Natural Falls State Park

Resource Management Plan

Delaware County
Oklahoma
August 2008

Prepared by Deb Jordan, Re.D. and Lowell Caneday, Ph.D.
With Kaowen (Grace) Chang, Kevin Fink, Tyler Tapps, doctoral students at Oklahoma State University
Acknowledgments

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Kevin Fink and Tyler Tapps gathered and organized background information essential to the preparation of this report. They also spent hours in the field developing a protocol for gathering GPS data; they mapped all of Natural Falls State Park. Grace Chang provided the GIS support for the project and prepared the maps included in the report.

In addition, members of the general public, as visitors to Natural Falls State Park, participated in the Resource Management Plan through various input opportunities. Their assistance in providing a user’s perspective on the park was extremely valuable.

It is the purpose of the Resource Management Plan to be a living document to assist with decisions related to the resources within the park and the management of those resources. The authors’ desire is to assist decision-makers in providing high quality outdoor recreation experiences and resources for the current visitors, while protecting the experiences and the resources for future generations.

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# Abbreviations and Acronyms

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<tr>
<th>Abbreviation</th>
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<tr>
<td>ADA</td>
<td>Americans with Disabilities Act</td>
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<tr>
<td>ADAAG</td>
<td>Americans with Disabilities Act Accessibility Guidelines</td>
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<td>BP</td>
<td>Before Present [era]</td>
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<tr>
<td>CLEET</td>
<td>Council on Law Enforcement Education and Training</td>
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<td>CPSC</td>
<td>Consumer Product Safety Commission</td>
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<td>EPA</td>
<td>Environmental Protection Agency</td>
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<td>F</td>
<td>Fahrenheit</td>
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<tr>
<td>GIS</td>
<td>Geographic Information System</td>
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<td>GPS</td>
<td>Global Positioning System</td>
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<td>gpm</td>
<td>Gallons per minute</td>
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<td>Ksat</td>
<td>Saturated hydraulic conductivity</td>
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<td>LEED</td>
<td>Leadership in Energy and Environmental Design</td>
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<td>MCL</td>
<td>Maximum Contaminant Loading</td>
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<td>Mg/L</td>
<td>Milligrams per Liter</td>
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<td>NAWQA</td>
<td>National Water-Quality Assessment</td>
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<td>NEPA</td>
<td>National Environmental Policy Act</td>
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<td>NOAA</td>
<td>National Oceanic and Atmospheric Administration</td>
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<td>NPRM</td>
<td>Notice of Proposed Rule Making</td>
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<td>NRCS</td>
<td>Natural Resources Conservation Service</td>
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<td>OSU</td>
<td>Oklahoma State University</td>
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<td>OTRD</td>
<td>Oklahoma Tourism and Recreation Department</td>
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<td>OWRB</td>
<td>Oklahoma Water Resources Board</td>
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<tr>
<td>pCi/L</td>
<td>Picocuries per Liter</td>
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<td>ppm</td>
<td>Parts per million</td>
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<td>RMP</td>
<td>Resource Management Plan</td>
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<td>USDA</td>
<td>United States Department of Agriculture</td>
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<td>USDI</td>
<td>United States Department of the Interior</td>
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<td>USFWS</td>
<td>United States Fish and Wildlife Service</td>
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<td>USGS</td>
<td>United States Geological Survey</td>
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Oklahoma Tourism and Recreation Department

Mission Statement
The mission of the Oklahoma Tourism and Recreation Department is to advance Oklahoma’s exceptional quality of life by preserving, managing, and promoting our natural assets and cultural amenities.

Vision Statement
The vision of the Oklahoma Tourism and Recreation Department is to promote and enhance tourism throughout the state; protect and preserve the environment and natural resources; educate the public about Oklahoma’s people and places; provide exceptional customer service to all citizens and visitors; create a team environment in which all employees are successful, productive and valued; embrace and seek diversity in our workforce and those we serve.

OTRD Values
- Responsibility and leadership
- Respect
- Quality
- Exemplary customer service
- Balance and self-fulfillment
- Teamwork and communication
- Flexibility
- Creativity and innovation
- Coordination
- Commitment
- Integrity

(OTRD, 2008)
Chapter 1 – Introduction

Resource Management Plan: Purpose and Process

The Resource Management Plan (RMP) program purpose is to document management responsibilities to balance the use of water and land resources with recreational use in state parks; in this instance, Natural Falls State Park. As a management plan, the RMP seeks to provide guidance for long-term policy to limit adverse impacts on critical resources while providing protection and management of fish, wildlife, and other natural and cultural resources. In addition, the RMP will provide guidelines for public health and safety, public access, and a wide variety of outdoor recreation opportunities.

The purpose and scope of the RMP is to provide background information, provide descriptive and historical information of the project, identify the policies and goals governing the management of Natural Falls State Park and its incorporated resources, and summarize the plan’s components.

The ultimate purpose of the RMP is to establish a management framework for the conservation, protection, enhancement, development, and use of the physical and biological resources at Natural Falls State Park. The RMP is to:

• Provide managers and decision-makers with consistent direction and guidance for the successful management of the resources at Natural Falls State Park;
• Ensure that management of the resources is compatible with authorized purposes for Natural Falls State Park;
• Ensure that recreation experiences and facilities are compatible with environmental resources;
• Ensure that planned developments are based on public need and the ability of the environmental resources to accommodate such facilities and use; and
• Resolve issues and concerns related to management of the environmental resources.

Planning Process

The planning process for preparation of this Resource Management Plan included discussion between research staff at Oklahoma State University and management personnel from Oklahoma State Parks. In addition, the process incorporated (1) acquisition of archival information from libraries, state parks, books, research reports, and other sources; (2) interviews of state park personnel; (3) records provided by state park management; (4) input from members of the public through surveys, comments cards, and focus groups; and (5) searches of the Internet for information that expanded on other archives.

The purposes of public involvement are to inform the public and solicit public response regarding their needs, values, and evaluations of proposed solutions. Public involvement programs are designed not only to meet state and federal regulations, but also to include interested individuals, organizations, agencies, and governmental entities in the decision-making process.
Techniques used for public involvement include interviews, workshops, advisory committees, informational brochures, surveys, and public hearings. The process of public involvement is important to help strengthen the relationship between public and government agencies involved in the proposed plan. The relative success of public involvement techniques and the participation of supporting government agencies regarding the program as a whole is indicated by how well informed the public is and by how much the public has contributed to making environmentally sound, feasible decisions that are supported by a significant segment of the public. Visitor Comment Cards, telephone surveys, email surveys, and voluntary visitor blogs and web pages were utilized as sources of input for the public involvement plan for the Natural Falls State Park RMP.

The original concept in preparation of an RMP is a federal action that requires compliance with the National Environmental Policy Act (NEPA); therefore, the public involvement process must fulfill the RMP and NEPA requirements as well as other related policies. Oklahoma State Parks has committed the agency to follow a similar model at the state level for state parks.

Using several public involvement methods to gain insight into the concerns of the public and governmental agencies potentially affected by provisions of the Natural Falls State Park RMP, representatives from OSU compiled and analyzed the data. This course of action was used to gather information, ideas, and concerns regarding the different issues to be compiled and addressed to determine topics of public concern. The issues were then evaluated resulting in alternative solutions for the program.

Finally, the RMP process included integration of global positioning system (GPS) technology into Geographic Information System (GIS) software to document features and attributes within each park. This component of the process permits an on-going record of facilities, structures, and unique natural features with their respective locations, attributes, and conditions. As a result, the GPS and GIS components of the RMP process are integral to on-going implementation and application of the planning effort.

**Agencies Involved**

Oklahoma State Parks, through the Oklahoma Tourism and Recreation Department, contracted with Oklahoma State University to prepare Resource Management Plans for each of the state parks. This agreement specified the development of RMPs for Lake Eucha State Park and Natural Falls State Park during 2007 – 2008.

The RMP agreement became effective July 1, 2007 between Oklahoma Tourism and Recreation Department (OTRD) and Oklahoma State University (OSU). Following a meeting between OTRD and OSU staff all requested information, reports, and visitor comment cards were provided to OSU for review. In accordance with the RMP contract, OSU performed research services and delivered reports to OTRD concluding with a written plan for Natural Falls State Park by the end of August 2008.

The authority for the agreement between OTRD and OSU is based upon Title 74 § 2213 as authorized by Engrossed Senate Bill 823 of the 2005 session:
The Commission may contract for the study, analysis, and planning as reasonably necessary to aid in determining the feasibility of leasing, selling or privately managing or developing the property or facilities under the control of the Commission. The Commission shall be exempt from the competitive bidding requirements of the Competitive Bidding Act for the purpose of soliciting, negotiating, and effectuating such a contract or contracts.

The Division of State Parks, a unit of the Oklahoma Tourism and Recreation Department, is governed by the laws of the state of Oklahoma. These laws define the authority for the division and the context in which individual state parks are managed. Title 74 § 2214 of the Oklahoma Statutes states that the Division of State Parks shall, subject to the policies and rules of the Commission.

1. Conserve, preserve, plan, supervise, construct, enlarge, reduce, improve, maintain, equip and operate parkland, public recreation facilities, lodges, cabins, camping sites, scenic trails, picnic sites, golf courses, boating, and swimming facilities, and other similar facilities in state parks reasonably necessary and useful in promoting the public use of state parks under the jurisdiction and control of the Commission;

2. Supervise the management and use of state properties and facilities under the jurisdiction of the Commission. The Commission may adopt rules to lease concessions in any state-owned facility if the Commission deems it feasible;

3. Authorize those employees in the Park Manager job family classification series, as established by the Oklahoma Office of Personnel Management, to maintain administrative control over all facilities, programs, operations, services, and employees in the park to which they are assigned; and

4. Enforce the rules and policies governing the use of and conduct of patrons in all recreational facilities and properties of the Commission.
Chapter 2 – Project Description

About the Park
Located in Delaware County in northeastern Oklahoma, Natural Falls State Park is at the southern edge of the Ozark Plateau. Six miles west of West Siloam Springs and the Arkansas border, visitors access Natural Falls State Park one-quarter mile south of OK Highway 412 (see Figure 1). Natural Falls State Park has been held as private land, a private tourist resort, and now as a state park.

Draft Purpose Statement: Natural Falls State Park
In preparation for the development of this RMP, the research team asked park staff to evaluate several draft purpose statements, highlighting the intended focus of the park. After evaluation, staff amended one of the draft statements to serve as a working purpose statement. The staff at Natural Falls State Park submitted the following as the working purpose statement for the Park.

*Natural Falls State Park serves the state of Oklahoma in providing a quality outdoor recreational opportunity in the Oklahoma Ozarks; and by providing long-term conservation of our natural, cultural, scenic, and recreational resources. Key in these resources is the 77-foot high waterfall in the park, trail system to provide appropriate access, RV camping area, and gardens. Park staff will strive to provide quality facilities, family-oriented programs and opportunities, consistent with our mission, for both overnight camping and day use experiences.*

Physical Setting
The Oklahoma Tourism and Recreation Department acquired Natural Falls State Park in 1990, making it the newest park in the Oklahoma State Park system. It consists of 120 acres of oak-hickory-pine forest, open meadows, and pristine Ozark streams. The most unique feature of this park is the 77-foot high waterfall, which gave the park its original name, Drippings Springs State Park. To ensure that all visitors experience the water flowing over the falls, in the 1920s the owners installed a pump to recycle the water to the top; this practice continues today.
Above the falls, on the dry, rocky ridge top portion of the park are post oak, blackjack oak, and grasses, which struggle to survive on the thin soil. An entirely different plant community exists in the canyon at the base of the waterfall. A dense forest of maples, chinquapin, white oak, flowering dogwood, redbud, sassafras, coral berry, spicebush, and pawpaw blanket the cool forest floor while the waterfall creates a moist environment where ferns, mosses, and liverworts thrive.

Moving water forms caves and sinkholes in the limestone rock providing shelter for many species of wildlife, and special protection for many species of bats and salamanders. An observation platform overlooks the falls, and a boardwalk with viewing deck is located at the base of the falls in the grotto area.

Natural Falls State Park is a mix of natural features and recreational development. The park provides a campground that accommodates RV and tent camping; it also offers hiking trails and a formal gardens area. Other recreational facilities include a multi-purpose center, group picnic shelter, open playing field, and various play structures.

History
Natural Falls State Park has a long history as private property and a relatively short history as a state park. Both are influenced by the history of the surrounding area; therefore, a brief history of Delaware County is provided, followed by park-specific information.

Delaware County History
Delaware County lies on the western slopes of the Ozark Plateau, an area of forests, prairies, and farmland (see Figure 2) (The Nature Conservancy, 2008). The Grand River and Elk River are the major watercourses in the county’s northern portion, while Flint Creek and the Illinois River drain the southern section. The Ozark limestone holds limited oil and minerals, but provides an abundant supply of water. The total land and water area of Delaware County is slightly more than 792 square miles.

Researchers have documented at least three different periods of prehistoric peoples in Delaware County. By 2004 twenty-three Archaic, seventeen Woodland, and sixty-three Eastern Villager archaeological sites had been tested. In 1939, before Grand Lake filled, University of Oklahoma
archaeologists excavated along Grand River and Honey Creek, uncovering many artifacts. The sites, similar to the Hopewell Culture that resided in the Kansas City, Missouri area 2000 to 1400 years ago, are now under the lake. In more modern times, few American Indians lived in the present county until the federal government began relocating tribes (Brooks, 2005).

In approximately 1820 a group of Delaware who had befriended the Cherokee against the Osage settled Delaware Town. This town was located approximately two miles south of present Eucha on Spavinaw Creek and now lies under Lake Eucha. The Cherokee named the surrounding area the Delaware District. Beginning in 1828 the Western Cherokee were relocated from Arkansas, settling mainly outside future Delaware County. This was in the southern part of the region that later became the Cherokee Nation. In 1832 the Seneca from Ohio were removed to Indian Territory into lands that extended into present northeastern Delaware County. Some of the Eastern Cherokee arrived in 1836 and 1837, but the main body came late 1838 into 1839.

Delaware County was created at statehood in November 1907. As the only incorporated town in the county at statehood, Grove was designated the seat of government. However, a movement soon emerged to relocate the county seat to a central location. Those who supported the move banded together, found a place on Jay Washbourne’s allotment, platted a town, won a vote to make Jay the county seat, and built a courthouse there. After a legal fight, a judge ruled in favor of the Jay plat, and in 1912 the county records went into the Jay courthouse.

At the turn of the twentieth century subsistence farming served as the principal occupation in the region. Much changed in the century’s first two decades. Better transportation, refrigerated railroad cars, new farm equipment, and agricultural education brought improvements. The value of dairy products increased almost $60,000 in ten years. Egg production increased 60% between 1919 and 1929. Over time, labor-intensive row crops and grains gave way to cattle. In 1920, more than 2,100 farms with 257,671 acres existed in the county. This held steady until the 1960s, when the number began decreasing. In the 1970s poultry became a key product in the region. In 1997, more than 1,303 poultry farms covered 364,620 acres. The value of all agricultural products sold that year was $94 million, approximately two-thirds of which were poultry products.

Three lakes changed the face and the economy of Delaware County. In 1924 the city of Tulsa completed a water-supply dam at Spavinaw on Spavinaw Creek in Mayes County. Lake Spavinaw impounds water into Delaware County. Although small, the lake began to attract weekenders and day-trippers for recreation. In 1940, a dam on Grand River was completed, and Grand Lake O’ the Cherokees was filled. Grand Lake sprawls north across Delaware County into Ottawa County. Creation of the lake displaced hundreds of people, covered roads, and necessitated relocation of a number of cemeteries.

Tulsa’s growing need for water caused it to revisit Spavinaw Creek, and in 1952 an upstream dam was completed, creating Lake Eucha. It became a popular fishing and recreation area for people in the region. The lake inundated the Cherokee town of Eucha, the home of Cherokee Chief Charles Thompson, or Oochalata, who was buried there. The town and the cemetery were relocated.

After World War II a boom began, and tourism and retirement became big business. In 1965, Green Country, Incorporated formed to coordinate promotion and development of sixteen
northeast Oklahoma counties, including Delaware County. In 2000, the three largest occupational groups, each at 23% of the labor force, were management, professional, and related occupations; production, transportation and material moving occupations; and sales and office jobs. Service occupations involved 16% of the population, while farming and related jobs involved only 2% of county residents.

Rail access assisted community growth over the years. In 1896, Congress authorized the Arkansas Northwestern Railway to build a line from Southwest City, Missouri, northwest to the Kansas line between Baxter Springs and Chetopa. Under the name of the Arkansas and Oklahoma Railroad, a line was built from Rogers, Arkansas, to Grove, reaching there in 1900. The next year, the St. Louis and San Francisco Railway bought the line, which never extended beyond Grove, and abandoned it in 1940. In 1912-13 the Kansas, Oklahoma, and Gulf Railroad built tracks through the region to connect Kansas and Texas. Upon entering Delaware County, the line looped west and then southwest, following the west bank of Grand River and exiting into Craig County. In 1912, the town of Bernice was platted on both sides of the railroad near the crossing of Horse Creek. Many businesses in Needmore, two miles east, moved to Bernice. When Grand Lake was built, Bernice relocated to higher ground on the west side of Horse Creek, and some of the railway grade was moved. The line was abandoned in 1966, and the railway grade, including the Horse Creek Bridge, became State Highway 85A.

