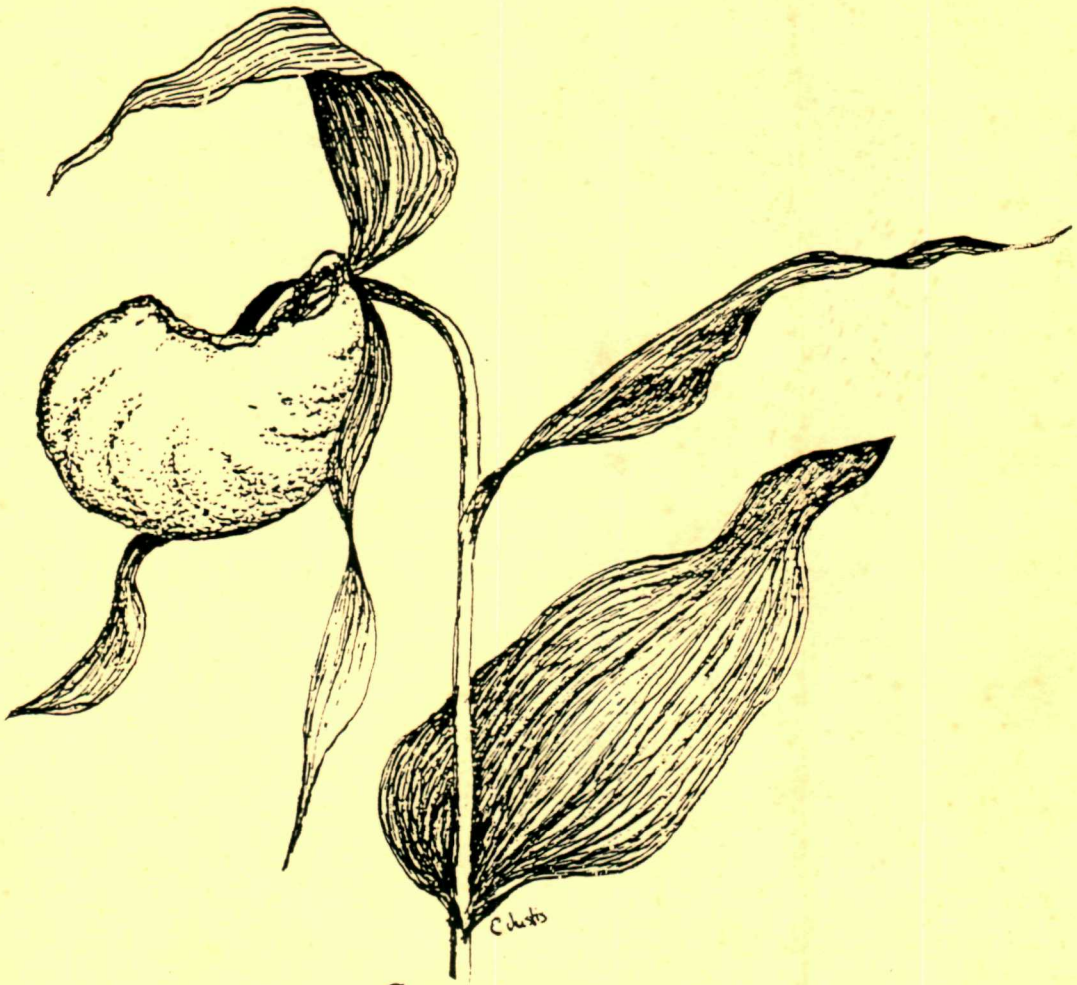
COOPERATIVE INVENTORY OF ENDANGERED, THREATENED, SENSITIVE AND RARE SPECIES, DANIEL BOONE NATIONAL FOREST, MOREHEAD RANGER DISTRICT



Cooperators:

United States Forest Service
The Nature Conservancy
Kentucky State Nature Preserves Commission
Kentucky Department of Fish and Wildlife Resources

March 1992

Cover illustration is of *Cypripedium kentuckiense*, Kentucky Lady's-slipper Orchid. An extensive population of this candidate for federal protection is along North Fork of Triplett Creek, in some of the few remaining pieces of bottomland forest within the Morehead District.

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INTRODUCTION

An important first step in the responsible stewardship of land, regardless of the purpose, is an inventory of the natural resources in the area to be managed. The information derived can be used to implement conservation goals in coordination with other uses planned for the area. The Daniel Boone National Forest (DBNF), United States Department of Agriculture Forest Service (USFS), is committed to recovering threatened and endangered species listed by the U.S. Fish and Wildlife Service (USFWS), and to ensuring that sensitive species do not become threatened or endangered as a result of planned management activities.

The Nature Conservancy (TNC) is an international conservation organization committed to preserving natural diversity by identifying and protecting lands and water supporting the best examples of all components of the natural world. Following the 1987-1990 inventories of the Somerset, Stanton, Stearns and Berea Ranger Districts (Palmer-Ball et al. 1988, Campbell et al. 1989, 1990, 1991), TNC provided $15,500 for a public lands inventory in cooperation with other agencies. This was matched with a $30,000 Challenge Cost Share from USFS to fund an inventory of the endangered, threatened, sensitive, and rare plants and animals of the Morehead Ranger District of DBNF. The Kentucky Department of Fish and Wildlife Resources (KDFWR) provided an additional $3000 for zoological contractees, as well as direct use of its personnel.

Inventory funds were used by TNC to support two botanists and two zoologists for various activities, and to cover travel, supplies, and expenses. Administrative coordination was provided by USFS and TNC. Morehead Ranger District staff arranged lodging for the biologists and assisted with the field work. The Kentucky State Nature Preserves Commission (KSNPC) assisted with expenses, provided some part-time zoological help, coordinated data processing, and printed the final report. The rare species database maintained by KSNPC, and their earlier studies of eastern Kentucky (Harker et al. 1979a, 1981), provide an invaluable foundation for the DBNF inventory. This partnership of federal, state and private agencies continues to be highly productive.

Previous research in this district, and the small number of high quality areas, when reviewed in preparation for the field work, allowed a particularly thorough targeting of sites with potential for new data. The general nature of this inventory was much influenced by the location of Morehead State University (MSU) within the district. No other DBNF district contains a college or university. As a result, there has been much biological information collected during the past 50 years, though some records are from uncertain locations (as exemplified by Appendix A). There is a high diversity of habitats in the district, though large limestone caves are relatively infrequent. However, due to extensive human settlement and disturbance, especially on bottomlands, rather few good examples of the original natural communities can be located. Only 13 "Significant Areas" were finally selected in this report. Some of these are rather large and may need better definition in the future.

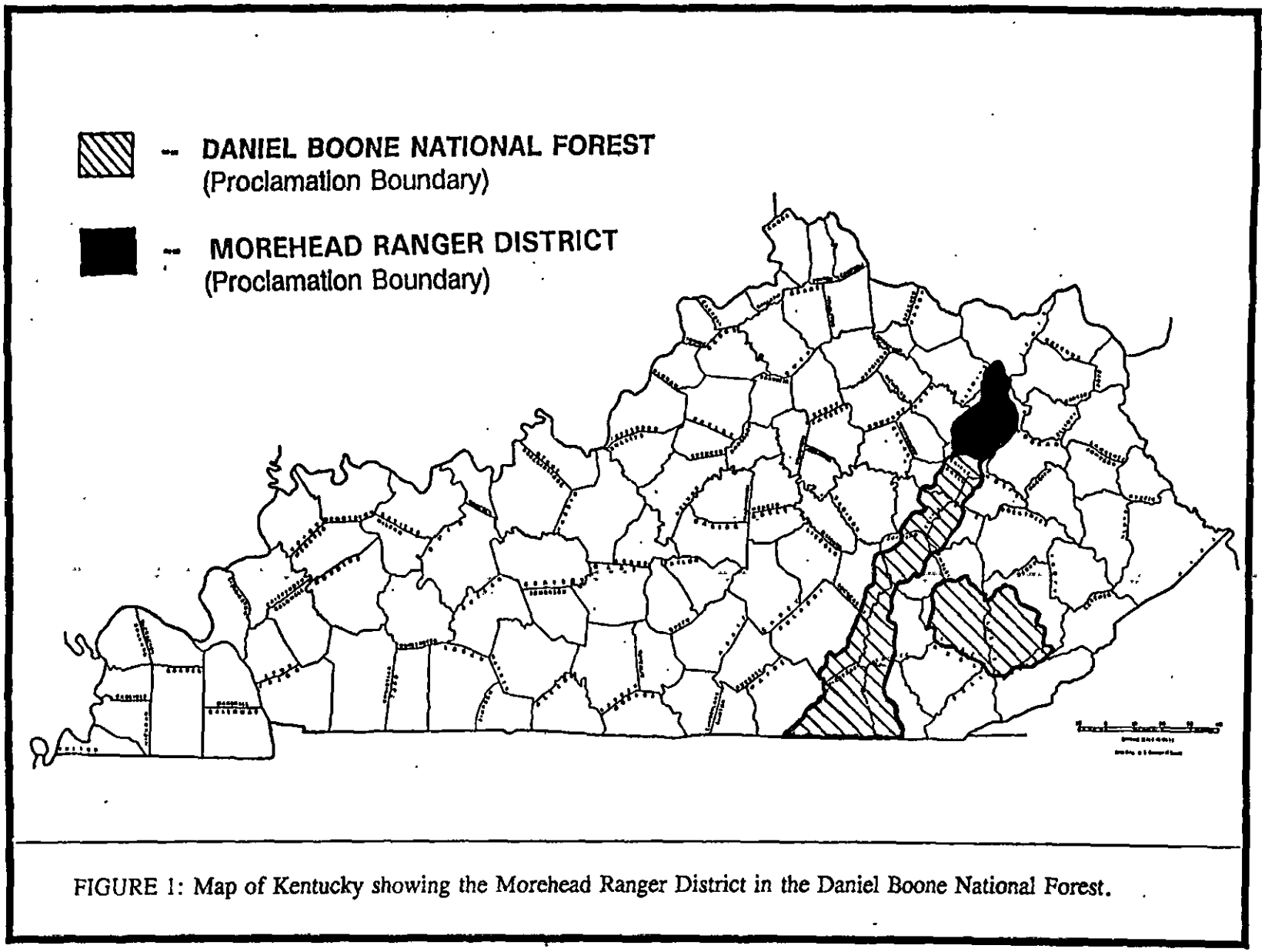

FIGURE 1: Map of Kentucky showing the Morehead Ranger District in the Daniel Boone National Forest.

DESCRIPTION OF THE STUDY AREA

The Morehead Ranger District is one of the seven management units within the proclamation boundary of the Daniel Boone National Forest, Kentucky (Fig. 1). This district contains approximately 270,000 acres and covers most of Rowan County, and parts of Bath, Menifee and Morgan Counties (Fig. 2). The USFS tracts cover approximately 117,000 acres, and are particularly extensive near Cave Run Lake, a large impoundment of the Licking River that was completed in 1974. The large contiguous block of USFS land south of the dam includes the Pioneer Weapons Hunting Area (PWHA). In contrast, there is little USFS land near Frenchburg and Morehead, and west of Salt Lick Creek, where Olympia State Forest is located.

PHYSICAL ENVIRONMENT

Climate

Climate in the Appalachian Plateaus Physiographic Province is of the humid mesothermal type, characterized by mild temperate rainy climates with no distinct dry season (Trewartha 1954). Precipitation in this region is generally a result of moisture-bearing low pressure formations, which move from the western Gulf of Mexico, and cross Kentucky in a northeasterly direction. Fall is generally the driest season, and spring the wettest. Average annual precipitation is about 44-48 inches, with little variation over the region. Average annual snowfall is about 15 inches. The mean annual temperature is 55-60° F. Average July temperature is about 75-79° F, and average January temperatures is 35-39° F. The average frost free period is 170-175 days, with the average date of first fall freeze, October 11-16, and the average date for final spring freeze, April 24-27 (Karan and Mather 1977).

Geology and Topography

The Morehead Ranger District lies within the Knobs Region (broadly defined) and the Cliff Section (Braun 1950) of the Appalachian Plateaus Physiographic Province (Fenneman 1938; Figs 1 and 2). However, these two physiographic regions are less distinct from each other here, than in the Stanton and Berea Districts further south. Much of the district can be considered a transitional subsection of the Knobs Region, containing extensive hills on Mississippian siltstone. To the southeast, Cave Run Lake extends into the Low Hills Belt (Braun 1950), but this also is a gradual transition. The whole district is drained by the Licking River, which may be used to distinguish these subsections of the Knobs and Cliff Section from those drained by the Kentucky River (Campbell et al. 1988).

In the Knobs Region, on the north and west sides of the district, Silurian, Devonian and Mississippian shales and siltstones form the predominant bedrock (USGS Geological Quadrangles). The Mississippian Borden Formation has particularly thick beds of siltstone. In lower Silurian and lower Devonian strata, there are calcareous rocks, especially dolomite. In upper Mississippian strata, the Newman Limestone is an extensive feature of the district, but its thickness varies 100 ft or more to 25 ft or less, and is generally less than further south in DBNF. The broad transition from Knobs to Cliff Section is characterized by the occurrence of this Newman Limestone on ridges and upper slopes, forming karst features

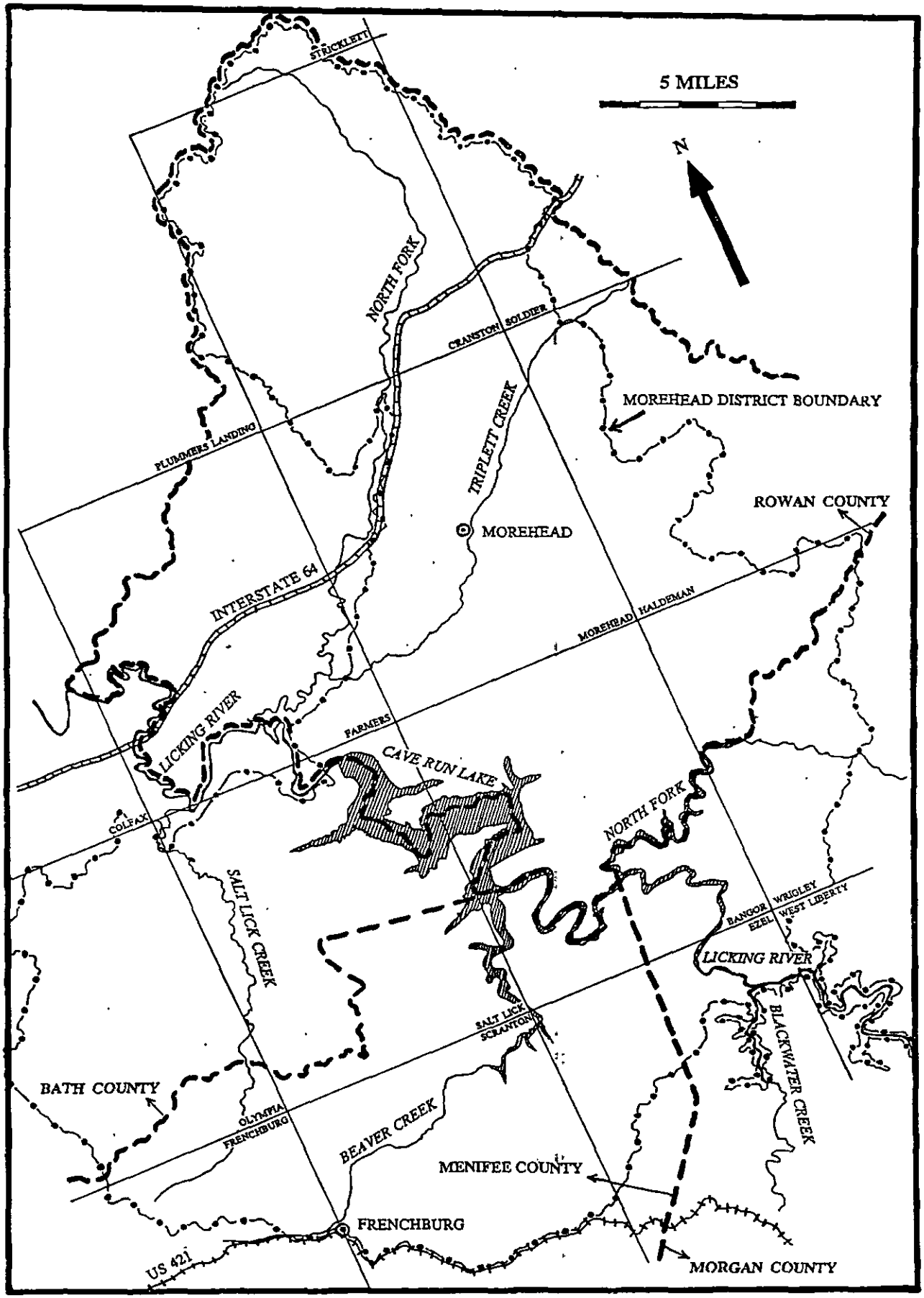

Figure 2. Map of Morehead Ranger District (Proclamation Boundary) showing county boundaries, USGS Quadrangles, and other important features.

in places, but with few large caves. Much of this limestone has been quarried, especially on Clack Mountain. Further east, within the Cliff Section, this limestone occurs only on lower slopes or is absent. Instead, the overlying Pennsylvanian strata predominate, which largely consist of non-calcareous shale (especially in the Breathitt Formation) and massive sandstone (especially in the Lee Formation). The Breathitt Formation becomes more exposed towards the southeast. This formation has small amounts of coal, but virtually no mining has occurred. Iron ore was formerly mined in this district, from Silurian (top of Brassfield Dolomite), Devonian (top of Boyle Dolomite) and Pennsylvanian (lower Breathitt Formation) strata.

Although the Licking River and other large streams flow through the district, and some sections have highly dissected topography, much of the district is less rugged and has less cliff development than further south in the Cliff Section. This may be related to the generally thinner layer of Newman Limestone, which makes limestone cliffs less prominent, and may also reduce the degree of solution and undercutting below sandstone cliffs. In addition, the sandstone is generally somewhat thinner, and there is frequently a less abrupt topographic shift from sandstone ravines to the more gently rolling, overlying hills.

In general, the Knobs Region here has broad valley bottoms at 650-750 ft a.s.l., and slopes increasing up to isolated knobs or narrow ridge-systems at 1200-1300 ft on the Mississippian siltstone. A special feature of the Knobs Region along the western edge of this district are the relatively flat, broad benches and ridges at about 800-900 ft. These are underlain by the Silurian Crab Orchard Formation (around Preston, Olympia and further north) and lower strata of the Mississippian Borden Formation (around Farmers, "Sharkey Flats" and further north). On many of these flats, there are swampy alluvial terraces of Quaternary age (Meijer et al. 1981). In the broad transition to Cliff Section, the valley bottoms are at about 700-800 ft, and the ridges, with much limestone, are at 1100-1200 ft, with occasional sandstone peaks to about 1350 ft. Within the Cliff Section proper, valley-bottoms are at 700-800 ft, ravines are rimmed with sandstone cliffs, and upper ridgelines are generally at 1100-1300 ft.

Soils

The Morehead Ranger District is covered by the soil surveys of Rowan, Menifee and NW Morgan Counties (Avers et al. 1974), and Bath County (Weisenberger et al. 1963). A summarized classification of soils in Daniel Boone National Forest is presented in Table 1. This is an update of versions in previous reports, with synonyms of outdated series names. Major trends in soil characteristics are related to bedrock, from acid sandy soils to calcareous soils, and to topographic position, from residual soils on ridges to colluvial soils on lower slopes.

The physiographic divisions of Knobs Region, Cliff Section and Low Hills Belt in DBNF, which can be related to geographic trends in soils, have considerable botanical significance (Campbell et al., 1989, 1990, 1991). However, there is additional variation in DBNF from northeast to southwest. In the Morehead District, the Knobs Region has particularly extensive soils typical of Mississippian, Borden Formation siltstone (well-drained Berks and Cranston series), and, at lower levels, on Silurian, Crab Orchard Formation clay-

Table 1. Classification of soils in and near the northern Cliff Section.#

DERIVED MOSTLY FROM SANDSTONE, WITH LESSER AMOUNTS OF SILTSTONE OR SHALE														
DYSTROCHREPT	A		DYSTROCHREPT	B		1/HAPLUMBREPT	B					UPLAND SOILS		
Ramsey		sal	Steinsburg		fsal	*Cutshin		lom						
12-20	1-2	1	6-40	2-3	1	20-60	4-6	1-5						
HAPLUDULT	B		HAPLUDULT	B		FRAGIUDULT	C		FRAGIAQUULT	D		OCHRAQUULT	E	
*Rigley		sal	Lily		fsal	Monongahela		lom	Tyler		fsal	Purdy		sil
20-60	5-8	1-2	2-25	2-4	0-1	2-6	4-6	0-2	0-2	5+	0-1	0-2	5+	0-1
HAPLUDULT	B		HAPLUDULT	B		HAPLUDULT	C					HAPLAQUEPT	E	
Jefferson		gsil	Chavies		fsal	Cotaco		lom				Atkins		sil
2-20	5+	0-1	0-6	6+	1-2	1-6	3-4+	1-2				0-2	5+	1-3
DYSTROCHREPT	B		DYSTROCHREPT	B		DYSTROCHREPT	C		FLUVAQUENT	D		HAPLAQUOLL?	F	
Clifty		gsil	Pope		lom	Philo		sil	Stendal		sil	Blago		sil
0-4	3-6	1-3	0-4	4-10	1-2	0-2	5+	3	0-4	4-10	1-2	0-4	5+	0-1
UDIFLUVENT	A													
Bruno		lfs												
0-4	10+	1-4										LOWLAND SOILS		
DERIVED MOSTLY FROM SILTSTONE AND SHALE, WITH LESSER AMOUNT OF SANDSTONE														
DYSTROCHREPT	A					2/DYSTROCHR.	A					UPLAND SOILS		
Weikert		sil				Berks		sil						
12-80	1-2	1-2				12-70	1-3	1-2						
1/HAPLUDALF	B		HAPLUDULT	B		2/HAPLUDALF	B							
*Renox		rsil	Gilpin		sil	*Cranston		rsil						
40-60	3-6	3-5	2-60	2-3	1	2-60	4+	1-3						
HAPLUDULT	B		HAPLUDULT	B		FRAGIUDULT	C		FRAGIUDULT	D		FRAGIAQUULT	E	
*Shelocta		sil	Rayne		sil	Tilsit		sil	Johnsburg		sil	Mullins		sil
15-60	4-10	1-3	2-35	3-5	1-2	2-12	3-5	0-3	0-6	4-6	1-2	0-2	4-8	0-2
HAPLUDULT	B		HAPLUDULT	B		FRAGIUDULT	C					FLUVAQUENT	E	
Allegheny		lom	(Whitley)		sil	Captina		sil				Bonnie		sil
2-30	6-10	1	0-12	3+	1	2-12	5-10	2				0-2	6+	1-2
			DYSTROCHREPT	B		HAPLUDULT	CD							
			Cuba		sil	Morehead		sil						
			0-6	4-10	1-2	0-4	6-10	1-2				LOWLAND SOILS		

Distinct, older series usages are in parentheses. Series with distinct site conditions are boxed; these are coded as follows: 1 = base-rich colluvium on N-facing slopes; 2 = Mississippian Borden Formation, siltstone; 3 = slack-water deposit (gray-brown/red-yellow podzolic); 4 = limestone-sandstone mixtures; 5 = Upper Odrovician dolomite; 6 = Silurian Crab Orchard Formation, calc. clay shales.

The following series have been referred to under different names (listed after "=") in earlier surveys: *Baxter = Frankstown; Berks = Rockcastle; Bledsoe = Brookside; Caneyville = Fredonia; Clarksville = Etowah?; Dickson = Bedford; Gilpin = Berea/Wernock?/some Muse?; Lily = Clymer, Hartsells; Needmore = Colbert?; Otway = Brassfield; Rayne = Wellston/Whitley; Rigley = Jefferson/Tate; Sequoia = Latham/Trappist?/some Muse?; Steinsburg = Dekalb.*

Table 1 continued.

DERIVED MOSTLY FROM ACID SHALE

UPLAND SOILS

DYSTROCHREPT A Colyer ssil 6-60 1-3 0-1	HAPLUDULT B Sequoia scl 6-60 2-3 1-2		
HAPLUDULT B *Muse scl 20-60 3-6 2	HAPLUDULT B Trappist sil 2-20 2-5 1-2	HAPLUDULT? C Rarden sil 2-20 2-4 0-2	FRAGIUDULT? D Cavode sil 2-12 4-6 1-2?
HAPLUDULT B (Muse) sil 6-20 5+ 0-1	HAPLUDULT B Cruze sil 2-15 4-8 1-4?		
	3/GBP SLACK B Sequatchie scl 0-4 5+ 0-1	3/RYP SLACK C Whitwell sil 0-2 5+ 0-1	

LOWLAND SOILS

DERIVED FROM CALCAREOUS ROCKS

UPLAND SOILS

	HAPLUDALF B Opequon sil 12-65 1-2 3-4	5/EUTROCHREPT A Otway sic 6-50 2-5 5-6	6/HAPLUDALF B Shrouts scl 6-30 2 4-7	
4/HAPLUDALF B Donahue rsal 6-60 2-4 1-5	HAPLUDALF B Caneyville sil 6-35 2-3 1-5	5/HAPLUDALF B Beasley scl 2-20 4-10 2-3	6/HAPLUDALF? B Fleming csil 6-25 3-5 4	6/FRAGIUDALF? CD Landisburg csil 2-12 5+ 1-4
HAPLUDALF B *Bledsoe sil 20-60 5-7 3-5	HAPLUDALF B Hagerstown sil 0-20 3-6 2-4	FRAGIUDULT C Dickson sil 0-6 3-6 1-2	FRAGIUDALF D Lawrence sil 0-4 4-6 1-3	OCHRAQUULT? E Guthrie sil 0-2 3-7 1-2
4/HAPLUDALF B (Renox) gfsal 2-15 5+ 5	HAPLUDALF B Elk sil 0-12 5-10 2	HAPLUDALF C (Cotaco) fsal 2-6 4-6 5	FLUVAQUENT D Newark sil 0-2 5-10 4-5	FRAGIAQUULT E Robertsville sil 0-2 5-10 0-1
4/DYSTROCHR. B Skidmore gfsal 0-2 3-6 3-4	HAPLUDOLL B Huntingdon sil 0-4 5-10 4	EUTROCHREPT C Lindside sil 0-2 5-10 5	FLUVAQUENT D (Stendal) fsal 0-4 4-6 5	FLUVAQUENT E Melvin sil 0-2 5-10 4-5

LOWLAND SOILS

Arranged according to parent material and topography (poor drainage to right; and upland versus lowland). "Lowland soils" are on alluvium; "upland soils" are on residuum, plus alluvium of high terraces and streamheads (if poorly drained), or on colluvium of lower slopes below cliffs (if asterisked*).

Data and terminology are from Soil Conservation Service county surveys, and are condensed here in a way that enables overlays for individual characteristics to be readily generated. The three-line summary of each soil series is as follows:

First line: Classification of National Cooperative Soil Survey; A = somewhat excessively well drained; B = well drained; C = moderately well drained; D = somewhat poorly drained; E = poorly drained; F = very poorly drained.

Second line: Soil series name, with typical A horizon texture: (c/g/r/s)sil = (cherty/gravelly/rocky/shaley) silt loam; lom = loam; sic = silty clay; scl = silty clay loam; lfs = loamy fine sand; (g)fsl = (gravelly) fine sandy loam.

Third line: left numbers = typical slope percent; central numbers = typical depth to bedrock in feet; right numbers = typical A horizon pH (unlimed) as follows:
0= 4-4.5; 1= 4.5-5; 2= 5-5.5; 3= 5.5-6; 4= 6-6.5; 5= 6.5-7; 6= 7-7.5; 7= 7.5-8.

shale (Johnsburg, Cavode and Rarden series). These series increase in extent towards the north, adding to the typical Devonian black shale soils (Colyer, Rockcastle/Muse and Sequoia series). In addition, there are extensive areas of more or less poorly-drained, acid soils with fragipans on the Silurian and Mississippian "flats" noted above, whereas, further south, such soils are more typical of the Pennsylvanian uplands. Another special feature of the Morehead District is the extent of residual calcareous soil, often mixed with slumped non-calcareous material (Donahue series). Ridges and upper slopes with this soil series help mark the broad transition from Knobs Region to Cliff Section.

The Cliff Section in this district is typified by complex catenas (topographic sequences) of soils. These include soils derived from colluvial limestone on lower slopes (Bledsoe =Brookside), sandstone (Rigley and Steinsburg), mixed sandstone, siltstone and shale (Shelocta, Gilpin and Rayne=Whitley), and residual shale on upper slopes (Sequoia=Latham). Towards the southeast, the Low Hills Belt is dominated by soils derived from shale-sandstone mixtures (especially Shelocta) or, on upper slopes, from shale alone (Sequoia=Latham). Notably less extensive than further south are the more or less poorly drained soils typical of broader ridges in the Cliff Section, or of flatter land in the Low Hills Belt.

BIOGEOGRAPHY

Flora

There has been much previous botanical work in the Morehead District, largely due to collections made by faculty and students at MSU, including Katherine Carr (especially in the 1930s), Clyde Reed (1950s), Howard Setser (1960s on), Les Meade (1970s on), and Allen Risk (1980s on). However, some of the collections have dubious label data (especially K. Carr collections; Appendix A) or are more or less unavailable (especially C. Reed collections). In addition, Braun (1943, 1950) made several collections and observations, especially in the Clack Mountain area, and Wharton's (1945) thesis dealt with part of the region. More recently, KSNPC conducted biological surveys in this area (Harker et al. 1979a, 1981). There is also an important historical manuscript by Peck (1834), to which may be referred several collections at the Philadelphia Academy of Sciences (Appendix C). Despite this wealth of information, little has been published. The only publications that focus on this region's flora are by McCoy (1936), Carr and Cohn (1941) and Cusick (1989).

Much previous work in the Cliff Section as a whole has already been summarized in the Somerset and Stanton District reports (Palmer-Ball et al. 1988, Campbell et al. 1989). Vegetation types in DBNF were described in these reports (see also Campbell 1987). Table 2 summarizes the current distribution of forest stands in the Morehead District that date from before 1900, based on data on file at the district office. Table 3 provides data on forest composition in about 1900, taken from Barton's (1919) survey. Forest types are essentially the same as further south, though their physiographic relationships are slightly different, and there are distinctive floristic features in several special habitats (see below). The extensive Mississippian siltstone supports populations of *Tsuga, Pinus strobus* and their associates further west into the Knobs Region than is usual further south. Also, *Viburnum dentatum* is a relatively frequent shrub in forests on siltstone. Of minor ecological interest is the occurrence of some calciphilic species on or near sandstone, e.g., *Polypodium polypodioides, Woodsia obtusa* and *Chasmanthium latifolium* in the Clack Mountain area or nearby.

There is a general mixture of northern, southern and Appalachian species in the flora of the Cliff Section. The flora of the Morehead District is similar to other districts, though with somewhat lower overall diversity. Many southern species are absent. Moreover, although this district is at the northern terminus of DBNF, there are less occurrences of rare northern species than in the Stanton District, probably due to the lesser extent and development of deep sandstone ravines with cool microclimates. However, it does have a few northern or Appalachian species absent from the Stanton District. Parenthetic notes in the following lists are supplied for species not covered in the Results section (see also Significant Sites for details).

Northern or Appalachian species recorded in this district or nearby include the following (*asterisks indicate those unknown to the south in the Stanton District): *Agastache scrophulariaefolia, Anemone quinquefolia, Betula allegheniensis, Cardamine rotundifolia, Carex pedunculata, C. scabrata, C. lurida* var. *gracilis, Circaea alpina, Cimicifuga americana, Dryopteris spinulosa, Glyceria melicaria, Hydrophyllum virginianum*, Iris verna, Juncus*

Table 2. Pre-1900 stands in the Morehead District: USFS type and distribution.*

Forest type	Number of stands	Acres (approx.)	Note on distribution
Yellow/pitch pine (32,38)	4	80	Mostly on ridges and dry slopes in moderately rugged areas from the Craney Creek area southwest to the Beaver Creek area
Yellow/pitch pine-oak (12,15,16)	2	20	
Chestnut oak-scarlet oak-pine (45)	8	140	Mostly on ridges and dry slopes, scattered throughout
Chestnut oak/scarlet oak (59,60)	26	530	
White/black oak-yellow pine (47)	8	150	Mostly on dry to moist slopes and ridges in center and SE
White oak/other oak (54,51)	15	330	Scattered on average slopes and moister ridges, throughout with concentrations in PWHA, head of Clear Creek, Clack Mt. area, etc.
White oak-red oak-hickory (53)	213	5100	
Yellow poplar ± oak (56,50)	83	830	Scattered on moister slopes throughout, with concentration in PWHA and head of Clear Cr.
Hemlock-hardwood (8)	2	60	Mostly on moist sandstone slopes in SE sections, e.g., along upper Minor Creek and Open Fork -Spaws Creek area
Hardwood-White Pine-hemlock (41)	9	220	
Sugar maple-beech -birch (81)	6	70	Mostly on moist rich slopes; small areas in SE sections, especially Meyers Fk./Beaver Cr./Licking Rv.

* Data are from files at the Morehead District office; they refer only to land owned by USFS. The USFS type numbers are in parentheses after each type's name.

Table 3. Composition of forests ca. 1900 in counties of Morehead District.*

SPECIES	COUNTIES			
	Rowan	Bath	Menifee	Morgan
Yellow Pine (*Pinus*)	8.8%	8.0%	5.0%	1.4%
White Pine (*Pinus strobus)*	---	---	2.7	---
Chestnut oak (*Q. montana*)	8.1	6.5	14.9	13.9
Chestnut (*Castanea*)	9.4	3.2	7.2	7.5
White oak (*Q. alba*, etc.)	21.7	16.7	20.7	24.7
Black oak (*Q. velutina*, etc.)	29.1	17.1	10.4	12.9
Hickory (*Carya*)	7.7	7.2	4.1	6.8
Ash (*Fraxinus*)	0.3	2.4	0.1	1.0
Locust (*Robinia, Gleditsia*)	---	2.0	0.9	---
Hemlock (*Tsuga*)	---	---	7.7	1.3
Cucumber (*Magnolia*)	---	0.2	---	0.3
Poplar (*Liriodendron*)	2.8	5.8	10.8	7.6
Beech (*Fagus*)	5.0	5.6	5.9	6.7
Basswood (*Tilia*)	1.8	1.8	1.6	1.7
Buckeye (*Aesculus*)	---	0.2	---	0.3
Walnut (*Juglans*)	---	0.8	---	---
Maple (*Acer*)	2.2	6.1	3.1	5.2
Gum (*Nyssa, Liquidambar*)	0.7	10.5	2.7	8.5
Elm (*Ulmus*)	---	1.0	---	---
Sycamore (*Platanus*)	1.0	0.5	2.3	0.7
Total (thousand board feet measure)	199,771	76,899	223,491	309,695

* Taken from Barton (1919).

articulatus, Juniperus communis, Oryzopsis racemosa, Oxalis montana, Phlox stolonifera, Pinus strobus* (in Cliff Section; also White Pine Hollow in Knobs Region), *Poa alsodes, Rubus odoratus*, Salix eriocephala, Scutellaria saxatilis*, S. serrata** and *Taxus canadensis.* Other northern species have been reported, but the label data are dubious (Appendix A).

Only a few species in or near this district have typical "southern" distributions within the context of Appalachian Kentucky. These include *Calamagrostis cinnoides, Clematis glaucophylla,* perhaps *Hexastylis arifolia* var. *ruthii* (W.T. Levy, MRE, 1972, DBNF, Rowan Co.), and *Xyris torta.* More widespread southern species include *Aesculus pavia, Carex abscondita, C. crus-corvi* (see a below), *Erythronium rostratum* and *Panicum scoparium* (see b below).

Selected groups of less frequent, or geographically restricted species are characteristic of special habitats in the Morehead District or nearby. Most of these patterns have been described in previous inventories. The following notes from the Morehead District are supplementary, and emphasize differences from other districts.

(a) Wetlands of broad bottomlands. Several aquatic or wetland species have been found along the western edge of the district in remnants of oxbow lakes, ponds, marshes, wet meadows, and occasionally in artificial ponds. Most of these have widespread ranges in eastern North America, or are largely restricted to the Coastal Plain and Great Lakes Region. They include *Callitriche heterophylla* (K. Carr, MRE, 15 Oct 1932, near Rodburn, Rowan Co.), *Carex crus-corvi* (found in 1991 along Mud Lick Creek, and an oxbow 0.6 miles W of Cincinnati Hollow), *C. tenera, Ceratophyllum muricatum, Cyperus bipartitus, Decodon verticillatus, Dulichium arundinaceum, Echinocystis lobata* (extirpated?), *Glyceria septentrionalis, Gratiola viscidula, Hottonia inflata* (extirpated?), *Lemna valdiviana* (Bath Co. Bayou, and an oxbow 0.6 miles W of Cincinnati Hollow), *Lycopus rubellus* (Bath County Bayou, and Hawkins Pond), *Myosotis laxa, Platanthera peramoena, Polygonum amphibium* (Eagle Lake on MSU Campus), *P. arifolium, Potamogeton pulcher, Ranunculus ambigens, Sagittaria graminea, Scirpus purshianus, Sium suave, Utricularia gibba, Vallisneria americana* and *Wisteria frutescens* (a waif?).

(b) Former "marshes" or "wet prairies" on poorly-drained terraces. Some uncommon species recorded from bottomland sites in this region are typical of relatively acid or wet-dry fluctuating soils with little or no tree cover. Many of these species have wide ranges, but others have southern or northern concentrations: *Thelypteris palustris, Lespedeza capitata, Oenothera cf. olelandii, Viola lanceolata, Hypericum canadense*, Sabatia campanulata*, Pycnanthemum verticillatum*, Aster puniceus*, Helianthus angustifolius, H. mollis, Vernonia noveboracensis, Calopogon tuberosus*, Stenanthium gramineum, Platanthera lacera, Juncus bufonius, Scirpus expansus* and *Carex straminea.* The records for some of these species (*) are all from before 1950, and it seems that their habitats have been virtually eliminated by human disturbance. The only remnants of such places are roadsides, wet meadows and thickets, often in tributaries of the main river valleys. This habitat type may have graded into the following upland type, and there was probably some overlap in characteristic species.

(c) Seasonally wet, boggy streamheads and seeps on non-calcareous soils. There are many more uncommon species known from such habitats further south in DBNF. Those of interest in this district are *Bartonia paniculata**, *Calamagrostis cinnoides*, *Carex bromoides**, *Drosera intermedia** (extirpated?), *Isoetes engelmannii**, *Lorinseria areolata** (in Rowan Co. Sphagnum Swamp, and KY 1274 ditch 0.5 miles S of Licking Rv.), *Panicum scoparium* (a southern species found at Hog Hollow), *Platanthera ciliaris*, *Pogonia ophioglossoides** (extirpated?), *Rhynchospora globularis* and *Xyris* spp. These were mostly found on the flats around Farmers, based on Mississippian siltstone and shale, in contrast to the streamheads further south on Pennsylvanian bedrock. Some of them occur mostly in open streamheads, while others (*) occur mostly in the woods, and extend down to bottomland seeps and other habitats. They mostly have southern or east-coastal ranges in Eastern North America.

(d) Well-drained terraces and rocky banks along larger streams. A few uncommon species are characteristic of wooded terraces on well-drained sandy soil in the Morehead District, especially the remaining bottomland forest along North Fork of Triplett Creek: *Carex woodii* (also on moist slopes), *Cypripedium kentuckiense*, *Panax trifolius*, *Panicum yadkinense*, *Phlox stolonifera*, *Uvularia sessilifolia*. A few other species are typical of more open banks, often with boulders and cobbles: *Clematis glaucophylla*, *Juncus articulatus* (a calciphile?), *Salix eriocephala* (a calciphile?), *Crataegus verruculosa* and *Viburnum dentatum* var. *lucidulum*. These species mostly have Appalachian-Ozarkian or northern ranges.

(e) Siltstone outcrops (especially near Christy and Gates). Below the limestone cliffs, there is usually a bench, and below this there are often exposures of siltstone in the Borden Formation. On some dry, south- or west-facing slopes and points, these outcrops form distinct openings in the forest. However, the open forest, thickets and herbaceous ledges of these openings contain only a few, moderately uncommon species (see introduction to Significant Sites).

(f) Limestone cliffs and rocky woods nearby. Though mostly less frequent than further south, there are several occurrences of rare species typical of limestone cliffs and rocky woods in this region. These include *Apocynum androsaemifolium/medium*, *Bouteloua curtipendula*, *Calamagrostis porteri* ssp. *insperata* (siltstone-limestone transition), *Muhlenbergia capillaris*, *Oryzopsis racemosa*, *Phlox subuluta**, *Solidago harrisii**, and *Thaspium pinnatifidum**. These species have ranges centered further west, or in calcareous Appalachian regions (*).

(g) Calcareous prairie or glade remnants, including roadsides. A few species in DBNF are concentrated along roadsides on ridges, where they may be relics from grassy "barrens" or "prairies" maintained by fire before settlement (Campbell et al. 1991). In this district such species are mostly on the calcareous ridges of Clack Mountain and nearby (especially on the Donahue soil series). These species include several with mid-western or southern-central ranges: *Carex gravida* (found in 1991 on Big Mt., and S-face near Claylick Br.), *C. tetanica**, *Cirsium altissima*, *C. carolinianum*, *Echinacea purpurea** (locally frequent in the district), *Eryngium yuccaefolium*, *Gentiana alba*, *Helianthus grosserratus*, *Liatris aspera*, *L. squarrosa**, *L. spicata*, *Lilium philadelphicum*, *Phaseolus polystachios*, *Phlox pilosa* (Clack Mt., and Cave Run Glades), *Silphium terebinthinaceum**, *Solidago rigida* (Clack Mt., and Cave Run Glades), *S. speciosa* var. *speciosa* (Clack Mt., and Lower Lick Fk. roadsides), and *Veronicastrum virginicum**

(roadsides near Morehead, Clack Mt. and Lower Lick Fk.). Some of these are also found occasionally in open woods. Along the western edge of the district or just beyond, a few sites on the Silurian Crab Orchard Formation have some of these same species (those with asterisks*), plus *Carex juniperorum, Linum sulcatum, Orbexilum onobrychis, Penstemon laevigatus, Poa languida* (open woods) and *Scutellaria leonardii.*

(h) Sandstone cliffs and glades. There are few known occurrences of rare species along the clifflines of the Morehead District. *Dodecatheon frenchii* and *Trichomanes boschianum* are the only rare rockhouse species known. Two more species of interest have been reported from this habitat, but these records should probably be reassigned to more widespread taxa: *Cystopteris tenuis* [= *C. fragilis* var. *mackayi*] to *C. tenneseensis*; and *Thalictrum mirabile* to *T. clavatum.* On clifftops, outcrops do not generally extend back far, and the only characteristic rare species may be *Juniperus communis*, *Cornus racemosa* and *Dichanthelium boreale* (see also notes on *Dichanthelium* spp. in Results section). Good examples of clifftop openings, though generally no more than 0.1 acre, occur along Chestnut Cliffs, Pounder Branch and east of lower Beaver Creek. Common species of these "glades" include *Hypericum gentianoides, Andropogon scoparius, Panicum linearifolium, Danthonia sericea, Aster surculosus, Tephrosia virginiana, Gaultheria procumbens, Gaylussacia baccata, Amelanchier arborea, Pinus virginiana* and *Quercus* spp.

Fauna

All surface waters within the Morehead District are tributaries of the Licking River, a probable pre-Pleistocene tributary of the Teays River (Burr and Page 1986). Sections of the river that have not been impounded and its high quality tributaries are of considerable interest for protection of remnants of our increasingly rare aquatic natural heritage (Hannan et al. 1982, Kentucky Division of Water and National Park Service 1990). Unfortunately, the Licking River, and lower sections of its major tributaries within the district, were inundated by Cave Run Lake in 1974. This severely altered or destroyed much of the native aquatic fauna before it had been adequately studied.

In the earliest examinations of the Kentucky fish fauna, Rafinesque (1819, 1820) reported nine species from the Licking River, possibly from within the district. Welter (1938) generated an important list of Licking River fishes from Rafinesque's work, unpublished data, and personal collections. The Kentucky Department of Fish and Wildlife Resources conducted a series of primarily sportfish-oriented examinations of the Licking River (Clark 1941a,b; Tompkins and Peters 1952; Jones 1970; Brewer 1980), the most important of which was a summary of previous information, presentation of new data, and discussion of the fauna by Kornman (1989). Branson (1977) assembled the first list of rare DBNF fishes, and further stream inventories were conducted by Harker et al. (1979), Slone (1990) and Meade (1992c). The Kentucky range of *Clinostomus elongatus*, much of which is in the Licking River drainage, was greatly expanded and clarified by Meade et al. (1986). All of these studies provide important baseline information regarding the historic and recent locations of rare organisms in the district. Much of the taxonomic and distributional information from the aforementioned studies was included in Clay's

(1975) book on the fishes of Kentucky, which was updated and supplanted by Burr (1980) and Burr and Warren (1986).

The terrestrial vertebrate fauna of the Morehead District has not previously been studied as a whole, though studies of certain groups have been conducted by a number of investigators (e.g., Welter and Carr 1939, Meade 1992a,b). Barbour (1971) and Barbour and Davis (1974) included several county records for amphibians, reptiles and mammals. Mengel (1965) collected numerous records of birds from this area, including references to earlier work by Barbour (1940, 1948, 1950, 1951, 1952, 1955). Information compiled by the Nongame Wildlife Program of the Kentucky Department of Fish and Wildlife Resources includes records of many other species in the region (D. Yancy, pers. comm.). This source is particularly important for data on the rare bats that use caves and clifflines in this region.

The terrestrial fauna includes a diverse mixture of northern and southern components, though the latter are less numerous. Relatively northern species include Jefferson Salamander (*Amystoma jeffersonianum*), Mountain Dusky Salamnader (*Desmognathus ochrophaeus*), Northern Water Snake (*Nerodia s. sipedon*), Eastern Ringneck Snake (*Diadophis punctatus edwardsii*), Northern Black Racer (*Coluber c. constrictor*), Black-throated Green Warbler (*Dendroica virens*), Ruffed Grouse (*Bonasa umbellus*), Smoky Shrew (*Sorex fumeus*), Pygmy Shrew (*Microsorex hoyi winnemana*), Least Weasel (*Mustela nivalis*) and Northern Long-eared Bat (*Myotis septentrionalis*). Relatively southern species include Southern Leopard Frog (*Rana u. utricularia*), Scarlet Kingsnake (*Lampropeltis t. elapsoides*), Red-eyed Vireo (*Vireo olivaceus*), Ovenbird (*Seiurus aurocapillus*) and Eastern Wood Rat (*Neotoma floridana magister*).

METHODS

Several sources of information were used to identify potentially significant sites. At the onset, lists of species for inventory were generated from information in the Kentucky State Nature Preserves Commission's Natural Heritage Database and from a literature review. These species included the few federally Endangered or Threatened species, candidates for federal listing by the USFWS, those listed as Endangered, Threatened, or Special Concern by KSNPC (1991a, updating Warren et al. 1986), and the few additional species listed as Sensitive by DBNF (B. Knowles, pers. comm.).

Using 7.5 minute U.S. Geological Survey (USGS) topographic maps, aerial photographs, USFS Continuous Inventory of Stand Conditions (CISC), Soil Conservation Service (SCS) surveys, and personal communication with knowledgable people, potential sites for rare species and ecologically significant habitats were identified and ranked for inventory. Maps and aerial photographs were used to identify areas with wetlands, cliffs and other outcrops, sinkholes and other uncommon topographic features. Forest stands estimated to exceed 100 years old were identified using CISC data and aerial photographs. In addition, USFS personnel and others familiar with the area suggested further sites for visitation. A field schedule was then devised that focused the inventory on the potentially more interesting sites and species, in their appropriate seasons.

Field work began in April 1991 and was mostly completed by October 1991. However, cave surveys continued into December 1991. Approximately 80 man-days in the field were devoted to botanical inventory, plus much additional time working on specimens. At least 120 man-days were devoted to zoological inventory, plus 80 man-nights of mist-netting bats.

FLORA

Botanical field work was conducted in areas scattered throughout the district and encompassing as many vegetation types as possible. The primary goals were to relocate previously recorded populations of rare species and to discover new ones. There were few repeated visits to the same sites, due to the limited time. However, through an accumulation of notes made during the year, a qualitative description of the overall vegetation composition was made, with special emphasis on the areas containing rarer species. These notes include comments on dominant species, and general species lists, though these are incomplete and have seasonal limitations. In addition, population estimates were made for some of the rarer species.

Most rare species were concentrated along watercourses, from riverbanks to streamheads, and along clifflines, together with other nearby outcrops. Accordingly, most time was devoted to these areas, but, in traveling to many of them, much of the more typical upland forest was covered as well. In addition, many roadsides were searched for the small group of rare species that are characteristic of such sites.

Plant specimens were selectively collected throughout the inventory work, focusing on the listed rare species, other rare species of interest, and plants that could not be readily identified in the field. These will be deposited at the University of Kentucky and Morehead State University, with some duplicates to Berea College and Eastern Kentucky University. Photographs were taken of many rare species and will be deposited at the Winchester and Morehead offices of the Daniel Boone National Forest.

The vascular plant nomenclature used in this report generally follows Kartesz & Kartesz (1980). The listed rare species' names all follow this source, though a few currently used synonyms have also been given in brackets [ ], as discussed briefly in the species accounts. For the rest of the flora, no strict standard has been followed, though virtually all names preferred here have been used in at least one of the standard manuals (Fernald 1950, Gleason and Cronquist 1963, Radford, Ahles and Bell 1968). In the short lists of associated species that are provided in the text below, there is no strict order, but species are generally separated by life-form and taxonomy. Species with no congeners in DBNF are referred to by genus name only. A complete floristic list is not included with this report. However, much information on the DBNF flora is already available from earlier inventory reports, and further data are being incorporated into the Atlas of the Kentucky Flora, a database compiled by J. Campbell and others.

Acronyms for herbaria (often given in parentheses after the collector's name) are mostly from Holmgren et al. (1981): BEREA = Berea College; CAS = California Academy of Sciences; DHL = University of Louisville; EKY = Eastern Kentucky University; FI = Field Museum, Chicago; GH = Gray Herbarium, Harvard University; KES = Kentucky Agricultural Experiment Station; KNK = Northern Kentucky University; KY = University of Kentucky; MI = University of Michigan, Ann Arbor; MO = Missouri Botanical Garden; MRE = Morehead State University; MUR = Murray State University; NCU = University of North Carolina (Chapel Hill); PH = Philadelphia Academy of Sciences; US = United States Herbarium, Smithsonian Institution (Washington, D.C.); VDB = Vanderbilt University; WKY = Western Kentucky University.

FAUNA

Streams were sampled for rare organisms by two teams of 2-4 persons on 15-18 and 29-31 July, and 14-15 and 27 August 1991. Cave Run Lake was not sampled because this impoundment of the Licking River has destroyed habitat present for most rare aquatic organisms. Mollusca were sought by scanning the stream bottom in shallow water with viewing buckets, searching the bottom with hands and feet, and/or by examining the shoreline and banks for shells. Shells were retained as voucher specimens and will be deposited at Eastern Kentucky University or Illinois Natural History Survey. Fishes were sampled by seining or electrofishing in all available habitats at a site. In many cases, easily identified specimens were counted and released at the sample site. Others were preserved for lab identification and will be retained at the KDFWR Northern Fisheries District Office or deposited at Southern Illinois University at Carbondale. Distributional statements are based on Burr and Warren (1986), Cicerello et al. (1991), Kentucky State Nature Preserves Commission (1991), and specimens at the University

of Louisville (UL) and Ohio State University Museum of Zoology (OSUMZ). Nomenclature for unionids follows Turgeon et al. (1988), and that for fishes follows Robbins et al. (1991).

