Chapter 3
AFFECTED ENVIRONMENT

The Hensley Settlement

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CHAPTER 3
AFFECTED ENVIRONMENT

This section describes characteristics of the existing environment that could be affected by the proposed action alternatives and the No Action Alternative (continue current management). The description of the affected environment focuses on the impact topics retained for further analysis as described in Table 3 of Chapter 1. These include: cliffs, caves and karst, soils, water quality, fisheries / aquatic resources, wetlands, vegetation – native plant communities, species of special concern, historic and cultural resources, and design of the built environment, ethnographic resources/sacred sites, socioeconomics, visitor use and experience and viewshed, transportation, soundscape, park operations, and concessions and commercial services, The affected environment establishes the baseline for analysis of impact in Chapter 4, "Environmental Consequences." Impact topics described in this chapter are listed in Table 3 of Chapter 1, "Purpose and Need for a General Management Plan."

NATURAL RESOURCES

This section describes the characteristics of natural resources in the park according to the impact topics that were retained based on the criteria defined in Chapter 1. These include: cliffs, caves and karst, soils, water quality, fisheries / aquatic resources, wetlands, vegetation – native plant communities, and species of special concern.

Geology – Cliffs, Caves, and Karst

Cliffs

Numerous large sheer cliffs occur in the park that provide spectacular scenic vistas, including, for example, the Pinnacle, located near Cumberland Gap, and the White Rocks, located on the southern side of Cumberland Mountain at the northeastern end of the park near Ewing, Virginia. The Pinnacle is the number one visitor attraction in the park, and is near Cumberland Gap. The White Rocks rise almost vertically from Poor Valley to an elevation of 3,513 feet and were an important landmark for pioneers heading to Cumberland Gap. The White Rocks were formed from resistant sandstone capped with conglomerate that contains hematite, the mineral form of iron oxide.

Caves

Twenty four caves in the park developed on Cumberland Mountain. The overlying mountains are part of a large over thrust block made of shale, limestone, sandstone, conglomerate, and layers of coal (NPS 1998a). Caves form over long periods of time by dissolution of the limestone layers by rainwater that contains carbonic acid. These natural caves, ranging from 60 feet to approximately 5 miles long, are located along the south face of Cumberland Mountain, within the Greenbrier limestone formation (NPS 1998a). The importance of one cave, once referred to as Cudjo Cavern and identified as Gap Cave in this general management plan, was recognized in the park's 1940 establishing legislation (54 STAT 262). More recent legislation, such as the Federal Cave Resource Protection Act of 1988, defined caves as an important national resource that must be protected and preserved for the perpetual use, enjoyment, and benefit of all humankind. The NPS *Management Policies 2006* further affirm the significance of cave resources. Significance of the caves in the park is related to an unusually large variety of cave formations and because the largest cave (Gap Cave) harbors the federally endangered Indiana bat. Evidence for historic occupation of Gap Cave by the federally endangered gray bat has also been shown (NPS 1998a). Finally, the caves of the park are likely to be an important cultural resource (NPS 1998a). Following is a summary of the main features of caves in the park (excerpted from OSM (1996) and NPS (1998a).

Eleven of the caves are located within an approximately 1,900-acre tract that was originally owned by Lincoln Memorial University between 1920 and 1947. In 1947, ownership of the tract was transferred to the Commonwealth of Virginia. However, the university retained water rights to the underground stream (Gap Creek) that supplies water to Lincoln Memorial University and the communities of

Cumberland Gap and Harrogate. Between 1947 and 1992, the University retained rights to conduct commercial tours in the caves, and a series of concessioners were contracted for this purpose. Infrastructure was installed in the caves to support this business enterprise. This included improvements around the cave entrances, the addition of lighting, walkways, doors, a store, a water reservoir, and a small parking area. These 11 caves were acquired by the NPS in 1992. The NPS currently owns and manages the entire system of caves on Cumberland Mountain, including Gap Cave.

