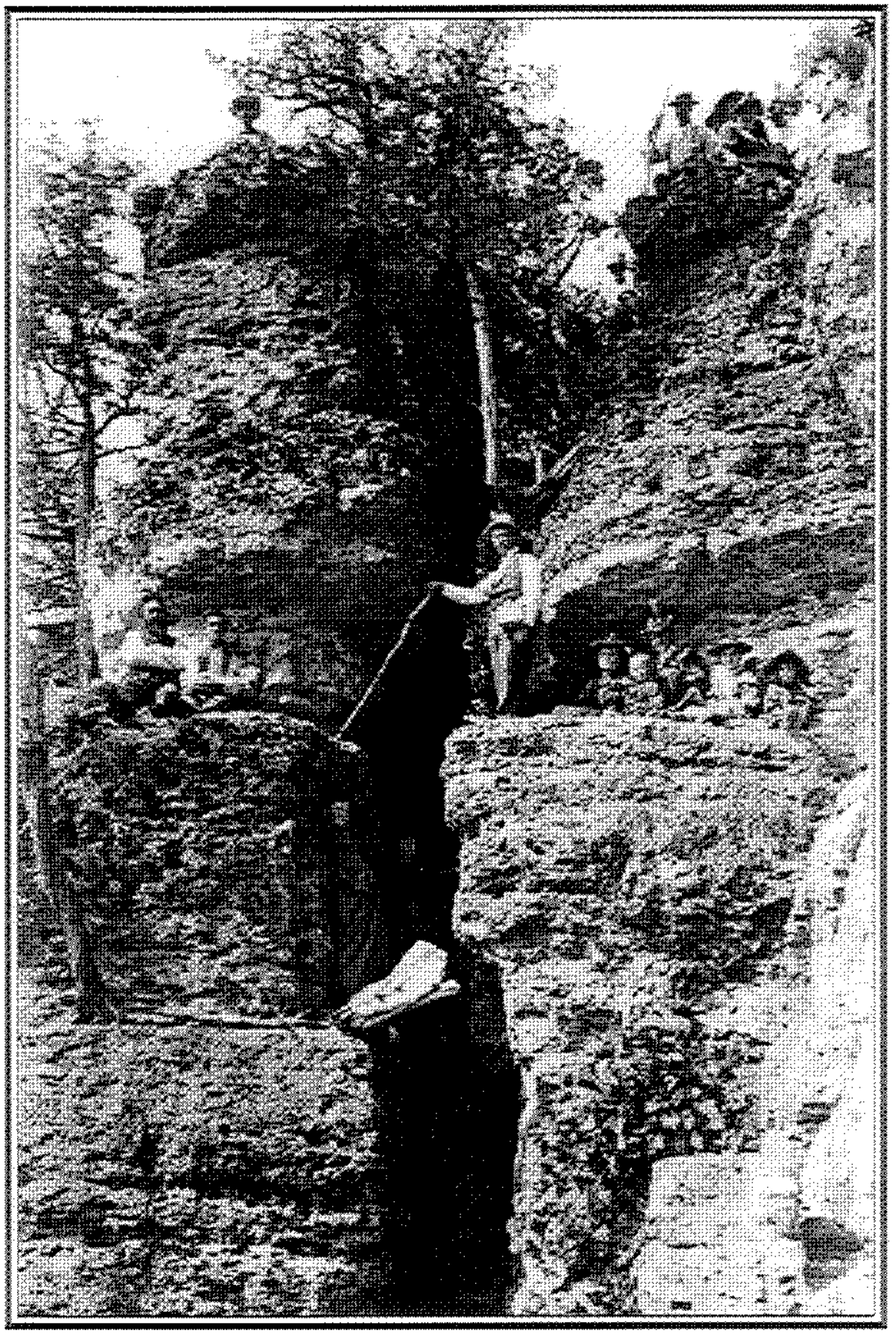
THE NATURAL HISTORY OF BACKBONE STATE PARK

DELAWARE COUNTY, IOWA

edited by Raymond R. Anderson



GEOLOGICAL SOCIETY OF IOWA

April 23, 1995 Guidebook 61

Cover Photograph: The "Stairway", a crevice in weathered Silurian dolomite on the "Devil's Backbone", the feature that gave Backbone State Park its name. This feature will be visited in Stop 4.

Photo courtesy of the Calvin Collection
Department of Geology, The University of Iowa

THE NATURAL HISTORY OF BACKBONE STATE PARK
DELAWARE COUNTY, IOWA

edited by:

Raymond R. Anderson
Iowa Department of Natural Resources
Geological Survey Bureau
109 Trowbridge Hall
Iowa City, Iowa 52242-1319

with contributions by:

E. Arthur Bettis III
Iowa Department of Natural Resources
Geological Survey Bureau
109 Trowbridge Hall
Iowa City, IA 52242-1319

William Green
Office of the State Archaeologist
305 Eastlawn
Iowa City, IA 52242

Lisa Hemaseth
Iowa Department of Natural Resources
Fish and Wildlife Division
Boone Research Station
Boone, IA 50036

John Pearson
Iowa Department of Natural Resources
Parks, Recreation and Preserves Division
Wallace State Office Building
Des Moines, IA 50319-0034

Robert Schaut
Iowa Department of Natural Resources
Parks, Recreation and Preserves Division
Backbone State Park
Dundee, IA 52038

Brian J. Witzke
Iowa Department of Natural Resources
Geological Survey Bureau
109 Trowbridge Hall
Iowa City, IA 52242-1319

April 23, 1995

Geological Society of Iowa
Guidebook 61

TABLE OF CONTENTS

INTRODUCTION

This year (1995) marks the 75th anniversary of the dedication of Iowa's first state park, Backbone State Park. In honor of this event, the Department of Natural Resources (DNR)has initiated a new publication series that will examine the natural history of Iowa's state parks. The first of these new publications will be ***The Natural History of Backbone State Park.*** It will include discussions of the geology, vegetation, animals, archaeology, and more recent history of the park and should be available to the public before the end of 1995. To help launch this publication series, the 1995 Geological Society of Iowa Spring Field Trip will examine ***The Natural History of Backbone State Park, Delaware County, Iowa*** This trip will cover topics similar to the planned publication, including stops and discussions of the rock, glacial, and fluvial geology of the park; the vegetation of Backbone including a look at a savanna restoration project and old-growth oaks, an overview of the animals and habitats in the park including a discussion of an on-going migratory bird study; a review of the archaeology of the park and surrounding area; and a discussion of the more recent history of Backbone Park itself, including WPA projects.

The rock geology portion of the trip will be led by **Brian Witzke** (DNR Energy and Geological Resources Division, Geological Survey Bureau) and will examine the Silurian Hopkinton Formation, especially the *Pentameras* beds. Stop 2 will include a discussion of the exposures near a spring in the northern area of the park, and later at Stop 4, "the Devil's backbone" (which gives the park its name), he will describe spectacular exposures of the unit.

Art Bettis (DNR Energy and Geological Resources Division, Geological Survey Bureau) prepared a discussion of the Quaternary history of Backbone State Park and the Maquoketa River Valley. Unfortunately Art will not be able to participate in the field trip, so at Stop 3 **Brian Witzke** will describe the Pleistocene terraces and discuss the general Quaternary history of the area, including the pahas north and south of the park.

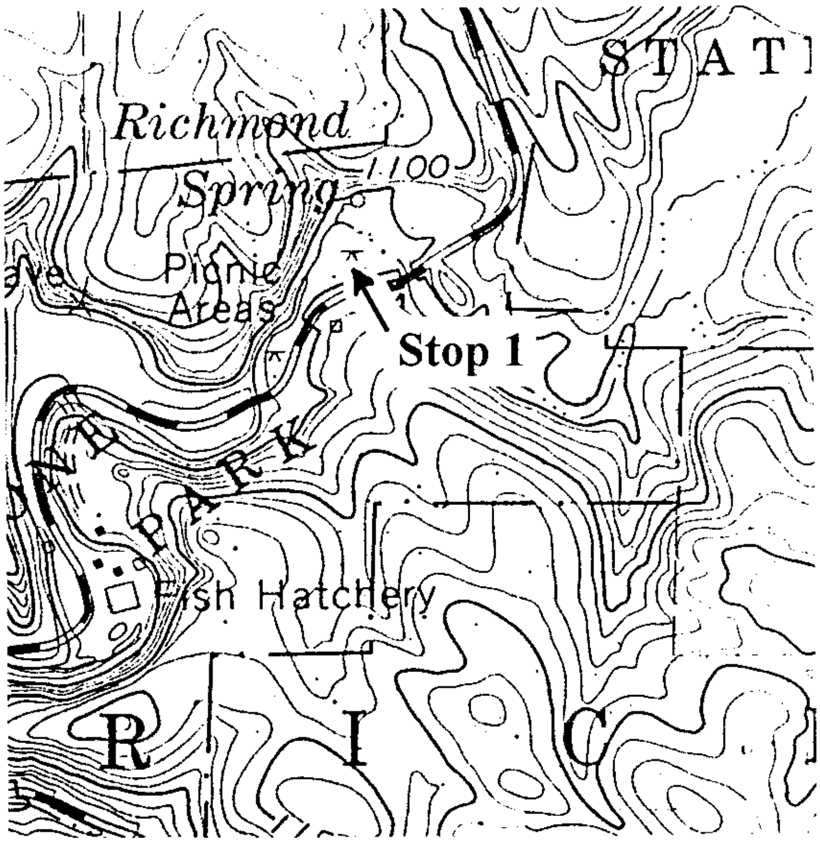
A discussion and examination of the parks flora will be led by **John Pearson** (DNR Parks and Preserves Division, Program Administration) who will lead a short hike to examine some of the park's 200-300 year old oak trees and discuss the progress of a savanna restoration program.

Lisa Hemaseth (DNR Parks and Preserves Division, Wildlife Bureau, Boone Research Station) will discuss the wildlife in the park, especially the bird fauna, which are especially diverse in this large, isolated woodland. Lisa has been conducting research on neotropical songbirds in the park, and at Stop 4 she will lead a short hike to a habitat area near the southern nose of the Devil's Backbone.

At Stop 5, State Archeologist **Bill Green** (Office of the State Archaeologist, Iowa City) will discuss the pre-history of Delaware County and Backbone Park and the significance of an effigy mound at the stop. Additionally, he will discuss evidence of prehistoric campsites at the Devil's backbone at Stop 4.

Finally, Park Ranger **Bob Schaut** will lead a discussion of the pre-CCC (Civilian Conservation Corps) history of Backbone Park at Stop 6, the Old Boathouse. This will be followed by the last scheduled stop of the day, Stop 7, a visit to the CCC museum located near the west gate of the park.

STOP DESCRIPTIONS AND DISCUSSIONS



Richmond Spring

Early stonework at Richmond spring was completed by W.E. Albert in 1925 as an erosion control project. Later, in the late 1930's, the ponds were constructed by the Civilian Conservation Corps (CCC).

At this stop **Bob Schaut** (Backbone Park Ranger) will briefly discuss the construction around the spring. John Pearson (DNR Parks and Recreation) will describe the local flora, then John will lead a hike up to bluff to a savanna restoration project. Along the way he will point out oak trees that are over 200 years old. We will hike back down a series of Pleistocene terrace remnants, which will be briefly described by **Brian Witzke** (Geological Survey Bureau).

STOP 1. VEGETATION OF BACKBONE STATE PARK- AN OVERVIEW

John Pearson
Iowa Department of Natural Resources
Parks, Recreation and Preserves Division
Wallace State Office Building
Des Moines, IA 50319-0034

INTRODUCTION

Backbone State Park is a 1,780-acre corridor of forested bluffs, slopes, and uplands along the entrenched course of the Maquoketa River and its tributary, Fenchel Creek, in rural Delaware County, northeastern Iowa. Backbone is considered to be the oldest state park in Iowa; officially dedicated in 1920, the park is 75 years old in 1995. During this time, the park has been largely free from logging and grazing, resulting in a prevalence of mature forest. Approximately 80% of the park is forested, with the balance comprised of scattered openings associated with campgrounds, picnic areas, and the Backbone Lake impoundment. Of the forestland, about two-thirds is dominated by large trees while only 5% consists of stands of small trees (the remainder is a broad mixture of tree sizes). Privately owned woodlands, cropfields, hayfields, pastures, and a golf course surround the park.

FOREST

Many species of trees are present in the park, but a relatively small number reach dominant status over large areas of upland, mainly white oak (*Quercus alba*) and red oak (*Quercus borealis*). Black oak (*Quercus velutina*), white pine (*Pinus strobus*), sugar maple (*Acer saccharum*), and basswood (*Tilia americana*) also achieve dominant size and abundance, but usually in relatively small patches of specialized habitat. Ironwood (*Ostrya virginiana*) is a common understory tree throughout the park. White oak and red oak co-occur in mixed stands throughout much of the park, although white oak becomes the sole dominant in some places, especially on dry ridges and rocky plateaus in the vicinity of Richmond Springs. Red oak forms nearly pure stands in many places, especially on north- and east-facing slopes such as those flanking the southwest side of Backbone Lake near the modern campground. Sugar maple and basswood dominate flat to gently sloping uplands with deep loamy soil and form significant stands along the southern boundary of the park. Black oak is a dominant species on sandy soil south of the primitive campground.

On bottomlands along the Maquoketa River and Fenchel Creek, a variable mixture of walnut (*Juglans nigra*), hackberry (*Celtis occidentalis*), ash (*Fraxinus* spp.), boxelder (*Acer negundo*), and cottonwood (*Populus deltoides*) comprises a narrow band of bottomland forest. Willows (*Salix* spp.) join this admixture in the upper reaches of Backbone Lake.

Surprisingly, no comprehensive study of the total flora of the park has been conducted. Several hundred species of vascular plants undoubtedly occur in the park. The upland forest understory consists predominantly of hazelnut (*Corylus americana*) and gooseberry (*Ribes missouriense*) in the shrub layer with sedges (especially *Carex pensylvanica*), wild geranium (*Geranium maculatum*), sweet cicely (*Osmorhiza claytoni*), tick-trefoil (*Desmodium glutinosum*), hog peanut (*Amphicarpaea bracteata*), lopseed (*Phyrma leptostachya*), maidenhair fern (*Adiantum pedatum*), lady fern (*Athyrium filix-femina*), and interrupted fern (*Osmunda claytoniana*) commonly comprising the herbaceous layer. An introduced annual herb, garlic mustard (*Alliaria petiolata*), is abundant throughout much of the bottomland forest. Rare plants known to occur in Backbone State Park include shining clubmoss (*Lycopodium* *lucidulum*), Sullivantia (*Sullivantia sullivantia*), nodding wild onion (*Allium cernuum*), rattlesnake plantain (*Goodyera pubescens*), yellow lady's-slipper (*Cypripedium calceolus*), and coralroot orchids (*Corallorhiza odontorhiza* and *C. maculata).*

Natural successional trends in the park are gradually changing the character of the forest. White oaks and red oaks presently dominating the forest canopy over most of the park are not regenerating in the shaded understory. The vast majority of seedlings and saplings found in the current understory are those of mesophytic, shade-tolerant tree species such as basswood, sugar maple, elm, ash, hackberry, and bitternut hickory; by implication, these species will replace the oaks as dominant canopy trees during the course of the next century or so. The increase of mesophytic trees will significantly alter the "presettlement" aspect of the present forest with its historical prevalence of oaks. The potential loss of oak dominance is also projected to cause a loss of the flora and wildlife which presently flourish in the forest. As mast-producing oaks are replaced by nonmast species, acorn-eating animals such as turkeys and squirrels can be expected to decline in abundance. Dense shade cast by maples and basswoods may decrease the abundance of plants which are adapted to the sun-dappled forest floor typical of oak woods.

Two small management demonstration projects designed to maintain the present dominance of oaks and a diverse understory have been established: a clearcut and an open woodland or "savanna". Both projects were initiated in 1990 and their progress is still being monitored. The 10-acre clearcut was conducted in a 140-year-old white oak-red oak stand in the northwestern corner of the park; an initial thinning in 1987 was followed in January 1990 with a clearcut conducted as a commercial timber sale. As of this writing, the clearcut is 5 years old. While nearly all plant species increased to some degree, very large increases in raspberry (*Rubus allegheniensis*), hazelnut, geranium, and interrupted fern were observed. Over 2000 seedlings/acre of red oak were detected in the clearcut during its first year. In years 2-5, woody plants continued to increase in height and cover while many herbaceous species began to decline toward pre-treatment levels. The stand is presently a dense thicket of shrubs and saplings.

The "savanna" project is located on a rocky plateau near Richmond Springs. It was initially a mature white oak stand with a dense understory of ironwood and a sparse herbaceous cover. Several of the white oaks are over 200 years old, representing some of the oldest trees known to occur in the park. In October 1990, trees less than six inches in diameter (chiefly ironwood) were cut and removed by park staff from a one-acre plot, which was then subjected to a prescribed burn. The overall aspect of this stand is now semi-open and "park-like" due to the presence of scattered large, old oaks and a grassy turf dominated by sedges (especially *Carex pensylvanica*).