In terrestrial habitats, small mammals were surveyed by using pitfall traps (32 oz. plastic cups) and snap traps (mouse traps and museum special traps). Pitfall traps were partially filled with 10% formalin (9:1, water: formaldehyde), so that complete specimens could be obtained. These traps were set using a posthole digger, in areas with frequent signs of small mammal activity. A total of 17 sites were selected, covering a variety of habitats, from mesophytic forest (usually with boulder talus), open mesophytic forest, prairie-remnants, upland and bottomland fields, swamp forest and streamside forest. Snap traps were set in similar areas at nine sites. These efforts resulted in 84,743 trap-nights of sampling time, though leaf litter reduced the effective time during late fall. Amphibians and reptiles were also captured in pitfall traps, but were usually sampled by overturning rocks and logs. Additional records of these animals and small mammals, including many road-kills, were made by driving and walking. All specimens collected from traps and usable road-kills are deposited in the Morehead State University Vertebrate Collection. Birds were noted from auditory and visual criteria, but there was no directed search for bird species. Using data from the Kentucky Breeding Bird Atlas, a list of breeding birds was generated (Appendix E).

Since several of the rare species in the area were associated with caves and crevices of clifflines, a special effort was made to census the bats and other animals of these habitats. During the summer, clifflines were checked for locations of sandstone-shelters and limestone-caves that might harbor rare species. Potentially significant sandstone shelters were located from prior knowledge, further inventory in 1991, and ongoing biological evaluations of timber-sales by USFS. Several sites were revisited for mist-netting in the summer and early fall. Mist nets were placed in front of shelters and caves, elsewhere along clifflines, and across potential foraging corridors along streams, pipelines and logging roads. In December, there was an intensive search for hibernating bats in virtually all known sandstone rockshelters and limestone caves that were considered likely to harbor rare bat species. Of these caves, only one--Ellington Pit Cave (0.3 miles SE of Pickett Branch mouth, Bangor Quad.)--was left largely unexplored, because its 50 ft pit requires special expertise to enter. It will be mist-netted during April, 1992.

RESULTS

This section has been divided into three parts: notes on the rare flora, rare fauna, and "Significant Areas". Table 4 presents total numbers of old and new records for USFWS-, KSNPC- and USFS-listed rare species from the Morehead District, excluding those plant species for which only uncertain or marginal records are available. It also indicates numbers of records within "Significant Areas". The distribution of all these listed rare species records, combined, is shown in Fig. 3. For details of some old plant records of interest, see Appendices A and C. For details of terrestrial vertebrates observed during the inventory, see Appendices D and E.

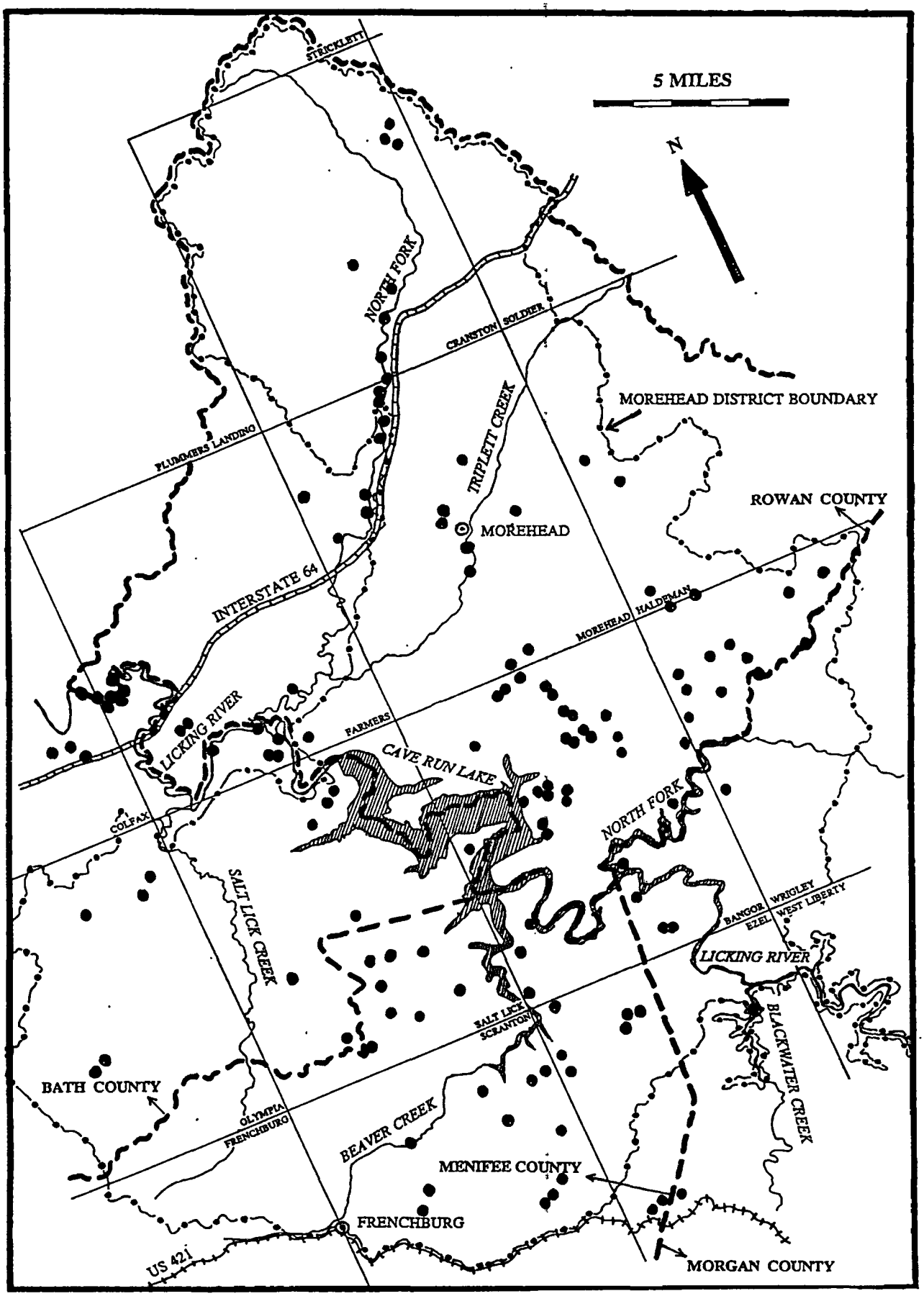

Figure 3. Map of Morehead Ranger District (Proclamation Boundary) showing approximate locations of listed species occurrences.

Table 4. Occurrences of listed rare species known from the Morehead District*.

SPECIES: FLORA	Number of formerly known sites	Number of sites added by inventory	Number of sites in Significant Areas
Bouteloua curtipendula			
Side-oats Grama	--	1	1
Calamagrostis cinnoides			
Nuttall's Reedgrass	--	1	1
Calamagrostis porteri ssp. *insperata*			
Porter's Reedgrass	--	5	3
Calopogon tuberosus			
Grass Pink	1x	--	--
Carex tenera			
Slender Sedge	--	2	1
Circaea alpina			
Small Enchanter's Nightshade	--	3	3
Cleistes divaricata			
Spreading Pogonia	--	1	--
Clematis glaucophylla			
White-leaved Leather-flower	2	1	1
Cypripedium kentuckiense			
Kentucky Lady's-slipper	1	2	3
Dichanthelium boreale			
Northern Witchgrass	--	1	--
Dodecatheon frenchii			
French's Shooting Star	--	1	1
Drosera intermedia			
Spoon-leaved Sundew	1x	--	--
Dryopteris spinulosa			
Spinulose Wood Fern	1	--	--
Erythronium rostratum			
Golden Star	1	--	1
Gentiana alba			
Yellow Gentian	1	--	1
Glyceria melicaria			
Slender Manna Grass	--	1	1
Hydrophyllum virginianum			
Virginia Waterleaf	1x	--	--
Juncus articulatus			
Jointed Rush	1	--	--
Junperus communis			
Ground Juniper	1	1	1
Lilium philadelphicum			
Wood Lily	3	1	2

Table 4 continued.

SPECIES: FLORA	Number of formerly known sites	Number of sites added by inventory	Number of sites in Significant Areas
Monotropsis odorata			
Sweet Pinesap	--	1	1
Oryzopsis racemosa			
Black-fruit Mt.-ricegrass	1	2	1
Panax quinquefolius			
Ginseng	>3	7	>3
Poa languida			
Drooping Bluegrass	--	1	--
[*Podostemon ceratophyllum*]			
Threadfoot	--	[1]	[1]
Pogonia ophioglossoides			
Rose Pogonia	1x	--	--
Potamogeton pulcher			
Spotted Pondweed	--	1	1
(*Prenanthes alba*)			
White Rattlesnake-root	(2)	--	(1)
Rhynchospora globularis			
Globe Beaked-rush	--	1	1
Sagittaria brevirostra			
Short-beaked Arrowhead	2	2	4
Sagittaria graminea			
Grassleaf Arrowhead	1	--	--
Scirpus expansus			
Woodland Beakrush	2	1	2
Scutellaria saxatilis			
Rock Skullcap	2	--	--
Silphium terebinthinaceum var. *lucy-brauniae*			
Lucy Braun's Prairie Dock	2	1	2
Smilacina stellata			
Star. False Solomon's-seal	2x	--	--
(*Streptopus roseus*)			
Rosy Twisted-stalk	2x	--	--
Taxus canadensis			
Canadian Yew	1	--	1
Thaspium pinnatifidum			
Cutleaf Meadow-parsnip	3	9	3
Trichomanes boschianum			
Filmy Fern	2	3	4
Vallisneria americana			
Eel-grass	--	1	--

Table 4 continued.

SPECIES: FAUNA	Number of formerly known sites	Number of sites added by inventory	Number of sites in Significant Areas
Molluscs (unionids)			
Alasmidonta marginata			
Elktoe	1x	--	--
Simpsonaias ambigua			
Salamander mussel	--	1	--
Fishes			
Ammocrypta pellucida			
Eastern sand darter	3x	--	--
Clinostomus elongatus			
Redside dace	6	7	6
Etheostoma tippecanoe			
Tippecanoe darter	1x	--	--
Noturus stigmosus			
Northern madtom	1x	--	--
Percina evides			
Gilt darter	1x	--	--
Percopsis omiscomaycus			
Trout-perch	[1]	--	[1]
Amphibians			
Aneides aeneus			
Green Salamander	6	>10	>6
Cryptobranchus alleganiensis			
Hellbender	2	--	2?
Reptiles			
(*Apalone mutica mutica*)	1?	--	1?
Midland Smooth Softshell			
Lampropeltis triangulum elapsoides			
Scarlet Kingsnake	1	--	--
(*Thamnophis sauritus*)			
Eastern Ribbon Snake	1?	--	--

Table 4 continued.

SPECIES: FAUNA	Number of formerly known sites	Number of sites added by inventory	Number of sites in Significant Areas
Birds			
Accipiter striatus Sharp-shinned Hawk	4	1	2
Haliaeetus leuocephalus Bald Eagle	1	--	1
Nyctanassa violacea Yellow-crowned Night-Heron	[1]	1	1
Tyto alba Barn Owl	1	--	1
Mammals			
Mustela nivalis Least Weasel	1	1	1
Myotis leibii Eastern Small-footed Bat	--	2	1
Myotis septentrionalis [*M. keenii*] Northern Long-eared Bat	5	7	7
Myotis sodalis Indiana Bat	1	2	3
Neotoma floridana magister Eastern Wood Rat	>10	>50	>7
Plecotus rafinesquii Rafinesque's Big-eared Bat	6	5	7
Plecotus townsendii virginianus Virginia Big-eared Bat	5	1	6
Sorex [Microsorex] hoyi winnemana Pygmy Shrew	3	10	5
Spilogale putorius Eastern Spotted Skunk	1	--	--
Ursus americanus Black Bear	4	2	2

Key:

( ) -- uncertain record

[ ] -- occurrence near boundaries of district; plants were probably extirpated within district.

x -- species not relocated; perhaps extirpated.

VASCULAR FLORA

Listed Species

The following accounts summarize data on the 51 listed rare plant species that have been documented in the Morehead District or nearby. The 10 species in square brackets [ ] have not been recorded in the district but there are records from within five miles of the boundary; see also Campbell et al. (1989) for marginal records to the south. These species are included because they can be expected within the district, or they probably occurred here before major human disturbance. The four species in parentheses only have tentative records, and their presence or past occurrence requires confirmation. One state-listed species, ***Thalictrum mirabile***, was excluded for taxonomic reasons (see also *Monarda russeliana*; Campbell et al. 1989). Following each species' name, its listed status is shown as follows: (1)/(2)/(3).

(1) Status in Kentucky according to the Kentucky State Nature Preserves Commission (KSNPC 1991a; updating Warren et al. 1986): E = Endangered; T = Threatened; S = Special Concern; "-" = not listed.

(2) Status in Daniel Boone National Forest as listed by the USFS at the beginning of 1991 (B. Knowles, pers. comm.); S = Sensitive: E = Endangered; "-" = not listed; "+" = KSNPC listed species that the DBNF inventory has documented on USFS land for the first time.

(3) Federal Status as designated by the United States Fish and Wildlife Service (1985, 1990a,b); C1 or C2 = candidate for listing, Category 1 or 2; C3 = species removed from consideration. No federally-designated "Endangered" or "Threatened" species have been found in the district. Only two candidates are detailed below: *Calamagrostis porteri* ssp. *insperata* and *Cypripedium kentuckiense*. *Polemonium reptans* var. *villosum* occurs in the district but has recently been removed from the list of candidates (see Other Species of Interest). *Carex purpurifera* and *Juglans cinerea* have been reinstated as candidates, but their many Kentucky records were apparently overlooked by USFWS (1990b). *J. cinerea* has special disease problems beyond the scope of this report, and a detailed review of data on the distribution of diseased versus healthy populations in DBNF will be possible after the rare species inventory is completed.

In parentheses after each species' name and status is shown the number of Kentucky counties where it is known, followed by the approximate number of individual occurrences. These data are filed at Kentucky State Nature Preserves Commission. They may be used to help reassess the listed status of some species.

[*Acer spicatum* **Mountain Maple**: T/-/- (6/6).] In Kentucky, this northeastern species is known from scattered Appalachian locations with cool microclimates, mostly on limestone. This species has been reported a few miles to the south of the Morehead District (Campbell et al. 1989), and collected to the east: L. Meade, Jun 1984, Elliott Co., small hollow S of Laurel Fork, W of Carter School Road crossing. Revisiting the latter site in 1991, at least 20 plants were seen here, growing in young forest of *Liriodendron* (dominant), *Magnolia tripetala, Betula lenta, Athyrium thelypteroides, Cimicifuga americana*, etc.

[*Aconitum uncinatum* **Monkshood**: T/S/- (5/8).] This Appalachian species may be expected in the Morehead District, since it has been found to the north (Kinniconick Creek, Lewis Co.) and south (Campbell et al. 1988).

Bouteloua curtipendula **Side-oats Grama**: S/+/- (11/16). In Kentucky, this species is known from calcareous hills and knobs around the Bluegrass, and on the Pennyrile Karst Plain. In the Morehead District, it is known only from on top of the large, west-facing cliff between Claylick Branch and Warix Run, bordering Cave Run Lake. This is the most prominent limestone cliff in the district. At least ten clumps were seen here. The small grassland areas, totalling less than an acre, were dominated by *Andropogon scoparius* and *Aster oblongifolius* (see notes in Significant Sites).

Calamagrostis cinnoides **Nuttall's Reedgrass**: S/+/- (6/30). In Kentucky, this southern and east-coastal species is virtually restricted to the southern Cliff Section, where it is locally frequent in thinly wooded acid streamheads. In the Morehead District, it was found only at the Hog Hollow streamheads (see Significant Areas). Two 5-20 ft^2 patches were noted here in 1991, growing in wet, brushy meadows on either side of the area bulldozed for dam construction. Associates were similar to those of *Xyris torta* (see below).

Calamagrostis porteri ssp. *insperata* **Porter's Reedgrass**: E/+/C2 (4/10). This Appalachian-Ozarkian subspecies is most clearly distinguished from the central Appalachian ssp. *porteri* by characters of the leaf sheath, and by differences in chromosome number (Green 1984). It flowers rarely in its usual woodland habitat, where increasing shade due to reduced fire or drought frequency may be a cause of this species apparent relic status (G. Yatskievysh, Missouri Bot. Gard., pers. comm.). Until recently, it was known only from two sites in Ohio, a few in Missouri and one in west-central Arkansas. In 1990, field work by B. Summers in Missouri has brought the number of sites there to 27 (mostly non-flowering), and it has been found at one site in Illinois. It was first discovered in Kentucky during the Stanton District inventory, above limestone cliffs on narrow ridges NW of Irvine (Campbell et al. 1989). In the Morehead District, it was found at five additional localities, mostly in a band from Warix Run to Big Mountain. It occurred in dense patches covering 10-1000 ft^2. The largest population was on Big Mountain (see Significant Sites), with over 10 patches. This and most other populations were on ridges with siltstone bedrock, but within 100-1000 ft of the overlying limestone caps. Associated species included *Quercus montana* (abundant), *Q. velutina, Q. rubra, Carya glabra* (frequent), *Liriodendron, Nyssa, Robinia, Sassafras, Amelanchier, Cornus florida, Vaccinium vacillans* (abundant), *Smilax rotundifolia* (frequent), *Vitis aestivalis, Rhus radicans, Rosa carolina, Heuchera longiflora, Phlox carolina, P. subulata, Helianthus divaricatus, Corepsis major, Aster divaricatus* (and locally *A. macrophyllus*), *Solidago caesia, Antennaria plantaginifolia* s.l., *Carex pennsylvanica, C. nigro-marginata, Brachyelytrum, Panicum boscii, P. dichotomum*, etc. This habitat differs from the Grassy Knob Ridge system, where plants were all above limestone and in some cases on the overlying sandstone. However, at one site in the Morehead District, above a branch of Clifton Creek (Menifee Co.), plants were found on a steep slope above a sandstone ravine, with no limestone nearby.

Calopogon tuberosus **Grass Pink**: E/S/- (10/10). The few Kentucky records of this southern and east-coastal species are mostly old. Typical of somewhat open, acid wetlands, it was formerly known in scattered parts of eastern and south-central counties. There are three old records from the Morehead District or nearby: C.W. Short (PH), Jun 1831, Licking River Swamp [Bath Co.?]; Dorothy Riggs (MRE), 23 Jun 1936, US 60 5 miles E of Morehead, Rowan Co.; E.L. Braun 4857

(US), 1 Sep 1948, moist soil 3 miles E of Morehead [perhaps same locality as preceding]. It seems likely that the wet, acid soils and associated open vegetation with this species have been greatly changed by settlement on bottomlands of the district.

Carex tenera **Slender Sedge**: S/-/- (7/10?). This northern species is poorly known in Kentucky, and often difficult to distinguish from other species in *Carex* Section *Ovales*. During 1991, it was found to be frequent in two areas of swampy bottomland forest: on the lower Mud Lick Creek bottomland in woods and rights-of-way (see Significant Sites); and along Lower Lick Fork in the woods with *Isoetes* (see below), opposite Forman's Grocery. With these data, the species is now known from the following Kentucky counties: Bath, Ballard, ?Montgomery, Owsley, ?Powell, ?Montgomery, Rowan, Shelby and ?Whitley. Common associates included *Liquidambar, Liriodendron, Osmunda* spp., *Thelypteris, Onoclea, Panicum microcarpon*, etc.

(*Carex triangularis* **Fox Sedge**: S/-/- (5/5?).) A collection was noted by J. Campbell at MSU in recent years: L. Meade, 6 Jul 1973, wet field near mouth of Laurel Branch of Upper Lick Fork. However, this collection cannot currently be found at MRE. Elsewhere in Kentucky, this species of the lower Mississippi Embayment is known only from Graves, Carlisle, McCracken and Hardin Counties.

Circaea alpina **Small Enchanter's Nightshade**: T/S/- (6/14). In Kentucky, this northern (circumboreal) species is known from a few sandstone ravines in the Cumberland Mountains, northern Cliff Section and Mammoth Cave area. In 1991, it was discovered at three localities in the Morehead District: Bott's Fork (Menifee Co.), Bear Branch (Morgan Co.) and a Minor Creek tributary (Rowan Co.). Nearby, it was also found along Broke Leg Creek (Menifee Co., two sites) and Laurel Creek (Elliott Co., near *Acer spicatum*). All populations were near the dripline below overhanging cliffs, generally on wet, shaley ground. Most sites had only 10-100 mature plants, but at Broke Leg Falls over 1000 were seen. Associates included *Tsuga, Liriodendron, Rhododendron, Athyrium* spp., *Dryopteris* spp., *Thalictrum clavatum, Pilea, Laportea, Amphicarpaea, Arisaema triphyllum, Carex scabrata, Leersia virginica*, etc.

Cleistes divaricata **Spreading Pogonia**: S/+/- (13/23). In Kentucky, this southern species of open pine-oak woods and clearings is known only from the Cliff Section and the Cumberland Mountains. D. Taylor (pers. comm.) recently extended its known range to Rowan County, near Cave Run Lake, where he found a single plant in the field on the ridge 0.5 mile NE of Poppin Rock Tunnel.

Clematis glaucophylla **White-leaved Leather-flower**: S/+/- (8/20). This southern taxon has been reported from a few scattered areas of Kentucky, mostly on rocky river banks or nearby bottomland in the Cliff Section, especially on non-calcareous rocks. Typically with glabrous lower leaf and sepal surfaces, it is closely related to the pubescent *C. viorna* of more base-rich sites, and may deserve only varietal rank. In the Morehead District, glabrous or sparsely pubescent plants have been found at three locations in Rowan Co.: S. Hay (MRE), 24 Jun 1976, field on MSU property near Clay Lick boatdock; L. Meade 771 (MRE), 8 Sep 1973 and 22 Jul 1974, near mouth of Upper Lick Fork; J. Campbell (KY), 31 May 1991, near Christy Creek at the base of a siltstone glade on KY 32.

Cypripedium kentuckiense **Kentucky Lady's-slipper**: S/S/C2 (11/25). This southern species has a center of distribution in the Cliff Section of Kentucky, mostly on sandy floodplains along a few of the larger streams. It is also scattered to the southwest as far as Texas (Atwood 1985, Orzell and

Bridges 1987). The only well-documented locality in the Morehead District is along North Fork of Triplett Creek, where plants have been found at several places, generally 5-10 ft above normal water level. In 1991, about half of the creek from the KY 32 bridge to Rock Fork was searched. About 90 plants were seen, but a third of these did not flower. Many plants were in groups of only 1-10 plants, but concentrations of 15-30+ plants have been found below Pond Lick Branch, and below the KY 32 bridge. About 40 plants were found in ca. 1986 near the Brushy Creek tributary, along Copperas Branch 0.8 miles west of its mouth, in more rocky alluvium than is usual for the species (M. Meadows, pers. comm.). In 1991, a few plants were also found for the first time along the main stem of Triplett Creek, near the KY 32 bridge. The species has also been reported from Carter, Elliott and Menifee Counties (Reed 1981), but this information has never been verified. Reed stated: "students reported it to me from Menifee and Estill Counties. Most recently, I was told of its being in Rockcastle County [an erroneous interpretation of Rockcastle River reports]." Another possible record is from Peck's (1834) map, noting "*Cypripedium*--3 species" in the region around the mouth of Triplett Creek; only two other congeners are known in this area--*C. acaule* and *C. pubescens*. Associated species in the district included *Liriodendron, Magnolia tripetala, Platanus, Liquidambar, Betula nigra, Acer saccharum, Aesculus, Carpinus, Asimina, Thalictrum pubescens, Amphicarpaea, Rhus radicans, Viola* spp., *Helianthus decapetalus, Aster divaricatus, Iris cristata, Brachyelytrum, Bromus purgans, Elymus riparius, Panicum clandestinum, P. yadkinense*, etc. In a few cases, plants occurred closer to the water or at the back of gravel bars, in more open, shrubby vegetation with more *Alnus, Ilex verticillata, Aster prenanthoides, Uvularia sessilifolia*, etc. This species has not been found in the thicker vegetation that occurs on more base-rich soils downstream of the forks (see Significant Sites).

[*Cypripedium parviflorum* **Small Yellow Lady's-slipper**: E/-/- (6/10)]. This northern species (Atwood 1985a) is sometimes treated as a variety of *C. pubescens*. In Kentucky, most or all records are from Appalachian regions, in the transitional forest from *Fagus, Tsuga* and *Rhododendron* to *Quercus* and *Kalmia*, in "less rich humus" than *C. pubescens* (Braun 1943). Flowering dates average a little later: May 9/10/12/18...Jun 12 versus late April to mid-May. Previous records from the Morehead District were based on misidentications (Appendix A). However, it may well occur here, since there are collections from a few miles to the south and east (see also Campbell et al. 1989): Higgins 1252 (DHL), 9 May 1969, rich moist woods along KY 715, Menifee Co. (det. J.T. Atwood); B. Thornberry (MRE), 12 Jun 1981, headwaters of Newcombe Br., Right Fk. of Dick Br., Elliott Co.; and, perhaps transitional to *C. pubescens*: C.G. Oldfield & B.S. Miller 36 (KY), 12 May 1963, high slope near base of cliff, trib. [Broke Leg Creek?] of Blackwater Creek, 3 miles NW of Ezel, Morgan Co. At one site visited in 1991 (slope north of Little Laurel Creek mouth, Morgan Co.), there were 13 plants in fruit that may have been this species, since the vegetation indicated relatively dry, acid soils similar to the sites in the Stanton District: *Liriodendron* and *Quercus alba* were codominant, with *Tsuga, Acer rubrum, Rhododendron maximum, Geranium maculatum*, etc., also present.

[*Decodon verticillatus* **Hairy Swamp Loosestrife**: T/-/- (9/11).] This species has a widespread range in the eastern United States, but is largely restricted to areas with much wetland, especially large natural ponds. In Kentucky, most records are from the western half of the state. The only sites known in northern or eastern regions are the Rowan County Sphagnum Swamp and the Bath County Bayou. Plants from these two sites are the glabrous var. *laevigata*, which may be restricted to more northern regions, at least in Kentucky. At the Rowan County Swamp, thickets covered 100s of ft^2 in a wet open area within forest dominated by *Acer rubrum* and *Betula nigra*, and it has

recently been propagated in the restored wet meadows. At the Bath County Bayou, the species was locally dominant around the pond margin, covering 1000s of ft^2 and in places forming more or less floating mats (see Significant Sites).

Dichanthelium boreale **Northern Witchgrass**: S/-/- (7/12). Plants referred to here key in existing manuals to *Panicum bicknellii*, which is listed as a synonym by Kartesz and Kartesz (1980). In Kentucky, this north-central species is documented from seven counties, mostly in the Cliff Section and adjacent areas (also Oldham County). There are only three collections from in or near the Morehead District: M.E. Wharton 2481 (MI), Bath Co.; Hannan & Phillippe 2728 (DHL,KY), Lockegee Rock, Rowan Co.; J. Campbell (KY) & A. Risk 5376 (MRE), 6 Jun 1991, dry open woods near N end of small sandstone cliffs, N of Triangle Lookout Tower, Rowan Co.

Dodecatheon frenchii **French's Shooting Star**: S/+/C3 (10/23). This species is restricted to the floors of sandstone overhangs in Missouri, Illinois and Kentucky. Most Kentucky sites are in the Dripping Springs Escarpment (between Pennyrile and Shawnee Hills). Further east, it is known only from the Carter Caves area, and during the 1991 inventory it was discovered near the head of Bott's Fork of Beaver Creek (Menifee Co.). Over a 1000 plants, including seedlings, were found here on two ledges, but only about 60 were flowering. They were growing on somewhat trampled, bare sand, with abundant *Thalictrum clavatum* and lesser amounts of other typical species in this habitat. The adjacent, rather open, forest canopy was dominated by *Fagus*.

Drosera intermedia **Spoon-leaved Sundew**: E/-/- (2/2). This species has a widespread range in eastern North America, but it is largely restricted to regions with large boggy wetlands. There are only two Kentucky records (Beal and Thieret 1986). One is "a somewhat aberrant" specimen of Sadie Price (KES), probably from Edmonson or Warren County (based on hand-annotations in Price 1893). The other is a collection of Clarendon Peck (PH), labelled "Licking River". On Peck's (1834) map, he noted "*Drosera longifolia*", a synonym, on the river bottom between Bayou Creek and Salt Lick. He also noted "*Pogonia* and *Drosera*" on the "High Flat" up to a mile south of Farmers. The only other record of *Drosera* in the state is of *D. brevifolia*, from a site in Pulaski County.

Dryopteris spinulosa **Spinulose Wood Fern**: S/-/- (11/15?). The correct name for this northern (circumboreal) species should be *D. carthusiana* (Cranfill 1980). Most Kentucky records are from in or near the Cliff Section, in fairly dry to damp woods. However, some of these are not clearly distinct from the glandular *D. intermedia*. In the Morehead District, there is at least one good collection of this species: K. Carr (MRE), 30 May 1937, woods along Martin's Branch, Rodburn, Rowan Co. There are also two sparsely glandular specimens that may be hybrids with *D. intermedia*: H. Setser 489 (MRE), 19 Jun 1967, hillside near mouth of Craney Creek, Rowan Co.; A. Risk 167 (MRE), 10 Oct 1981, upper end of Laurel Fork, Rowan Co.

Erythronium rostratum **Golden Star**: E/+/- (5/8?). This species of the southern Appalachians and Piedmont was recently discovered in Kentucky by A. Cusick (1989, and pers. comm.). Suprisingly, this and Cusick's subsequent records are all from northeastern counties: Boyd, Floyd, Lawrence, Johnson and Rowan (Lewis was in error). (Only one collection at MRE appears to be be this species: C.M. Ross 27, Apr 1980, area to be flooded by Paintsville Lake, Johnson Co.) The only known locality in the Morehead District is along Burnt House Branch and Elk Lick Fork of North Fork, Triplett Creek. Here Cusick found 1000s of plants at three sites within half a mile of each

other, on lower slopes in young mesophytic forest, with nothing else unusual about its composition. Associates noted in 1991 included *Liriodendron, Carpinus, Quercus alba, Acer* spp., *Viburnum dentatum, Polystichum* (and other ferns), *Asarum, Tiarella, Rhus radicans, Aster* spp., *Solidago* spp., *Poa cuspidata*, etc. *Erythronium americanum* is absent from this particular locality and other parts of the siltstone hills searched around Cranston, though it is locally abundant on lower slopes and bottoms downstream near the North Fork and along the main stem of Triplett Creek.

Gentiana alba **Yellow Gentian**: E/-/- (3/10?). This largely north-western species is typical of prairies. In Kentucky, it known only from a field near the Blue Licks area, in Nicholas County, and from Clack Mountain, along KY 1274 2 miles south of KY 519, in Rowan County. Along KY 1274, it is currently known only from the "good" tall-grass prairie patch, where about 20-30 plants have been seen in recent years (see Significant Sites). This general area may be the source of older collections: Story & Walters 356 (MRE), 14 Aug 1938, open field, Morehead; E.L. Braun 4866 (US), 28 Sep 1950, prairie patches, Clack Mountain.

Glyceria melicaria **Slender Manna Grass**: S/+/- (10/15). In Kentucky, this species is known only from the northern Cliff Section and the Cumberland Mountains. The only plants found in the Morehead District were in the upper part of the Mine Branch valley. About 10 clumps were found here along a stream, associated with *Carex scabrata* (see also Significant Sites). *G. melicaria* has also been found in Elliott Co.: A. Risk 704 (MRE), 8 Aug 1991, moist sandy soil, 8 miles E of Elliottville on KY 504 in gorge of Little Caney Creek.

[*Gratiola viscidula* **Short's Hedge Hyssop**: T/-/- (9/9).] In Kentucky, most records of this Appalachian species (as its var. *shortii*) are from broad bottomlands on either side of the Cliff Section. It is known from Licking River bottomland just west of the Morehead District, where it was recently found by A. Risk and A. Cusick at the Rowan County Sphagnum Swamp, with over 1000 plants in wet brushy fields. In 1991, it was also found at the Bath County Bayou, with four small (1-10 ft^2) patches among shrubs (*Alnus, Cephalanthus*) at the edge of the open (*Nuphar)* zone.

[*Hydrocotyle americana* **American Water-pennywort**: E/S/- (2/2).] This northern species was rediscovered recently in the Somerset District, where it had been found in the 1930s by E.L. Braun (Palmer-Ball et al. 1988). The only other Kentucky record is another collection of E.L. Braun, from a few miles east of the Morehead District: 327 (US), 9 May 1932, wet mossy sandstone banks of Little Sandy Rv., near Sandy Hook, Elliott Co.

(*Hydrophyllum virginianum* **Virginia Waterleaf**: S/-/-.) In Kentucky, most records of this northern species are from the Cumberland Mountains and the Rugged Eastern Area of the Appalachian Plateau. The single record from the Morehead District is the only one from DBNF: K. Carr (MRE), 28 May 1936, bank of Triplett Cr., Morehead, Rowan Co. Although Carr's label data may be doubted (Appendix A), there are other collections from northern Kentucky that may lend credence to this record: A.M. Peter 208 (KY), 9 May 1878, Milburn's fence opposite Fonshee's gate, Fayette Co.; E.L. Braun 1836 (US), 24 Apr 1938, S of Greenup, Greenup Co.

Juncus articulatus **Jointed Rush**: S/+/- (6/8). In Kentucky, this northern (circumboreal) species is known from in and near the northern Cliff Section, always along rocky banks of medium sized streams. There are collections from only one locality in the Morehead District: G. Ricicki 71 (MRE), 24 Oct 1971, Triplett Creek area, swampy ditch in vicinity of the bridge, Morehead, Rowan

Co.; L. Meade 347/351 (MRE), 11/27 Jun 1973, common along Triplett Creek near Bridge Street, Morehead [in siltstone cobbles, gravel and mud].

Juniperus communis **Ground Juniper**: E/-/- (2/4). This northern (circumboreal) species was unknown in Kentucky until recently discovered in DBNF. There were two earlier reports by Greenwell (1935) and E. Carr (unpublished), but the latter was based on misidentified *J. virginiana* (Carr Herbarium at Pine Mountain Settlement School). As in the Somerset District (Palmer-Ball et al. 1988), plants in the Morehead District were discovered (at first by L. Kornmann) along sandstone clifftops on narrow ridges. All sites are in the hills either side of Leatherwood Creek (Menifee Co.). The largest population, with at least 100 plants including seedlings, was found on Chestnut Cliffs. Plants were more common on the south side of the hills, and were associated with open forest of *Pinus virginiana* (dominant), *Quercus montana, Amelanchier, Kalmia, Epigaea, Gaylussacia baccata, Vaccinium* spp., *Danthonia sericea, Andropogon scoparius*, etc. On the north side, there was less *Pinus*, more *Kalmia*, and *Rhododendron maximum* was present.

Lilium philadelphicum **Wood Lily**: T/+/- (9/14). In Kentucky, this species is known only along the Cliff Section, as the Appalachian var. *philadelphicum*. Documented populations are mostly small, declining or now lost. There are few records from the Morehead District: K. Carr (MRE), 19 Jun 1925, Lockegee, Rowan Co.; F. Rose, 19 Jun 1935, Clearfield, Rowan Co.; M. Evans (sight record), May 1985, six plants in dry open woods, edge of W (and perhaps E) Cave Run Glade, Bath Co.; A. Risk (sight record), 30 May 1991, one plant in dry open woods, ridge SSE of Warix Run Boat Ramp, Rowan Co. The latter two, more recent records are both from narrow ridges near the interface between siltstone and limestone, and the two old records may have been from similar habitat. Attempts to relocate the plants found by M. Evans have been unsuccessful.

[*Linum sulcatum* **Grooved Yellow Flax**: S/-/- (9/15).] This largely mid-western species is known from several calcareous glades in the western Knobs Region and Pennyrile Karst Plain. A. Cusick (No. 28,309, pers. comm.) recently discovered it in the eastern Knobs, along Sand Road (KY 1269) west of Hedrick Church, 2 miles from the DBNF Boundary (see also *Orbexilum onobrychis*).

Monotropsis odorata **Sweet Pinesap**: T/S/- (5/8). In Kentucky, this Appalachian species is known from a few sites in the Cumberland Mountains and Cliff Section. This species is a saprophyte or parasite associated with pines, and it is reported usually during March-May. However, recent Kentucky records are earlier (February in Campbell et al. 1989). On 20 January 1992, A. Risk discovered a flowering population of at least 40 stems, growing on a steep west-facing slope just below the natural arch on the SW side of Chestnut Cliffs. This flowering date is remarkably early, and in this particular case the flowers were killed by frost. In the Red River Gorge, D. Dourson (pers. comm.) found two population in flower, on 11 Feb 1991 and 7 Jan 1992. Could the exceptionally eary flowering in Jan 1992 be related to the alternation of relatively mild rainy weather and short dry freezes during the preceding two months?

Oryzopsis racemosa [= Piptatherum racemosum] **Black-fruit Mountain-ricegrass**: T/+/- (10/20). In Kentucky, this northern species is known from scattered sites on broken limestone cliffs and points in north-central regions, mostly in the eastern Knobs and transition to Cliff Section. In the Morehead District, it has recently been found at three sites on the Bangor Quad. (near Fuget Branch, Warix Run and Sugar Camp Branch). Two of these sites had particularly numerous plants (100-200) on fairly moist, north-facing slopes, though rocky and with much *Juniperus*. The other site was

probably west- or south-facing (Braun 4820; Hannan & Phillippe 2778). Associated species included *Juniperus, Quercus muhlenbergii, Q. rubra, Ostrya, Carya ovata, Acer saccharum, Cercis, Staphylea, Hepatica acutiloba, Aquilegia, Sedum ternatum* and *Parthenocissus*, with thick moss cover on the rocks.

Panax quinquefolius **Ginseng**: -/S/- (50/>100). This north-central species is widespread in Kentucky but continues to be much exploited for its medicinal roots. There are several previous collections from the Morehead District: E Fork Dog Hollow, Rowan County (MRE); the Nott place 0.5 miles from Frenchburg on KY 36, Menifee County (MRE); Rough Branch of Spaws Creek (Hannan & Phillippe 2359). In 1991, inventory personnel found this species at seven sites, each with only 1-2 mature plants (plus 5 seedlings in one case). Most sites were in typical mesophytic slope forest, though two were on bottomland and one was on a drier west-facing slope. Total localities and approximate numbers of mature plants found by inventory personnel in each of the districts covered so far are, from north to south: 7/10 (Morehead); 15/50+ (Stanton); 8/20 (Berea); 5/5 (Somerset); 5/10 (Stearns). These data suggest that the species is more common in the northern half of DBNF, especially Stanton District.

Poa languida **Drooping Bluegrass**: E/-/- (3/5). In Kentucky, this northern species of moderately dry, open oak woods is known only from the eastern Knobs. During the 1991 inventory, it was found near Olympia along McArty Branch, on low gentle slopes in disturbed, open woods with *Quercus* spp. and *Pinus virginiana*. It has also been found to be locally frequent in mixed oak forest and edges 5-10 miles to the southwest, in Bath and Montgomery Counties north of Means (J. Campbell colls. at EKY). It appears that this species is scattered from the Eastern Knobs north to Lewis County, generally on shaley soils formed from the Silurian Crab Orchard Formation.

[*Podostemon ceratophyllum* **Threadfoot**: T/+/- (11/20).] This Appalachian species of river riffles is a remarkable flowering plant, superficially like a benthic alga. In Kentucky, it is known mostly from the Cliff Section or nearby, and appears to have been extirpated further west (Kentucky River and Falls of Ohio River). It probably occurred within the Morehead District before the Cave Run Dam construction. From 2 to 20 river-miles downstream of the dam, at least six 10-1000 ft^2 patches of this species were found in 1991, but plants up to 1 mile downstream of the Rowan County sewage effluent were mostly dead or covered with algae. One of the lowest known site is at Moore's Ferry, where L. Meade first collected this species in 1983. In 1991, E. Loudermilk (pers. comm.) found another large population further downstream, at the mouth of Indian Creek. At these lower sites, it was found growing on the abundant mussel shells, as well as the usual rocky substrates.

Pogonia ophioglossoides **Rose Pogonia**: E/-/- (2/2). This largely northern species is virtually unknown in Kentucky, except for a recent discovery on Pine Mountain in Letcher County. There is also a collection from the western edge of the Morehead District: Peck (PH), "Licking River marshes". Peck's (1834) map is noted "*Pogonia & Drosera*" on the "High Flat" area with "marshes" 0.5-1 mile south of Farmers, Rowan Co. The presence of both taxa would suggest that an acid, boggy environment developed in these areas. Human disturbance may well have removed all traces of this habitat on these terraces, though the same kind of habitat still remains in many parts of the state. Further southwest, in Arkansas, a recently described example of its habitat has much in common with Kentucky vegetation: Orzell and Bridges (1987) noted 200 plants concentrated around *Osmunda regalis*, with *Sphagnum, Rhexia mariana, Pedicularis lanceolata, Coreopsis tripteris, Senecio aureus, Eupatorium perfoliatum, Aster lateriflorus, Juncus effusus, Dulichium, Andropogon*

gerardii, Panicum scoparium, Carex lurida, C. suberecta and *C. interior.*

Potamogeton pulcher **Spotted Pondweed**: E/+/- (4/4). This aquatic species has a widespread range in the eastern United States, but is concentrated on the Coastal Plain and other areas with extensive wetlands. Its typical habitat is the stagnant water of small ponds that occasionally dry up. In Kentucky, there are records only from Bath, Clinton, Edmonson and Laurel Counties. The Bath County site, discovered during the 1991 inventory, is a small pond (20-30 ft across) in streamhead woods near the Hog Hollow. The pond is artificial, but several decades old, with dense aquatic vegetation including *Utricularia gibba, Nuphar advena, Sparganium* sp., *Leersia oryzoides* and *Spiraea tomentosa.* At least 30 *Potamogeton* leaves were seen.

(*Prenanthes alba* **White Rattlesnake-root**: E/?/- (4?/6?) .) This northern species has been reported rarely from Kentucky. There may be collections from Lewis Co. (Buddell, KNK; Cusick, NCU/EKU, NY). A reported collection from Harlan Co. (McInteer, KY) was burnt. In the Morehead District, there may be an old collection from Bath Co. (Short, PH, Mud Lick Hills), and there is a verified collection from Rowan Co.: K. Carr (MRE), 25 Aug 1937, dry woodland, Morehead. Carr's label data, however, may be doubted (see Appendix A).

[*Ranunculus ambigens* **Water-plantain**: S/-/- (11/11?).] In Kentucky, this north-central species of muddy ponds and swamps is known from scattered sites on broad bottomlands in the Knobs Region, northern Pennyrile and along the Ohio River. One record is from half a mile outside DBNF: W. Meijer et al. (MRE), 6 Aug 1974, Rowan Co., pond and wet fields 1 mile E of KY 801 on KY 1722 [Triplett Road, on the bottomland of Triplett Creek].

Rhynchospora globularis **Globe Beaked-rush**: T/+/- (7/9). This southern species is known from scattered parts of southern Kentucky and rarely north of the Mississippian Plateaus, generally on wet acid soil. During the 1991 inventory, A. Risk found it to be frequent in a few acres of damp, streamhead meadow near Hog Hollow (see Significant Sites). Other plants of interest at this site were *Spiranthes gracilis* and, nearby, *Xyris difformis* (see below). A. Cusick (coll. at VDB) has also found this species along Sand Road, Bath County (near the *Orbexilum onobrychis*).

(*Sabatia campanulata* **Slender Marsh Pink**: E/-/- (3/4).) This southern species of wet, acid grasslands has been rarely recorded in Kentucky. Most recently, it was found in the 1970s by R. Cranfill near Clay City, Powell County. There are also two old collections from Whitley County: Braun (US), near Jellico; Crandall (KY), Corbin. At the western edge of the Morehead District, in the region around Farmers and the mouth of Triplett Creek, Peck's (1834) map lists "*Sabatia gracilis*", a synonym. A collection has not been located (PH should be checked).

Sagittaria brevirostra **Short-beaked Arrowhead**: S/+/- (20/30?). This largely mid-western species, an aquatic of pond margins, has been much confused with the more southeastern *S. australis*, both have been treated as subspecies of *S. engelmanniana.* Though some collections need closer examination, there appear to be records from at least 20 Kentucky counties, and the species should probably not be considered rare. Collections from the Morehead District include: L. Meade 95 (MRE), 7 Sep 1971, Lockegee, Rowan Co.; A. Risk 1889 (MRE), 15 Aug 1988, Minor Cr. ca. 2 miles E of confluence with Craney Cr., Rowan Co.; J. Campbell (KY), 1 Aug 1991, wet meadow near Hog Hollow, Bath Co.; J. Campbell (KY). 5 Sep 1991, Rock Fork of Triplett Cr., Rowan Co. There are also collections that may be this species, but which were determined as *S. australis* by

Beal (Beal and Thieret 1986): L. Meade (MRE), 4 Oct 1971, Lower Lick Fork, in pond W of Poppin Rock Tunnel, Rowan Co.; W. Meijer et al. (MRE), 6 Aug 1974, pond and wet field 1 mile E of KY 801 on KY 1722 [Triplett Road], Rowan Co.

Sagittaria graminea **Grassleaf Arrowhead**: T/-/- (11/15?). This species is widespread in eastern North America, but in Kentucky it is largely restricted to the large river valleys along the western boundary of the state. There is one record from the Morehead District: L. Meade 753 (MRE), 17 Jul 1974, N end of Eagle Lake, MSU Campus, Rowan Co. The only other Appalachian record from is from Knox County (coll. at EKY). Both these collections are the typical variety (not var. *platyphylla*).

Scirpus expansus **Woodland Beakrush**: S/+/- (1/3). This northeastern and Appalachian species was first found in Kentucky by L. Meade during 1973. There are now three known sites, all in Rowan County, with one added in 1991. These sites are wet grassy areas and roadsides by ditches and streams along Lower and Upper Lick Forks of the Licking River, southeast of Morehead. Each population covers ca. 30-300 ft^2. Associates included *Platanus, Alnus, Thelypteris palustris, Isoetes, Rosa palustris, Boehmeria, Typha, Scirpus atrovirens, Glyceria*, etc. Also found recently in northern Kentucky is the related species, *S. microcarpus*, which has a bifid style, two-angled achene, and a usually smooth culm summit; *S. expansus* has trimerous flowers and scabrous culm summit.

Scutellaria saxatilis **Rock Skullcap**: T/+/C2. In Kentucky, this Appalachian species is known mostly from northeastern and southeastern regions. There are two records from the Morehead District: C.W. Short (PH), Mud Lick [Bath Co.]; H.L. Setser 476 (KY), 15 Jun 1967, wooded area 3 miles above Cave Run Dam (before flooding), Bath Co. There are also records to the north, in Lewis and Greenup Counties. The distinction of this species from *S. arguta* may not be clear; the latter was treated as *S. saxatilis* var. *pilosior* by Fernald (1950). Another collection from the Morehead District appears closer to *S. arguta* than *S. saxatilis*, but with some glandular hairs: H.L. Setser (MRE), 27 Jun 1967, Beaver Cr., roadside, Menifee Co. The only definite Kentucky record of *S. arguta* is from further south in Menifee County (Campbell et al. 1989).

Silphium terebinthinaceum var. *lucy-brauniae* **Lucy Braun's Prairie Dock**: S/+/- (6/10). With glabrous upper leaf surface, this variety of the common western prairie species mostly occurs in the Knobs Region of north-central Kentucky and southeastern Ohio. Within the Morehead District, most records are from the Clack Mountain area (including Lockegee), where it is locally abundant on grassy calcareous roadsides, with 1000s of plants in total (see Significant Sites). Other records are from fields near Morehead (1930s coll. at MRE), and from open, brushy woods on a siltstone-limestone ridge southwest of Big Mountain, Bath Co. (J. Campbell, sight record, 13 May 1991). At Big Mountain, only two non-flowering plants were found, in dry open woods with *Quercus alba, Q. stellata, Robinia, Ulmus rubra, Cercis, Helianthus divaricatus, Carex tetanica* (var. *meadii*?), etc. Just west of the district, this species has been also found in prairie remnants on the Silurian Crab Orchard Formation: along Sand Road and Interstate 64 NW of Polksville, Bath Co. (see *Orbexilum onobrychis*); and near Flemingsburg and Wallingford, Fleming Co. (1920-45 colls. at KES).

Smilacina stellata **Star-flower False Solomon's-seal**: E/-/- (4/10). This species appears to have been collected from four Kentucky counties, but only around the hill-prairies of Lewis County are large populations well known today. Other records are mostly old and problematic: C.W. Short (PH), 1830s, Corn Island [near Falls of the Ohio River, Jefferson Co.]; Hannan and Phillippe 4817

(DHL?--a depauperate specimen), 30 Jul 1980, alluvial woods S of Green Rv. and KY 138, McLean Co.; K. Carr (MRE), 30 May 1936, swamp, Rodburn, Rowan Co.; K. Carr (MRE), 1 Jun 1937, moist bank above N Fork Creek at bridge 3 miles N of Morehead, Rowan Co. The latter two collections are labelled as from the Morehead District, but these data may be doubted (see Appendix A).

(Streptopus roseus **Rosy Twisted-stalk**: E/S/- (2/5).) There are two collections of this northern and Appalachian species from the Morehead District by K. Carr (MRE): 20 Jun 1936, rich woods, Morehead (2 sheets); 16 Aug 1936, rich woods, Morehead (1 sheet). These vegetative collections were correctly identified as var. *longipes*, with rhizomes elongated and leaves less densely ciliate. The only other Kentucky collections of this species are var. *perspectus*, from Black Mountain (KSNPC 1991b). The var. *longipes* is not otherwise known to extend further south than NW Pennsylvania. Citing collections at MRE and Cornell University, Carr and Cohn (1941) published a report of this taxon from Rowan County: "in the low moist woods along Evans Branch and in Cincinnati Hollow." These sites are near Morehead, and have been revisited several times by botanists. It is curious that these locations were not written on the MRE collections; the Cornell collections need to be checked. Could the authors have confused specimens from New York and Kentucky? The authenticity of these data remains somewhat doubtful, as with some other Carr collections (Appendix A).

Taxus canadensis **Canadian Yew**: S/S/- (6/15). In Kentucky, this northern species is known only from eight general localities along low north-facing limestone cliffs in ravines of the Cliff Section, mostly near cave entrances. In the Morehead District, it was recently discovered by L. Kornmann along a tributary of Minor Creek (0.3 miles N of Shop Br.). This population, probably a single clone, was on a low north-facing slope, covering an area of about 100 ft along the slope and 40 ft wide. However, the limestone bedrock had little or no exposure. Associated species included *Liriodendron, Tsuga, Acer saccharum, Betula* spp., *Rhododendron, Hydrangea, Dryopteris* spp., *Hepatica acutiloba, Asarum, Tiarella, Impatiens pallida, Meehania, Carex plantaginea*, etc.

Thaspium pinnatifidum **Cutleaf Meadow-parsnip**: S/?/- (4/10). This species is restricted to dry woods and thickets on limestone in and around the Appalachian Region. In Kentucky, it has only been confirmed from in or near the northern end of the Cliff Section, though it also has been reported from Hardin Co. (Cranfill, in press) and elsewhere. Older records include: L. Meade 689 (MRE), 1 Jul 1974, along Ravens Road, Menifee Co.; and W.M. Huffaker, 16 Jul 1974, plains area along Tygarts Creek, downstream of trail to Natural Tunnel, Carter Co. In the Morehead District, it is now known from about 12 sites, mostly found in 1991. These are all within a 20 mile^2 area, on ridges from Clack Mountain south to the Licking River. The roadside sites often had more mesophytic vegetation. Several populations contained 1000s of plants. Associated species included *Juniperus, Quercus muhlenbergii, Q. alba, Q. rubra, Fraxinus* spp., *Acer saccharum, Ostrya, Cercis, Rhus* spp., *Rhamnus, Viburnumm, Thalictrum* spp., *Anemone virginiana, Euphorbia corollata, Monarda russeliana, Aureolaria flava, Houstonia canadensis, Helianthus hirsutus, Coreopsis major, Silphium terebinthinaceum, Solidago ulmifolia, S. sphacelata, Allium cernuum, Brachyelytrum, Danthonia spicata, Bromus purgans, Muhlenbergia sobolifera, Andropogon scoparius*, etc.