Of the 11 caves, two primary caves have been historically open to the public: King Solomon's Cave and Soldier's Cave. These were connected by a tunnel in 1934. The combined cave was then named Gap Cave, which was then changed to Cudjo Cavern after a fictional character in a regional novel. The name Gap Cave has been retained for purposes of this general management plan.

The majority of the infrastructure constructed in Gap Cave by Lincoln Memorial University was removed or greatly modified by the NPS as part of a restoration project. Today, to augment the cave experience, visitors experience ranger-led guided tours using flashlights to view cave features. A system of stairways and handrails was also installed.

Radon monitoring, for caves that receive visitors, began in 1977 (NPS No Date). During the summer months, high readings of radon were found at Indian Cave. Indian Cave was gated in 2001 for reasons other than radon levels. Gap Cave (formerly Cudjo Caverns) has four radon monitoring sites that are monitored year round. Based on guidance set forth in Occupational Safety and Health Administration regulations regarding occupational radon exposure (29 Code of Federal Regulations 1910.1096), radon levels in the cave are far below levels that would be hazardous to park staff that frequently visit the cave (NPS 2006d). Visitors are in the cave for such a limited time that their exposure is nearly incalculable.

Gap Cave is part of a larger cave system that extends approximately 5 miles in total distance. However, parts of the system are still unexplored. Gap Cave is nationally known for its wide variety of geological formations. These include a massive 60-foot high stalagmite, corrugated rim basins, concretions, fern-like crystal growths, bacon strip and curtain draperies, terraced stalagmites, helicites (curved or angular twig-like projections of calcium carbonate), and delicate straw-shaped stalactites (NPS 1998a). Some of the cave's dome pits are up to 125 feet deep.

Few ecological studies have been conducted in Gap Cave. Both ecological and geological resources in caves are known to be delicate and easily impacted dramatically by human use. Further inventories are needed to better understand and protect Gap Cave resources.

The upstream section of Gap Cave is a critical hibernating area for the federally endangered Indiana Bat (*Myotis sodalis*). There is also evidence that federally endangered gray bats (*Myotis grisescens*) may have historically used Gap Cave as a summer habitat (NPS 1998a).

Caves in the park provide an important habitat for a wide variety of bats, as well as wood rats, beetles, phoebes, foxes, and bobcats. A variety of mosses and lichens also grow near the cave entrances.

The first known use of Gap Cave by humans was approximately 9,000 years ago. During the Civil War, cave dirt containing saltpeter was mined in the greater Gap Cave System.

Many of the caves in the park are located in Cumberland Mountain but do not extend into the interior of the mountain through extensive recognizable passageways. These caves are shallow erosional features located along the south side of Cumberland Mountain. The best known example is Sand Cave, located 0.75 miles west of the White Rocks at the east end of the park. Sand Cave is 240 feet long and 84 feet wide and is located beneath an erosion- resistant sandstone ledge. No passages extend into the mountain. The floor of the cave is approximately 1.25 acres in extent and is covered with deep deposits of colorful sand formed by water percolating through the rocks above. Water originates from rainfall and a wetland located directly above the cave (NPS 1978a).

Karst

Karst features include several limestone sinks located along Cumberland Mountain. The best known example of a karst sinkhole is Goose Nest, located approximately 7 miles east of the Pinnacle. Several open vertical karst pits, up to 100 feet in depth and 3 feet in diameter, can also be found in the park.

Soils

Cumberland Gap National Historical Park encompasses approximately 24,531 acres of land and contains over 60 individual types of soils. Seven soil types represent over 75 percent of the total area and are discussed below. Appendix C includes a list of all soil types that occur within the park, including the number of acres of each soil type and the percentage of the total park acreage. Appendix C also includes descriptions, general use, vegetation, and locations for each soil found within the Fern Lake Watershed.