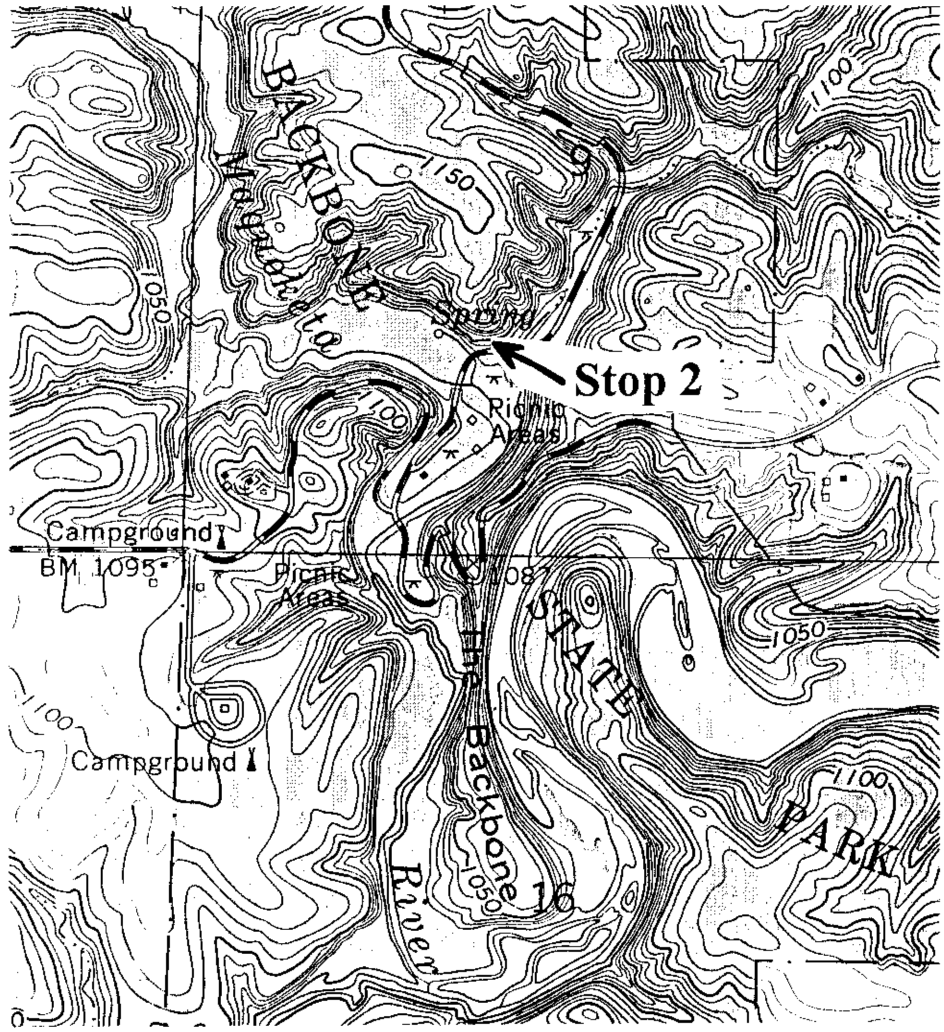
GLADE

A small, but significant area of natural, non-forest habitat is the "glade" located on top of "the Backbone". This extremely dry, narrow, rocky ridge is characterized by an open mixture of exposed rock, trees, and prairie patches collectively supporting a wide variety of plants. Tree species adapted to the xeric habitat of the backbone are chinquapin oak (*Quercus muhlenbergii*) and eastern redcedar (*Juniperus virginiana*). Herbaceous species populating the backbone include groups adapted to prairie and cliff microhabitats:

Prairie Species	**Cliff species**
Zizea aurea	*Campanula aparinoides*
Euphorbia corallata	*Pellaea glabella*
Lespedeza capitata	*Comandra richardsonii*
Liatris aspera	*Polygala senega*
Gentiana alba	*Aquilegia canadensis*
Amorpha canescens	*Pedicularis canadensis*
Stipa spartea	*Artemisia caudata*
Andropogon gerardii	*Cystopteris protrusa*
Coreopsis palmata	*Castilleja coccinea*
Schizachyrium scoparium	(formerly)

PRAIRIE

A narrow roadside prairie with several species adapted for growth in sandy soil is found along the north side of the west entrance road. Wavy-leafed milkweed (*Asclepias amplexicaulis*) and yellow puccoon (*Lithospermum carolinianum*) are among the distinctive plants of this habitat along with more familiar prairie plants such as spiderwort (*Tradescantia ohiensis*), blue-eyed grass (*Sisyrinchium campestre*), hoary puccoon (*Lithospermum canescens*), shooting star (*Dodecatheon meadia*), and yellow stargrass (*Hypoxis hirsuta*).



Rock Exposure near Watercress Spring

The two shelters in this area and old pit latrine were constructed by the CCC. Across the river, an old trail (now abandoned) called the Catacombs Trail, wandered through the cracks and crevasses of the exposed Silurian bedrock.

Bob Schaut will say a few words about the history of the CCC constructed structures in this area. before turning the program over to **Brian Witzke** (Geological Survey Bureau) for a discussion of the Silurian dolomite that provides so many spectacular cliffs in the park. Brian will lead a hike up the bluff along the as he explains the features of this widespread rock formation.

STOP 2. BEDROCK GEOLOGY OF BACKBONE STATE PARK

Brian J. Witzke
Iowa Department of Natural Resources
Geological Survey Bureau
109 Trowbridge Hall
Iowa City, IA 52242-1319

INTRODUCTION

Dramatic cliffs and picturesque rock escarpments and buttresses expose Silurian-aged bedrock in the valley walls along much of the course of the Maquoketa River in eastern Iowa. The natural beauty of these rock exposures is particularly well displayed in Backbone State Park, where the inspiration to establish Iowa's first state park some seventy-five years ago was born. "Backbone" derives its name from the narrow and precipitous ridge of bedrock carved by downcutting of a meander loop of the Maquoketa River. Nearly a hundred years ago Samuel Calvin, then State Geologist, wrote these words about the "Backbone": "Its sides are in places precipitous, the rocky cliffs rising sheer for more than 80 feet. Erosion and secular decay have carved the rocks into picturesque columns, towers, castles, battlements and flying buttresses. The exposed faces are deeply pitted and weather worn" (Calvin, 1898, p. 132).

The rocks so wonderfully displayed in Backbone State Park were originally deposited as lime sediments in a shallow tropical sea that covered the Iowa area about 430 million years ago, a time geologists have termed the Silurian Period. Because of gradual movement of the continents, that part of the continent that would one day be called Iowa actually occupied a position in tropical latitudes south of the equator during the Silurian, beneath an extensive seaway that covered much of the interior of North America. The seas were home to corals, brachiopods, and a host of other sea-dwelling creatures, many of which left fossil evidence in the rocks of their former abundance.

THE ROCKS: DOLOMITE AND CHERT

The bedrock exposed at Backbone, like most of the Silurian bedrock in eastern Iowa, is comprised primarily of a mineral called dolomite. Dolomite rock is sometimes referred to as "limestone," but this is not technically correct. Although both limestone and dolomite (dolostone) are composed primarily of carbonate minerals, limestone is dominantly composed of calcium carbonate (the mineral calcite), whereas dolomite is a calcium and magnesium carbonate mineral. Geologists of the past century often referred to dolomite as "magnesian limestone" to note its differing composition from normal limestone.

Most limestones and dolomites were originally deposited as calcium carbonate sediment (lime mud and shells) in tropical seas. However, certain chemical processes can take place during the lithification (turning to rock) of these lime sediments. If the original calcium carbonate sediment is not significantly modified, lithification will produce limestone. On the other hand, if the buried sediments are chemically modified by descending brines or other reactive magnesium-bearing solutions, the calcium carbonate is converted to (replaced by) dolomite. Dolomite replacement commonly preserves evidence of the precursor lime sediments, including fossil shells. However, the fossil shells and mineral skeletons of sea-dwelling creatures are commonly dissolved during the dolomite replacement process, preserving the fossils as hollow molds. The upper part of the bedrock section in Backbone Park displays a remarkable abundance of brachiopod shell molds.

The dolomite seen in the park is a porous rock, marked not only the molds of fossils, but also by irregular small cavities and irregularly-shaped holes in the rock. These hollow void spaces in the rock are called vugs. Most vugs are only a few inches or less in diameter, but some are larger. Many vugs were created in the rock during dolomite replacement of the original sediment (this is due in part to an overall volume reduction which occurs during dolomitization). Other vugs and porous surfaces were formed during more recent weathering and erosion of the bedrock. Dolomite, like limestone, slowly dissolves by percolating rainwater—the movement of groundwater is capable of creating caves and solutional openings in the bedrock. Some groundwater solutions precipitate the mineral calcite within vugs and openings in the rock, and calcite-filled or calcite-lined vugs are common features in the park.

Chert is a rock composed of microcrystalline quartz (also called silica or silicon dioxide). Chert occurs in oblong nodules and bands within dolomite strata in the upper part of the bedrock interval in the park. The chert nodules are harder and more resistant to weathering than the enclosing dolomite, and chert forms a dominant portion of the remaining material left behind when the surrounding dolomite weathers away, as seen by the abundance of chert gravel (and scarcity of dolomite) in the Maquoketa River. The glass-like fracture and sharp edges made chert an important resource to Native American people for the manufacture of weapons and tools. The chert found in Backbone is a quality resource that was utilized by local prehistoric people, and chert flakes seen in the park provide evidence of tool manufacturing.

Like dolomite, chert is formed as a chemical replacement of the original lime sediment. Many of the cherts in Backbone State Park preserve molds of brachiopod shells and other fossils. Partial to complete silica replacement of the skeletons of coral colonies and other shells is common in lower bedrock strata within the park. This replacement, termed "silicification," faithfully preserves the original structure of skeletons formerly composed of calcium carbonate.

THE BEDROCK STRATA

The bedrock in Backbone State Park, as elsewhere in Iowa, is displayed in essentially horizontal layers, or strata. These strata form stacked layers, one atop the other like the pages of the book, preserving a history of ancient times. Although simplistic in its formulation, the recognition that strata are older downward and younger upward (the law of superposition) provided the key to interpreting earth history by pioneering geologists over the past two centuries. Geologists were quick to realize that sedimentary rock layers can be grouped together into identifiable packages of strata in specific geographic regions. These convenient groupings of strata have been named by geologists, usually after a geographic locality where the strata are characteristically displayed. The basic grouping of rock strata is termed a "formation." Formations are subdivided into constituent "members." The study and recognition of rock strata is termed "stratigraphy."

Exposed rock strata in Backbone State Park are assigned to the Hopkinton Formation, an interval of dolomite and cherty dolomite originally named after exposures along the Maquoketa River downstream from Backbone near the town of Hopkinton in Delaware County. The Hopkinton Formation was named by Calvin (1906). Hopkinton strata are present in the surface and subsurface across much of eastern Iowa, where it forms the primary water-producing unit of the economically important Silurian aquifer. Where covered by younger Silurian strata, the Hopkinton Formation averages about 130 feet (40 m) in total thickness.

Strata of the Hopkinton Formation were first termed the "Coralline and Pentamerus beds" of the "Upper Magnesian (Cliff) Limestone" by pioneering geologist David Dale Owen based on his investigations in the Iowa area during the 1840s (see summary by Johnson, 1977; Witzke, 1992). Owen recognized Silurian fossils in these strata, and roughly equated the Iowa rocks with "Niagara group" strata exposed below Niagara Falls, New York-Ontario. Wilson (1895) further subdivided the Iowa Silurian strata into a series of units named after characteristic fossils. Wilson's intervals exposed at Backbone State Park include the "lower Coralline beds" and the overlying "Pentamerus beds."

Calvin (1898) and Calvin and Bain (1900) refined Wilson's Silurian subdivisions, and included units termed the "*Syringopora tenella* beds" and the "*Pentamerus* Beds" in the area of the Backbone and elsewhere in eastern Iowa. Calvin (1898) recognized that these two units, as exposed along the Maquoketa River, comprise the "Cliff-forming beds," a term particularly apt at the Backbone. Calvin (1906) subsequently combined these cliff-forming strata, and several other units of Silurian dolomite in eastern Iowa, under a broader label, the "Hopkinton Stage" (now known as the Hopkinton Formation or Hopkinton Dolomite).

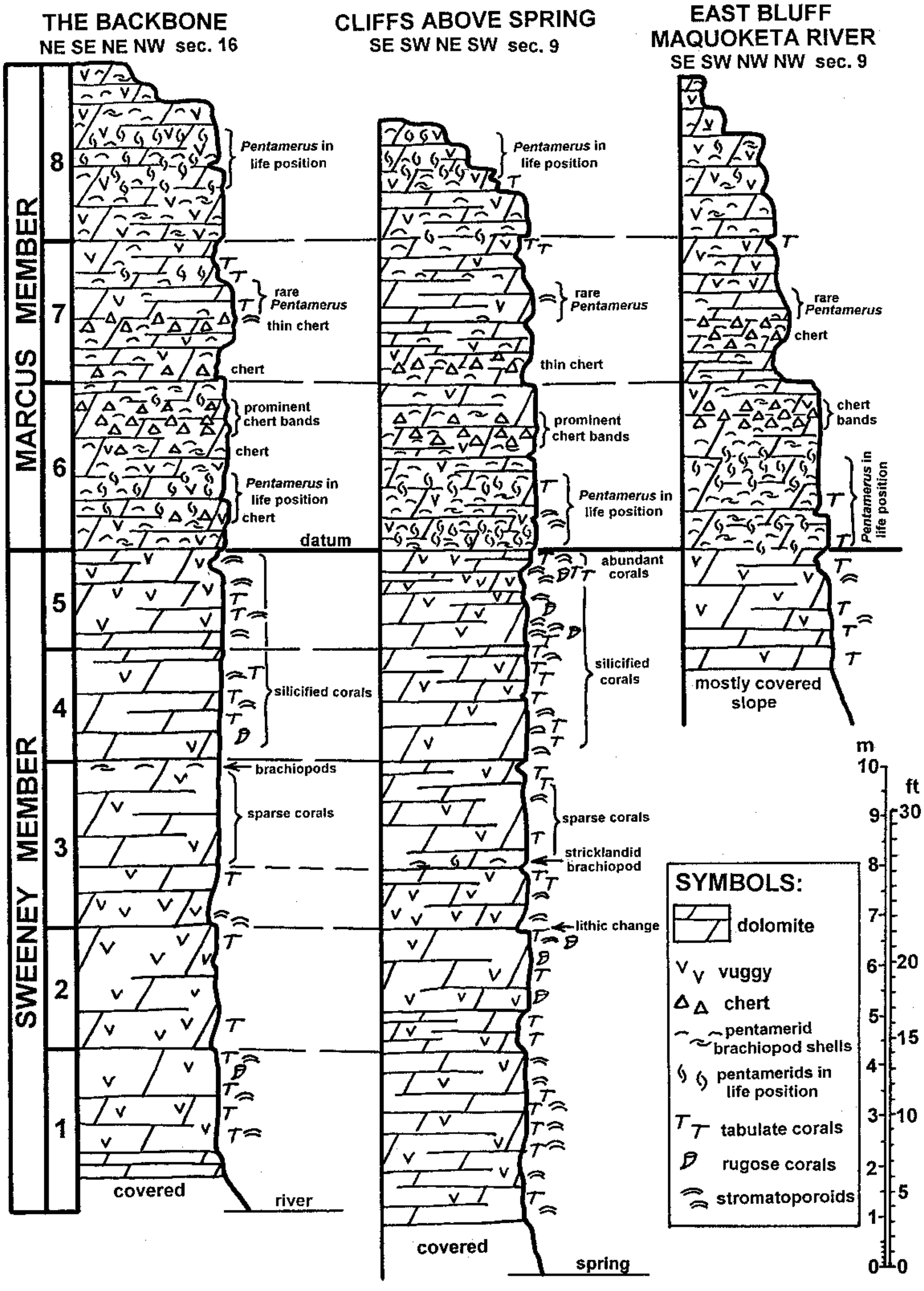
Hopkinton strata in Iowa attracted little study from geologists until the 1970s. Johnson (1975) expanded and corrected Calvin's subdivisions of the Silurian in eastern Iowa, retaining the "*Syringopora* Beds" and "*Pentamerus* Beds" within the stratigraphic scheme. About the same time, Willman (1973) published a revision of Silurian stratigraphy for identical strata across the Mississippi River in northwestern Illinois. The modern practice of stratigraphy discourages the naming of rock units after fossils, and the formal definition of rock-stratigraphic units requires a geographically-based name tied to a particular reference section (the "type section"). Calvin's "*Syringopora* Beds" and "*Pentamerus* Beds" were, therefore, renamed by Willman (1973) the Sweeney and Marcus formations, respectively. These names derive from geographic localities at Mississippi Palisades State Park near Savanna, Illinois. Sweeney and Marcus strata form the prominent cliff faces at the Mississippi Palisades, and equivalent strata are also impressively displayed in precipitous cliffs at numerous locations in eastern Iowa, including Backbone State Park (the "Cliff-forming beds" of Calvin, 1898).