Trichomanes boschianum **Filmy Fern**: S/-/-. This Appalachian species is scattered in eastern and western Kentucky at the base of sandstone cliffs in damp crevices. In the Morehead District, it has

been found at five sites, all in the past two years. Three are within 1 square mile at the heads of SE-flowing tributaries of Craney Creek (Rowan Co.); another is 2 miles upstream along Slabcamp Creek; and the fifth is along Spaws Creek (Menifee Co.). Each patches covered from about 3 to 30 ft^2.

Vallisneria americana **Eel-grass**: S/+/- (5/16). This widespread eastern species is known from the Ohio River, Kentucky River (extirpated?), Little South Fork of Cumberland River (abundant; Campbell et al. 1989), and along two smaller streams in the southern Low Hills Belt. In the Morehead District, there is also a solitary record from the artificial Eagle Lake, just north of Morehead State University. In 1990, A. Risk discovered several beds along the western shore.

[*Vernonia cf. noveboracensis* **New York Ironweed**: E/+/- (4/7).] In Kentucky, this south-central species of wet, acid meadows is known from a few sites in the Knobs and southern Cliff Section. It is very similar to the common *V. gigantea*, but differs in its long acuminate involucral bracts, more purplish pappus, and more numerous florets/head (30-65 versus <30). In 1991, plants that may be this species were discovered for the first time in northeastern Kentucky, at the Rowan County Sphagnum Swamp. However, the brown pappus color, and relatively short phyllary tips, suggest that they may be hybrids with *V. gigantea*, or even *V. glauca* (see also Price 1893, hand addenda). These plants were frequent in the meadows that were recently restored to a wetter condition. The closest locality where similar plants have been found is in Madison County (a collection with slightly pointed bracts at BEREA).

Other Species of Interest

The following 79 species are not currently listed by KSNPC (1991a) or the Daniel Boone National Forest (B. Knowles, pers. comm.), though several of them deserve consideration for listing. These species have been reported widely in the state but with a low density of records, or they are restricted to small sections but are locally common. Some are more frequent in other parts of the state, but are near the edge of their range in the Morehead District and thus of special local interest. Not all of these species deserve consideration for listing, but their presence at least gives extra floristic interest to the areas where they occur. Fifteen species, shown in parentheses ( ), have only tentative records from the district. Five species, shown in square brackets [ ], were not found within the Morehead District, but are known from within a few miles of the boundary.

In parentheses after each species' name, is given the number of Kentucky counties where it is known, followed by the approximate number of individual records. These data have been collected by Kentucky State Nature Preserves Commission, and by J. Campbell and M. Medley (unpublished). They can be used to compare the rarity of these species with the listed species above.

Several species that were considered "of interest" in the previous DBNF Inventory reports appear now to be more frequent, at least in the Morehead District. Therefore, they are not listed below. These include *Cardamine rotundifolia, Carex communis, C. laxiculmis, C. lucorum, C. projecta, C. purpurifera, Geum virginianum, Ilex montana* var. *beadleyi* (doubtfully distinct from var. *montana*), *Panicum yadkinense, Viburnum dentatum* and *Viola rotundifolia.*

Aesculus pavia **Bottlebrush Buckeye** (8/10?). This southern species occurs mostly in the Mississippian Embayment of Kentucky, but even here it is infrequent. From the western edge of the Morehead District, there is a remarkable disjunct collection: M.E. Wharton 6242 (KY), 22 Apr 1946, wooded hillside near Farmers, Rowan Co. Its leaves have dense spreading hairs beneath, making it var. *discolor*. The only other record of this species from eastern or central Kentucky is a collection of var. *pavia*: J.L. Gentry 959 (KY), 5 May 1963, 0.3 miles E of Orville, E of KY 561 in woods on slope along small creek, Henry Co.. Both localities have been searched in recent years without success. It is conceivable that these disjunct occurrences resulted from human propagation.

[*Agastache scrophulariaefolia* **Purple Giant Hyssop** (6/7).] This northern species is known from only 5-10 Kentucky sites, mostly scattered in hilly areas surrounding the Bluegrass Region. It was collected by Wharton (No. 3423, MI) from Bath County, in "thickets in moist ground...rare" (Wharton 1945).

Anemone quinquefolia **Wood Anemone** (12/30). In Kentucky, this Appalachian species is known from eight southeastern counties as the typical variety and from four northeastern counties, where most or all plants may be var. *interior*. There are three collections from the Morehead District: K. Carr (MRE), May 1932, Morehead; K.D. Hall (MRE), 24 Apr 1976, moist fertile soil, Christy Creek near MSU Trailer Court #3; D. Lawyer 29 (MRE), [1970s], Morehead City Park. Plants at the latter location were destroyed by construction of a pavilion (H. Setser, pers. comm.). These collections have stems with hairy summits, making them var. *interior*.

Apocynum androsaemifolium or *A. X medium* **Dogbane** (4/6). In Kentucky, this northern species or its hybrid with *A. cannabinum* (*A. X medium*) is known from a few locations in the eastern Knobs and northern Bluegrass. There is a cluster of three records from Rowan County, in the Morehead District: K. Carr 20 (MRE), 9 Jul 1938, hillside back of library, Morehead; E.L. Braun (1943, sight record of *A. X medium*); J. Campbell (KY), 6 Jun 1991, dry open woods at north end of narrow saddle, 0.5 miles W of KY 1274 bridge over Licking River.

Aralia nudicaulis **Wild Sarsaparilla** (5/5?). In Kentucky, this northern species is known from a few sites in the Cumberland Mountains. There are also two old records from in and near the Morehead District: E.L. Braun 2494 (US), 21 May 1939, Perry Br. [of Triplett Cr., N of Morehead], Rowan Co.; E.L. Braun 4508 (US), 9 May 1942, mesophytic woods, Big Sulphur, Lewis Co.

Aster laevis var. *concinnus* **Smooth Aster** (6/14). In Kentucky, this largely Appalachian variety (interpreted as a species by Cronquist 1980) has been recorded mostly from excessively well-drained sandstone boulders and cobbles along the Cumberland River and its major tributaries, where it may, however, be mixed with the typical variety. When cultivated in the moist rich soil of J. Campbell's garden, a plant collected as var. *concinnus* became indistinct. In 1991, plants keying to var. *concinnus* were found in the Clack Mountain area, in thickets and grassy roadsides. Typical plants were also found nearby.

Aster puniceus **Purple Aster** (6/6). In Kentucky, this north-central species is known from a few scattered sites in the Appalachian and Mississippian Plateaus, generally in wet bottomland thickets. There are two old records from in or near the Morehead District: K. Carr (MRE), 29 Jun 1937, Rodburn, Rowan Co.; E.L. Braun 2093 (US), 5 Oct 1938, near Moore's Ferry, Rowan Co.

Aster schreberi **Smooth Broad-leaf Aster** (6/11?). The distribution of this northern species in Kentucky is poorly documented, partly because of infrequent flowering and also confusion with the closely related *A. macrophyllus*. In 1991, a non-flowering plant that may be this species was collected by J. Campbell (KY) along the banks of North Fork, Triplett Creek near Cranston.

Bartonia paniculata **Screwstem** (13/20?). In Kentucky, this southern and east-coastal species is known mostly from southern regions. In northeast Kentucky, it is known from swampy forests near Clay City (Campbell et al. 1989) where it seems to be increasing (as observed by J. MacGregor), and in streamhead forests of the "Sharkey Flat" region in or near the western edge of the Morehead District, where it was discovered in 1991 (0.5 mile NNW of Bull Fork mouth, and 0.8 mile S of Farmers, Rowan Co.; Hog Hollow, Bath Co.). Associated species included *Liriodendron, Fagus, Acer rubrum, Ilex verticillata, Onoclea, Viola primulifolia, Oxypolis, Uvularia sessifolia, Carex debilis, Sphagnum lescurii*, etc. The only record from the Appalachian Plateau in northeast Kentucky is due to D. Taylor (pers. comm.), who observed it in a streamhead draining into Spaws Creek.

Campanula aparinoides **Marsh Bellflower** (5/?). This north-central species of "meadows, swales and wet shores" (Fernald 1950) was mapped in five Kentucky counties by Beal and Thieret (1986)--Carter, Elliott, Lewis, Martin and Rowan. These records may have been based on collections now in the private herbarium of Clyde Reed (of Baltimore, Maryland; formerly at Morehead State University). Without other Kentucky records, these data remain rather mysterious.

Carex abscondita **Absconded Sedge** (5/5). In Kentucky, this southeastern species is known from scattered sites in the Cliff Section and adjacent hills to the west. It is probably more widespread, but is easily overlooked due to its hidden (absconded) infructescences, as collected (absconded) by Cusick (1989). There is one record from the Morehead District: A. Cusick 26398 (VDB), Burnt House Branch [of North Fork, Triplett Creek], Rowan Co. This site is close to the *Erythronium rostratum* sites (see Listed Species).

Carex bromoides **Sedge** (11/25). This widespread eastern species is known from scattered sites in Kentucky, mostly in the Cliff Section. It is typical of boggy, acid soil in woods along small streams. During the 1991 inventory, it was found at along four small streams rimmed by sandstone cliffs (especially smaller streams in watersheds of Upper Lick Fork, Clear Creek, Beaver Creek, Leatherwood Creek, Spaws Creek, etc.), and in streamheads near Hog Hollow (see Significant Sites). Common woody associates included *Tsuga, Liriodendron, Fagus* (especially at Hog Hollow), *Quercus alba, Betula* spp., *Alnus, Acer rubrum, Rhododendron*, etc. Herbaceous associates included *Osmunda cinnamomea, Thelypteris noveboracensis, Polystichum, Spiraea tomentosa* (Hog Hollow), *Impatiens capensis, Cardamine rotundifolia, Aster divaricatus, Senecio aureus, Iris cristata, Juncus effusus* var. *pylaei, Carex gracillima, C. prasina* (frequent), *C. gynandra, C. lurida* var. *gracilis, Leersia oryzoides, Glyceria striata, Panicum microcarpon*, etc.

Carex digitalis var. *copulata* **Sedge** (2/2). Fernald (1950) and others have suggested that this taxon originated from hybridization of *C. digitalis* and *C. laxiculmis*, but A. Reznicek (pers. comm.) treats it as a distinct variety. The first Kentucky records appear to be collections made in 1991: A. Reznicek with J. Campbell (KY), edge of oak woods near prairie, Hughes Knob, Lewis Co.; J. Campbell (KY), 22 May 1991, dry woods on siltstone ridge SW of Zilpo Camp Ground, Bath Co.

[*Carex juniperorum* **Cedar Sedge** (2/7).] This species was recently described by Catling et al. (1992). It is known from only about 19 sites, worldwide: 2 in Ontario, 10 in Adams Co., Ohio; 5 in Lewis Co., Ky.; and 2 in Bath Co., Ky. It is typical of open woods and grassland transitions on dry calcareous soils, generally with much *Juniperus virginiana*. The Bath County sites are on two hills a mile northwest and southwest of Polksville, 0.5-1 mile north of the DBNF Proclamation Boundary. These hills have remarkable eroded areas of calcareous clay-shales, at upper levels of the Silurian Crab Orchard Formation. These areas cover 5-10 acres on each hill, and the vegetation ranges from completely absent, to thin grass and herb cover, to denser grassland and open woods. The *Carex juniperorum* plants are frequent in the grassland-woodland transition, which had much *Juniperus* (abundant), *Pinus virginiana* (abundant), *Quercus stellata, Rhus radicans, Melilotus* sp. (exotic), *Medicago lupulina* (exotic), *Solidago nemoralis, Aster* sp. (aff. *cordifolius*), *Danthonia spicata, Aristida oligantha, Sporobolus asper, Andropogon scoparius, Cladonia*, etc.

Carex pedunculata **Red-based Tussock Sedge** (12/45). This northern species was not reported from Kentucky before the DBNF Inventory. However, there were pre-existing collections from Menifee County (KY) and Rowan County: K. Carr (MRE), 13 May 1941, dry woodland, Bluebell Island, Triplett Creek, Morehead. The latter habitat data seem atypical. It is now known from many sites in the Cliff Section and nearby, especially in the Red River Gorge area. In 1991, the number of known sites in the Morehead District was brought to nine, and several populations had 100s of plants. The new sites were all in sandstone ravines, sometimes with limestone bases, on steep lower *slopes and streambanks with mesophytic forest. Common associates included *Liriodendron, Fagus, Acer saccharum, Rhododenderon, Thelypteris, Cimicifuga, Tiarella, Iris cristata*, etc.

Carex scabrata **Rough Running Sedge** (14/30). In Kentucky, this northern species is scattered through much of the Appalachian Region, but it is concentrated in the northern Cliff Section. Its typical habitat is sand and gravel washed along smaller streams and seeps, which its long rhizomes effectively colonize. During the 1991 inventory, it was found at four localities, all in sandstone ravines (Glady Br. of Leatherwood Cr., and Taylor Hollow of Meyer's Fork, Menifee Co.; Glady Br. at Upper Lick Fork, hollows 0.5-1 mile to S, and Minor Cr. trib. NW of Blairs Mills, Rowan Co.; hollow S of Bear Br., Morgan Co.). Associates were similar to those of *C. bromoides* (see above), plus species typical of somewhat better-drained, sandy soil next to streams (e.g., *Leersia virginica, Pilea*).

[*Carex straminea* **Sedge** (4/4).] This species of swamps in east-central states has rarely been reported in Kentucky: C.W. Short (PH), Meade Co.; Greenwell (1933), Nelson Co.; J. Aldrich (KY), May 1990, Hundred Acre Pond, Hart Co.; A. Risk 1972 (MRE), 5 Sep 1988, Rowan County Sphagnum Swamp. At the latter site, 1.5 miles north of DBNF, plants are scattered at the edge of a wet brushy meadow and around *Decodon* thickets. Associates included *C. tribuloides, C. scoparia, C. louisianica, Eleocharis tenuis* var. *verrucosa, Juncus acuminatus, Galium tinctorium, Gratiola viscidula, Polygala sanguinea, Rosa palustris* and many others.

Carex tetanica **Sedge** (4/4?). This species is widespread in Eastern North America, including the more northern var. *tetanica*, and the more southern var. *meadii*. The latter has often been considered a distinct species, but much material in Kentucky is difficult to assign to either taxon (as indicated in parentheses below). In Kentucky, var. *tetanica* is known only from calcareous glades and prairie remnants in the Knobs Region. In the Morehead District or nearby, the species has been found at several sites during the past two years: Clack Mountain roadside prairies (A. Risk 5338, *tetanica*?); W-facing clifftop in Claylick-Warix Run area (A. Risk 5252, *meadii*?); eastern Cave Run glade (*meadii*?); ridge SW of Big Mountain (*meadii*?); Polksville Knob Licks on Feaping Road (*tetanica*?). The typical habitat is in open woods and edges of the oak-hickory or oak-ash-cedar type. This species may easily be confused with *C. woodii*, which has been found in the district, and *C. crawei*, which has not.

Carex woodii **Sedge** (3/10?). In Kentucky, this species of east-central states is known only from Lewis, Rowan and perhaps Bath Counties. The earliest collection appears to be: L. Meade (MRE), 19 Jun 1974, wet roadside woods along Lick Fork ca. 6.5 miles SSE of Morehead. It was subsequently reported by Cusick (1989). The Rowan County sites are scattered along North Fork of Triplett Creek, Warix Run, Lower Lick Fork, Upper Lick Fork, and tributaries of these streams. Plants were frequent over several acres on well-drained sandy banks and levees along the larger creeks, and occasional patches were also found on moist-to-dry slopes nearly up to the sandstone clifflines (with more *Quercus alba*, etc.). Common associates on streambanks included *Platanus, Betula* spp., *Carpinus, Liriodendron, Lindera, Acer saccharum, Laportea, Amphicarpaea, Solidago flexicaulis* (sensu lato), *Senecio aureus*, etc. (see also notes on North Fork, Triplett Creek). Additional species on the Upper Lick Fork terraces included *Tsuga, Thelypteris, Meehania*, etc. There is also a depauperate collection that may be this species: J. Campbell (KY), 5 Jul 1991), moderately dry woods on low knobs N of railroad W of Olympia, Bath Co.

[*Ceratophyllum muricatum* **Hornwort** (3/3).] This widespread eastern species, a submerged aquatic, is known from only three Kentucky localities, in McLean Co. (KY), Logan Co. (MM,NKY?) and Bath Co. (KY). The latter locality, discovered during 1991, comprises old oxbows of the Licking

of the Licking River (Hawkins Pond) and Salt Lick Creek (oxbow to W of Salt Lick). These are natural bodies of water, but only 1-3 ft deep in summer. These oxbows are similar to the Bath County Bayou, but more disturbed by surrounding settlement, drainage, sedimentation and pollution. Other plants in these ponds included *Nuphar advena* (abundant), Lemnaceae and *Potamogeton foliosus*.

Cimicifuga americana **Mountain Bugbane** (12/28). In Kentucky, this Appalachian species is known only from the Cumberland Mountains and Cliff Section (especially Red River Gorge). During the 1991 inventory, it was found in Spaws Creek, at two sites, and at the northern end of Betty Gap Ridge (both Menifee Co.). It was also found nearby along Laurel Creek in Elliott Co. It was locally frequent in mesophytic forest on north-facing slopes below sandstone cliffs, though only a small proportion of stems were flowering. Common associates included *Liriodendron, Lindera, Acer saccharum, Aesculus octandra, Tilia, Fraxinus americana, Cornus florida, Dryopteris marginalis*, etc.

Cirsium altissimum **Wood Thistle** (10/20?). This species has a widespread south-central to mid-western species, but in Kentucky it is curiously localized within various calcareous regions. Most records in the state are from around the northern Cliff Section and the central Pennyrile. The only DBNF records are from the Morehead District, and mostly from the Clack Mountain area and adjacent hills, where it is scattered along forest edges, open woods, thickets and prairie patches on moderately dry soil. There are also two old collections from further north: E.L. Braun 1728 (US), 19 Oct 1937, prairie patches, dry limestone slope, NE of Morehead; K. Carr (MRE), 28 Sep 1940, Flemingsburg Road near Morehead. In many wooded areas, only non-flowering plants were seen, and the species seems to do best in full sun. Its distribution may reflect past concentrations of native grassland. Associates included many typical species of open, brushy variants of oak-ash-cedar, oak-hickory and sugar maple forest types (see Significant Sites).

Cirsium carolinianum **Carolina Thistle** (9/25). This southern species is reported from scattered areas of Kentucky, mostly in the Cliff Section and other regions with transitions from Pennsylvanian to Mississippian bedrock, noncalcareous and calcareous. In the Morehead District, it was found during 1991 at several sites in the Clack Mountain area, with 100s of plants concentrated along the roads in 1991. There are also two old collections, initially identified as *C. virginianum*: E.L. Braun 1438 (US), 22 May 1937, prairie patch near Morehead; E.L. Braun 1934 (US), 20 Jun 1938, oak-prairie, Clack Mt., Rowan Co. In recent years, a few (ca. 3-5) plants have also been found at the edge of the eastern Cave Run Glade.

Cornus racemosa **Red Osier** (3/5). In Kentucky, this north-central and east-coastal species is known from a few isolated collections in the Cliff Section, either on rocky river banks or on dry rocky ridges. In the Morehead District, there are two old records: K. Carr (MRE), 3 Jun 1936, open woods, Morehead; E.L. Braun 1457 (US), 22 May 1937, limestone soil, ridgetop prairie [probably Clack Mt.], Rowan Co. In 1991, it was found in dry forest, dominated by *Quercus montana*, on the ridge north of the radiotower east of Morehead, covering a sandstone rock about 10-15 ft across and 3-5 ft high.

Cyperus bipartitus [= C. rivularis] **Umbrella-sedge** (12/15?). In Kentucky, this species of wet, open bottomland and pond margins is known mostly from north-central regions. Until recently it had been overlooked in the state, or misnamed *C. diandrus*. The only Eastern Kentucky records are

from the Knobs Region, including one from the Morehead District: L. Meade, 13 Aug 1973, bank of Triplett Creek near Bridge Street, Morehead.

(*Cyperus plukenetii* **Umbrella-sedge** (2/2?).) The only verified Kentucky record of this southern species may be a Braun (US) collection from McCreary County, determined by Carter (1984). Another collection may be this species, but needs checking: Braun 4840 (US?), sandstone ledges, false [illeg.?] Lockegee Rock, Rowan Co.

Cypripedium pubescens **Yellow Lady's-slipper** (45/>100). This widespread eastern species is known from many areas of Kentucky in forest on moist, moderately acid soil, but populations are mostly small and potentially threatened by people digging for horticultural or herbal use. During the 1991 survey, it was seen at 4-5 scattered sites in the district, with only 1-13 plants at each site (see also *C. parviflorum*). Most sites were in mesophytic woods on lower slopes in sandstone rimmed ravines (with much *Liriodendron, Lindera, Fagus*, etc.), but a few plants were also found on moderately dry slopes near prairie remnants on Clack Mountain (with *Acer saccharum, Ostrya, Cercis, Amphicarpaea*, etc.). There are also old records at MRE (1935, Clearfield; 1941, road to Fallen Timber Cr.; 1967, N-face White Pine Cr.).

(*Cystopteris tenuis* **Fragile Fern** (2/2?).) In Kentucky, this northern species (= *C. fragilis* var. *mackayi*; Moran 1983a) has been reported from several sites during the DBNF inventory, generally growing under overhanging sandstone cliffs. During 1991, nine sites were initially reported from the Morehead District. However, R. Cranfill and J. Campbell have begun to reexamined these and other collections, including material determined by Hauffler (see also Hauffler and Windham 1991). A problem with identification in this genus is that the distinctive glands of *C. bulbifera* and its hybrids are often difficult or impossible to find on dried specimens. Most or all DBNF collections may be *C. tennesseensis*, a tetraploid which appears to have originated from hybridization of diploid *C. protrusa* and *C. bulbifera*. *C. tenuis* is a distinct (non-glandular) tetraploid that appears to have originated from hybridization of diploid *C. protrusa* and a currently unknown ancestor ("*C. hemifragilis*"). Nevertheless, more careful study is warranted since there is little or no previous record of *C. tennesseensis* from sandstone cliffs in the Appalachian Plateaus. *C. protrusa* is often rare or absent near these cliffs. It is possible that some of these plants are hybrids between *C. tenneseensis* and *C. tenuis*, as recently described from Ohio (Moran 1983b). *C. tenuis* itself, though, seems to have reliable from only the following Kentucky counties: Crittenden, Livingston, Hardin and Carter (Cranfill 1980); Fleming (J.K. Grannis (KES), 9 Apr 1938); and perhaps Wolfe (depauperate plants collected by J. Campbell in Tight Hollow and Rockbridge Fork).

Dichanthelium acuminatum var. *villosum [= Panicum villosissimum]* **Panic Grass**: S/+/- (18/>30). This taxon has been found at many sites during the DBNF Inventory, and is not really rare in the state, but it was initially listed by KSPNC. It was not searched for rigorously during 1991, but it is known to be scattered along roads and trails on dry, non-calcareous ridges. Two collections were made: J. Campbell (KY), 13 May 1991, dry open woods on siltstone ridge SW of Big Mountain, Bath Co.; A. Risk 5552 (MRE), 15 Jul 1991, ridge between Rock Fk., and Fisher Br., Rowan Co.

Dichanthelium sabulorum [= Panicum columbianum var. *thinium]* **Panic Grass**: S/+/- (8/>30). This species is similar to *D. acuminatum* var. *villosum* in its distribution within Kentucky and DBNF, though not as frequent and more restricted to sandstone clifftops. It was not searched for rigorously in 1991, but it is known to be scattered widely in suitable habitat. In 1991, it was collected at Tater

Knob (MRE, possibly var. *columbianum*), Chestnut Cliffs (KY) and Pounder Branch (KY).

[*Disporum maculatum* **Spotted Mandarin** (8/20).] This Appalachian species may be expected in the Morehead District, since it is known a few miles to the south, along tributaries of the Red River (Campbell et al. 1988), and in southeastern Ohio counties along the Ohio River (Johnson 1968). Without flowers or fruit, it is difficult or impossible to identify this species, but leaves may be generally larger and more hairy than *D. lanuginosum*. Plants with these foliar features were noted along Spaws Creek in 1991.

[*Dulichium arundinaceum* **Three-way Sedge** (15/20?).] This widespread North American species is, in Kentucky, largely restricted to a limited number of natural ponds that are filling in with aquatic vegetation, but which remain relatively undisturbed by man. About 0.1-1.5 miles outside the western edge of the Morehead District, it is known from three sites: the small oxbow 0.5 mile E of Salt Lick, the Bath County Bayou; ditches along US 60 west of the Licking River (all Bath Co.); and a small area in the Rowan County Sphagnum Swamp (H. Bryan, pers. comm.). It was particularly abundant in the Bath County Bayou, where floating mats covered several acres (see Significant Sites for associated species). Associates included *Cephalanthus, Nuphar advena, Polygonum hydropiperoides, Utricularia gibba, Leersia oryzoides, Sagittaria* spp., and various other species in the more disturbed ditches.

Echinocystis lobata **Prickly Cucumber** (9/10+?). This widespread east North American species is reported to be locally abundant as a weed in crops on recently cleared bottomlands along the Mississippi and Ohio River in western Kentucky. Dr. Bill Witt (Univ. of Kentucky, Agr. Sch., pers. comm.) has records from Fulton, Hickman, Carlisle, Ballard, McCracken (?) and Union Counties. The only records elsewhere in the state are from Jefferson Co. (KY), Campbell Co. (Univ. of Cinc.) and Rowan Co.: K. Carr (MRE), 31 Jul 1935, Railroad Street, Morehead; O.B. Story & E.P. Walters 228 (MRE), 6 Aug 1938, open fields, Morehead. The long history of farming on bottomland may have eliminated this species from the region.

Glyceria septentrionalis **Manna Grass** (17/25+?). In Kentucky, most records of this widespread eastern species are from large river valleys in the west, and from swampy areas along the margin of the Appalachian Plateau. During the 1991 inventory, it was found at two sites along rights-of-way through the swampy forest of the Mud Lick Creek bottom (see Significant Sites). Both populations appeared vigorous, with 100s of plants. Just outside the Morehead District, smaller populations have been found in wet brushy meadows of the Rowan County Sphagnum Swamp, and in the Bath County Bayou (woods at E end). Associates at these three sites included *Liriodendron, Platanus, Acer rubrum, Saururus, Boehmeria, Hypericum mutilum, Ludwigia* spp., *Lycopus* spp., *Aster ontarionis, Solidago* spp., *Platanthera flava, Juncus* spp., *Scirpus* spp., *Carex* spp., *Eleocharis tenuis*, etc.

Helianthus angustifolius **Narrow-leaved Sunflower** (>10/>30?). In Kentucky, this western species has been recorded in several regions, and is locally common in the Mississippian Embayment. There are also several records from poorly drained bottoms and plains adjacent to the Cliff Section. In the Morehead District, it has been found during the past 1-5 years in ditches scattered along KY 211 2-3 miles south of Salt Lick, and along KY 32 by the Triplett Creek bridge. The Salt Lick population was reduced to scattered plants by bulldozing in recent years, and the Triplett Creek population could not be relocated in 1991.

Helianthus mollis **Downy Sunflower** (>15/>50). This mid-western species has a few disjunct records in central Kentucky. The only records from the eastern Knobs are from the Morehead District: K. Carr 191 (MRE), 11 Aug 1935, Frenchburg Rd., Rowan Co.; A. Risk 2155b (MRE), 1988, near KY 32/I-64 in front of Presbyterian Church, Rowan Co.; A. Risk 5647 (MRE), 1991, KY 211 3.5 miles S of Salt Lick, Bath Co.

Helianthus grosseserratus **Big-toothed Sunflower** (8/8?). This mid-western species is unknown in Eastern Kentucky, except for a 1970s record from the Clack Mountain area (MRE, KY 1274, 2.3 m south of KY 519). Other Kentucky records are from Bullitt and Wolfe Counties (M. Medley colls.); and from Christian, Graves (WK), Christian, Hickman and McCracken Counties (R. Athey colls.).

[*Hottonia inflata* **Featherfoil** (11/15?).] This southern and east-coastal species is known from several wetland areas in the western third of Kentucky, plus an old collection from Jefferson Co. Further east, the only record is from Peck (1834), who listed *H. palustris* (a synonym) from the Farmers area, though without exact location. Perhaps it occurred in the "swamp" he noted between Bayou Creek and Farmers. The species has highly variable populations through time, and generally grows in at least 2 ft of water (Radford et al. 1968).

Hydrastis canadensis **Goldenseal** (>60/>100). This north-central species is known from many forested areas of Kentucky, especially in moist to somewhat dry, moderately base rich soil. However, it is generally rare due to harvesting for medicinal use. During the 1991 inventory, it was found in and around a sinkhole near the KY 1274 bridge over Licking River (Rowan Co.). Several patches occurred here: (a) in the sinkhole with much *Liriodendron, Acer saccharum, Athyrium* spp. and *Dryopteris goldiana*; (b) below nearby sandstone cliffs with more *Quercus* and, on the ground, frequent *Diarrhena americana* and *Chasmanthium latifolium*. The only other 1991 record was from Botts Fork, on a moist slope below sandstone cliffs. Older records are from Slabcamp Creek (Hannan & Phillippe 2881, Univ. of Louisville); MSU property on Wilson Hill (MRE); 1000 ft W of KY 519, 10.3 miles S of Morehead (A. Risk 645, MRE); slopes below E end of Chestnut Cliffs (D. Taylor, pers. comm.). Most of the these sites were on or near limestone.

(*Hypericum canadense* **Bog St. John's Wort** (6/6).) In Kentucky, this northern species has been recorded only six times, mostly from broad bottomlands just west of the Appalachian Plateaus, between the Knobs and other low hills. There is one old record from the Morehead District: K. Carr (MRE), 23 Aug 1932, edge of Gearhart Pond, Rowan Co. Gearhart Pond is the oxbow 0.5 miles E of Cincinnati Hollow, which has now been partly filled and greatly disturbed.

Isoetes engelmannii **Quillwort** (12/20?). This southern and east-coastal species of woodland ponds and slow-moving streams is known from scattered non-calcareous regions of Kentucky, mostly in the Cliff Section and the eastern Mississippian Plateau. Even within the Cliff Section (and DBNF), it is known only from the Berea and Morehead Districts, with most sites discovered by A. Risk. In the Morehead District, it has been found at six sites, in a variety of habitats: in a stagnant channel of North Fork, Triplett Creek (only ca. 11 plants with *Sparganium, Alisma*); road-ruts in a wet meadow near Beaver Creek (D. Taylor, pers. comm.); bottomland woods along Lower Lick Fork (>100 plants with *Liquidambar, Osmunda regalis, Onoclea, Carex tenera*, etc.); and below sandstone cliffs at heads of Minor Creek tributaries. A mile west of the district, it has also been found along a small tributary of Bull Fork, in a streamhead habitat similar to the Berea District.

Juncus bufonius **Toad Rush** (7/8). In Kentucky, this annual species is known from a few records in western and central regions. Three records are from the Morehead District: M. Wharton 2537 (KY), 10 Jun 1938; low open ground near Olympian Springs, Bath Co.; V.A. Bailey 43 (MRE), 12 Sep 1972, open moist field on S bank of Triplett Creek, Rowan Co.; L. Meade 343 (MRE), 5 Jun 1973, Rowan Co., roadside ditch along KY 801 near KY 1274, ca. 8 miles S of Morehead, Rowan Co. The only other Kentucky records are from Boone (Beal and Thieret 1986), Henry, Jessamine and Muhlenberg Counties (colls. at KY; Cranfill 5044 from Hardin Co. is *J. secundus*).

Lespedeza capitata **Capitate Bush-clover** (>11/>25?). In Kentucky, this south-central and mid-western species is scattered in southern regions. The only Appalachian records of this variasble species, or possible hybrids (Isely 1990), are some 1935-40 collections from McCreary County. (Campbell et al. 1990) and two records from the Morehead District: *L. simulata* (= *L. capitata x virginica*?) of E.L. Braun 1721 (US), 17 Oct 1937, NE of Morehead, Rowan Co.; and *L. capitata* of J. Campbell (KY), 28 Jun 1991, two patches (10+ and 30+ stems), gas line right-of-way at edge of swampy woods, Mud Lick Creek, ca. 1 mile SSW of its mouth, Bath Co. At the latter site, common associates included *Eupatorium* spp., *Sorghastrum, Panicum* spp., *Juncus effusus, Carex* spp., etc. (see also Significant Sites).

Muhlenbergia capillaris **Southern Satin Grass** (12/20?). This southern species has been found at several sites in the Pennyrile Karst Plain. It is typical of dry, open woods and glades on limestone. The only records from eastern Kentucky are from the Grassy Knob Ridge System (Campbell et al. 1989), and from the Morehead District: E. King 393 (MRE), 12 Oct 1926, Morehead, Rowan Co.

Myosotis laxa **Lax Forget-me-not** (1/1). This species occurs in northeastern North America and several other cool temperate regions of the world. The only Kentucky record is from the Morehead District: Sam Ison 89 (MRE), 10 Oct 1973, Triplett Creek bed sandbar, sunny wet, probably rich soil, Rowan Co. Several bars in Triplett Creek and its North Fork were searched unsuccessfully in 1991.

[*Oenothera cf. clelandii* **Evening-primrose** (3/3?).] This northern species is concentrated in the upper mid-west, where it occurs on sandy soil in fields and prairies. It was recently distinguished from the western *O. rhombipetala* by Dietrich, Raven and Wagner (Dietrich and Wagner 1988). The latter species had been reported from Edmonson County by Davies (1955). The only Kentucky record cited by Dietrich and Wagner is from Clay County (Lloyd s.n., DS/CAS). From Rowan County, there is also a collection of three depauperate (5-10 cm high) plants that may be this species: L. Meade (MRE), 17 Jun 1974, Fish Hatchery along oxbow. However, these plants have solitary flowers and leaves not distinctly grey-green, characters that suggest *O. curtissii*, a species of similar habitats on the Coastal Plain (AL, FL, GA, SC).

[*Orbexilum onobrychis [= Psoralea o.]* **Scurf-pea** (8/8).] In Kentucky, this mid-western species is known from scattered calcareous regions. Five localities are in northeastern Kentucky, and one is 2 miles from the Morehead District, along Sand Road (KY 1269) and Interstate 64, 1.5 miles west of KY 211, near Indian Creek, where observations were made in recent years by J. Campbell, M. Medley, J. & C. Baskin and A. Cusick. It was found here in remnants of prairie vegetation on roadsides and adjacent fields. Other species present in this vegetation, excluding intermixed woodland species, included *Thalictrum revolutum, Fragaria, Agrimonia* spp., *Desmodium cuspidatum* (and others), *Lespedeza* spp., *Orbexilum pedunculata, Strophostyles cf. umbellata, Linum sulcatum,*

Euphorbia corollata, Croton monanthogynus, Hypericum prolificum, H. punctatum, Gaura biennis, Thaspium barbinode, Asclepias tuberosa, A. viridis, Apocynum, Phlox pilosa, Lithospermum canescens, Isanthus brachiatus, Salvia lyrata, Monarda fistulosa, Pycnanthemum flexuosum, Physostegia virginiana, Ruellia humilis, Penstemon laevigatus, Lobelia spicata, Heliopsis, Helianthus hirsutus, Rudbeckia hirta, Coreopsis spp., *Ratibida pinnata, Silphium trifoliatum, S. terebinthinaceum, Eupatorium hyssopifolium, Vernonia, Liatris squarrosa, Aster cf. drummondii, A. novae-angliae, A. dumosus, Solidago cf. speciosa, S. rugosa, S. gigantea, S. altissima, Erigeron* spp., *Cirsium altissima, C. discolor, Nothoscordium bivalve, Agave virginica, Rhynchospora globularis, Scirpus pendulus, Eleocharis erythropoda, Carex hirsutella, C. annectans, Sporobolus asper, Andropogon* spp., *Panicum polyanthes, P. acuminatum,* etc. Several exotics were also present: *Dianthus, Trifolium procumbens, Melilotus* spp., *Medicago, Coronilla, Daucus, Leucanthmum, Festuca arundinacea,* etc.

Oxalis montana **White Wood-sorrel** (9/30). In Kentucky, this northern species is known only from the Cumberland Mountains and the Cliff Section, mostly in the Red River Gorge. In the Morehead District, the only known locality is the Spaws Creek ravine (Harker et al. 1979). In 1991, several patches (covering several 1000 sq. ft.) were found in mesophytic forest on lower slopes and below sandstone cliffs. Common associates included *Tsuga, Liriodendron, Fagus, Rhododendron, Ilex montana, Dryopteris intermedia, Athyrium thelypteroides, Thalictrum clavatum, Heuchera parviflora, Viola blanda, Mitchella,* etc. To the south and east of the district, there are other records: E.L. Braun 293 (US), 5 May 1940, mossy sandstone rocks, N slope, Broke Leg Cr., Menifee; E.L. Braun 1224 (US), 3 May 1936, mossy sandstone, Little Sandy Rv., Elliott Co. (see also Campbell et al. 1989).

Panax trifolius **Dwarf Ginseng** (10/25). In Kentucky, this northern species is known mostly from moist lower slopes and terraces along larger streams in the Cliff Section. There is one old record from the Morehead District: K. Carr (MRE), 20 May 1937, rich woods opposite dam, Morehead. These woods may have been replaced by the baseball field and pavilion of the city park (see also *Anemone quinquefolia*).

[*Penstemon laevigatus* **Smooth Beard-tongue** (4/6).] In Kentucky, verified records of this southeastern species are only from northeastern counties. Just west of the Morehead District, it has been found during recent years at the Sand Road-Interstate 64 prairie remnant, and at the Polksville Knob Licks. Older collections were determined by Pennell: E.L. Braun 1891/1909 (US), 4 Jun 1938, open places/slopes, Blue Bank, Fleming Co.; E.E. Terrell 1199 (KY), moist roadside, 2-3 miles S of Carter, Carter Co.; E.E. Terrell 1203 (KY), 16 Jun 1942, roadside a few miles N of Lynn, Greenup Co.

Phaseolus polystachios **Wild Bean** (17/22). This south-central species is known from widely scattered areas of Kentucky, but with a low density of records. In the Morehead District, there are several old and recent records from the Clack Mountain area; three patches of 10-100 ft^2 were found in 1991. Another old collection may be from further north: E.P. Walters & O.B. Story (MRE), 26 Jul 1938, open fields, Morehead. Common associates were species typical of disturbed, brushy variants of oak-ash, oak-hickory, beech and sugar maple forest types.

Phlox stolonifera **Running Mountain Phlox** (8/30). In Kentucky, this Appalachian and Piedmont species is known only from parts of the Appalachian Plateau, mostly in the transition from the

northern Cliff Section to the more rolling landscape on its eastern sides. It is typical of sandy streambanks and terraces, especially on sandy soils somewhat washed out or with fresh alluvium. In the Morehead District, this species appears to be locally frequent along the North Fork of Triplett Creek. It was also found at one site along the main stem of Triplett Creek (E of Phelps Branch) and there are old MSU collections from this valley (base of N face E of city park; Patton Hollow; Cincinnati Hollow). This species was also found along Minor Creek and Broke Leg Creek (one patch 1.6 miles E of falls), which drains into the Licking River. However, this species is still not documented from the Red River drainage (Campbell et al. 1989). Common associates included *Liriodendron, Lindera, Asimina, Betula nigra, Aesculus, Thelypteris, Podophyllum, Asarum, Meehania, Aster divaricatus, Uvularia sessilifolia, Iris cristata, Carex* spp., *Brachyelytrum, Poa alsodes*, etc.

Phlox subulata var. *australis* **Moss Phlox** (5/20). In Kentucky, this Appalachian species is known as a native plant only from scattered knobs and narrow ridges in the Knobs Region and transitions to the Appalachian and Mississippian Plateaus, especially in the northeast. It is known from several localities in the Morehead District: hills N and W of Morehead (old MRE colls. from above Rodburn to Cincinnati Hollow; and recent obs.); Clack Mountian (old coll. noted on road to Lockegee); hills between Salt Lick Creek and Clear Creek, and Big Mountain area; point on E side of Beaver Creek. In 1991, at least 10 patches of 10-100 sq. ft. were found in these localities, always in dry, rocky, open woods on ridges, with siltstone or limestone exposed. This species appeared to be characteristic of transitions from the most open vegetation on limestone to denser woods on adjacent non-calcareous soils. Associates on more calcareous soils included *Juniperus, Cercis, Ostrya, Aster oblongifolius, Carex pennsylvanica, Panicum boscii, P. flexile*, etc. Associates on non-calcareous soils included *Quercus montana, Q. stellata, Q. marilandica, Carya glabra, Monarda russeliana, Houstonia canadensis, Helianthus divaricatus, Aster undulatus, Antennaria, Carex pennsylvanica, Danthonia spicata, Elymus hystrix*, etc.

Platanthera lacera **Ragged Orchid** (12/16). This widespread eastern species is known from several areas of eastern Kentucky, but with a low density of records. During the Morehead District inventory, it was found at two sites: about 50 plants around a bulldozed slope W of MSU; a few plants at the cleared edge of the Triplett Creek oxbow 0.6 miles W of Cincinnati Hollow. Also, just outside the district, one plant was found in young woods at the base of the Polksville Knob Licks on Feaping Road, and three plants were seen in a forest-field transition at the Rowan County Sphagnum Swamp.

Polemonium reptans var. *villosum* **Hairy Jacob's Ladder**: S/-/C3 (>15/>50). This taxon is largely restricted to the western edge of the Appalachian Plateaus, but is locally frequent and has been recently removed from the list of federal candidates. In the Morehead District, many plants have been found along North Fork and main stem of Triplett Creek (in 1991; also A. Cusick, pers. comm.). It was also noted along Clear Creek, Cold Cave Creek and others.

Polygala mariana **Milkwort** (4/4?). This southern species is poorly documented in Kentucky, and there has been some confusion with *P. nuttallii* (see also Appendix A). There is an old collection of *P. mariana* from the western edge of the Morehead District: A.M. Peter 162 (KY), 10 Aug 1877, Olympian Springs, Bath Co. The only other Kentucky records may be: F.E. O'Flynn (KY), 28 Jul 1920, Utica, Daviess Co.; H. Garman (KY), 9 Jul 1903, Guthrie, Todd Co.; W. Meijer (KY), 28 Jun 1969, 1500-2000 ft, Pine Mt. State Park, Bell Co.

[*Polygonum arifolium* **Tearthumb** (7/11?).] In Kentucky, this north-central species is known mostly from the large western bottomlands. The only sites known in Eastern Kentucky are the slough just east of Salt Lick (M. Evans, pers. comm.), and the Bath County Bayou, where a few plants were found at the west edge of the pond in wet ground with shrubs and sedges. The only Bluegrass record is due to W. Meijer (pers. comm.), who reported this species in the 1970s at the Backbone Swamp (Franklin Co.), and perhaps Lees Branch Swamp (Woodford Co.).

(*Populus tremuloides* **Balsam Poplar** (1/2?).) This northern species was mapped in southeastern Ohio, and in Bracken County, Kentucky, by Little (1971), but no collection has been located to validate this state record. There are recent reports from Joe Lacefield & Jeff Sole (Ky. Dept. Fish & Wildlife, pers. comm.) that trees occur in Bath County along Clear Creek past the shooting range (Salt Lick Quad.), and in Rowan County near the KY 799 crossing over Interstate 64 (Cranston Quad.)

Pycnanthemum verticillatum **Mountain Mint** (8/15?). In Kentucky, this northeastern species is known mostly from the northern Pennyrile Karst Plain and the Knobs Region. It is sometimes combined with the more pubescent *P. pilosum*, which has a mid-western range. Typical glabrous plants have been collected from two localities in the Morehead District: K. Carr (MRE), 7 Aug 1935, Rodburn, Rowan Co.; M.E. Wharton 6267 (KY), 20 Jul 1947, 2 miles E of Morehead, probably close to preceding; F.T. McFarland 13 (KY), 15 Jul 1949, woods near Olympian Springs, Bath Co. The latter collection has shorter, sparser pubescence.

Rubus odoratus **Purple-flowering Raspberry** (8/15?). This northeastern and Appalachian species is scattered through the Cumberland Mountains, but is rare elsewhere. There are three collections by K. Carr (MRE): 4 Aug 1939, Little Sandy, Elliott County; 7 Aug 1939, Cincinnati Hollow, 2 miles west of Morehead, Rowan County; 10 Aug 1939, Black Mountain, Harlan Co. The only location currently known in the Morehead District is along KY 1274 on the south side of its bridge across Cave Run Lake, in Menifee County. Discovered here by L. Meade in 1974, at least 50 bushes occur on ledges of the siltstone roadcut, which grades into more or less natural outcrops 50-100 ft from the road. In adjacent Elliott County, L. Meade also found this species along roadsides and banks of Laurel Fork at the Carter School Road crossing; relocated in 1991, at least 20 plants occurred here at the edge of forest with *Liriodendron, Tsuga, Rhododendron maximum*, etc. The only Kentucky localities west of Appalachian Regions are across the river from where the species occurs in Indiana: C.W. Short (PH), [1830s], Meade Co.; R. Cranfill (in press), Hardin Co.

(*Salix discolor* **Pussy Willow** (4/4).) In Kentucky, this northern species is known from scattered sites in the Bluegrass and Appalachian Regions. Braun (1943) reported this species from Rowan County, but there is no record in her catalogue or collections (US). The only verified records are from Bell (US), Wolfe (US), Oldham (DHL) and Henry (KY) Counties (Argus 1986).

Salix eriocephala **Willow** (10/11?). In Kentucky, this north-central species is known from several sites in and around the Bluegrass and Knobs Regions, plus a few sites further west along the Ohio River. In the Morehead District, there are two records from Rowan County: C.F. Reed 16564 (CFR), cited by Argus (1986); J. Campbell (KY), 5 Sep 1991, gravel and cobble along Rock Fork of Triplett Creek. The only other records from DBNF, or elsewhere in Appalachian Kentucky, are from Menifee County (Argus 1986).

Scirpus purshianus [= S. smithii var. *williamsii]* **Pursh's Bulrush** (6/6). In Kentucky, this north-central wetland species is known from a few scattered records in various regions. In the Morehead District, it is known only from the wet banks at the north end of Eagle Lake (Evans Branch), on MSU Campus (L. Meade 498, 3 Oct 1973; and noted as frequent here in 1991 by A. Risk). Also, a population of over 200 plants was found by A. Cusick (No. 28,300, pers. comm.) in shallow water on the east side of Clear Creek Lake, south of Salt Lick.

[*Scutellaria leonardii* **Small Skullcap** (13/20?).] This mid-western species is typical of calcareous glades in western and southern Kentucky, but is virtually unknown in eastern Kentucky. In 1991, it was found 0.5-1.5 miles outside the Morehead District, in the Polksville Knob Licks, on eroded Crab Orchard Formation. Also, A. Cusick (No. 28,268, pers. comm.) recently found this species near the Lewis County prairies.

Scutellaria serrata **Skullcap** (7/12). In Kentucky, most records of this Appalachian species are from the Cliff Section. There are two records from the Morehead District, in Rowan County: A. Risk 443, 21 May 1982, banks of Triplett Creek or low slopes near mouth of Phelps Branch (unable to relocate in 1991); J. Campbell, 21 Jun 1991, NE slope below sandstone cliff W of Lime Kiln Hollow. At the latter site, a single plant was observed on a boulder, in forest with *Liriodendron, Lindera, Dryopteris marginalis, Asarum, Parthenocissus*, etc. Nearby, it has also been reported from Elliott County: Hannan & Phillippe 2170 and 2195 (Harker et al. 1979), hill W of Isonville, and Little Caney Creek.

[*Sium suave* **Water-parsnip** (6/10?).] This species is widespread in North America, but the few Kentucky records are mostly from broad river bottoms in the Shawnee Hills or Mississippian Embayment. The only records in central or eastern Kentucky are from just outside the Morehead District: M. Evans (sight record), slough just E of Salt Lick, Bath Co.; J. Campbell (KY), 11 Jul 1991, Bath County Bayou, 1 mile SW of Farmers. About 5-10 plants were found in wet woods at both ends of the latter site.

Solidago harrisii **Harris' Goldenrod** (7/30). In Kentucky, it appears largely restricted to the western edge of the north-central Cliff Section, and adjacent knobs, in areas drained by the Kentucky River (Campbell et al. 1989, 1991). It grows on rocky limestone soils, in somewhat open woods. During the Morehead District inventory, it was found at only two sites: on a ridge south of Warix Run (100s of plants); and on the point between Licking River and its North Fork (10s of plants). Associated species included *Quercus alba* (dominant), *Q. rubra, Acer saccharum, Ostrya, Thalictrum dioicum, Thaspium pinnatifidum, Smilax rotundifolia, Brachyelytrum, Muhlenbergia sobolifera*, etc.

Stenanthium gramineum **Featherbells** (14/20?). In Kentucky, this south-central species has been recorded from widely scattered wetland areas, generally in open woods and thickets on wet acid soil. There are only about 10 post-1970 records. Several records are from the Morehead District, in Rowan County, mostly in the Triplett Creek drainage: W.A. Welter (MRE), 14 Aug 1935, low ground, KY 60, Rodburn; O.B. Story & C.P. Walters (MRE), 22 Jul 1938, open fields, Morehead; K. Carr (MRE), 4 Aug 1939, roadside near Christy Station; J.K. Grannis (KY, var. *robustum*), 8 Aug 1934, near Morehead (and by same collector, 1 Nov 1935, Flemingsburg); L. Meade 492, 3 Oct 1973, Evans Branch Lake; H. Setser (MRE), Sep 1991, at least 30 plants, Triplett Creek bottom 2 miles W of Clearfield, in ditch along railroad; A. Risk (MRE), 6 Oct 1991, at least 30 plants in wet opening with *Osmunda* spp., along small stream 0.6 miles W of Brinegar. Most of these

collections appear to be the typical variety. There are few other records from DBNF or nearby: records of var. *micranthum* in McCreary County (Campbell et al. 1990); head of Wolf Pen Branch, Menifee Co. (Campbell et al. 1989); Browne & Browne 6232 (KY), 24 Aug 1962, 3.2 miles S of Rockcastle-Madison Co. line, between US 25 and L&N railroad; J. MacGregor (sight, var. *robustum*), ca. 1980, along US 25, London, Laurel Co.

Thelypteris palustris **Marsh Fern** (16/20?). In Kentucky, this north-central (circumboreal) species is known from scattered areas of acid, marshy meadows and open woods. The only records from northern DBNF are from the Morehead District, in Rowan County: along Upper Lick Fork (small patches), Lower Lick Fork (20-30 ft across), and Triplett Creek bottomland east of Morehead (100s x 5 ft). Associates included *Cephalanthus, Alnus, Rosa palustris, Juncus* spp., *Eleocharis tenuis, Rhynchospora capitellata, Scirpus atrovirens s.l., Carex lurida, Festuca arundinacea*, etc.

Utricularia gibba **Bladderwort** (13/20?). This floating aquatic is widespread in North and Central America, but most Kentucky records are from the western half of the state. Near the western edge of the Morehead District, there are old and recent records from the Licking River valley near the dam, in Bath County: Peck (1834); E.L. Braun 4361 (US), 18 Oct 1941, ditches near Midland; M. Evans (sight record), 1980s, slough with *Dulichium* E of Salt Lick; J. Campbell (sight record), 5 Jul 1991, SW of Hog Hollow in a small old artifical pond in streamhead woods; A. Risk (MRE), 11 Jul 1991, Bayou Creek Bayou. There are only five other records from Appalachian counties: H. Garman (KES), 10 Sep 1929, Clay City, Powell Co.; J. MacGregor & D. Taylor (BEREA), pond on KY 15 near Zachariah, Lee Co.; D. Taylor (sight), 1980s, mudflats, Owsley Fork reservoir, Jackson Co.; P.D. Haragan 1531 (KES), 29 Jun 1987, mudflats around pond, Feltner 4H Camp, 3 miles S of London, Laurel Co.; R. Hines (sight), 1991, pond on SW side of Faubush, Pulaski Co.

Uvularia sessilifolia **Sessile Bellflower** (ca. 12/60). In Kentucky, this north-central species has been recorded from several eastern and western localities, but it appears to be frequent only along some tributaries of the Cumberland River and its South Fork (Campbell et al. 1990). It is generally restricted to narrow, damp zones along certain larger streams, especially on sandy soils somewhat washed out or with fresh alluvium. The only definite records from north or northeast Kentucky are from Rowan and Lewis Counties. In the Morehead District, it was found at several places along North Fork of Triplett Creek, its tributaries, and streamheads on the flats above Farmers (near airport and Bull Fork). There is also an old MRE collection from "Morehead", probably along the main stem of Triplett Creek. Associates were generally similar to those of *Phlox stolonifera* (see above).