In 1910, Delaware County reported a population of 11,469; only five counties had fewer people. This did not change appreciably until 1970 when the population surged. The 2000 census recorded 37,077; more than the population in 59 other counties in the state. In 2004, Census reports revealed that while rural counties were losing population, Delaware County was the fifth fastest growing in the state. In addition to tourism, a tight labor market, aggressive action to attract employers, and a growing economy in adjacent northwest Arkansas contributed to these changes.

Since the surge of whites into Indian Territory in the last decades of the nineteenth century, whites (non-Hispanic) have outnumbered other racial/ethnic groups in the region. In 1900 the census of Indian Territory indicated that 77% of the Delaware County population was white and 13% was American Indian. In the 2000 census, 70% of residents were recorded as white (non-Hispanic) and 22% were noted as American Indian.

Several recreation areas and historic sites are located within the county. Just south of Lake Eucha is the 14,316-acre Spavinaw Wildlife Management Area. State parks in the region include Honey Creek, Bernice, Lake Eucha, and Natural Falls. HarBer Village, a large museum, is west of Grove and the Moravian Springplace Mission is near the town of Oaks. Southwest of Maysville, Arkansas, is the site of Fort Wayne. Six properties have been listed in the National Register of Historic Places. Polson Cemetery, west of Southwest City, Missouri, is the burial place of Major Ridge, John Ridge, and Stand Watie. Northwest of Grove in the Seneca-Cayuga area is the still-active Splitlog Church built by Mathias Splitlog. The Hildebrand-Beck Mill stands on Flint Creek just north of U.S. Highway 412 east of Kansas, Oklahoma. Finally, the Talbot Library and Museum in Colcord displays artifacts and provides genealogy resources (Stauber & The Oklahoma Historical Society, 2007).
Natural Falls State Park History

The area in which Natural Falls State Park is situated was originally known as Dripping Springs, in Indian Territory. According to the Delaware County Historical Society (1974), the first known formal designation of the property was in 1888 when Jefferson and Caleba Carnes moved to the 170-acre site. Jefferson Carnes was a citizen by blood of the Cherokee Nation and was allotted the property by the Cherokee Nation, Indian Territory. In 1907, a homestead deed was given to Carnes, and in 1908 Secretary of State, James R. Garfield, approved it. The Carnes family built a house on the property and constructed a ‘windlass’ to collect water for daily use. A trough was built below the main spring and water ran from the trough into pails that were then drawn to the top by way of cables. In addition, the family excavated an entrance into another spring and built a cistern where water was collected. Milk, butter, and other items needing refrigeration were stored in this structure.

People visited the Carnes for their company, and to experience the springs and relax. Visitors to the springs would take a train from various locations to Siloam Springs (approximately 14 miles east), and complete the journey to Dripping Springs by horse and buggy. Records exist reporting that students from nearby eighth grade graduating classes visited the springs for picnics and class trips.

In 1918 Richard and Sabra Rankin purchased the Dripping Springs property, and one year later P.G. and Ervilla Airy purchased a one-half interest. Together, the Rankins and the Airys developed the property for visitors. They built the original swinging bridge, which at 152 feet long and 75 feet high spanned the canyon and waterfall.

In addition to the bridge, the Rankin-Airy families constructed a small store (named the Confectionary, and seen in Figure 3) and a stone wall at the entrance to the walkway to the falls. The
stone wall stands in the same location today. To accommodate the many visitors who were arriving at the Springs, the families erected ten ‘modern’ cottages on the hill across from the swinging bridge and added a large, lighted entrance sign, which led to the falls: ‘Dripping Springs.’

During this time, the owners had two small dams built—one at the base of the main springs so people could walk across and view the springs, and the other downstream from the falls. The dam at the main springs is below and southeast of the falls; it can be viewed from the current-day steel span bridge. The downstream dam, to the southwest of the falls, created a small pond called the swimming pool, where visitors could relax in the cool spring water.

Amenities included a nearby bathhouse and diving board on the downstream dam. To help defray costs, admission to the springs and access to the bathhouse and swimming pool was ten cents. Also during this period, the main house was converted into a six-bedroom hotel and named ‘The Wayside Inn.’ At the front of the inn, a water garden with two fountains made out of native stone was constructed. While the exact date is unknown, it was during this time that a Ram Pump (see Figure 5) was installed below the falls to pump the water back to the top, thereby providing a continuous flow of water over the falls.

After ten years of Rankin-Airy ownership, in 1927 Henry and Louella Echols purchased Dripping Springs. They enlarged the store and operated it as a filling station and grocery store. At this time many visitors traveled to the vacation spot in their Model A Ford cars. Three years later the State of Oklahoma purchased a small parcel of land (fifty-five hundredths of an acre) to augment the right of way for Highway 11. Six months afterward, Texaco leased the filling station and grocery store. And, in 1937 the State purchased another small parcel of land (forty-eight hundredths of an acre) for construction of Highway 33.

Louella Echols was known as ‘the heart of the operation at Dripping Springs’ and after she died in 1942, Dripping Springs went into estate. During this time the hotel was torn down and highway construction was completed. Two years later, in 1944, Clint and Kathleen Smith purchased 120 acres of the property for private use. The Smiths leased the store to the Davidson family, built a barn, and raised cattle and hogs. The Smiths moved six of the cottages from the hill behind the swinging bridge to behind the store, and sold four of them.

In 1950 the Southwestern Gas and Electric Company purchased an easement and perpetual right to erect, operate, and maintain a line of poles, wires, and fixtures on the property across from the swinging bridge. Later the same year, Richard and Ruth Wilkerson purchased Dripping Springs. They remodeled the store, sold gas and tires, and rented the remaining cabins. Throughout the 1950s and early 1960s, the Wilkersons allowed the Life Science and Botany classes from the University of Tulsa to visit Dripping Springs to study plant morphology. Students examined mosses, liverworts, and hunted for fossils.
Changing hands once again, in 1964 Guy and Helen Osburn purchased Dripping Springs to operate as a private resort. They opened and operated a café and curio shop; sold gas, oil, and fishing gear; and put in a new well. The Osburns raised Rainbow Trout in the pool by the main springs and charged a one-dollar admission to view the springs and engage in other recreational activities.

After camping at Dripping Springs while on vacation, in 1972 David and Charlene Gadient purchased the property. They remodeled and enlarged the store, and moved the cabins to be among the trees. The Gadients also restored the swinging bridge, which had fallen into disrepair. One year later, a Safari franchise campground opened at Dripping Springs; it provided ‘deluxe accommodations’ for overnight guests. The campground included 98 camper sites with full hook-ups, wilderness sites, swimming pool, showers, restroom, a common dining room with fireplace, recreation center, playground, picnic tables and grills, laundromat, and sanitary disposal station. Other Dripping Springs facilities included a gas station, grocery store, gift shop, and restaurant. In the early 1970s a lighted cement walkway was added, allowing visitors easy access to an observation deck to view the falls day or night. And, in 1973 several scenes for the movie, “Where the Red Fern Grows,” were filmed near the springs and waterfall.

Little information was found regarding the ownership and use of Dripping Springs between 1974 and 1985. It is evident, however, that the various owners had difficulty in maintaining the many facilities and structures on the property. In 1985, the owners claimed bankruptcy and sold the 120-acre land parcel to the State of Oklahoma to establish a state park (Klein, 1990). In 1997, in anticipation of the park opening the Oklahoma Legislature approved a $3.00 per vehicle entrance fee pilot program for Natural Falls State Park. The law states,

The Division of Parks may establish until July 1, 1999, a pilot entrance fee program and rates for entry in Natural Falls State Park in Delaware County. All monies collected shall be deposited to the Oklahoma Tourism and Recreation Department Revolving Fund; provided 100% on such monies collected shall be spent on repairs, upkeep or improvement of park areas in Natural Falls State Park in Delaware County. Within sixty (60) days of the end of the pilot program, the Division shall prepare an evaluation of the program and recommendations for continuation, termination, or expansion of the program. The evaluation shall be submitted to the President Pro Tempore of the Senate and the Speaker of the House of Representatives. Ch. 157 § Section 1811, p. 931

Then, in 1997, after demolishing, refurbishing, or replacing the damaged areas and facilities, Dripping Springs State Park opened to the public. In 1998, due to liability concerns, the swinging bridge was replaced with a 150-foot long steel span bridge 120 feet above the falls. In addition, an 80-foot long and a 49-foot long bridge were constructed across the creek, downstream of the falls (Stahl, 1999). In the same year, to minimize confusion with an existing state park named Dripping Springs in Okmulgee, the Oklahoma Legislature changed the name of the park to Natural Falls State Park (1811.5A of Title 74).

Community and Regional Context
As indicated earlier, Natural Falls State Park is located in Delaware County in northeastern Oklahoma, approximately 14 miles from the Arkansas border. As seen in Figure 6, the park is
situated in the midst of private, unrestricted land holdings. The following discussion presents details related to the community and regional setting, as well as the environment surrounding the park.

**Regional Entertainment Facilities**

One-quarter mile east of Natural Falls State Park on the north side of US Highway 412, is the West Siloam Speedway. It has been open since 1987 and was refurbished in 2005. The track is a one-quarter mile red clay oval track and the owners operate a variety of dirt-car races: pure stock, mini stock, factory stock, super stock, 360 modified, limited late model and modified cars; they also offer bike racing for youth. Racing is scheduled from March to October each Saturday afternoon and into the night hours. The facility opens at 3:00pm, practice begins at 5:00pm, and the races start at 7:00pm. The noise from the Speedway is clearly heard at Natural Falls State Park and can continue until midnight or later.

Also to the east of Natural Falls State Park, a Cherokee Casino and Hotel is under construction in West Siloam Springs. It is located approximately six miles from the park at the junction of Highways 412 and 59. As of August 2008, the café, a dance bar, and a portion of the casino are open and available to visitors 24 hours each day. Upon completion, the 50,000 square foot casino and hotel is anticipated to cost $83 million. The hotel will be an 8-story, 140 room lodging facility; it is being built within walking distance of the casino.

**Demographic and Socioeconomic Conditions**

The United States Census Bureau reported that in 2006, the Oklahoma population estimate was 3,579,212; a 4% increase from April 2000 (2008). The size of Oklahoma is 68,667 square miles; thus, approximately 50 persons per square mile reside in the state.

Based on a 2006 estimate, 40,061 persons reside in the 741 square mile area of Delaware County—an 8% increase in population size since 2000 (Census Bureau, 2008). Like the state, this equates to approximately 50 persons per square mile. Delaware County includes an additional 51 square miles of surface water.

Small rural towns with populations that range from approximately 200 persons (Leach; 9 miles southeast) to a population of 925 (West Siloam Springs; 6 miles east) surround Natural Falls State Park. The nearest city with a population of more than 50,000 is Fayetteville, AR (37 miles to the east). The closest large city in Oklahoma with more than 200,000 residents is Tulsa, which is 86 miles to the west.
As of 2004, the median income per household in Delaware County was $30,385 (the statewide median income was $37,109), and 16% of residents live below the poverty line (state poverty rate = 14%). In general, the small towns surrounding Natural Falls State Park have high poverty rates with between 18% and 31% of the population below the federal poverty line.

In terms of race/ethnicity, 71% of the Delaware County population indicated they were White, non-Hispanic. The African American and Asian populations were least represented at 0.5% and 1%, respectively. Statewide, African Americans make up 8% of residents while Asians constitute 2% of Oklahoma inhabitants. The largest ethnic minority group in Delaware County is comprised of American Indians (multiple tribes and nations) at 22% of the population; 8% of the state population is American Indian. Only 3% of the County population reported themselves as Hispanic or Latino in origin, and almost 7% reported two or more races (twice the number statewide) (City-data, 2008). In the small nearby communities, the percentage of American Indians in the population ranges from 16 to 86% of residents. In Tulsa, 27% of the population reported American Indian ancestry.

Thirty-one percent of Delaware County residents are below the age of 18, and 19% are over 65 years old. These numbers exceed the statewide percentages of individuals in these age groups (22% and 13%, respectively). City Data (2008) reports that the median age of residents is 41 years old and that 51% of the population are females. Almost 23% of county residents report having a disability, which is slightly higher than across the state (19%).

Delaware County is similar to the State of Oklahoma in education levels: 75% of the persons in Delaware County have graduated from high school; the State of Oklahoma claims an 81% high school graduation rate. Thirteen percent of Delaware County residents who are 25 years or older have earned a Bachelor’s or graduate degree.

Typically, private employment is more common than government or self-employment work. In 2005, private wage work accounted for 74% of all work in Delaware County, while the government provided 13% of the county jobs. Slightly fewer than 13% of Delaware County workers are self-employed. The manufacturing industry employs 21% of all workers, social services provides work for 17%, and, 12% of county residents work in retail business. The unemployment rate in Delaware County in 2004 was 5%, which is the same as reported for the state.

The most common types of crime in Delaware County, as reported by the Sheriff’s office in 2005, are burglaries and thefts (244 and 219, respectively). In 2005, no murders were reported, while 10 rapes were reported (City-Data, 2008).

**Cultural Resources**

Delaware County is fairly rich with cultural and historic resources. More than 300 prehistoric and historic archeological sites have been documented, and more than 1,000 federally funded sites have been surveyed. Many more archeologically important sites are believed to exist, but no funding exists to explore the various locations.

The various excavated and documented sites indicate the existence of individuals from the Paleo period (12,000 – 10,500 before present (BP)), Dalton period (10,500 – 9,500 BP), Archaic period (9,500 – 2,000 BP), Woodland period (2,000 – 1,100 BP), Mississippian period
(1,100 – 300 BP) and Plains Village period (499 – 0 BP). In Delaware County, archeologists have found evidence of early existence in “Indian mounds.”

To protect archeological sites on state-owned land, in 1985 the state legislature passed the Oklahoma Antiquities Law (OK Stat 30:361). Only trained researchers who have been issued a permit from the State Archeologist may conduct excavations on state lands. All artifacts recovered from excavations on state lands must be deposited in an Oklahoma museum or repository. The policy of the State Archeologist, the State Historic Preservation Officer, and the Oklahoma Museum of Natural History is to make archeological materials available to qualified researchers for study, and to responsible museums for display (Brooks, 2005).

More recently, the Ozarks are the home of several American Indian nations and are famous for being the relocation site for the Cherokee (from the Carolinas and Georgia) and the Choctaws (from Georgia and Florida) at the end of the “Trail of Tears” forced relocations in the early 1800s. Now these nations have a significant influence on the past and present culture of the area and many of the area residents claim American Indian ancestry. Other American Indian nations in the region include the Creek, Delaware, Eastern Shawnee, Miami, Modoc, Muskogee, Osage, Ottawa, Peoria, Quapaw, Seneca-Cayuga, and Wyandotte.

The Ozarks also are significant for their history involving the westward expansion of European-American settlers and freed African-Americans after the Civil War. Numerous historic sites dot the region such as homes, buildings, cemeteries, farmsteads, and settlements. Significant sites within the project area include original tribal government locations, Chief Sequoyah’s home, Tsa La Gi Cherokee Village, Fort Gibson Stockade, the Tri-State Mining area in Ottawa County, and a number of local museums associated with early settlement and timber industry. Archeological sites may be extant throughout the region, wherever encampments of early indigenous people occurred.

**Land Use**

Rural land uses still dominate the seven-county Ozark Plateau area. Livestock grazing, cropping (especially sorghum, wheat, soybeans, and hay/alfalfa), and a newer phenomenon: confined animal feeding operations for poultry and hogs, are typical agricultural activities throughout the area. Forest products from timber operations are a source of income for some landowners (see Table 1).