Willman (1973) failed to accommodate Calvin's earlier grouping of these strata within the Hopkinton Formation in Iowa. Johnson (1983) adopted Willman's terminology, but included the Illinois-based rock units as members within the Hopkinton Formation. Johnson's proposal has produced a stable and practical rock stratigraphy for Hopkinton strata across eastern Iowa (see also Witzke, 1992). Using Johnson's classification, strata exposed in Backbone State Park encompass approximately the lower half of the Hopkinton Formation, including the lower Sweeney Member and overlying Marcus Member.

Bedrock strata exposed in the lower valley walls within Backbone State Park belong to the Sweeney Member. These strata, commonly expressed in bold-faced cliffs, are generally vuggy thick-bedded dolomites with scattered to common coral and stromatoporoid (sponge-like animal) fossils. The corals are variably preserved as molds within the dolomite, or by partial to complete silica replacement. Sweeney strata commonly show finely crystalline dolomite intervals interstratified with thin stringers and bands (generally no more than a few centimeters in thickness) of more coarsely crystalline dolomite. The coarsest dolomite crystals are noted in the middle of the member (Unit 3; see Figure and unit descriptions). The coarser dolomite crystals are primarily a replacement of crinoidal skeletal debris, which were concentrated into bands by water currents during deposition (likely during storm events).

Overlying vuggy dolomite strata of the Marcus Member, where exposed in sheer faces, form slightly overhanging cliffs and buttresses above underlying units of the Sweeney Member. Marcus strata slope back into the upland forests above the cliffs and buttresses. Marcus strata display a more bedded character on weathered surfaces than the Sweeney, with irregular bedding breaks. In the Backbone area, Marcus strata also differ from underlying Sweeney units in generally being more finely crystalline, in containing prominent bands of nodular chert, and in displaying an abundance of brachiopod shell molds. The chert bands are developed in the middle portion of the exposed Marcus interval in the park (units 6-7; see Figure and unit descriptions), locally reaching thicknesses to about 6 inches (15 cm). The contact between the Sweeney and Marcus members is sharply drawn at the base of brachiopod-rich rocks, slightly above a persistent weathered re-entrant in the cliff faces.

Although younger Silurian strata of the



Graphic representation of Silurian bedrock sections (Hopkinton Formation) exposed in Backbone State Park. The section at "The Backbone" was measured up a narrow crevice along the west side; this crevice was termed the "Stairway" in Calvin (1898, Plate IX; see guidebook cover picture).

Hopkinton Formation are not exposed in Backbone State Park (they are eroded away), elsewhere in eastern Iowa Marcus strata are overlain by strata of the Farmers Creek Member. Even though the contact between these two members is not preserved in the park, Marcus strata are thicker in the Backbone area than at most other localities in eastern Iowa where their full thickness is preserved. Marcus strata, with their abundance of large pentamerid brachiopod molds, reach their thickest and most dramatic development in northwestern Delaware County (up to about 35 feet [11 m] in Backbone Park, probably to 50 feet [15 m] in the area). Across eastern and central Iowa, lower Marcus and upper Sweeney strata share complementary thickness relationships, and the two members are, in part, laterally equivalent in the region (geologists would say they share "facies relations"). Chert bands seen in the Marcus Member in this area are more prominently displayed than elsewhere in the state, and, in fact, chert is generally rare to absent in the Marcus at most localities in eastern Iowa and western Illinois.

THE FOSSILS

Fossils recognized in Hopkinton strata within Backbone State Park provide evidence of ancient life that once inhabited the tropical seas that covered the Iowa area during portions of the Silurian Period some 430 million years ago. The most characteristic fossils from Sweeney strata include the molds and silicified skeletons of extinct corals. Corals fossil are scattered to common through most of the Sweeney Member, and are most abundant near the top of the member in the park. Simple examination of the weathered dolomite surfaces should reveal coral fossils with minimal effort. Most coral fossils range between about 2 and 6 inches (5-15 cm) in diameter, but some are larger (up to 15 to 20 inches [40-50 cm]). Corals also occur in overlying Marcus strata, but are rarer and less easily recognized in these beds. Coral fossils are commonly preserved in an upright position as in life, but many corals are rotated or overturned, providing evidence of movement by bottom currents during their deposition.

The skeletons of extinct tabulate coral colonies are the most common coral fossils. Most show flattened disc or hemispherical shapes. The distinctive *Halysites* is the most abundant; this coral has a distinctive arrangement of corallites which when viewed from above forms a chain-like pattern (hence, the common name "chain-coral"). The "honeycomb coral," *Favosites*, is also common, whose corallites resemble the hexagonal pattern of honeycomb. Other tabulate corals also occur in lesser abundance, most noteworthy of which is *Syringopora*, the original name-bearer used by Calvin (1898) to label these strata. *Syringopora* colonies show loose aggregations of small tube-like corallites.

Another group of extinct corals, the rugosans, is also seen within the park, primarily solitary corals. The solitary rugose corals are commonly termed "cup corals" and "horn corals." These conical cup-like and horn-shaped coral forms display distinctive radiating partitions within the cup, with individual corallites notably larger than seen in the tabulate corals. Colonial rugose corals are rare, but are also noted within the park (*Arachnophyllum*).

Silicified skeletons and molds of stromatoporoids are also common fossils within the Sweeney Member, similar in size and habit to the colonial corals. However, stromatoporoids may not be easily recognized by the untrained eye, as their form is commonly a relatively nondescript flattened disc shape which displays fine laminae (millimeter-scale layers) in cross-section. Some stromatoporoids in the park form hemispherical shapes. Stromatoporoids are an extinct group of primitive sea-dwelling animals that are most likely allied with sponges.

The Marcus Member contains a remarkable abundance of fossil brachiopod molds. Brachiopods are a group of shelled sea-dwelling animals that superficially resemble clams. They are not, however, clams at all, and brachiopods form a unique phylum of marine animals. A few brachiopods survive in the modern oceans, but brachipods achieved their greatest abundance and diversity in the ancient seas of the Paleozoic Era. The brachiopod fossils seen in Marcus strata are primarily identified as *Pentamerus oblongus*, a representative of the extinct pentamerid brachiopod group that achieved spectacular abundance during the Silurian. *Pentamerus* shells are relatively large as far as brachiopods go, generally varying between about one-half to 3 inches (1-8 cm) in size. The molds of *Pentamerus* shells on one side superficially resemble deer hoof prints.

Isolated *Pentamerus* shells are commonly displayed in bands, reflecting the disaggregation, movement, and concentration by bottom currents, most likely during episodic storm events that scoured the bottoms of the shallow seas. In some beds, whole *Pentamerus* shells preserving both valves are preserved as concentrated clusters in life position. In life, these brachiopods attached to the sea bottom, beak side down, extracting food particles from the water by feeding structures enclosed within the shell. Horizons of *Pentamerus* in life position can be seen at a number of levels within Backbone Park (especially within units 6 and 8; see Figure and unit descriptions). The preservation of dense clusters in life position suggests that the bottom was occasionally smothered by influxes of mud, probably during waning stages of storm-induced sedimentation.

The Marcus Member is characterized throughout its geographic extent by a great abundance of *Pentamerus* shells. The abundance and preservation of these brachiopods indicates their remarkable success in the Silurian seas of the region, where in life they probably formed dense oyster-like accumulations and banks across broad expanses of the sea-bottom. *Pentamerus*-rich Marcus strata span across the entire region of exposed Silurian bedrock in northwestern Illinois and eastern Iowa, trending westward through the subsurface of central Iowa into eastern Nebraska. Eastward, *Pentamerus*-bearing strata crop out again in the Chicago area (where they are included in the correlative Kankakee Formation; see Willman, 1973). The remarkable lateral continuity of *Pentamerus*-rich strata in the region provides evidence of broad uniformity of environments, with dense accumulations of living *Pentamerus* stretching across hundreds of miles of the seafloor in the Iowa region.

A few brachiopods are seen in the Sweeney Member, but these are nowhere as abundantly displayed as in Marcus strata. Scattered bands of pentamerid brachiopods (including a stratigraphically important form called *Stricklandia*) are seen in middle Sweeney strata in the park (unit 3, see Figure) and elsewhere in eastern Iowa. A few other small brachiopods are scattered in beds of the Marcus and Sweeney members.

Other fossils are also found in the Hopkinton Formation of Backbone State Park, but none quite so prominently as the corals, stromatoporoids, and brachiopods. Only the crinoids achieved a level of success comparable to these more prominent groups. Crinoids are group of sea-dwelling animals whose skeletons are composed of numerous small plates of calcite, which, upon death, typically disaggregated into sand-sized debris that accumulated on the sea bottom. Crinoids are a group of echinoderms which superficially resemble stalked plants (hence the common name "sea-lily"). More familiar echinoderms in the modern oceans include starfish and sea urchins. The debris of crinoid plates is common to abundant in Hopkinton strata, but their small size and unassuming form may make their recognition difficult. Small sand-size molds of individual circular crinoid stem plates and occasional larger segments of the cylindrical crinoid stems are recognized in the dolomite beds. Coarser crystalline dolomite horizons within the Sweeney Member are actually dolomite replacements of sands originally composed of small crinoid debris.

A variety of less common or less conspicuous fossils seen in lower Hopkinton strata include sponges, bryozoans (small coral-like colonies), snails, nautiloids (shelled squid-like molluscs), trilobites (extinct bug-like arthropods), and conodonts (enigmatic tooth-like microfossils). Although the shallow tropical seas teamed with a variety of life during the Silurian, the Silurian world lacked many of the familiar life forms of the modern world. Fish were apparently absent from the Silurian seas of the Iowa area, and animals and plants were largely absent from the surface of the Earth. The appearance of dinosaurs and primitive mammals was still 200 million years in the future.

THE MODERN BEDROCK EXPOSURE

Silurian dolomite is among the most resistant bedrock strata found in Iowa, holding up to the progressive onslaught of erosion better than most other intervals of bedrock in the state. As such, the Silurian bedrock edge forms a broad escarpment across the uplands of eastern Iowa. The Mississippi River deflects eastward where it impinges against this escarpment, forming the "nose" along the eastern border of east-central Iowa. The distribution of resistant Silurian dolomite strata elsewhere in the eastern United States is also expressed in the modern landscape, marking broad escarpments that define the margins of Lakes Michigan and Huron and trending east to the prominent Niagara escarpment at Niagara Falls.

The rocks now seen in Backbone State Park lay buried beneath younger rocks and sediments for untold millions of years. Only through long-term changes in the relative movement of the Earth's crust beneath Iowa, and by the inexorable onslaught of erosion, were these rocks finally exposed at the surface in the area of present-day Backbone State Park. The bedrock surface in northeastern Iowa evolved in response to recurring episodes of erosion, episodically modified by periods of renewed deposition and burial. The waxing and waning of continental ice sheets across the interior of North America over the last 2 million years or so left a complex record of erosion and sedimentation in the area, modifying and changing the land surface and the associated and partially-buried bedrock surface. Exhumation of the various fluvial (river), glacial, and interglacial deposits by the meandering and downcutting Maquoketa River drainage left portions of the bedrock surface exposed in the valley walls. The bedrock surface evolved in response to a varied history of superimposed landscapes. It is this complex and collective history that resulted in the rocky landscape we see today in the park, amplified by the latest stages of erosion operating during the last 12,000 years or so.

Earlier stages of bedrock erosion in the Backbone area are identified where the former bedrock surface is now covered by surficial materials, including wind-blown loess deposits. In addition, earlier episodes of bedrock dissolution resulting from the infiltration of rainwater through the bedrock are displayed as solutional openings and collapsed karst features, some now infilled with younger sediments or lined by chemically-precipitated calcite. Caves and rock-shelters in the park formed through bedrock solution, a process that continues to operate today. The infiltrating groundwater continues to dissolve the bedrock, ultimately discharging in springs at local base-level or feeding the local bedrock groundwater system. However, the erosional processes that continue to modify the bedrock in Backbone Park are slow by human standards. The beautiful rocky landscape is preserved as a lasting treasure in our State Park System for countless generations to enjoy in the future.

REFERENCES

Calvin, S., 1898, Geology of Delaware County: Iowa Geological Survey, Annual Report, v. 8, p. 119-192.

Calvin, S., 1906, Notes of the geological section of Iowa: Journal of Geology, v. 14, p. 571-578.

Calvin, S., and Bain, H.F., 1900, Geology of Dubuque County: Iowa Geological Survey, Annual Report, v. 10, p. 381-622.

Johnson, M.E., 1975, Recurrent community patterns in epeiric seas: the Lower Silurian of eastern Iowa: Proceedings of the Iowa Academy of Science, v. 82, p. 130-139.

Johnson, M.E., 1977, Early geological explorations of the Silurian System in Iowa: Proceedings of the Iowa Academy of Science, v. 84, p. 150-156.

Johnson, M.E., 1983, New member names for the Lower Silurian Hopkinton Dolomite of eastern Iowa: Proceedings of the Iowa Academy of Science, v. 90, p. 13-18.

Willman, H.B., 1973, Rock stratigraphy of the Silurian System in northeastern and northwestern Illinois: Illinois State Geological Survey, Circular 479, 55 p.

Wilson, J.L., 1895, The Upper Silurian in northeastern Iowa: American Geologist, v. 16, p. 275-281

Witzke, B.J., 1992, Silurian stratigraphy and carbonate mound facies of eastern Iowa: Iowa Department of Natural Resources, Geological Survey Bureau, Guidebook Series No. 11, 111 p.

DESCRIPTION OF BEDROCK STRATIGRAPHIC UNITS, BACKBONE STATE PARK

based on measured sections at the Backbone (NE SE NE NW sec. 16, T90N, R6W, Delaware Co.) and elsewhere in the park (SE SW NE SW sec. 9, SE SW NW NW sec. 9, T90N, R6W); Brian Witzke with Ray Anderson, March-April, 1995.

abbreviations: vf - very fine, f - fine, m - medium, c - coarse, xlln - crystalline; thicknesses in meters (m).

LOWER SILURIAN — HOPKINTON FORMATION
MARCUS MEMBER

UNIT 8. Dolomite, vf-f xlln, skeletal-moldic, vuggy to very vuggy; cliff-former in lower part, overhang at base, recessive upward, unit slopes back into forest cover above cliffs, minor bedding breaks and solutional re-entrants within unit; bands of *Pentamerus* valves scattered to common through, mostly isolated valves concentrated into laterally discontinuous layers, *Pentamerus* shells are generally small (1 to 3 cm) in the lower meter or so of unit, increasing in size (to 8 cm) in upper part of unit; large *Pentamerus* in life-position scattered at horizons ranging from 1.15 to 2.25 m above base of unit; tabulate corals are rare in unit (*Favosites* noted at base, 10 cm *Halysites* noted 1.1 m above base), small crinoid debris molds scattered throughout, includes scattered crinoid stems in middle part of unit; Unit 8 is erosionally beveled at top, reaching maximum measured thickness at the Backbone to 3.55 m.

UNIT 7. Dolomite, vf-f xlln, f-m xlln in bands, skeletal-moldic, slightly vuggy to vuggy, locally very vuggy in upper part; cliff-former in middle part, lower 40 to 60 cm forms recessive interval throughout park (thinner bedded and denser lithologies), top 1 m is generally less resistant with solutional re-entrants and more recessive character, bedding break at top, unit displays irregular bedded aspect; thin chert bands in lower half of unit, laterally discontinuous, cherts are smooth, light brown, with scattered molds of crinoid debris and *Pentamerus*, chert nodules generally less than 2 cm thick (locally to 5 cm), irregular chert bands noted at 20, 40, 55-95, and 107 cm above base of unit; bands of small *Pentamerus* molds are scattered to common in part of unit (primarily in lower and upper interval), *Pentamerus* rare to absent in middle part (especially 1.3 to 1.9 m above base), rare large *Pentamerus* in life position in upper part (locally noted at top and 60 cm below top); upper half of unit with scattered laminar stromatoporoids and tabulate corals, part silicified, includes *Halysites* (up to 10 to 30 cm diameter), rare *Alveolites* (to 15 cm); fine crinoid debris molds scattered through unit; unit is 2.85 to 3.0 m thick.

UNIT 6. Dolomite, dominantly vf-f xlln, part with f-m xlln, some f-c xlln upward, skeletal-moldic, vuggy; prominent cliff-former, generally overhanging at base, irregularly-bedded aspect (20-45 cm), multiple minor solutional re-entrants and discontinuous bedding breaks internally, locally forms minor bench at top; prominent chert bands in upper part, chert is light brown, smooth, irregular, contains molds of crinoid debris and *Pentamerus* shells, chert forms nodular bands (individual nodules locally to 2 m long, up to 10 to 15 cm thick, most are smaller), prominent chert bands noted 2.15 to 2.9 m above base of unit, minor chert nodules locally recognized at 70 cm and 1.95 m above base; *Pentamerus* scattered to abundant through unit, most common in concentrated bands of disarticulated valves, size and abundance of *Pentamerus* generally decreases upward in top half of unit, lower half of unit with multiple horizons of large *Pentamerus* molds in life position (noted near base and 20, 30, 35, 39, 47, 80 cm above base, and 1.2, 1.25, 1.37-1.52, 1.6-1.8, 1.92-1.97 m above base); small crinoid debris molds scattered through, includes crinoid stems 1.5 m above base; lower 1.4 m with scattered tabulate corals and laminar stromatoporoids, part silicified small laminar stromatoporoids locally noted 65-80 cm above base, *Favosites* locally scattered at base, *Halysites* (to 15 cm) and *Favosites* (to 15 cm) molds locally scattered 1.2-1.4 m above base; unit is 3.3-3.4 m thick.