Viburnum dentatum var. *lucidulum* **Smooth Arrow-wood** (6/15?). This northern taxon is often treated as a distinct species (*V. recognitum*). Its few Kentucky records are mostly from rocky banks of larger streams in the Cliff Section. There are two records from the Morehead District: A. Risk 154 (MRE), 2 Oct 1981, sunny area along Roberts Br., Rowan Co.; J. Campbell (sight), 20 Jul 1991, banks of Pond Lick Br., N Fk. Triplett Cr. Other northeast Kentucky records are from Lewis Co. (Braun 1943); and C.M. Ross 51 (MRE), Apr 1980, area to be flooded by Paintsville Lake, Johnson Co. *V. dentatum* var. *dentatum*, which has a south-central range, was found frequently in the Morehead District, especially in floodplain woods, but also on slopes and occasionally ridges. It appears to be more common here than elsewhere in DBNF. [Note: *V. molle* was erroneously reported from the Berea District (Campbell et al. 1990), based on a collection of *V. dentatum*; Braun's collections from the Stearns District should also be checked (Campbell et al. 1989).]

Viburnum rafinesquianum var. *rafinesquianum* **Arrow-wood** (2/3?). This species is frequent on limestone clifftops along the Kentucky River Palisades and along some sections of the Cumberland River. These plants are all the glabrous var. *affine*. In Kentucky, the pubescent var. *rafinesquianum* is verified only from the Tygarts Creek area in Carter County (KY/MRE colls.), and from one collection made in the Morehead District: K. Carr (MRE), 23 Jul 1937, open woods, Rowan Co.

Vitis labrusca **Fox-grape** (4/5?). In Kentucky, this northeastern species is poorly documented. Two collections from the Morehead District appear to be this species: K. Carr (MRE), 24 May 1941, Lockegee, dry rocky ground; H. Setser (MRE), 14 May 1966, Bangor, high on S facing slope. There are also collections from Hancock (KY), Johnson (MRE), Meade (KY) and Rockcastle (Braun 3125 at US) Counties.

Viola lanceolata **Narrow-leaved Violet** (15/20?). In Kentucky, this widespread eastern species is known from scattered locations along the large western river valleys, on flatter ground in and near the Cliff Section. There are three old collections from the Morehead District: K. Carr, 6 Sep 1933, edge of woods, Rodburn, Rowan Co.; M.E. Wharton 1964 (KY), 2 May 1938, 3/4 mile NW of Olympian Springs (possible hybrid with *V. primulifolia*); M.E.W. 2471 (KY), 2 Jun 1938, wet ground, 1.5 miles W of Peeled Oak, Bath County. The are only two other DBNF records: M. Medley (DHL), Curt Pond near Keno, Pulaski Co.; J. Campbell (KY), pond on Peter's Mountain, McCreary Co.

(*Viola fimbriatula* **Fringed Violet** (3/3).) The only recent Kentucky record of this north-central species, in its strict sense (as distinct from *V. emarginata* and *V. sagittata*), is from McCreary County (Campbell et al. 1989). There is also an old collection from the Morehead District: K. Carr (MRE), 6 May 1936, dry gravelly hillside, Morehead. However, Carr's label data may be doubted (Appendix A). It was also reported from the state by McFarland (1942).

Wisteria frutescens **Wisteria** (12/50?). In Kentucky, this southern species is known mostly from the large river valleys along its western boundary. The only records from northeastern Kentucky are from along the western edge of the Morehead District: A. Surmont 96 (MRE), 1 Oct 1981, field left of barn, Minor C. Clark Fish Hatchery, Rowan Co.; and perhaps (vegetative) J. Campbell (KY), 21 May 1991, banks of North Fork, Triplett Cr., S of Cranston, Rowan Co.

Xyris difformis **Yellow-eyed Grass** (1/1). This species has a fairly wide range in eastern North America, but is concentrated in coastal regions. It occurs on wet peaty or sandy soil, in the open or in partial shade. In 1991, A. Risk provided its first verified record in Kentucky. About 100 plants were found in a wet brushy streamhead meadow, draining into Hog Hollow (see Significant Sites). These plants clearly key to *X. caroliniana* in Fernald (1950) and other manuals, but Kral (1965), who redetermined Risk's collection (as var. *difformis*), showed that *carolininana* had been incorrectly applied. Associates included *Ludwigia alternifolia, Scutellaria integrifolia, Eupatorium perfoliatum, Juncus acuminatus, J. biflorus, Scirpus cyperinus, Rhynchospora capitellata, Carex crinita, Panicum microcarpon, Sphagnum lescurii*, etc. There is also an unverified report of *X. caroliniana* from Woodford County (Wharton 1991, citing a coll. of E. Carr at Pine Mt. Settlement School).

Xyris torta **Yellow-eyed Grass** (11/15?). This south-central species is known from scattered sites in southern Kentucky, with a concentration in and near the southern Appalachian Plateau. It grows with native grasses, forbs and brush on acid, seasonally wet soil. During 1991, A. Risk extended the known range of this species to Bath County, in the streamheads around Hog Hollow, where he found at least 150 plants at three sites. Further south, the closest records are from wet meadows near Clay City, near the swamp forests of Meijer et al. (1981), and from a boggy streamhead 1.2 miles SSW of Roger's Chapel. In Kentucky, this species has a similar range and habitat to *Rhynchospora globularis*, and this also occurs at Hog Hollow. Most plants at Hog Hollow were growing in the woodland-field transition, especially along old roadbeds, with partial shade of *Pinus* spp., *Quercus* spp., *Liriodendron, Liquidambar, Acer rubrum*, etc. Associates included *Osmunda* spp., *Pteridium, Thelypteris, Spiraea, Rhexia mariana, Hypericum mutilum, Viola primulifolia, Lysimachia quadrifolia, Asclepias incarnata, Scutellaria integrifolia, Lycopus virginicus, Galium tinctorium, Lobelia cardinalis, Eupatorium* spp., *Aster umbellatus, A. lateriflorus, Solidago rugosa, Platanthera ciliaris, P. clavellata, Juncus* spp., *Scirpus* spp., *Carex glaucodea, C. lurida* var. *gracilis, C. debilis, C. crinita, Leersia oryzoides, Glyceria, Cinna, Calamagrostis cinnoides, Erianthus, Panicum* spp., etc. (see also Significant Sites: Hog Hollow).

FAUNA

The following accounts summarize data for all listed rare species that have been reported from the Morehead District or within five miles of its boundaries. Species with only tentative or migratory records are listed in parentheses ( ), while those with only marginal or seasonal, non-breeding records are listed in brackets [ ]. In addition, a few notes are included on other taxa of interest, which have either been listed in the past, or which may deserve consideration for listing in the future. Following each species' name, its official status is shown as follows: (1)/(2)/(3).

(1) Status in Kentucky according to the Kentucky Academy of Science and the Kentucky Nature Preserves Commission (KSNPC 1991a; updating Warren et al. 1986): E = Endangered; T = Threatened; S = Special Concern; "-" = not listed.

(2) Status in Daniel Boone National Forest as listed by the USFS at the beginning of 1990 (B. Knowles, pers. comm.); E = Endangered; S = Sensitive; PS = proposed sensitive: "-" = not listed; "+" = KSNPC listed species that the DBNF inventory has documented on USFS land for the first time.

(3) Federal Status as designated by the United States Fish and Wildlife Service (1989, 1990b); E = Endangered; C1 or C2 = candidate for listing, Category 1 or 2; C3 indicates that the species has been removed from consideration.

Mussels

Alasmidonta marginata **Elktoe**: T/-/-. Although not collected during the inventory, this unionid was collected from the Licking River a short distance downstream from Cave Run Dam in 1968 (OSUMZ) and is known to persist further downstream at Moore's Ferry. The elktoe inhabits small to large rivers (Gordon and Layzer 1989), and it probably occurred historically in the Licking River within the district. Specimens should be sought in North Fork, lower Craney Creek and Minor Creek upstream from the reservoir backwater.

Simpsonaias ambigua **Salamander mussel**: T/PS/C2. A single specimen of this small and easily overlooked unionid was collected from Blackwater Creek in the backwaters of Cave Run Reservoir. Elsewhere in the drainage, the salamander mussel has been collected from Slate Creek, South Fork, and mainstream Licking River upstream as far as Bath County. In addition to Blackwater Creek, streams such as North Fork and Minor Creek that have slab cobble and boulder substrata should be examined for additional populations.

Fishes

Ammocrypta pellucida **Eastern sand darter**: S/PS/C2. There are three pre-impoundment records for this fish in the district, all from the segment of Licking River inundated by Cave Run Reservoir. Below the reservoir, this darter occurs in the vicinity of Moore's Ferry, where it is fairly common, and further downstream. This darter was also collected upstream of the reservoir in Morgan County in 1958 (Williams 1975), and in Magoffin County in 1955 (Univ. of Louisville). However, Prather (1985) did not secure specimens during recent sampling of the upper Licking, where silt and muck deposits appeared to have reduced habitat quality in pools and riffles. There is a chance that

Ammocrypta pellucida persists in the largest and highest quality streams remaining in the district (e.g., Blackwater Creek and North Fork) above the reservoir influence. The only known extant population in the DBNF apparently is in Red River, suggesting that the status of the eastern sand darter in the forest (Branson 1977) should be elevated to endangered.

Clinostomus elongatus **Redside dace**: S/PS/-. Redside dace generally inhabit pools in small, high quality streams with clear, cool water. The banks are usually shaded and the substratum varies from bedrock to gravel and sand. Efforts by Meade et al. (1986) and others defined the distribution of this dace to include tributaries to Red River (i.e., Chimney Top Cr., Edwards Branch, Gladie Cr. and Indian Cr.) in the Kentucky River drainage, and several in the Licking River drainage: Beaver Cr., Craney Cr., Minor Cr., Yocum Cr., Upper and Lower Lick Fk., Devil Fk. and North Fork. With the exception of Devil and North forks, all of these streams were in DBNF. Sixteen of the 50 sites sampled during this inventory yielded redside dace. Specimens were found in segments of drainages previously documented to support redside dace: Clifton Cr., Botts Fk. and Meyers Fk. in Beaver Creek; Stonecoal Br., Slabcamp Cr. (2 sites) and Wagner Fk. in Craney Creek; and two sites in Minor Creek. New populations were found in Leatherwood Creek, Buck Creek, Spaws Creek of Open Fork, Laurel Branch, Cold Cave Creek, and Warm Fork (Cold Cave tributary), all direct tributaries to Cave Run Reservoir. Redside dace were also found at one (Clear Creek) of five sites sampled in the Salt Lick drainage. Laurel Branch was the only direct tributary to the Licking River mainstream (now Cave Run Lake) where *C. elongatus* was collected. Except for the Clear Creek (Salt Lick) record, all other populations sampled within the District were in the Beaver Creek and North Fork drainages. These collections extend the known range of *C. elongatus* northwest to include additional Cave Run Reservoir tributaries and Salt Lick Creek, a tributary to the Licking River downstream from Cave Run Dam. As suggested by Meade et al. (1986), additional undiscovered populations may be present in other high quality streams in the district. The Clear Creek population could be threatened by *Lepomis cyanellus, L. macrochirus, L. microlophus* and *Micropterus salmoides*, which have invaded the stream from Clear Creek Lake. Other *C. elongatus* populations that were not lost because of the impoundment of Cave Run Lake may have been impacted by expanding predator fish populations. For example, some *C. elongatus* streams have been stocked with *Oncorhynchus mykiss* and *Salmo trutta*, fishes not native to Kentucky. The impact of these introductions has not been evaluated.

Etheostoma tippecanoe **Tippecanoe darter**: S/PS/-. The status of the tippecanoe darter in the district and DBNF closely mirrors that of *Ammocrypta pellucida*. A pre-impoundment record verifies its former presence in the district within the Licking River segment inundated by Cave Run Reservoir. This diminutive darter occurred at several sites downstream from Cave Run dam as recently as 1959, but now inhabits the river upstream only as far as the Butler, Kentucky area. Although it was collected from the Licking River upstream from the reservoir near West Liberty, Morgan County, in 1959 (Univ. of Louisville), Prather (1985) sampled several sites in that area but did not secure additional specimens. Tippecanoe darters inhabit fairly large, free-flowing upland rivers, a type of habitat that is now exceedingly rare or non-existent in the district. North Fork and Blackwater Creek are among the few marginal refugia for any remnant *E. tippecanoe* population that may persist in the district. As Branson (1977) suggested, the tippecanoe darter may be in danger within DBNF, where the only known extant population is in the South Fork Kentucky River drainage.

Noturus stigmosus **Northern madtom**: (S/?/-). In the Licking River, the northern madtom occurs in suitable habitat from Moores Ferry downstream. A pre-impoundment record from the area inundated to form Cave Run Reservoir verifies its former presence in the Licking River within the district. This noturnal bottom-dweller was collected from the Licking River upstream from the district in 1959 (UL), but was not relocated by Prather (1985). It inhabits large rivers with gravel/sand bottoms, sometimes in association with pondweed and debris. It has probably been extirpated from the district and DBNF, but North Fork and Blackwater Creek upstream from the reservoir backwater are two of the best places to seek remnant populations.

Percina evides **Gilt darter**: (S/?/-). The gilt darter is sporadically distributed in the Licking River. Recent records are available from the vicinity of Moores Ferry and downstream. This bottom-dweller historically occurred within the district, based on a 1963 Cave Run Reservoir pre-impoundment record. Gilt darters inhabited the upper Licking in Magoffin and Morgan counties based on records from 1969 and earlier, but recent sampling has not confirmed its continued existence in this area. The Morehead District has lost most of its swift, large river habitat, with the gravel and cobble preferred by *P. evides*. This fish probably has been extirpated from the district, but specimens should be sought in places such as lower North Fork and Blackwater Creek.

[*Percopsis omiscomaycus* **Trout-perch**: S/-/-.] This species is common in Tygarts Creek and the Little Sandy River, within Kentucky, but its main range is centered further east. There is an old record from the North Fork of Triplett Creek, outside the DBNF Proclamation Boundary (Welter 1938). However, Slone (1990) was unable to find this species during recent sampling.

Amphibians

Aneides aeneus **Green Salamander**: -/S/C3. This Appalachian species is relatively frequent along sandstone cliffs in more rugged parts of DBNF. Occasionally, it is found on limestone. With several sites added during this inventory, it is now known from most or all sections of the district with sandstone cliffs, including: Clack Mountain and Lower Lick Fork area (Lockegee Rock, Amburgy Rock, Thomas Cave Br.), Craney area (Upper Lick Fk., Minor Cr.), Clear Creek area (near Shooting Range), Beaver Creek area (Chestnut Cliffs, Dock Hollow, Murder Br.), Mine Branch area, and Blackwater Creek area (Spaws Cr.)

Cryptobranchus a. alleganiensis **Hellbender**: -/S/C2. Welter and Carr (1939) found this Appalachian salamander to be very common in Triplett Creek and Licking River near Morehead. More recently, L. Meade has found it just outside DBNF in North Fork of Triplett Creek (at Conley Road near Bratton Branch and in Weaver Hole near Weaver Branch), and in Licking River (at Moores Ferry, Johnson Ford, and 9.7 miles S of Farmers). This species probably still occurs within DBNF along Triplett Creek and its North Fork.

Desmognathus ochrophaeus **Mountain Dusky Salamander**: -/PS/-. In Kentucky, this Appalachian species has been found in only 10 counties, all in moist woodlands of eastern Kentucky. The most terrestrial of the dusky salamanders, it is usually found near small mountain streams or seepage areas under logs, rocks or leaves. During the 1991 inventory, it was found in seepage areas of sandstone shelters, along Spaws Creek (0.6-0.7 miles SW of Open Fork) and the head of Mine Branch. L. Meade has also found it in a small hollow along Craney Creek (June 1982, ca. 0.5 miles N of its mouth), and, just outside DBNF, near Rockhouse Branch (NW of Wrigley) and along Broke Leg Creek.

Reptiles

(*Apalone m. mutica* **Midland Smooth Softshell**: S/-/-.) This inhabitant of the Mississippi River drainage is currently known from seven Kentucky counties. These include Fulton, Ballard, McCracken, Marshall and Trigg Counties in the Mississippian Embayment. Also, Welter and Carr (1939) reported specimens from Triplett Creek in Rowan County and Fox Creek in Fleming County. However, these specimens cannot be located at MSU or elsewhere. Extensive seining and electrofishing of the Licking River drainage in and near the Morehead area during the past 20 years, has revealed only *A. s. spinifera* (Eastern Spiny Softshell), as opposed to *A. m. mutica*.

Cemophora coccinea copei **Northern Scarlet Snake**: -/-/-. This woodland species is known from scattered records in eastern and western Kentucky. It is seldom seen because of its burrowing, secretive nature. There are two old records from Rowan County, in the Morehead District (Meade 1992a).

[*Eumeces a. anthracinus* **Northern Coal Skink**: T/PS/-.] In Kentucky, most records of this Appalachian species are from shaley hills on the west side of the Cliff Section, mostly in the south (ca. 10 counties in all). It has been found in Madison and Powell Counties, but is unknown further north, in the Morehead District. Suitable habitat is available in this region, and this species should be looked for along shale outcrops, especially near streams.

Lampropeltis triangulum elapsoides **Scarlet King Snake**: S/PS/-. This secretive, southeastern subspecies is known from widely scattered records in most regions of Kentucky, though it intergrades with *L. t. syspila* (Red Milk Snake) near Kentucky Lake. Welter and Carr (1939) reported this species from six miles east of Morehead, but their specimen escaped and there is no further record from the Morehead District.

(*Thamnophis s. sauritus*, **Eastern Ribbon Snake**: S/PS/-.) This eastern species ranges across Kentucky from the Mississippi River to the Bluegrass Region. It is most common in wetlands of the Mississippian Embayment and Shawnee Hills. Barbour (1971) reported this species from Rowan County, but the source of this record is unknown. During over 20 years of searching for snakes in this region, L. Meade (1992a) has never found it. There was a tentative sighting by J. MacGregor in the 1980s, from just outside DBNF near the slough below the Minor C. Clark Fish Hatchery. Another report, from Licking River banks south of Spurlock Gap (L. Linville & T. Ramsey, pers. comm. to L. Meade), was probably based on *Nerodia s. sipedon* (Northern Water Snake).

Birds

Accipiter striatus **Sharp-shinned Hawk**: S/S/-. In Kentucky, this species is fairly common and widely scattered in the winter. It is currently considered rare as a summer resident, though Barbour (1951) noted that it was common during 1933-39 in Rowan County. Its typical summer habitat is in extensively forested areas with some pines. During recent years, summer observations have also been made at the Minor Clark Fish Hatchery (F. Busroe), MSU Campus (L. Meade), the Meyers Fork area (T. Towles), and on the Haldeman, Ezel, Scranton and Wrigley USGS Quadrangles (Kentucky Breeding Bird Atlas data; B. Palmer-Ball, pers. comm.). During the Morehead District inventory, one bird was seen, on 30 May 1991, USFS 918, 2.5 miles from USFS 129, in PWHA.

[*Haliaeetus leuocephalus* **Bald Eagle**: E/E/E.] The bald eagle is uncommon throughout Kentucky in the winter, and extremely rare as a summer resident. In the Morehead District, however, this species is frequent during the winter in the area around Cave Run Lake, especially near the Minor Clark Fish Hatchery. A bald eagle census was started in 1981 by F. Busroe, L. Kornman, A. Surmont and S. Bonney. Numbers in recent winters have been 10 in 1988/89, 3 in 1989/90, 3 in 1990/91, and 4 in 1991/92. The nearest breeding site for this species--only a recent attempt--is at Laurel Lake (Laurel County), but Cave Run Lake could eventually support a breeding population.

[Nycticorax nycticorax **Black-crowned Night-Heron**: E/-/-.] In recent winters, this species has been observed several times in and near Cave Run Lake. However, there is no evidence of a resident, breeding population in the summer.

Nyctanassa violacea **Yellow-crowned Night-Heron**: T/-/-. This species is associated with a variety of aquatic habitats, but it is mostly seen along secluded streams and sloughs. In Kentucky, most records are from west of the Appalachian Plateaus. During June 1991, this species was observed by J. Kiser and others in the swamp forest along Mud Lick Creek, near Mud Lick Youth Center (Bath County). Moreover, Youth Center personnel had seen birds each summer for several years. These observations suggest that a breeding population may occur here. The closest known breeding populations are in Lexington (Fayette Co.) and near Ashland (Boyd Co.).

[*Pandion laiaetus* **Osprey**: E/S/-.] In recent years, this species have been observed frequently during in migration at Cave Run Lake and Clear Creek Lake. However, there is no evidence of a resident, breeding population.

Tyto alba **Barn Owl**: S/-/-. This nocturnal species was formerly a common resident in more open areas of the state, but it is now uncommon or rare. In Rowan County, Barbour (1951) observed a nest in a "haymow" near Clearfield. Specimens at MSU have been taken from the Morehead area in 1932 (W. Welter), 1939 (Wade) and 1959 (A. Lake). The most recent sighting was by F. Busroe at Minor Clark Hatchery in 1984.

Mammals

Lasionycteris noctivagans **Silver-haired Bat**: -/-/-. This species ranges across most of the northern United States and Canada. It is occasionally found in Kentucky during the winter months in tree snags, buildings, rock crevices or caves. There is only one summer record (J. MacGregor & D. Yancy, 1991, Pine Mt.). In the Morehead District, silver-haired bats were mist-netted at Murder Branch Cave and Mine Branch Cave. Hibernating individuals have been found at Mine Branch Cave and Silver-haired Cave.

Lasiurus cinereus **Hoary Bat**: -/-/-. This species ranges over much of North America, and is occasionally found in Kentucky. It roosts in trees during warmer weather, but usually migrates south for the winter. During the 1991 inventory, a single hoary bat was mist-netted along North Fork of Triplett Creek near Cranston.

Mustela nivalis **Least Weasel**: S/-/-. This northern species ranges southward into central and eastern Kentucky, where it is known from 13 counties. In the Morehead District, it has been found in recent years near Haldeman (E of Morehead), and near the Claylick Boat Ramp by T. Slone

(Meade 1992b).

Myotis leibii **Eastern Small-footed Bat**: E/S/C2. This species is rare in Kentucky, and is one of the rarest bats in Eastern North America (Barbour and Davis 1974). All summer records from Kentucky are of males. In the Morehead District, two individuals have been mist-netted: in 1990 along USFS 909 at the head of Clear Creek; and in 1991 along Spaws Creek 0.3 miles E of Rough Branch. The numerous small caves and cracks along sandstone cliffs in this region should provide habitat for this species.

Myotis septentrionalis [= M. keenii] **Northern Long-eared Bat**: S/-/-. This northern species has been found in 39 Kentucky counties, mostly in limestone regions. In the Morehead District, this species has often been found in small numbers along sandstone clifflines, and sometimes in sandstone rockshelters and limestone caves. After dark, they appear to forage along the cliffline, and possibly utilize the numerous holes and shelters for hiding and resting. In the 1991 inventory, individuals were mist-netted in the hills east of Morehead (near Triangle Tower), Murder Branch area (pipeline at head of Scale Ladder Hollow; USFS 1074 3 miles N of KY 1274; Murder Branch Cave), west of Beaver Creek (Skidmore sandstone shelter; Chestnut Cliffs), above Clifton Creek (Menifee County Park), and Spaws Creek.

Myotis sodalis **Indiana Bat**: E/E/E. This highly colonial bat was once found in scattered areas throughout the eastern United States. It is widespread in cave regions of Kentucky, with 20 county records, but populations have declined greatly in recent decades. During the 1991 inventory, Indiana bats were mist-netted at two locations: a sandstone rockhouse near Triangle Tower (USFS 12A 1.5 miles from USFS 12); and along Spaws Creek (3 miles E of Rough Branch). Also, one was found by B. Graham (pers. comm.) along Spaws Creek, hibernating in a small limestone cave. In previous years, a few (ca. 2-4) have been found in Murder Branch Cave, but none were found here in December 1991.

Neotoma floridana magister **Eastern Wood Rat**: -/S/C2. This southern species is known from many cliffs and caves in Appalachian Kentucky, and the Dripping Springs Escarpment in west-central Kentucky. Sudden drastic declines have occurred during the 10-30 years in many states bordering Kentucky (MO, IL, IN, OH) and to the northeast. DBNF probably has the best remaining populations of this subspecies. In the Morehead District, fresh signs of this species have been found at over 100 cliff and cave sites during the past 15 years, with many added during 1991. Woodrat nests contain such items as acorns, sticks, leaves, grasses, chestnut burs and bones (deer and raccoon).

Plecotus rafinesquii **Rafinesque's Big-eared Bat**: T/S/C2. This species occurs locally in much of the southeastern United States. Its habitats include limestone caves, sandstone overhangs, hollow trees, abandoned mines and old buildings. In Kentucky, there are widespread records from 31 counties and at least 110 individual sites, but the total known population is only about 1400, and only 15 censused hibernacula have had 20 or more bats. In the Morehead District, this species has been found in small numbers at several sites in or near sandstone cliffs and limestone caves. However, only two hibernating colonies with more than 10 individuals have been found: the Clack Mountain Railroad Tunnel, with 10-20 bats over the years; and the Donahue Cave, generally with 50-100 bats over the years, though 134 were counted in February 1982 (Meade 1992b). A few hibernating bats were also found in the upper part of a small pit cave near Pickett Branch (the deeper pit there needs

further exploration). A few summer colonies with up to 10-15 or more bats have been found in the Beaver Creek area (Chestnut Cliffs, Skidmore Creek, Brushy Fork). A probable maternity colony with 50-60 bats was found along Brushy Fork of Beaver Creek in 1990, but when revisited on the subsequent night, the colony had moved (B. Graham, pers. comm.). Two potential maternity sites, indicated by guano piles, have been found nearby.

Plecotus townsendii virginianus **Virginia Big-eared Bat**: E/E/E. This eastern subspecies has scattered populations in Kentucky, West Virginia and Virginia. The largest Kentucky colonies are in Lee County, and it has also been found in nine other counties (Meade 1992b). In the Morehead District, a pregnant female was mist-netted at Murder Branch (USFS 1074 3 miles from KY 1274), providing the first direct evidence that a maternity colony exists in this area. During the past decade, generally in the winter, groups of 1-5 resting individuals have been occasionally been found caves and rockshelters in the following areas: Murder Branch Cave, Donahue Cave, Cold Cave Creek, Wagers Hollow, and Clack Mountain Railroad Tunnel. These records suggest a concentration around the Beaver Creek area.

Sorex hoyi winnemana [= Microsorex h.w.] **Pygmy Shrew**: -/S/C2. This widespread Appalachian subspecies was placed in the genus *Sorex* by Diersing (1980). In Kentucky, it is known from 26 counties in the eastern and central regions, excluding the Bluegrass (Meade 1992b). Pitfall trapping by J. Kiser and L. Meade in the Morehead District during 1991 yielded 14 specimens. These were in scattered sections of the district, mostly in mesophytic forest with boulder talus. In contrast, sampling in the Stanton District yielded specimens only on dry oak-pine ridges (Campbell et al. 1989).

Sorex longirostris **Southeastern Shrew**: -/-/-. This species has been found in swamps, marshes, wet fields and bottomland forests of southeastern states (Caldwell and Bryan 1982). In Kentucky, specimens have been collected from the Mississippian Embayment to the western edge of the Appalachian Plateaus (Meade 1992b). During 1991, specimens were collected with pitfall traps near Cave Run Dam and downstream: in wet fields around Hog Hollow; in bottomland forest by the Minor C. Clark Fish Hatchery; and in swamp forest of the Rowan County Sphagnum Swamp. Also, in 1990, a carcass was found in a Morehead parking lot by B. Graham.

Spilogale putorius **Eastern Spotted Skunk**: S/PS/-. In Kentucky, this southeastern species has been found mostly in Appalachian Regions. There is one record from the Morehead District: a specimen at MSU found in Morgan County (by Blackie Conley of Sandy Hook, pers. comm. to L. Meade).

Ursus americanus **Black Bear**: S/-/-. The black bear is an animal primarily of large forested regions with little human presence. They usually wary and somewhat nocturnal, and thus rarely seen by man. An average home range is about 14,000 acres (Lowman 1975). This species is moving back into Kentucky from the central Appalachians (see also Campbell et al. 1989, 1990). The Morehead News (21 June 1988) reported one sighted near Hays Branch, and there are more recent reports by residents and hunters from Black Cave Hollow (Rowan Co.?), KY 1274 near Beaver Creek, and several others south of Cave Run Lake (pers. comm. to S. Bonney). Just south of the district, there was also a report in spring of 1991 from residents of Ezel (Clayton Wells at 606/768-3250 to S. Butler, pers. comm.). In 1991, inventory personnel found bear feces at two sites: near the mouth of Craney Creek (J. Kiser); and along Meyers Fork (2 miles north of Denniston on US 460, A. Risk).

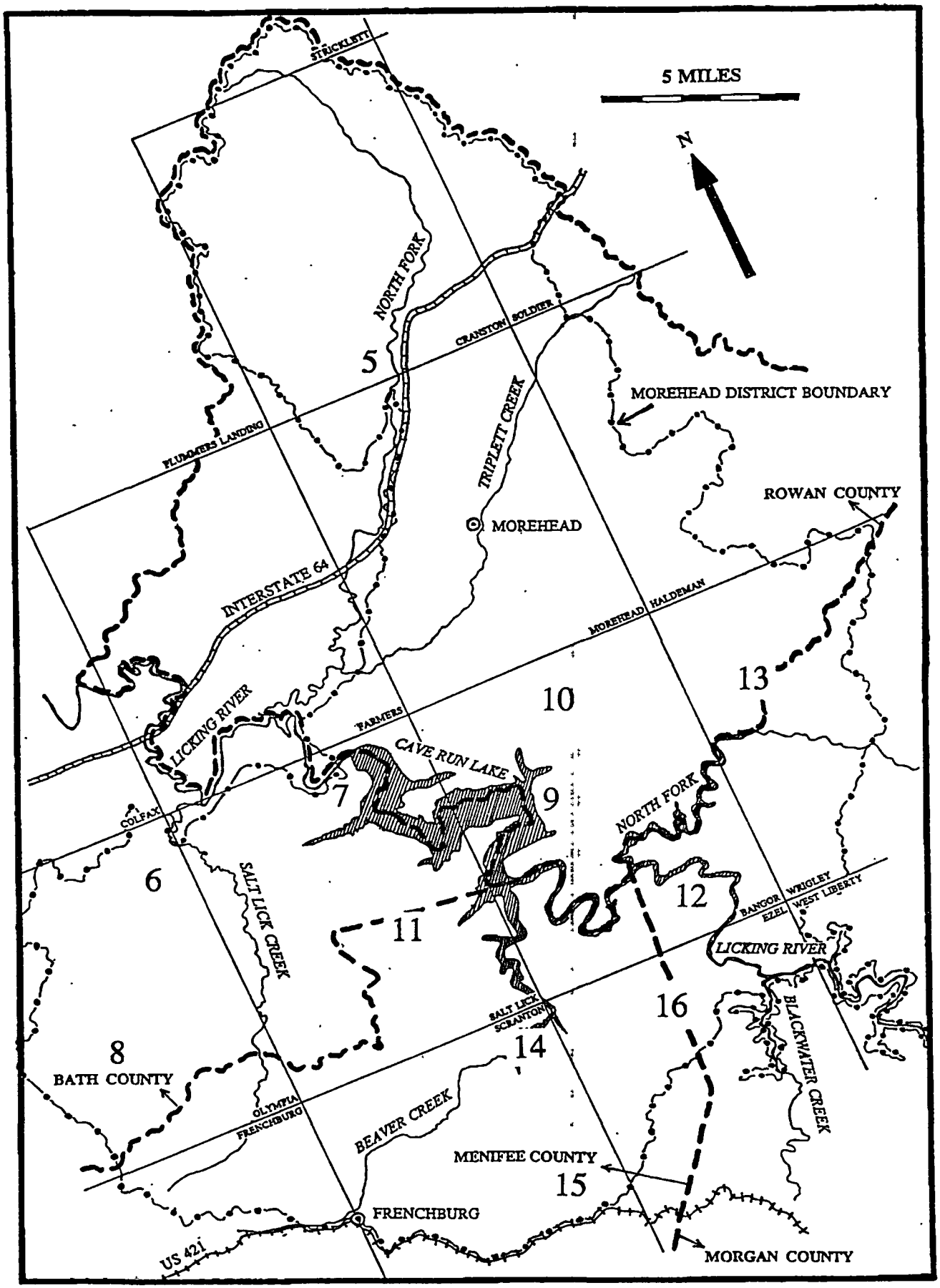

Figure 4. Map of Morehead Ranger District showing locations of significant areas. Numbers on the map corresponmd to figure numbers in the following section.

SIGNIFICANT AREAS

The following areas were deemed "significant" because each has one or more of the following attributes: (a) a concentration of several rare species; (b) a particularly good population of a rare species; (c) a special ecological feature. These areas therefore have relatively high contribution to overall biodiversity within the Morehead District. Together, they contain a majority of the rare species occurrences within only 5-10% of the total district area, depending on if "buffer zones" are included. Note, however, that this district appears to have fewer rare species occurrences and less significant natural areas than further south in DBNF. After a comprehensive assessment of the whole DBNF, the threshold for "significance" adopted in this report may prove to be somewhat lower than in some previous inventory reports.

General locations of these areas are shown in Fig. 4, and individual boundaries in Figs. 5-16. Wherever justified, boundaries include broad corridors along major streams or whole watershed units, so as to suggest some ecological integrity in any future management plan. In some larger areas described below, further work is required to locate rare species populations more precisely and to focus on the most important sections for conservation (especially North Fork Triplett Creek, Craney Creek Ravines and the Beaver Creek area). Appendix B describes five additional significant sites that are just outside the Morehead District boundaries, but which provide important benchmarks for evaluating sites within DBNF, and for general research and education in the region.

These areas' important features are described below as a basis for any management or acquisition plans aimed at conservation of rare species and special habitats. Rare species are listed for each area. These species include a few [in brackets] that may be extirpated from the area of interest, or that have only been recorded nearby (within a mile or so) but may well occur in suitable habitat within the area. Some plant species treated in the preceding sections are relatively widespread in the region, and are not included under all site descriptions. These include *Carex pedunculata, Cypripedium pubescens, Dichanthelium* spp., *Panax quinquefolius, Polemonium reptans* var. *villosum* and *Sagittaria brevirostra.*

Excluded from this section are notes on two older forest stands on USFS land that were considered significant by Harker et al. (1979a, 1981), but which were logged in the 1980s. These were known as the McDale Branch Old-growth (Bath Co., Salt Lick Quad.) and the Barn Hollow area (Morgan Co., Bangor Quad.). Another stand that appears to have been exceptionlly old, based on aerial photographs and interviews with residents, occurred along east fork of Possum Trot Hollow (Rowan Co., Haldeman Quad.). This was also logged in the 1980s. These appear to have been the last true old-growth stands in the district, with many canopy trees at least 150 years old.

Before detailing the areas of obvious importance, a few notes are needed concerning some other potential sites of interest. These deserve more study in regard to possible conservation efforts, though most of them are probably not as significant as those detailed in the expanded descriptions.

(a) Triplett Creek Corridor, main stem (Rowan Co.; mostly Morehead Quad.). From the creek's mouth (Farmers Quad.) upstream to the Gates and Christy areas (Haldeman Quad.), this corridor has been greatly disturbed by human development, especially in and near the city of Morehead. Exotic species, especially *Polygonum cuspidatum, Rosa multiflora, Lonicera japonica* and *Eulalia viminea*, have become locally abundant in the woodland remnants. Several rare plants have been found here, but populations have generally become fragmented or extirpated. These species include the same ones found on the less disturbed floodplain of the North Fork. Many additional rare species have been recorded along the main stem, its tributary valleys or lower slopes, but these are currently unknown or with only one known extant site (see also Appendices A and B): *Anemone quinquefolia, Apocynum androsaemifolium, Aralia nudicaulis, Callitriche heterophylla, Calopogon tuberosus, Carex crus-corvi, Cyperus bipartitus, Dryopteris spinulosa, Echinocystis lobata, Helianthus angustifolius, Hydrophyllum virginianum, Juncus articulatus, J. bufonius, Lemna valdiviana, Myosotis laxa, Panax trifolius, Platanthera lacera, Pycnanthemum verticillatum, Ranunculus ambigens, Rubus odoratus, Scutellaria serrata, Smilacina stellata, Stenanthium gramineum, Streptopus roseus*?, *Thelypteris palustris, Veronicastrum officinale* and *Viola lanceolata*. To these may be added a few species found in prairie remnants and dry open woods on slopes above the valleys. Animals of interest found in this corridor include the Hellbender, Scarlet King Snake, and Southeastern Shrew. Conservation of rare species remaining in this corridor would require special efforts from the community itself, including the University and City.

(b) Eagle Lake, on Evans Branch, Triplett Creek (Rowan Co., Morehead Quad.). Although this small lake on the MSU Campus is artificial, it has accumulated many native aquatic species, including some that are rare in this region: *Polygonum amphibium, Sagittaria graminea, Scirpus purshianus, Stenanthium gramineum* and *Vallisneria americana*.

(c) Christy and Gates Siltstone-Glades (Rowan Co., Haldeman Quad.). Several south-facing, lower slopes along Triplett Creek near Gates, and along Christy Creek near Christy, have treeless exposures of siltstone in the Borden Formation. The vegetation here is unusual for the region, though no state rarities are known. The glades support the only populations of *Cheilanthes lanosa* known in the district, and other uncommon species in the region (*Chenopodium hybridum, Chionanthus virginicus, Asclepias verticillata*, etc.). An unusual specimen of *Agalinis cf. tenuifolia*, with unusually large calyx lobes, was found at one site in June, 1991, which is much earlier than the typical flowering season for any *Agalinis* species in Kentucky. Frequent woody species in and around these glades included *Juniperus* (abundant), *Pinus virginiana, Quercus stellata, Ostrya, Celtis tenuifolia, Rosa carolina, Cercis, Staphylea, Rhus copallina, Fraxinus americana, Chionanthus, Viburnum prunifolium*, etc. Frequent herbaceous species include *Cheilanthes, Heuchera longiflora, Euphorbia corollata, Monarda russeliana, Helianthus divaricatus, Solidago sphacelata, S. juncea, S. nemoralis, Antennaria arnoglossa, Carex pennsylvanica, Chasmanthium latifolium, Danthonia spicata, Andropogon scoparius* and *Panicum acuminatum* var. *fasciculatum*. Others included *Woodsia obtusa, Clematis viorna* s.l., *Potentilla* spp., *Lespedeza* spp., *Viola pedata, Oenothera tetragona* (var. *longistipulacea*?), *Houstonia canadensis, Coreopsis* spp., *Bidens bipinnata, Liatris aspera, Aster drummondii, A. undulatus, A. patens, Ambrosia artemisiifolia, Andropogon virginicus, Carex muhlenbergii, Panicum boscii, P. linearifolium*, etc.

(d) Christy-Triangle Tower Woods (Rowan Co., Morehead Quad.). On the bottomland of lower Christy Creek, two uncommon plants have been collected: *Anemone quinquefolia* and *Clematis glaucophylla*. The unnamed, NW-flowing branch directly west of Martin Branch has relatively mature forest on the NE-facing slope, with canopy trees 1-2.5 ft dbh. Major species were *Liriodendron* (dominant), *Fagus, Quercus alba* and *Tsuga* (to 2.5 ft); others included *Tilia, Rhododendron maximum, Polystichum, Osmunda claytoniana, Thelypteris, Asarum, Laportea, Tiarella* and *Carex purpurifera*. The other small ravines between here and the Triangle Lookout Tower have relatively mature forest in places, though one area was recently cut. In 1991, on the sandstone ridge north of the tower, two rare plants were found (*Cornus racemosa, Dichanthelium boreale*), and, near the tower, two rare bats were mist-netted (*Myotis septentrionalis, M. sodalis*).

(e) Olympia Springs area (Bath Co., Olympia Quad.). Within a mile or two of Olympia Springs, several uncommon or rare plants have been found, though some records (*) are 40-120 years old: *Carex cf. woodii, Juncus bufonius*, Liatris squarrosa, Poa languida, Polygala mariana*, Pycnanthemum verticillatum*, Ratibida pinnata* and *Viola lanceolata*; *Solidago rigida* is also expected (seen in 1985 on Clay Lick Road N of Means). These were mostly found on roadsides, old fields and edges of dry woods (with much *Quercus stellata* and some *Q. falcata*) on the Silurian Crab Orchard Formation, and some are indicative of former prairies or open woods on lower slope and valley flats. Other species typical of these areas, though often mixed with more widespread forest or farmland species, included *Salix humilis, Orbexilum pedunculata, Zizia aptera, Asclepias tuberosus, A. viridis, A. viridiflora, A. verticillata, Lithospermum canescens, Pycnanthemum tenuifolium, Lobelia spicata, Silphium trifoliatum, Eupatorium altissimum, Solidago juncea, S. nemoralis, Agave, Elymus glabriflorus, Sporobolus vaginiflorus* s.l., *Andropogon* spp. and *Sorghastrum*. No intact prairie seems to remain, but restoration, at least on roadsides, might be feasible. More significant remnants of such conditions have been found to the north near Polksville (Appendix B; see also notes on *Orbexilum onobrychis*).

(f) Cave Run Lake Corridor (Rowan, Morgan and Bath Cos.; Wrigley, Bangor and Salt Lick Quad.). Before impoundment in 1974, this section of the Licking River would have extended the corridor noted in Appendix B, with several rare aquatic species. It is possible that some of these species still survive above backwaters of the lake along North Fork, Craney Creek, Minor Creek and Blackwater Creek (where *Simpsonaias ambigua*, the salamander mussel, was found in 1991). Some rare birds frequent the lake area, including the Clark Fish Hatchery, though not in breeding seasons: *Haliaeetus leucocephalus* (Bald Eagle), *Nycticorax nycticorax* (Black-crowned Night-heron) and *Pandion haliaetus* (Osprey). On land, four "Significant Areas" described below lie mostly within a mile of Cave Run Lake (Hog Hollow, Warix Run/Claylick Cliffs, Beaver Creek, and Donahue Cave/Mine Branch area); the extensive Craney Creek area adjoins the lake; and the Bath County Bayou lies 1.5 miles downstream (Appendix B). Since conservation of forests on slopes adjacent to the lake already has practical importance, it may be useful eventually to recognize an connected system of natural areas. However, the connecting forests are generally not particularly mature, and there are only a few additional rare species occurrences (*Apocynum androsaemifolium, Hydrastis canadensis, Oryzopsis racemosa, Phlox subulata, Rubus odoratus, Scutellaria saxatilis, Solidago harrisii, Thaspium pinnatifidum*). It is also important to note the great importance of water quality from the lake for special biological features a few miles downstream of the dam: the rare mussels (see Listed Species), *Podostemon ceratophyllum*, and probably the Bath County Bayou.

(g) Lower Lick Fork Bottomland (Rowan Co., Bangor Quad.). Between Thomas Cave Branch and Cave Run Lake, this valley bottom has several species of interest in wet woods (opposite Forman's Grocery store), meadows and roadsides: *Carex tenera, Isoetes engelmannii, Lilium canadense, Scirpus expansus, Solidago speciosa, Thelypteris palustris* and *Veronicastrum virginicum.*

(h) Trough Lick Branch Watershed (Bath Co., Salt Lick Quad.). This ca. 1200 acre watershed is within the PWHA, north of Cedar Cliffs and the Cave Run Glades (see below). USFS data indicate that about 30% of the forest is 80-100 years old. Most of the forest is younger, but less than 10% has been clearcut within the past 20 years. This area has the potential to become one of the least disturbed large watersheds in the district within a few decades.

(i) Pounder Branch Ridges (Menifee Co., Frenchburg Quad.). This area of narrow sandstone ridges and cliffs was identified by Harker et al (1979) as an "Ecological Area" of interest, but with no particularly rare species known. The discovery of *Juniperus communis* and rare bats a few miles to the north may now makes Chestnut Cliffs a more significant area, though it is still possible that such rare species occur on the Pounder Branch Ridges as well. The dry woods and clifftop openings have typical species composition for such sites (see also Campbell et al. 1989). Species of local interest include *Carex bromoides* (in gullies to N), *Hypericum prolificum* (dry clifftops), *Rhododendron roseum* and *Viburnum cassinoides* (N-facing clifftop, an unusual habitat for this species).

(j) Clifton Creek Ravines (Menifee Co., Scranton Quad.). This area adjoins the Menifee County Park. Two federal candidate species are known here: in the small hollow to the south, a few patches of the *Calamagrostis porteri* ssp. *insperata* was unexpectedly found (see Listed Species); and in the Clifton Creek itself, a healthy population of *Clinostomus elongatus* (redsice dace) was found. Other rare animals found in this area include Green Salamander, Sharp-shinned Hawk and Northern Long-eared Bat. On the west side of this creek, the unnamed branch with USFS land and other tracts have been mostly logged, though a 10 acre patch of old-growth still remained in 1991 above the USFS clearcut (but including the rockhouse excavation). This old-growth had much *Liriodendron* (1-2 ft dbh), *Tsuga* (1.5-2.5 ft dbh) and *Fagus* (1.5-2.5 ft dbh), and a few large trees of *Acer rubrum* and *Quercus montana.*

(k) Yocum Creek Ravine (Morgan Co., Wrigley Quad.). This area is one of the few large sandstone ravines in the district without recent road building or clearcuts. However, the forest here is not particularly mature, and some private residential development abuts USFS land. There is excellent water quality, a good redside dace population, and a 60 ft waterfall along one side. It deserves further exploration.

(l) Open Fork Seeps (Rowan Co., Haldeman Quad.). The small tributary of Open Fork, 0.5-0.7 miles SW of Brinegar has unusual seeps with *Osmunda* spp. (abundant), *Stenanthium gramineum* and, near an old mine, five *Sphagnum* species (including the rare *S. squarrosa* and *S. capillifolium* var. *c.*; also *S. russowii, S. fimbriatum* and *S. lescurii*). A. Risk has found similar areas in Elliott and Carter Counties, and these deserve further comparative study.

Site Name: NORTH FORK, TRIPLETT CREEK CORRIDOR; Fig. 5
Size: ca. 5000 acres
County: Rowan
USGS Quadrangles: Morehead, Ky.; Cranston, Ky.

Location. This area lies along North Fork of Triplett Creek, a major tributary of the Licking River, from a half mile downstream of the KY 32 bridge, upstream to the mouth of Rock Fork. From there, there are two secondary extensions: (a) upstream on Rock Fork for 1.75 air-miles; and (b) upstream on North Fork for 3 miles then up Elk Lick Fork to include most of its watershed. Access is easy, with KY 377 running along most of the western side of the corridor. The corridor extends for about 15 air-miles along these valleys, and is generally 0.2-0.5 miles wide, covering most of the valley bottoms. Note: the lowest 5 miles of this site, upstream to half a mile above Weaver Branch, lie outside the DBNF Proclamation Boundary. However, the watershed is largely within DBNF.

General Description. North Fork of Triplett Creek runs through the Knobs Region. The watershed is largely forested except for lower slopes and bottoms. The corridor is mostly cleared for agriculture, but several 5-20 acre patches of bottomland forest remain, in addition to the continuous 100-200 ft wide strip of forest along the stream itself. The stream channel has much siltstone cobble and sand, with frequent bars and islands.

Listed Animal Species

(?*Apalone m. mutica*, Midland Smooth Softshell (turtle), unconfirmed)
Cryptobranchus alleganiensis, Hellbender
[*Percopsis omiscomaycus*, Trout-perch, old record]

Other Animal of Interest

Lasiurus cinerea, Hoary Bat (mist-netted)

Listed Plant Species

Cypripedium kentuckiense, Kentucky Lady's-slipper (orchid)
Erythronium rostratum, Golden Star (trout-lily)

Other Plants of Interest

(?*Aster schreberi*, Broad-leaf Aster, tentative id.)
Carex abscondita, Sedge
Carex woodii, Sedge
Isoetes engelmannii, Quillwort
Phlox stolonifera, Running Mountain Phlox
Salix eriocephala, Willow
Uvularia sessilifolia, Sessile Bellflower
[*Viburnum dentatum* var. *lucidulum*, Smooth Arrow-wood, nearby]

Biological Significance. North Fork of Triplett Creek is one of the least disturbed large watersheds in the Kinniconick-Licking section of the Knobs Region. Extensive forests still exist in the hills, with much USFS ownership, but the bottomland is mostly cleared and has virtually no USFS ownership. The corridor outlined here includes the best remaining patches of bottomland forest, with canopy trees 16-24 inches dbh in several cases. In addition, over 100 plants of *Cypripedium*

kentuckiense, a C2 federal candidate, have been found along the sandy streambanks. Other than a few plants of this species near Morehead, this is the only population known within the Morehead District. A few other rare plants occur along the stream, and on lower slopes in the Elk Lick Branch valley. Also notable in this latter valley are the 1.5-3 ft dbh trees of *Pinus strobus* scattered along White Pine and Little White Pine Hollows, towering above 1-1.5 ft dbh *Quercus alba, Q. velutina*, etc. This may be the only large native population of *Pinus strobus* in the Knobs Region part of the district. From an icthyological standpoint, this is one of the most diverse streams in the Licking River drainage. Sixty-nine species have been documented (Welter 1938, Slone 1990), though the rare *Percopsis omiscomaycus* has not been documented since Welter (1938). The mussel fauna has all the species typical of Licking River tributaries of this region, but no rare species are known.

Notes on Vegetation. Relatively mature pieces of forest were found 1-1.5 miles up Rock Fork; 0-0.5 miles downstream from Rock Fork; between Fisher and Hogge Branches; 0-0.5 miles downstream of Clear Fork (in Cranston); 0-1 mile downstream from Weaver Branch; 0-0.5 miles downstream from Roberts Branch; and 0-0.25 miles downstream from KY 32 bridge. Small (1-10 acre) patches of forest in these sections have most canopy trees 1-2 ft dbh, with a few 3-4 ft. Frequent woody species include *Platanus, Liriodendron* (often dominant in canopy), *Magnolia tripetala, Lindera, Asimina, Fagus* (including several larger trees), *Quercus rubra, Betula nigra, Carpinus, Acer saccharum* (often dominant in understory) and *Aesculus flava* (especially in transition to streamside *Platanus-Betula*). Unfortunately, the exotics shrubs or vines, *Rosa multiflora* and *Lonicera japonica* are locally frequent, especially in more open areas (other exotics are asterisked in following list*).

Frequent herbaceous species include *Athyrium thelypteroides, Thelypteris novebroacensis, Polystichum, Podophyllum, Asarum, Amphicarpaea, Tiarella, Impatiens* spp., *Laportea, Rhus radicans, Viola* spp., *Polemonium reptans* var. *villosum, Phlox stolonifera, Meehania, Galium concinnum, Helianthus decapetalus, Aster divaricatus, Iris cristata, Trillium grandiflorum, Dioscorea batatas**, *Brachyelytrum* (abundant), *Festuca obtusa, Poa alsodes, Bromus purgans, Elymus* spp., *Eulalia**, *Panicum clandestinum, P. yadkinense, Carex* spp. (*communis, woodii, laxiculmis, gracilescens, gracillima, amphibola* s.l.), etc. (see notes on *Cypripedium kentuckiense*). The stream itself has many gravel bars, with *Alnus, Cornus obliqua, Aster prenanthoides, Justicia, Carex torta*, etc. At one site just upstream of a bar, *Nuphar advena* colonies were found.

Below the forks, and along the main stem of Triplett Creek, there is a general shift towards forest of more base-rich soils, with more clay and less sand. There is more *Acer negundo, Aesculus glabra, Fraxinus pennsylvanica, Celtis occidentalis, Juglans nigra, Elymus macgregorii* (Brooks, in press), Urticaceae, *Cryptotaenia, Lysimachia ciliata, Phlox paniculata, Rudbeckia laciniata, Carex grayii, Leersia* spp., etc. *Betula nigra* is notably less frequent. *Cypripedium kentuckiense* has not been found in this ground vegetation, which is generally denser.