Many of the soils in the park have limitations for building and development due to slope, erosion potential, and shallow bedrock. Soil erosion associated with construction, therefore, has a potential to affect water quality in adjacent streams.

In addition to the above information, descriptions of soils in the Fern Lake watershed are also presented in the environmental impact statement prepared in conjunction with a petition with the U.S. Office of Surface Mining to designate certain lands in the Little Yellow Creek watershed as unsuitable for all surface coal mining operations under the federal program for Tennessee (30 Code of Federal Regulations 942.700) (OSM 1996). Appendix C also includes a summary of this information, excerpted from the original environmental impact statement.

Water Quality

Water quality in the park is protected and managed under the Federal Water Pollution Control Act Amendments of 1972 and the Clean Water Act of 1977. *NPS Management Policies 2006* also require the protection and conservation of water quality in the park. Water quality is primarily the net result of overall watershed characteristics and the effects of point-source and nonpoint-source discharges of pollutants. This section includes a summary of the characteristics of watersheds in the park and a summary of existing water quality in streams, lakes, and ponds located within the park, including Fern Lake.

Watershed Characteristics

The park is located within the Powell and Upper Cumberland (U.S. Geological Survey Cataloging Unit: 05130101) watersheds, which encompass Bell, Campbell, Claiborne, Hancock, Harlan, Norton, Scott, Wise, Letcher, Union, and Lee Counties (USEPA 2007). Drainages located within Bell County are the Upper Cumberland and Powell. Watersheds located within Claiborne County include Upper Cumberland, Upper Clinch, and Powell. Watersheds located in Harlan County include Middle Fork, Upper Cumberland, and Powell. Watersheds located in Lee County include Upper Cumberland, Upper Clinch, and Powell.

Hydrology in the park is an interactive process between surface water flow and groundwater flow. During dry weather, small first and second order streams commonly dry up, and flows in major streams and rivers may be attributed to base flow contribution from groundwater (OSM 1996). The majority of streams in the park are smaller first and second order streams. Surface water drains into either the Cumberland River or Powell River drainage basins, while the groundwater is a part of the Non-glaciated Central Region (OSM 1996).

Streams generally flow in opposite directions from the top of the Brush Mountain and Cumberland Mountain ridges (Nicholson 1978). Hillsides are characterized by steep hollows drained by relatively small streams that are seasonally flooded. Four permanent streams drain the northwest slope of the park. In the western end of the park, Little Yellow Creek receives flow from Fern Lake and ultimately

connects to Yellow Creek in Middlesboro. Sugar Run and Davis Branch flow into Yellow Creek and then into the Cumberland River.

Shillalah Creek and Martins Fork are the primary streams in the eastern end of the park and drain into the Cumberland River. The southeastern side of Cumberland Mountain is drained by Station Creek near the Wilderness Road Campground. Several smaller intermittent streams also drain the southeastern face of Cumberland Mountain. Lower volumes of surface water drain off the southeast face of Cumberland Mountain because it is steeper then the northern side of the mountain.

Fern Lake is a 150-acre public water supply for Middlesboro, Kentucky, located southwest of the park visitor center. The City of Middlesboro withdraws about 1.5 million gallons of water per day from Fern Lake or about 547.5 million gallons per year (1,668-acre feet per year).

Based on an examination of the National Wetland Inventory maps (USFWS 2007b), several small man-made ponds also exist within the park boundaries (Appendix E). The majority of these ponds occur in relatively undisturbed areas of the Fern Lake watershed at the southwestern end of the park. These ponds have been created by either dikes or excavations. No information on water quality of these small ponds is available, but since they are located in a relatively undisturbed watershed, it is likely that water quality is relatively good.

Karst geology of the park creates large amounts of groundwater that originate on top of Cumberland Mountain from rain events. Rainwater percolating downward enters a vast karst system of caves and crevices. Water emerges at various locations along the base of the mountain where it enters surface streams. Gap Cave is a good example of how this works. Water leaving Gap Cave has excellent water quality and is used as a source of drinking water. The water is tapped, treated, bottled, and sold by the Cumberland Gap Spring Water & Middlesboro Coca-Cola Bottling Company, Inc.