Since the early nineteenth century, domesticated chickens and turkeys have been a mainstay in Oklahoma. The birds were brought to Indian Territory by relocated southeastern American Indians, by farmers working on reservations, by troops stationed at forts, and by licensed traders, white intruders, and legal non-Indian settlers. After 1889 and the various land runs and lotteries, most Oklahoma Territory newcomers who engaged in agriculture transported a flock with them. In the early 1900s agricultural extension agents and the Oklahoma Board of Agriculture pushed rural residents to pursue poultry production, claiming that the state’s temperate climate suited the industry.
### Table 1. Delaware County Land Use – Agricultural (USFWS, 2002)

<table>
<thead>
<tr>
<th>Land Use Description</th>
<th>Acres</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delaware County</td>
<td>505,737</td>
<td>1.13</td>
</tr>
<tr>
<td>Cropland</td>
<td>12,293</td>
<td>2.43</td>
</tr>
<tr>
<td>Orchards, groves, horticultural crops</td>
<td>217</td>
<td>0.04</td>
</tr>
<tr>
<td>Rangeland – Open grasslands</td>
<td>1,324</td>
<td>0.26</td>
</tr>
<tr>
<td>Rangeland – Post Oak/Blackjack; High density; Canopy &gt; 35%</td>
<td>11,937</td>
<td>2.36</td>
</tr>
<tr>
<td>Pastureland</td>
<td>194,466</td>
<td>38.45</td>
</tr>
<tr>
<td>Pastureland – Brushy; Canopy &gt; 20%</td>
<td>158</td>
<td>0.03</td>
</tr>
<tr>
<td>Forest – Shortleaf Pine/Oak (mixed forest)</td>
<td>49</td>
<td>0.01</td>
</tr>
<tr>
<td>Forest – Oak/Hickory/Associate species; &gt; 70% deciduous</td>
<td>226,958</td>
<td>44.88</td>
</tr>
<tr>
<td>Forest – Bottomland Hardwoods</td>
<td>20</td>
<td>0.00</td>
</tr>
<tr>
<td>Forest – Post Oak/Blackjack Oak</td>
<td>761</td>
<td>0.15</td>
</tr>
<tr>
<td>Urban Ranchette – House and lot/Tract 2 to 20 acres</td>
<td>40</td>
<td>0.01</td>
</tr>
<tr>
<td>Farmstead greater than 20 acres</td>
<td>40</td>
<td>0.01</td>
</tr>
<tr>
<td>Bare exposed rock</td>
<td>30</td>
<td>0.01</td>
</tr>
<tr>
<td>Quarries and gravel pits &gt; 5 acres</td>
<td>10</td>
<td>0.00</td>
</tr>
<tr>
<td>Cemetery</td>
<td>49</td>
<td>0.01</td>
</tr>
<tr>
<td>Pasture – Bermuda grass</td>
<td>20</td>
<td>0.00</td>
</tr>
<tr>
<td>Landfill – active</td>
<td>10</td>
<td>0.00</td>
</tr>
<tr>
<td>Urban/Built up land</td>
<td>23,252</td>
<td>4.60</td>
</tr>
<tr>
<td>Water (lakes/ponds)</td>
<td>33,608</td>
<td>6.65</td>
</tr>
</tbody>
</table>

After World War II the methodology changed for Oklahoma’s poultry industry. In the mid-twentieth century Arkansas broiler chicken-processing plants, which capitalized on advancing technology, such as refrigerated trucks, began to expand into eastern Oklahoma. These companies used a vertical integration system, controlling all facets of production and contracting with area farmers to raise the birds. The parent company or subsidiaries provided its farmers with chickens, insurance, medication, supervision, feed, and the market, while the farmer contributed the buildings and labor. By 1961 Oklahoma ranked sixth in the nation in poultry and egg production value (O’Dell & Oklahoma Historical Society, 2007).

Tourism, including hunting and fishing, stimulate recreational developments including resorts, campgrounds, lake marinas, vacation homes, and associated support services. A newer trend in the Ozarks is residential retirement development. Retirees are attracted by the relatively inexpensive land prices and the desirable esthetics of the rural, rolling wooded hills, and small town atmospheres. The increasing population growth in the region is also stimulating changes in land use from agricultural to urban development uses, such as residential, commercial, and industrial development, primarily near the larger towns and cities.

### Recreational Use

The public participates in hunting, fishing, hiking, camping, nature observation, river floating, and cave exploration in the area surrounding the park. Deer, turkey, squirrel, raccoon, bobwhite quail, and rabbit are the most commonly hunted animals. Some waterfowl hunting occurs in nearby lake and wetland areas. Fishing and boating (particularly canoeing and kayaking) are popular in the larger regional streams, rivers, lakes, and reservoirs.

The Illinois River is designated as a scenic river by the Oklahoma Scenic Rivers Commission and draws large numbers of outdoors people each year. The river is accessible within two
miles of the park, and several canoe/kayak outfitters may be found within 15 miles of the park. Park staff estimate that 5% to 10% of those camping in Natural Falls State Park float nearby sections of the river during their stay.

Caving is popular wherever caves are accessible. Serious cavers may, or may not, belong to several grottos (local chapters of the National Speleological Society), or other organized caving groups in the region. In addition, casual visitors often visit accessible caves. Most serious cavers recognize, appreciate, and try to minimize their impacts on cave formations and resources. Vandalism to caves and disturbance to the animals and formations in the caves from casual, and even malicious, visitors is a serious concern for those who appreciate and study cave resources.

Threats to fish and wildlife habitats include disturbances to cave animals and other cave resources by humans, clearing for new recreational sites, and contamination of underground water through drainage from septic systems, debris and trash dumping in sinkholes and runoff from concentrated animal feeding operations. Highways, power line and pipeline right-of-way construction, and cave commercialization also impact these resources. Human disturbance to cave animals is presently the biggest threat to the natural resources in the region (USFWS, 2002).

Natural Resources in the Park

Climate and Air Quality

Natural Falls State Park lies within the Northeast Climate Division of Oklahoma and is classified as humid subtropical due to its mild winters and hot summers. Precipitation during winter months may include rain and snow, while summer months include thunderstorms and, rarely, a tornado. From 1950 to 2005, Delaware County recorded 30 tornadoes; the County averages 48 to 50 thunderstorm days per year (Oklahoma Climatological Survey, 2008).

Average annual temperatures for Delaware County are 57 degrees to 60 degrees Fahrenheit (F). During the coldest months, average temperatures range from 33 degrees to 36 degrees F, although a few days each year will drop below freezing. July is the hottest month for Delaware County and temperatures vary between 79 and 82 degrees; occasionally the temperature will rise above 100 degrees F (OK Climatological Survey, 2008).

The mean annual precipitation for Delaware County is 48.6 inches, and ranges from 45 inches to 51 inches. Of that precipitation, approximately 10 to 12 inches occurs as snow. Typically, the average first freeze date is between October 22nd and October 31st.

Air quality in the Ozark Plateau is generally excellent because of its primarily rural nature. Scattered sites may have lesser quality air due to local industries and urban concentrations of
vehicles. Dust from unpaved roads is a scattered local problem (USFWS, 2002).

**Topography**

The entire Ozark Plateau is within an area of rolling hills and deciduous forests. These rolling hills vary in elevation within Delaware County as demonstrated by several elevations reported for the county. At West Siloam Springs, approximately six miles east of Natural Falls State Park, the elevation above mean sea level is recorded as 1100 feet. The nearby town of Twin Oaks is 1132 feet above sea level. The confluence of the Illinois River and Flint Creek is approximately 4 miles south of Natural Falls State Park and is 851 feet above sea level (all elevations from USGS). The elevations at Natural Falls State Park range from approximately 850 to 750 feet above sea level.

**Geology**

The Boone Groundwater Basin lies along the southwestern flanks of the Ozark uplift, a structural dome that covers about 40,000 square miles in Missouri, Arkansas, and Oklahoma (Osborn, 2001). The regional dip is westward and averages about 15 to 20 feet per mile. Rocks along the margin of the uplift are folded and broken by faults. Most of the faulting occurred during middle Pennsylvanian time as a result of the uplift (Osborn, 2001). One of the most prominent faults is the Seneca fault, which begins in Missouri and extends southwestward across Ottawa County, northwestern Delaware County and diagonally across Mayes County. It is part of a graben made by two faults, and is sometimes called a syncline.

A graben is the result of a major drop in a block of land producing a valley with a distinct scarp on each side. Graben structures often occur side-by-side with horsts. Horst and graben structures are indicative of tension in the geological structure and stretching of the earth’s crust. Grabens are produced from parallel normal faults, where the hanging wall drops and the footwall rises. The faults typically dip toward the center of the graben from both sides. Horsts are parallel blocks that remain between the grabens. The bounding faults of a horst typically dip away from the center line of the horst.

The basement material underlying the Boone Groundwater Basin consists of volcanic and granite rocks of Precambrian age. The Precambrian surface is very irregular; depth to basement ranges from zero, where it outcrops, to as deep as 3,000 feet (Christenson et al., 1994; Imes & Emmett, 1994 as cited in Osborn, 2001). Overlying the Precambrian basement are the Cambrian-age Lamotte Sandstone, Reagan Sandstone, and Doe Run Dolomite.

These rock units are overlain by a thick sequence of water-bearing dolomite, limestone, and sandstone formations ranging in age from Late Cambrian to Ordovician. The primary water bearing formations are the Gasconade Dolomite, the Roubidoux Formation, and the Jefferson City and Cotter Dolomites. The Cotter Dolomite crops out around Spavinaw Lake. The Burgen Sandstone rests without uniform conformity upon the Cotter Dolomite, and produces an outcrop south of Lake Eucha, along the Illinois River.

The majority of the basin lies within the Springfield Plateau section of the Ozark Plateaus province, where Mississippian age rocks crop out. The Ozark Plateaus province is a geologic uplift that rises above surrounding lowlands. Erosion has cut the limestone and cherty limestone, forming a rugged topography with deep, v-shaped valleys separated by narrow, flat-topped ridges. The northwestern portion of the basin, west of the Spring and Grand rivers, lies
within the Osage Plains section of the Central Lowland province. Younger, late Mississippian and Pennsylvanian-age rocks consisting of soft shale interbedded with sandstone and limestone underlie the Osage Plains. Erosion of these rocks has produced a gently rolling surface interrupted by low east-facing escarpments and isolated buttes capped by resistant limestone and sandstone (Christenson et al., 1994; Marcher & Bingham, 1971 as cited in Osborn, 2001).

Economic mineral resources in the area include limestone, shale, cement, tripoli, sand, and gravel. Oil and gas are also produced, but not in the major quantities as in other parts of Oklahoma.

**Hydrology**

The major rivers that drain the basin are the Grand (Neosho) River, the Spring River, and the Illinois River. The Grand River is usually called the Neosho River above its confluence with the Spring River, and the Grand River below the confluence. The Neosho River begins in Kansas and flows south and southeasterly, joined by the major tributaries of Labette Creek, Spring River, Spavinaw Creek, and Pryor Creek before it joins the Arkansas River. The Spring River originates in Missouri, where it flows westerly into Kansas, then southwesterly into Oklahoma. The Illinois River begins in northwest Arkansas and flows in a southwesterly direction toward the Arkansas River. It is joined by the main tributaries of Ballard Creek, Flint Creek, Barren Fork, and Caney Creek.

The Oklahoma State Legislature has designated the Illinois River, Flint Creek, and Barren Fork as scenic rivers. Six major impoundments are in the basin: Fort Gibson Lake, Lake Hudson, and Grand Lake O’ the Cherokees are on the Grand (Neosho) River. The Grand River Dam Authority operates the lakes, primarily for flood control and hydroelectric power generation. Eucha and Spavinaw Lakes are on Spavinaw Creek and provide water for the City of Tulsa. Tenkiller Ferry Lake is on the lower part of the Illinois River.

The Boone Groundwater Basin covers about 3,065 square miles in portions of Adair, Cherokee, Craig, Delaware, Mayes, Ottawa, Sequoyah, and Wagoner counties in northeastern Oklahoma. Although well yields average less than 10 gallons per minute (gpm), the basin supplies more than 1,400 households with water. Located within one of Oklahoma’s most scenic regions, the area has experienced some of the highest growth rates in the state during the last decade (Osborn, 2001).

The Boone aquifer is part of a large groundwater system that encompasses parts of southern Missouri, southeastern Kansas, northeastern Oklahoma, and northern Arkansas. Referred to as the Springfield Plateau aquifer by the USGS, this system is comprised of water-bearing Mississippian limestone and chert that forms the uppermost geo-hydrologic unit in the Ozark Plateaus aquifer system. The western boundary of the aquifer system is in a broad, topographically low area where fresh water moving westward from the Ozark Plateaus aquifer system meets saline water moving eastward through the Mississippian and Pennsylvanian formations that comprise the Western Interior Plains confining system (Imes & Emmett, 1994 as cited in Osborn, 2001). Alluvium and a terrace deposit overlie the surface, the aquifer is unconfined, and the top of the basin is the water table surface. Where the aquifer is overlain by younger Mississippian and Pennsylvanian formations, it is confined, and the top of the basin corresponds to the top of the Boone Formation. The top of the underlying Chattanooga Shale, easily identified on well drillers’ logs, defines the base of the basin. The Boone Formation is
absent from erosion along portions of streams and rivers in Adair, Cherokee, Delaware, and Mayes counties. In these areas, Precambrian, Ordovician, and Devonian rocks are exposed at the surface.

Due to its cavernous and fractured nature, the Boone aquifer is considered a karst aquifer. Karst features, such as caves, sinkholes, disappearing streams, and springs, occur where the Boone Formation crops out. These features provide direct conduits for precipitation and runoff to transport contaminants to the water table, making the aquifer highly vulnerable to contamination from surface sources (Osborn & Hardy, 1999 as cited in Osborn, 2001). Other characteristics common to karst aquifers are the rapid recharge rate and groundwater flow rate. Water levels in wells and discharge from springs can increase rapidly after a rainstorm. Groundwater flow can cross topographic divides, making determination of the recharge basins for lakes and springs difficult.

Recharge to the Boone aquifer is almost entirely from infiltration of precipitation in areas where the Boone Formation crops out. Precipitation may infiltrate the unsaturated zone quickly because soil and subsoil in the Ozarks is thin, near-surface faults and fracture systems are common, and dissolution of the carbonate rocks is widespread. Although slopes are often steep, the trees, grass, and other vegetation hold the water, reducing the loss through runoff. Sinkholes in parts of the area can take large amounts of water from disappearing streams (Osborn, 2001).

Groundwater discharges naturally to streams, rivers, and springs. The Grand (Neosho), Spring, and Illinois rivers are perennial, and receive substantial base flows from the Boone aquifer. Perennial streams include Beaty, Brush, Honey, Spavinaw, and Spring Creeks. Most of the springs flow from water-filled cavities along bedding planes in the Reeds Spring Formation. Measurements of 25 larger springs made in September and October 1968 revealed discharges ranging from 30 to 3,600 gpm, with a median of about 390 gpm (Bingham, 1969; Marcher & Bingham, 1971 as cited in Osborn, 2001). Some groundwater also discharges downward through the underlying Chattanooga Shale into the Roubidoux aquifer (Imes & Emmett, 1994 as cited in Osborn, 2001). This occurs in the mining area, where the hydraulic head in the Boone aquifer is higher than the head in the Roubidoux aquifer. Water moves from the mine workings in the Boone downward through pores and fractures in the rock units, toward the Roubidoux aquifer (Christenson et al., 1994 as cited in Osborn, 2001).

In areas where the Boone Formation crops out, water type in the aquifer is calcium bicarbonate, resulting from dissolution of carbonate rocks. Dissolved solids concentrations are generally within the range of 100-300 milligrams per liter (mg/L). Chloride and sulfate concentrations are generally less than 10 mg/L. Water in the Boone aquifer is a sodium chloride type along the western boundary, where the aquifer is confined. In this area, westward flowing, fresh water of the Boone aquifer mixes with eastward flowing, saline water of the Western Interior Plains confining system. Concentrations of dissolved solids increase abruptly to greater than 500 mg/L in the confined portion of the aquifer. Chloride concentrations
increase to greater than 100 mg/L, and sulfate concentrations increase to greater than 50 mg/L (Imes & Davis, 1990; Imes & Emmett, 1994 as cited in Osborn, 2001).

Oklahoma water law requires the Oklahoma Water Resources Board (OWRB) to conduct hydrologic investigations of groundwater basins to characterize the availability, extent, and natural hydrologic conditions of the resource. Upon completion of the hydrologic investigation, the OWRB must determine the maximum annual yield of fresh water to be produced from the basin and the equal proportionate share to be allocated to each acre of land overlying the basin, based on a minimum life of 20 years. The maximum annual yield of a minor groundwater basin is based upon present and reasonably foreseeable future use of groundwater from the basin, recharge and total discharge, the geographical region in which the basin is located, and other relevant factors. Information on the Boone Groundwater Basin that should be considered in determining the maximum annual yield and equal proportionate share is highlighted below:

1. The total land area overlying the basin is 1,961,600 acres.
2. The average saturated thickness of the basin is estimated to be 200 feet; the average hydraulic conductivity is estimated to be 22 ft/day; the average transmissivity is estimated to be 4,400 ft³/day; and the average specific yield is estimated to be 0.07.
3. The amount of water in storage in the basin is estimated to be 27 million acre-feet.
4. The average rate of recharge is estimated to be 10.5 inches/year or 25 percent of the average annual precipitation (43 inches) and totals about 1,716,400 acre-feet.
5. Pollution from natural sources could occur along the western boundary of the basin, where pumping could induce eastward encroachment of saline groundwater.
6. The Boone Groundwater Basin is an important source of water for domestic purposes, supplying more than 1,400 households with water (Osborn, 2001).

Due to increasing population in the area, domestic water use is predicted to increase. The low well yields typical of the basin, however, will continue to limit its use for agricultural, municipal, and commercial purposes in the foreseeable future.

**Water Quality**

The Ozark Plateau has been recognized for its clean springs, clear cold springs, deep reservoirs, and import underground aquifers. These waters typically have provided important supplies for agriculture and towns throughout the plateau. In some cases, water has been drawn from these streams into more distant watershed as is the case with the city of Tulsa. The dominant aquifer in Delaware and Ottawa counties is the Roubidoux (USFWS, 2002).

