urticifolia
R Thyma leptostachya
Lycopus americanus
L. rubellus
Teucrium canadense
Scutellaria nervosa
* S. australis
R * S. incana
R Cunila origanoides
R Monarda bradburiana
R M. fistulosa
Hedeoma pulegioides
Salvia lyrata
R Verbenatenum tenuifolium
Stachys tenuifolia
R Prunella vulgaris
Solanum carolinense
R * S. ptycanthum
Datura stramonium
* Physalis virginiana
* P. lanceolata
Veronica arvensis
* Penstemon alluvionum
R P. pallidus
R Aureolaria flava
R Agalinis bosseyana
Mimulus alatus
R [illegible]

V. blatteria
R Campsis radicans
R Orobanche uniflora
R Buchnera hispida
R. strepens
* Plantago cordata
P. lanceolata
R P. virginica
P. rugelii
Cephalanthus occidentalis
R Galium circaezans
R G. pilosum
* G. triflorum
G. concinnum
R Diodia teres
R Houstonia purpurea
R H. longifolia
R Lonicera japonica
R Symphoricarpos orbiculatus
Valerianella radiata
* Sicyos angulatus
R Triodanis perfoliata
Campanula americana
R Lobelia inflata
L. spicata
* Senecio [illegible]
* S. glabellus
[illegible]

1 Solidago juncea
R S. nemoralis
S. canadensis
Euthamia graminifolia
R Aster turbinellus
1 * Erigeron philadelphicus
E. strigosus
1 E. annuus
1 Conyza canadensis
R Verbesina helianthoides
* Bidens coronata
B. aristosa
Coreopsis tripteris
Silphium integrifolium
R Heliopsis helianthoides
* Helianthus annuus
1 H. divaricatus
* H. decapetalus
1 H. microcephalus
* Rudbeckia pinnata
Rudbeckia subtomentosa
R R. hirta
Helenium flexuosum
Eclipta prostrata
R Parthenium integrifolium
1 Achillea millefolium
R * Matricaria matricarioides
Boltonia asteroides

1 Eupatorium serotinum
E. coelestinum
R E. rugosum
E. fistulosum
1 Cirsium discolor
R C. carolinianum
* Liatris aspera
R L. squarrosa
R L. spicata
R * Vernonia baldwinii
Gnaphalium purpureum
1 Antennaria plantaginifolia
R Erechtites hieracifolia
1 Cacalia atriplicifolia
Ambrosia bidentata
1 A. trifida
1 A. artemisiifolia
* Xanthium strumarium
* Iva annua
* Pycnanthemum virginianum
Lycopus americanus
R Hieracium gronovii
R H. scabrum
1 Taraxacum officinale
Lactuca serriola
* L. floridana
R L. canadensis
Cichorium intybus

R Krigia biflora
R Polygonatum commutatum
R Commelina communis
Juncus effusus
J. biflorus
Commelina virginica
* Carex flaccosperma
R C. annectens
* C. gravida
* C. bebbii
C. tribuloides
R C. glaucodea
R C. artitecta
C. retroflexus
R Cyperus filiculmis
R Sporobolus heterolepis
Panicum dichotomiflorum
Andropogon virginicus
R Schizachyrium scoparium
R * Agrostis perennans
R Dichanthelium acuminatum
R D. sphaerocarpon
R * D. malacophyllum
D. clandestinum
* D. commutatum
R Bromus racemosus
R B. pubescens
R Elymus virginicus
Aristida oligantha
R A. purpurascens
Agrostis scabra
R A. alba
R Chasmanthium latifolium
R Poa compressa
R Elymus canadensis
Setaria viridis
R Eragrostis capillaris
E. pectinacea
Cinna arundinacea
Leersia lenticularis
* Poa sylvestris
Digitaria ischaemum
Alisma gramineum
Cyperus pectinata
Botrychium dissectum