SWEENEY MEMBER

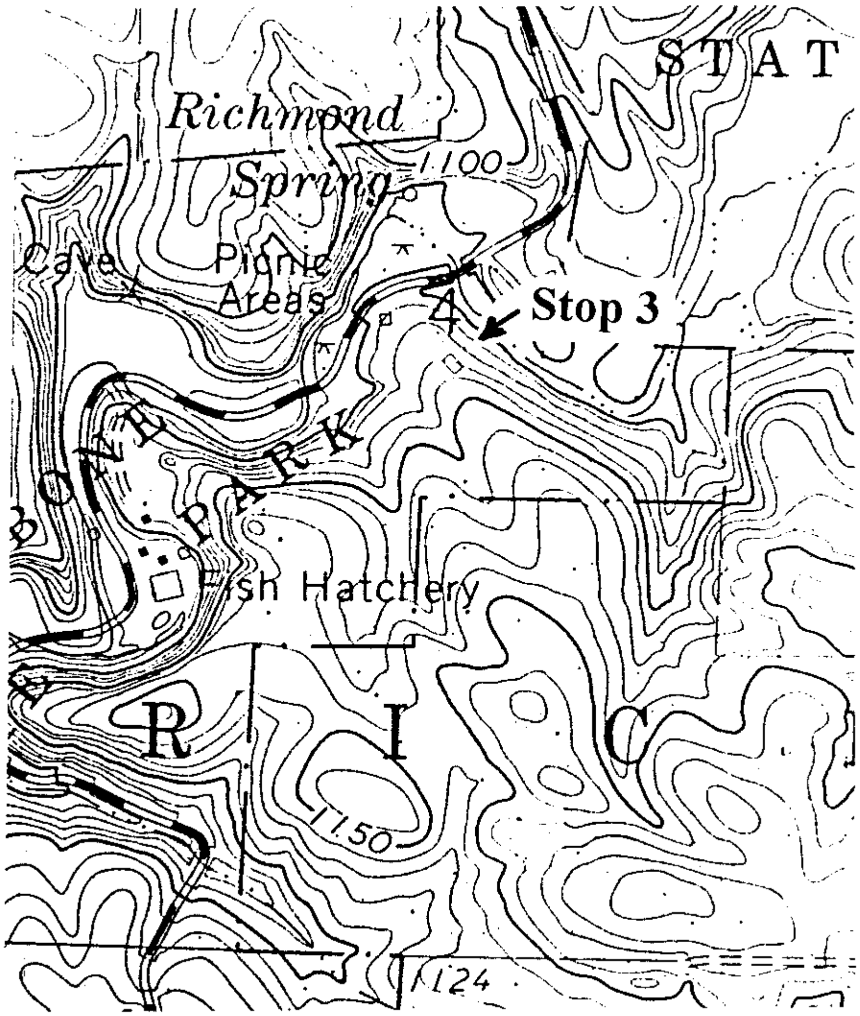
UNIT 5. Dolomite, vf-f and f-m xlln (in stringers), slightly more finely xlln than unit 4, skeletal-moldic dolomite (lacks prominent brachiopod molds of overlying unit), larger skeletal material is partially to completely silicified, unit is variably vuggy; cliff-forming unit, solutional re-entrant in upper part, slight overhang top 25 cm, generally massive with discontinuous irregular bedding breaks internally; scattered to common corals, most are silicified, some are molds, corals are abundant in bands in top 50 cm; corals include *Favosites* (to 35 cm diameter in lower part), *Halysites* (to 15 cm), *Syringopora* (to 25 cm), small solitary rugosans, larger cystiphyllid rugosans; stromatoporoids are common through most of unit, many are silicified, most are thin laminar forms (to 35 cm diameter), some laminar stromatoporoids form loose aggregations to 75 cm wide, lower and middle parts of unit with scattered hemispherical stromatoporoids (5-15 cm diameter), laminar stromatoporoids are abundant in upper part of unit; small crinoid debris molds and dolomitized crinoidal packstone stringers; unit is 1.95-2.05 m thick.

UNIT 4. Dolomite, vf-f and f-m xlln (in stringers), f-c xlln in lower 50 cm, skeletal-moldic dolomite, larger skeletal material is partially to completely silicified; cliff-forming unit, irregular bedded aspect, minor bedding breaks internally, slightly vuggy to vuggy through most, becomes denser in upper part, top 10 to 15 cm is dense dolomite (mudstone) forming minor ledge; scattered to common corals, many are partially silicified, dominantly *Halysites* (most 5-10 cm) with scattered small *Favosites*, *Syringopora* (to 20 cm), and solitary rugosans (to 4 cm diameter); scattered to common laminar stromatoporoids, partially silicified, rare hemispherical stromatoporoids; small crinoid debris molds, dolomitized crinoidal packstone stringers; unit is 2.1-2.2 m thick.

UNIT 3. Dolomite, f-m xlln with f-c xlln stringers (crinoidal packstone lithologies), c-vc xlln stringers in middle and upper parts, vf-f xlln in upper part, notably more coarsely crystalline than unit below, abrupt lithic break at base; skeletal-moldic dolomite (fine crinoid debris molds) with common stringers of dolomitized crinoidal packstone; cliff-forming unit, scattered to common vugs, very vuggy in basal 60 cm, slightly recessive at base, irregular bedded aspect, minor solutional bedding breaks and re-entrants internally (especially 1.28 m above base); scattered to rare corals (*Halysites* to 15 cm) and laminar stromatoporoids in lower 1.25 m; stromatoporoids and corals sparse to absent in upper 2.1 m, locally some scattered small favositid corals (<5 cm); local bands of large (1-3 cm) brachiopod molds noted near top and bottom of unit, includes *Pentamerus* and/or *Stricklandia* in upper 20 cm, *Stricklandia* and indeterminate pentamerids 1.3 to 1.5 m above base; unit is 3.25-3.35 m thick.

UNIT 2. Dolomite, vf-f xlln, some f-m xlln stringers in lower and upper parts, fine skeletal-moldic (crinoid debris molds); most of unit is cliff-former, scattered to common vugs, lower 80 cm is locally recessive (vuggier to thinner bedded), minor discontinuous bedding breaks internally; scattered to common coral molds (some part silicified), generally increase in size upward, includes *Halysites* (most 5-10 cm, 10-20 cm in upper part) and scattered solitary rugose corals (to 15 cm near top); scattered laminar stromatoporoids near top; unit is 2.4-2.45 m thick.

UNIT 1. Dolomite, vf-f xlln, some f-m xlln in upper part, fine skeletal-moldic (includes crinoid debris); primarily a cliff-forming unit, part slightly recessive in lower half, irregular bedded aspect internally (7-20 cm thick), discontinuous bedding surfaces internally; vuggy through most; scattered laminar stromatoporoids through; scattered corals include primarily *Halysites* (to 15 cm) with rarer *Favosites*, *Alveolites*, and solitary rugosans (horn corals); unit is exposed only in lowest portions of valley walls immediately above river level, maximum measured thickness for unit is 3.4 m.



Auditorium near Richmond Spring

This auditorium was constructed in 1930, a part of the first park master plan prepared by Iowa State University professor Fittsimmons. It was to be one part of a large complex that was to include cabins, a kitchen, and a large meeting room, all designed to serve as a center for nature study. However, with the initiation of CCC activity in the park, plans for the construction of the rest of the complex was abandoned.

Park Ranger **Bob Schaut** will provide a brief discussion of the history of the Auditorium. The primary purpose of this stop is to examine the Pleistocene terrace on which the auditorium is constructed, one of several such terraces visible throughout the park. **Brian Witzke** will lead the discussion of these terraces and other aspects of the Quaternary geology of Backbone Park.

STOP 3. QUATERNARY GEOLOGY OF BACKBONE STATE PARK

E. Arthur Bettis III
Iowa Department of Natural Resources
Geological Survey Bureau
109 Trowbridge Hall
Iowa City, IA 52242-1319

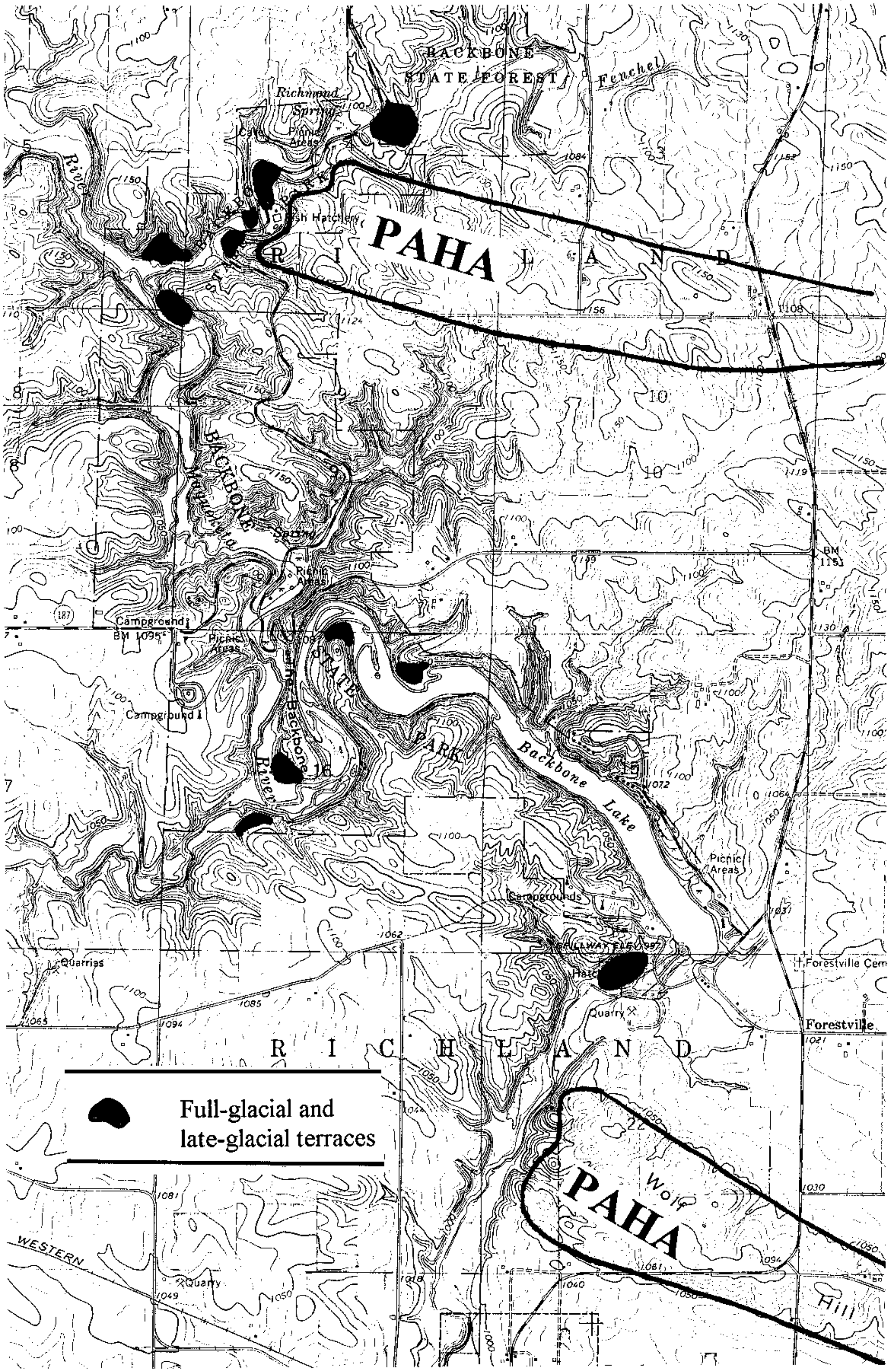
PHYSIOGRAPHY

The park is within the northern extent of the Iowan Surface about 2.5 miles south of the boundary between the Iowan Surface and the Paleozoic Plateau landform regions. The landscape within the park is more like that typical of the Paleozoic Plateau because the deep entrenchment of the drainage network and differences in erosional resistance of the various exposed bedrock units control the form of the land surface. Entrenchment of the Maquoketa River and its tributaries created the park's distinctive topography. From its headwaters near Arlington in southeastern Fayette County the Maquoketa flows through a broad, shallow valley typical of Iowan Surface drainage lines. As the river crosses into southwestern Clayton County the valley becomes more deeply entrenched, and rock crops out along the valley walls. By the time it enters the park in northwestern Delaware County the valley is a gorge; relatively narrow, deeply entrenched, with rock-lined margins. The gorge morphology is lost south of the park boundary, and the valley regains the broad, shallow form typical of the Iowan Surface.

REGIONAL GEOLOGIC UNITS

Exposures of Quaternary deposits are few and poor because the park's streams usually flow against rock along their valley margins, and man-made exposures are old and vegetated. Nevertheless, a few glimpses of Quaternary stratigraphic units are available for those willing to settle for the less than spectacular. Regionally extensive Quaternary stratigraphic units in the Upper midwest are restricted to deposits most typically encountered in upland settings. In this part of the state these are Pre-Illinoian tills and late Wisconsinan eolian deposits. Outcrops of Pre-Illinoian till are not known in the park, but could be present in steep tributary valleys. The presence of erratic pebbles and cobbles in the erosional lag (dominantly composed of local chert) on steep slopes indicates that tills are probably present beneath younger units on some upland areas in the park. Regional stratigraphic studies have concluded that this part of Iowa was last glaciated about 500,000 years ago (Hallberg, 1980).

Development and entrenchment of the present drainage system occurred after the last glaciation. The chronology of the entrenchment is unknown. The most extensive upland units in this area are late Wisconsinan Peoria Loess and correlative eolian sand. These form a three to twenty foot thick mantle on all uplands in the park. The distribution of loess and eolian sand is discontinuous on the Iowan Surface. The source of both deposits was the aggrading floodplains of rivers that traversed the region. During periods of low flow and high wind (winter for example), sand and silt was deflated from unvegetated floodplain surfaces and transported to adjacent uplands where it was trapped by vegetation. Thick sand and loess deposits occur on large southeast-trending ridges east of the Maquoketa Valley in the vicinity of the park. These ridges are "paha" the Lakota Sioux word for hill. Paha are constructional landforms, places where wind-blown sediment accumulated while erosion and landscape lowering were occurring elsewhere on the Iowan Surface. Paha occur downwind of localities where river valleys are aligned such that they provide a long fetch for prevailing wind (from the northwest in this case). In the case of the paha in the park's vicinity (see map on page 20) the upstream end of the gorge is aligned parallel with prevailing wind and acted to funnel wind down the

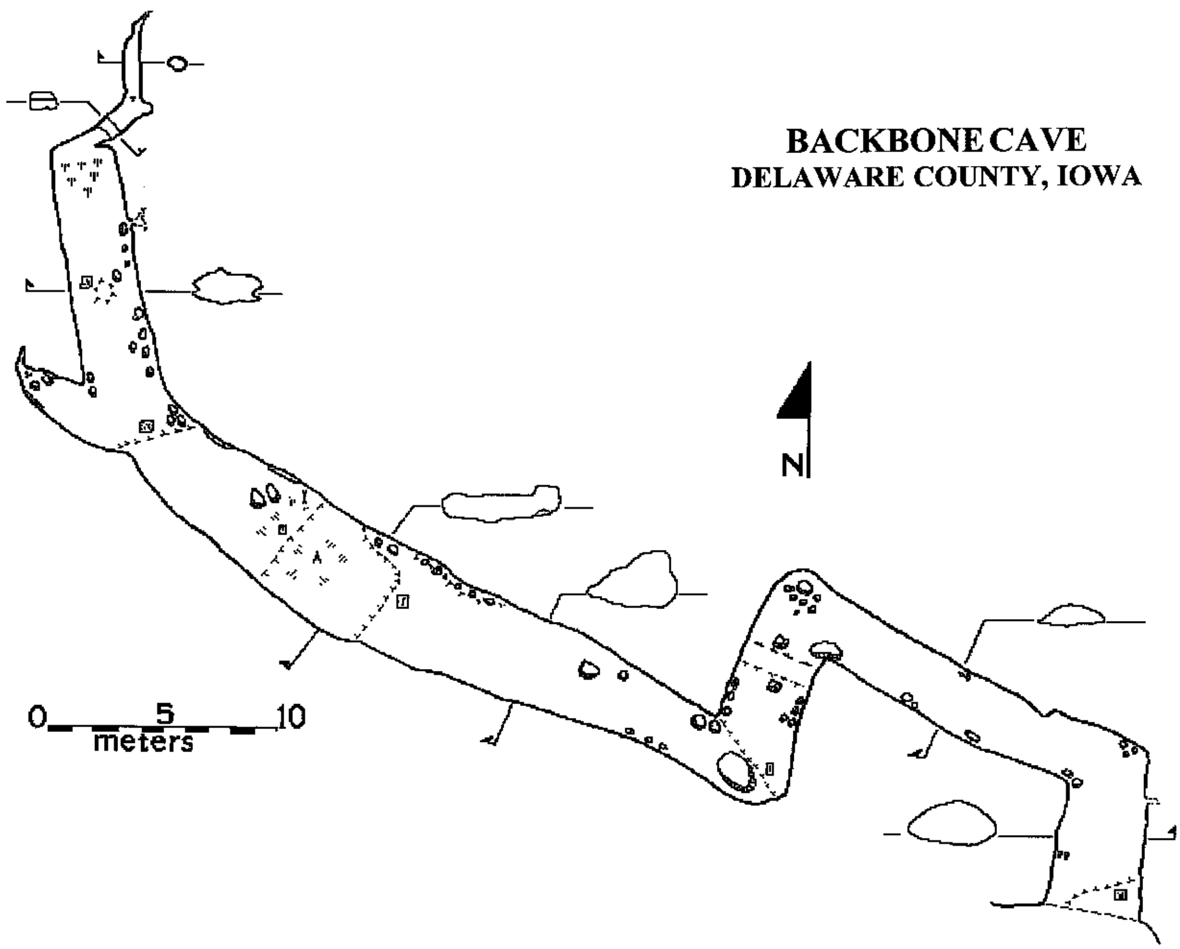

BACKBONE STATE FOREST
Richmond Spring
PAHA
R I C H L A N D
BACKBONE STATE PARK
Backbone Lake
Campground
Campgrounds
Picnic Areas
Quarry
Forestville
Full-glacial and
late-glacial terraces
PAHA

valley here. The switchback loop in the valley at The Backbone makes the valley very wide as far as wind is concerned, which further aided in the deflation of sand and silt from the valley floor by wind.