As mentioned, karst regions are particularly vulnerable to underground
water contamination since karst formations easily catch surface runoff, transfer it to underground water bodies, and transfer it back to other surface water bodies (USFWS, 2002). Results from the 1998 National Water-Quality Assessment (NAWQA) study indicate that the groundwater quality of the Boone and Roubidoux aquifers are susceptible to surface contamination and are being affected by increased concentrations of nitrate and the presence of pesticides. Elevated concentrations of nitrate in groundwater of the Boone aquifer are widespread, particularly in areas where land use is predominantly agricultural. However, very few samples exceeded the maximum contaminant level (MCL) of 10 mg/L, established by the U.S. Environmental Protection Agency (EPA). Pesticides were detected in 18 of 36 (50 percent) samples from the Boone aquifer. Peterson et al. (1998) concluded that water from springs generally is more susceptible to surface contamination than water from wells. The median nitrate concentration was greater and pesticides were detected statistically more often in samples collected from springs than in samples collected from wells.

As part of the NAWQA program, the United States Geological Survey also analyzed groundwater in the Boone and Roubidoux aquifers for radon. Radon, a naturally occurring element, can enter buildings through the water system, and from surrounding rock and soil through foundation cracks. Exposure to radon has been recognized as a cause of lung cancer (Peterson et al., 1998). Samples collected from 73 wells in the Boone and Roubidoux aquifers had radon levels ranging from 99 to 2,065 picocuries per liter (pCi/L) and a median of 269 pCi/L. Radon levels exceeded the proposed MCL of 300 pCi/L in nearly one-half of the samples. Radon levels were substantially higher in samples from the Boone aquifer and unconfined part of the Roubidoux aquifer, than from the confined part of the Roubidoux aquifer (Peterson et al).

The presence of a rotten-egg odor, characteristic of hydrogen sulfide, has been observed in many wells completed in the Boone aquifer. Most people can detect the rotten-egg odor of hydrogen sulfide in waters that have concentrations as little as 0.5 parts per million (ppm). A 1-2 ppm hydrogen sulfide concentration gives water a disagreeable taste and odor and makes the water very corrosive to plumbing. Hydrogen sulfide is a gas that is dissolved in water, and readily dissipates when water is exposed to the atmosphere. Wells are commonly vented to allow the hydrogen sulfide gas to escape. To date, hydrogen sulfide concentrations have not been determined in the Boone aquifer.

**Soil**

According to the USFWS, the major soil in the Springfield Plateau is the Bodine-Baxter association, which developed in cherty limestones. The Bodine-Baxter soils are low in fertility and have a low water-holding capacity. They contain an abundance of coarse chert fragments, making cultivation difficult. The soils are often forested with oaks and hickory.

Soils in Delaware County have been influenced by the karst and sandstone geology and hilly topography, and range from sandy loams to heavy clays and rock outcroppings (USFWS, 2002). The dominant soil type in Delaware County and Natural Falls State Park is **ultisols** of the sub-order **udults** (see Figure 7). These soils tend to be strongly leached and acidic. In particular, calcium, magnesium, and potassium are commonly leached from the weathered soils. As a result, these soils are generally unproductive for agricultural purposes, but frequently are associated with productive forests. **Udults** include the presence of iron, resulting
in strong yellowish or reddish colors, and are characteristic of the “red clay” soils of eastern Oklahoma and, more broadly, the southeastern portion of the United States.

The Natural Resources Conservation Service (NRCS) prepared a custom soil resource report in 2007, and indicated that various types of silt loam are found throughout Natural Falls State Park. The primary soil types include Doniphen, Clarksville, Tonti, Britwater, and Razort. The report consisted of several tables describing percentage of soil type found within the park, and at various slopes. Based on these data, the NRCS indicated varying limitations for various outdoor recreation related uses. Further, from input through a public input process, the following resource concerns were identified as priorities in the Delaware County Soil Conservation District for Fiscal Year 2008:

- Water – Quality – Surface Water Contaminates (Nutrients and Organics)
- Water – Quality – Sedimentation and Erosion (Buffer Establishment)
- Plants – Management – Pests – Weeds (Musk Thistle)
- Plants – Management – Nutrient Management
- Plants – Condition – Plant Health and Vigor
- Animals – Habitat – Water (Domestic) (NRCS, 2007)

The NRCS (2007) used a rating system and terms to identify limitations that might exist based on desired activity and soil attributes. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by
special planning, design, or installation. Fair performance and moderate maintenance can be expected. Very limited indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

**Soil Suitability for Paths, Trails, and Golf Fairways**

The soils in Natural Falls State Park were rated according to limitations that affect their suitability for paths, trails, and golf fairways. The ratings were based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding was considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

Ideally, *paths and trails* for hiking and horseback riding should require little or no slope modification through cutting and filling. The 2007 NCRS report indicated that with appropriate slopes (less than 20 percent), few soil limitations existed that would prohibit paths or walking and hiking trails. The rating was based on the soil properties that affect trafficability and erodibility such as stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

*Off-road motorcycle trails* typically require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. Again, with appropriate slopes (less than 20 percent), the NCRS (2007) indicated that few soil limitations existed that would prohibit off-road motorcycle trails. The rating was based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties included stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

As opposed to trails, *golf fairways* are subject to heavy foot traffic and some light vehicular traffic. Cutting, filling, and irrigation may be required and were not considered in the ratings. Findings indicated that the ratings for golf fairway development was very limited; concerns primarily included gravel content and large stones content. The ratings were based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth were reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of
sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens was not considered in the ratings.

**Soil Suitability for Camp Areas, Picnic Areas, and Playgrounds**

In addition to trails and fairways, Natural Falls State Park soils were rated according to limitations that affect their suitability for camp areas, picnic areas, and playgrounds. The ratings were based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding was considered.

Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

_Camp areas_ require site preparation, such as shaping and leveling the RV or tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. Regardless of slope, all soils were rated as _somewhat limited_ for the development of camp areas. The Clarksville soil type was rated as _very limited_ in areas with more than a 5% slope. The ratings were based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas. The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. The surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry to be deemed good in trafficability. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, saturated hydraulic conductivity, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, Ksat, and toxic substances in the soil (NCRS, 2007).

Similarly, _picnic areas_ are subject to heavy foot traffic while most vehicular traffic is confined to access roads and parking areas. Regardless of slope, all soils were rated as _somewhat limited_ for the development of picnic areas. The Clarksville soil type was rated as _very limited_ in areas with more than a 5% slope. These ratings were based on soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas.
areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, Ksat, and large stones. The soil properties that affect the growth of plants include depth to bedrock or a cemented pan, Ksat, and toxic substances in the soil.

Playgrounds require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. Regardless of slope, all soil types were rated as very limited for playground development. The ratings were based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness were the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, Ksat, and large stones. The soil properties that affect the growth of plants included depth to bedrock or a cemented pan, Ksat, and toxic substances in the soil.

Soil Suitability for Sewage Disposal

Two types of sanitary facilities are typically constructed in state parks: septic tank absorption fields and sewage lagoons. Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches or between a depth of 24 inches and a restrictive layer is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Saturated hydraulic conductivity, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation while subsidence interferes with both installation and maintenance. Further, excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas. In addition, some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated (NCRS, 2007).

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, Ksat, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Saturated hydraulic conductivity is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a Ksat rate of more than 14 micrometers per second are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.
A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

NRCS (2007) reported limitations for development of septic tank absorption fields and sewage lagoons for all soils types at all slopes; the limitations ranged from *somewhat limited* to *very limited*. This was due to concerns related to slow water movement, depth to saturated zone, gravel content, and seepage.

**Vegetative Cover**

Deciduous forests, especially of the oak-hickory mix, dominate the Ozark Plateau that encompasses northeastern Oklahoma. The area that includes Natural Falls State Park is characteristic of Bailey’s Oak-Hickory Forest Eco-region and supports an oak-dominated deciduous forest community (USFWS, 2002). An environmental assessment completed by the U.S. Fish and Wildlife Service for this region documents the common species in the oak-hickory forest (see Figure 8).

![Figure 8: Vegetation types in Natural Falls State Park](image)

Common species within an oak-hickory forest include:

- Principal oak species: blackjack, post oak, black oak, southern red oak, Shumard oak, pin oak, bur oak, and white oak;
- Principal hickory species: black hickory, shagbark hickory, and mockernut hickory;
• Typical understory vegetation: flowering dogwood, eastern redbud, green brier, poison ivy, May apple, white sassafras, and coralberry; and
• Moist valley vegetation: silver maple, river birch, American elm, eastern cottonwood, American sycamore, and American linden.

**Rare and Vulnerable Plant Species**

The US Fish and Wildlife Service maintains a list of plants and animals native to the United States that may warrant future listing as species vulnerable to extinction. Species considered sensitive are candidates for listing as threatened or endangered under the Endangered Species Act [16 USC 1531-1544]. Despite their rarity, however, insufficient information exists regarding population stability of and threat(s) to these species.

Two rare plants are found in Delaware County: the Ozark Spiderwort (*Tradescantia ozarkana*) and Ozark Chinquapin (*Castanea ozarkensis*). The Ozark spiderwort population estimates vary from 200 to 1,000 individual plants. Ozark spiderwort grows in deciduous forests on steep, rocky, hillsides and mesic ravines composed of limestone and sandstone. This species is endemic (i.e., found in a very limited geographic range) to the Ozark Mountains of Missouri, Oklahoma, and Arkansas, and to the Ouachita Mountains of western Arkansas and southeastern Oklahoma. Residential development, conversion of natural areas to cropland, logging, and impounding of rivers have contributed to the decline of the Ozark spiderwort. In areas where the Ozark spiderwort occurs, forested areas should be maintained and herbicide use discouraged (Oklahoma Biological Survey, 2005).

The Ozark Chinquapin tree has been negatively impacted by the chestnut blight, which kills the trees before they mature. It is a tree that, when healthy, can grow to 3 feet in diameter and 65 feet tall. It has 5-inch long, serrated leaves and flowers in May. The nut (seed) of this tree is edible. Ozark Chinquapin trees grow on uplands and cliff margins and ridges, and at the base of talus slopes on limestone, sandstone, and chert. It occurs in oak-hickory or oak-pine forests and is found at elevations of 500-2800 feet above sea level. The population size is unknown (Center for Plant Conservation, 2006).

**Fish and Wildlife**

Delaware County has a wildlife complement typical of Midwestern deciduous forests (USFWS, 2002). Thus, we find a diverse assortment of vertebrate and invertebrate species common to the Ozark Plateau and more broadly across Oklahoma, northwest Arkansas, and southwest Missouri. Among the more common mammals around and in Natural Falls State Park are whitetail deer, grey squirrel, raccoon, opossum, skunk, beaver, fox, bobcat, coyote,
and a number of hawk and owl species; bald eagles are also found in the region. The caves of this region are extremely important for the survival species of bats and salamanders.

An interesting feature of the Ozark Plateau is the development of populations unique to individual caves or small areas. As a result, some cave ecosystems develop their own endemic species. As an example, in 2002 the USFWS reported finding three species of insects unique to a single cave in the Ozark Plateau (USFWS, 2002).

Mammals of specific concern around Natural Falls State Park include a number of species of bats. Maternity caves and hibernating caves (hibernacula) are commonly associated with caves, cliffs, and rock ledges in oak-hickory forests on the Ozark Plateau. Among the bats that have been identified in the ecosystem around Natural Falls State Park are the following species: Townsends Big-eared bat; eastern red bat; big brown bat; silver haired bat; hoary bat; evening bat; gray myotis; little brown myotis; northern myotis (edge of range); Indian myotis; and eastern pipistrell. The Ozark big-eared bat (*Corynorhinus townsendii ingens*) is on the federal list of endangered species. Additional federally endangered gray bats (*Myotis grisescens*) and federally endangered Indiana bats (*Myotis sodalis*) are found in the area of Natural Falls State Park.

Other protected species that have been identified in areas near Natural Falls State Park include the cave crayfish (*Cambarus tartarus*), the Ozark cavefish (*Amblyopsis rosea*), and the Neosho mucket (*Lampsilis rafinesqueana*). The longnose darter (*Percina nasuta*) has been identified in Lee Creek south of Delaware County. Bowman’s cave amphipod (*Stygobromus bowman*) and the Ozark cave amphipod (*Stygobromus ozarkensis*) have also been identified as species of concern in the area. Three amphibians are on the Oklahoma listing for Delaware County, including the cave salamander (*Eurycea lucifuga*), grotto salamander (*Typhlotriton speleaeus*), and Oklahoma Salamander (*Eurycea tynerensis*). The State also lists the prairie mole cricket (*Gryllotalpa major*) as protected.

The Oklahoma Ornithological Society reported 108 species of birds from the records of a 1849 expedition into Indian Territory near present-day Delaware County (Turner, 1997). On a second expedition in 1850 Woodhouse added another 47 species to his list. Stevens identified a high of 221 identified bird species in Delaware County in 1912. Most of these species remain in the area, although four have now been declared to be extinct and eight have been marked as being questionable. In any case, there is a rich avian population of possibly 150 species or more in the Natural Falls State Park area.

Two bird species are worthy of specific mention: the bald eagle (*Haliaeetus leucocephalus*) and Bachman’s sparrow (*Aimophila aestivalis*). The bald eagle is on the protected list of the US Fish and Wildlife Service, and a winter resident of Delaware County. Bachman’s sparrow is on the list of threatened species for the State of Oklahoma, but is not considered on the federal list.

Reptiles often attract the attention of people, especially in recreation settings. A number of species of lizards, skinks, and salamanders are common to northeastern Oklahoma and are likely found within the park. In addition, several species of snakes – both venomous and non-venomous – are common to Delaware County. Most of the reptiles that inhabit this ecosystem are quite compatible with human use.
Twenty-eight species of fish may be found in Delaware County (Gelwick & Gore, 1990). This is considered to be relatively high in diversity for Oklahoma and likely reflects the high diversity of habitat conditions, which mimic those of larger streams. In addition there are permanently flowing water sources of apparently good quality and a lack of obvious habitat destruction by cultural activities (e.g., channelization and clearing of riparian timber) that have harmed fish faunas in other systems. In Natural Falls State Park, visitors catch (and release) perch, bluegill, and catfish from the small lake downstream of the falls.
Natural Falls State Park

Natural Falls State Park is bounded on the north by E 580 Road, which is the old US Highway 33. Private property borders the park on the south, east, and west. The neighboring land parcels are mostly wooded; some agricultural clearing has occurred to the southwest of the park property. Figure 8 presents an aerial view of the public use area of the park. Additional park property, primarily service roads and maintenance structures, are to the east.

As can be seen on the park map (Figure 10) two access points to the park exist from the north — both off of E 580 Road. The entry to the west is for visitor access, while the eastern entry point is for park personnel only (it provides access to the new maintenance facility). The northern border of the public use areas of the park is unfenced and, as a result, some
individuals enter the park by driving across the field (thereby avoiding the entry fee). The only sections of the northern border of the park that are fenced are those that prevent roadside access to the maintenance facilities. The remaining park borders are not fenced and public access is possible from multiple points.

Figure 10. Park map

Park Facilities and Structures

Accessibility
The Oklahoma State Parks Division strives for accessibility for those with disabilities in all its park locations and facilities. Many parks and facilities were designed and constructed before the passage of the 1990 Americans with Disabilities Act (ADA), and well before the Americans with Disabilities Act Accessibility Guidelines (ADAAG) were developed. Further, by its very nature, the natural environment may not lend itself to easy access for those with mobility impairments. In addition, many human-made features found in parks were well established before the property became part of the State Parks system, and thus may not be subject to the ADA.
This is because the technical provisions related to the ADA permit deviation from the normal guidelines. These provisions allow deviation from full compliance if accessibility cannot be provided because (1) compliance would cause substantial harm to cultural, historic, religious or significant natural features or characteristics; (2) substantially alter the nature of the setting or purpose of the facility; (3) require construction methods or materials that are prohibited by federal, state or local regulations or statutes; or (4) would not be feasible due to terrain or the prevailing construction practices.

In 2007, the United States Access Board issued a Notice of Proposed Rule Making (NPRM) for outdoor developed areas. These rules and their associated interpretations have direct bearing on consideration of access in Natural Falls State Park. The minimum requirements found in the NPRM for outdoor developed areas are based on several principles developed through the regulatory negotiating process. They include (National Center on Accessibility, 2007):

1. Protect the resource and environment
2. Preserve the experience
3. Provide for equality of opportunity
4. Maximize accessibility
5. Be reasonable
6. Address safety
7. Be clear, simple, and understandable
8. Provide guidance
9. Be enforceable and measurable
10. Be consistent with Americans with Disabilities Act Accessibility Guidelines (as much as possible)
11. Be based on independent use by persons with disabilities

The trails that currently exist in Natural Falls State Park vary from natural surface to artificially hardened surfaces. The hardened surfaces consist of boardwalk in some sections, concrete, gravel, and cinder in other sections. Any one designated trail may make use of all or several surface types. Should major trail redesign or construction occur, it would be important to ensure compliance with the ADA. The NPRM addresses ten provisions that must be considered related to trail accessibility. These provisions are:

1. Surface – must be firm and stable
2. Clear tread width – minimum of 36 inches
3. Openings in surface – may not permit passage of sphere one-half inch in diameter
4. Protruding object – minimum of 80” of clear headroom above the trail
5. Tread obstacles – cannot exceed a maximum of two inches
6. Passing space – minimum of 60” by 60” at intervals of 1000’ or less
7. Slope – addresses cross slope and running slope
8. Resting intervals – at least 60” in width
9. Edge protection – not necessarily required, but may be provided
10. Signage – information on distance and departure from technical provisions
An example of possible signage for trails as suggested by the National Center on Accessibility is shown in Figure 11. As of 2008, no specific signs have been designated for universal communication related to accessible trails. However, these signs communicate the concept of accessibility in outdoor developed recreation spaces that include trails.