Water quality in streams and lakes is affected by land uses within the watershed, geology of the area, soil erosion, vegetation, and soil nutrients. Because the majority of the park is relatively undisturbed and elevated directly above the surrounding areas, surface water originating within the park provides an abundance of clean water to the region. Water quality of streams and Fern Lake is described in the sections that follow.

The following evaluation of the condition of the streams, ponds, and lakes in the park is based upon the ability of each water body to support designated uses for fishing, aquatic life, swimming, drinking water, etc., in compliance with the state and federal regulations in each of the three states. Most water bodies at the Cumberland Gap National Historical Park are classified as fishable and swimmable. Primary sources of information for this assessment were the 2002-2004 Water Quality Reports to Congress (state water quality reports to Congress as required under section 305(b) of the Clean Water Act) (TDEC 2002; 2004) from the states within Cumberland Gap National Historical Park (Virginia Department of Environmental Quality, Tennessee Department of Environment and Conservation, Kentucky Division of Water).

The 303(d) list (TDEC 2004a) was also referenced to describe existing water quality in the park. The 303(d) list is a compilation of the streams and lakes that are water quality limited or are expected to exceed water quality standards in the next two years and need additional pollution controls. Water quality limited streams are those that have one or more properties that violate water quality standards. They are considered impaired by pollution and not fully meeting designated uses. However, because the majority of the water bodies in the park are located in natural or wilderness areas, most of the streams in the park are characterized by good water quality (Table 11).

Table 11. Water Quality in the Principal Streams and Lakes in Cumberland Gap National Historical Park Based on U.S. Environmental Protection Agency Assessments[1]

Name	Watershed/State	Stream Order Inside Park[2]	Condition	Setting	Land Use
Fern Lake	Upper Cumberland/ TN and KY	N/A	Good	Natural	Wooded/Natural
Indian Creek	Powell/VA	1	Good	Natural	Wooded/Natural
Devils Garden Branch	Upper Cumberland/ KY	1	Good	Natural	Wooded/Natural
Lewis Hollow Branch	Powell/VA	1	Good	Natural	Wooded/Natural
Davis Branch	Upper Cumberland/ KY	1 and 2	Good	Natural	Urban in lower section, wooded/natural in upper section
Sugar Run	Upper Cumberland/ KY	1 and 2	Good	Natural	Wooded/Natural
Martins Fork Branch	Upper Cumberland/ KY	1, 2 and 3	Good	Natural	Wooded/Natural
Station Creek	Powell/VA	1 and 2	Good	Natural	Wooded/Natural
Shillalah Creek	Upper Cumberland/ KY	1 and 2	Good	Natural	Wooded/Natural
Gap Creek	Powell/TN and VA	1 and 2	Good	Mix of Natural and Urban	Small part of upper Gap Creek is located in wooded/natural setting; the rest is located in relatively urban setting. Stream adjoins Town of Cumberland Gap.
Little Yellow Creek	Upper Cumberland/ KY	1, 2 and 3	Some contamination	Mix of Natural and Urban	Mix of Urban and Wooded
Upper Little Yellow Creek (Above Fern Lake)[3]	Upper Cumberland/ TN	1, 2 and 3	Generally good[3]	Natural	Wooded/Natural

[1] Stream Order refers to the relative size of streams. Stream orders range from smallest (1) in the uppermost portion of a watershed to the largest (12) in the lowermost part of the watershed.
[2] Source: TDEC (2004)
[3] Note: Upper Yellow Creek was not included in the USEPA (2007) assessment. Information on water quality obtained from OSM (1996).