Many other typical mesophytic forest species occurred on the floodplain, and additional forest types were found in the corridor. Also, the adjacent siltstone slopes with *Tsuga* and *Rhododendron maximum* added to the overall diversity. An interesting forest type was found on a few terraces where relatively well-drained, acid coniditions appeared to exist, especially along Rock Fork. Woody species here included *Liriodendron* (abundant), *Magnolia tripetala, Quercus alba, Alnus, Cornus* spp., *Kalmia, Rhododendron nudiflorum, Vaccinium corymbosum, Ilex verticillata, Chionanthus* (with frequent seedlings), *Viburnum dentatum* (abundant), etc. Herbaceous species

included *Thelypteris noveboracensis* (abundant), *Osmunda cinnamomea, Mitchella, Medeola, Isotria,* etc. On higher terraces, a somewhat poorly drained flatwoods remnant was found north of Grassy Lick Branch mouth, with frequent *Quercus alba, Q. velutina* (cut out), *Acer rubrum, Liriodendron, Carya tomentosa, Vaccinium vacillans* and *Thelypteris*.

Explanation of Boundaries. The boundaries focus on the bottomland, where much clearance has occurred, but within which there are forest remnants and perhaps some long-term opportunities for forest restoration. The Elk Lick Branch watershed is included as a relatively undisturbed example of this section of the Knobs Region, with a few rare species. This section generally has few unusual biological features.

Site Name: MUD LICK CREEK BOTTOMLAND FOREST; Fig. 6
Size: ca. 550 acres
County: Bath
USGS Quadrangles: Olympia, Ky.

Location. This area lies along the bottomland of Mud Lick Creek, a tributary of Salt Lick Creek, from between its mouth and Chalybeate Branch. It is about 2.8 miles long and 0.3-0.5 miles wide. Access is easy from Mud Lick Road, which runs along the eastern side of the valley.

General Description. Mud Lick Creek runs through the Knobs Region. This section of the valley is largely forested, though much of the forest may have originated from old-field succession. There has been some drainage and light grazing by livestock continues in some of the woods. Some utility rights-of-way are maintained in a grassy condition. The land is all privately owned.

Listed Animal Species

Nyctanassa violacea, Yellow-crowned Night-Heron (breeding?)

Listed Plant Species

Carex tenera, Slender Sedge
[*Poa languida*, Drooping Bluegrass, nearby on low slopes]
[*Prenanthes alba*, White Rattlesnake-root, old record nearby]
[*Scutellaria saxatilis*, Rock Skullcap, old record nearby]

Other Plants of Interest (mostly indicating marsh/wet prairie)

Carex crus-corvi, Sedge (only site known in county)
Gentiana saponaria, Soapwort Gentian (only site known in county)
Glyceria septentrionalis, Manna-grass
[*Helianthus angustifolius*, Narrow-leaved Sunflower, nearby]
[*Helianthus mollis*, Downy Sunflower, nearby]
Lespedeza capitata, Capitate Bush-clover

Biological Significance. This site is significant simply because it has the largest contiguous bottomland forest area remaining within the whole DBNF Proclamation Boundary. It represents one of the best opportunities to restore a natural bottomland forest community in eastern Kentucky, together with most of the species that would have occurred here before settlement. Although no listed rare species have been found so far, there is a good chance that some of the rare species found in smaller "significant areas" on bottomland in the Knobs Region could flourish here with appropriate management. Even the rights-of-way have some importance for natural history, since they may be rare species refuges and potential restoration sites for wet prairie vegetation (see Biogeography notes above). *Lespedeza capitata*--a species of prairies in western Kentucky--is currently known from nowhere else in the northern half of DBNF. The two sunflowers listed above occur on bottomland roadsides in the adjacent Salt Lick Creek valley.

Notes on Vegetation. Earlier notes on this site were provided by Meijer et al. (1980). The forest is generally young, with trees no more than 1 ft dbh; there are a very few scattered trees of up to 2-4 ft dbh (*Fagus, Quercus alba, Q. palustris*). Frequent woody species included *Pinus echinata* (terraces), *Liriodendron, Q. palustris* (less frequent were *Q. bicolor* and *Q. imbricaria*), *Betula*

nigra, Alnus, Liquidambar, Acer rubrum var. *trilobum, Nyssa, Carya* spp., *Rosa (palustris, setigera, multiflora), Cornus obliqua, Lonicera japonica,* etc. Frequent herbaceous species in the forest included *Thelypteris, Boehmeria, Rhus radicans, Parthenocissus, Gratiola* spp., *Lycopus* spp., *Galium obtusum* var. *ramosum, Aster umbellatus, A. lateriflorus, A. ontarionis, Glyceria striata, Poa autumnalis, Cinna, Elymus virginicus, E. hystrix, Carex rosea, C. stipata, C. projecta, C. albolutescens, C. tenera, C. squarrosa, C. louisianica,* etc. In grazed area, the exotics, *Ranunculus repens* and *Eulalia viminea,* were also frequent.

The rights-of-way and old fields were dominated by native species in many places. These included *Galium tinctorium, Verbesina* spp., *Vernonia gigantea, Eupatorium fistulosum, E. serotinum, Solidago rugosa, S. gigantea, S. altissima, S. graminifolia, Juncus effusus, J. tenuis, J. acuminatus, J. torreyi, Sorghastrum, Panicum clandestinum, P. micrpocarpon, P. agrostoides, Scirpus spp., Carex vulpinoidea, C. scoparia, C. tribuloides, C. festucacea, C. lurida, C. lupulina, Eleocharis tenuis* s.l. and many others. Also present were *Gentiana saponaria* and *Platanthera peramoena.*

Explanation of Boundaries. This site is defined simply by the extent of contiguous bottomland forest, plus a minor amount of intermixed old-fields and pastures. The flatness of the bottom, and the fragipan soil, appear to have maintained swampy conditions across most of its width, largely hindering agricultural development.

Site Name: HOG HOLLOW STREAMHEADS; Fig. 7
Size: ca. 600 acres
County: Bath
USGS Quadrangles: Salt Lick, Ky.

Location. This area is located southwest of Cave Run Dam, on the low bend between the Licking River by the Fish Hatchery (to the north), and the mouth of Caney Creek (to the south). It includes most of the Hog Hollow watershed, and the small bottomland woods west of the gaging station on Licking River. Access is from KY 826 and the gravel road south of Cave Run Dam.

General Description. This relatively flat area lies on Mississippian siltstone and shale, within the Knobs Region. Flatter parts of the area also have alluvium deposited by the Licking River earlier in the Quaternary Period. It is physiographically similar to the more extensive "Sharkey Flats" north of Farmers and outside DBNF. Much of the flatter area was used to extract material for the Cave Run Dam construction, and now has been reclaimed with much lespedeza and pine. However, the surrounding streamheads have wet meadows with native species and the steeper ground is still wooded. All is owned by USFS.

Listed Animal Species

[*Haliaeetus leucocephalus*, Bald Eagle, overwintering]

Other Animal of Interest

Sorex longirostris, Southeastern Shrew

Listed Plant Species

Calamagrostis cinnoides, Nuttall's Reedgrass
Potamogeton pulcher, Spotted Pondweed
Rhynchospora globularis, Globe Beaked-rush

Two others may have occurred in the past:
[*Drosera intermedia*, Spoon-leaved Sundew, nearby, extirpated?]
[*Pogonia ophioglossoides*, Rose Pogonia, nearby, extirpated?]

Other Plants of Interest

Bartonia paniculata, Screwstem
Carex bromoides, Sedge
Panicum scoparium, Hairy Panic Grass (only site in district)
Sphagnum macrophyllum, a bog moss (only site in state)
Utricularia gibba, Bladderwort (only site in district)
Xyris difformis, Yellow-eyed grass (only site in state)
Xyris torta, Yellow-eyed grass

Biological Significance. Though much of this "flat" has been highly disturbed, the area defined here holds the best opportunity for conservation and restoration of the upland "marshes" and open, boggy streamhead woods that appear to have existed in the "flats" around Farmers and Sharkey. Historical evidence of this unusual vegetation, with rare species now unknown in the region, such as the *Pogonia* and *Drosera*, is noted above (Biogeography section). These "flats" contain small areas of

wet open woods, marshy meadows and small ponds with the rare species noted above. The original vegetation must have been similar to "boggy" streamheads on the Cumberland Plateau in southern DBNF, where soils may be still more acid and nutrient-poor. However, streamheads in the Farmers-Sharkey area differ in several of their rare species (including *Uvularia sessilifolia*, not yet found at Hog Hollow), and they have more *Spiraea tomentosa* and *Leersia* spp., and less ferns. Despite disturbance, their special quality is still evidenced by the occurrence of two plants unknown anywhere else in the state--*Sphagnum macrophyllum* and *Xyris difformis* (typical varieties in both cases). This is the most inland record in the eastern U.S. for *S. macrophyllum*, a species largely restricted to the Coastal Plain.

The nearby woods on the Licking River bottom are significant because the rest of the Licking River bottom in the district is now under water. In addition, these woods are frequently used by bald eagles in the winter. These woods of have canopy trees only 8-12 inches dbh, and are dominated by *Liriodendron*, with much *Pinus* spp., but *Fagus* is invading the understory. Of ecological interest is the dense strip of *Rhododendron maximum* along the riverbank of Devonian shale, a geological stratum where that species rarely occurs.

Notes on Vegetation. Frequent species in wet, brushy meadows and forest edges were as follows: *Eupatorium serotinum, E. album, E. rotundifolium* var. *ovatum, Bidens cf. polylepis, B. coronata, Solidago rugosa, S. graminifolia, Juncus effusus, J. acuminatus, Scirpus cyperinus, S. georgianus, Eleocharis obtusa, E. tenuis, Carex crinita, C. tribuloides, Andropogon glomeratus, A. gyrans, A. scoparius, Panicum scoparium, P. polyanthes, P. microcarpon, P. verrucosum, P. anceps, P. agrostoides* and *Sphagnum* spp. Minor species included *Spiraea tomentosa, Ludwigia alternifolia, Viola primulifolia, Rotala ramosior, Agalinis purpurea, Rhexia virginica, Galium tinctorium, Sagittari brevirostra, Spiranthes gracilis, Rhynchospora* spp., *Leersia* spp., *Calamgrostis cinnoides*, etc. (see also notes on *Xyris torta* from forest-field edges). (Drier old-fields in the Sharkey Flat area were found to have different composition, with frequent *Euphorbia corollata, Pycnanthemum incanum, Eupatorium fistulosum, Coreopsis tripteris, Sorghastrum*, etc.).

This site has higher *Sphagnum* species diversity than any other similar sized area known in DBNF. *S. recurvum* var. *recurvum* typically dominates the ground in streamhead seeps. *S. imbricatum* and *S. lescurii* often occur with *S. recurva. S. lescurii* is the most common species in wet open meadows. *S. russowii* and *S. fimbriatum* are infrequent at the margins of pools and on wet soil in the meadows. *S. macrophyllum* was also found in one of these pools in the meadows, covering about 40 ft^2.

Some of the woods on the north and west side of Hog Hollow are fairly mature, and locally dominated by *Fagus* trees 1-2 ft dbh, with *Quercus alba, Q. coccinea, Pinus echinata, Vaccinium vacillans*, etc., on drier ground. The springs and boggy ground in these woods had a dense ground cover of *Alnus, Ilex verticillata, Spiraea tomentosa, Osmunda cinnamomea, Thelypteris noveboracensis, Polystichum, Impatiens capensis, Juncus effusus* var. *pylaei, Carex bromoides, C. gracillima, Leersia virginica, Glyceria striata, Panicum microcarpon* and *Sphagnum* spp. Minor species included *Aronia melanocarpa, Viola cucullata, Oxypolis, Lycopus virginicus, Scutellaria lateriflora, Chelone, Platanthera clavellata, Scirpus polyphyllus, Carex crinita* var. *gynandra, C. debilis* var. *rudgei, C. lurida* var. *gracilis*, etc. The small artificial pond with *Potamogeton pulcher* (see species notes) is located below such an area.

In general, the drier flatwood remnants in this area had abundant *Liriodendron, Quercus alba, Acer rubrum* and lesser amounts of *Fagus, Q. falcata, Liquidambar, Oxydendron, Vaccinium* spp., etc. In places, the streamheads are eroded or otherwise disturbed, with much *Eulalia* and *Lonicera japonica* (exotics).

Explanation of Boundaries. It is difficult to locate an ecologically meaningful boundary, given the great disturbance on flatter ground. However, the line drawn here includes all known rare species sites, and it runs along watershed divides indicated by contour lines. More detailed survey of vegetation and hydrology is needed.

Site Name: BIG MOUNTAIN; Fig. 8
Size: ca. 640 acres
County: Bath
USGS Quadrangles: Olympia, Ky.

Location. This area is about 2 miles southwest of Olympia Springs, at the head of Mud Lick Creek and Clark Fork of Salt Lick Creek. It can be reached from gravel and dirt roads off KY 36, and from the Clarks Fork Road.

General Description. These hills are in a typical part of the Knobs Region, and are capped by Mississippian siltstone and limestone. Upper slopes are very steep, with small outcrops and rocky ground in places. The area is all forested, but has been frequently burned, so that scrubby growth and briars are widespread. Most of the site is privately owned, but about half (ca. 150 acres) of the central "Big Mountain" is part of Olympia State Forest, managed by the Kentucky Division of Forestry.

Listed Animal Species

None known but more sampling is needed; the area has excellent habitat for *Eumeces anthracinus* (Coal Skink) and *Sorex hoyi winnemana* (Pygmy Shrew).

Listed Plant Species

Calamagrostis porteri ssp. *insperata*, Porter's Reedgrass
[*Poa languida*, Drooping Bluegrass, nearby on lower slopes]
Silphium terebinthinaceum var. *lucy-brauniae*, Lucy Braun's Prairie Dock

Other Plants of Interest:

Carex gravida (var. *gravida*), Sedge (1/2 sites in district)
Carex tetanica (var. *meadii*?), Sedge
Phlox subulata var. *australis*, Moss Phlox

Biological Significance. The major feature of importance here is the large population of *Calamagrostis porteri* ssp. *insperata*, a candidate for federal protection (see species notes). This population is the largest known in Kentucky, and may be among the largest worldwide. In addition, the woods around Big Mountain include some moderately mature areas, though with a rather open, uneven canopy closure. Much of the woods on the drier ridges and south- or west-facing slopes have been burned frequently, and this fire regime, perhaps largely due to arson, may tend towards presettlement conditions. The rare flowering of *Calamagrostis porteri* ssp. *insperata* appears partly caused by increasing shade, which can result from fire suppression (see species notes). The occurrence of a few non-flowering plants of the prairie species, *Silphium terebinthinaceum*, suggests former grassy conditions, perhaps similar to the prairie remnants on Clack Mountain. Even the burned, scrubby woods that currently occur on the limestone ridges here have special ecological interest. These sites are relatively moist in places, with abundant *Fraxinus americana* and *Juglans nigra*, but, even in the understory, there is virtually no *Acer saccharum*, which is the expected, though fire-sensitive, climax dominant. Such woods may help us understand how similar vegetation occurred in the Bluegrass Region before settlement (Campbell 1989).

Notes on Vegetation. The forests in most of this area are disturbed, frequently burned, variants of the usual oak-hickory, former oak-chestnut and oak-ash types with more mesic beech-poplar and sugar maple on lower slopes. The chestnut oak forest variant with *Calamagrostis porteri* ssp. *insperata* has been described above (see Listed Species notes). Another unusual variant was found on the limestone ridges southwest of Big Mountain. Despite the topographic position, soils here appeared to be relatively moist and fertile. Woody species included frequent *Juglans nigra* (open canopy), *Fraxinus americana* (dominant) and *Ulmus rubra* (understory), with lesser amounts of *Juniperus*, *Robinia* and *Cercis*; herbaceous species included *Thalictrum revolutum* and *Parthenocissus* (both frequent), *Rubus occidentalis, Sanicula gregaria, Galium triflorum, Cacalia atriplicifolia, Festuca obtusa, Bromus purgans, Elymus hystrix, Panicum boscii*, etc. The complete absence of *Acer saccharum* was remarkable, and may have been caused by frequent fires, to which this species is known to be especially sensitive (Martin 1990). Similar forest conditions may have occurred on moist, fertile soils of the Inner Bluegrass before settlement (Campbell 1989).

Explanation of Boundaries. The boundaries enclose all known rare species locations along this ridge. It encloses all of the more mature forest of Big Mountain, and it extends south of South Knob to include some forest that appears to have been burned particularly often.

Site Name: WARIX RUN/CLAYLICK CLIFFS; Fig. 9
Size: ca. 930 acres
County: Rowan
USGS Quadrangles: Bangor, Ky.

Location. These hills are on the east side of Licking River (Cave Run Lake), between Warix Run and Claylick Branch. Old House Hollow forms the north-central section of this site. The site is about a mile across in both directions. Access is from KY 801 at the Warix Run Boat Ramp, and from the road down to Claylick Boat Ramp.

General Description. The site is at the eastern side of the Knobs Region, in transition to the Cliff Section. It consists of several small tributary watersheds, with narrow ridges capped by siltstone and limestone. The area is almost all forested, except for a few grassy outcrops. A few houses and clearings lie along the southeastern margin. The area is mostly owned by USFS.

Listed Animal Species

Mustela nivalis, Least Weasel
[*Neotoma floridana magister*, Eastern Wood Rat, nearby]

Listed Plant Species

Bouteloua curtipendula, Side-oats Grama
Calamagrostis porteri ssp. *insperata*, Porter's Reedgrass
Lilium philadelphicum, Wood Lily
Oryzopsis racemosa, Black-fruit Mountain-ricegrass
Thaspium pinnatifidum, Cutleaf Meadow-parsnip

Other Plants of Interest

Carex gravida (var. *gravida)*, Sedge (1/2 sites known in district)
Carex tetanica (var. *meadii*?), Sedge
Carex woodii, Sedge
[*Hydrastis canadensis*, Goldenseal, nearby]
Solidago harrisii, Harris' Goldenrod

Biological Significance. This area is a good example of dissected land in this section of the Knobs Region. Of particular interest are the several rare plant species, which mostly occur in rocky woods or on clifftops. To some extent, the area resembles the Grassy Knob Ridge System of the Stanton District (Campbell et al. 1989), which is more extensive, more rugged and has several additional rare species. However, the presence of *Thaspium pinnatifidum* in this part of the Morehead District is distinctive, as are the extensive siltstone ridges.

Notes on Vegetation. The open grassy woodland on limestone clifftops in this area (also on Wilson Hill and 1.5 miles to the SSE) included the following species: *Juniperus* (abundant), *Cercis, Quercus muhlenbergii, Ostrya, Celtis tenuifolia, Ulmus rubra, Rhamnus caroliniana, Viburnum rufidulum?, Rhus* spp., *Parthenocissus, Anemone virginiana, Desmodium* spp., *Arenaria patula, Euphorbia corollata, Zizia aptera, Thaspium pinnatifidum, Matelea obliqua, Lithospermum canescens, Isanthus, Verbena simplex, Aureolaria flava, Houstonia nigricans, H. canadensis, Helianthus* spp., *Aster oblongifolius* (locally dominant), *A. patens, A. linearifolius, Solidago sphacelata, Ambrosia*

artemisiifolia, Allium cernuum, Agave, Sisirynchium albidum, Scleria triglomerata, Carex tetanica, Bouteloua, Sorghastrum, Andropogon scoparius (locally dominant), *Panicum boscii, Pellaea atropurpurea, Polypodium polypodoides* and several mosses (*Rhytidium rugosum, Orthotrichum strangulatum, Pleurochaete squarrosa, Grimmia alpicola*) and blue-green alga (*Nostoc*). In addition, a northern moss rare in Kentucky, *Thuidium abietinum*, was found by A. Risk half a mile to the south, on Wilson Hill. (A. Risk also found this moss recently on Ravenna Knob, in the Stanton District.)

Explanation of Boundaries. These are drawn to include the cluster of rare species records, and to include complete watersheds around this cluster.

Site Name: CLACK MOUNTAIN; Fig. 10
Size: ca. 600 acres
County: Rowan
USGS Quadrangles: Bangor, Ky.; Morehead, Ky.

Location. This ridge system includes KY 1274, from its intersection with KY 519 south to its intersection with KY 801. It includes USFS 16 (gravel) west of KY 1274, to a mile east of its intersection with KY 801. It also includes Lockegee Rock, which is connected by a short trail to USFS 16.

General Description. These roads lie along ridges in the broad transition from Knobs Region to Appalachian Plateau. The ridges are mostly underain by siltstone and limestone, though with a few sandstone knobs as well. Lockegee Rock is the most prominent sandstone knob in this area. There is also a small, though significant, limestone cave at the southern end. Most of the road is lined by forest or brushy vegetation, and, except on the east side of KY 1274, most land is owned by USFS.

Listed Animal Species

Aneides aeneus, Green Salamander
Myotis septentrionalis, Northern Long-eared Bat
Neotoma floridana magister, Eastern Wood Rat
Plecotus rafinesquii, Rafinesque's Big-eared Bat
Plecotus townsendii virginianus, Virginia Big-eared Bat
Sorex hoyi winnemana, Pygmy Shrew

Other Animal of Interest

Lasionycteris noctivagans, Silver-haired Bat (using the cave)

Listed Plant Species

Calamagrostis porteri ssp. *insperata*, Porter's Reedgrass
Dichanthelium boreale, Northern Witchgrass
Gentiana alba, Yellow Gentian
Lilium philadelphicum, Wood Lily (extirpated?)
Silphium terebinthinaceum var. *lucy-brauniae*, Lucy Braun's Prairie Dock
Thaspium pinnatifidum, Cutleaf Meadow-parsnip

Other Plants of Interest

Aster laevis var. *concinnus*, Smooth Aster
Carex tetanica, Sedge
[*Cornus racemosa*, Red Osier, old record, nearby?]
Cirsium carolinianum, Carolina Thistle
[*Cyperus plukenetii*, Umbrella-sedge, id. needs confirmation]
Eryngium yuccaefolium, Rattlesnake Master (only site in NE Ky.)
Helianthus grosseserratus, Sunflower (only site in NE Ky.)
Juncus bufonius, Toad Rush
Phaseolus polystachios, Wild Bean
Phlox subulata, Moss Phlox (old records only?)
Solidago speciosa var. *s.*, Goldenrod (only locality in NE Ky.?)

Biological Significance. The importance of this area was initially documented by Braun (1943, 1950). Although artificial in current maintenance, there are strips of native grassy vegetation in several places along the roads. These appear to be the only remnants of a kind of limestone prairie that is inferred to have existed here before settlement (see Biogeography section above). The only similar prairie remnants known in DBNF are the small (1/10 acre) patch below "White Oak Cliffs" (Grassy Knob Ridge System in Stanton District), and perhaps the Cave Run Glades (see below). The moderately deep limestone soils, dense tall-grass cover, abundance of *Silphium terebinthinaceum*, and presence of certain rare species, all make these remnants distinct from more rocky calcareous glades and from grassland remnants of non-calcareous soils.

There is only one patch of grassland that appears to have largely escaped serious soil disturbance (half a mile SE of USFS 16). This half-acre patch is the only site in DBNF known to have *Gentiana alba*. Other grassy sections of these roadsides have been quarried for limestone and clay, or greatly disturbed by the road-building itself. However, native grassland species generally dominate in the secondary vegetation on these disturbed sites. This whole roadside system could become managed to maintain and enhance this native grassland aspect. Fire, which was presumably involved in the original grasslands before settlment, could be used to try and extend the grassland into adjacent forest strips.

Lockegee Rock is an area that has been well-known to biologists for several decades. It has excellent habitat for green salamanders and woodrats. Some plants typical of the roadside-prairies have been found near here. In addition, a remarkable series of *Asplenium* hybrids have been found on the sandstone and limestone outcrops: X *ebenoides*, X *gravesii*, X *trudellii* and X *wherryi* (L. Meade 128 (MRE), 27 Sep 1971, along trail to Lockegee Rock). The hybrid X *wherryi* has few other Kentucky records: A. Risk 5399 (MRE), 7 Jun 1991; sandstone boulder on N-facing slope, Elm Log Branch, Morgan Co.; L. Meade (MRE), Cascade Cave, Carter Co.; and Lee/Powell Co. (Cranfill 1980). West of Lockegee Rock, there is population of *Calamagrostis porteri* ssp. *insperata* along the road, making this by far the most accessible population for study in Kentucky.

At the northern and southern ends of this site, there are two sites with colonies of rare bats. During each winter of the past decade, the Clack Mountain Railroad Tunnel has habored 10-20 Rafinesque's Big-eared Bats. This tunnel is also used by Northern Long-eared Bats in the summer. The Silver-haired Cave has consistently habored a few individuals of Rafinesque's Big-eared Bats.

Notes on Vegetation. The "best" prairie patch appears to be slowly filling in with *Pinus virginiana*, *Diospyros*, *Sassafras*, *Cercis*, *Ostrya* and other species successional to oak-hickory and oak-ash forest types. However, it still has abundant *Silphium terebinthinaceum* and *Andropogon gerardii*, frequent *Asclepias tuberosus*, *Phlox pilosa*, *Physostegia*, *Aster laevis* (some var. *concinnus*), *Solidago rigida* and *Sorghastrum nutans*. Other species of the open areas include *Salix humilis*, *Ceanothus americanus*, *Anemone virginiana*, *Thalictrum revolutum*, *Melilotus* spp.*, *Desmodium paniculatum*, *D. marilandicum*, *Lespedeza procumbens/repens*, *Euphorbia corollata*, *Viola triloba*, *Eryngium yuccaefolium*, *Zizia aptera*, *Daucus carota**, *Gentiana alba*, *Asclepias syriaca*, *A. viridiflora*, *Apocynum cannabinum*, *Matelea obliqua*, *Lithospermum canescens*, *Convolvulus spithameus*, *Scutellaria incana* var. *incana*, *Salvia lyrata*, *Helianthus divaricatus*, *H. hirsutus*, *Coreopsis tripteris*, *Silphium trifoliatum*, *Echinacea purpurea*, *Rudbeckia hirta* var. *serotina*, *Liatris X spheroidea* (? = *aspera x spicata*, see Gaiser 1946; collected here by Braun in 1936/1950 and by A. Risk in 1991, this is only known Ky. locality), *Solidago ulmifolia*, *S. altissima*, *Aster phlogifolius*, *A. patens*,

Erigeron strigosus, Senecio anomalus, Cirsium discolor, Leucanthemum vulgare, Scirpus lineatus, Scleria triglomerata, Carex nigro-marginata, C. tetanica, Festuca arundinacea**, etc. (The few exotic species in this list are shown by asterisks*.) The relatively tall stature of many plants in this prairie is notable, as is the virtual absence of *Liatris squarrosa, Andropogon scoparius* and other shorter species.

Additional species typical of native grassy roadsides in this area include *Desmodium cuspidatum, Phaseolus polystachios, Thaspium pinnatifidum, Taenidia integerrima, Ipomaea pandurata, Liatris squarrosa, L. aspera, Aster novae-angliae, Solidago speciosa, Cirsium altissima, C. discolor, C. caroliniana, Agave, Sisirynchium* spp., *Carex hirsutella, Sporobolus* spp., *Andropogon scoparius*, etc.

Explanation of Boundaries. These include all rare plant sites along the roads, and all sites where the tall native prairie species remain dominant. It may be reasonable in the future to consider restoring prairie along most of this road, and even converting some adjacent forest. The width of the roadside corridor on the map includes most of the deeper, calcareous soil and indicates the maximum width to which restoration might be considered.

Site Name: CAVE RUN GLADES; Fig. 11a
Size: ca. 40 acres
County: Bath
USGS Quadrangles: Salt Lick, Ky.

Location. This area lies between Buck Creek and Big Cave Run, 4-5 miles due south of Cave Run Dam. It can be reached from KY 211 to USFS 129 and USFS 918, which passes near both glades.

General Description. These hills lie in the transition from Knobs Region to Cliff Section, and are rimmed with limestone outcrops and topped by a sandstone knob (Tater Knob). The area is all forested and owned by USFS. The forests are relatively young and brushy in places.

Listed Plant Species

Lilium philadelphicum, Wood Lily

Other Plants of Interest

Carex tetanica (var. *meadii*?), Sedge
Cirsium carolinianum, Carolina Thistle

Biological Significance. These two limestone glades are the only good examples of such vegetation found in the Morehead District, apart from the Clack Mountain roadsides, which have generally deeper soils. They have been observed for several years (M. Evans, pers. comm.), and management has recently begun to increase their size, with fire, tree cutting and poisoning the exotic, *Coronilla varia*. A few rare species have been found here in recent years: *Lilium philadelphicum* (though not relocated in 1991), *Cirsium carolinianum* (E glade) and *Carex tetanica* (var. *meadii*?, E glade). Also, D. Taylor reported seeing *Philadelphus hirsutus* near here.

Notes on Vegetation. Frequent species in these glades included *Andropogon scoparius, A. gerardii, Carex pennsylvanicum, C. tetanica* (var. *meadii*?), *Arenaria patula, Senecio anonymus* (W glade) and the exotic, *Coronilla varia* (especially in E glade, where USFS has recently begun eradication). *Thalictrum revolutum* and *Eupatorium rugosum* were frequent at lower edges of west and east glades, respectively. Other species included *Anemone virginiana, Desmodium rotundifolium, Lespedeza* spp., *Orbexilum pedunculatum, Viola triloba, Convolvulus spithameus, Ipomaea pandurata, Asclepias verticillata, Lithospermum canescens, Physalis heterophylla* var. *ambigua, Ruellia* spp., *Phlox pilosa, Monarda fistulosa, M. russeliana, Lobelia spicata, Helianthus* spp., *Eupatorium sessilifoluim, Liatris squarrosa, L. aspera, Aster laevis, A. patens, Solidago rigida, Allium canadense, A. cernuum, Sisyrinchium albidum, Scleria nitida, Carex hirsutella, C. pennsylvanica, C. cf. umbellata, Sphenopholis nitida, Tridens flavus, Muhlenbergia sobolifera, Sporobolus asper, S. vaginaeflorus s.l., Sorghastrum, Panicum flexile*, etc. The surrounding forest is a mixture of oak-hickory and oak-ash types, with occasional *Juniperus* and *Pinus virginiana* colonizing the open area.

Explanation of Boundaries. The site defined here is confined to the two glades, plus the connecting roadside corridor where prairie restoration might reasonably be attempted. Note: the adjacent Trough Lick watershed, north of the road, may ultimately become a significant area (see introduction to this section).

Site Name: CHESTNUT CLIFFS; Fig. 11b.
Size: ca. 520 acres
County: Menifee
USGS Quadrangles: Salt Lick, Ky.

Location. This area lies between Leatherwood Creek and Buck Creek, about six miles due south of Cave Run Dam. It can be reached from KY 211 to USFS 129 and other gravel roads.

General Description. This hill is an outlying piece of the Cliff Section, rimmed with sandstone cliffs. The area is all forested and owned by USFS. There are some clearcuts nearby, especially on the north side.

Listed Animal Species

Aneides aeneus, Green Salamander
Myotis septentrionalis, Northern Long-eared Bat
Neotoma floridana magister, Eastern Wood Rat
Plecotus rafinesquii, Rafinesque's Big-eared Bat (summer)
[*Plecotus townsendii virginianus*, Virginia Big-eared Bat, marginal use?]

Listed Plant Species

Juniperus communis, Ground Juniper
Monotropsis odorata, Sweet Pinesap

Other Plants of Interest

[*Carex bromoides*, Sedge, nearby]
Hydrastis canadensis, Goldseal (large population)

Biological Significance. Along the clifftops, at the edge of *Pinus virginiana* forest, this area has the best concentration of *Juniperus communis* plants found in the Morehead District (see Flora: Listed Species). Except for a few other plants on the Salt Lick Quadrangle, the only other known location for this species in the state in the Somerset District. *Monotropsis* is also known from very few records in the state, though this early flowering species is easily overlooked. At the base of the sandstone cliffs, there is at least one small cave with a small summer colony of Rafinesque's Big-eared Bats, plus an occasional Virginia Big-eared Bat. The Green Salamander has a particularly healthy population, occuring under rocks and in a small limestone cave, in addition to the usual sandstone cliff-face crevices. Except for clearcuts along its northern side, this area has forest of slightly above average maturity for the region, with trees up to 1-2 ft dbh in places. On the south-facing slopes below the cliffs, white pine is a frequent addition to the more usual oaks, beech, maples and hemlock.

Explanation of Boundaries. These enclose the whole sandstone cliffline of this hill, plus the forested hollows that surround it.

Site Name: DONAHUE CAVE/MINE BRANCH AREA; Fig. 12
Size: ca. 1400 acres
County: Morgan
USGS Quadrangles: Bangor, Ky.

Location. This area lies along the south side of the main stem of Licking River, from half a mile upstream of the North Fork, to near to mouth of Bear Branch. Access from KY 1274 to USFS 933.

General Description. This is a rugged example of land in the Cliff Section. The Mine Branch-Bear Branch ravine may well be an ancient channel of the Licking River. The sandstone cliffline is particularly convoluted in places, and there are several small caves along it, in addition to a limestone cave in Mine Branch. The area is all forested and mostly owned by USFS. The bottoms along Mine Branch and Bear Branch appear to have been farmed several decades ago. There have been recent clearcuts along the south side, with some disturbance (slash fill) along clifftops and smaller cave entrances.

Listed Animal Species

Aneides aeneus, Green Salamander
Myotis septentrionalis, Northern Long-eared Bat
Neotoma floridana magister, Eastern Wood Rat
Plecotus rafinesquii, Rafinesque's Big-eared Bat
Plecotus townsendii virginianus, Virginia Big-eared Bat

Other Animal of Interest

Lasionycteris noctivagans, Silver-haired Bat

Listed Plant Species

Circaea alpina, Small Enchanter's Nightshade
Glyceria melicaria, Slender Manna Grass

Other species of interest

[*Carex scabrata*, Sedge, nearby]

Biological Significance. Donahue Cave is a sandstone cave with a relatively large hibernating colony of Rafinesque's Big-eared Bats. The maternity site for these bats has not yet been definitely located (but see Beaver Creek area). Mine Branch Cave, in limestone, is used by other rare bat species. The Mine/Bear Branch ravine may have a relatively cool microclimate, since it harbors two northern plant species, which have little or no record elsewhere in the district. Several swampy or boggy areas occur along Mine Branch and Bear Branch. Further exploration of this complex area is likely to reveal more features of interest.

Notes on Vegetation. The swampy area at the head of Mine Branch had much *Osmunda cinnamomea* and *Theypteris noveboracensis*, under partial shade of *Magnolia macrophylla, Acer rubrum, Quercus alba, Carya tomentosa, Oxydendron, Clethra, Vaccinium corymbosum*, etc. Other species included *Lycopodium obscurum, Athyrium asplenioides, Tiarella, Amphicarpaea, Polygonum caespitosum, P. sagittatum, Hypericum mutilum, Viola blanda, Oxypolis, Lycopus virginicus, Senecio aureus, Platanthera clavellata, Juncus effusus, Scirpus polyphyllus, Carex crinita, C. scabrata,*

Glyceria spp., *Agrostis perennans, Panicum clandestinum, P. microcarpon*, etc.

Explanation of Boundaries. Centered on the two most significant caves, this area is drawn to include sufficient cliffline and stream corridor for support of rare bat populations. Its design also includes a great variety of topography, which, although not yet thoroughly explored, will likely provide a relatively high diversity of species and communities.

Site Name: CRANEY CREEK RAVINES; Fig. 13
Size: ca. 4100 acres
County: Rowan
USGS Quadrangles: Wrigley, Ky.

Location. This large area lies north of the North Fork, Licking River at "Craney". It includes much rugged land along Minor Creek, Craney Creek and Upper Lick Fork. Access is by several gravel and dirt roads from KY 519 north of Cave Run Lake, and from KY 1167 east of Morehead.

General Description. This area has typical rugged topography of the Cliff Section, with sandstone cliffs lining all the hollows and ravines. Limestone occurs at lower elevations, but in a relatively thin layer, with little or no cave development. The area is almost all forested, and most is owned by USFS. However, there has been much logging in past decades, and there appear to be no forests that unusually old for the district. On private land along upper Minor Creek, there has been some particularly destructive logging in recent years, causing much siltation in the creek.

Listed Animal Species

Accipiter striatus, Sharp-shinned Hawk
Aneides aeneus, Green Salamander
Clinostomus elongatus, Redside Dace.
Neotoma floridana magister, Eastern Wood Rat
Plecotus rafinesquii, Rafinesque's Big-eared Bat (nearby)
Sorex hoyi winnemana, Pygmy Shrew
Ursus americanus, Black Bear

Also, rare aquatic species of the Licking River system might still survive in lower sections of Craney and Minor Creeks (see notes on individual species in results section).

Other Animal of Interest

Desmognathus ochrophaeus, Mountain Dusky Salamander

Listed Plant Species

[*Carex triangularis*, Sedge, needs confirmation]
(*Dryopteris spinulosa X intermedia*, Spinulose Wood Fern hybrid)
Scirpus expansus, Woodland Beakrush
Taxus canadensis, Canadian Yew
Trichomanes boschianum, Filmy Fern

Other Plants of Interest

Carex bromoides, Sedge
Carex scabrata, Sedge
Carex woodii, Sedge
Crataegus calpodendron, Rocky Bank Hawthorn
Isoetes engelmannii, Quillwort
Phlox stolonifera, Running Mountain Phlox
Thelypteris palustris, Marsh Fern

Biological Significance. This is a large area that has a wide scattering of rare species occurrences. The redside dace has significant populations in Upper Lick Fork, Craney Creek, Minor Creek, and their tributaries. A particularly large population was found in upper Minor Creek. Recent indications of black bear suggest that this large, relatively remote area could become important for the recovering population. Among the several rare plants found here, the occurrence of *Taxus canadensis* is most notable, since it is unknown elsewhere in the district.

Notes on Vegetation. Interesting bottomland forest variants were found along Upper Lick Fork. At the mouth of Laurel Hollow, there was an open forest of *Platanus* and *Alnus*, with frequent *Isoetes* and small patches of *Thelypteris palustris* and *Scirpus expansus*. Below Blacklog Hollow, there was forest dominated by *Tsuga* (12-20 inches dbh), with *Liriodendron, Fagus, Quercus alba, Acer saccharum, Lindera*, etc.; the ground was dominated by *Meehania*, with frequent *Thelypteris noveboracensis, Tiarella* and *Carex woodii*.

Explanation of Boundaries. The extensive boundaries are needed to enclose the diffuse cluster of rare species occurrences, and the potentially significant clifflines that link this whole area. More exploration of this relatively inaccessible study area is needed, especially for rare bat populations. The White Pine Branch area, and other areas west of Upper Lick Fork, should also be reexamined. It is likely that boundaries may be changed considerably after better sampling.

Site Name: BEAVER CREEK AREA (CAVE RUN LAKE); Fig. 14
Size: ca. 7700 acres
County: Menifee
USGS Quadrangles: Scranton, Ezel, Salt Lick and Bangor, Ky.

Location. Centered on Beaver Creek, this large area includes parts of Murder Branch, Skidmore Creek and Meyers Fork (with Brewer's Hollow). Access by road is from KY 1240 and KY 1274, northeast of Frenchburg.

General Description. This area is in the Cliff Section, with extensive sandstone cliffs along all valleys. Limestone occurs at lower elevations, but, except for Murder Branch Cave, there are no cave systems. The area is almost all forested, and about half is owned by USFS.

Listed Animal Species

[*Accipiter striatus*, Sharp-shinned Hawk, nearby]
Aneides aeneus, Green Salamander
Clinostomus elongatus, Redside Dace
[*Myotis leibii*, Eastern Small-footed Bat, nearby]
Myotis septentrionalis, Northern Long-eared Bat
Myotis sodalis, Indiana Bat
Neotoma floridana magister, Eastern Wood Rat
Plecotus rafinesquii, Rafinesque's Big-eared Bat
Plecotus townsendii virginianus, Virginia Big-eared Bat
Sorex hoyi winnemana, Pygmy Shrew
Ursus americanus, Black Bear

Other Animal of Interest

Eurycea lucifuga, Cave Salamander (rare occurrence on sandstone)

Listed Plant Species

Scutellaria saxatilis, Rock Skullcap (tending to *S. arguta*)

Plants of Interest

[*Carex bromoides*, Sedge, nearby]
[*Carex scabrata*, Sedge, nearby]
Cimicifuga americana, Mountain Bugbane
Isoetes englemannii, Quillwort

Biological Significance. This area has significant potential for recovery of some rare animal species' populations. This is the only area in the Morehead District with a cluster of recent Virginia Big-eared Bat records. It is likely that hibernation and maternity colonies occur along the sandstone cliffs, though searching for these has been unsuccessful so far. Several sandstone rockshelters have been found with small hibernacula and probable maternity colonies of Rafinesque's Big-eared Bat (see species notes). Murder Branch Cave is the largest cave known in the district. It has a relatively large number of hibernating bats, but with only small numbers of rare species. Recent signs of black bear in this area suggest that more remote parts could become important for the recovering population.

Notes on Vegetation. No outstanding botanical features are known here, but more exploration is warranted. The Federal Candidate, *Scutellaria saxatilis*, has not been relocated, but there is much suitable habitat. Several 1-10 acre patches of older forest occur on north-facing slopes in this area, with 2-3 (rarely 4) ft dbh trees of *Fagus* and other species. These were found in Kendrick Hollow and nearby along Meyers Fork, in Taylor Hollow, and to NW on other side of Kendrick Ridge (with rich herb layer including *Dryopteris goldiana* and *Jeffersonia diphylla*).

Explanation of Boundaries. These simply enclose the area where Virginia Big-eared Bats have been seen. Additional, minor considerations are integrity of watersheds and clifflines. Further exploration, especially for rare bats, could lead to substantial modifications of these boundaries.

Site Name: BOTTS FORK; Fig. 15
Size: ca. 560 acres
County: Menifee
USGS Quadrangles: Scranton, Ky.

Location. Botts Fork is a tributary of Brushy Fork of Beaver Creek. It is 5-6 miles due east of Frenchburg, and can be reached from US 460 to KY 1240.

General Description. This ravine lies on the eastern side of the Cliff Section. There is a fairly spectacular waterfall at the head. The sandstone cliffline is well developed, but with relatively little undercutting. The surrounding ridges are relatively broad and rolling. The ravine is all forested and mostly owned by USFS. The uplands included here are still forested, though all are privately owned, and some areas above the falls were recently logged.

Listed Animal Species

Clinostomus elongatus, Redside Dace.
Neotoma floridana magister, Eastern Wood Rat
Sorex hoyi winnemana, Pygmy Shrew

Listed Plant Species

Circaea alpina, Small Enchanter's Nightshade
Dodecatheon frenchii, French's Shooting Star

Biological Significance. This area has the only known population of *Dodecatheon frenchii* in DBNF, and one of the three *Circaea alpina* populations known in Morehead District. The stream supports a healthy population of the redside dace. The forests within the ravine are not particularly mature, except for ca. 30 acres of older towards the downstream end, with frequent 1-2 ft dbh trees of *Fagus*. There has been little or no logging of Botts Fork since the 1930s. Common species included *Liriodendron, Tsuga, Fagus, Rhododendron, Dryopteris intermedia, Asarum, Hepatica acutiloba, Meehania, Carex plantaginea*, etc.

Explanation of Boundaries. These include all of the ravine, plus a forested upland rim up to 1000 ft wide.

Site Name: SPAWS CREEK; Fig. 16
Size: ca. 580 acres (2200 acres in watershed)
County: Menifee and Morgan
USGS Quadrangles: Ezel, Ky.

Location. Spaws Creek is a tributary of Open Fork of Licking River. Access is from KY 1693 (west of Frenchburg between US 421 and KY 1274) and from connecting unpaved roads.

General Description. This watershed lies in the Cliff Section, and has a typical rugged ravine along the creek, and low hills on the surrounding uplands. The ravine and most of the northern watershed is forested and owned by USFS. Only about half of the southern watershed is forested, and little is owned by USFS.

Listed Animal Species:

Aneides aeneus, Green Salamander
Clinostomus elongatus, Redside Dace.
Myotis leibii, Eastern Small-footed Bat
Myotis septentrionalis, Northern Long-eared Bat
Myotis sodalis, Indiana Bat
Neotoma floridana magister, Eastern Wood Rat

Other Animal of Interest

Desmognathus ochrophaeus, Mountain Dusky Salamander

Listed Plant Species:

Trichomanes boschianum, Filmy Fern

Other Plants of Interest

Carex bromoides, Sedge
Cimicifuga americana, Mountain Bugbane
Oxalis montana, White Wood-sorrel

Biological Significance. This ravine has some of the most mature forest remaining in the district, with 2-3 ft dbh trees (*Tsuga, Fagus, Quercus montana, Acer rubrum*) scattered through certain sections. It appears to have a relatively cool microclimate, with a large population of the northern herb, *Oxalis montana*. The cliffs and small limestone caves provide habitat for rare bat species, including small numbers of the Federally Endangered Indiana Bat and the Federal Candidate, Eastern Small-footed Bat. Water temperatures are relatively low, and the fish fauna indicates undisturbed, natural water quality, with an excellent population of the redside dace. This, and perhaps Yocum Creek, appear to be among the highest quality streams in the district, and are among the last within the Morehead Ranger District that have not been made accessible by logging roads in recent decades. This watershed would be the best candidate for conservation within the Cliff Section of the district.

Notes on Vegetation. Frequent woody species in the ravine were *Tsuga, Fagus* and *Rhododendron*. Others included *Pinus strobus, Magnolia* spp., *Platanus, Betula* spp., *Quercus rubra, Q. montana, Acer* spp., *Tilia*, etc. Frequent herbaceous species included *Dryopteris intermedia, Thelypteris, Laportea, Tiarella, Geranium maculatum, Oxalis montana, Viola blanda, Meehania, Aster*

divaricatus, Luzula acuminata, Carex plantaginea and many others (see also notes on *Oxalis montana*). Notable species along or near the cliffline included *Ilex montana, Selaginella, Lycopodium porophilum, Cystopteris tenneseensis* (limestone and sandstone), *Asplenium pinnatifidum, Chenopodium hybridum*, etc. (For a more complete list, see field notes filed at KSPNC).

Explanation of Boundaries. The features of special biological interest are confined to the ravine itself. However, the whole watershed will need consideration, at least for monitoring water quality impacts, if special management plans are ever proposed.

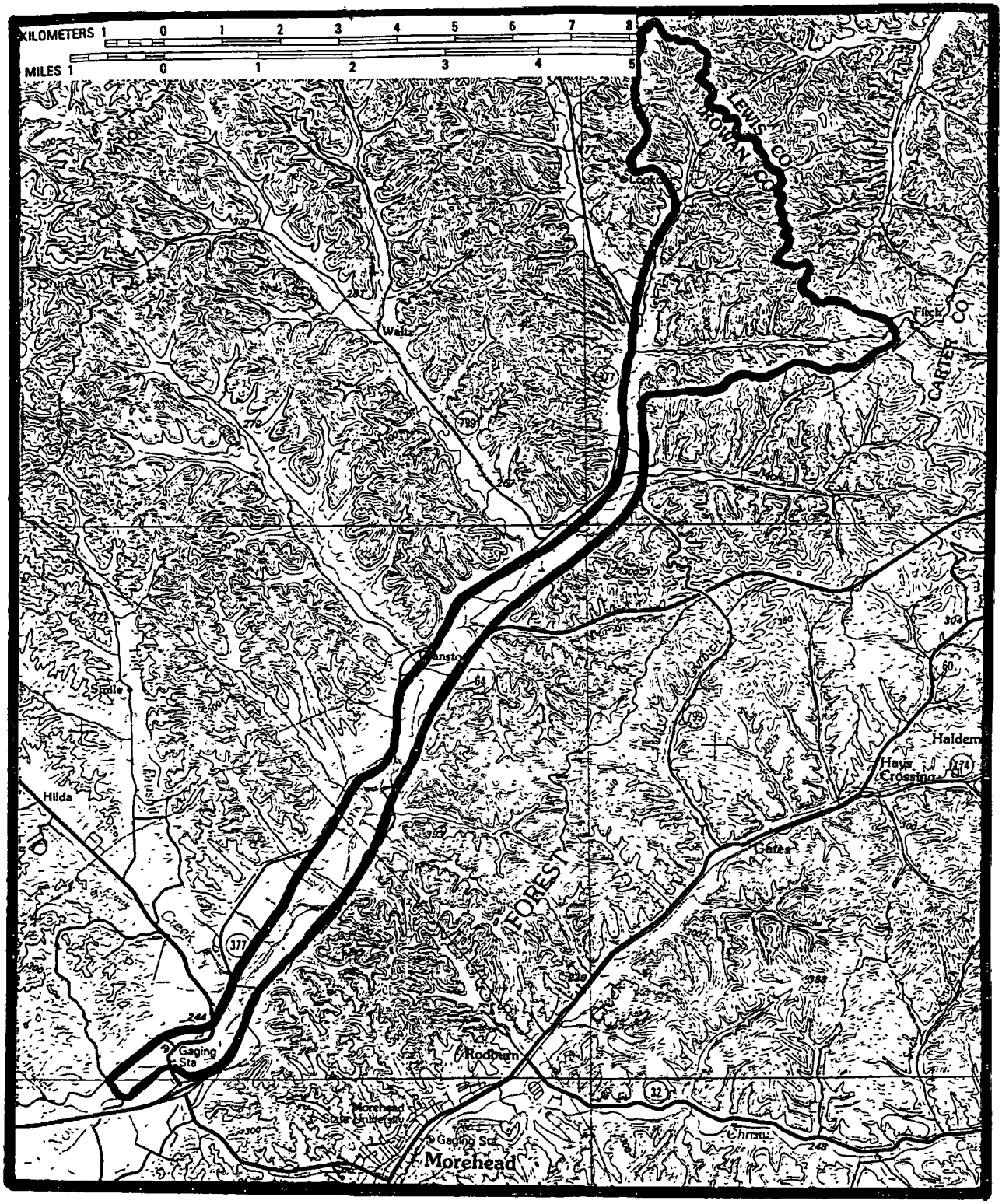

Figure 5. Map of the North Fork, Triplett Creek Corridor showing significant area. Morehead, Ky. 30 X 60 Minute Topographic Quadrangle.

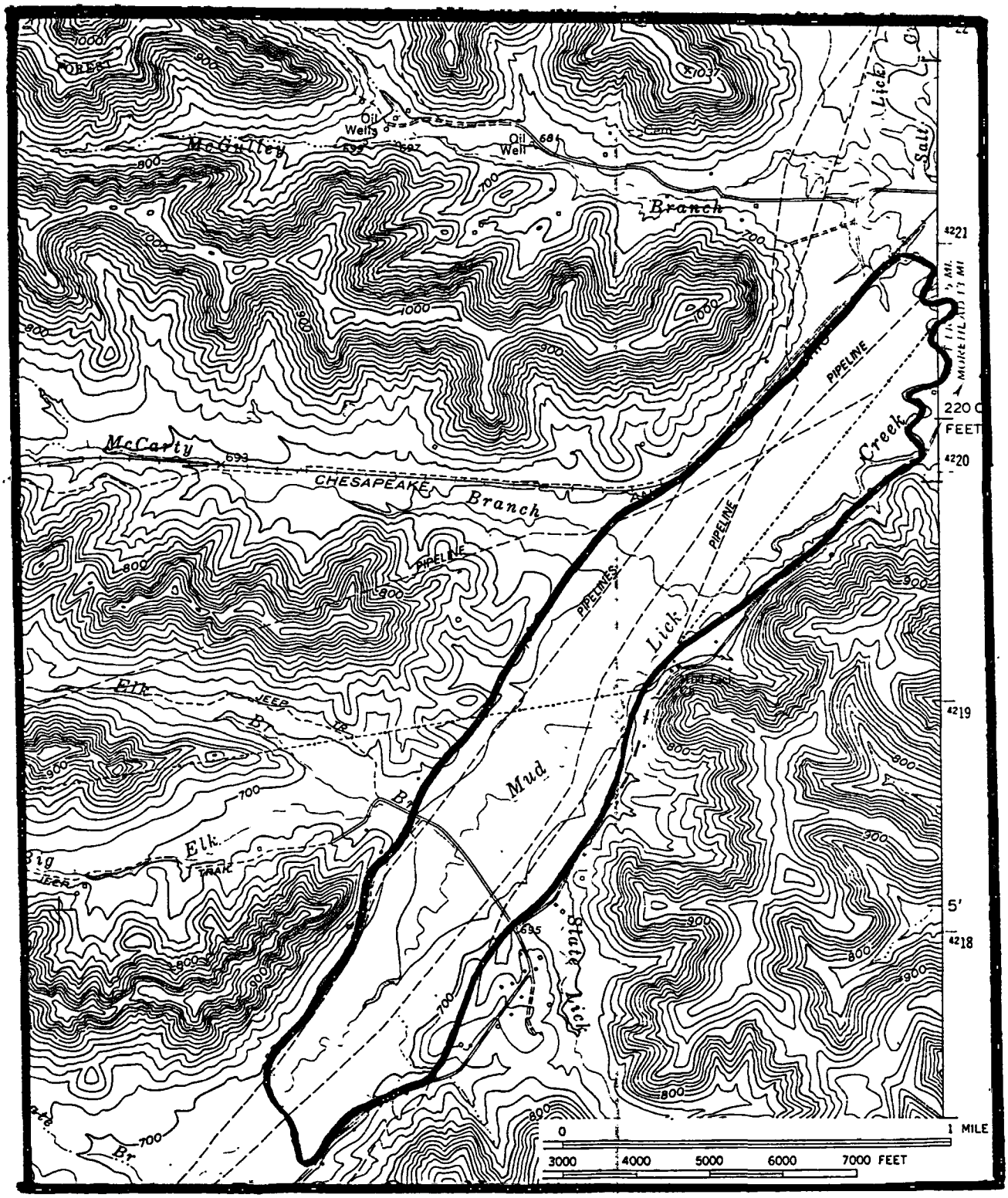

Figure 6. Map of the Mud Lick Creek Bottomland Forest showing significant area. Olympia, Ky. USGS 7.5 Minute Topographic Quadrangle.