Other considerations related to access for persons with disabilities include “Braille trail” concepts that allow persons with visual limitations to enjoy the features of a trail. This is particularly true if the trail is interpretive in nature, with signs communicating information related to natural, cultural, historic, or other significant topics.

In an effort to fully disclose the extent of accessibility within state parks, the Oklahoma State Park Division developed terms to describe two levels of access, which are used in State Parks publications: accessible and useable.

Accessible indicates that the park “substantially complies with the Americans with Disabilities Act Accessibility Guidelines (ADAAG). The facility is connected with a barrier-free-route-of-travel from an accessible parking area.”

Useable indicates that the “facility allows significant access. Some individuals with disabilities may have difficulty and need assistance. Due to topography and the primitive nature of some sites, parking and connecting routes may not be accessible to all with disabilities.” (OTRD, 2007).

OTRD acquired Natural Falls State Park several years after the passage of the ADA; thus, many of the established structures do not meet the explicit requirements of the law. Further, the natural terrain is steep and rocky, and the environment includes sensitive species of plants and animals. Thus, ADAAG-defined accessibility to every area of the park is not practical, nor necessarily desirable.

Parking Facilities
General visitor parking is available north of the formal gardens, and a second lot is to the immediate west of the Visitor Center (see Figure 9). Additional limited parking is immediately north of the Visitor Center. Accessible parking designated for those with disabilities is available in the lot north of the Visitor Center, at the trailhead near the top of the falls, at the restroom/shower house near the campground, and adjacent to the Carnes Picnic Shelter. At busy times the parking area to the west of the Visitor Center is used for overflow RV camping.

Park Office and Visitor Center
Completed in late 2005, the first structure one encounters upon entering the park is the Visitor Center and the adjoining Red Fern Reunion Center. It is here that day-use visitors must stop.
and pay the entrance fee (overnight campers are not charged a separate entrance fee). People who do not wish to pay the entrance fee may park in the west lot, pay 50 cents, and walk into the park. The entrance drive veers toward the building, where an individual driving a vehicle may stop at a drive-through window to obtain a park permit. The drive is not of sufficient size to accommodate a bus or RV at the window. These visitors must stop adjacent to the building, exit their vehicle, and enter the Visitor Center to obtain an RV permit. Walk-in and non-RV visitors may also enter the building to pay the entrance fee. Inside the building visitors can find informational brochures about the park and the surrounding area. Accessible restrooms are located in the hallway between the Visitor Center and the adjoining Red Fern Reunion Center.

**Red Fern Reunion Center**

The Red Fern Reunion Center is a multi-purpose building with one 24 ft by 40 ft open room with access to a small kitchen which includes a refrigerator, microwave oven, toaster oven, and coffee maker, and restrooms. Any group using the kitchen must furnish its own cooking and eating utensils. The center is fully heated and air conditioned. The multi-purpose room seats 50 comfortably and folding tables and chairs are available for use in the Center. Outside of the Center on the east is an outdoor patio with tables, chairs, and a grill. The Red Fern Reunion Center is used for club meetings, community gatherings, wedding receptions, baby showers, birthdays, and other special events.

The Center is available for rent throughout the week. Rental rates have remained the same since the opening of the facility in 2006. A group may reserve the Center for full one-day periods or four-hour blocks of time. If park staff are required to clean the Center after use, they assess the renter a cleaning charge.

**Hiking/Walking Trails**

Natural Falls State Park has three designated trails (see Figure 9, Park Map). The Dripping Springs Trail is ½ mile long and traverses the falls. In various sections, the trail is hardened with concrete and wood (boardwalks and bridges), and has handrails along the wood and concrete sections of the boardwalk adjacent to the falls. Because of its surfacing, the section of the trail from the falls parking lot to the overlook is accessible. The overlook provides an unobstructed view of the cascading 77-foot high waterfalls. The cut-off remains of vertical steel posts (which provided trail lighting in the 1920s) exist along the trail from the parking area to the overlook. From the trail, eighty-eight concrete steps take a visitor to a boardwalk and wooden observation deck at the base of the falls. Benches are provided on the lower observation deck in a well-shaded area.

A hiker can continue along the Dripping Springs Trail west of the falls, down the bluff, along the stream to a small fishing lake. Along the bluff, a hiker would pass a spring-filled cistern (circa 1920) that once served as a refrigeration unit for the family living on the property. After reaching the fishing lake, the trail then heads uphill to the east where it runs parallel with a section of the Ghost Coon Trail. Trail surfacing ranges from natural, to gravel, to wooden
boardwalk, and rates of erosion and trail damage vary. Where the trail runs parallel to the Ghost Coon Trail, visitors can choose to change trails, or continue on the Dripping Springs Trail to the steel span bridge. The Dripping Springs Trail returns to its starting point near the top of the falls and parking lot.

The Ghost Coon Trail is a loop trail that begins at the east side of the formal garden area and takes the visitor from forest edge to stream bank to a prairie area. This hilly trail passes by the stream that feeds the falls, loops to the southwest and leads through a forested area. The vestiges of a 1920s low water dam and trout pool may be viewed from this trail. At 1½ miles long, the Ghost Coon Trail is not accessible to those with mobility limitations.

The shortest designated trail in Natural Falls State Park provides access from the campground to the fishing lake. Named the Bear Trail, it is one-tenth of a mile long, steep, and rugged. It begins near the northeast corner of the RV area and drops down the bluff to join with the Dripping Springs Trail close to the lake. Due to its narrow width and rough terrain, the Bear Trail is not accessible to those with physical limitations.

Upon request visitors may obtain a handout with a trail map on one side and short descriptions on the other side. The handout also lists several trail rules, which address safety for users as well as the environment.

Staff indicated that in 2008 – 2009, a new fully accessible trail will be constructed. The Pine Ridge Trail will be a loop trail that runs along the edges of the open space north of the campground, to the Carnes Picnic Shelter area (and restrooms), to the trail to the waterfalls overlook, on to the north along the internal park road, and back to the open play field area. The trail will be an 8-foot wide path with asphalt surface and be suitable for walking, biking, in-line skating, and skateboarding.

Safety and interpretive signage is found along many trail sections, although directional signage is lacking. The safety signs warn visitors to remain on the designated trail either for their own safety or the protection of the natural environment. Other interpretive notices describe the natural features within the immediate area or educate the visitor about area history. Most of the existing signage is unreadable (due to weathering) and in poor condition. Staff have indicated that existing signage is due to be replaced in 2008 – 2009, and that directional signage will be added.

**Fishing Lake**

Downstream and southwest of the falls is a low-water dam that results in a 3.5-acre impoundment, referred to as a lake. The lake provides park visitors with opportunities to engage in catch and release shoreline fishing. While the water is typically clear and visibility is good, during late summer, the surface of the water is often covered with duckweed. To access the lake visitors must walk down one of the trails, thus, this area is not accessible to visitors with disabilities.
Campground
The campground at Natural Falls State Park was constructed in 1996. It includes 44 RV camping sites and a separate area with 15 sites designated for tent camping. These sites include grills and picnic tables, and access to potable water. During the busy season, tent camping often extends into the adjacent grass playing field. The RV sites (all with picnic tables and grills) include back-in sites and pull-through sites with water and electric access (38 sites); seven sites provide full hook-ups (e.g., water, electric, and sewer). In addition, a sanitary dump station for RVs is located near the campground entrance. Two of the RV sites are accessible for those with disabilities. The park offers two premium pull-through sites and one premium full hook-up site. Premium sites are designated as such due to their proximity to the shower house and play areas, as well as deluxe, decorative fire rings at the site. The park has a 14-day limit of stay in the camping area, and visitors may request an extension through the Park Manager.

Formal Gardens
A formal terraced garden area is in the northeast section of the park, immediately south of the maintenance barn and a visitor parking lot. The gardens were built some time in the mid-1900s and are maintained by park staff. At times volunteer groups (e.g., garden clubs, scouts) provide weeding and other basic maintenance functions. Walking paths follow the gardens in a linear fashion; a curved ‘side path’ is also designated. The side path directs visitors around a raised flower bed to a pump house, which is located adjacent to the garden pathways. The gardens are terraced and include several steps; thus, the area is not accessible to individuals using wheelchairs. The area would be considered useable by State Park terminology, because a wheelchair user could access the gardens along the grass (when the ground is firm and dry).

Carnes Picnic Shelter
The Carnes Picnic Shelter is a day use structure that includes picnic tables, a pedestal grill, and nearby electricity, water, fire ring, and comfort station. Parking for those with disabilities adjoins the shelter. Parking, the shelter, tables, and grill are accessible, but the closest comfort station is not. The fire ring is useable by those with disabilities. Visitors may reserve use of the shelter up to one year in advance. A historic re-creation of a late 19th century smoke house, which was built in the 1970s, is located near the shelter.

Play Structures and Playing Courts
Play structures are of two general types and located in two areas of the park. The first type of play apparatus consists of individual playground structures, such as stand-alone swings or climbing structures. The second type of play equipment consists of integrated play elements such as slides, bridges, and climbing structures. These types of play groups are typically made of a plastic composite.
On the east side of the park, near the Carnes Picnic Shelter are two tire swings with an underlying surface of large-grain sand. On the other side of the park, north of the campground is another set of horizontal tire swings, two stand-alone climbing structures, and a large sandbox. The surfaces for these play structures range from sand to pebbles to shredded rubber. In general, the play surface materials are contained by borders of wooden timbers or PVC piping. To the north of the stand-alone play elements, near the campground is a large integrated play structure; its surface is shredded rubber. While the play structures vary in design and material, they have not been evaluated for compliance with Consumer Product Safety Commission (CPSC) guidelines for public playgrounds. Similarly, the play surfaces are not inspected regularly for compliance with CPSC guidelines for ability to absorb impact from falls or for compliance with accessibility standards.

*Playing courts* include sport courts and fields, and play courts for miscellaneous lawn games (e.g., horseshoes). Only permanent courts and fields are considered in this RMP. North of the campground are horseshoe pits and a tetherball structure. The large grass field also north of the campground has a designated sand volleyball court; the open grassy area is used for activities such as disc golf, kite flying, and other open field games. As mentioned earlier, close to the Carnes Picnic Shelter are basketball goals on an asphalt court; this area also includes a designated horseshoe pit.

**Other Park Facilities**

Other park facilities include a small (approximately 10 ft by 12 ft) water garden, within a concrete containment pond. When rain is sufficient, water runs through a culvert and fills the water garden. Cattails, lilies, and other aquatic plants sometimes grow here. In the south-center section of the park is a stage area. Prior to state ownership, this area had been used to host music festivals; the area is currently unused.

Two primary maintenance structures exist within the park – one is located on the northeast edge of the parking lot north of the gardens, and a new metal pole building set on a concrete slab has been erected (2001 construction date) on the northeast corner of park property. The new maintenance facility is not currently in use. Park personnel gain entry to this facility directly from E 580 Road.

The older maintenance facility, which is in use, is located in the northeast corner of the visitor parking lot north of the gardens. Park personnel access this facility via internal park roads. To
the immediate east of the barn are fuel storage tanks (gasoline, diesel, oil). A concrete crash barrier (2 to 3 feet tall) surrounds the tanks.

**Park Visitation**

Based on 2006 – 2008 revenue data provided by park staff, Natural Falls State Park receives most of its revenue-producing use during the months of June through October. June, October, and May are typically the three highest revenue-producing months; this is primarily due to the collection of camping fees during this time. The Carnes picnic shelter is most often reserved/rented during the months of March through October. On average, the shelter is rented slightly fewer than three times per month, although it does get a good deal of casual day use.

Staff reported that approximately 13,000 – 14,000 day use tags are distributed each year and that the park facilities are rented for weddings 30 – 40 times per year. They also reported that during the months of May and June, the first half of July, September, October, and the first half of November, the RV campground is at or near capacity on weekends; weekday use is more sporadic. Reduced camping rates are offered Monday through Thursdays of each week.

In 2003, Caneday and Jordan conducted a visitor study for the Oklahoma State Park system. They collected data from each park and drew conclusions based on those data. They reported that people visit Natural Falls State Park between 1 and 12 times a year, with an average of four visits per year. Most visitors, however, experienced the park one time per year. Caneday and Jordan found that Natural Falls State Park is a primary destination for most users, rather than a stop as part of a longer trip. Recently obtained information from visitor-posted online reviews, however, indicate that many visitors stop over at Natural Falls State Park on their way to and from sites in Arkansas and Colorado.

Some park visitors are local, traveling a few miles to the park, while others travel over 1,000 miles for a visit. On average, people traveled 135 miles to the park, although most visitors were from within 30 miles of the area. The most common purpose for visiting Natural Falls State Park was to camp, hike, and picnic. Many visitors traveled to the park to view the waterfalls and to relax. Park visitors appreciated the various park amenities and that there was ‘something for everyone’ at the park (Caneday & Jordan, 2003).

An examination of recent reservation forms covering the period from July 2006 to early November 2008 shows that approximately 65% of those reserving some aspect of Natural Falls State Park are Oklahoma residents (N = 118). Two individuals listed on the rental forms were from Texas, one was from Tennessee, and one was from Missouri. The remaining renters (31%) specified Arkansas addresses; fully one-half of those were from Siloam Springs. Almost 70% of those renting park facilities come from within a 30-mile radius of the park.

Rental records and online visitor-posted information show that various special user-groups use Natural Falls State Park. The Gold Wing Road Riders Association (Honda motorcycle group), the American
Volkssport Association, several RV travel clubs, church groups, and scouting troops, are the most common groups that rent park facilities. RV clubs and user groups tend to rent between 6 and 25 campsites at one time. Family groups also frequent Natural Falls State Park for weddings, family reunions, baby showers, birthdays, and other special events.

Caneday and Jordan (2003) reported that those who camped indicated that the most important amenities at the campground included the availability of a campground host, playground equipment, free public showers, public telephone, public toilets, security lighting, easy access to information, and directional signage. At campsites within the campground, visitors reported the most important amenities were electrical service, fire ring, grill, parking for a second vehicle, picnic table, sewer hook-up, shade, and water hook-up. Concrete pads for RVs, mowing of grassy areas, and a reservation system were also identified as important attributes for Natural Falls State Park campers.

Users have indicated that the walking/hiking trails are very important to them, and they would like benches to be installed along the trails. Park visitors generally hear about the park by word of mouth; this includes personal online postings and reviews of the park. Overall, users believe the park fees are appropriate for the value, and they feel safe while at the park.

**Visitor Evaluations**

Park visitors have an ongoing opportunity to express their opinions about various aspects of their Natural Falls experience by completing comment cards. Information from the comment cards for the years 2005 – 2008 was collected and analyzed. All those who provided input about their experiences rated every item as 4.4+ (5.0 = excellent). The following aspects of the park experience were rated as good or excellent by at least 98% of those providing feedback: office staff, camp hosts, maintenance staff, facilities, and park conditions. Safety was rated as good or excellent by 91% or users and ‘recreation activities offered’ were rated as good or excellent by 84% of those who submitted comment cards.

In the development of this RMP the researchers conducted telephone and email evaluations of individuals who had rented one or more spaces or facilities in the park within the past two years. Visitors were pleased to participate in the input process and freely expressed their opinions. We asked participants to rate the importance of various park amenities and their level of satisfaction with several aspects of the park experience.

Visitors rated almost every amenity as important or extremely important (see Tables 3 – 6). The highest rated items for day users included available drinking water, restrooms, and nature trails. Overnight guests rated accessible restrooms, accessible showers, electrical hook up (50 amp), water hook up, group campsites, and a group shelter/pavilion as most important amenities in a campground. Least important were wireless Internet access, primitive camping sites, and premium camping sites.

In terms of park attributes, all respondents rated a clean, litter-free park with mowed open areas as important or extremely important. Park ranger staff and accessibility for persons with disabilities were also rated as extremely important by most survey participants. Further, park users believe it is extremely important to protect the natural and sensitive features of Natural Falls State Park. Lastly, entrance and rental fees were rated as non-determining factors in decisions related to park use by most survey participants. One respondent stated,
Our group understands the importance of these funds in maintaining the park. We anticipate fees—plus, it’s cheaper than a hotel!”

Another individual indicated a concern with entrance fees: “Inflation and cost of gasoline determine how much RV’ing we will be able to continue camping [sic].”