LOCAL STRATIGRAPHIC UNITS

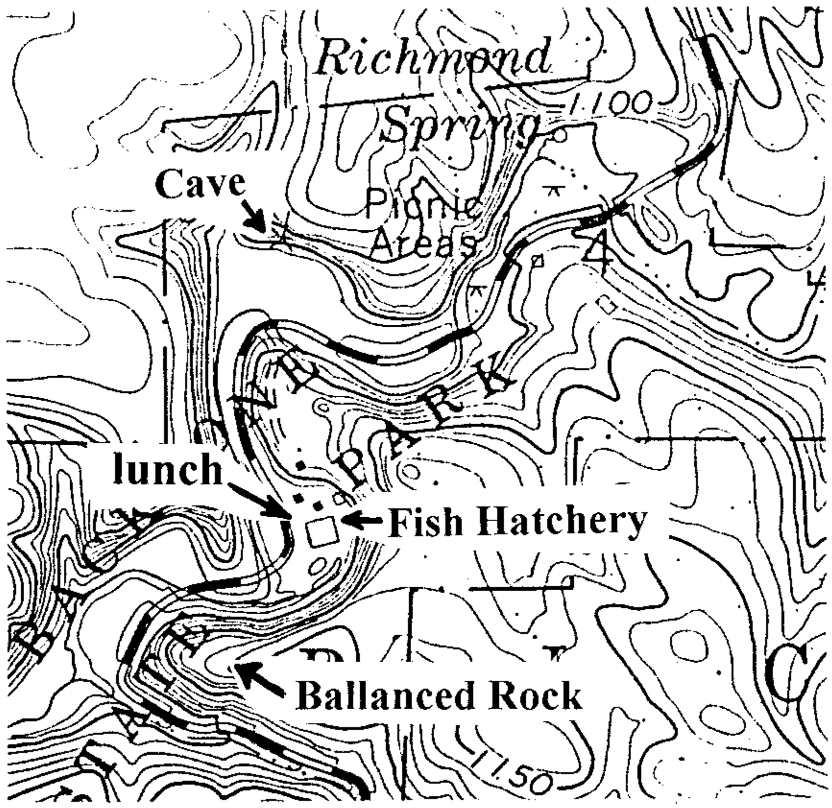
Three groups of Quaternary deposits occur intermittently along drainages through the park; rocky colluvium and talus, pebbly sand deposits associated with high terraces, and sandy, gravelly, and loamy alluvium associated with the modern streams. These units are correlative with deposits elsewhere in the Upper Midwest, but are not continuous in their distribution for any great distance. The oldest of these local units are the rocky colluvium, talus and pebbly sand deposits. The colluvium and talus are found along the base of cliffs and steep slopes and are composed of local rock blocks and pieces in a loamy, sandy, and silty matrix. These deposits accumulated primarily during the last full glacial, about 21,000 to 16,000 years ago when northern Iowa was in a periglacial zone. The climate was very cold and probably drier than today, and tundra vegetation occupied uplands, with coniferous forests along entrenched valleys. Large areas of permafrost (ground frozen year-round) were present and frost action was very intense along rock gorges such as those in the park. Frost-shattered rock from the cliffs and silt and sand washed from the uplands accumulated along the base of the bluffs. The large amount of sediment delivered to valleys during this period of intensive erosion on uplands caused valleys to aggrade (fill) with pebbly sand alluvium. The valleys in the park filled to a level twenty to twenty five feet above the present floodplain. Remnants of this full-glacial filling are present as terraces in the park (see map). Good examples of terraces underlain by full-glacial alluvial fill can be seen east of the north park entrance road along the north side of Fenchel Creek upstream of Richmond Spring, just below the savanna restoration area downstream of Richmond Spring, and east of the road just north of the old fish hatchery. A few small outcrops of the fill beneath these terrace remnants show the pebbly sand with common erratic pebbles derived from erosion of glacial tills on the upland that characterize this alluvial fill. Most of this alluvial fill has been removed by subsequent entrenchment and meandering of the streams.

Alluvium associated with the Holocene streams in the park consists of an upper loamy or sandy increment over chert gravel. A cursory examination of outcrops and the valley landscape in the park suggests that most of the Holocene alluvial fill is very young. It appears that the streams have been actively meandering across their floodplains during the recent past and have removed most of the older Holocene alluvial fill.



The information for the above map of Backbone Cave is from a compass and tape survey conducted by Ohms and Winch on July 25, 1990. The map was prepared by Marc Ohms and provide by the Iowa Grotto.

LUNCH STOP



We will stop at the old fish hatchery parking lot where those who brought sack lunches. This area provides rest rooms, open grassy areas for eating, and a number of other park attractions which field trip participants may wish to examine. Park Ranger **Bob Schaut** will briefly discuss some of the interesting facts and stories about these features during lunch.

Old Fish Hatchery Parking Lot

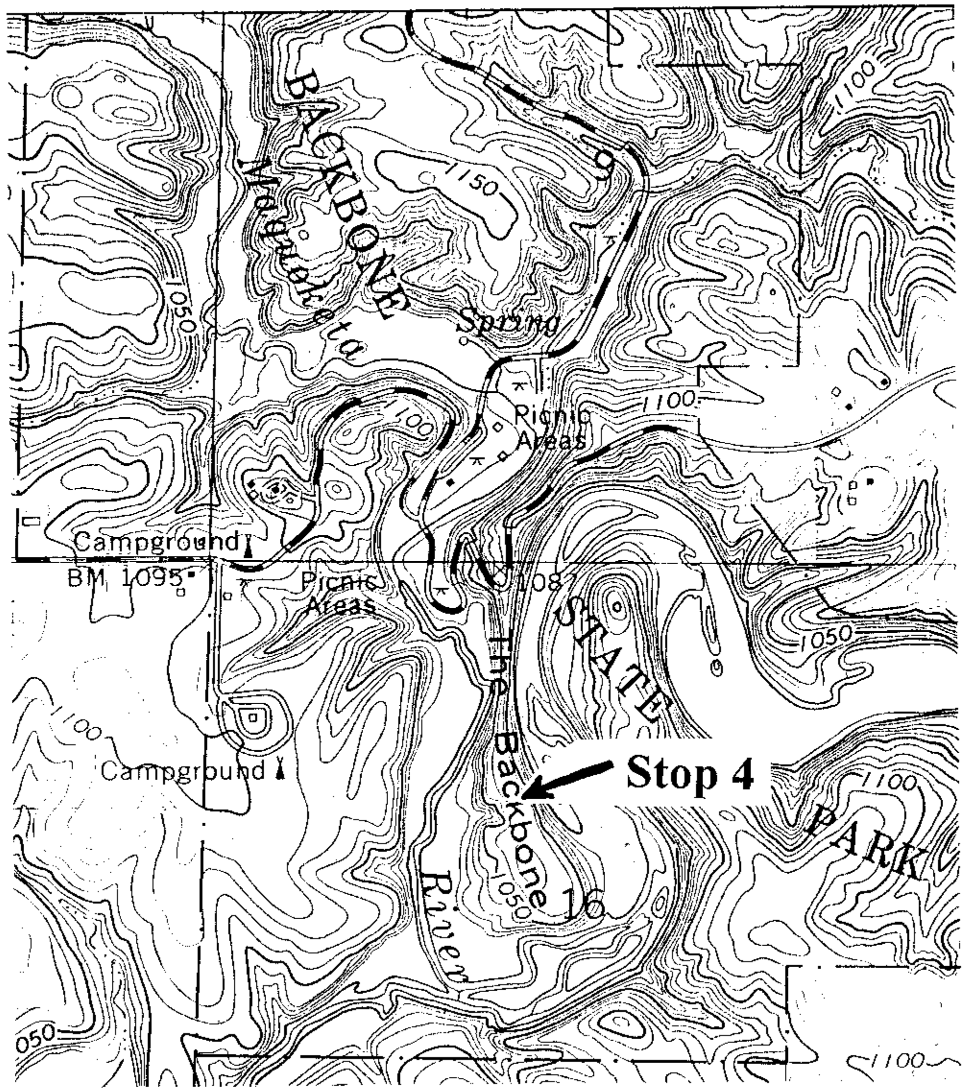
The first hatchery in this area, and the stone wall that fronts the hatchery were built in 1925 by W.E. Albert. In 1934 the hatchery was officially dedicated to W.E. Albert by the CCC, who then promptly dismantled Albert's construction and rebuilt the hatchery, preserving only the wall. The facility served as a State trout hatchery from 1935 until 1976 when it was replaced by the recently acquired Manchester Hatchery. Although not an active hatchery, the pounds were stocked with trout as an exhibit until 1988 when it was closed.

Balanced Rock

Erosion by the Maquoketa River and the ravages of wind, rain, and time sculpted this intriguing oddity. It is one of the parks most photographed natural features.

Backbone Cave

The cave is one of the most popular attractions at Backbone State Park. The cave extends only about 70 m (210 feet) with only one very short side passage (see map on facing page). If you want to explore to the back end of the cave, be prepared to crawling in some areas.



The Devil's Backbone

The Devil's Backbone is the feature from which the park draws its name. This area of the park was given to the state of Iowa by Edward M. Carr, a Manchester lawyer, in 1919.

Bob Schaut will start us out with a dramatic retelling of a story recounting how the Devil's backbone got its name. After proceeding out the backbone, State Archaeologist **Bill Green** will discuss evidence of prehistoric camps on the backbone. Then **Lisa Hemaseth** (DNR Fish and Wildlife Division) will lead a hike down the Backbone to examine a wildlife habitat area near the Maquoketa River. There she will discuss the fauna of the park, especially the recent research on neotropical migratory songbirds that frequent the park. Following Lisa's discussion, **Brian Witzke** will lead a hike up the west side of the Backbone for another look at Silurian rock strata, and a rigorous climb up a fracture for the more fit and daring among us.

STOP 4. THE FAUNA OF BACKBONE STATE PARK

A SONGBIRD REFUGE

Lisa Hemaseth
Iowa Department of Natural Resources
Fish and Wildlife Division
Boone Research Station
Boone, IA 50036

With 70% of Iowa's forests destroyed, Backbone State Park is a valuable refuge for forest wildlife. Surrounded by a sea of cropland, the park's 1,390 acres of forest attracts a wide variety of wildlife including deer, turkeys, ruffed grouse, and many species of songbirds. The diverse wildlife resources are the result of not only the size of the forest but also its diversity. The age of the park's forests range from old/mature timber stands in the uplands and along the steep bluffs to saplings in small openings in the forest. Tree diversity is also great with oak and hickory dominating the uplands and bluffs; walnut, cottonwood, ash, hackberry, and boxelder dominating the bottomlands; and small stands of pine scattered throughout the park.

The diverse forest resources attracts wildlife species with a wide variety of habitat needs. Large trees along the Maquoketa River and its tributaries in the park support a small rookery, a colony of great blue herons that build their stick nests in the top branches of large oaks, hickories, and cottonwoods. In 1994, a pair of red-shouldered hawks, a state threatened species typically associated with large tracts of mature bottomland forest, built a nest in an old white oak along the Maquoketa River and successfully produced three young. And the sound of ruffed grouse drumming in the spring can be heard on the western border of the park in small openings of a young timber stand. The wildlife resources of the park produces is endless. Nonetheless, the park's greatest asset is the wildlife habitat it provides for many species of songbirds.

In 1994 birds were censused throughout Backbone State Park to determine the value of its forests for breeding birds (Herzberg et al. 1995). Of the birds documented, 25 species were neotropical migratory landbirds, birds that breed in North America and winter in Central and South America, and the Caribbean. Known more commonly as songbirds, neotropical migratory birds include flycatchers, warblers, thrushes, swallows, cuckoos, tanagers, vireos, grosbeaks, and other colorful birds usually associated with the coming of spring.

Many species of songbirds have been undergoing population declines in the last 25 years. A popular theory for the decline in songbird numbers is increased habitat fragmentation. Since the Euro-Americans settled Iowa, the forest resources of the state have not only been reduced but also degraded. The large tracts of forests that once existed in northeast Iowa and along our riverways have been reduced to small woodlots. These habitat fragments attract the brown-headed cowbird, a nest parasite, that lays eggs in the nests of many neotropical migratory birds. The parents unsuspectingly incubate the eggs of the cowbird and raise the cowbird young at the expense of their own young, hence the number of young produced by the nesting species decreases and the population starts to decline. Small woodlots also attract many edge predators, animals such as skunk, raccoon, fox, crow, and blue jay that hunt near the boundaries of forests. Increased predation on nests also results in lower population numbers. Backbone State Park's large forest tract offers some protection from the consequences of habitat fragmentation and maybe a safe nesting area for many breeding neotropical migratory birds. The importance of Backbone State Park to breeding neotropical migratory birds becomes apparent when considering that forest tracts larger than 1300 acres are scarce in the state.

Table 1. A list of the 25 neotropical migratory songbirds found in Backbone State Park in 1994 and their population trends in the Midwest determined by the Breeding Bird Survey[1] (0=steady population numbers, - = decrease, + =increase)

Species	Trend between 1966 and 1991	Trend between 1982 and 1991
Acadian Flycatcher	0	0
American Redstart	-	0
Barn Swallow	0	-
Black-billed Cuckoo	0	+
Blue-gray Gnatcatcher	0	0
Cerulean Warbler	-	0
Eastern Wood-pewee	-	0
Gray Catbird	0	0
Great Crested Flycatcher	0	0
House Wren	+	+
Indigo Bunting	0	-
Least Flycatcher	0	0
Louisiana Waterthrush	0	0
Northern Oriole	0	0
Northern Rough-winged Swallow	+	0
Ovenbird	0	0
Purple Martin	0	0
Rose-breasted Grosbeak	0	-
Red-eyed Vireo	+	+
Ruby-throated Hummingbird	0	0
Scarlet Tanager	0	+
Veery	-	-
Wood Thrush	-	-
Yellow-billed Cuckoo	-	-
Yellow-throated Vireo	0	0

[1] Provided by B. Peterjohn and J. Sauer, Office of Migratory Bird Management and the Branch of Migratory Bird Research, Patuxent Wildlife Research Center, U.S. Fish and Wildlife Service.

Population trends for the 25 species of neotropical migratory songbirds varies between species (Table 1). According to the Breeding Bird Survey, a national roadside survey that has been conducted since 1966, six species have shown statistically significant population declines between 1966 and 1991 throughout the Midwest. An additional three species have shown declines during a shorter time period between 1982 and 1991.