Fern Lake

The general water quality of Fern Lake is good from both a chemical and sediment load basis (OSM 1996). However, water quality of Little Yellow Creek below Fern Lake has been affected by sedimentation and runoff. In the environmental impact statement prepared in conjunction with the determination of the watershed as unsuitable for coal mining (OSM 1996), the sediment load characteristics of Little Yellow Creek below Fern Lake were assessed and compared to another local watershed that had been mined. Following is a summary of the results of these investigations (excerpted from OSM 1996):

- For small rainstorms, most sediment is from roads adjacent to Little Yellow Creek. Most sediment is produced on the lower stream segments. Tributaries contain little sediment since few roads or other disturbances are present. Most of the surface flow is from forest litter or materials that move through well vegetated areas downslope by force of gravity or erosion and collect at the base of mountains or foothills, with little or no sorting (colluvial deposits).
- Tributaries on the north side of Little Yellow Creek and Fern Lake had different water quality characteristics than the south side tributaries, as follows:
- Low conductivity values observed on the south side of the watershed are due to differences in geology. Here, the strata is composed primarily of porous sandstone, which allows for much greater groundwater movement through the shallow fracture system and greater leaching of the exposed rock surfaces over time. Groundwater and surface runoff from the area more closely resemble the chemistry of rainwater. Streams on the south side of the lake are acidic with low pH, low alkalinity, and little sulfate.
- In contrast, the tributary streams on the north side of the Fern Lake basin are higher in pH, have moderate alkalinity, hardness, and elevated conductivity. This is due to several factors: (1) the north side of the watershed has a different geologic formation with numerous clay and coal zones, (2) strata have been fractured by stress relief forces, (3) sandstones have lower hydraulic conductivity on the north side, and (4) historic mining and road disturbances are common on the north side of the Fern Lake watershed.
- Groundwater in the Fern Lake basin plays an important part in maintaining the hydrologic balance of the watershed. The many conceptual groundwater models developed in the 1980s and ‘90s appear to concur that mining has had a direct effect on the groundwater regime.
- The water in Fern Lake mirrors the water quality of the tributaries. In fact, many of the tributaries to Fern Lake are derived from springs. The steep gradients allow for a high volume of groundwater flow. This explains why even during heavy rains surface runoff may not be evident and defined stream channels are not as prevalent on the hillsides. Runoff quickly infiltrates into the ground litter and recharges the coarse rocks below or travels as interflow at the intersection of material. This water is able to move quickly to steep drainage draws with colluvial deposits that minimize the surface gullying found in other types of watersheds.
- In areas characterized by alluvial deposits (rock debris that has been eroded into fine sediments and transported by a stream or river to the valley floor), water quality is more affected by biological and geochemical environment than most colluvial deposits. This is because alluvial deposits are usually fine-grained, allowing a larger surface area of the material in contact with the water. The hydraulic gradients are usually much lower allowing more residence time of the groundwater. Two large bodies of alluvial deposits have been mapped within the Fern Lake watershed. The largest mapped deposits are associated with the mouth of Little Yellow Creek at Fern Lake. Part of these deposits makes up a wetland located on the extreme upper portion of Fern Lake.

- Some low-yielding natural springs and seeps can be seen issuing from colluvial and alluvial deposits along Little Yellow Creek. Several of these springs leave an orange colored deposit on the rocks beneath, but the amount of flow is very small (<1 gpm). Sometimes these strained springs are mistaken to be acid mine drainage springs and seeps. Many of these red colored springs, however, come from natural sources of organic matter, bacteria, and algae in the soil.