In addition to asking about the importance of various park elements, we also asked about levels of satisfaction with several park facilities. All respondents indicated that they were extremely satisfied with the reservation system (used for campground, Reunion Center, picnic shelter, garden area, or other). In addition, all respondents who used the campground were extremely satisfied. Trails were highly satisfying to most, while the fishing lake was least satisfying. It is important to note that only one-third of all those on the rental list (118) used the fishing lake during the Natural Falls State Park experience. Tables 2 – 5 present the evaluation details; the reported numbers are percentages of individuals who checked that particular response. Percentage totals may not equal 100 due to rounding.

To augment the information gleaned from the visitor survey and the comment cards, the researchers conducted an exhaustive search of the Internet for information about Natural Falls State Park. We found information posted by park visitors on review sites such as tripadvisors.com, as well as on personal Web blogs and photo-sharing sites. Clearly, visitors who make information available on the web are generally pleased with their experiences at Natural Falls State Park. Visitors expressed positive views about the park beauty, cleanliness, park staff, hiking trails, campsites, and accessibility for those with disabilities. On the other hand, a few of those who posted online expressed concerns about the noise from the nearby race track. A sampling of quotes is found below, and the quotes are found in their entirety in a separate appendix to this report.

This lovely state park is just across the border in Oklahoma. The whole park is fairly uncommercialized but hosts a beautiful fall in a spectacular setting. The short hike to the falls is a lovely afternoon trip. –applecrestinn.com

By far the most beautiful park we have found in the northwest Oklahoma/Arkansas area. Extremely well maintained with great play ground area for the kids. Can reserve site ahead. Staff very friendly and courteous. –rvparkreviews.com

I would have rated this campground a ten, but only a quarter mile away is a race track that holds races on Saturday nights which you can clearly hear even with windows closed until well into the night. I do not mind the sound of horsepower, but some may not like this. –rvparkreviews.com
### VISITOR EVALUATION OF CAMPGROUND AMENITIES

<table>
<thead>
<tr>
<th>Amenities in campground</th>
<th>Extremely unimportant</th>
<th>Unimportant</th>
<th>Neither important nor unimportant</th>
<th>Important</th>
<th>Extremely Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>RV sites</td>
<td>11</td>
<td>3</td>
<td>9</td>
<td>9</td>
<td>69</td>
</tr>
<tr>
<td>Tent sites</td>
<td>6</td>
<td>3</td>
<td>16</td>
<td>38</td>
<td>44</td>
</tr>
<tr>
<td>Group camp sites</td>
<td>3</td>
<td>6</td>
<td>12</td>
<td>15</td>
<td>65</td>
</tr>
<tr>
<td>Handicapped accessible sites</td>
<td>3</td>
<td>3</td>
<td>14</td>
<td>9</td>
<td>69</td>
</tr>
<tr>
<td>Electrical hook up</td>
<td>6</td>
<td>0</td>
<td>9</td>
<td>6</td>
<td>80</td>
</tr>
<tr>
<td>(20 / 30 / 50 amp)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water hook up</td>
<td>6</td>
<td>0</td>
<td>9</td>
<td>9</td>
<td>76</td>
</tr>
<tr>
<td>Sewer hook up</td>
<td>6</td>
<td>0</td>
<td>23</td>
<td>20</td>
<td>54</td>
</tr>
<tr>
<td>Concrete RV pads</td>
<td>9</td>
<td>0</td>
<td>17</td>
<td>26</td>
<td>46</td>
</tr>
<tr>
<td>Pull-through sites</td>
<td>6</td>
<td>3</td>
<td>23</td>
<td>37</td>
<td>29</td>
</tr>
<tr>
<td>Premium camp sites</td>
<td>3</td>
<td>0</td>
<td>40</td>
<td>17</td>
<td>37</td>
</tr>
<tr>
<td>Primitive sites (no utilities)</td>
<td>6</td>
<td>20</td>
<td>29</td>
<td>21</td>
<td>29</td>
</tr>
<tr>
<td>Wireless internet access</td>
<td>37</td>
<td>26</td>
<td>21</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>Sanitary dump station</td>
<td>6</td>
<td>0</td>
<td>18</td>
<td>26</td>
<td>50</td>
</tr>
<tr>
<td>Camp hosts on site</td>
<td>0</td>
<td>3</td>
<td>14</td>
<td>46</td>
<td>36</td>
</tr>
<tr>
<td>Group shelter/pavilion</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>13</td>
<td>71</td>
</tr>
<tr>
<td>Accessible restrooms</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>6</td>
<td>89</td>
</tr>
<tr>
<td>Accessible showers</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>24</td>
<td>73</td>
</tr>
<tr>
<td>Nearby playground</td>
<td>0</td>
<td>9</td>
<td>9</td>
<td>24</td>
<td>59</td>
</tr>
<tr>
<td>Interpretive or educational programs</td>
<td>14</td>
<td>6</td>
<td>29</td>
<td>31</td>
<td>20</td>
</tr>
</tbody>
</table>

**TABLE 2.** Visitor evaluation of campground amenities
## VISITOR EVALUATION OF PARK AMENITIES

<table>
<thead>
<tr>
<th>Amenities in the park</th>
<th>% agree</th>
<th>Extremely unimportant</th>
<th>Unimportant</th>
<th>Neither important nor unimportant</th>
<th>Important</th>
<th>Extremely Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group shelter in day use area</td>
<td>0</td>
<td>6</td>
<td>17</td>
<td>29</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Horseshoe pits</td>
<td>9</td>
<td>0</td>
<td>17</td>
<td>50</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>Picnic tables and grills for day use</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>31</td>
<td>61</td>
<td></td>
</tr>
<tr>
<td>Drinking water</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>9</td>
<td>88</td>
<td></td>
</tr>
<tr>
<td>Playground/play structures</td>
<td>0</td>
<td>3</td>
<td>15</td>
<td>13</td>
<td>68</td>
<td></td>
</tr>
<tr>
<td>Benches spread in area</td>
<td>0</td>
<td>3</td>
<td>15</td>
<td>31</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>Restrooms in day use area</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>15</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Green space/open play area</td>
<td>0</td>
<td>3</td>
<td>13</td>
<td>21</td>
<td>62</td>
<td></td>
</tr>
<tr>
<td>Scenic or nature trail</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>21</td>
<td>73</td>
<td></td>
</tr>
<tr>
<td>Area to watch wildlife</td>
<td>0</td>
<td>3</td>
<td>11</td>
<td>29</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td>Security lighting</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>34</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Convenience store</td>
<td>6</td>
<td>27</td>
<td>27</td>
<td>29</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

### TABLE 3. Visitor evaluation of park amenities

## VISITOR EVALUATION OF PARK AND FACILITY ATTRIBUTES

<table>
<thead>
<tr>
<th>Park or Facility Attributes</th>
<th>% agree</th>
<th>Extremely unimportant</th>
<th>Unimportant</th>
<th>Neither important nor unimportant</th>
<th>Important</th>
<th>Extremely Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessibility for persons with disabilities</td>
<td>0</td>
<td>0</td>
<td>9</td>
<td>24</td>
<td>68</td>
<td></td>
</tr>
<tr>
<td>Clean, litter-free park</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Mowing of roadsides and open areas</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Park ranger staff</td>
<td>0</td>
<td>0</td>
<td>9</td>
<td>24</td>
<td>68</td>
<td></td>
</tr>
<tr>
<td>Need to protect natural features and resources of the park</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>12</td>
<td>76</td>
<td></td>
</tr>
<tr>
<td>Entrance/rental fees impact on my decision to use park</td>
<td>37</td>
<td>3</td>
<td>20</td>
<td>17</td>
<td>23</td>
<td></td>
</tr>
</tbody>
</table>

### TABLE 4. Visitor evaluation of park or facility attributes
<table>
<thead>
<tr>
<th>Satisfaction with service or facility</th>
<th>Extremely dissatisfied</th>
<th>Dissatisfied</th>
<th>Neither satisfied nor dissatisfied</th>
<th>Satisfied</th>
<th>Extremely Satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reservation system (for campground, Reunion Center, Carnes shelter, Garden area...)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>9</td>
<td>91</td>
</tr>
<tr>
<td>Campground</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>97</td>
</tr>
<tr>
<td>Red Fern Reunion Center</td>
<td>0</td>
<td>0</td>
<td>14</td>
<td>18</td>
<td>68</td>
</tr>
<tr>
<td>Carnes Picnic Shelter</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>29</td>
<td>62</td>
</tr>
<tr>
<td>Formal garden area</td>
<td>0</td>
<td>0</td>
<td>9</td>
<td>26</td>
<td>65</td>
</tr>
<tr>
<td>Fishing lake (only 30% of respondents used the fishing lake)</td>
<td>10</td>
<td>0</td>
<td>20</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>Trails</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>13</td>
<td>81</td>
</tr>
</tbody>
</table>

TABLE 5. Visitor Satisfaction with Park Service or Facility

**Services**

Services at Natural Falls State Park are managed internally and consist of facility rental with associated services. As indicated earlier, the Red Fern Reunion Center is available for rent by the full day or four-hour blocks of time. In addition, the formal gardens area is available for rent for special events, as are the Carnes Picnic Shelter and the open playing field. The formal gardens area is most frequently rented for weddings. Folding tables, chairs, and a small party tent are also available for visitor use. Table 6 (next page) illustrates the 2008 fee structure for rental areas.
### RENTAL FEE STRUCTURE

<table>
<thead>
<tr>
<th>Package 1 – Garden Area</th>
<th>Use of the large, terraced garden area including 100 folding chairs, 16 folding tables, and entrance fee for 20 vehicles (maximum of 6 people per vehicle)</th>
<th>$100.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Package 2 – Garden Area and Shelter</td>
<td>Use of the large, terraced garden area including 100 folding chairs, 16 folding tables, entrance fee for 20 vehicles (maximum of 6 people per vehicle), and the Carnes Shelter Area</td>
<td>$140.00</td>
</tr>
<tr>
<td>Package 3 – Garden Area and Red Fern Reunion Center</td>
<td>Use of the large, terraced garden area including 100 folding chairs, 16 folding tables, entrance fee for 20 vehicles (maximum of 6 people per vehicle), and Red Fern Reunion Center</td>
<td>$200.00</td>
</tr>
<tr>
<td>Package 4 – Other Park Areas</td>
<td>Entrance fee for 10 vehicles (maximum of 6 people per vehicle)</td>
<td>$50.00</td>
</tr>
<tr>
<td>Additional optional fees</td>
<td>Additional per vehicle charge (in conjunction with purchase of one the above packages; is collected with entire package fee)</td>
<td>$3.00</td>
</tr>
<tr>
<td></td>
<td>10ft X 10ft Tent; per day charge</td>
<td>$25.00</td>
</tr>
</tbody>
</table>

**NOTES:** Set up and rehearsal dates/times are flexible; these fees are included in the above pricing. All wedding parties are responsible for set-up and take-down of chairs and tables.

**Carnes Picnic Shelter**

| Per day charge | $35.00 |

**Red Fern Reunion Center**

| Discounts are provided to Red Fern Reunion Center rental groups that rent RV campsites during the same period. If a group rents 30 or more RV sites, the Center rental fee is waived; with 20 to 29 sites rented, a 75% discount applies to the rental; and if 10 to 19 sites are rented, a 50% center rental fee discount applies. | $100 per day $50 per 4-hr time block $50 cleaning charge, as needed |

**TABLE 6. Rental Fee Structure (2008)**

### Entrance and Camping Fees

In 1999, legislators introduced House Bill 1020 to establish a pilot entrance fee program for Natural Falls State Park. The collected fees were to be used for repairs, upkeep, and improvement of areas within the park. In part, the bill reads:

Provided further, however, the Division of Parks may establish until July 1, 2001, a pilot program and rates for entry into Natural Falls State Park in Delaware County. All monies collected shall be deposited to the Oklahoma Tourism and Recreation Department Revolving Fund; provided, not less than one hundred percent (100%) of such monies collected shall be spent on repairs, upkeep or improvement of park areas in Natural Falls State Park in Delaware County.

And, in 2003, legislators passed House Bill 1353 approving the establishment of day-use charges for the state park system. As with the initial bill that related specifically to Natural
Falls State Park, all collected monies are designated for repair, upkeep, and improvements of each respective park.

Day users are charged $3.00 per vehicle, up to six persons—additional persons in a vehicle are assessed at a rate of $.50 per person. As per state law, the entrance fee is waived for individuals 62 years of age and older, who can show documentation. Schools transporting children on buses and who are engaged in educational field trips are charged a $10.00 fee per bus. The day-use fee is waived for overnight campers; camping fees range from $5.00 (tent camping with discount to persons with disabilities) to $26.00 (premium, full hook up RV sites). The camping fee structure is provided in Table 7. Upon request, individuals are permitted to park in the west parking lot and walk into the park at a rate of $0.50 per person.

<table>
<thead>
<tr>
<th>Type of campsite</th>
<th>Site amenities</th>
<th>Regular rate</th>
<th>Senior discounted rate</th>
<th>Rate for persons with disabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Back-in sites</td>
<td>Electric 30 amp Water</td>
<td>$18.00</td>
<td>$16.00</td>
<td>$13.00</td>
</tr>
<tr>
<td>Pull-through sites</td>
<td>Electric 50 or 30 amp Water</td>
<td>$18.00</td>
<td>$16.00</td>
<td>$13.00</td>
</tr>
<tr>
<td>Pull-through sites</td>
<td>Electric 50 or 30 amp Water</td>
<td>$23.00</td>
<td>$21.00</td>
<td>$18.00</td>
</tr>
<tr>
<td>Full hook-up sites</td>
<td>Electric 30 amp Water Sewer</td>
<td>$21.00</td>
<td>$19.00</td>
<td>$16.00</td>
</tr>
<tr>
<td>Full hook-up sites</td>
<td>Electric 30 amp Water Sewer</td>
<td>$26.00</td>
<td>$24.00</td>
<td>$21.00</td>
</tr>
<tr>
<td>Use of dump station</td>
<td></td>
<td>$8.00</td>
<td>$8.00</td>
<td>$8.00</td>
</tr>
<tr>
<td>Tent area</td>
<td></td>
<td>$10.00</td>
<td>$8.00</td>
<td>$5.00</td>
</tr>
</tbody>
</table>

TABLE 7. Natural Falls State Park Camping Fees (2008)

**Staffing**

Staffing at Natural Falls State Park includes the Park Manager (who is a reserve CLEET-certified officer), an Account Technician 2, and three maintenance workers. A CLEET-certified Park Ranger began a full-time appointment at the end of August, 2008; this individual will serve both Natural Falls State Park and Lake Eucha State Park. This individual will be responsible for interpretive programming as well as law enforcement. Five seasonal staff—two in the office, two assigned to maintenance, and one gate attendant—are hired during the primary camping season.

Two full-time and one half-time year-round campground hosts are also on-site. The campground hosts pay camping fees in the winter; during the camping season, their campsites are provided free of charge. Campground hosts engage in a variety of light maintenance work (e.g., clean restrooms, grills) and provide after-hours assistance to those in the park.
The staff have articulated a service mission and associated goals for the park:

Natural Falls State Park employees are dedicated to providing a first-class park and facilities which are clean and user friendly, to using proper conservation measures for effective management of the land and resources, and to providing guests the opportunity to experience a beautiful, natural place with a quality recreational experience in the Oklahoma Ozarks. All park staff will strive to provide the best customer service possible through professional, courteous and respectful treatment of our guests.

GOALS

- To continue providing the best customer service possible making an effort to satisfy every reasonable request to our guests. *Make this park known as a family-oriented destination.*
- Replace all aged signage in the park, providing new highway signage to make the park entrance more noticeable.
- To increase volunteering and opportunities for volunteers.
- Complete the Visitor Center project, new Maintenance Barn project, and Walkway to the Falls project.
- Provide for wintertime trout fishing in the lake in order to increase wintertime occupancy and provide a quality fishing experience.
- Construct a gazebo in the formal garden area in order to market the rental of this area for weddings and family reunions.
- Rework the gardens to include more walkways, larger trees, and a more landscaped appearance.

Hazards Analysis – Natural and Operational

Any recreational activity includes the exposure to hazards, and the probability of specific risks may increase in many outdoor settings. In most current discussions related to hazard and risk, hazards are defined as conditions or events. Risk is the likelihood of injury resulting from a given hazard and is typically defined as a probability of adverse effects from those conditions or events. Everything people do exposes them to hazards. It is how people conduct themselves that determines the risk. An agency or site risk management plan addresses potential loss from anticipated hazards.

**Natural Hazards**

As with all natural areas, Natural Falls State Park includes a number of hazards. Some of those hazards are natural and related to such things as topography, flora, and fauna. Some of the hazards are structural or related to design; other hazards are operational in nature.

Natural hazards in Natural Falls State Park include the steep terrain, caves, pools, and slippery surfaces due to running water and vegetation (most common near the waterfalls, stream, and lake). Trails invite visitors to engage the steep terrain, and while boardwalks and signage encourage users to stay on designated trails, it would not be unusual for park visitors to stray...
into unsafe or fragile areas. It would be desirable to have well-articulated evacuation plans for persons who might become injured in the canyon.

Among the natural hazards present in the park are those associated with weather events. The National Climatic Data Center reports a variety of such hazards by county over time. These hazards include hail, floods (flash and urban), thunderstorms with accompanying wind and lightning, tornado, heavy snow, ice, excessive heat, and drought. The National Climatic Data Center reported 459 such events for Delaware County since January 1950. These hazards resulted in six deaths, 12 injuries, and more than $51 million in property damage.