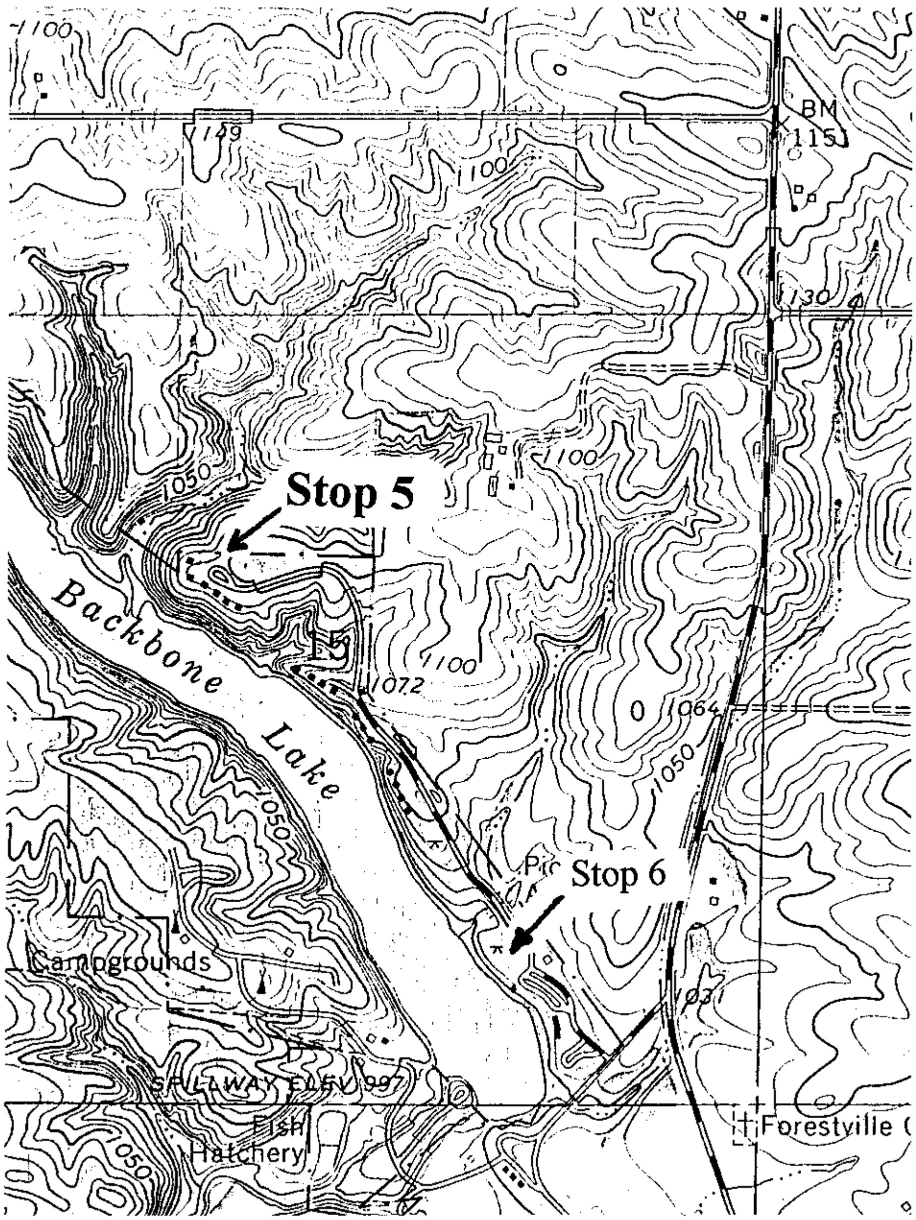
Of the nine species that show population declines, two, the eastern wood pewee and the American redstart, are the third and fourth most abundant bird species in the park. Only the American crow and the northern rough-winged swallow were found more frequently.

The habitat diversity the park has to offer is apparent when one considers the habitat needs of some of the songbirds: cerulean warblers and house wrens prefer bottomland forests; yellow-billed cuckoos and gray catbirds are edge species and like to nest in brushy woods or younger woodlands; wood thrushes, scarlet tanagers, and veerys are adapted to large tracts of mature upland woods. The age of forest stands, the composition and diversity of trees and shrubs, the condition of the understory, and the amount of disturbance from recreationalists are all major factors affecting the presence and distribution of birds in the park.

Backbone State Park's forest is progressing toward a more mature forest condition. Obviously, to ensure the continuing bird diversity of the park, active management of the forest will be necessary. The fact that Backbone State Park can fulfill the needs of such a wide variety of birds ranks it as a very valuable wildlife resource that will need careful management. Recreational, forestry, and wildlife management goals for the park need to be coordinated to ensure that all Iowans can enjoy their oldest state park while providing crucial songbird habitat.

REFERENCES

Herzberg, R., L.M. Hemesath, W.R. Norris, D.R. Farrar, 1995, Neotropical migrant songbird use of forest tracts in northeast Iowa: Report to the U.S. Fish and Wildlife Service, Backbone State Park: A Songbird Refuge, 102 p.



Mound near Cabins

We will stop in the cul-de-sac north of the cabin area for a discussion of the archaeology of Backbone State Park and the surrounding area by **Bill Green**. Following the discussion, Bill will lead a short hike to examine an unrestored burial mound, the only mound known in the park and the western-most of the linear Effigy Mounds.

STOP 5. ARCHAEOLOGY OF BACKBONE STATE PARK, DELAWARE COUNTY, IOWA

William Green
Office of the State Archaeologist
305 Eastlawn
Iowa City, IA 52242

INTRODUCTION

Archaeological resources are the principal sources of information on ancient peoples of Iowa. While over 17,000 archaeological sites have been reported throughout the state, these comprise only a small percent of the sites actually present. Many archaeological sites are difficult to find and are easy to disturb and destroy through erosion, plowing, and development activities. State parks such as Backbone provide opportunities to study ancient cultures through relatively undisturbed archaeological sites situated in environments which approximate to varying degrees the physical character of the prehistoric landscape.

The archaeological record comprises the physical traces of past human activities. Northeast Iowa's archaeological record is well known for its richness and diversity (Green 1988; Mallam 1983). The resources of Delaware County, however, have not received as much attention as those of neighboring Clayton and Dubuque counties. Only 48 sites are recorded in Delaware County, whereas most adjoining counties have hundreds of sites on file. Although the Maquoketa River valley in Jackson and Jones counties has received archaeological attention (e.g., Benn 1980; Cordell et al. 1991; Marcucci et al. 1993), the parts of this drainage in Delaware County and in the Backbone locality are poorly known from an archaeological perspective.

ARCHAEOLOGICAL SITES

Backbone State Park has been the focus of minimal archaeological study. Only seven archaeological sites are recorded within or adjacent to the park. Six of these sites were found in the 1970s during sporadic visits by archaeologists, and one site was recorded in 1992 during a Department of Natural Resources-sponsored investigation (Thompson and Roberts 1992). These seven sites probably constitute the tip of the iceberg. The relatively undisturbed nature of much of the park, combined with the local availability of a wide range of usable resources, suggests that the park retains great archaeological potential and that scores of archaeological sites may eventually be found within the park.

Two types of prehistoric archaeological sites—linear mounds and small campsites—have been recorded in and adjacent to Backbone State Park. The mounds are situated on upland terrain, with the most easily accessible example located near the cabins on the blufftop overlooking Backbone Lake (SE 1/4, NW 1/4. section 15). This particular mound is about 90 feet long, 20 feet wide, and 2 feet high. Originally, it may have been slightly larger, but erosion due to camping activities has obscured the mound's edges. Other possible linear mounds are located in uplands in the northern portion of the park. Some of these mounds may actually be recent features resulting from logging and road building activities.

Prehistoric campsite locations are revealed by the presence of chipped-stone tools and flaking debris from tool manufacture. Such artifacts have been found at four locations within the park, both in uplands and on terraces in the Maquoketa River valley. The summit of the Backbone ridge itself seems to have been a particular focus of activity. Campsites would have been used as temporary hunting stations and as seasonal bases from which people exploited forest resources such as nuts. Utilization of the Backbone region for hunting and other resource collection probably goes back to the time of the earliest human occupation of Iowa, around 12,000 years ago. However, little specific evidence has yet been collected to allow assignment of ages to the habitation sites in and around the park. One projectile point fragment from a blufftop site is similar to Middle-Late Archaic styles, ca. 2000-4000 B.C.

Prehistoric residents of the Backbone area used chert from local bedrock formations and stream cobbles as the principal raw material for their chipped stone tools. Chert flakes and tools from the Blanding and Hopkinton formations (Silurian) are commonly found on campsites (see Morrow 1994). Some of the utilized chert differs in color and texture from that exposed in bedrock or as stream gravel because it was deliberately heated prior to final shaping. Heat-treatment, which usually results in a reddish or pinkish color and a lustrous surface, generally improved the workability of chert for various tool types.

So far, no permanent base camps or villages have been identified in the Backbone locality. But the presence of mounds does suggest this part of the Maquoketa River valley played an important role in the settlement system of people during the Late Woodland period. Woodland people built mounds not only as burial places but also, perhaps, as territorial markers, ritual meeting places, and symbols of ancestral and ongoing human connections with the land (Benn et al. 1993; Mallam 1982). Northern Delaware County is located just beyond the southwestern limit of the distribution of the Effigy Mound tradition (Mallam 1976). Effigy Mound sites are characterized by conical and linear mounds in addition to the well-known animal shaped structures. Linear mounds such as those at Backbone are found outside of the limits of the Effigy Mound tradition (e.g., Collins 1991) but are believed to date to about the same period, ca. A.D. 300-1000.

CONCLUSION

Archaic and Woodland peoples utilized Backbone State Park for various purposes. Unfortunately, beyond this basic statement, not much can be said about the park's prehistoric heritage at this point. However, the available data do provide tantalizing clues of the probable richness of the Backbone State Park archaeological record. Preliminary geologic data suggest high archaeological potential that local rock shelters and chert workshops existed within the area that is now the park. Comprehensive, systematic archaeological survey can reveal much about the ways of life of the many peoples who resided in the area over thousands of years. Coordinated archaeological and geomorphological work—especially focusing on Maquoketa valley terraces and on undisturbed blufftops—can supply much needed information on the sequence and nature of human occupation. In the future, by coupling archaeological research programs with preservation of mounds and other significant sites, the potential of Backbone State Park's archaeological resources can be more fully realized.

REFERENCES

Benn, David W., 1980, *Hadfields Cave: A Perspective on Late Woodland Culture in Northeastern Iowa:* Report No. 13, Office of the State Archaeologist, University of Iowa, Iowa City.

Benn, David W., E. Arthur Bettis III, and R. Clark Mallam, 1993, Cultural Transformations in the Keller and Bluff Top Mounds: *in* J. A. Tiffany (ed.) *Prehistory and Human Ecology of the Western Prairies and Northern Plains,* Memoir No. 27. Plains Anthropological Society, Lincoln, Nebraska, p. 53-73.

Collins, James M., 1991, *The Iowa River Greenbelt: An Archaeological Landscape:* Special Publication, Office of the State Archaeologist, Iowa City.

Cordell, John, William Green, and Derrick Marcucci, 1991, The Paul Sagers Archaeological Collection: *Journal of the Iowa Archaeological Society,* v. 38, p. 5-10.

Green, William (ed.), 1988, *Archaeological and Paleoenvironmental Studies in the Turkey River Valley, Northeastern Iowa:* Research Papers Vol. 13, No. 1. Office of the State Archaeologist, University of Iowa, Iowa City. Report submitted to the Iowa State Preserves Advisory Board and Iowa Department of Natural Resources, Des Moines.

Mallam, R. Clark, 1976, *The Iowa Effigy Mound Manifestation: An Interpretive Model:* Report No. 9. Office of the State Archaeologist, University of Iowa, Iowa City.

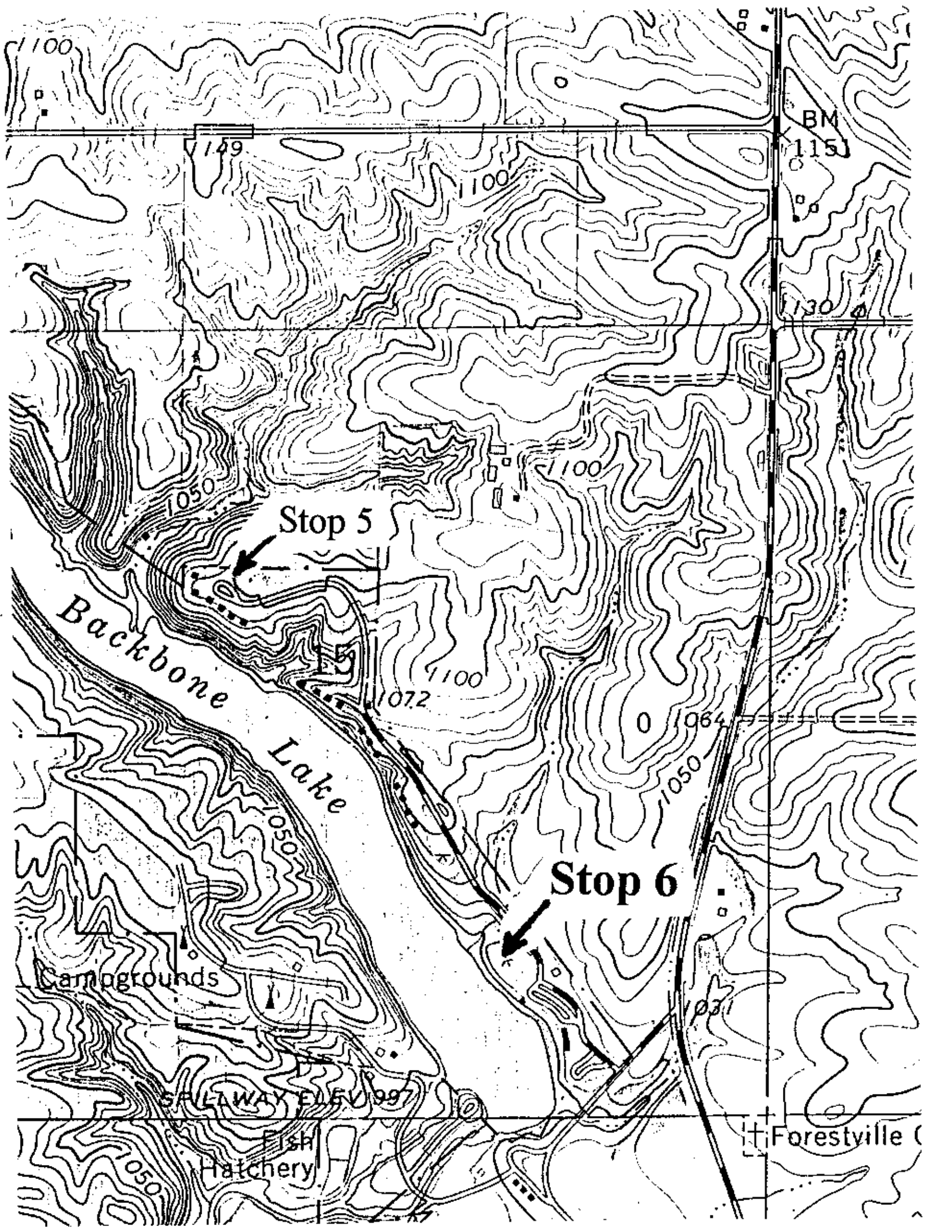
Mallam, R. Clark, 1982, Ideology from the Earth: Effigy Mounds in the Midwest: *Archaeology,* v. 35 (no. 4), p. 60-64.

Mallam, R. Clark, 1983, Driftless Area Archaeology: *Iowa Conservationist,* v. 42(nos. 4/5), pp. 19-22, 44-45.

Marcucci, Derrick J., Susan L. Gade, Julie Morrow, and Toby Morrow (eds.), 1993, *An Introduction to the Prehistory and History of Maquoketa, Jackson County, Iowa:* Association of Iowa Archaeologists Field Trip Guide. Cultural Resource Group, Louis Berger & Associates, Cedar Rapids, Iowa.

Morrow, Toby, 1994 A Key to the Identification of Chipped-Stone Raw Materials Found on Archaeological Sites in Iowa: *Journal of the Iowa Archeological Society* 41:108-129.

Thompson, Joe B., and Timothy E. Roberts, 1992, *A Phase I Cultural Resource Survey for Proposed Construction Activities in Selected Iowa State Parks and Recreation Areas:* BCA No. 207. Bear Creek Archaeology, Inc., Decorah, Iowa. Report submitted to Iowa Department of Natural Resources, Des Moines.



Old Boat House

The Old Boat House, completed by the CCC in 1935, is the most photographed structure in Backbone Park. The location where it was ultimately constructed was not the site originally planned for the structure.

Bob Schaut will discuss the pre-CCC history of Backbone Park, and also point out the first site chosen for the Boat House.

STOP 6. BACKBONE STATE PARK: A HISTORICAL PERSPECTIVE BEFORE THE CCC

Robert Schaut
Iowa Department of Natural Resources
Parks, Recreation and Preserves Division
Backbone State Park
Dundee, IA 52038

INTRODUCTION

Backbone State Park or "the backbone" as it was known as before its designation as Iowa's first state park, has been an area attractive to visitors since long before European settlers invaded the area. The area was a unique location surrounded by prairies and providing shelter from the elements, food for the hungry, and changes in elevation which would lead one to easily understand that "the backbone" was a sacred area to the native Americans.

Today, "the backbone" is very similarly viewed by the visitor in that shelter from the elements, food for the hungry, and the changes in elevation still inspire those who stand and behold its beauty. Many changes have occurred at "the backbone" since the area was inhabited by the native Americans to both preserve the area for its natural beauty and provide easy access for visitors who stop to recreate and gaze upon its limestone bluffs, wooded hills, and diverse plant and animal life.

The early Iowans who had the insight to save "the backbone" for all had a different vision of what the area meant to them than how the area has developed, but then how could the changes in the demands of the recreating public or the nations hard times be understood in the way Backbone State Park would be shaped. McBride, Pammel, Newberry, Hoyt, and Carr are recognized as some of the most influential Iowans in establishing Backbone State Park. They had a vision of preservation more than development of the area as a major recreation site with developed facilities which exists today. The biggest impact on "the backbone" to shape how the park visitors interact and view the area was the Twenty Five Year Conservation Plan completed in the early 1930's, and the establishment of the Civilian Conservation Corps and the construction which was completed by the beginning of World War II. Many of the facilities constructed by the CCC are of importance to the park visitor and stand out as impressive structures and works of architectural art which would be very difficult to reproduce today.