Figure 7. Map of the Hog Hollow Streamheads showing significant area.
Salt Lick, Ky. USGS 7.5 Minute Topographic Quadrangle.

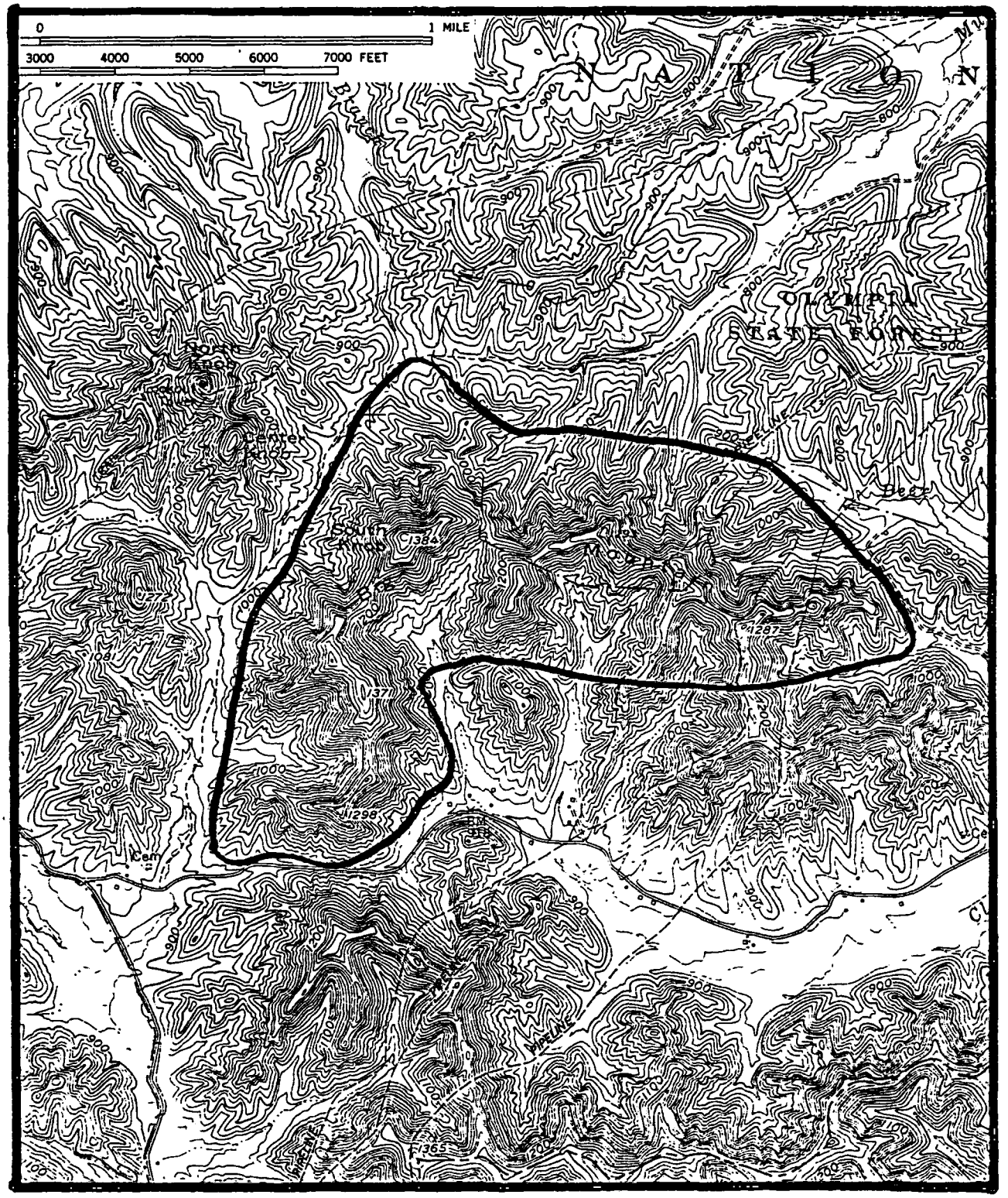

Figure 8. Map of Big Mountain showing significant area.
Olympia, Ky. USGS 7.5 Minute Topographic Quadrangle.

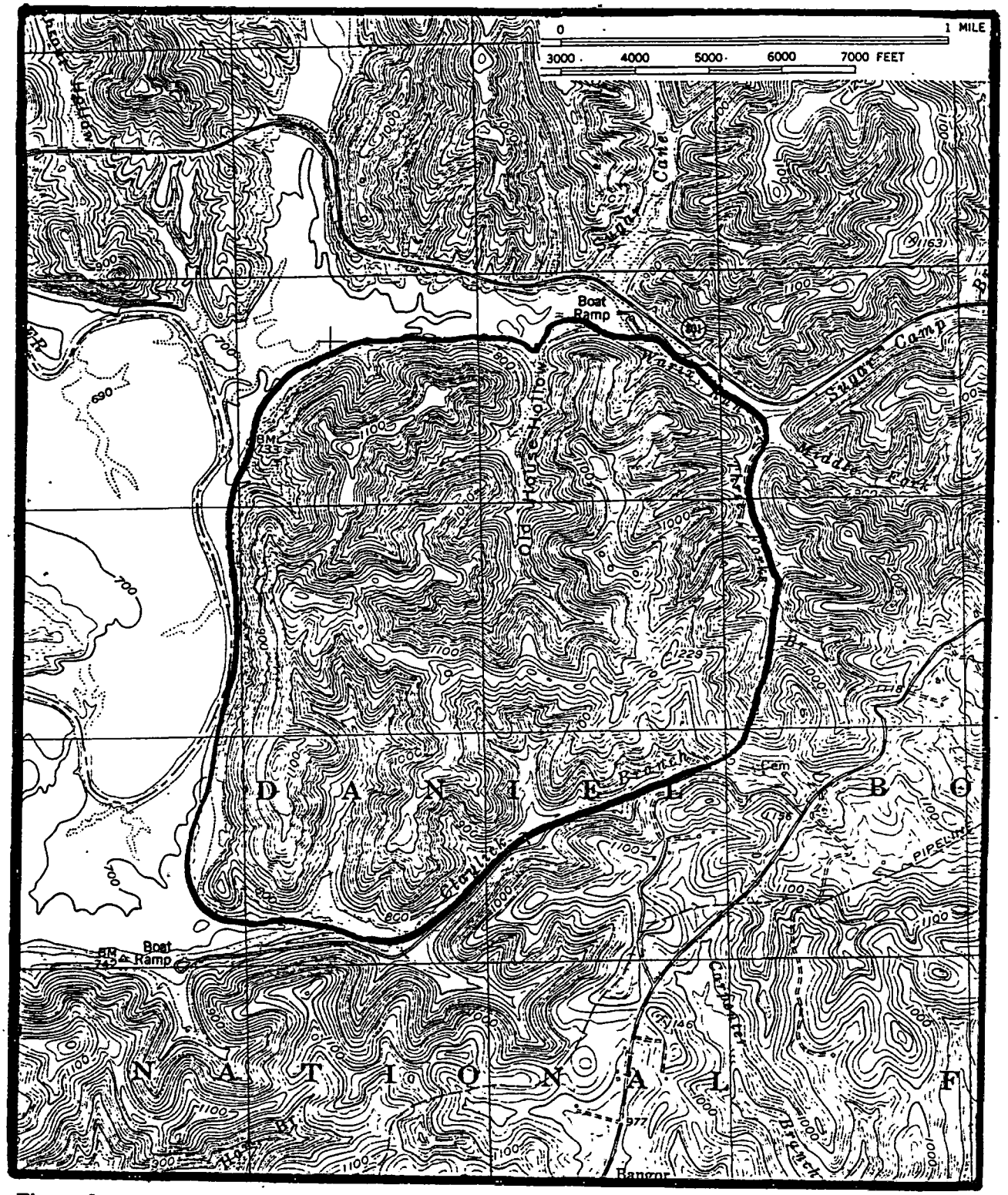

Figure 9. Map of the Warix Run/Claylick Cliff Area showing significant area. Bangor, Ky. USGS 7.5 Minute Topographic Quadrangle.

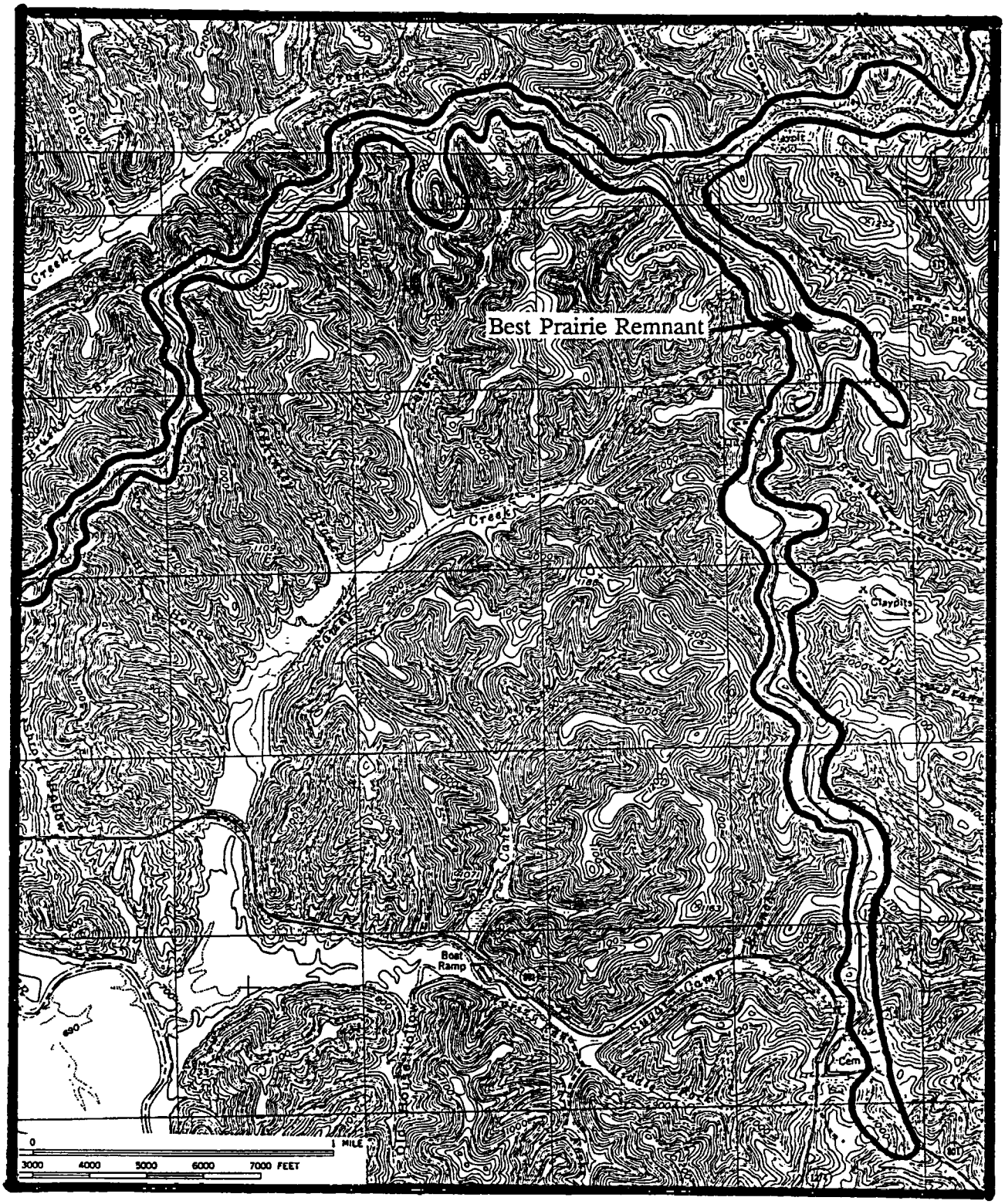

Figure 10. Map of Clack Mountain showing significant area.
Bangor and Morehead, Ky. USGS 7.5 Minute Topographic Quadrangle.

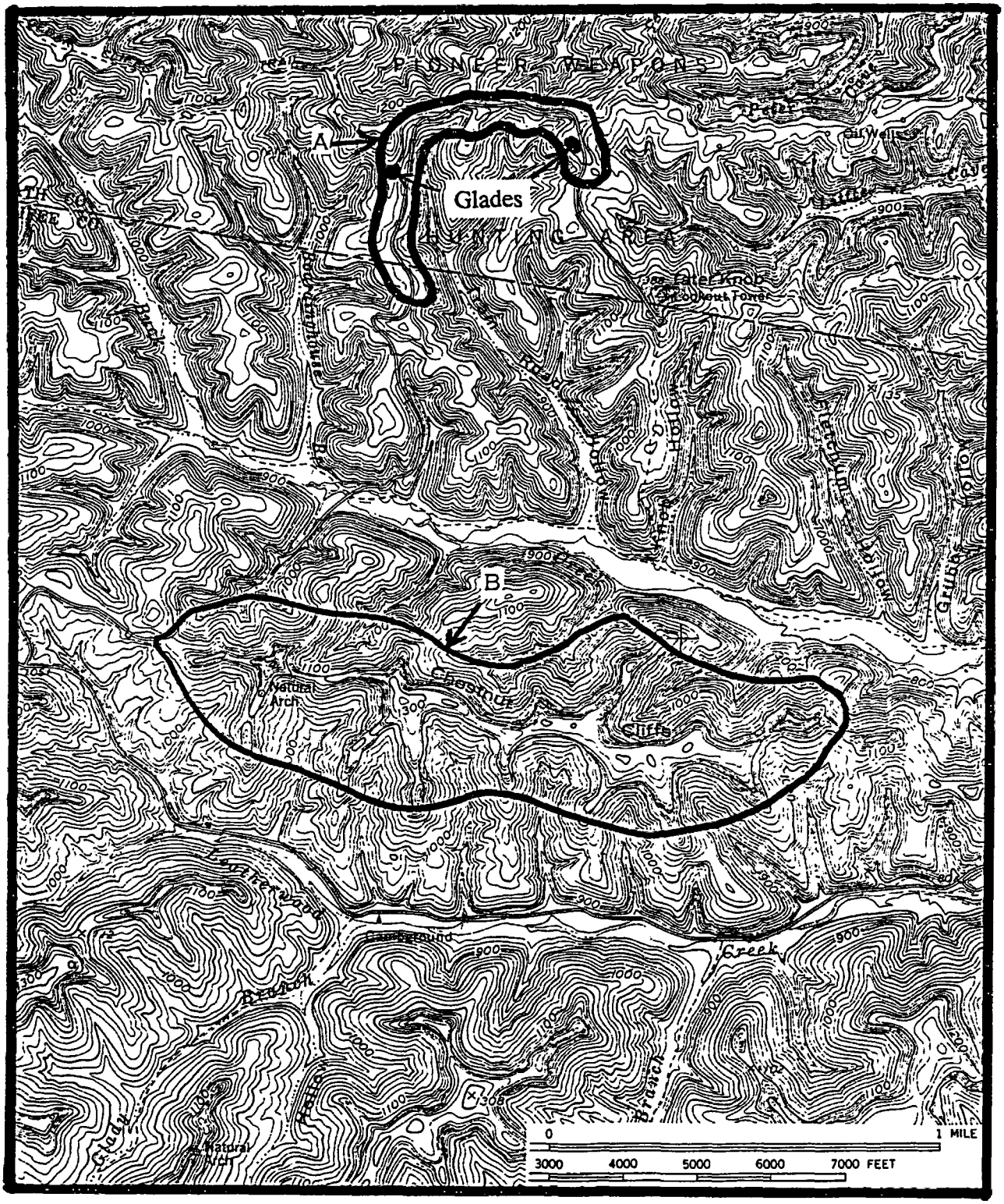

Figure 11. Map of (a) Cave Run Glades and (b) Chestnut Cliffs showing significant areas. Salt Lick, Ky. USGS 7.5 Minute Topographic Quadrangle.

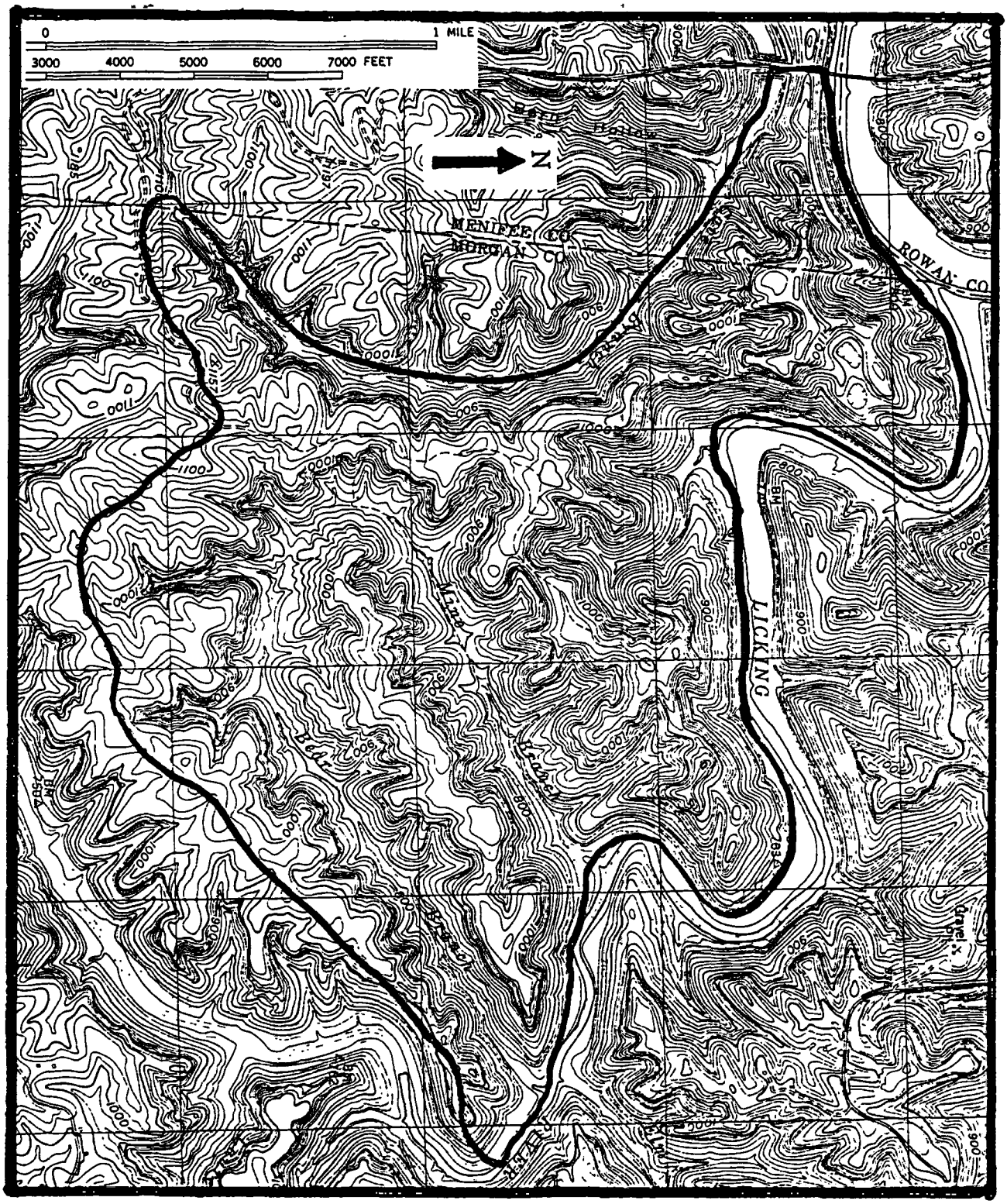

Figure 12. Map of the Donahue Cave/Mine Branch Area showing significant area. Bangor, Ky. USGS 7.5 Minute Topographic Quadrangle.

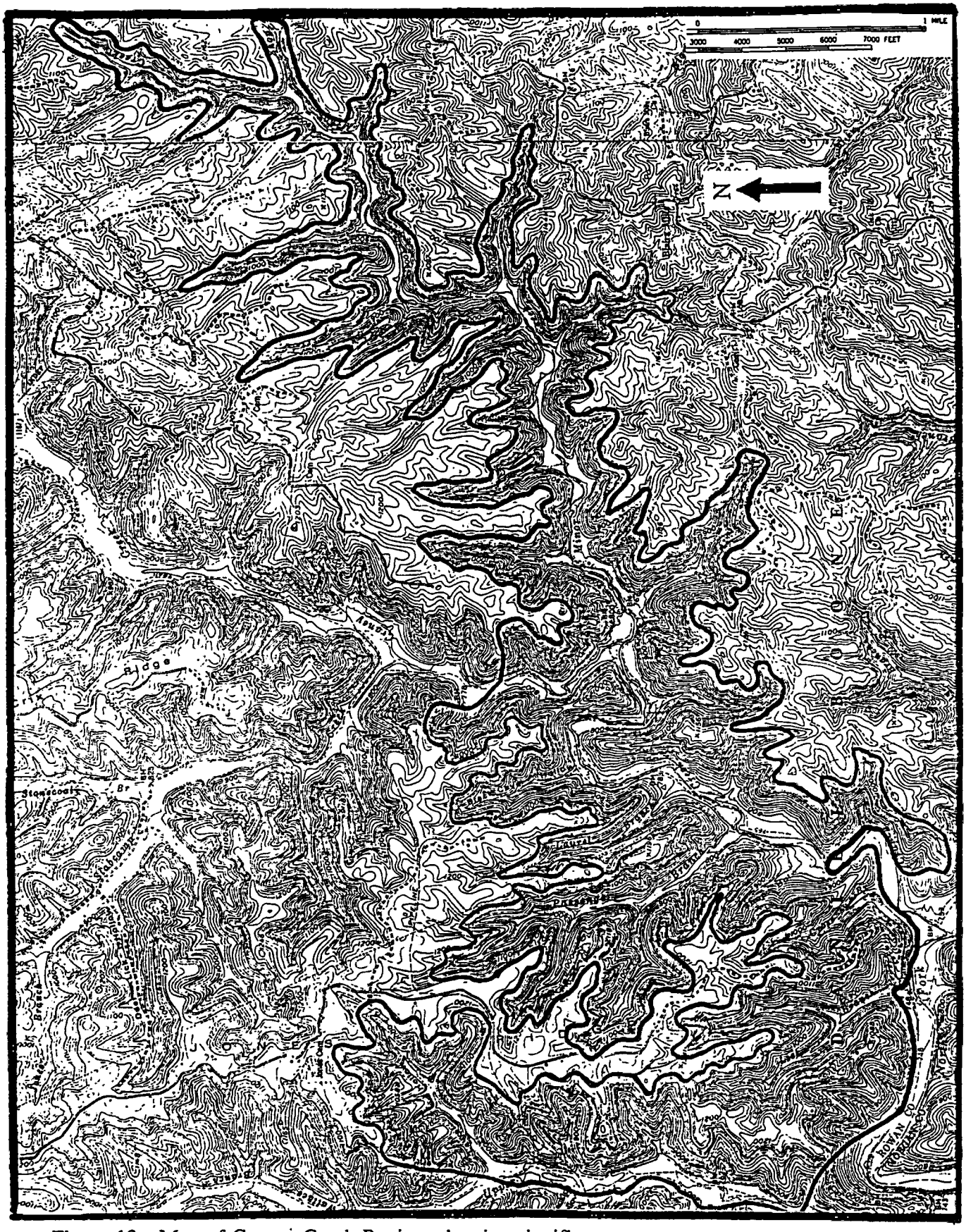

Figure 13. Map of Craney Creek Ravines showing significant area. Wrigley, Ky. USGS 7.5 Minute Topographic Quadrangle.

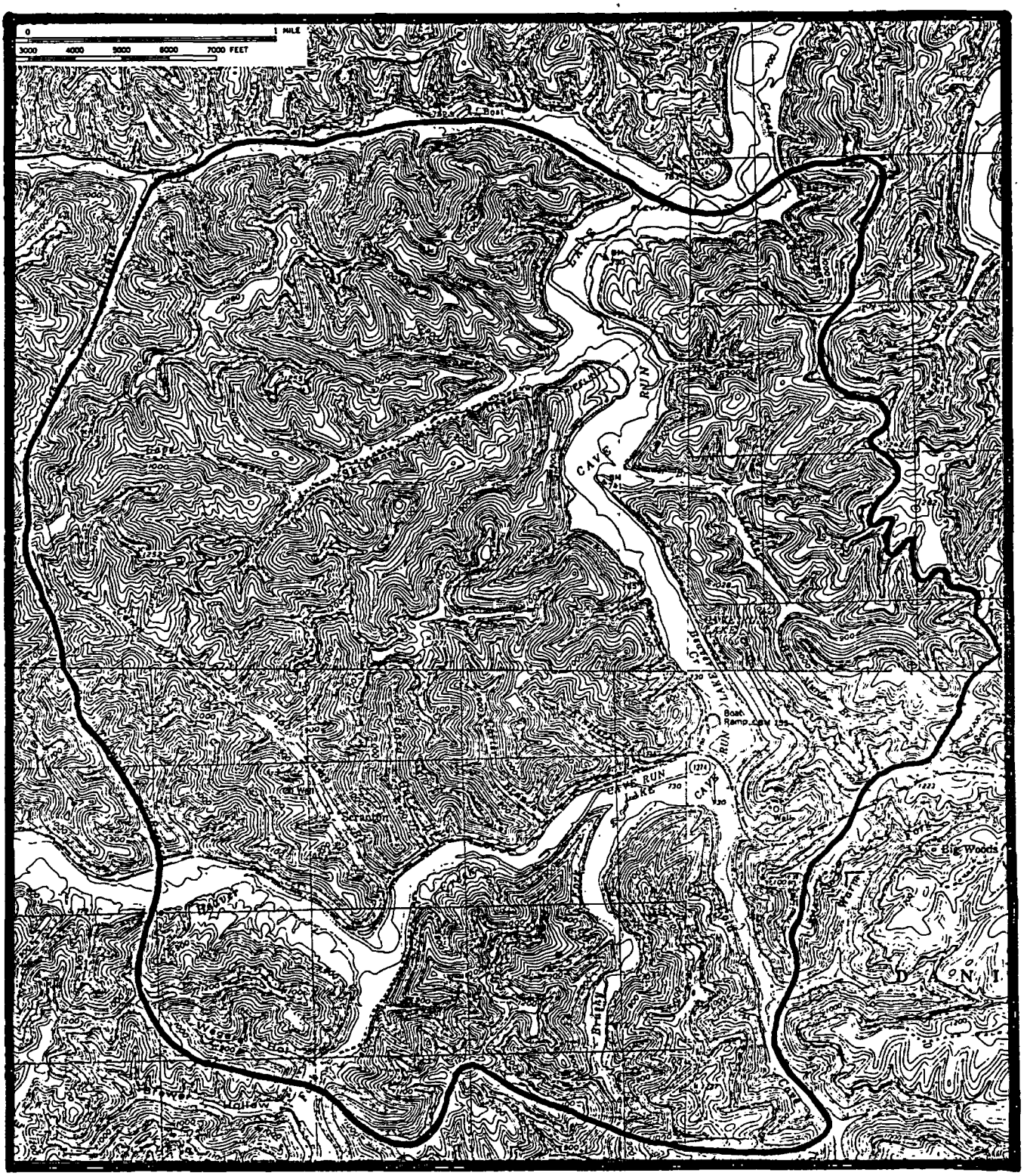

Figure 14. Map of Beaver Creek Area (Cave Run Lake) showing significant area.
Salt Lick, Bangor, Scranton and Ezel, Ky. USGS 7.5 Minute Topographic Quadrangles.

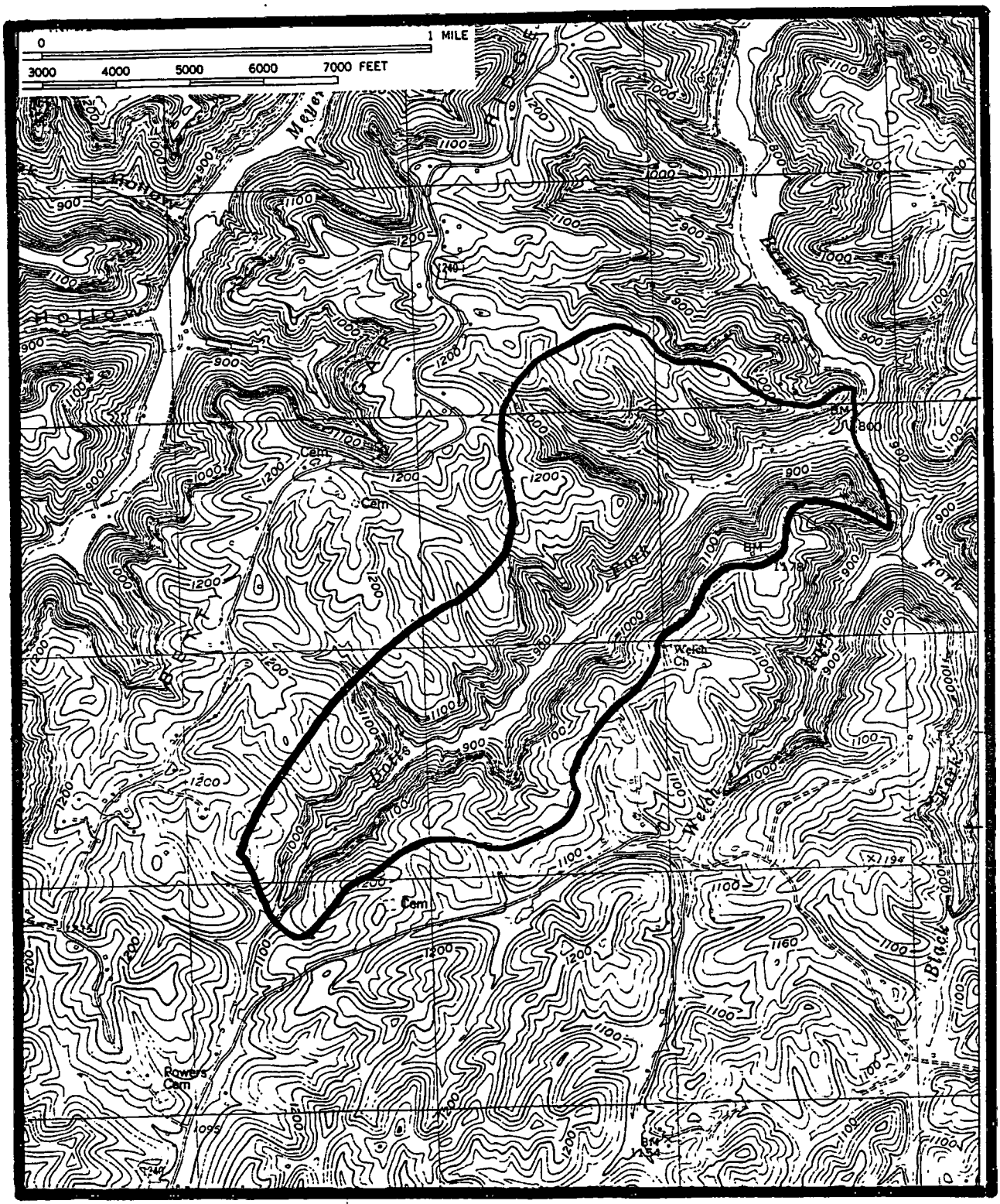

Figure 15. Map of Botts Fork Ravine showing significant area.
Scranton, Ky. USGS 7.5 Minute Topographic Quadrangle.

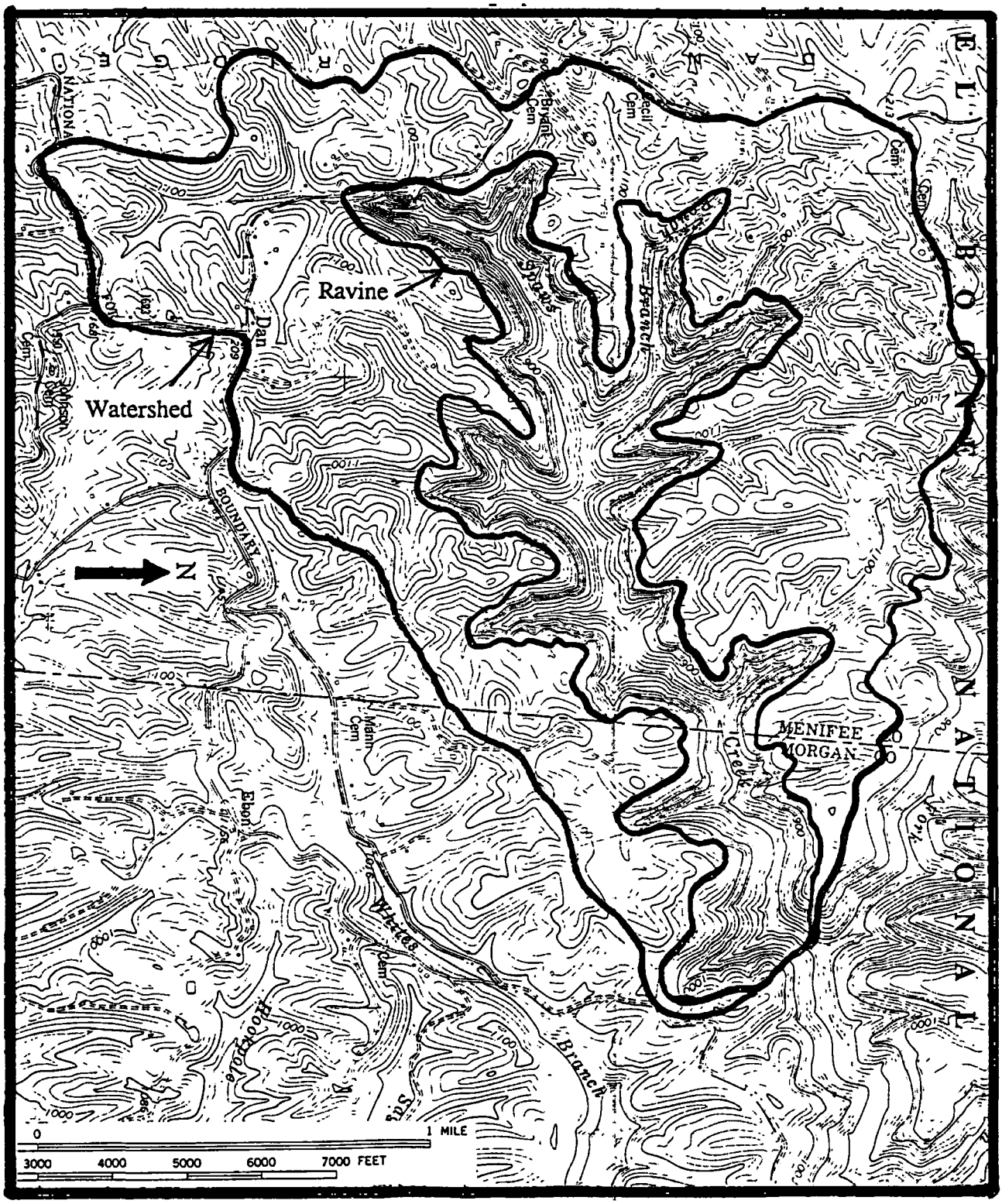

Figure 16. Map of Spaws Creek Ravine showing significant area.
Ezel, Ky. USGS 7.5 Minute Topographic Quadrangle.

SUMMARY

The results of the Cooperative Inventory of Endangered, Threatened, Sensitive and Rare Species in the Morehead Ranger District have greatly enriched the knowledge of rare flora, fauna and natural communities in this northern portion of the DBNF. Information provided by the report will assist DBNF staff in making wise protection and management decisions.

Prior to the inventory, the Kentucky State Nature Preserves Commission had 38 records for 25 species of endangered, threatened or other listed rare plants, 14 records for 8 listed aquatic animal species, and 46 records for 13 listed species of terrestrial vertebrates from the Morehead District (Table 4). The inventory generated about 50 new records for listed rare plants, amounting to a 125% increase in the total records, including 14 new species. It generated about 50 new records for animal species (80 including *Neotoma*--Eastern Wood Rat), amounting to an overall increase in animal records of about 80% (170% including *Neotoma*), including 3 new species. Distributional notes on these listed species are provided above.

In addition, much information was obtained for a number of other species of interest, including some which are in need of further study and consideration for listing by KAS-KSNPC and USFS. Two plant species new to Kentucky were found, both at Hog Hollow ("Caney Site"--*Sphagnum macrophyllum*--a moss--and *Xyris difformis*--a Yellow-eyed Grass), and two others new to DBNF were found (*Dodecatheon frenchii*--French's Shooting Star--at Botts Fork and *Potamogeton pulcher*--Spotted Pondweed--at Hog Hollow).

This report also outlines "Significant Areas" within the Morehead District (Fig 4.), based on the documented concentrations of rare species (Fig. 3), and other biological features. These areas contain about three-quarters of the rare species occurrences within only a quarter of the total district area. Conservation efforts can now be most efficiently focused on these sites.

The inventory has been an excellent opportunity to combine the expertise and resources of several conservation agencies, forming a partnership that has made efficient use of the funds invested. It is estimated that less than one percent of the Commonwealth's land closely resembles its presettlement condition. Creative partnerships of public and private conservation agencies have a great opportunity, and responsibility, to maintain Kentucky's remaining natural treasures through cooperative ventures such as this inventory.

It is hoped that this cooperative effort will continue to be funded and otherwise supported by these agencies. An inventory of all the districts will clarify the status of the Forest's rare species and unusual natural communities, and it will help the U.S. Forest Service, Kentucky State Nature Preserves Commission, Kentucky Department of Fish and Wildlife Resources, and The Nature Conservancy, to safeguard the most unique biological features of this area.

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APPENDIX A

DOUBTFUL AND ERRONEOUS FLORISTIC RECORDS FROM THE MOREHEAD RANGER DISTRICT

1. Collections of Katherine Carr that may have been mislabelled.

Doubts about the label data on some of K. Carr specimens made in the 1930s at the Morehead State University Herbarium (MRE) have been expressed by several Kentucky botanists (R. Cranfill, M. Medley, W. Meijer, H. Setser and others, pers. comm.). Unfortunately, K. Carr and her colleagues are deceased, and her students have not been traced or questioned. General reasons for this doubt are as follows.

(a) Several southern, northern or montane species are labelled as from the Morehead area, but have no other record from northeastern Kentucky. Given our increasing knowledge of their biogeography, most of these species are unlikely to occur in the Morehead area. Moreover, it would be extraordinary if such a large number of disjunctions occur in an area that does not have particularly extensive areas of cool microclimate, in contrast to the adjacent Red River Gorge further south. Further details are noted under each of the species below.

(b) In two cases (*Solidago roanensis* and *Veratrum parviflorum*), label dates indicate that the species were collected in Rowan County on the same day as being collected in the Cumberland Mountains. It seems highly unlikely or impossible that a rare species was collected in both places by the same person on the same day, especially given the much poorer road system at that time. In another case (*Trollius laxa*), the crossing out of original label data adds to general doubts.

(c) Several species are labelled as if from the Bluegrass Region, but have virtually no other records from this region or are generally accepted to be completely absent. Most of these are labelled "Lexington" (June 1929), and a few more are from Frankfort or Danville. These are mostly species that are typical of acid soils not found in this region. Among the most salient examples are *Claytonia caroliniana, Cunila origanoides, Elephantopus tomentosus, Gentiana villosa, Hypericum gentianoides, Lobelia puberula, Magnolia tripetala, Phlox stolonifera, Pinus rigida, Panicum microcarpon, Poa alsodes, Polygala mariana, Orbexilum pedunculata, Rhododendron maximum* and *Tephrosia virginiana.*

The following list includes all of the doubtful specimens found at MRE that are labelled as if from Rowan County. It exludes a few species which may be unlikely in the Morehead area, but which have reliable records from similar areas elsewhere in eastern Kentucky or southern Ohio, e.g., *Hydrophyllum virginianum, Hypericum canadense, Smilacina stellata* and *Viola fimbriatula.* It also excludes *Streptopus roseus*, because of the published record, though even that case still remains mysterious (see Listed Species above). The collection numbers are not included here, because they appear to have no temporal sequence, and are generally indicative of some taxonomic ordering within the original herbarium.

Agalinis purpurea var. *parviflora*
26 Aug 1940, Hillsboro Road near Morehead.
This specimen seems to be var. *parviflora* or an intermediate; it has borderline flower size and slightly longer calyx lobes than var. *purpurea*. There is no other record from Kentucky.

Angelica triquinata (initially identified as *A. atropurpurea*)
12 Aug 1939, along Triplett Creek, Morehead
There is, however, a recently verified collection (D. Gibson at MI) from as far west as Adair Co. (R. Cranfill, pers. comm.), and the species was reported from Warren Co. by Price (1893). The only other verified record is from Big Black Mountain, Harlan Co.

Aureolaria pedicularia
20 Aug 1938, dry woodland, Morehead.
The only confirmed Kentucky records of this northern species are from the Cumberland Mountains. There are also several Kentucky records of the closely related southern species *A. pectinata*, but only from south-central and southwestern regions.

Calycanthus floridus var. *fertilis*.
10 Jul 1936, hillside back of library;
7 Jul 1937, open woods, Morehead (collected with P. King);
10 May 1941, woods above Rodburn School, Rodburn.
Except for a disjunct occurrence in Powell Co. (J. Falconer, pers. comm.), all Kentucky records are from McCreary and Whitley Cos.

Campanula divaricata
1 Aug 1939, Lockegee.
Except for this record, *C. divaricata* is confined to southeastern Kentucky, as far north as Jackson and Breathitt Cos. Lockegee Rock has been searched by many other botanists without finding this species.

Cornus rugosa
7 Jul 1936, roadside, Rodburn.
There is no other verified Kentucky record.

Geum rivale
30 May 1936, swamp, Gearhart Pond, Morehead.
There is no other Kentucky record.

Hypericum denticulatum var. *denticulatum*.
6 Sep 1936, wet bank of stream, Triplett Creek, Morehead.
The only other Kentucky record, unconfirmed but labelled as the synonymous var. *ovalifolium*, is from Edmonson Co. (Braun 1943).

Hypericum virginicum var. *virginicum*.
6 Sep 1936, wet marshy field near football field, Morehead.
Other Kentucky records are unconfirmed, though there may be collections from Clinton Co. (Beal and Thieret 1986) and Adair Co. (Gibson 376, FI).

Lechea villosa
16 May 1933, Lockegee, dry hillside.
Other Carr collections from Lockegee were annotated as *L. minor* and *L. leggertii*, but redetermined as *L. racemulosa* by J. Campbell.

Liatris graminifolia
13 Sep 1936, Morehead, dry field.
There is also a doubtful record from Fleming Co., which may be based on *L. spicata*: W. Meijer et al. 1148 (MO), 6 Aug 1974, 1.5 miles W of KY 801 near Rowan Co. line.

Lycopodium clavatum
10 Aug 1936, hillside back of campus, Morehead.
Cranfill (1980) also rejected this record. The only reliable record from Kentucky is a recent collection: W. Meijer (KY), 23 Apr 1985, open sandy stripmine bench and slope, SW of Bledsoe, Harlan Co.

Melampyrum lineare var. *pectinatum*
16 Sep 1936, open woodland, Morehead
The only other record of this taxon in Kentucky is from the trail to Sky Bridge, where several plants still existed in 1988. There are also records of var. *latifolium* from Cumberland Mountains in Bell and Harlan Cos.

Monarda punctata
16 Sep 1936, sandy soil, Morehead.
The only other Kentucky record is from Livingston Co. A specimen at KES was redetermined as *M. citriodora*.

Pedicularis lanceolata
1 Oct 1938, back of library, Morehead
The only other record of this species in Kentucky is a collection of C.W. Short (at Univ. of Ky.) labelled "wet barrens of Kentucky".

Porteranthus trifoliatus
19 Oct 1938, open woods, Morehead.
This species is locally frequent in southeastern Kentucky, but there is no other record north of Whitley Co.

Prenanthes trifoliata
20 Aug 1936, dry woodland, Morehead.
There is no other confirmed Kentucky record, except perhaps an immature collection from Big Black Mountain, Harlan Co. (Welter s.n., MRE).

Solidago roanensis
12 Aug 1939, hillside back of library, Morehead.
With the same date, there is another collection of this species at MRE from Harlan Co. (Black Mountain, dry slope of ravine). The only confirmed Kentucky records are from the Cumberland Mountains. (See also misidentified *S. erecta* noted below).

Symphoricarpos occidentalis (as *S. albus* var. *laevigatus*)
28 Jul 1937, dry rocky field, Morehead.
This specimens has the characteristic crenate, glabrous leaves of *S. occidentalis*. There are no other Kentucky records.

Trautvettaria carolinensis
21 May 1937 (crossed out), Carter Caves (crossed out); "bank of stream added". Carter Caves are in Carter Co., east of Rowan Co. The crossing out casts doubt about these data, though this species is known from northern Kentucky in Powell Co. and Kenton Co. All other records are from southeastern counties.

Trollius laxa
30 May 1936 (crossed out), Rodburn (crossed out); "swamp" added.
There is no other record from Kentucky, and occurrence in the Morehead area would be extremely unlikely.

Utricularia cornuta
20 Aug 1936, sandy creek bank, Elliotsville.
There is no other Kentucky record.

Vaccinium cf. *myrtilloides* (labelled *V. pennsylvanicum*, crossed out, then *V. angustifolium*)
1 Jun 1937, hillside above library, Morehead.
There is no other Kentucky record.

Veratrum parviflorum; collected by a colleague--W.A. Welter
12 Aug 1939; Rowan Co., swampy place, Lewis Pond.
There is also a specimen at MRE by the same collector from Black Mountain, with the same date. The only other Kentucky records are from the Cumberland Mountains, plus one plant near Cumberland Falls.

Viburnum lentago
22 Jun 1936, swampy field, Morehead.
No other Kentucky reports have been confirmed, though there may be collections from Ballard (Palmer 16574, MO) and Harlan Cos. (Kearney 325, MO).

Viburnum opulus var. *americanum* [= *V. trilobum*]
29 Jun 1936, swamp, Rodburn.
Identification of this specimen is tentative; it might be the exotic var. *opulus*. There are no other Kentucky records.

2. Misidentifications and other misleading collections. Several potentially rare species have been reported from the Morehead District, or entered into the KSNPC database, but were misidentified. A few other problematic reports and collections are included.

Botrychium oneidense. As *B. dissectum* var. *oneidense*, this was reported from Rowan Co. by Carr and Cohn (1941), based on Carr collections (MRE). These have been redetermined by R. Cranfill (and J. Campbell) as *B. biternatum*.

Cypripedium parviflorum. Carr collections (MRE) from Clearfield and Fallen Timber Branch were redetermined as *C. pubescens* by J. Campbell. Another Carr collection (MRE), labelled "Frankfort ... May 1929", was labelled as this species, but the plant is immature or damaged and cannot be distinguished from *C. pubescens*, which has been collected from Franklin Co. (KY).

Dentaria maxima. A Carr collection (MRE: 19 Apr 1941, bank of Triplett Cr, at bridge, Rodburn) was redetermined by J. Campbell as an abnormal *D. heterophylla*, with 3 alternate leaves.

Eleocharis elliptica var. *borealis*. This species was reported by Beal and Thieret (1986) from Rowan County, based on L. Meade 564 (11 Jun 1974, Lower Lick Fork). This collection has been redetermined as *E. tenuis* var. *tenuis* by J. Campbell.

Erianthus giganteus. This was reported from Rowan County by Beal and Thieret (1986), based on a specimen at MRE that was redetermined as *E. alopecurioides* by J. Campbell.

Heuchera pubescens. This was reported by Braun (1943) from Rowan, Greenup and Wolfe Counties, and by Rosenthal et al. (1936) from other eastern counties. However, it was excluded from Kentucky in Wells' (1984) recent monograph. The only known Kentucky collections that may be this species are from Edmonson and Warren Counties (WKY).

Monarda didyma. There are several collections of this species or hybrids from the Morehead area, but most or all may be from cultivated plants. Only one suggests native status: H. Setser & L. Meade (MRE), 3 Jul 1973, low swampy area near mouth of Leatherwood Creek, Menifee Co. This species may not be native anywhere in Kentucky (see also Campbell et al. 1989).

Panicum leucothrix. A Carr collection (MRE: 20 Sep 1935, Farmers, low ground) was labelled as this species, but cannot be found currently at MRE. It may have been redetermined and set aside.

Panicum mattamuskeetense. H. Setser put this name on specimens of Carr initially labelled *P. clutei* (9 Jun 1935, Morehead, bank of stream, Triplett Cr.; and 27 Sep 1936, Morehead, Sandy Cr. banks). The collections were tentatively redetermined by J. Campbell as *P. acuminatum* (var. *tennesseense*?) and perhaps *P. commutatum x acuminatum*, respectively.

Platanthera fimbriata. Peck (1834) noted this species, as "*Orchis fimbriata*", near Farmers. This is a strictly northern species, and he may have been referring to *P. psycodes* or, more likely, an unusual *P. peramoena*. *P. psycodes* is reported from the Red River Gorge, but never vouched by collection (Campbell et al. 1990). *P. peramoena* has been observed recently in or near the district: near the KY 801 crossing over Interstate 64, Rowan Co. (H. Bryan); wet meadow, Mud Lick Creek, Bath Co. (J.

MacGregor, photo 4611); Broke Leg Creek in Menifee County (J. Campbell). Several of the Mud Lick plants had shallowly fringed lips.

Polygala nuttallii. A Carr collection (MRE: 29 Jul 1935, Lockegee) was redetermined as *P. ambigua* by M. Medley (and J. Campbell). Another old collection (A.M. Peter 162 at KY) from the district was determined as *P. mariana* (see notes above).

Quercus nigra. This species was planted at several sites within a few miles of Cave Run Dam, during or shortly after its completion in 1974 (Mike Cohan, USFS; pers. comm.). Without this knowledge, these small trees might be mistaken as native, especially those in the Hog Hollow area, where they are scattered without obvious pattern in a brushy wet meadow with *Acer rubrum* and other native species.

Silene caroliniana var. *pensylvanica*. A Carr collection (MRE: 14 May 1935, dry woodland, back of campus) was redetermined as *S. virginica* by J. Campbell.

Solidago roanensis. A collection of W. Meijer (KY: Sep 1974, near the Triangle Lookout Tower, Rowan Co.) was redetermined as *S. erecta* by A. Cusick (and J. Campbell!).