The National Oceanic and Atmospheric Administration (NOAA) reported that 27 tornadoes were spotted in Delaware County between 1950 and 2008. F3 tornadoes occurred in the county in 1957, 1959, 1974, and 1980. Delaware County is slightly below the Oklahoma average for reported tornado events, but is 2.6 times the United States average. During this same time period, the county experienced 183 thunderstorms with high velocity winds (severe) and six ice events.

Other natural hazards are related to life forms in the natural environment. Any time people are hiking and recreating in an outdoor environment, a chance exists that they will inadvertently encounter such wildlife; this is the case in Natural Falls State Park. The Park encompasses an environment suitable for venomous snakes including the copperhead, timber rattlesnake, and western cottonmouth.

A number of mammals in the oak-hickory forest are subject to rabies. During 2006, two laboratory-confirmed cases of rabies in Delaware County were reported. One case was reported in a cat, while the other involved a skunk. Other animals found in the park environment that potentially could transmit rabies include raccoons, opossums, skunks, and bats.

The forest environment at Natural Falls is home to mosquitoes, ticks, and spiders – all of which may be hazards or present hazards to recreational visitors. The Brown Recluse spider and the Black Widow are native to Delaware County. Both spiders have produced adverse effects for humans in recreational settings (and other environments). In addition, ticks are known carriers of a number of serious diseases in humans. The 2002 Statewide Comprehensive Outdoor Recreation Plan (Caneday, 2002) stated:

An “environmental problem” of increasing occurrence in Oklahoma in recent years is related to ticks and tick-transmitted diseases. Although there are a number of tick-transmitted diseases, the most frequent occurrence is shown by Rocky Mountain spotted fever, Lyme disease, and Tularemia. A number of factors are related to this increased occurrence of disease including demographics, living preferences, and recreational behavior. Oklahoma has experienced significant increases in tick-transmitted diseases over the past decade. While most of these diseases can be treated, the diseases can also be life threatening. Participants in outdoor recreation are among those who encounter the ticks and who contract the tick-transmitted diseases. A concerted, unified effort is necessary to educate the recreational visitor regarding the results of recreational behaviors.

At the time of the writing of the 2002 SCORP, the author contacted the Centers for Disease Control (CDC) in Atlanta regarding rumors (at that time) of a mosquito borne virus – West
Nile virus. The CDC assured Caneday that Oklahoma would not experience West Nile virus within the five-year period covered by the 2002 SCORP (2002-2007). However, by summer 2003, Oklahoma was experiencing cases of West Nile virus among horses and humans. Often these resulted from outdoor recreation activity, and that pattern is continuing.

Some plants are also hazardous to some individuals and the risk varies by degree of exposure and response to that exposure. Among those plants at Natural Falls are poison ivy and, to a more limited extent, poison oak.

Another potential natural hazard in a recreation environment is waterborne disease. As stated in the 2002 Statewide Outdoor Recreation Plan (SCORP) for Oklahoma (Caneday, 2002):

Since 1971, Federal agencies (CDC and EPA) have maintained a collaborative surveillance system for collecting and reporting data related to occurrences and causes of waterborne-disease outbreaks (WBDOs). As an environmental hazard, waterborne diseases have always been present in the United States; however, outbreaks linked to drinking water have steadily declined since 1989. By contrast, the number of outbreaks linked to recreation activity has increased (Center for Disease Control). It is not clear whether this is due to increased outdoor recreation activity, larger numbers of people involved in outdoor recreation, or greater hazard present in the water environment. CDC reports for 1995 – 1996 have shown that the exposure to the disease occurred in lakes in 59% of waterborne-disease outbreaks of gastroenteritis associated with recreational water. Equal percentages (27%) of Cryptosporidium parvum and Escherichia coli as the etiologic agent were reported during that period.

Natural Falls State Park has the potential to be a host for waterborne disease through the natural springs and impoundments. While swimming is prohibited in the park, without patrolling park rangers, it is not possible to monitor visitor activity in and around the water sources. Another source for waterborne disease at Natural Falls State Park is through the drinking water provided on-site.

**Operational Hazards**

Operational hazards include those vulnerabilities to park staff, the park system, or the state of Oklahoma that exist as a result of management or operation of the resource and application of policy. Management and operational decisions are made on a daily basis and are impacted by budgets, prioritization within the state park system, staffing patterns, local and state politics, and other external influences.
Facility-Related Exposures
As part of the data collection for the development of this RMP, the researchers conducted several on-site visits to Natural Falls State Park. Common issues that could lead to danger to visitors included cut off metal railings along the Dripping Springs trail, irregular or fractured surfacing (all trails), and weather-worn safety signs found along trails and in recreation areas in the park. Playground surfaces are worn, and some tree limbs require pruning.

A more serious risk exposure is that related to the fuel storage tanks to the east of the maintenance facility, at the north edge of the visitor parking lot. While the tanks are set behind a concrete crash barrier, the barrier does not prevent individuals from entering the area. The tanks are accessible to the public, and lack the appropriate Occupational Safety and Health Administration (OSHA) approved placards indicating the fuel type and prohibiting smoking in the storage area. Above-ground fuel storage tanks are regulated by the Clean Water Act, the Oil Pollution Act, the Clean Air Act, and the Resource Conservation and Recovery Act, which can pose a challenge to appropriate management.

Other possibilities of risk exposure that affect both operational and managerial hazards include the lack of fencing on the northern park border and lack of a gate at the campground entrance. After staffing hours, any member of the public can freely enter park property (including the campground) without paying the appropriate fees. This may present a greater risk to the park budget than to visitors; nonetheless, the lack of border fencing and gates may be cause for concern.

In addition, the play structures and playing courts utilize a variety of surfacing materials and many areas are showing a good deal of wear. Areas under the swings are deeply eroded, and the surface material in all play structure areas is strewn about in the immediate vicinity. A thorough examination of the play structures and the applicable surface materials for compliance with Consumer Product Safety Commission guidelines for public playgrounds is warranted at this time.

Further, weather-related events (e.g., ice storms, strong winds) in Oklahoma often result in tree and limb damage throughout the park. The locations in which downed trees and limbs have immediate impact on visitors include the camping areas, trails, and waterfall overlook area. Staff indicated that on average 12 to 14 trees are downed each year in the RV camping area. Currently, Natural Falls State Park does not have a formal limb management or tree replacement program; this is common throughout the state park system. Park staff attend to downed trees and limbs as they discover them and/or are notified of the hazard.
Policy-Related Exposures

One element of hazards and management of risks is incorporated into law enforcement. Park rangers are the law enforcement personnel for the Oklahoma Tourism and Recreation Department, although they frequently have cooperative (mutual aid) agreements with county sheriffs and the Oklahoma Highway Patrol. Law enforcement authority for Oklahoma State Park Rangers is authorized by state statute as follows (Section 1811.2 of Title 74, 1991):

Park rangers, when commissioned, shall have all the powers of peace officers except the serving or execution of civil process, and shall have in all parts of the state the same powers with respect to criminal matters and enforcement of the laws relating thereto as sheriffs, highway patrolmen and police officers in their respective jurisdictions and shall possess all immunities and matters of defense now available or hereafter made available to sheriffs, highway patrolmen, and police officers in any suit brought against them in consequence of acts done in the course of their employment, provided, however, they shall comply with the provisions of Section 3311 of Title 70 of the Oklahoma Statutes.

A Park Ranger 1 recently began work at Natural Falls State Park (the Ranger will also serve Lake Eucha State Park) with responsibility for enforcement of rules, regulations, ordinances, and laws, as well as park programming (e.g., interpretation).

Written weekly logs are maintained by park staff to document minor incidents such as visitors who are observed entering the park without paying the entrance fee, or reports of dogs off leash. Actual data related to the number of occurrences of these types of events are not consistently recorded and, thus, were not available for review.

In addition to the weekly log, staff complete incident reports when notified of property damage or personal injury to visitors or staff. The incident reporting form requests minimal information regarding personal injury or property damage. Further, the incident reporting process does not appear to require follow-up with the reporting party; it was unclear how documents and records are filed and maintained.

Since 1999, 16 incidents have been reported—eight have been related to personal injury (e.g., falls resulting in a broken wrist, contusions, broken teeth) and eight involved property damage. The property damage involved park visitors (e.g., vehicle damage) and park property (e.g., missing inventory, vandalism to building). Emergency medical care was requested for three of the personal injury incidences and the Sheriff’s department responded to a domestic violence incident in the campground.
Waste Management

A sewage holding system is located in an open field between the campground and the access to the falls. This is a three-tank system that holds 3,000 gallons of black water. A private contractor pumps out the black water approximately ten times each year (4 to 7 times a week during the camping season). A private firm based in Jenks, Oklahoma is currently working on engineering plans to construct a sewage lagoon in the southeast section of the park to handle black water. Based on the 2002 soil study, surface preparation will be crucial to protect the aquifer and watershed.

Proposed Resource Use

During the preparation of this Resource Management Plan, the research staff reviewed the environmental assessment for the Ozark Plateau National Wildlife Refuge Expansion prepared by the United States Fish and Wildlife Service. This proposal explicitly stated its purpose as:

to expand the Ozark Plateau National Wildlife Refuge. Currently including 3,067 acres in Adair, Delaware, and Ottawa Counties, Oklahoma, the Refuge is proposed to be expanded to include units in Cherokee, Craig, Mayes, and Sequoyah Counties. A total of 11,933 acres of protected habitats would be added to the project area to bring the total refuge acreage to 15,000 acres. (USFWS, 2002)

All of Delaware County and Adair County are encompassed by the proposal, as well as portions of Ottawa, Mayes, Wagoner, Cherokee and Sequoyah counties. The expansion is based on the premise that “habitats would be protected by acquiring lands in fee title or in conservation/access/management easements at fair market value from willing sellers and donors” (USFWS, 2002).

Due to the geology and ecosystems, two focus areas were identified. A secondary area in southern Adair County became a focus because particular geological formations indicated caves (sensitive environments) are likely to be present. The primary area identified in the environmental assessment included southern Delaware County. This area was the primary focus for expansion because of known cave concentrations and existing bat populations. This area encompasses Lake Eucha State Park, the
Lake Eucha-Spavinaw Lake watershed, and extends south to encompass Natural Falls State Park.

Since the state parks and the desirable watershed are in the public domain, acquisition by fee title would not be necessary. However, conservation easements would be a definite possibility. The proposal details the need for preventing disturbance to roost habitat and hibernacula for endangered and threatened bat species present in the target area. It also addressed the need for maintenance, protection, and restoration of foraging areas within the proposed expansion. The environmental assessment acknowledged the need for and benefit of environmental education to assist in coordination and protection of the Ozark resources.
Chapter 4 – Alternatives and Preferred Plans

Overview and Summary

At multiple times throughout the project, the research staff from Oklahoma State University met with park management personnel from Oklahoma State Parks to identify issues, plans, alternatives, and preferences. In addition, the research staff reviewed comment cards from guests at Natural Falls State Park during the past several years. Further, data from a 2002-2003 state park visitor study was reviewed for applicability to Natural Falls. These data included direct interviews with guests in state parks throughout Oklahoma. Finally, specific input on issues, alternatives, and preferences was gathered from recent users of Natural Falls State Park through the reservation system.

Issues and Alternatives

Issue Statement 1: Branding as a state park

Natural Falls State Park differs from other properties in the Oklahoma State Park system and, as a limited service park, may require intentional actions to maintain the state park brand.

Background: Natural Falls State Park is relatively small, and has a history as deeded property to a member of the Cherokee Nation, as a private resort, as a private ranch, and as a state park. Because of its history, the property includes unique human-made features—such as the formal gardens area. In addition, the park includes distinct and sensitive natural resources—such as the waterfalls and caves. In terms of recreational use, these resources have the potential to be in conflict with the purposes and structure of the Oklahoma State Park brand.

There is no current standard for what qualifies as a state park; and the branding process is currently underway. The Oklahoma process for determination of a state park tends to be more politically oriented than property and experience oriented. However, it is essential to consider the criteria of a resource to be branded as a “state park.”

What is a “state park?” Jordan and Caneday addressed this question in an earlier report for OTRD as a part of the state park visitor study in 2003 (Caneday & Jordan). As stated in that report –

The research team believes that the term “state park” should mean something specific. The term, “state park,” should identify a property distinctively through management practices, quality of experience and appearance to the public. The research team believes that visitors to Oklahoma “state parks” should know immediately that they are in a State Park because of the distinctive “branding” apparent to the visitor and deliberately intended by management. The research team believes that the Oklahoma Tourism and Recreation Department must jealously guard the use of the term “state park” in much the same manner as companies protect symbols of intellectual property.
An example of resource qualifications for specific classifications can best be demonstrated through the National Park Service. For a property to be classified as a National Park there must be (1) evidence of national significance for a natural, cultural, or recreational resource, (2) management of the property must be feasible, and (3) the property must be suitable within the mission, purpose, and system of the National Park Service.

By contrast, other classifications of National Park Service properties include National Recreation Areas (such as the Chickasaw National Recreation Area in Oklahoma) and National Preserves. National Recreation Areas should be able to maintain a high recreation carrying capacity for all-purpose recreational use, and may be managed by entities other than the National Park Service. National preserves are limited to significant environmental resources and may vary in ownership and management of the resource.

OTRD policy related to acquisition of property uses some of this language, thereby establishing a general pattern of resource qualification. These criteria include (1) statewide significance for natural beauty, uniqueness, or other recreational and resource preservation purposes; and (2) sites which will improve the overall availability of public recreation facilities to the recreating public while possessing resource significance (Oklahoma Tourism and Recreation Commission, 1988).

In addition, branding and classification of properties within the Department has varied over the years. Minutes of the Oklahoma Planning and Resource Board (a precursor to the Oklahoma Tourism and Recreation Commission) from September 18, 1953 record the passing of a motion defining state parks, state recreation areas, state memorials, and state monuments. That variation in descriptive classification was changed by legislation during the 1980s.

Applying the national concepts to state parks in Oklahoma and utilizing the earlier property designations in Oklahoma, it could be concluded that a state park must (1) have a significant statewide natural, cultural, or recreation resource, (2) be feasible to manage by the agency, and (3) be suitable within the mission, purpose, and statewide system of state parks. If this set of qualifications is applied to Natural Falls State Park, it could be concluded that:

1. The Natural Falls State Park property offers a natural and environmental resource of statewide significance. Further, it could be argued that the cultural/historic resource is also significant from a statewide perspective. While some visitors come from distant states, the property tends to attract a relatively localized clientele.

2. The Natural Falls Park property is feasible to manage within the agency.

3. The Natural Falls State Park property fits within the mission of OTRD to preserve and manage the natural assets of the state.

As a result, the research team recognizes the value of Natural Falls State Park as a state park because of the natural and cultural/historical environment and the need to preserve and manage those assets. It is appropriate to brand as a state park based on the present recreational use, structures, and patterns of visitation.

Alternatives:

A. Remove the cultural/historic human-made features that are outside the common definition of a state park and focus on the natural environment.
B. Refurbish the cultural/historic human-made features that are outside the common definition of a state park and focus programming on those elements.

C. Refurbish and maintain the cultural/historic human-made features, and focus on preservation of the natural and environment assets.

D. No Action (maintain the current blend of human-made and natural resources for recreational use).

Preferred Plan: Alternative D – No Action.

• Maintain the current blend of human-made and natural resources for recreational use. This will, at the least, require a strategic plan to refurbish and preserve the historical and natural features in the park.

**Issue Statement 2: Security and controlled entrance to the park**

Visitor safety and collection of entrance fees Natural Falls State Park require controlled access through a specified park entrance, however, a lack of fencing and gates allows access from many locations directly from E 580 Road.

Background: Natural Falls State Park is one of three state parks where an entrance fee is collected. This requires controlled and directed visitor access. An unfenced and open grass playing field on the northwest side of the park is adjacent to E 580 Road, allowing open access for individuals who drive across the field to enter the park. In addition, the entrance area at the Visitor Center lacks a control gate. This is also true of the campground area—there is no gate or control at the entrance to the camping area.

In addition, the current entrance and exit areas of the park can be confusing to park visitors. The entrance area where one stops to pay the entrance fee is poorly indicated, and the drive-through window will not accommodate an RV. At busy times incoming traffic is two lanes wide, yet only one lane is directly observable to park staff in the office area. Further, visitors frequently (yet unknowingly) exit through the entrance area and enter through the exit area. In addition to a redesign of the entrance and exit to the park, signage providing information related to traffic flow is needed at both exit and entrance points.

A dirt racetrack is located within one-quarter mile of the park (racing season mirrors the primary camping season at Natural Falls State Park). In addition, a 50,000 sq ft casino is in final stages of construction a few miles west of the park. Camping is an inexpensive alternative to hotel/motel lodging in the nearby area. Thus, it is possible that the numbers of potential campers may increase, and that the character of those overnight guests may change.