Backbone State Park has been a source of joy and recreational opportunity for the park visitor for many years. Development of structures by the CCC has enhanced the user comfort to allow for many to visit the park and partake in the wonders within the boundaries. The lake controversy continues today as a focus of general misunderstanding of what poor planning can lead to. Let's examine Backbone's historic past from these prospectives as not all inclusive but to realize that all that have explored "the backbone" have their own stories to tell.

" THE BACKBONE" A NATURAL CHOICE

Backbone State Park is one of Iowa's most unique areas and an examination of the natural beauty of the area is essential in understanding why the area was on the minds and in the hearts of the Iowans responsible for establishing "the backbone" as the state's first park. The forces of nature which acted in the region to form the surrounding abrupt changes in topography will not be explored in its entirety here but a general understanding of the result will be outlined.

Backbone is located in the center of Richland Township of far northwest Delaware County. The

Park is north of the small town of Dundee by 3 miles, south of Strawberry Point by 4 miles, and west of Lamont by 4 miles. Manchester, of which is the closest large town is located south east of the park approximately 12 miles.

The instrument of sculpture here to create the backbone is the Maquoketa River which originates Northwest of the area and snakes its way through the limestone valley. Several small tributaries merge with the Maquoketa with in the Backbone Park area with each contributing to the exposure of additional limestone bluffs. Lamont Creek and the Spring Branch which is fed by Richmond Spring are the two main waterways which enter the Maquoketa River within the park area and contribute to the limestone exposure. Many small dry valleys (areas which drain the surrounding hills and uplands) also extend down to add character to the surrounding topography. Many springs flow from the rock outcroppings along the river valleys and add a flow of water to the stream which enhances the river water quality to provide for clear, cold flow.

The area surrounding the Backbone Park is comprised of nearly level to gently rolling crop lands that prior to intensive agriculture was prairie characteristic of Iowa prior to its settlement. Much of the surrounding lands drain to create the Maquoketa River. The relative size of this drainage area is what has created the problem associated with the lake siltation problem.

The valleys cut by the drainage of the Maquoketa have established a quite rugged area. The sides of the valley have steep cliffs of dolomite limestone. Dolomite is a very hard limestone composed of magnesium carbonate. The magnesium carbonate deposits are a result of chemical conversion of calcium carbonate by the action of the seas which covered the area. The dolomite limestone at Backbone was formed millions of years ago when much of Iowa was covered by seas. These ancient seas extended into Canada and as far east as New York. Many of the softer calcium based limestones have dissolved from the surrounding dolomite leaving the rock outcroppings which comprise the backbone. The backbone is a long narrow ridge of dolomite which the Maquoketa River has created by almost folding back upon itself. From the top of the Backbone ridge one can see the Maquoketa River flow past to the south on one side and return flow to the north before it again winds south on the other side. Many towers of limestone exist along "the backbone" as well as the entire river valley within the park to create an interesting mix of cracks, crevices, and caves. If one looks closely at the limestone many fossil imprints can be observed reminding of the sea which laid these deposits many years ago.

The contrasts in topography have created the many varied ecosystems which harbor the mix of plant and animal diversity that can be observed within the park. Many of these plants and animals thrive in the unique environment. L.H. Pammel, botanist from the State University at Ames and later Chairman of the Board of Conservation, described the area prior to establishment as a state park:

> *" The Devil's Backbone is a veritable island of vegetation when considered with the contiguous region-an island of flora because some of the species do not occur in the surrounding region. The type of vegetation of this singular area is accounted for by the some of the topographic features; the region is very rugged and interlaced with deep ravines which converge in a narrow valley or gorge through which flows the south branch of the Maquoketa river."*

Pammels description is of the Backbone is still quite fitting in that all of the plant species noted are growing in the park today:

> *"The trees and timber of the region are of interest. There are as many species in this small area as in any other similar area in northeastern Iowa. White pine-the white pine are among the largest and oldest native white pine in the state. I saw a stump there which was nearly four feet in diameter and I should judge that these trees go back to the time when Iowa belonged to France. The Indians protected these trees and why should we not do the same."*

Early accounts of the Backbone are scattered among documents, newspaper articles, and folk lore. One of the earliest accounts of which the name Backbone may have originated was written by

Freeman R. Conaway. Mr. Conaway's article refers to Hon. Willis G. Haskell (Haskell was a state senator and Board of Conservation member during the early 1920's) as the director general of a party which toured the area for scientific work during 1920. Much rambling exists in the article but the account written by Conaway is:

> *"If the Devil's Backbone in Delaware County is the gateway to scenic Iowa then it might be truthfully said that Pike's Peak and the heights at McGregor are the jumping off places. John Milton, had he toured these scenic spots in Iowa might easily have fixed this part of creation as the location of his great drive. Satan... became the first arch disturber. He (Satan) organized the first rebellion. When he discovered that the Lord's hosts were not to pious to fight he lost his nerve, left his back bone in Delaware county and was driven to McGregor where he and his followers were pitched headlong over the cliffs to the Mississippi River hundreds of feet below."*

Tales such as this were strong with many of the old timers of the area. Cattle rustlers, horse thieves, bank robbers and Native Americans probably used the area to hide from the law when the area was a young territory. These accounts of people that frequented the area as well as the numerous bobcat, timber wolves and bears may have added additional credibility to the reference of the area as the devils backbone (later shortened to the more common reference "the backbone").

DEVELOPMENT AS A STATE PARK

The effort to establish public areas within the state of Iowa first had roots established by Thomas MacBride during the 1895 meeting of the Iowa Academy of Science. MacBride is credited with beginning the conservation movement in Iowa. MacBride's association with Louis H. Pammel and Pammels subsequent appointment to the Board of Conservation lead to the establishment of Backbone as the first state park. Pammel's interest with Backbone is well documented and little influence was needed to persuade him of the importance of the area as unique to the State of Iowa. In general the area was considered prime for exploration by many in the scientific community.

When the backbone area was first settled, the area which is currently state park was divided into many small plots of which were used by the early inhabitants for obtaining firewood to heat their homes. With much of the surrounding terrain existing in prairie the area was the obvious choice for the supply of wood. Several stands of trees which exist in the park today predate these settlements and could be assumed to have survived the deforestation due to their sheer size or inaccessibility to horse and skid. The remaining trees and their associated flora understory served as seed stock when the demand for wood fuel products would cease in the future. Senator Willis Haskell stated during a speech in July 1921 at Backbone State Park to exemplify the state of the area at the turn of the century;

> *"Twenty years ago the Devil's Backbone was as barren as the badlands. It had been stripped of the virgin trees to satisfy firesides of the community. Only here and there were a few pines left to mark the spot which had been considered as one of the most beautiful nature freaks in all the country. Livestock had been turned in so that an unprofitable piece of land might meet its taxes. ...it has been devoted to cattle and sheep with goats turned in occasionally to eat up the underbrush."*

Haskell paints a picture of a quite barren landscape during the turn of the century as to Backbone's vegetation. Much more of the rock outcroppings were visible due to the early settlement deforestation which had occurred. Early accounts and photos of the area were able to exhibit the area as a rocky canyon.

Samuel Calvin, State Geologist during the late 1800's, traveled the Backbone area and compiled a fine photographic record of the land formations. These early photos are quit interesting and exhibit many of the features which visitors are attracted to the park to view today. It should be noted that Calvin was a fine photographer and his photographic record of early Iowa is highly treasured. Calvin's photos display many of the rock formations which are today hidden from the casual visitor by the stands of trees which have grown to impede one's view of these towering limestone structures. Calvin described the Backbone area as;

> *"Inside the Iowan area, and surrounded on all sides by the Iowan drift, are two anomalous regions that seem not to have been invaded by Iowan ice. ... One of the regions occupies the central part of Richland township and may be called the Richland highlands.... The regions in question seem to have been islands in the midst of the Iowan glacial sea."*

Protection of the Backbone due to human activity must have been on the minds of the Iowa scientific community during the early 1900's. When the opportunity to establish public areas for the common good presented itself, the unique features of the Backbone and its inherent beauty made the area a natural to establishment as Iowa's first state park.

Local involvement to reach out to the citizens of the state helped greatly in keeping Backbone in the spotlight for park development. The Travel Club of Manchester met at the "Backbone" on September 19, 1918 with soon to be appointed Board of Conservation Chairman L.H. Pammel. Pammel with his past interest in the park encouraged the group to assist in establishing the state park formation with the "backbone" in mind. A committee was appointed from the meeting to work with the local citizens of Manchester, Strawberry Point, Lamont and adjacent territory to establish the "backbone" as Iowa's first state park. Members of the committee were Mrs. E.B. Dunham, Mrs. A.R. Stearns, Mrs. Jennie Leroy, E.M. Carr and B.W. Newberry.

The State Executive Council met on December 27, 1918 in a special session for the purpose of conferring with the newly created Board of Conservation about the adoption of a general policy in reference to purchasing and improving park areas. Due to the work of the Travel Club of Manchester and the committee appointed the "backbone" area was chosen as the site for the establishment of the first state park. Appraisers for the property to be purchased were appointed during this special session by then Governor Harding. E.H. Hoyt, State treasurer at the time and final authority in land purchases, George W. Dunham of Manchester, Senator B.W. Newberry of Strawberry Point, and W.A. Abbott of Lamont were given the task of working with the local land owners to acquire the park property. The initial ground work had been laid by the Travel Club and the property was acquired in short order. It should be noted that the property to be acquired had lost most of its value with owners since crops could not be grown, and with brush and stone outcroppings making the area hard to pasture.

Pammel reported in early 1919 of the appraisal:

> *"In my visit to the Devil's Backbone last fall and in December it was impossible for me to entirely cover the area and thus comment on all of the desirable features of the area. The matter of purchasing the land has certainly been put in the hands of a most trustworthy man, Mr. Hoyt, who not only knows every foot of the land but the many springs and desirable features. He has performed his duties in an eminently and highly satisfactory way. When the land is too high three appraisers, Senator Newberry, of Strawberry Point, Judge Dunham, of Manchester, and Mr. Abbott, of Lamont, have appraised the land. The eminent fairness of these men and their good judgment puts the matter in such shape that the state will be greatly benefited by their wise judgment."*

Before the formal dedication of Backbone a temporary caretaker was hired to coordinate activities within the park. George Durham of Lamont was hired to prepare the grounds for the formal dedication. Durham lived in a cabin adjacent to the west facing limestone wall of the "backbone". Durham stated that one Sunday in August 1919 had 131 autos and 11 teams with about 800 people in attendance . The park was immediately filling its roll as a major recreation site of the state, in providing the public with a place to meet and enjoy one of the wonders of Iowa.

Plans for the dedication of Backbone was held on September 19,1919 at the Park. During this meeting the committee decided that no food would be allowed by venders but that a picnic lunch would be more appropriate. The local communities would provide the lunch dinner with Strawberry Point leading the way for distribution of the meals. The meal would be provided free to demonstrate the appreciation of the locals in establishing the first state park on this site. The dedication was initially to take place on October 1, 1919 and programs would be printed for the event.

Fall rains were quite heavy during the fall of 1919 causing roads to be impassible and wash outs within the Maquoketa river valley making maneuvering impossible. The dedication date was postponed till October 7, but was cancelled due to the continued rains which washed out bridges and trails within the low areas of the park. Mud and silt covered most of the prime picnic areas as well. Programs already printed would have to do when the weather cooperates.

The dedication was again reset for the following spring on May 28, 1920. The only road to be reopened for the dedication was from Lamont. The citizens of Lamont were to host overnight visitors from afar with lodging and the community would provide a complimentary breakfast.

Lamont, the community located west of the park by 4 miles, had declared itself to be the gateway of Backbone State Park and placed much effort into the importance of the establishment of Iowa's First State Park. Lamont prepared for the visitors which would arrive on May 28 for the dedication.

Late in the evening of May 27, 1920, a Pullman car arrived from the capital, holding the Governor and other prominent citizens. The train pulled into town with those inside sleeping in the late hours of the evening. The town was a frenzy of activity preparing for the event to follow the next day.

The women of Lamont, acting for the Commercial Club provided breakfast at 8:00 a.m. the following morning with guest of honors being Governor Harding, State Treasurer E.H. Hoyt, Board of Conservation Chairman L.H. Pammel, and other members of the Conservation Board and politicians in tow. Over 100 visitors were in attendance at the breakfast meal which was served in the Odd Fellows hall. W.A. Abbott, later to become park ranger, was master of ceremonies and welcomed the group to the area and assured the travelers that competent drivers would steer the autos into the Backbone Area since it was well known the roads were of questionable use during times of rainfall and access was rugged at best along the limestone cliffs. After breakfast the visitors made their way by auto to a meeting location near the west face of the "backbone". The caravan of vehicles from Lamont consisted of over 100 autos to carry dignitaries and those of local prominence.

Prior to the entertained group leaving Lamont, local men rose at four o'clock and worked on the roads to the park to ease the transport of those to attend the event. The men and their teams of horses were utilized to smooth the roads left rough by spring rains. Road sentries were placed to assist in giving directions and information to visitors of the day as well as direct traffic into the park.

The remaining morning was used to sightsee the park area and visit with those in attendance. Lunch was served by over 40 Women of Strawberry Point and impressed those in attendance with the hospitality and quality of food provided. Not to be left out were the Women from Manchester and the other surrounding communities who assisted in providing the fine meal.

After lunch was served the crowd gathered in and around the Pulpit Rock on the west face of the Backbone with some clinging to the "backbone" cracks and crevices to hear the speaking to come. The pulpit is elevated above the surrounding area and provided a platform to address all that were near. Adjacent to the pulpit was the cabin of the park caretaker Durham. Many were in attendance at the dedication with estimates in the 5000 range being quite accurate.

Senator Newberry was presiding over the ceremony. Mr. Newberry made remarks of the dedication of the park and outlined the ceremony to come forth. The old name of the devil's backbone was to be forever discarded and in the future the area would be known as "The Backbone State Park". Two bands played at the event. The Manchester Cornet Band and the Boy Scout Band of Hopkinton. Invocation was provided by Rev. C. H. True, a former Baptist pastor and well known resident of Clayton County. An address of welcome was given by Judge Carr of Manchester. A vocal solo was provided by Mrs. E.W. Williams with presentation of the park to the citizens of Iowa by Pammel. The Park was accepted by Governor Harding who voiced his appreciation of being present at a historic moment in providing the new public institution for the citizenry. Letters were read from Judge Dunham of Manchester, Dr. Shimek of Iowa City, and a telegram from E.R. Harlan secretary of the board of Conservation all of whom were unable to be present.

Five minute talks were also provided by State Treasurer Hoyt, State geologist George Kay, Conservation Board member John Ford of Fort Dodge, Mayor of Dubuque J. Alderson, "***The Farmer***" editor J. Jarnigan, Assistant Fish and Game Warden J. Riceville, Secretary of the Board of Health G.H. Sumner, Principal of Epworth Seminary Rev. Brown, and General Passenger Agent of the C.&G.W. Railroad A.C. Irons. The speeches were followed by a coronet solo performed by Mr. McClellan of Cedar Rapids, further words from the Governor on public schools, and the event was closed by the Manchester Band.

A quotation found in the Dedication Program are " tongues in trees, books in running Brooks, sermons in stones and good in everything" which was the theme of the time. George Bennett, field representative of the ***Iowa Conservation***, summarized the event by writing that it "was a great day, it was a great occasion, it was a great record.".

The Park had been dedicated and was ready to serve those which would visit its boundaries for years to follow.

THE 1920'S - PROVIDING ACCESS TO THE PARK

Following the dedication of Backbone State it was apparent to those who visited the need for better access by visitors to enjoy the natural wonders of the area. Access previously had been somewhat limited and much depended on the weather being dry to allow one to enter without difficulty. Road construction was initiated during the October 13, 1922 Board of Conservation meeting held in Strawberry Point. Senator Newberry presented a proposal to build a road to Trout Run (now known as Richmond Spring) from Strawberry Point and then adjoin it with the road entering from Lamont at the southern section of the park. Newberry suggested the erection of stone portals at each of the entrances to be joined. Newberry had taken the liberty of contacting the architectural firm Messrs., Crowley & Cope to design such portals. Newberry also suggested the acquisition of property to construct a road from the east into the park. Newberry was granted the authority to move forward on the proposal of said construction with the stone portals still existing to this date.

The Board of Conservation contacted E.A. Peister to assist in landscaping the park for roads which would be constructed with help from the Delaware County Supervisors as well as from the Highway Commission. The Delaware County Supervisors agreed to construct bridges in the park during 1924 making access to all areas of the park possible there after.

A concession stand was allowed during 1922 which was operated by A.D. Ownby of Winthrop. The concession provided groceries and ice cream to the park visitor near the North entrance of the Park. Since the park was prone to flooding the concession proved to be not as profitable as Ownby had hoped. They left the operation by 1924. The concession operation established a precedent for future permanent establishment in the park during the 1930's.