APPENDIX B

Significant Areas near the Morehead District

This appendix describes a few additional significant sites that are just outside the Morehead District boundaries, but which provide important reference points for evaluating sites within DBNF, and for general research and education in the region.

Site Name: LICKING RIVER CORRIDOR; Fig. 17(a)
(CAVE RUN DAM TO INDIAN CREEK)
Size: ca. 20 river-miles, 500 ft wide.
County: Bath and Rowan
USGS Quadrangles: Salt Lick, Farmers and Colfax, Ky.

Location. This section of the Licking River flows from Cave Run Dam downstream to Indian Creek, through the broad valley between Salt Lick, Bath County, and Farmers, Rowan County. Note: this summary refers just to the aquatic community itself, and the immediate river banks; for other notes on the valley, see subsequent summaries of Rowan County Sphagnum Swamp and Bath County Bayou.

General Description. This broad valley flows through the Knobs Region. Although most adjacent land is farmed, the banks generally have a strip of forest.

Listed Animal Species

Alasmidonta marginata, Elktoe (a mussel)
Ammocrypta pellucida, Eastern sand darter
Cryptobranchus a. alleganiensis, Hellbender
?*Etheostoma tippecanoe*, Tippecanoe darter (extirpated?)
Noturus stigmosus, Northern madtom
Simpsonaias ambigua, Salamander mussel
Percina evides, Gilt darter

Listed Plant Species

Podostemon ceratophyllum, Threadfoot

Other Plants of Interest

[*Wisteria frutescens*, Wisteria, a nearby waif?]

Biological Significance. This is the upper section of a long river corridor of high significance in Kentucky, containing several rare aquatic species on state and federal lists. This information has been summarized elsewhere (Burr and Warren 1986, Kornman 1989, Cicerello et al. 1991), and is detailed in Kentucky State Nature Preserves Commission files. In this upper section, special problems may be caused by artifical effects of the dam, including reduced flooding and cooler water temperatures. Mussel reproduction appears to have declined at Moore's Ferry, possibly due to cool temperatures. This section also has the only known *Podostemon* in the river (see notes on listed plant species).

Notes on Vegetation. Unusual vegetation was found in or near the riffles, gravel-bars and rocky banks.

(1) There were several aquatic species in or near the riffles: *Podostemon* (submerged rocks and mussels), *Potamogeton nodosus* (sand/gravel banks), *Justicia* (gravel-bars), and some aquatic mosses (*Fontinalis* sp. and *Fissidens fontanus*). *Podostemon* is less healthy, however, for 2 miles below the sewage treatment plant, where much of it and the substrate are covered by algae.

(2) Drier parts of gravel-bars and bedrock banks had shrubby growth of *Platanus, Betula nigra* and *Salix exigua*, with open areas of *Diodia virginiana, Eleocharis erythropoda, Leersia* spp. and, on drier sites, *Andropogon gerardii*. Other species included *Equisetum hyemale, Onoclea, Saururus, Pilea, Phyllanthus, Mimulus* spp., *Asclepias incarnata, Silphium perfoliatum, Bidens* spp., *Eclipta, Paspalum fluitans* and the exotic, *Arthraxon hispidus*.

(3) At the edge of the rocky riverside forest, there was frequent *Platanus, Betula nigra, Acer saccharinum, Fraxinus pennsylvanica, Amphicarpaea, Impatiens capensis, Lippia lanceolata and Chasmanthium latifolium*. Other species included *Rhus radicans, Vitis vulpina, Polygonum* spp., *Desmodium* spp., *Hypericum prolificum, Viola sororia* s.l., *Sanicula canadensis, Phlox paniculata, Galium triflorum, Lobelia* spp., *Helianthus tuberosus, Verbesina alternifolia, Eupatorium* spp., *Solidago gigantea, Smilax hispida, Cinna, Elymus* spp., *Muhlenbergia frondosa, Eulalia*, etc.

Explanation of Boundaries. The section of the river noted here may be greatly affected by management of Cave Run Lake and land use in the Morehead area. The occurrence of *Podostemon* here may also be a useful basis for ecological subdivision of the corridor. Also, below Moore's Ferry, the geological substrate becomes somewhat calcareous.

Site Name: BATH COUNTY BAYOU; Fig. 17(b)
Size: ca. 30 acres
County: Bath
USGS Quadrangles: Farmers, Ky.

Location. This pond is about 1.5 miles northwest of Cave Run Dam, and a mile southwest of Farmers. It can reached across fields from either US 60 or KY 826.

General Description. This is an isolated oxbow of the Licking River, and is also connected with the small, largely bottomland drainage of Bayou Creek. It holds a more or less permament pool of water about 2-4 ft deep, depending on season. Aquatic vegetation fills the pond and this is surrounded by a strip of forest that is generally only 30-100 ft wide, but includes an extension of about 5 acres at the eastern end. Around this strip are bottomland fields.

Animal of Interest

Sorex longirostris, Southeastern Shrew (nearby)

Listed Plant Species

Decodon verticillatus, Hairy Swamp Loosestrife
Gratiola viscidula, Short's Hedge Hyssop

The following species may have occurred in this general area.
[*Calopogon tuberosus*, Grass Pink, nearby extirpated?]
[*Drosera intermedia*, Spoon-leaved Sundew, nearby extirpated?]
[*Sabatia campanulata*, Slender Marsh Pink, nearby extirpated?]

Other Plants of Interest

[*Aesculus pavia*, Bottlebrush Buckeye, nearby extirpated?]
[*Ceratophyllum muricatum*, Hornwort, nearby]
Dichelyma capillaceum, a moss (second state record)
Dulichium arundinaceum, Three-way Sedge
Glyceria septentrionalis, Manna Grass
[*Hottonia inflata*, nearby extirpated?]
Lemna valdiviana, Duckweed (only known locality in county)
Lycopus rubellus, Bugleweed (only known locality in E Ky.)
[*Oenothera clelandii*, Evening-primrose, nearby waif?]
Polygonum arifolium, Tearthumb (only known locality in E Ky.)
Sium suave, Water-parsnip (only known locality in E Ky.)
Utricularia gibba, Bladderwort
[*Wisteria frutescens*, Wisteria, nearby waif?]

Biological Significance. This is probably the least disturbed oxbow pond known in eastern Kentucky. It is certainly the best along the Licking River below the dam, and it may be that clean water flowing from the lake has maintained the natural quality here. Other oxbows downstream appear more influenced by agriculture, with associated drainage, siltation and pollution. Similar sites along Red River and Kentucky River are highly disturbed (Campbell et al. 1989), and broader bottoms of the Cumberland River and its tributaries are cleared or impounded.

The rare species found here--or a few miles downstream on the Licking River valley and likely to occur here--are not globally rare, but, within Kentucky, they are mostly confined to the larger western river valleys and depressions in karst region. The moss, *Dichelyma capillaceum*, was found growing on stems of *Cephalanthus* at or above the water level. The only other Kentucky record is a collection of C.W. Short made in the 1830s.

Some of the plants listed above were only recorded by Peck (1834), and are probably extirpated from the area. They may have grown in marshes, wet prairies and open flatwoods on bottomlands near the pond. Careful restoration efforts would be needed to bring them back. Such restoration may already be experimented with at the nearby Rowan County Sphagnum Swamp (see below).

Notes on Vegetation. The vegetation showed the following fairly clear-cut zonation.

(1) In the deepest water, probably remaining at least 1-3 ft deep in most years, there were floating aquatics--*Spirodela polyrhiza, Lemna valdiviana, Utricularia gibba*--and, covering most of the area, thick beds of *Nuphar advena*.

(2) In transitional water depths, there were floating mats (rather dangerous to walk on!) dominated by *Dulichium* and *Decodon*, with frequent *Polygonum hydroperoides* and *Rosa palustris*.

(3) Around the shore of the pond, there was open shrubby vegetation dominated by *Alnus* and *Cephalanthus*, with frequent *Hypericum tubulosum* (some var. *walteri*) and *Leersia oryzoides*. Other species include *Hibiscus moscheutos, Polygonum sagittifolium, P. arifolium, Ludwigia palustris, Gratiola viscidula, Galium tinctorium, Bidens* spp., *Sagittaria calycina, Iris virginica, Scirpus cyperinus, Carex lupulina, C. tribuloides*, etc.

(4) On banks of the pond, there was an open floodplain forest with frequent *Platanus, Liriodendron, Prunus serotina, Acer saccharinum, A. negundo, Fraxinus pennsylvanica, Boehmeria, Impatiens capensis, Carex projecta, Glyceria striata*, etc. Other species included *Sambucus, Polygonum virginianum, Apios, Scutellaria lateriflora, Scirpus* spp., *Carex stipata, Elymus* spp., etc.

(5) At the east end of the pond, there was a 5 acre patch of more shady floodplain forest, dominated by *Liriodendron* (1-2 ft dbh); other woody species included *Acer rubrum* var. *trilobum, A. negundo, Betula nigra, Platanus, Quercus palustris, Lindera, Asimina, Arundinaria, Lonicera japonica* (exotic), etc. On the ground, the filled-in channel had abundant *Saururus*, with frequent *Glyceria septentrionalis* and *Platanthera flava* var. *f.* This channel merged into better-drained ground with frequent *Boehmeria* and *Lycopus rubellus*. Other species included *Onoclea, Laportea, Amphicarpaea, Parthenocissus, Impatiens capensis, Cicuta, Sium, Phlox paniculata, Chelone, Gratiola neglecta, Lobelia cardinalis, Aster ontarionis, Iris cristata, Smilax hispida, Carex scoparia, C. projecta, C. crinita, C. louisianica, Leersia virginica, Eulalia* (exotic), etc.

Explanation of Boundaries. The obvious boundaries at present just enclose the pond and adjacent strip of forest. However, a long-term management plan would have to consider land-use in surrounding fields, and the possible restoration of these fields to natural vegetation.

Site Name: ROWAN COUNTY SPHAGNUM SWAMP; Fig. 17(c)
Size: 30 acres
County: Rowan
USGS Quadrangles: Farmers, Ky.

Location. This area is 3 miles west of Farmers, on KY 211, on the north side of Green Mountain.

General Description. This is a swampy area at the edge of the Licking River floodplain, within the Knobs Region. It is drained by short intermittent streams and ditches that have been greatly modified by the general agricultural use of surrounding bottomlands. Part of the area has swamp forest remnants, with tree up to 40 years old. Much of this site has recently been restored by Ecotech, Inc. (H. Bryan and associates, Frankfort) to wet meadow condition, with some replanted of trees. The area is owned by Morehead State University.

Animal of Interest

Sorex longirostris, Southeastern Shrew

Listed Plant Species

Decodon verticillatus, Swamp Loosestrife
Gratiola viscidula, Short's Hedge Hyssop
Vernonia cf. noveboracensis, New York Ironweed (or hybrid?)
See also Bath County Bayou notes for species probably exirpated.

Other Plants of Interest

[*Aster puniceus*, Purple Aster, nearby extirpated?]
Carex straminea, Sedge
Dulichium arundinaceum, Three-way Sedge
Glyceria septentrionalis, Manna Grass
Lorinseria areolata, Net-veined Chain-fern (only site in county)
Platanthera lacera, Ragged Orchid

Biological Significance. This area has been greatly disturbed by clearance and drainage in the past, and winter flooding was substantially reduced by Cave Run Dam. However, this area still has some rare wetland plants, and current restoration efforts may well increase these and other species. In particular, these is much potential to restore the marshes, wet boggy prairies and open, grassy flatwoods that appear to have existed in this region before settlement, but which are now almost completely destroyed (see Biogeography section). Mowing, grazing or fire in dry seasons may be needed to maintain the openness of such vegetation. There is little natural ponding in the area, but small artificial ponds have recently been dug. Further restoration of such aquatic environments could lead to other rare species being reintroduced (see, for example, those listed at the Bath County Bayou). Research and management issues are being worked on by B. Reeder and others at MSU (Blevins 1991, Webb 1991).

Explanation of Boundaries. Only the area owned by Morehead State University is indicated on the map. However, long-term goals might include expanding this area into adjacent bottomland forest remnants. Extension to the adjacent Green Mountain would greatly increase habitat diversity, including the unusually open chesnut oak "barrens" on dry Devonian shale slopes.

Site Name: POLKSVILLE KNOB LICKS; Fig. 18
Size: 20 and 25 acres (two sites combined)
County: Bath
USGS Quadrangles: Colfax, Ky.

Location. This "site" includes two separate areas of low hills, half a mile to the north and south of US 60, about 1 mile west of Polksville. One site is east of Ore Mine Road (the large "Knob Lick") and the other is east of Feaping Road (the "Blue Clays"). Note: several other small glades and roadside prairie remnants occur within two miles of these glades.

General Description. The glades are eroded areas on the Silurian Crab Orchard Formation (upper strata), in the foothills of the Knobs Region. Several acres of bare clay-shale occur at each site, and erosion has caused an amazing "bad lands" look. Around the edges of these bare areas, and in gully bottoms, there is thin grassy vegetation that grades into open, stunted woodland. Local history suggests that these were licks used by deer and buffalo before settlement (notes of J. Philley, Morehead State University). There was some mining of iron ore ca. 1900 in lower Silurian strata of this region, but the USGS Geological Quadrangle does not indicate mine workings at these particular sites.

Plants of Interest

Aster sp. (aff. *cordifolius*), Aster (does not match manuals)
Carex juniperorum, Sedge
Carex tetanica, Sedge
Penstemon laevigatus, Beard-tongue
Scutellaria leonardii, Skullcap

Biological Significance. These glades and other nearby sites with rare species, though small and probably much changed since settlement, may be among the best remnants of the extensive natural grasslands that seem to have formerly existed in foothills of the eastern Knobs Region (see Biogeography notes above). The most significant species may *Carex juniperorum*, which has only recently been described and may be globally rare (see species notes above). There are several other rare, grassland species recorded from roadsides within a few miles of this site, and some of these could be included in any future restoration plans (see notes on Olympia Springs area under Significant Sites; and on *Orbexilum onobrychis* under Other Species of Interest).

Notes on Vegetation. The open woods around the glades are dominated by *Juniperus* and *Pinus virginiana*, with *Quercus stellata, Q. marilandica, Fraxinus americana, Diospyros, Viburnum rufidulum*, etc. In the glades and forest edges, the following species are relatively frequent: *Rhus radicans, Melilotus* spp.*, *Medicago lupuliona**, *Monarda russeliana, Aster* sp. (aff. *cordifolius*), *Solidago nemoralis, Leucanthemum vulgare**, *Carex juniperorum, C. pennsylvanicum, C. tetanica, Danthonia spicata, Aristida oligantha, Festuca arundinacea**, *Sporobolus asper, Andropogon scoparius* and *Cladonia*. Other species typical of the open areas included *Salix tristis, Hypericum prolificum, Comandra, Potentilla simplex, Fragaria, Desmodium canescens, Lespedeza intermedia, L. virginica, Orbexilum pedunculata, Euphorbia corollata, Viola pedata, Zizia aptera, Asclepias viridis, Apocynum, Phlox pilosa, Lithospermum canescens, Convolvulus spithameus* (stunted non-flowering in 1991), *Ipomaea pandurata, Campsis, Ruellia humilis, Prunella, Physostegia, Pycnanthemum tenuifolium, Scutellaria leonardii, Penstemon laevigatus, Agalinis* sp., *Houstonia*

canadensis, Lobelia spicata, Helianthus hirsutus, Silphium trifoliatus, Liatris squarrosa, L. spicata, Aster laevis, A. dumosus, Solidago juncea, S. graminifolia, Erigeron strigosus, Senecio anonymus, Manfreda, Hypoxis, Sisirynchium albidum, Juncus effusus, Scirpus pendulus, Carex umbellata, C. hirsutella, C. granularis, Panicum flexile, etc.

Explanation of Boundaries: The erosion-glades are on distinct hills, and are easily defined. However, if prairie restoration is ever considered on the deeper soils between these glades, then more complex issues of site selection, protection and restoration will have to be tackled. Several other small sites in this region need to be more closely examined.

Site Name: BROKE LEG CREEK RAVINE; Fig. 19
Size: ca. 460 acres
County: Menifee and Morgan
USGS Quadrangles: Ezel, Ky.

Location. This site is on the north side of US 460 at the line between Menifee and Morgan Counties, 1-3 miles west of Ezel. Broke Leg Creek drains into Blackwater Creek, a tributary of Licking River that is now partially impounded.

General Description. This ravine is on the eastern side of the Cliff Section, within an area that is otherwise transitional to the more gently rolling Lows Hills Belt. Sandstone cliffs line the ravine, which is entirely forested. The falls area was previously developed for tourism, and trails are now being restored by a private conservation group.

Listed Animal Species

Aneides aeneus, Green Salamander
Clinostomus elongatus, Redside dace
Neotoma floridana magister, Eastern Wood Rat
[*Plecotus rafinesquii*, Rafinesque's Big-eared Bat, one in house]

Other Animal of Interest

Desmognathus ochrophaeus, Mountain Dusky Salamander

Listed Plant Species

Circaea alpina, Small Enchanter's Nightshade
Cypripedium parviflorum, Small Yellow Lady's-slipper

Other Plants of Interest

Oxalis montana, White Wood-sorrel
Phlox stolonifera, Running Mountain-phlox

Biological Significance. This sandstone ravine has a cluster of notable biological features. There is a good redside dace population. There is a particularly large population of *Circaea alpina* below the falls, despite past disturbance. Other rare species may well be found with further exploration. Around the falls, and about 1-1.5 miles downstream from the falls, there are some older patches of forest, with 1-2.5 ft dbh trees of *Tsuga, Liriodendron, Fagus* and *Acer saccharum*, plus some *Quercus alba, Q. rubra, Pinus strobus*, etc.

Explanation of Boundaries. The whole ravine system upstream of Knocking Cave Branch can be considered significant. The lower section, and the Blackwater Creek corridor down to Cave Run Lake need further field work, but 1980 aerial photographs of these areas suggest that the forest was in relatively good condition at that time. A rare mussel, *Simpsonaias ambigua*, was found during 1991 in lower Blackwater Creek.

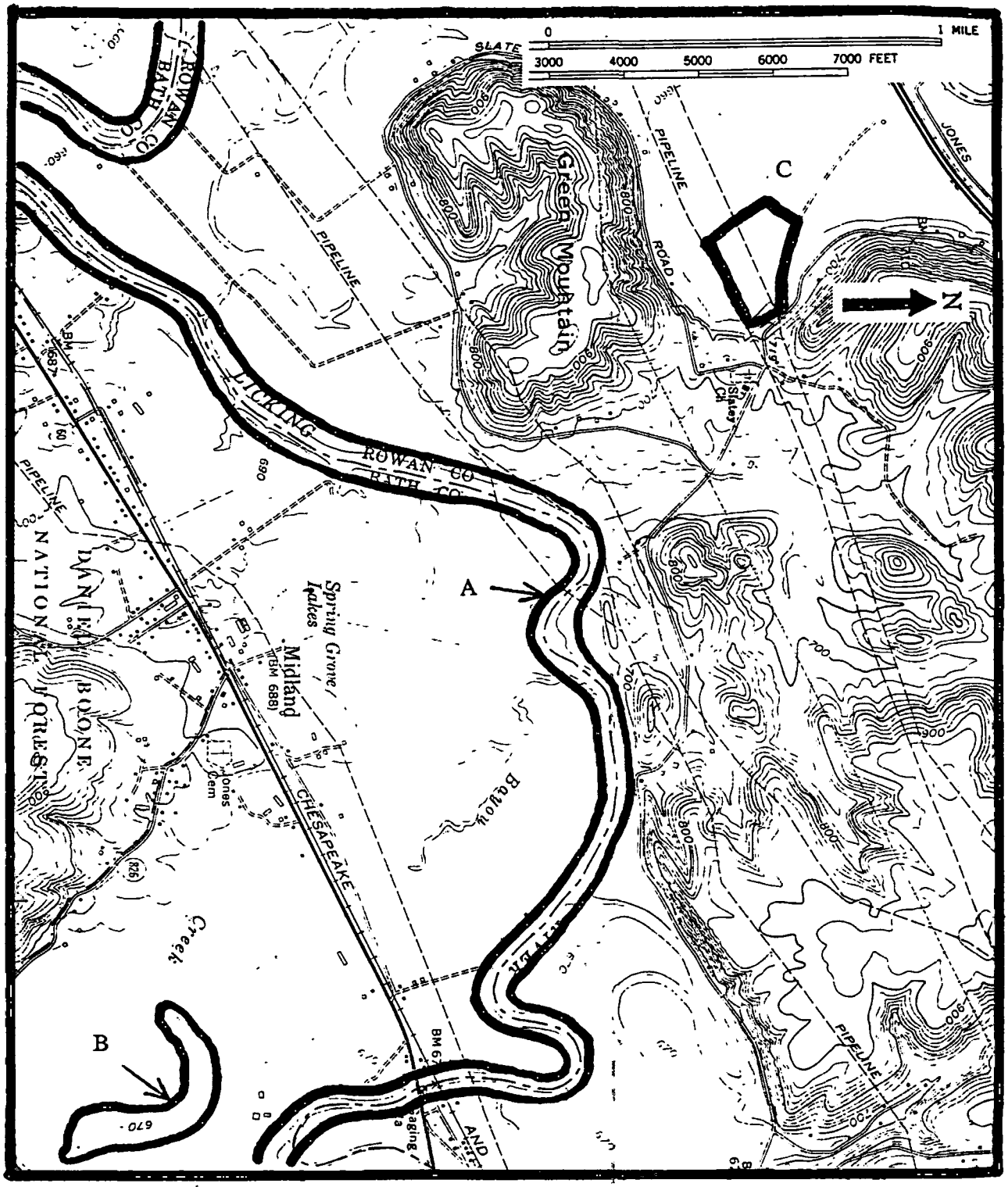


Figure 17. Map of Salt Lick/Farmers area showing significant areas:
(a) Licking River Corridor; (b) Bath County Bayou; (c) Rowan County Sphagnum Swamp. Farmers and Colfax, Ky. USGS 7.5 Minute Topographic Quadrangle.

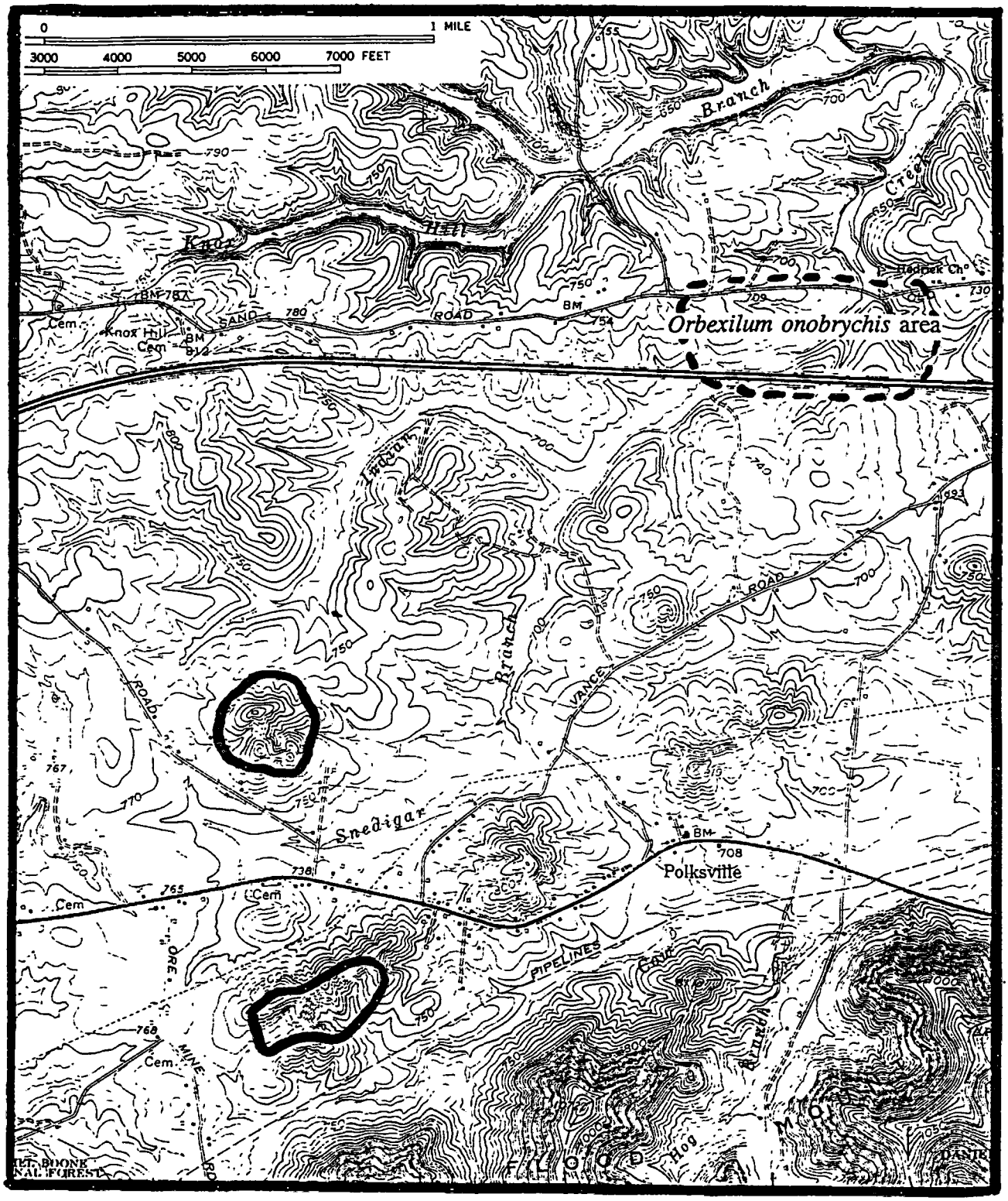


Figure 18. Map of the Polksville Knob Licks showing significant area. Colfax, Ky. USGS 7.5 Minute Topographic Quadrangle.

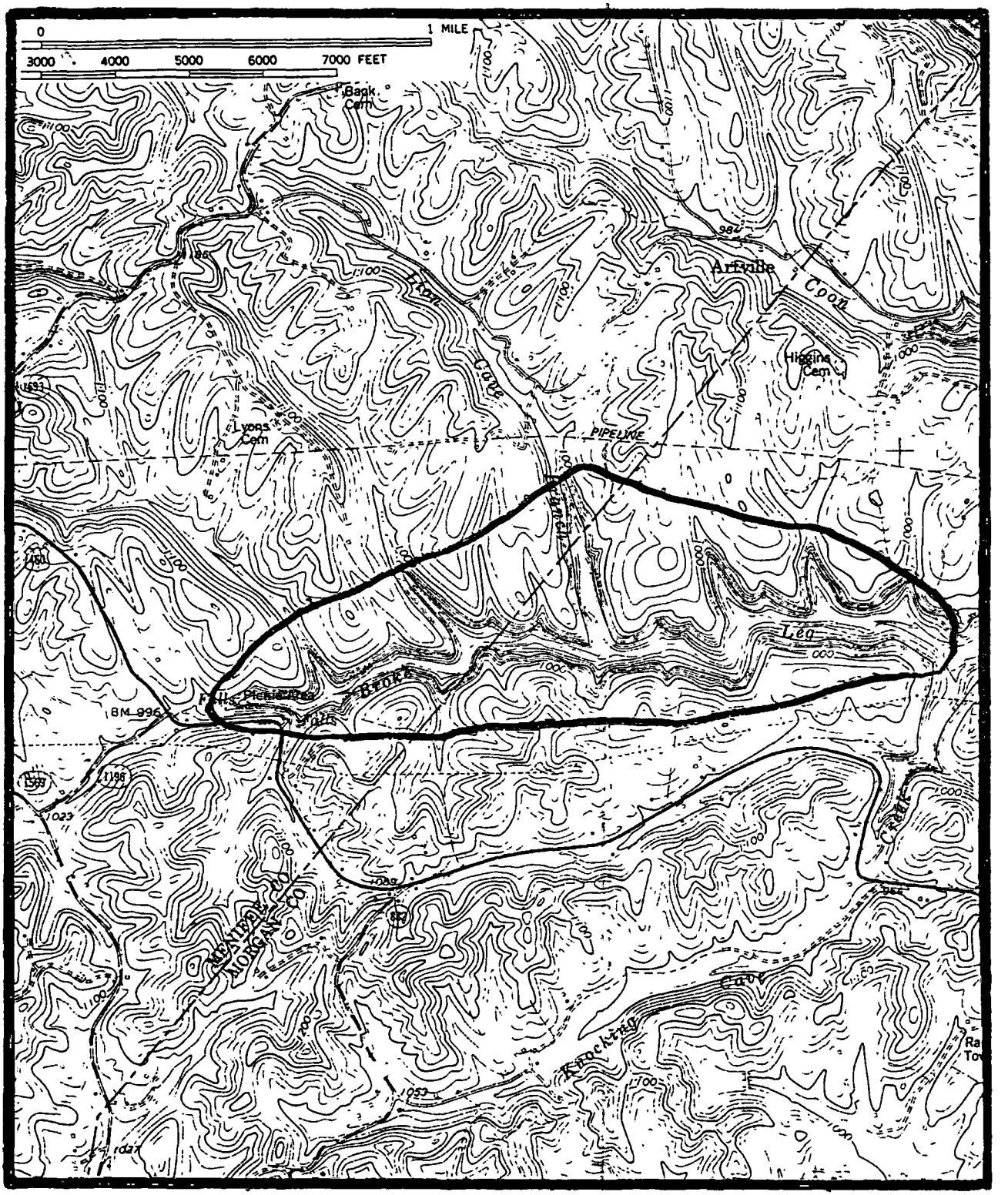
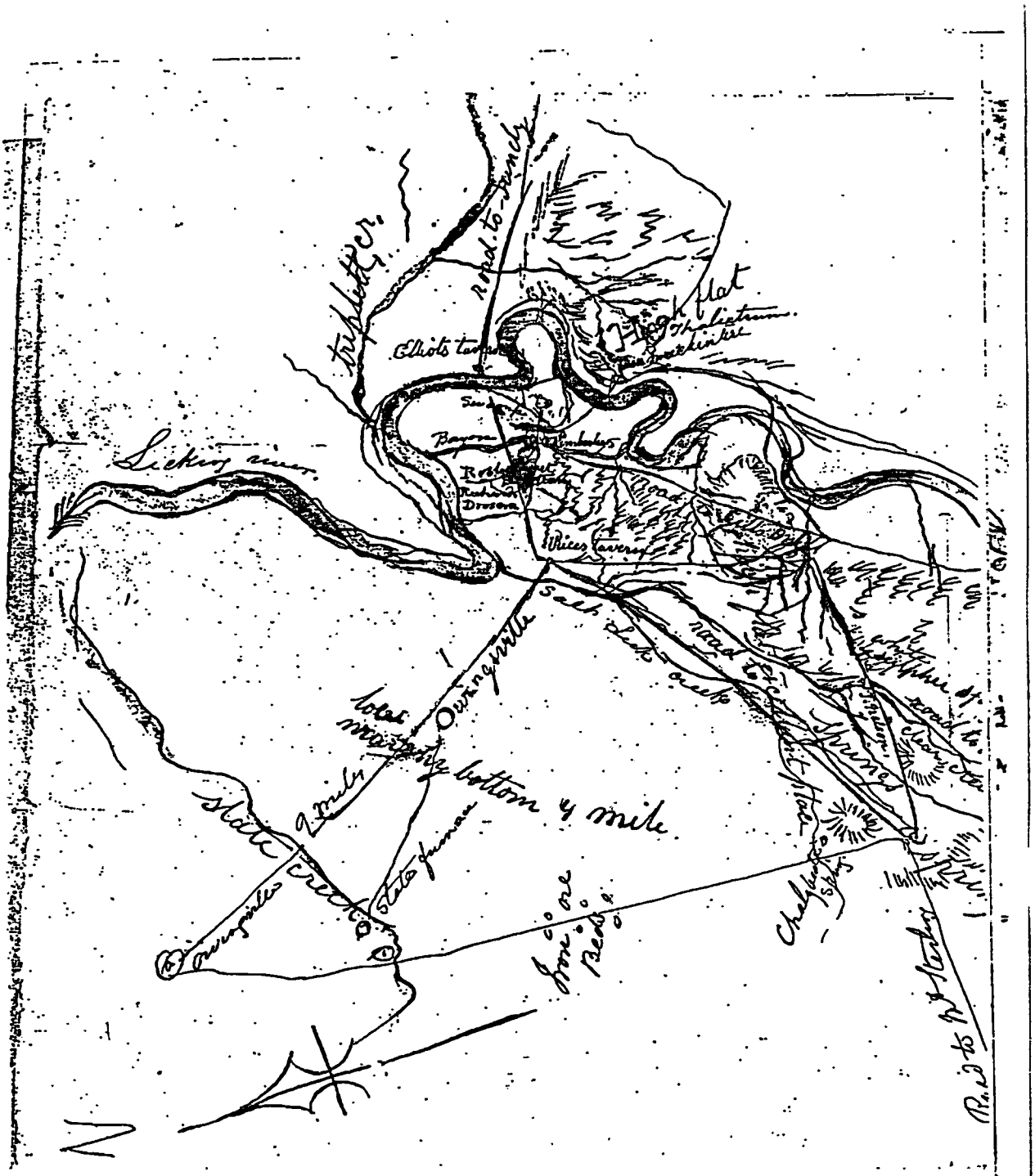


Figure 19. Map of Broke Leg Creek showing significant area.
Ezel, Ky. USGS 7.5 Minute Topographic Quadrangle.

APPENDIX C

Peck's Maps of the Farmers Area in 1834

Clarendon Peck was a resident of Bath County in the 1830s. He was an amateur botanist who sent collections and letters to C.W. Short. Several collections of Peck, together with a large number of Short, are now housed at the Philadelphia Academy of Science (PH). The maps photocopied here were rediscovered in 1991 by Stuart Sprague (Morehead State University) among C.W. Short's papers in the Southern Historical Collection at the University of North Carolina, Chapel Hill. The handwriting suggests that Short may actually have contributed to these maps, using information from Peck (M. Medley, pers. comm.).

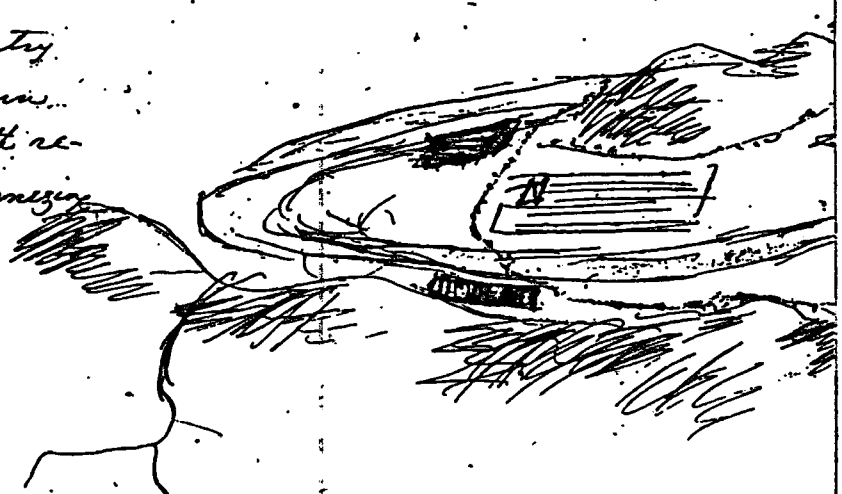

Licking river
Elliots tavern
Bayou
Rices tavern
Owingsville
bottom 4 mile
state creek
Springs
Road to Sterling

#662
folder 13

Malaxis lilifolia
Orchis fimbriata
—— Ciliaris -
Drosera longifolia
Sabbatia gracilis
—— angularis -
Chionanthus virginica
Azaleas — 2 species -
Cypripedium — 3 species
Magnolias — 4 species -
Chimaphilla — maculata
Gaultheria procumbens
Epigea repens
Vaccinium of several species
Utricularia —
Hottonia palustris.
Thalictrum racemulinum
Aironia

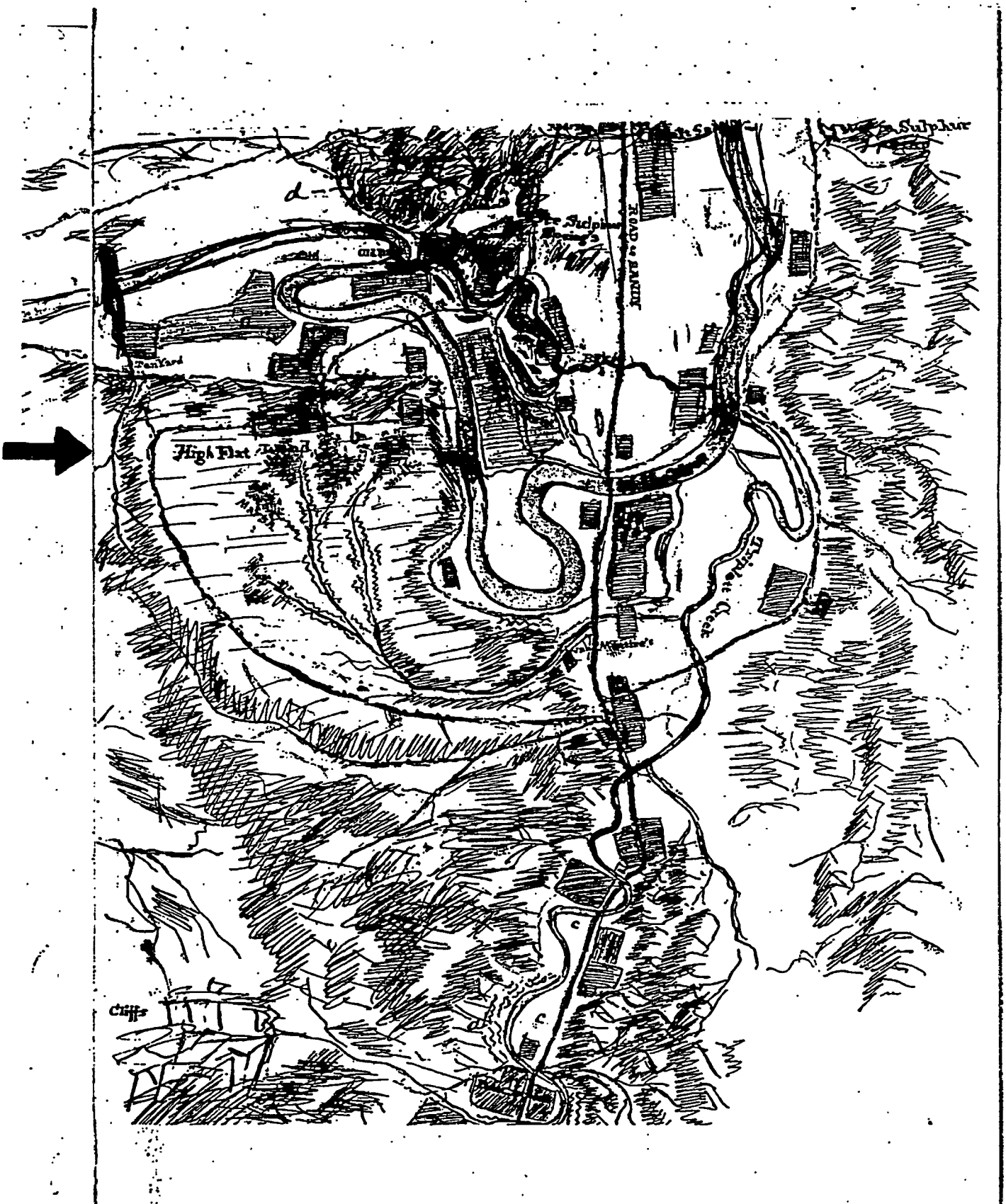
A Picter of Pecks
Travels on Licking

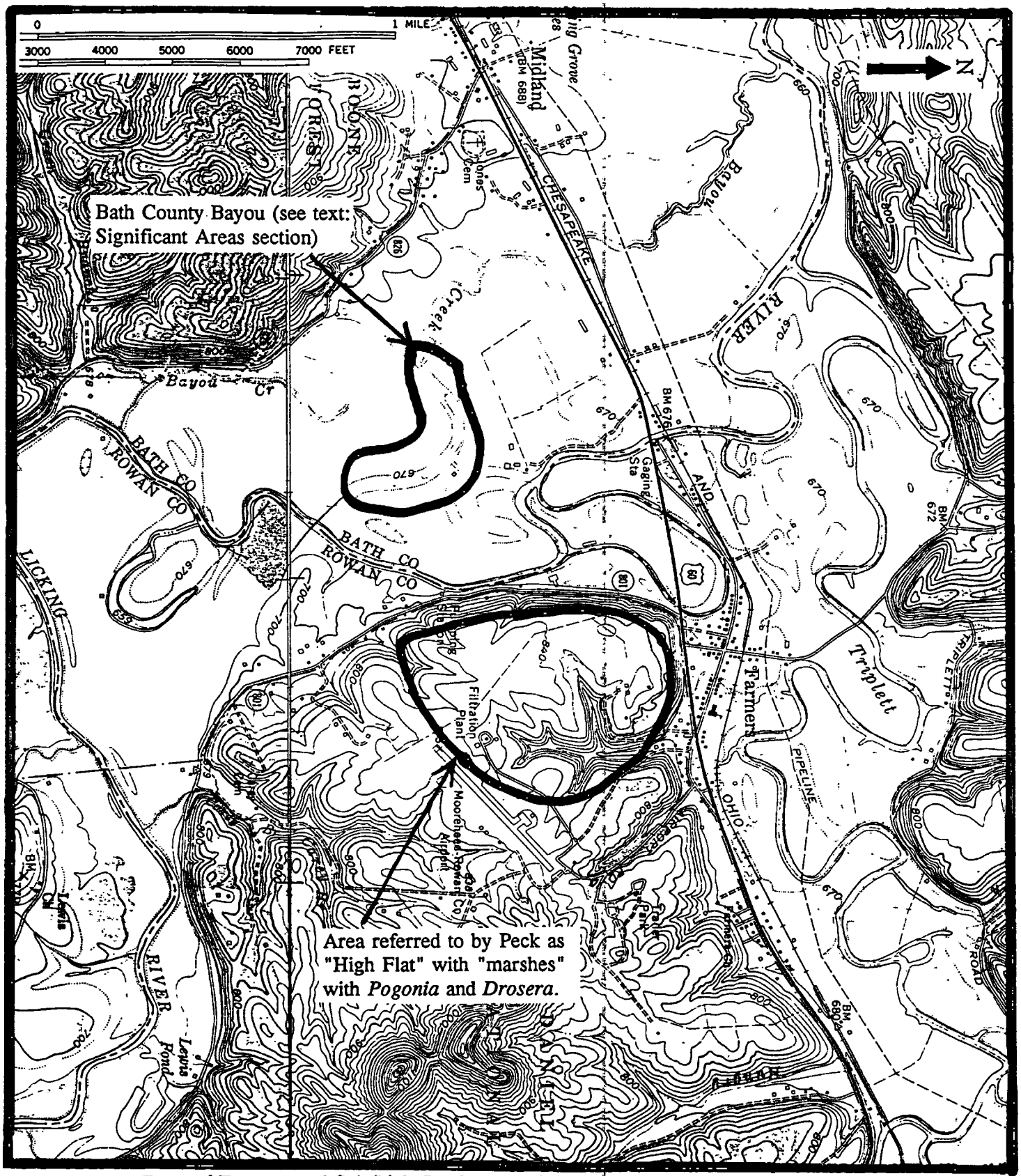
Sketch of the country around Elliotts Tavern on Licking River, with reference to the best botanizing grounds by J. G. Peck.
Oct 1834



a. Phlox rotundifolia
b Pogonia & Drocera
c Magnolia
d Viola palmata

[illegible]


High Flat
Cliffs



Parts of Farmers and Salt Lick Quadrangles that were covered by Peck

APPENDIX D

Sampling Data for Terrestrial Vertebrates

APPENDIX D1. Pitfall Trapping Data for Morehead RD Inventory (1991).

Bath County — Salt Lick Caney Site (Hog Hollow Fields) pitfalls Quadrangle

Flat lands along FS 1062, E and S of Hog Hollow and just S of Cave Run Dam.

Open grassy fields, wet to dry; large beds of sphagnum and haircap moss; also some stream-head wetlands and rut ponds; thick stands of Va. pine and Japanese honey-suckle; man-made, in part.

MAMMALS
Blarina brevicauda
Sorex longirostris

AMPHIBIANS
Ambystoma barbouri
Bufo americanus
Rana clamitans melanota
Rana palustris

Bath County — Salt Lick Glady Hollow pitfalls Quadrangle

North-facing slope in Glady Hollow, above FS 906, 1.0 mile from its junction with FS 909.

Rich mesophytic forest, dominated by beech, below a limestone cliffline.

MAMMALS
Blarina brevicauda
Microsorex hoyi
Napaeozapus insignis
Peromyscus leucopus
Sorex fumeus

AMPHIBIANS
Bufo americanus
Plethodon kentucki
Rana palustris
Salamander

REPTILE
Eumeces fasciatus

APPENDIX D1 continued.

Bath County	Salt Lick Quadrangle	Tater Knob pitfalls	
	West facing slope on Tater Knob, beside the junction of FS 918 and FS 918-B.		Dry upland oak woods just below a west facing sandstone cliffline.
	MAMMALS *Blarina brevicauda* *Microsorex hoyi* *Sorex fumeus*		REPTILES *Eumeces fasciatus* *Scincella lateralis*
Menifee County	Bangor Quadrangle	Murder Branch Gap pitfalls	
	Near Murder Branch Gap, just uphill from FS 1074; 3.6 miles North of SR 1274 and perhaps 0.2 miles West of Murder Branch Gap mistnet site.		Mature xeric hardwood forest with boulder talus, below a sandstone cliff.
	MAMMALS *Blarina brevicauda* *Microsorex hoyi* *Sorex fumeus*		AMPHIBIANS *Aneides aeneus* *Bufo americanus* *Rana clamitans melanota* *Rana sylvatica* REPTILE *Eumeces fasciatus*

APPENDIX D1 continued.

Menifee County	Bangor Quadrangle	Murder Branch pitfalls	
	Murder Branch, on an East facing lower slope, about 0.3 miles North of Murder Branch Cave and 0.2 miles South of where FS 1074 meets Murder Branch.		Mature hardwood forest with some rock talus, below a limestone outcrop.
	MAMMALS *Blarina brevicauda* *Microsorex hoyi* *Napaeozapus insignis* *Peromyscus leucopus* *Sorex fumeus*		AMPHIBIANS *Eurycea cirrigera* *Plethodon glutinosus* *Plethodon kentucki* Salamander
	CRUSTACEAN *Cambarus dubius* complex		REPTILE *Sceloporus undulatus*
Menifee County	Scranton Quadrangle	Botts Fork pitfalls	
	Botts Fork of Brushy Creek, 0.7 miles west of mouth; on a steep northeast facing slope of the first tributary above the mouth.		Mature hardwood forest featuring beech and oak; rich herbaceous flora; sandstone boulder talus.
	MAMMALS *Blarina brevicauda* *Microsorex hoyi* *Peromyscus leucopus* *Sorex fumeus*		AMPHIBIANS *Bufo americanus* *Eurycea cirrigera* *Plethodon glutinosus*

APPENDIX D1 continued.

Menifee County	Scranton Quadrangle	Kendrick Ridge pitfalls	
	Kendrick Ridge, in an unnamed west facing hollow facing Beaver Creek below Bashford Cemetery, across Beaver Creek from SR 1274 at a point 3.3 miles east from SR 36.		Rich mature hardwood forest ravine with some boulder talus and a good herbaceous flora, below sandstone cliffline.
	MAMMALS		AMPHIBIANS
	Blarina brevicauda		*Bufo americanus*
	Microsorex hoyi		*Eurycea longicauda*
	Napaeozapus insignis		Frog
	Peromyscus leucopus		*Notophthalmus viridescens*
	Sorex fumeus		*Plethodon glutinosus*
			Pseudotriton ruber
	CRUSTACEAN		REPTILES
	Cambarus dubius complex		*Eumeces fasciatus*
			Terrapene carolina
Menifee County	Scranton Quadrangle	Sweet Flag Swamp pitfalls	
	Beaver Creek floodplain, east side of SR 1274, 3.6 miles east of SR 36, opposite 1274 from Bashford Cemetery.		Open, wet weedy field dominated by sedges and sweet flag.
	MAMMAL		AMPHIBIANS
	Blarina brevicauda		*Acris crepitans blanchardi*
			Hyla chrysoscelis
	CRUSTACEAN		REPTILE
	Cambarus sp. (green)		*Terrapene carolina*

APPENDIX D1 continued.

Morgan County	Wrigley Quadrangle	Craney Creek pitfalls	
	South (east) side of Craney Creek, opposite and just upstream from mouth of Cross Branch, 0.3 miles northeast and east of the junction of FS 939 and FS 947.		Mesic lower slope with thick rhododendron cover, large trees, lots of old logs and stumps, and some rock talus.
	MAMMALS *Blarina brevicauda* *Microsorex hoyi* *Napaeozapus insignis* *Peromyscus leucopus* *Sorex fumeus*		AMPHIBIANS *Bufo americanus* *Notophthalmus viridescens* *Plethodon kentucki* *Plethodon* sp. *Rana clamitans melanota* *Rana sylvatica* *Rana utricularia* Salamander
Rowan County	Bangor Quadrangle	Clack Mountain Prairie pitfalls	
	Clack Mountain Prairie, atop Clack Mountain along SR 1274, 1.8 miles south of SR 519.		Open xeric ridgetop, dominated locally by a community of prairie grasses and wildflowers.
	MAMMALS *Blarina brevicauda* *Peromyscus leucopus* *Sorex fumeus*		AMPHIBIANS *Bufo americanus* *Rana sylvatica* REPTILES *Eumeces fasciatus* *Sceloporus undulatus* *Scincella lateralis*

APPENDIX D1 continued.

Rowan County	Cranston Quadrangle	Haney Branch pitfalls	
	Haney Branch drainage, along FS 977 about 1.1 miles southwest of its junction with SR 799, near ridgetop.		Northwest facing, xeric, oak-dominated hardwood forest located just below crest of ridge.
	MAMMALS *Blarina brevicauda* *Peromyscus leucopus* *Sorex fumeus*		AMPHIBIANS *Bufo americanus* Small frog
Rowan County	Cranston Quadrangle	Triplett Creek/ New Hope Church pitfalls	
	Floodplain of North Fork of Triplett Creek, behind New Hope Church and Cranston Cemetery.		Rich, mesic mature floodplain forest with large trees and many downed logs.
	MAMMALS *Blarina brevicauda* *Peromyscus leucopus* *Sorex fumeus*		AMPHIBIANS *Bufo americanus* *Eurycea cirrigera* *Pseudotriton ruber*

APPENDIX D1 continued.

Rowan County	Farmers Quadrangle	MSU Sphagnum Swamp pitfalls	
	Morehead State University Sphagnum Swamp, north of Green Mountain and west of Slatey Church at the edge of the Licking River floodplain.		Bottomland forest with mostly river birch, sweet gum, and red maple; open wet meadows with sedges and various wetland herbs; large patches of sphagnum moss.
	MAMMALS *Reithrodontomys humulis* *Sorex longirostris* Vole		AMPHIBIANS *Bufo americanus* Frog *Rana clamitans melanota* CRUSTACEAN *Cambarus* sp.
Rowan County	Morehead Quadrangle	Amburgy Rocks Road pitfalls	
	FS 964 near Amburgy Rocks, 0.4 miles from where FS 964 joins FS 16.		Upland oak forest, just below sandstone cliffline near top of ridge.
	MAMMALS *Blarina brevicauda* *Microsorex hoyi* *Peromyscus leucopus* *Sorex fumeus*		AMPHIBIANS *Aneides aeneus* *Bufo americanus* *Notophthalmus viridescens* *Rana sylvatica* Salamander REPTILES *Eumeces fasciatus* *Terrapene carolina*

APPENDIX D1 continued.

Rowan County — Morehead Quadrangle — Triangle Tower pitfalls

Near top of ridge, about 0.4 miles northeast of Triangle Tower; access from FS 12 about 2.2 miles from SR 1167.

Moderately xeric, northeast facing upper slope below sandstone cliffs, in an oak forest.