At the same time, staff have indicated a desire to “maintain this park as a family-oriented destination” (Staff, 2008). In their evaluations, visitors have commented that people enter the park after hours, and often are noisy and disrespectful of legitimate overnight guests.
Alternatives:

A. Erect a fence at the northern park border and a control gate at the park and campground entrances; modify campground hours to have specified ‘open and closed’ hours; redesign the park entrance and exit.

B. No Action (continue to have an open border).

Preferred Plan: Alternative A

- Erect a fence at the northern park border and a control gate at the park and campground entrances; modify campground hours to have specified ‘open and closed’ hours; redesign the park entrance and exit.

**Issue Statement 3: Reservation policies and marketing**

Natural Falls State Park accepts reservations for the campground, the Red Fern Reunion Center, the formal gardens area, and the Carnes Picnic Shelter.

Background: Rental fees for the various structures and recreation opportunities at Natural Falls State Park have existed since the opening of the park. A review of Internet and hard copy materials related to the park reveal that the only information regarding reservations is related to RV camping. And, while Natural Falls State Park does receive a fair amount of rental use, marketing materials do not appear to mention the reservation availability of formal gardens area, picnic shelter, and Reunion Center. According to rental records, the Carnes Picnic Shelter and the Red Fern Reunion Center are rented approximately three days a month, and the gardens are rented two days each month, on average. Visitors can make reservations for any facility up to one year in advance; evaluations indicate that those who have used the reservation system are pleased with the process.

Related to facility rental is the ability to lease space in the park for day use (open grass field), and for long-term temporary storage of RVs (northeast parking lot). As with the above-mentioned issues related to reservations, information about the availability of these types of rentals appears to be done on a relatively informal basis. The availability of storage space for RVs may require that formal policies and processes be developed to minimize risk exposure to the state. These policies and processes may involve storage/lease agreements including waivers of liability to the property as well as to visitors who may be injured by accidental vehicle movement. Further, as more visitors become aware of the availability of the storage area, limited parking may become a problem.

Alternatives:

A. Provide only ‘first-come, first-served’ camping and facility use; disallow RV storage on-site; use only word-of-mouth marketing.

B. Review, develop, implement, and evaluate a reservation and rental plan for all available opportunities at Natural Falls State Park; this would require the establishment of appropriate policies and procedures, as well as a complementary marketing plan.

C. No Action (continue to use informal policies and procedures for rentals; allow word-of-mouth to remain the primary method of information-sharing with the public).
Preferred Plan: Alternative B

- Review, develop, implement, and evaluate a reservation and rental plan for all available opportunities at Natural Falls State Park; this would require the establishment of appropriate policies and procedures, as well as a complementary marketing plan.

**Issue Statement 4: Additional recreational development**

Natural Falls State Park provides unique human-made and natural features, which serve to draw visitors. Recreation development is restricted to camping, play structures, limited lawn/sport courts and fields, hiking trails, group picnic shelter, a formal gardens area, and multipurpose indoor facility.

Background: When Natural Falls State Park was acquired as a state park, initial development thoughts included constructing a 9-hole golf course, additional camping areas, an interpretive center, and other recreation facilities. Staff have indicated a desire to add a gazebo structure to the formal gardens area, as well as a trailhead information kiosk at the start of the Dripping Springs trail. The construction of a wildlife blind in the southern section of the park has also been articulated.

The one feature unique to this state park is the 77-foot waterfalls; this is frequently cited as a primary draw to the park. The falls flow in a somewhat sensitive Ozark environment including vulnerable species of bats and plants, as well as the stream and watershed. In addition, the steep and rocky terrain along the bluff and trail system is prone to erosion.

In response to the stated desire for visitor-intensive recreation development at Natural Falls State Park, soil studies were conducted to determine suitability for motorcycle, horseback riding, and hiking trails; camping, playground, and picnic areas; and sewage disposal options. The soil studies show that while few limitations would exist to prohibit trail development in the park, the property is not well situated to include a golf course or additional playground, picnic, or camping areas. Because of the environment and the focus of the park, horseback riding and motorcycle (and mountain biking) trails would not be appropriate.

Currently, black water sewage is temporarily contained in underground holding tanks, which are pumped out once a month by a private contractor. Park staff are responsible for pumping and transporting gray water. Soil types in Natural Falls State Park have been rated as very limited for a septic system or sewage lagoons to treat black water, indicating incompatibility for this type of use. However, a black water treatment lagoon is currently in the planning phases, and is slated to be in place within a year. Its location is south of the falls, away from general public use areas.

Alternatives:

A. Construct additional visitor-intensive recreation opportunities such as a 9-hole golf course, interpretive center, and camping facilities.

B. Construct selected recreation facilities that are suitable for the environment, and which enhance appropriate interaction between visitors and the natural environment.

C. No Action (maintain the existing recreation and natural resources).
Preferred Plan: Alternative B

- Construct selected recreation facilities that are suitable for the environment, and which enhance appropriate interaction between visitors and the natural environment. These might include a gazebo in the formal gardens area, additional hiking/walking trails, an information kiosk at the head of the Dripping Springs trail, and an interpretive center in the day use area.

**Issue Statement 5: Protection of natural features**

Natural Falls State Park includes many unique natural features including a 77-foot waterfall, caves, and sensitive areas that support vulnerable flora and fauna.

**Background:** The Park includes three trails, one of which leads to an overlook to the waterfalls. All trails include multiple surface types and have been maintained to varying degrees. Because of desires of visitors to get into the natural environment and the steepness of the terrain, several concerns exist: the development of social or volunteer (non-designated) trails that lead into sensitive or unsafe areas; trail erosion and surface wearing; unlawful entry into caves and grottos; and unlawful swimming in the stream and pools.

**Alternatives:**

A. Develop, implement, and evaluate a trail maintenance plan, with an aim to stabilize trail surfaces and encourage visitors to stay on designated trails.

B. Develop new trails near the campground area and to the falls, ensuring accessibility for all.

C. No Action (continue the existing maintenance plan).

Preferred Plan: Alternative A

- Develop, implement, and evaluate a trail maintenance plan, with an aim to stabilize trail surfaces and encourage visitors to stay on designated trails. This could include additional interpretive and safety signage along the trails.

**Issue Statement 6: Education of and interpretation for visitors**

Natural Falls State Park has a 100-year history as deeded property, which would be of tremendous interest to visitors and area residents. Many original features and structures that would lend themselves to interpretation and education exist or are available to park staff. Currently, no educational or interpretive programs or facility are present.

**Background:** With a known property history dating back to the late 1800s, Natural Falls State Park offers multiple opportunities for education and interpretation of the human history of the area. Several early structures (e.g., Ram pump, stage, refrigeration cistern, low water dams), photographs, and stories exist that would lend themselves to historical interpretation. In addition, the natural environment includes edible and medicinal plants, and habitat appropriate for a wide variety of birds, mammals, and reptiles. Further, it would not be unexpected to find...
evidence of early (Paleo, Villager, Woodland) peoples in the park environment, as well as fossils of various plants and animals.

Alternatives:

A. Develop a comprehensive education and interpretive curriculum and program, and construct an interpretive center; replace all worn interpretive signs, relocate them as necessary, and add new signs where appropriate.

B. Remove all existing interpretive signs; eliminate references to local history in park information.

C. No Action (do not develop any interpretive or educational programs or services)

Preferred Plan: Alternative A

• Develop a comprehensive education and interpretive curriculum and program, and construct an interpretive center; replace all worn interpretive signs, relocate them as necessary, and add new signs where appropriate.

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**Issue Statement 7: Relationship to the proposed Ozark Plateau National Wildlife Refuge expansion**

The U.S. Fish and Wildlife Service proposed the expansion of the Ozark Plateau National Wildlife Refuge by conservation easement or contractual agreement with willing landowners. Natural Falls State Park is located in the premier focus area for this expansion and offers features that would be very attractive as habitat for inclusion in the expanded refuge. As public property, such an agreement could have mutual benefit to the State of Oklahoma and the US Fish and Wildlife Service.

Background: As presented earlier, Natural Falls State Park is located within the primary focus area for expansion of the Ozark Plateau National Wildlife Refuge. Expansion of the refuge is based on the premise that “habitats would be protected by acquiring lands in fee title or in conservation/access/management easements at fair market value from willing sellers and donors” (USFWS). Since Natural Falls State Park is already in the public domain, there would be no need to acquire the lands for the refuge. However, a conservation easement between the USFWS and Oklahoma State Parks would offer protection for the sensitive resources on the premises.

It could be perceived that a conservation easement would introduce another layer of bureaucracy for all management decisions. It is likely that such an easement would be fully compatible with the mission of OTRD and purpose of Natural Falls State Park, while not presenting incompatible bureaucracy for management.

Alternatives:

A. Negotiate a conservation easement or contract with the USFWS to include Natural Falls State Park in an expanded Ozark Plateau National Wildlife Refuge.

B. No Action (do not pursue an agreement with USFWS).
Preferred Plan: Alternative A

- Negotiate a conservation easement or contract with the USFWS to include Natural Falls State Park in an expanded Ozark Plateau National Wildlife Refuge.

**Issue Statement 8: Need for buffer around state park property**

All state park properties face the possibility of encroachment and influences from neighboring lands; Natural Falls State Park is no exception. Encroachments might be in the form of excessive noise, light, odors, and other nonpoint pollutants. In addition, it is not uncommon for private fences to be erected several feet inside park boundaries.

Background: Natural Falls State Park is a small park surrounded by private land holdings. The northern border is a state road; north of that is a small strip of private land (1/8 mile wide), and north of that is Highway 412. To the south, west, and directly east are agricultural lands. During various seasons of the year, noise from farm vehicles as well as odors (organic fertilizer) emanate from these properties. One quarter of a mile northeast of the park is a commercial race track, which holds races on weekends from mid-afternoon through the early hours of the following morning. Noise and lights are the two primary pollutants from this entity that encroach upon the natural experience in the park.

Alternatives:

A. Review adjacent properties for possible acquisition to augment the state park.

B. Review adjacent and nearby properties for possible acquisition to serve as unimproved buffer areas to the state park.

C. No Action (do not consider any more property acquisition).

Preferred Plan: Alternatives A and B

- Review adjacent properties for possible acquisition to augment the state park as well as to serve as unimproved buffer areas to the state park.

**Recommendations Beyond the Issues**

During the preparation of the Resource Management Plan, it became apparent that there were a number of recommendations that need to be considered, which were not specifically addressed in the Issue Statements. These recommendations focus on day-to-day management and would be of value regardless of implementation of the preceding alternatives.

**Recommendation 1: Move the maintenance barn contents and fuel storage tanks**

A new maintenance facility was constructed in 2001, and yet is not in use. The existing maintenance facility is in full view and access to the public and is located very close to the day use area. The fuel storage tanks are in need of appropriate OSHA signage. Further, appropriate fencing to guard against public access and vandalism is necessary. Moving these structures to the newer maintenance area to the east will resolve the public and environmental safety concerns that currently exist.
**Recommendation 2: Ensure that all new construction meets or exceeds external requirements**

To meet the missions of the OTRD and State Parks Division, it will be important to ensure that all new construction, as well as any major renovations to existing structures, meets or exceeds external standards such as those articulated by the Americans with Disabilities Act (ADA) and Leadership in Energy and Environmental Design (LEED) program. The LEED program will facilitate the park staff goal of ensuring environmentally responsible policies and actions.

**Recommendation 3: Develop a risk management plan**

A risk management plan is a necessity for all state parks. A thorough plan will include a risk management philosophy statement as well as an assessment of the risks (both natural and human-made). Policies and procedures designed to reduce those risks, as well as those that address any injury (to person or property) must be included. Processes and forms such as maintaining an incident log, accident and incident reporting, rental and storage (e.g., RV) agreements, and clearly articulated policies are also important elements of a risk management plan. Other elements would include evacuation plans (from the canyon area, campground, and park), a severe weather plan, limb management program, playground inspection (utilizing a Certified Playground Safety Inspector), and planned responses to environmental hazards due to such things as fuel or sewage lagoon spills or leaks. It is also recommended that each state park have an automated external defibrillator (AED) on site, as well as staff trained in first aid and CPR.

**Recommendation 4: Attend to play structure safety**

The surfaces for the independent play structures, as well as the integrated playgroup need to be inspected and repaired, then sustained with a routine maintenance inspection in compliance with CPSC guidelines. In addition, the swings in both the campground and day use areas appear to be higher off the ground than would be safely useable by children and youth. Signage indicating appropriate age groups and recommending parental supervision should be posted near each playgroup.

**Recommendation 5: Correct existing marketing information**

Multiple items in print and on the Internet provide erroneous information related to Natural Falls State Park. Some of these items are the responsibility of OTRD and should be corrected; some of the information is on commercial or personal websites where the authors have repeated out-of-date information.

**Recommendation 6: Examine and refine office procedures**

It appears as though some office policies (e.g., 50¢ walk-in fee, weekly incident reports) are relatively informal in nature. Nowhere, for instance, is the walk-in fee posted or apparent to visitors upon entering the park. People are informed about the reduced fee when they question the $3.00 per vehicle charge. While it is essential to ensure equitable access to all citizens, it is also important to be consistent and fair. Thus, signage and marketing materials should provide complete information relative to entrance fees, including any discounts for seniors and those with disabilities.

In addition, reservation and incident/accident reporting procedures should be consistent and complete, and be retained for a minimum of seven years. If at all possible, such record keeping
should be computerized and/or digitized (i.e., hard copies scanned) for long-term and easy access. Further, information learned from comment cards should be entered into a database and analyzed for trends and other pertinent information.

**Recommendation 7: Increase awareness of the fishing lake**

It was apparent that most visitors (almost two-thirds) were unaware of the fishing lake. As a natural feature directly related to the primary park feature (waterfall), the fishing lake could provide alternative natural resource-based recreation opportunities. Staff have indicated a desire to stock the lake with trout. This plan should be thoroughly examined prior to implementation to ensure viability of the fish and the existing resource.

**Recommendation 8: Ensure accessibility to those with disabilities**

Ensuring accessibility to park features, as appropriate, is important to park visitors. Several of those individuals contacted indicated that members of their parties are older individuals and accessible restrooms and showers in the campground area are very important. Further, accessible trails and playgroup equipment are desirable for visitors. Trail accessibility must be measured against any negative impact on the natural resources of the park. Buildings and structures should also meet ADA requirements. Braille signage, a TDD-designated public phone for those with hearing impairments, and attention to doorways, thresholds, and door opening/closing pressure should all be checked and adjusted, as needed.

**Recommendation 9: Renovate the RV camping area**

Campground and RV site renovation will be needed in the near future. Public input suggests that 50 amp electrical hook ups are very important at all sites and should be added at each site. As long as a sanitary dump station is provided, sewer hook up at each site was not deemed to be critical to users; thus, staff may wish to wait to add this particular amenity.

Premium campsites were not viewed as very important to campers, and may not be necessary in a renovation. The definition of *premium* varies by individual camper. Natural Falls State Park defines a *premium* site as one close to the shower house, and which has a decorative fire ring. Many individuals reported that they did not use the fire rings in the campground. In addition, to many people, a *premium* site is one that is private and away from the restrooms/shower house, has extra space, and that is well shaded. Park staff may wish to revisit the concept of and need for premium RV sites.

To maintain RV site aesthetics as well as functionality, soil compaction and tree replacement will need to be addressed. The trees are aging and severe storms often damage limbs and open the trees to disease and insect infestation. A tree replacement plan is needed to maintain a diversity of tree species, age, and appropriate location.

**Recommendation 10: Integrate plywood cut-out figures (dragon, bears) at the Bear Trail entrance into appropriate surroundings**

The caricatures of bears, a bear chasing a park ranger up a tree, and a dragon’s head at the entrance to the Bear Trail seem out of place with the wooded, natural surroundings. Suggestions include providing interpretive information relative to these objects, moving the objects to the playground area near the campground bathhouse, or removing them altogether.
**Recommendation 11: Update information to websites containing Park information**

In current times many travelers and park visitors get their information from the Internet; thus, it is important that correct and consistent information be provided on the Web. Each of the websites listed below includes descriptive information about Natural Falls State Park. While most of the websites are outside of the purview of OTRD (many of the sites invite park visitors to post their own reviews), it might be wise to contact the respective webmasters and provide them with up-to-date information about the park.

- http://www.beta.travelok.com/parks/parkDetail.asp?id=1+5U+3603
- http://okonline.com/parks-green.html
- http://www.ohwy.com/ok/n/natfalsp.htm
- http://www.lasr.net/pages/park.php?Park_ID=OK03sp003
- http://www.shopoklahoma.com/naturalf.htm
- http://parksoklahoma.com/

**Recommendation 12: Sustain friendly and caring staff**

Those who completed comment cards, responded to the park evaluation, and who voluntarily post information about Natural Falls State Park on the Internet were exceedingly consistent in their praise of staff. Almost every respondent indicated that Natural Falls State Park staff were friendly, caring, responsive, and professional. The staff should be commended for these qualities.
References


Reeves, A.R. (October 1, 1938). First Annual Report of the Division of State Parks. Oklahoma Planning and Resources Board. Oklahoma City, OK.


Talbot, V. (no date). The Old Mill. The Talbot Library and Museum, Colcord, Oklahoma.