A permanent Park Superintendent was established in Backbone during 1922 with the appointment of Lee Y. Trower. Mr. Trower was originally hired on a seasonal basis with a salary of $100 per month. Along with Trower an honorary custodian was appointed for the North entrance area of the park. Dr. E. J. Anthony was the appointee and completed his work with no salary.

Trower's report of the park usage of 1922 reports that the park was heavily used by many. Trower stated:

> *"As custodian, I have to keep an account of the number of people who visit the park each day. I feel safe in saying we had 40,00 visitors at the park the past season, and nearly every state has been represented. There has been, on a single day, as many as 2,200 visitors, cars from 8 different states and from 22 counties of Iowa."*

Both Trower and Anthony were short term workers at the park. Anthony resigned in March of 1924 and Trower resigned in November 1924 after the Boards denial to grant him the concession since

Ownbys had refused to continue with the operation earlier that year. W.A. Abbot of Lamont was appointed Superintendent of the park early in 1925.

The summer of 1925 brought with it many construction projects to develop areas for the park visitor. Work was slowed during the early summer with a massive flood which washed all the roads out in low areas and demolished existing bridges. All were subsequently rebuilt. A road was constructed in the Trout Run area which was elevated above that of the one recently washed out to hopefully prevent a future washout occurring again.

Abbott constructed a shelter house of logs which had four ovens and was able to house 75 people. A log "Information Bureau" was also constructed in which the registration book for visitors was housed.

Abbott also assisted in remodeling the lodge into a home for the park superintendent. The lodge (presently housing the CCC Museum) located near the west entrance of the park from Lamont was constructed without the knowledge of the Board of Conservation during 1923. The lodge was modified with the assistance of Mr. Preston and Mr. Scroggs, both prison guards, and by inmates from Anamosa. The inmate labor force assisted in many other construction projects within the park during the year.

The stone portals conceived by Newberry were also constructed and completed during 1925. The portals at the North entrance are still standing from these early times.

During 1925 the Trout Hatchery which had been talked of was constructed under the supervision of W.E. Albert the State Fish and Game Warden. Concrete ponds and the hatchery building were constructed to house the trout which would be stocked in Backbone and outlying streams. Added features which Albert had constructed by E.H. Grove of spirit Lake, the contractor of the original hatchery, were the rock walls of the Richmond Spring and Stone Wall of the Hatchery. The Richmond Spring wall was constructed to retain soil from entering the spring from surrounding bluffs and to add a beautiful border to the spring. The rock wall at the hatchery was constructed to hold back flood waters which had ravaged the area earlier that summer. It was installed with a gate which could be lowered to block high water completely from the trout rearing ponds and prevent a disastrous loss of reared trout.

Visitation of the 1925 year was difficult for Abbott to determine:

> *"The registers were swept away in the flood and for weeks after, there being no place to register, it is difficult to estimate the entire attendance for the season. Our largest day was on Sunday, August 23rd, when the big attraction was the concert given by the Manchester School Band, consisting of 35 pieces. Nearly 4000 people were in attendance.*

A general plan for the landscaping of Backbone was developed during 1925. The plan was developed, with the approval of the Board Chairman Pammel, by John Fitzsimmons a landscape architect from the extension service at Ames. The plan was not implemented but marked the beginning of a major development effort which would begin during the CCC era and transform the area into one of the most developed state parks in the entire U.S.

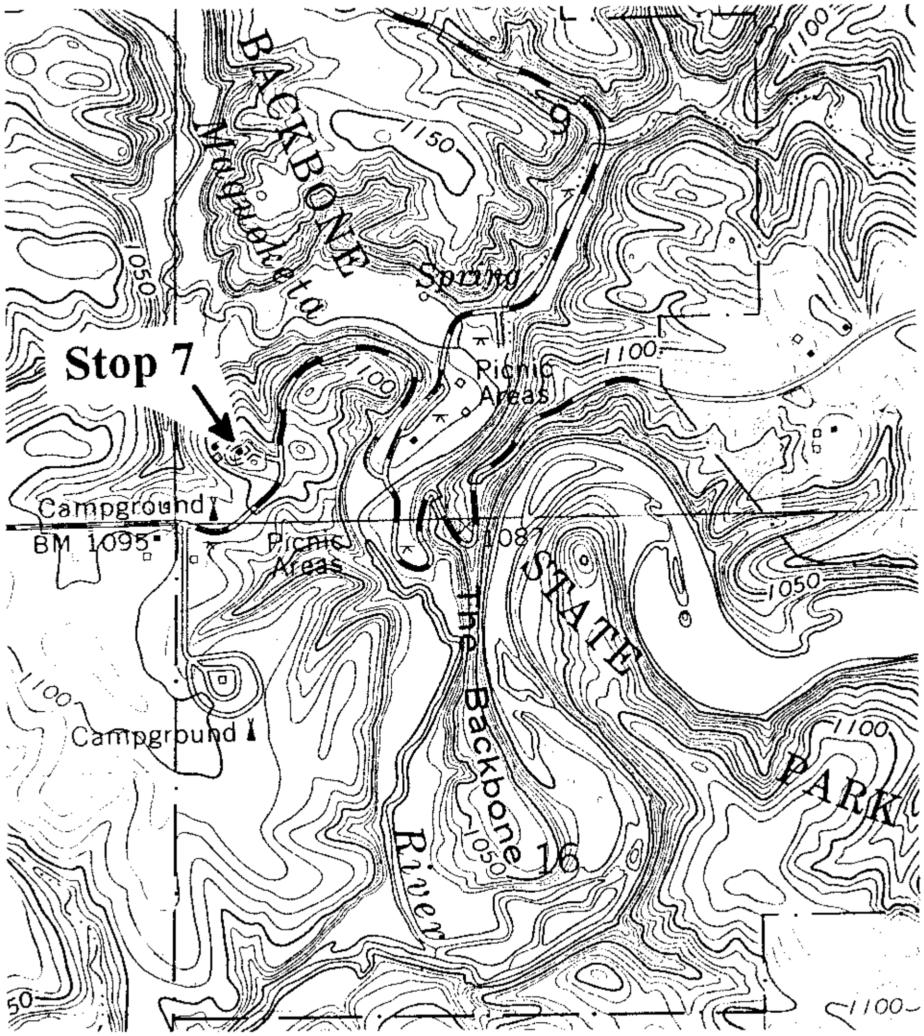
A state wide picnic was held on October 1, 1926 for the dedication of the newly constructed fish hatchery and naming of the roads which entered the park. The attendance at the dedication was estimated to be over 2500. Larger number would have attended if the weather had been better in the days preceding the picnic. The picnic was attended by Governor Hammill who accepted and dedicated the roads, Lieutenant Governor Kimball who dedicated the Fish Hatchery, State Game Warden Albert, members of the Board of Conservation, Executive Council, representatives of the Parole Board, and other state and local officials.

The picnic was a large event arranged by Mrs. E.F. Armstrong with music provided by the men's chorus from Colesburg, and the Manchester band and invocation provided by Rev. C.H. True. The picnic's purpose was for the naming of the newly established roads. The east road entering the park was named E.M. Carr Road, the west road entering from Lamont was named E.H. Hoyt Road, and the road entering from the North was named B.W. Newberry Road. The roads were dedicated to the conservation work these men had completed in the establishment of Backbone as a State Park. Large boulders were placed along these roads with name plaques. These boulders can be observed along the roads of the park today for visitors to inspect.

The hatchery was dedicated for the people of the state. The hatchery and Richmond Springs was placed under the control of the Fish and Game Commission with construction completed by the supervision of the State Game Warden Albert. The hatchery at the time was considered one of the best in the states. A plaque was placed later on the wall constructed to contain the hatchery in 1936 when a dedication ceremony named the hatchery in the name of Warden W.E. Albert.

A tree planting was established during 1928 south of the hatchery by the Daughters of the American Revolution. This tree planting is also marked with a stone and can be observed from the roadway. These White Pines have grown to a quite large size and tower over the surrounding area.

A large pavilion was in the works by 1930. The need for a large assembly hall was needed to accommodate the groups which used the area and were hampered by wet weather. Fitzsimmons was contacted to design the structure and associated buildings for the study of nature and centralizing a meeting area. The Auditorium, as it is referred to today, was the only building given authority for construction by the Conservation Board. The Auditorium was constructed near Richmond Springs and was the last in development before the Civilian Conservation Corps developed an extensive area within the park. The CCC construction dominated the park in overall transformation to the recreation area that is enjoyed today.



CCC Museum Near West Gate

The CCC Museum building was built in 1924, the first structure constructed in the park. An "unauthorized structure" the building was originally constructed as a barn, then served as the residence for the Park Ranger from 1925-1987. Following two years of remodeling, the building opened in 1988 as a museum to the work of the CCC in the park between 1933 and 1943.

Bob Schaut will present a brief discussion of CCC activities before field trip participants are released for self-guided of displays in the museum.

STOP 7. THE CIVILIAN CONSERVATION CORPS (CCC) MUSEUM AT BACKBONE STATE PARK

Robert Schaut
Iowa Department of Natural Resources
Parks, Recreation and Preserves Division
Backbone State Park
Dundee, IA 52038

FEDERAL ESTABLISHMENT OF THE CCC

Franklin Delano Roosevelt's overwhelming Presidential election victory in the 1932, coupled with the urgency of the worst economic collapse in U.S. history, opened the way for a flood of legislation in 1933. Both Roosevelt and the U.S. Congress, in trying to reduce unemployment and restore prosperity, endorsed a wide spectrum of new federal programs and agencies, most popularly identified by alphabetical titles. Roosevelt, a skillful political leader, helped win support for an unprecedented array of new services, regulations, and subsidies. He gave the name New Deal to this program, and especially to the innovative measures taken between 1933 and 1938 to counteract the effects of the Great Depression. Key among these new programs was the creation of the Civilian Conservation Corps.

Civilian Conservation Corps was established in April 1933 as part of the New Deal program of President Roosevelt. The agency, commonly called CCC, was created by the U.S. Congress for the conservation of the natural resources of the country-timber, soil, and water-and to provide employment and training for unemployed young men as long as the depression lasted.

At first the agency was officially known as Emergency Conservation Work, but when Congress extended its period of operation in June 1937, the popular name, Civilian Conservation Corps, was made official. In 1939 the agency became part of the Federal Security Agency. In June 1942 Congress, against the wishes of the president, voted to abolish the corps within 12 months; a presidential order for liquidation followed about 6 months later.

While the CCC was in operation, it provided for the enrollment of unemployed and unmarried men between the ages of 17 and 23 who were U.S. citizens. Members received a base pay of $30 per month and lived in work camps that were generally operated by the Department of War. While the agency was in operation, about 3 million men received employment on projects that included such work as reforestation, construction of fire-observation towers, laying of telephone lines, and development of state parks.

Modified from "New Deal," and "Civilian Conservation Corps," Microsoft (R) Encarta. Copyright (c) 1993 Microsoft Corporation. Copyright (c) 1993 Funk & Wagnall's Corporation

THE CCC AT BACKBONE

Backbone during the 30's was in store for some dramatic changes which would establish the park as one of the premier state parks in the U.S.. The 25 year conservation plan coupled with the Civilian Conservation Corps would allow for extensive development of parks within the state of Iowa. Development at Backbone was at a frenzied pace with most buildings being completed before the mid 1930's when soil conservation work was established as high priority in the area. The CCC work completed during the 30's and early 1940's (the last camp at Backbone was terminated in November 1941) is still a well established monument to the hard times of the depression. The extensive work completed by the CCC is well documented and would fill many pages of which will be referred for future work. Much of this work is presented in displays at the CCC Museum near the west gate of Backbone Park.

BACKBONE STATE PARK SINCE THE CCC

Once the construction was completed by the CCC, development of the park came to a standstill. The park was developed beyond what was found elsewhere in the State and much work would be needed to develop other parks to achieve what Backbone had for diversity in outdoor recreation. Backbone had been developed as a recreational playground of unrivaled status in Iowa. The work completed by the CCC was suddenly seen as a necessity to enjoy the natural resources of the park. The natural resources held within the park would become of equal importance with the development of the area for recreation when the CCC work was completed.

By the early 1970's many of the CCC buildings were in need of repairs and the trout hatchery would be moved to Manchester at the site of a Federal owned trout hatchery deeded to the state. These buildings constructed during early times were seen as more trouble than they were worth and systematic removal of several major facilities along with many small structures paved the way for new development.

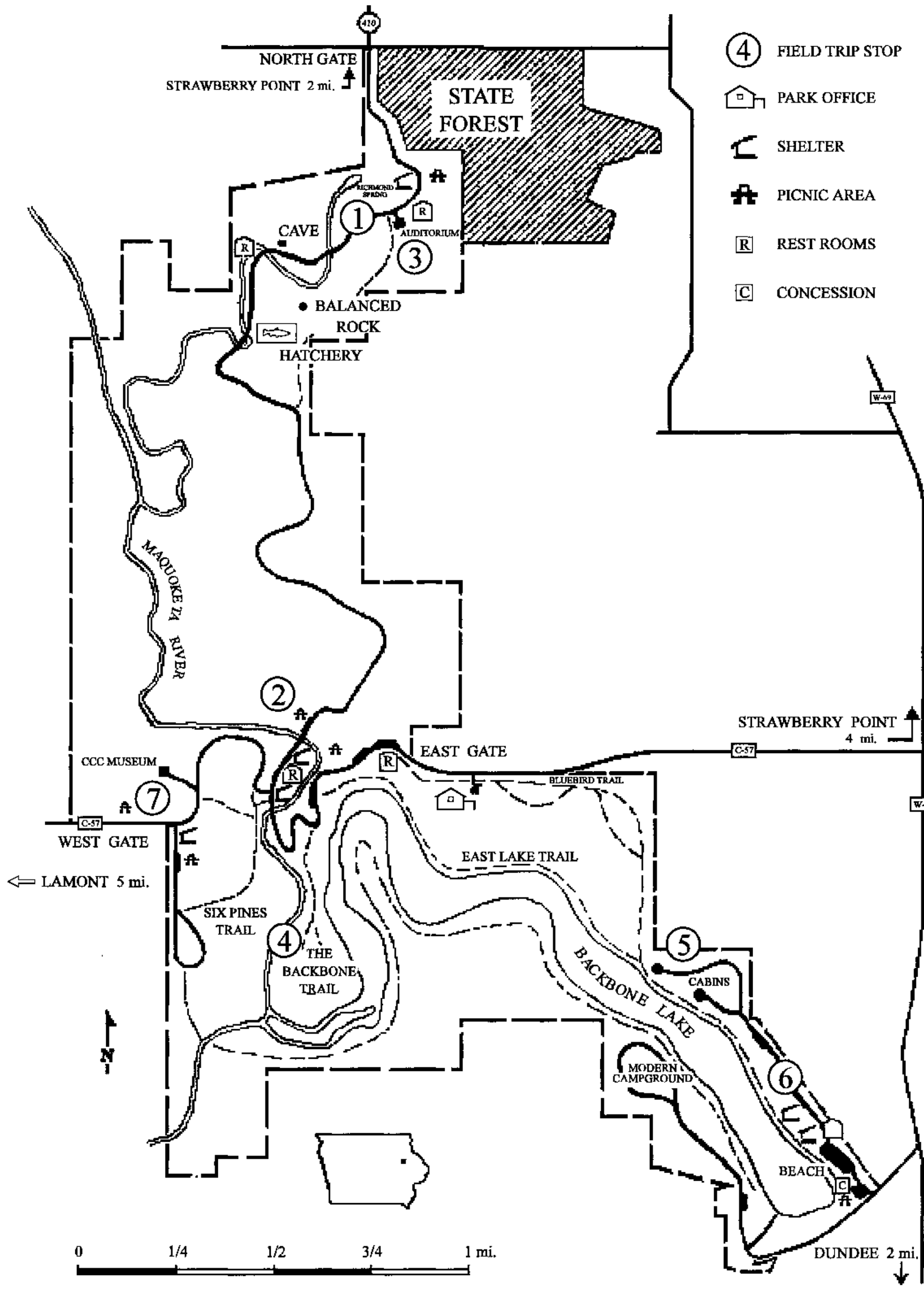
The recognition of the accomplishments of the CCC would not occur till the end of the 1980's with the establishment of a Museum to commemorate the work completed. In 1989 the museum was officially dedicated and opened to tell the story of the CCC. The museum is housed in the first building constructed within the park and later converted to a ranger's residence which housed W.A. Abbott during the 1920's. The establishment of the museum marked the beginning of a general recognition that the historic background of the parks movement is of importance to the conservation movement in the state.

CONCLUSION

Backbone State park was the example set forth to start the conservation movement in the State of Iowa. The diversity of landforms and rivers which flowed through the area made the establishment of Backbone as a natural park setting. Most of the woodlands were used by early Iowans to heat their homes and the remaining rock outcroppings were not conducive to farming. The early park was seen as a natural area to be preserved but access would be needed to allow for the peoples of the state to partake in the wonders within. The work completed by the Civilian Conservation Corps resulted in much of the development for recreational use that we can observe today.

The emphasis today on preservation of the work completed by the CCC can be compared to the same desire to preserve a valuable asset for the people that those which established Backbone as Iowa's First State Park.

Geological Society of Iowa
109 Trowbridge Hall
Iowa City, Iowa 52242-1319



BACKBONE STATE PARK

DELAWARE COUNTY