MAMMALS
Blarina brevicauda
Microsorex hoyi
Peromyscus leucopus
Sorex fumeus

AMPHIBIANS
Bufo woodhousei fowleri
Eurycea longicauda
Notophthalmus viridescens
Plethodon glutinosus
Rana clamitans melanota
Rana sylvatica

REPTILES
Eumeces fasciatus
Terrapene carolina

Rowan County — Salt Lick Quadrangle — Minor Clark Hatchery Oxbow pitfalls

North ends (both) of the oxbow lake at the Minor Clark Fish Hatchery, about 1.0 miles below Cave Run Dam.

Bottomland forest (rich, mesic, and dominated by river birch); adjacent wet weedy fields.

MAMMALS
Blarina brevicauda
Peromyscus leucopus
Sorex fumeus
Sorex longirostris

AMPHIBIANS
Bufo americanus
Bufo woodhousei fowleri
Rana clamitans melanota
Rana palustris

APPENDIX D1 continued.

Rowan County	Wrigley Quadrangle	Black Cave Hollow pitfalls		
	Black Cave Hollow, on west facing lower slope near the head; off FS 947, 2.0 miles east of FS 939.		Mature and fairly xeric hardwood forest below sandstone cliffs.	
	MAMMALS		AMPHIBIAN	
	Blarina brevicauda		*Rana clamitans melanota*	
	Microsorex hoyi			
	Microtus pinetorum		REPTILE	
	Napaeozapus insignis		*Terrapene carolina*	
	Peromyscus leucopus			
	Sorex fumeus			

APPENDIX D2: Snap Trapping Data for Morehead RD Inventory (1991).

Bath County	Bangor Quad	Zilpo Campground snap traps		
	USFS Zilpo Campground, Loop B.		Open old field with small stream; scattered multiflora rose amid dense stands of Lespedeza, asters, and goldenrods.	MAMMALS *Blarina brevicauda* *Microtus pinetorum* *Peromyscus leucopus*
Bath County	Olympia Quad	Mud Lick snap traps		
	Mud Lick Creek. Three sites were trapped, from Mud Lick Youth Camp to 0.5 miles NE of the mouth of McCarty Branch.		Open corridor dominated by sedges, rushes, and wetland herbs; a pipeline right-of-way through what was formerly swamp forest.	
	REPTILE *Terrapene carolina*			MAMMALS *Blarina brevicauda* *Microtus pennsylvanicus* *Reithrodontomys humulis*

APPENDIX D2 continued.

Bath County	Salt Lick Quad	Caney Site (Hog Hollow Fields)	snap traps	
	Flat lands along FS 1062, E and S of Hog Hollow and just S of Cave Run Dam.			Open grassy fields, wet to dry; large beds of sphagnum and haircap moss; streamhead wetland and rut ponds; a few thick stands of Va. pine and Japanese honeysuckle; man-made in part.
				MAMMALS *Blarina brevicauda* *Microtus pennsylvanicus* *Peromyscus leucopus* *Reithrodontomys humulis* *Synaptomys cooperi*
Menifee County	Scranton Quad	Sweet Flag Swamp	snap traps	
	Beaver Creek floodplain, east side of SR 1274, 3.6 miles east of SR 36, opposite 1274 from Bashford Cemetery.			Open, wet weedy field dominated by sedges and sweet flag.
				MAMMALS *Blarina brevicauda* *Microtus ochrogaster* *Microtus pennsylvanicus* *Peromyscus leucopus*

APPENDIX D2 continued.

Rowan County	Bangor Quad	Clack Mountain Limestone Talus snap traps		
	Along crest of Clack Mountain, SR 1274, 2.7 miles south of its junction with SR 519.		Open grassy field with limestone talus, along ridgetop.	MAMMAL *Peromyscus leucopus*
Rowan County	Farmers Quad	MSU Sphagnum Swamp snap traps		
	Morehead State University Sphagnum Swamp, north of Green Mountain and west of Slatey Church at the edge of the Licking River floodplain.		Bottomland forest with mostly river birch, sweet gum, and red maple; open wet meadows with sedges and various wetland herbs; large patches of sphagnum moss.	MAMMALS *Blarina brevicauda* *Peromyscus leucopus* *Sorex longirostris*
Rowan County	Morehead Quad	FS 977-i Pond snap traps		
	Along FS 977-i, next to a FS wildlife pond, about 0.2 miles east of FS 977.		FS wildlife pond on a wooded ridgetop in a fairly young oak-hickory forest.	MAMMAL *Peromyscus leucopus*

APPENDIX D2 continued.

Rowan County	Salt Lick Quad	Minor Clark Hatchery Oxbow	snap traps	
	North ends (both) of the oxbow lake at the Minor Clark Fish Hatchery, about 1.0 miles below Cave Run Dam.		Bottomland forest (rich, mesic, and dominated by river birch); adjacent wet weedy fields.	MAMMALS *Microtus pennsylvanicus* *Peromyscus leucopus*

APPENDIX D3. Mistnetting Data for Morehead RD Inventory (1991).

DATE	LOCATION	HABITAT	SPECIES
21 May 1991 Menifee Co Bangor Quad	Gap in sandstone cliff along FS road 1074, 4.8 miles from its junction with SR 1274, above south flowing fork of Murder Branch.	FS road through gap in sandstone cliff; over gravel road and next to adjacent cliffs.	*Eptesicus fuscus* *Myotis septentrionalis* *Plecotus townsendii virginianus* *Glaucomys volans*
10 Jun 1991 Menifee Co Bangor Quad	Gap in sandstone cliff along FS road 1074, 5.5 miles from its junction with SR 1274; south rim of Scale Ladder Hollow, opposite Ginter Cem.	FS road through gap in sandstone cliff.	*Eptesicus fuscus* *Lasiurus borealis* *Myotis septentrionalis* *Pipistrellus subflavus* *Glaucomys volans*
13 Jun 1991 Menifee Co Scranton Quad	Beaver Creek, 0.1 mile west of the junction of SR 1274 and FS 1088 (= from mouth Clifton Creek).	Valley bottom stream with forested hillside to the south and agricultural fields to the north.	*Lasiurus borealis* *Pipistrellus subflavus*

APPENDIX D3 continued.

DATE	LOCATION	HABITAT	SPECIES
18 and 19 Jun 1991 Rowan/Morgan Co. line Wrigley Quad	Craney Creek, 0.1 mile east on FS 947 from its junction with FS 939, near mouth of Cross Branch.	30' wide stream corridor with good canopy, adjacent to forested slope. Rainy weather 2 nts!	*Pipistrellus subflavus*
26 Jun 1991 Menifee Co ? Quad	FS 1231, 1.0 mile from jct SR 1274.	Gravel road with nice tree canopy on west-facing slope below sandstone cliffline	No bats
10 Jul 1991 Morgan Co Bangor Quad	Mine Branch drainage on and below FS 933, 1.9 miles from its junction with SR 1274, where old road winds down from near turnoff to Donahue.	Gravel road between forested slope and recent shelterwood cut on ridgetop; shallow rock shelters along sandstone cliffline below.	*Eptesicus fuscus* *Lasiurus borealis*
11 Jul 1991 Rowan Co Cranston Quad	North Fork Triplett Creek at Cranston, behind New Hope Church at old ford, below mouth of Clear Fork.	Large flowing stream with well-forested banks in a broad agricultural bottom.	*Eptesicus fuscus* *Lasiurus borealis* *Lasiurus cinereus* *Myotis lucifugus* *Pipistrellus subflavus*

APPENDIX D3 continued.

DATE	LOCATION	HABITAT	SPECIES
16 Jul 1991 Menifee Co Salt Lick Quad	Skidmore Creek area, 2.5 miles on FS 1227 from its junction with SR 1274; about 0.4 miles northwest of where FS 1227A joins FS 1227.	Sandstone cave and shelter along a southeast facing sandstone cliff; entrance 20' wide x 8' high.	*Eptesicus fuscus* *Myotis lucifugus* *Myotis septentrionalis* *Plecotus rafinesquii*
18 Jul 1991 Rowan Co Morehead Quad	South Fork Triplett Creek near McBrayer Road, behind Seal Master, 0.5 miles from US 60 and 0.5 miles east of mouth of Becky Branch.	Large bottomland stream with forested banks and good canopy closure.	*Eptesicus fuscus* *Lasiurus borealis* *Pipistrellus subflavus*
23 and 24 Jul 1991 Bath Co Olympia Quad	Off Mud Lick Road, 1.1 miles from its junction with SR 36; 0.5 miles NNE of Mud Lick Youth Camp.	Along pipeline clearing in a bottomland hardwood forest with alder, birch, and swamp white oak.	*Lasiurus borealis* *Glaucomys volans*

APPENDIX D3 continued.

DATE	LOCATION	HABITAT	SPECIES
25 Jul 1991 Rowan Co Morehead Quad	FS 12A, 1.5 miles from its junction with FS 12, about 0.75 miles due east of Triangle Tower.	West-facing sandstone shelter, 75' wide with a 20' ceiling, in a cliffline at the top of the ridge.	*Eptesicus fuscus* *Myotis septentrionalis* *Myotis sodalis* (male)
30 Jul 1991 Menifee Co Salt Lick Quad	Near Gate Post Hill, 4.6 miles on FS 909 from its junction with FS 129.	Sandstone cliffline on upper slope, above FS 909.	No bats
31 Jul 1991 Bath/Rowan Co. line Farmers Quad	Licking River below Cave Run Dam, west side of KY 801 about 0.5 miles south of the US 60 - SR 801 junction.	Wide (120') shallow stretch of Licking River with sloping wooded banks, in a broad river bottom with much agriculture and a nearby fish hatchery.	*Lasiurus borealis* *Myotis lucifugus* *Pipistrellus subflavus*
1 Aug 1991 Bath Co Farmers Quad	Old oxbow of Licking River, west of the river and about 0.5 miles south of US 60 (SSE of US 60 gaging station).	Weedy oxbow with a good wooded border and tree canopy; a small stream flows down the center over thick sediment deposits.	*Eptesicus fuscus* *Lasiurus borealis* *Myotis lucifugus* *Pipistrellus subflavus*

APPENDIX D3 continued.

DATE	LOCATION	HABITAT	SPECIES
6 Aug 1991 Menifee Co Salt Lick Quad	East end of Chestnut Cliffs, off FS 129, 2.4 miles east of its junction with FS 918.	In and bear the 18' wide entrance to a large rock shelter along the base of a high sandstone cliffline.	*Eptesicus fuscus* *Myotis lucifugus* *Myotis septentrionalis* *Plecotus rafinesquii*
13 Aug 1991 Menifee Co Ezel Quad	Spaws Creek, about 1.0 mile on FS 983 from its junction with SR 1693 at Dan and north via farm roads; 0.3 miles east of junction of Spaws Creek and Rough Branch.	Dry, sandy streambed at bottom of a very steep, well-forested ravine dominated by large hemlock and beech.	*Lasiurus borealis* *Myotis leibii* *Myotis lucifugus* *Myotis septentrionalis* *Myotis sodalis* *Pipistrellus subflavus*

APPENDIX D3 continued.

DATE	LOCATION	HABITAT	SPECIES
15 Aug 1991 Menifee Co Scranton Quad	Ridgetop near the head of Long Branch behind the Menifee County Park, near Frenchburg.	Sphagnum-rimmed pond on sandstone ridge, surrounded by young forest.	*Eptesicus fuscus* *Lasiurus borealis* *Myotis septentrionalis* *Pipistrellus subflavus*
10 Oct 1991 Morgan Co Bangor Quad	Mine Branch Cave.	In and near the two entrances to a limestone cave in the bottom of a deep, broad ravine.	*Lasiurus borealis* *Myotis lucifugus* *Myotis septentrionalis* *Pipistrellus subflavus* *Plecotus rafinesquii*

APPENDIX D3 continued.

DATE	LOCATION	HABITAT	SPECIES
30 Oct 1991 Menifee Co Ezel Quad	Murder Branch Cave.	In and near the entrance to a limestone cave surrounded by mature hardwood forest.	*Eptesicus fuscus* *Lasionycteris noctivagans* *Myotis lucifugus* *Myotis septentrionalis* *Plecotus rafinesquii*

APPENDIX D4. Winter Bat Cave Census Data for Morehead RD (1991-92).

Site Name Date	E PIP	BIG BRN	RAF B-E	VIR B-E	LIT BRN	IND BAT	NLE BAT	SLV HRD	TOTAL BATS
Old House Creek Sandstone Cave 12/12/91	13	3	1	-	-	-	-	-	17
WKMR Sandstone Shelter 12/12/91	-	-	-	-	-	-	-	-	0
Risk Cave 12/12/91	1	-	-	-	-	-	-	-	1
Dock Hollow Cave 12/13/91	6	-	-	-	-	-	-	-	6
Clifton Creek Iron Mine 12/13/91	2	-	-	-	-	-	-	-	2
Hill Top Mines 12/13/91	2	2	-	-	-	-	-	-	4
Wagers Hollow W-1 Shelter 12/13/91	-	-	-	-	-	-	-	-	0
Silver Haired Cave 12/13/91	8	1	-	-	-	-	-	2	11
Silver Haired Cave 12/16/91	5	3	-	-	-	-	2	3	13
Clack Mountain RR Tunnel 12/16/91	21	13	7	-	-	-	-	-	41
Murder Branch Cave 12/16/91	150	3	-	-	97	-	2	-	25
Slabcamp Sandstone Cave #39 12/16/91	-	-	-	-	-	-	-	-	0
Stonecoal Sandstone Cave 12/16/91	-	-	-	-	-	-	-	-	0
Stonecoal Sandstone Cave #27 12/16/91	-	-	-	-	-	-	-	-	0
Stonecoal Sandstone Cave #29 12/16/91	-	-	-	-	-	-	-	-	0
Hardin Cave #1 12/17/91	-	3	-	-	-	-	-	-	3
Hardin Cave #2 12/17/91	22	-	-	-	8	-	-	-	30
Slabcamp Sandstone Shelter 12/17/91	-	-	-	-	-	-	-	-	0

APPENDIX D4 continued.

Site Name Date	E PIP	BIG BRN	RAF B-E	VIR B-E	LIT BRN	IND BAT	NLE BAT	SLV HRD	TOTAL BATS
Slabcamp Sandstone Shelter #98 12/17/91	-	-	-	-	-	-	-	-	0
Cold Cave Pit 12/17/91	1	-	-	-	-	-	-	-	1
Kendrick Ridge Sandstone Shelter #23-b 12/17/91	-	-	-	-	-	-	-	-	0
Kendrick Ridge New Sandstone Cave 12/17/91	-	1	-	-	-	-	-	-	1
Ellington Pit Cave 12/17/91	-	-	-	-	-	-	-	-	N/A
Pickett Branch Pit Cave 12/17/91	-	-	2	-	-	-	-	-	2
Hardin Pit Cave 12/17/91	-	-	-	-	-	-	-	-	0
Chestnut Cliffs Sandstone Cave 12/18/91	-	1	-	-	-	-	-	-	1
Gatepost Hill Gap Sandstone Shelter 12/18/91	-	-	-	-	-	-	-	-	0
Holland Branch Sandstone Shelter 12/18/91	-	-	-	-	-	-	-	-	0
Skidmore Sandstone Cave 12/18/91	-	-	1	-	-	-	-	-	1
Mine Branch 3x3' Sandstone Shelter 12/19/91	-	-	-	-	-	-	-	-	0
Mine Branch 20' Sandstone Cave 12/19/91	-	1	-	-	-	-	-	-	0
Mine Branch Cave 12/19/91	51	7	-	-	8	-	-	-	66
Donahue Sandstone Cave 12/19/91	6	1	53	-	1	-	-	-	61
Dislocated Finger Sandstone Shelters 12/19/91	-	-	-	-	-	-	-	-	0
Betty Gap Cabin Sandstone Shelter 12/19/91	-	-	-	-	-	-	-	-	0
Open Fork Cave #1 12/20/91	2	-	-	-	-	-	-	-	2

APPENDIX D4 continued.

Site Name Date	E PIP	BIG BRN	RAF B-E	VIR B-E	LIT BRN	IND BAT	NLE BAT	SLV HRD	TOTAL BATS
Open Fork Cave #2 12/20/91	-	-	-	-	-	-	-	-	0
Wagers Hollow W-2 Sandstone Cave 12/20/91	-	-	-	-	-	-	-	-	0
Haldeman/Soldier RR Tunnel 12/20/91	-	2	-	-	-	-	-	-	2
Spaws Creek Camp Cave 12/20/91	-	-	-	-	-	-	-	-	0
TOTALS:	285	40	64	0	114	0	4	3	510

Key to Abbreviations:

E PIP = Eastern Pipistrelle (*Pipistrellus subflavus*)
BIG BRN = Big Brown Bat (*Eptesicus fuscus*)
RAF B-E = Rafinesque's Big-eared Bat (*Plecotus rafinesquii*)
VIR B-E = Virginia Big-eared Bat (*Plecotus townsendii virginianus*)
LIT BRN = Little Brown Bat (*Myotis lucifugus*)
IND BAT = Indiana Bat (*Myotis sodalis*)
NLE BAT = Northern Long-eared Bat (*Myotis septentrionalis*)
SLV HRD = Silver-haired Bat (*Lasionycteris noctivagans*)

APPENDIX D5: Past Winter Cave Bat Populations for Morehead Ranger District.

Site Name Date	E PIP	BIG BRN	RAF B-E	VIR B-E	LIT BRN	IND BAT	NLE BAT	SLV HRD	TOTAL BATS
Murder Branch Cave*									
1/15/82	N/A	N/A	-	4	N/A	N/A	-	-	4+
2/05/82	N/A	5	-	3	40	-	-	-	48+
3/15/83	N/A	N/A	-	OBS	N/A	OBS	-	-	1+
2/09/88	134	1	-	1	64	2	7	-	209
4/10/90	100	-	-	-	50	-	-	-	150
1/14/91	163	5	-	-	85	2	-	-	255
10/30/91	100	-	-	-	40	4	-	-	144
Clifton Creek Iron Mine									
1/25/89	5	-	-	-	-	-	-	-	5
Dock Hollow Cave									
1/25/89	12	-	1	-	-	-	1	-	14
Donahue Sandstone Cave									
2/15/82	N/A	N/A	61	N/A	N/A	-	-	-	61
2/15/84	N/A	N/A	134	N/A	N/A	-	-	-	134
3/07/84	4	-	67	1	2	-	-	-	74
1/12/86	1	1	118	-	1	-	-	-	121
3/17/86	1	1	85	2	1	-	-	-	90
1/17/87	-	1	34	-	1	-	-	-	36
2/09/88	2	-	95	2	1	-	-	-	100
2/06/89	6	1	86	1	1	-	-	-	95
1/07/90	7	2	77	1	-	-	-	-	87
1/08/90	6	2	43	1	-	-	-	-	52
1/14/91	5	-	49	-	-	-	-	-	54
Mine Branch Cave									
12/20/83	18	3	-	-	-	-	-	-	21
9/19/86	1	-	-	-	-	-	1	-	2
1/17/87	34	3	-	-	1	-	-	1	39
2/15/88	25	5	-	-	-	-	-	-	30
10/10/91	19	-	-	-	1	-	-	-	20
Mine Branch Shelters									
2/17/88	-	5	-	-	-	-	-	-	5
Small sandstone cave near Donahue Cave									
10/09/85	-	-	1	-	-	-	-	-	1
Spaws Creek Sodalis Cave									
3/21/91	5	-	-	-	1	1	-	-	7

APPENDIX D5 continued.

Site Name Date	E PIP	BIG BRN	RAF B-E	VIR B-E	LIT BRN	IND BAT	NLE BAT	SLV HRD	TOTAL BATS
Phillip Hardin Cave No. 1									
2/20/85	-	1	-	-	-	-	-	-	1
2/12/89	-	4	-	-	1	-	-	-	5
Phillip Hardin Cave No. 2									
2/20/85	9	5	-	-	1	-	-	-	15
2/12/89	19	-	-	-	4	-	-	-	23
Silver Haired Cave									
1/14/91	-	5	-	-	-	-	-	5	10
Clack Mountain RR Tunnel									
1/15/71	N/A	N/A	N/A	1	-	-	-	-	1+
2/15/82	-	1	15	-	2	-	-	-	18
11/25/87	14	13	13	-	1	-	-	-	41
1/14/91	10	9	8	-	-	-	-	-	27

Key to Abbreviations:

* Murder Branch Cave has long been known as a bat hibernaculum, but very few total counts of all species are available.

E PIP = Eastern Pipistrelle (Pipistrellus subflavus)
BIG BRN = Big Brown Bat (Eptesicus fuscus)
RAF B-E = Rafinesque's Big-eared Bat (Plecotus rafinesquii)
VIR B-E = Virginia Big-eared Bat (Plecotus townsendii virginianus)
LIT BRN = Little Brown Bat (Myotis lucifugus)
IND BAT = Indiana Bat (Myotis sodalis)
NLE BAT = Northern Long-eared Bat (Myotis septentrionalis)
SLV HRD = Silver-haired Bat (Lasionycteris noctivagans)
N/A = Not available

APPENDIX E

Terrestrial Vertebrate Lists

APPENDIX E1. Amphibians and Reptiles of the Morehead Ranger District.

Species	Habitat(s)
Amphibians	
Salamanders	
*Ambystoma barbouri** Streamside Salamander	Breeds in streams, ponds, wetlands, and ditches in early spring; eggs are laid singly in dense groups; adults are in low moist woodlands and fields.
*Ambystoma jeffersonianum** Jefferson Salamander	Breeds in upland and lowland woodland ponds in early spring; eggs are in small to medium sized masses and are attached to twigs or leaves; adults terrestrial in forested areas.
*Ambystoma maculatum** Spotted Salamander	Breeds in upland and lowland woodland ponds in early spring; eggs are in medium to large masses and attached to twigs and sticks; adults are terrestrial in forested areas.
Ambystoma opacum Marbled Salamander	Lays eggs in autumn at the margins of permanent or seasonal woodland ponds; adults are terrestrial in woodlands.
*Aneides aeneus** Green Salamander	Lays eggs in crevices in sandstone cliffs (occasionally rotting logs); adults are in sandstone crevices and shelters.
Cryptobranchus a. alleganiensis Eastern Hellbender	Lays eggs under rocks in streams in winter; adults live in rivers and large streams.
*Desmognathus f. fuscus** Northern Dusky Salamander	Lays eggs under rocks and logs at the edges of springs, seepages, and small streams in summer-fall; adults are semi-aquatic in similar habitats.
*Desmognathus monticola** Seal Salamander	Lays eggs in seepages and dripping waterfall crevices in summer-fall; adults are semiaquatic along rocky headwater streams and seepages.
*Desmognathus ochrophaeus** Mountain Dusky Salamander	Lays eggs at edges of seepages in summer and fall; adults live in mucky seeps and wet rock faces in ravines.
*Desmognathus welteri** Black Mountain Salamander	Lays eggs under rocks and debris at the edges of headwater streams in summer-fall; adults live along clean rocky headwater streams.
*Eurycea cirrigera** Southern Two-lined Salamander	Lays eggs under rocks in small streams in spring; adults usually live along stream margins or in adjacent woods.
*Eurycea l. longicauda** Longtail Salamander	Lays eggs in springs and wet caves in winter; adults live in rock crevices, caves, or along stream margins.

APPENDIX E1 continued.

Species	Habitat(s)
*Eurycea lucifuga** Cave Salamander	Lays eggs in springs and wet caves in winter; adults live in caves and along rock outcrops and are usually found only in limestone areas.
*Gyrinophilus porphyriticus duryi** Kentucky Spring Salamander	Lays eggs in springs; adults live in caves or along the margins of springs and rocky headwater streams.
*Hemidactylium scutatum** Four-toed Salamander	Lays eggs in rotten wood or mosses (especially sphagnum or haircap moss) along pond margins or the edges of upland headwater streams in spring; adults are terrestrial in acid woods.
*Necturus m. maculosus** Mudpuppy	Lays eggs under debris in rivers and streams; adults are aquatic in large streams, rivers, and reservoirs.
*Notophthalmus v. viridescens** Red-spotted Newt	Lays eggs singly in woodland ponds in spring; terrestrial immature Red Efts live in woodlands; adults are aquatic and Red Eft in ponds but may become terrestrial after breeding, as ponds become dry in summer, or as hibernation approaches.
*Plethodon glutinosus** Slimy Salamander	Lays eggs on land under rocks or in rotten logs in summer and autumn; the adults are terrestrial in woodlands, caves, or along rock outcrops.
*Plethodon kentucki** Cumberland Plateau Salamander	Lays eggs on land in rock crevices in late summer or autumn; adults are terrestrial in woodlands, caves, and old mines or along rock outcrops.
*Plethodon richmondi** Ravine Salamander	Lays eggs on land under buried rocks in summer; adults terrestrial in woodlands.
Plethodon wehrlei[2] Wehrle's Salamander	Lays eggs on land; adults terrestrial in woodlands and along rock outcrops. [Included here because suitable shale and siltstone outcrops appear to offer excellent habitat; the species is very rare and local in KY, TN, and western VA and WV and is easily overlooked]
Pseudotriton montanus diasticus Midland Mud Salamander	Lays eggs in springs and seepages; adults live along margins of springs, seepages, or small streams but at times are found well away from water.
*Pseudotriton r. ruber** Northern Red Salamander	Lays eggs in springs and seepages; adults live along stream and spring margins or far from water in forests.

APPENDIX E1 continued.

Species	Habitat(s)
Frogs and Toads	
*Acris crepitans blanchardi** Blanchard's Cricket Frog	Breeds (summer) and lives in ponds, along sluggish streams, or in wetland areas; almost always in bottomlands.
*Bufo a. americanus** Eastern American Toad	Breeds (spring) in shallow ponds and ditches; adults are terrestrial and occur in a wide variety of habitats.
*Bufo woodhousii fowleri** Fowler's Toad	Breeds (late spring-summer) in ponds, lakes, and streams or in temporary pools; adults are terrestrial in open or sandy soil areas.
*Hyla chrysoscelis** Cope's Gray Treefrog	Breeds (spring-summer) in woodland or forest edge pools; the adults are largely arboreal in forests or edges.
*Pseudacris brachyphona** Mountain Chorus Frog	Breeds (early spring to early summer) in seasonal upland pools or ditches; adults are terrestrial in woodlands.
*Pseudacris c. crucifer** Northern Spring Peeper	Breeds (spring) in ponds located in or near woodlands; adults terrestrial in woodlands.
Pseudacris triseriata feriarum Upland Chorus Frog	Breeds (early spring) in low-lying wet meadows, ditches, or swampy woodlands; adults terrestrial in bottomlands. [Occurrence is problemmatical in the northeastern quadrant of Kentucky; the few area reports are not supported by specimens; probably does not occur on the Morehead Ranger District.]
*Rana catesbeiana** Bullfrog	Breeds (summer) in permanent ponds or lakes or in pool sections of large streams and rivers; adults near water.
*Rana clamitans melanota** Green Frog	Breeds (summer) in woodland or open ponds or stream pools; adults usually remain near water.
*Rana palustris** Pickerel Frog	Breeds (spring) in woodland or pasture ponds or stream pools; adults may stay near water but often move to caves or rock outcrop areas after breeding.
*Rana u. utricularia** Southern Leopard Frog	Breeds (spring) in ponds or temporary pools, usually in bottomlands or in wetlands and often in open situations; adults in wet meadows or low woods.
*Rana sylvatica** Wood Frog	Breeds (early spring) in woodland ponds, often laying eggs communally in huge masses; adults are terrestrial in woodlands.

APPENDIX E1 continued.

Species	Habitat(s)
Scaphiopus h. holbrookii[1] Eastern Spadefoot	Breeds February to September during very heavy rains in ponds or flooded fields; adults live underground in various habitats and are rarely seen.
Reptiles	
Turtles	
Apalone m. mutica[2] Midland Smooth Softshell	Found in rivers and reservoirs and in the mouths of large tributary streams, usually only in stretches with fine sand bottoms [a literature record from the Morehead area is not vouchered by specimens and probably represents misidentified Spiny Softshells].
*Apalone s. spinifera** Eastern Spiny Softshell	Generally found only in large streams, rivers, and reservoirs with sandy or gravelly bottoms.
*Chelydra s. serpentina** Common Snapping Turtle	Found in every aquatic habitat from rivers and reservoirs to water-filled road ruts on ridges.
*Chrysemys picta marginata** Midland Painted Turtle	Lives primarily in floodplain ponds, wetlands, and oxbows; occasional in sluggish sections of large streams.
Graptemys geographica Common Map Turtle	Inhabits large streams, rivers, and reservoirs; prefers flowing waters.
Graptemys pseudogeographica ouachitensis[1] Ouachita Map Turtle	Found in very large streams, rivers, and reservoirs; occasionally in large oxbow ponds and other wetland areas. [Possibly has ascended the Licking River into the Morehead District; isolated populations are known from southern Ohio and the lower Kanawha River in West Virginia].
*Sternotherus odoratus** Common Musk Turtle	Lives in rivers, reservoirs, wetlands, oxbows, streams, ditches, and pasture ponds, mostly in lowland situations.
*Terrapene c. carolina** Eastern Box Turtle	Our only terrestrial turtle; found in all woodland and edge habitats; often moves into streams and water-filled road ruts in hot, dry weather.
*Trachemys scripta elegans** Red-eared Slider	Inhabits rivers, reservoirs, oxbows, wetlands, and pasture ponds - almost always in lowland habitats.

APPENDIX E1 continued.

Species	Habitat(s)
Lizards	
Eumeces a. anthracinus[1] Northern Coal Skink	Found in or near openings on rocky slopes, most often along streams but occasionally on ridge tops; seems to prefer shale areas. [Included here on the basis of records from the Stanton and Berea Ranger Districts and a single record from southern Ohio; probably occurs locally on Morehead.]
*Eumeces fasciatus** Five-lined Skink	Found in many habitats - most common around forest edge buildings, rock walls, sunny cliffs, or fallen logs with loose-fitting bark.
Eumeces laticeps Broadhead Skink	Habitats vary - usually found on large cavity-bearing trees on ridgetops or along cliffs, but also found on wooded floodplains and swamps.
*Sceloporus undulatus hyacinthinus** Northern Fence Lizard	Found in dry, open woodlands; often on pines or along rock outcrops bordering roads or trails; also on walls of old buildings, woodpiles, rockpiles, etc.
*Scincella lateralis** Ground Skink	Upland forests and forest openings; often abundant in disturbed sites with lots of rocks or other debris to hide under or along trails and old roads.
Snakes	
*Agkistrodon contortrix mokasen** Northern Copperhead	Most common in disturbed forests and edge situations, but also frequents mature woodlands, fields, pastures.
Carphophis amoenus ssp.* Worm Snake	Prefers rocky slopes in open woodlands but can be found in just about any non-flooding habitat; a burrower.
Cemophora coccinea copei Northern Scarlet Snake	Habitat uncertain; probably prefers dry open woods with sandy soils and abundant rocks and stumps; a burrower.

APPENDIX E1 continued.

Species	Habitat(s)
*Coluber c. constrictor** Northern Black Racer	Occasionally in woodlands, but most abundant in old fields, pastures, and other disturbed habitats with lots of brush and open land.
*Coluber constrictor priapus** Southern Black Racer	Occasionally in woodlands, but most abundant in old fields, pastures, and other disturbed habitats with lots of brush and open land.
*Crotalus horridus** Timber Rattlesnake	Most common in rocky wooded uplands and regenerating forest openings.
*Diadophis punctatus edwardsii** Northern Ringneck Snake	Rocky hillsides in or near forested areas; seems to prefer areas with slightly damp, sandy soils; sometimes found in bottomlands.
Elaphe g. guttata[1] Corn Snake	Most likely to be found in old fields and forest openings in bottomlands; also in open rocky upland woods. [Included on the basis of a recent record (Mike Lee), supported by a photograph, from eastern Morgan Co.]
*Elaphe o. obsoleta** Black Rat Snake	Woodlands, edges, old fields, and rocky slopes; bottomlands or uplands; often around old buildings.
Heterodon platirhinos Eastern Hognose Snake	Open woodlands and old fields with loose, sandy soils in both upland and bottomland situations.
*Lampropeltis getula nigra** Black Kingsnake	Prefers old fields, pastures, and open woods with rocky soils; most common in bottomlands but sometimes in uplands.
Lampropeltis triangulum elapsoides Scarlet Kingsnake	Poorly known; apparently a burrower in upland forests with deep sandy soils and abundant logs, stumps, and snags; prefers oak-pine and oak woodlands.
*Lampropeltis t. triangulum** Eastern Milk Snake	Most common in fields and forest openings with abundant rocks or debris for cover; less common in woodlands.

APPENDIX E1 continued.

Species	Habitat(s)
*Nerodia s. sipedon** Northern Water Snake	Common in all aquatic habitats; most abundant in open sites with numerous rocks and other debris along the edges of medium to large streams.
*Opheodrys aestivus** Rough Green Snake	An arboreal species; usually found in forest edges or regenerating fields in honeysuckle tangles, cedars, and young pines and hardwoods.
Regina septemvittata[2] Queen Snake	Found along the margins of large and medium-sized streams, usually in open areas with abundant rock cover or with many shrubs overhanging the water. [Unlikely but remotely possible along streams draining farmland in the western part of the Morehead RD].
*Storeria d. dekayi** Northern Brown Snake	Most common in fields and wet meadows on low ground; occasionally in lowland woods or upland rocky openings.
*Storeria o. occipitomaculata** Northern Redbelly Snake	Most common in upland situations; can be found in mature forest but prefers edges and openings with lots of cover.
Thamnophis s. sauritus Eastern Ribbon Snake	A wetland species; prefers open swampy areas with stands of buttonbush and willow and good populations of frogs and minnows. [Old literature record; exact locality and location of voucher specimen are unknown].
*Thamnophis s. sirtalis** Eastern Garter Snake	Found in all habitats; seems most common in fields and openings with a lot of cover on low ground.
Virginia v. valeriae Eastern Earth Snake	Seems to prefer open rocky slopes, fields, and forest openings with numerous rocks and debris for cover.

APPENDIX E1 continued.

Species	Habitat(s)

KEY TO SYMBOLS:

* -- Found on the Morehead District during this Inventory.

[1] -- Expected to occur on the District; suitable habitat exists and there are documented records nearby.

[2] -- Occurrence on the District is problemmatical.

All other species -- Previous records exist for the Morehead District, but the species was not found during the Inventory.

		DANIEL BOONE NATIONAL FOREST	MOREHEAD RANGER DISTRICT				
			A	B	C	D	TOTAL
TOTALS:	AMPHIBIANS	38	30	3	1	2	36
	Salamanders	24	19	3	-	1	23
	Frogs and Toads	14	11	-	1	1	13
	REPTILES	39	22	7	3	2	34
	Turtles	10	6	1	1	1	9
	Lizards	7	3	1	1	-	5
	Snakes	23	13*	5	1	1	20

* For counting purposes, Northern and Southern Black Racers have been considered as a single form

SOURCE OF SPECIES NAMES: Conant, Roger and Joseph T. Collins. 1991. A Field Guide to Reptiles and Amphibians of Eastern and Central North America. 3rd ed. Boston: Houghton Mifflin. 450 pp.

APPENDIX E2: Breeding Birds of the Morehead Ranger District.*

Species	Abundance	Habitat(s)
[Least Bittern]	ra	Clark Fish Hatchery.
Green-backed Heron	fc	River/streambanks, ponds.
Black-crowned Night-Heron	ra	Vicinity of Cave Run Reservoir.
Yellow-crowned Night-Heron	ra	Streams; impoundments.
Canada Goose	uc	Vicinity of Cave Run Reservoir.
Wood Duck	uc	Rivers, streams and ponds.
Mallard	uc	Vicinity of Cave Run Reservoir.
Black Vulture	uc	Woodlands; farmland.
Turkey Vulture	co	Farmland; over woodlands.
Sharp-shinned Hawk	ra	Woodlands.
Cooper's Hawk	uc	Woodland edge; farmland.
Red-shouldered Hawk	uc	Wooded ravines.
Broad-winged Hawk	fc	Woodlands.
Red-tailed Hawk	fc	Farmland and woodlands.
American Kestrel	uc	Farmland and roadsides.
Ruffed Grouse	fc	Woodlands.
Wild Turkey	uc	Woodlands; wildlife openings.
Northern Bobwhite	uc	Farmland; wildlife openings.
[Common Moorhen]	ra	Clark Fish Hatchery.
Killdeer	uc	Farmland; settled areas.
American Woodcock	uc	Successional woodlands; openings.

APPENDIX E2 continued.

Species	Abundance	Habitat(s)
Rock Dove	uc	Morehead; farmland.
Mourning Dove	fc	Farmland; open woodlands.
Yellow-billed Cuckoo	fc	Woodlands.
Eastern Screech-Owl	fc	Woodlands; edges.
Great Horned Owl	fc	Woodlands; farmland.
Barred Owl	uc	Wooded ravines; bottomland.
[Common Nighhawk]	uc	Morehead.
[Chuck-will's-widow]	ra	Woodland edge; woodlots.
Whip-poor-will	fc	Woodlands; edges.
Chimney Swift	fc	Farmland; settled areas.
Ruby-throated Hummingbird	fc	Woodlands.
Belted Kingfisher	uc	Rivers and ponds.
[Red-headed Woodpecker]	ra	Farmland; clearcuts.
Red-bellied Woodpecker	uc	Woodland edge; farmland.
Downy Woodpecker	co	Woodlands.
Hairy Woodpecker	fc	Woodlands.
Northern Flicker	uc	Woodland edge; farmland.
Pileated Woodpecker	fc	Woodlands.
Eastern Wood-Pewee	fc	Woodlands; edges.
Acadian Flycatcher	fc	Mesic/riparian woodlands.
[Willow Flycatcher]	ra	Clark Fish Hatchery.

APPENDIX E2 continued.

Species	Abundance	Habitat(s)
Eastern Phoebe	fc	Streambanks; woodland openings; clifflines.
Great Crested Flycatcher	uc	Woodlands.
Eastern Kingbird	fc	Farmland.
[Purple Martin]	ra	Settled areas; farmland.
Tree Swallow	uc	Vicinity of Cave Run Reservoir.
Northern Rough-winged Swallow	uc	Roadcuts; farmland.
Cliff Swallow	uc	Vicinity of Cave Run Reservoir.
Barn Swallow	fc	Farmland.
Blue Jay	co	Woodlands; edges.
American Crow	co	Woodland edge; farmland.
Carolina Chickadee	co	Woodlands.
Tufted Titmouse	co	Woodlands.
White-breasted Nuthatch	fc	Woodlands.
Carolina Wren	co	Ubiquitous.
[House Wren]	uc	Settled areas.
Blue-gray Gnatcatcher	fc	Woodlands.
Eastern Bluebird	uc	Farmland; settled areas.
Wood Thrush	co	Woodlands.
American Robin	fc	Farmland; settled areas.
Gray Catbird	uc	Woodland edge; settled areas.

APPENDIX E2 continued.

Species	Abundance	Habitat(s)
Northern Mockingbird	fc	Farmland; settled areas.
Brown Thrasher	uc	Woodland edge; brushy areas.
Cedar Waxwing	uc	Pine/mixed woodlands.
European Starling	co	Farmland; settled areas.
White-eyed Vireo	fc	Clearcuts; successional habitats.
Yellow-throated Vireo	fc	Sub-xeric woodlands.
Red-eyed Vireo	co	Woodlands.
Blue-winged Warbler	uc	Clearcuts; successional habitats.
Northern Parula	fc	Mesic/riparian woodland.
Yellow Warbler	uc	Along streams; farmland.
Black-throated Green Warbler	fc	Wooded ravines with hemlocks.
Yellow-throated Warbler	fc	Pine/mixed woodlands.
Pine Warbler	fc	Pine/mixed woodlands.
Prairie Warbler	fc	Clearcuts; successional habitats.
Cerulean Warbler	ra	Mature mesic woodlands.
Black-and-white Warbler	fc	Sub-xeric woodlands.
American Redstart	uc	Bottomland forest.
Prothonotary Warbler	ra	Vicinity of Cave Run Reservoir.
Worm-eating Warbler	co	Woodlands.
Ovenbird	co	Woodlands.
Louisiana Waterthrush	fc	Woodlands; streams.

APPENDIX E2 continued.

Species	Abundance	Habitat(s)
Kentucky Warbler	fc	Woodlands.
Common Yellowthroat	co	Woodland edge; clearcuts.
Hooded Warbler	co	Woodlands.
Yellow-breasted Chat	fc	Woodland edge; clearcuts.
Summer Tanager	fc	Sub-xeric woodlands.
Scarlet Tanager	co	Mesic woodlands.
Northern Cardinal	co	Woodland edge; farmland.
[Blue Grosbeak]	uc	Farmland; edges.
Indigo Bunting	co	Ubiquitous.
Rufous-sided Towhee	fc	Woodland edge; farmland.
Chipping Sparrow	fc	Settled areas; farmland.
Field Sparrow	uc	Farmland; brushy edges.
[Grasshopper Sparrow]	ra	Farmland; reclaimed mines.
[Henslow's Sparrow]	ra	Old fields; reclaimed mines.
Song Sparrow	uc	Along streams; edges.
Red-winged Blackbird	uc	Farmland; ponds.
Eastern Meadowlark	uc	Farmland; reclaimed mines.
Common Grackle	uc	Farmland.
Brown-headed Cowbird	uc	Farmland; woodland edge.
Orchard Oriole	uc	Farmland; successional habitats.
[Northern Oriole]	ra	Farmland; riparian forest.

APPENDIX E2 continued.

Species	Abundance	Habitat(s)
[House Finch]	ra	Morehead; other settled areas.
American Goldfinch	fc	Successional habitats.
House Sparrow	fc	Farmland; settled areas.

Key to Appendix E2:

* -- data compiled from the Kentucky Breeding Bird Atlas (1985-1991) and arranged in phylogenetic order.

Relative abundances: co -- common; fc -- fairly common; uc -- uncommon; ra -- rare.

[ ] -- indicates species not documented within the Morehead District, but in immediate vicinity.

APPENDIX E3. Mammals of the Morehead Ranger District.

Species	Habitat(s)
Shrews and Moles	
*Blarina brevicauda** Short-tailed Shrew	Found in a wide variety of habitats ranging from lawns, pastures, and wet meadows to mature forests.
Cryptotis parva Least Shrew	Occurs primarily in open lands; most common in lawns, pastures, and roadsides but occasionally found in forest areas with many grassy openings.
*Parascalops breweri** Hairy-tailed Mole	Primarily found in upland habitats; most common in forested areas but also in lawns and fields; a burrowing form.
*Scalopus aquaticus** Eastern Mole	Seems restricted to bottomland areas along the major river corridors and large tributary streams; a burrowing species of both woodlands and fields.
*Sorex fumeus** Smoky Shrew	A woodland species, most common on rich wooded slopes with rock talus, abundant stumps and logs, and/or deep leaf litter.
*Sorex hoyi** Pygmy Shrew	A woodland species; found in a variety of forest habitats including dry acid sandstone ridgetops and rich slopes.
*Sorex longirostris** Southeastern Shrew	Mostly confined to lowlands along major river corridors; uncommon in wooded uplands but found in forests, wetlands, old fields, meadows, and even roadsides in bottomland areas.
Bats	
*Eptesicus fuscus** Big Brown Bat	(Summer) Roosts primarily in buildings and in rock shelters along clifflines. (Winter) Hibernates in cold sections of caves/mines or in rock outcrops.

APPENDIX E3 continued.

Species	Habitat(s)
*Lasionycteris noctivagans** Silver-haired Bat	(Summer) Occurrence undocumented. (Winter) Hibernates in cold entrances of caves and mines; also may use snags, downed logs, and buildings.
*Lasiurus borealis** Red Bat	(Summer) Roosts under leaves in trees. (Winter) Many apparently migrate; some apparently roost in tree cavities and snags but winter habitat is largely unknown for this species.
*Lasiurus cinerea** Hoary Bat	(Summer) Probably roosts in trees. (Winter) Habitat unknown; apparently migrates southward out of our area.
Myotis grisescens[2] Gray Bat	(Summer) Roosts in large colonies in caves or culverts. (Winter) migrates to large hibernacula located out of our area. Included here on the basis of an old record (1931) from Carter Co. and a recently-discovered (1992) former colony site in Elliott Co.
*Myotis septentrionalis** Northern Long-eared Bat	(Summer) Unknown; probably roosts in buildings, snags, hollow trees, caves, and mines; often mistnetted along old roads and cliffline rock shelters. (Winter) Occasional in caves and mines and may also hibernate in rock crevice habitats.
*Myotis lucifugus** Little Brown Bat	(Summer) Roosts in large colonies in buildings; may use hollow trees. (Winter) Humid sections of caves and old mines.
*Myotis sodalis** Indiana Bat	(Summer) Roosts in snags (usually under bark) and hollow trees; some males continue to use caves as day roosts throughout the summer. (Winter) Hibernates in cool passages of caves and mines with humidity just under 100%; most are in dense clusters of 300 or more per sq ft.

APPENDIX E3 continued.

Species	Habitat(s)
*Myotis subulatus leibii** Eastern Small-footed Bat	(Summer) Apparently roosts in small clusters, or perhaps only singly, in holes and crevices in clifflines. (Winter) Poorly known; has been found in cold cave passages and crevices in sandstone rock shelters; may hibernate under rocks in caves and shelters.
Nycticeius humeralis[2] Evening Bat	(Summer) Inhabits buildings, usually in riparian areas; possibly in hollow trees as well. (Winter) Migrates.
*Pipistrellus subflavus** Eastern Pipistrelle	(Summer) Roosts singly or in small groups in trees or buildings. (Winter) Hibernates singly in warm, humid areas in caves and old mines.
*Plecotus rafinesquii** Rafinesque's Big-eared Bat	(Summer) Roosts singly or in small to medium-sized colonies in hollow trees, old buildings, mines, caves, and sandstone caves and shelters. (Winter) Found singly or clustered in sandstone and limestone caves.
*Plecotus townsendii virginianus** Virginia Big-eared Bat	(Summer) Roosts have been found only in sandstone caves and shelters or in limestone caves. (Winter) Found singly or clustered in caves (sandstone or limestone).
Mice, Rats, Voles, and Jumping Mice	
*Microtus ochrogaster** Prairie Vole	Found in pastures, roadsides, old fields, and reclaimed surface mines with sparse to dense grass cover.
*Microtus pennsylvanicus** Meadow Vole	Found generally in grassland habitats, old fields, and open weedy wetland margins with dense grassy cover; almost always in bottomland areas.
*Microtus pinetorum** Pine Vole	Occurs primarily in rich woodlands, but also occurs in grasslands and in forest openings or old fields with sparse to dense cover.

APPENDIX E3 continued.

Species	Habitat(s)
Mus musculus House Mouse	Most common in and around buildings on farms and in urban areas; also spreads into cultivated areas, old fields, and pastures.
*Napaeozapus insignis** Woodland Jumping Mouse	Rich, moist wooded slopes; seems to prefer areas with dense stands of rhododendron or stream margin habitats with abundant jewelweed; sometimes moves into wildlife openings.
*Neotoma floridana magister** Eastern Wood Rat	Almost entirely confined to limestone and sandstone clifflines and their associated caves, crevices, and other shelters; also lives in old mines and, occasionally, abandoned buildings.
Ochrotomys nuttallii Golden Mouse	Mostly old fields/edges with thickets of pine, red cedar, honeysuckle, or greenbriar; also favors wetland edges; seems mot common in the bottomlands.
*Peromyscus leucopus** White-footed Mouse	Found in all habitats - uplands and bottomlands; fields, thickets, and forests; urban yards, roadsides, and virtual wilderness areas.
Peromyscus maniculatus bairdii[2] Prairie Deermouse	A species of open habitats - pastures, cultivated fields, and prairie areas; Included here on the basis of a record from just west of the District in Mammals of Kentucky (1974).
*Rattus norvegicus** Norway Rat	Most common in and around buildings on farms and in urban areas; also spreads into cultivated areas, old fields, and pastures, especially in river bottoms.
*Reithrodontomys humulis** Eastern Harvest Mouse	A species of weedfields and the weedy edges of cultivated fields or pastures and wetlands; sometimes in prairie remnants, wildlife openings, or even reclaimed mines and waste sites.

APPENDIX E3 continued.

Species	Habitat(s)
*Synaptomys cooperi** Southern Bog Lemming	Occasionally found in swampy woodlands or wetlands; sometimes on rich wooded slopes; often common in pastures, reclaimed mine sites, wildlife openings, old fields, and highway rights-of-way featuring dense stands of crown vetch.
Zapus hudsonius[1] Meadow Jumping Mouse	Primarily found in open wetland areas with dense herbaceous cover, weedfield habitats, and the low-lying edges of pastures. There are scattered records for this species throughout most of the Bluegrass Region and in wet meadow habitats along the western edge of the Cumberland Plateau in Madison County.
Miscellaneous larger herbivores	
*Castor canadensis** Beaver	Found along rivers and medium-sized to large streams; sometimes in riparian wetlands, which are enlarged and improved over time.
*Glaucomys volans** Southern Flying Squirrel	Woodlands of all types; inhabits snags and cavity trees.
*Marmota monax** Woodchuck	Woodlands, brushlands, and fields; can be found in nearly all habitats.
*Ondatra zibethicus** Muskrat	Rivers, lowland streams, wetlands, ponds, ditches - any area with water and lots of herbaceous vegetation.
*Sciurus carolinensis** Gray Squirrel	Woodlands of all types.
*Sciurus niger** Fox Squirrel	Woodlands, primarily open.
*Sylvilagus floridanus** Eastern Cottontail	Old fields, pastures, roadsites, farmsteads, wildlife openings - nearly any open or semiopen habitat.
*Tamias striatus** Eastern Chipmunk	Woodlands of all types, edge habitats, and urban areas.

APPENDIX E3 continued.

Species	Habitat(s)
Miscellaneous carnivores	
*Canis latrans** Coyote	Open woodlands and agricultural lands; becoming more common year by year in eastern Kentucky.
*Didelphis virginiana** Virginia Opossum	All habitats, from forests and clifflines to agricultural and urban areas.
Felis concolor couguar[2] Eastern Cougar	Remote woodlands. Generally thought to be extinct in the Eastern U.S., but there are persistant reports of cougar sightings throughout DBNF (including the Cave Run Lake area on Morehead).
Lutra canadensis[1] River Otter	Rivers, large streams, and wetlands. River Otters were released by KDFWR on the Licking River in 1991, and the species should eventually return to the Morehead Ranger District.
*Lynx rufus** Bobcat	Woodlands and clifflines.
*Mephitis mephitis** Striped Skunk	All habitats, from forests and clifflines to agricultural and urban areas.
Mustela frenata Long-tailed Weasel	Bottomland forests, edges, and fields.
*Mustela nivalis** Least Weasel	Bottomland forests, edges, and fields.
*Mustela vison** Mink	Bottomlands, particularly along the margins of streams, rivers, ponds, and riparian wetlands.
*Procyon lotor** Raccoon	Found in many habitats - most common near water (streams, ponds, wetlands) and in agricultural bottomland areas.
Spilogale putorius Eastern Spotted Skunk	Poorly known; apparently most common along sandstone clifflines and in associated ravines.

APPENDIX E3 continued.

Species	Habitat(s)
*Urocyon cinereoargenteus** Gray Fox	Primarily found in woodlands and in adjacent fields and openings.
*Ursus americanus** Black Bear	Primarily found in woodlands and in adjacent fields and openings; only now beginning to become reestablished in eastern Kentucky after having been extirpated by uncontrolled hunting.
*Vulpes vulpes** Red Fox	Primarily found in open woodlands and agricultural lands.

KEY TO SYMBOLS:

* -- Found on the District during this Inventory.

[1] -- Expected to occur on the District; suitable habitat exists and there are documented records nearby.

[2] -- Occurrence on the District is problemmatical.

All other species -- Previous records exist for the District, but the species was not found during the Inventory.

	DANIEL BOONE NATIONAL FOREST		MOREHEAD RANGER DISTRICT				
			A	B	C	D	TOTAL
TOTALS:	ALL MAMMAL SPECIES	64	44	5	1	5	55
	Shrews/Moles	9	6	1	-	-	7
	Bats	14	11	-	-	2	13
	Mice, Rats, Voles	17	9	2	-	2	13
	Misc. Herbivores	9	8	-	-	-	8
	Misc. Carnivores	15	10	2	1	1	14

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