Fisheries/Aquatic Resources

Aquatic resources in the park, which include fish and annelid worms, mollusks, flatworms, roundworms, and crustaceans (macroinvertebrates), are described in this section. These organisms are excellent indicators of the ecological condition and long-term water quality of streams, rivers, and lakes. Because of the potential for environmental effects on aquatic resources as a result of implementation of the alternatives, a summary of the results of past studies in the area is provided in Appendix F. These studies have included the following:

- One of the first studies of fish in the park was conducted by Barbour, et al. (1979). This included sampling conducted at 12 stations throughout the park.
- The park has also sponsored studies of macroinvertebrates (Copeland, et al. 1992; Skelton and Eisenhour 1993; Skelton and Fraley 1995; NPS 2001d) in conjunction with the U.S. Hwy 25 Tunnel project. The NPS also assessed the condition of the blackside dace in Davis Branch (Stephens 1990-1996, 2006/2007). The blackside dace was initially identified in Little Yellow Creek by McCoy and McCoy Environmental Consultants (1993) as part of baseline environmental information provided in an application by Appolo Fuels, Inc., to conduct surface mining in the Little Yellow Creek watershed.
- In conjunction with the environmental impact statement on the Fern Lake unsuitable for mining petition (OSM 1996), the Tennessee Department of Environment and Conservation (TDEC 1995) conducted a quantitative assessment of fish community structure, a qualitative assessment of benthic macroinvertebrate communities, and an aquatic and riparian habitat assessment at four sampling locations on Little Yellow Creek upstream of Fern Lake.
- An investigation of the aquatic resources and water quality of the Yellow Creek watershed was conducted by the Kentucky Department of Environmental Protection, Division of Water in 1988 and 1990 (KDEP 1990) as part of an ongoing assessment of water quality in the Yellow Creek watershed to assess the extent of water quality improvement associated with upgrading of the Middlesboro Wastewater Treatment Plant in 1986.
- The Kentucky Division of Water Quality (KYDOWQ 1978) and Harker, et al (1980), conducted investigations in the Yellow Creek watershed associated with impacts of coal mine runoff and municipal wastewater effluents in the Yellow Creek watershed.
- An additional inventory of fish species in the park was conducted in 2004 by Albert W. Remley of Third Rock Consultants. Four warm-water and two cold-water reaches were sampled for a total of 1,410 meters of stream length. 1,946 individuals representing 22 species were observed during this project.

Appendix F contains detailed summaries of the results of these investigations. The overall conclusion of these studies was that the fish and benthic populations in the majority of streams in the park are in relatively healthy condition. Benthic populations in Little Yellow Creek, Yellow Creek, and Gap Creek have been affected by construction of the U.S. 25E tunnel project, but recovery is in progress and is expected to continue.

Construction of the U.S. 25E tunnel and elimination of U.S. 25E, resulted in short-term adverse effects on fish and benthic populations in the immediate vicinity of the construction, but recovery has been demonstrated and is expected to continue.

The most recent fish inventory found very few fish in the two cold-water streams in the park. These two streams previously supported a viable introduced brook trout population. Water quality data show a decline in the pH of the water, which may contribute to this decline in the fish population. Further studies will be conducted on these streams in the near future.

Wetlands

This section provides a summary of the numbers, types, acreages, and functions and values of wetlands in the park. Information to complete this assessment was identified from Geographic Information System layers available through the National Wetland Inventory and the NPS (USFWS 2007b; NPS 2006b) and from other available information.

The U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency formally define wetlands as, "Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas," (USACE 1987). Lakes and ponds are also classified as wetlands by the U.S. Fish and Wildlife Service (Cowardin, et al. 1979).

Wetlands perform many ecological functions that have associated value to humanity, including (USFWS 2007a):

- Surface water storage (flood control);
- Shoreline stabilization (wave damage protection/shoreline erosion control);
- Stream flow maintenance (maintaining aquatic habitat and aesthetic appreciation opportunities);
- Groundwater recharge (some types replenish water supplies);
- Sediment removal and nutrient cycling (water quality protection);
- Support of aquatic productivity (fishing, shell fishing, and waterfowl hunting), production of trees (timber harvest);
- Production of herbaceous growth (livestock grazing and haying);
- Production of peaty soils (peat harvest); and
- Provision of plant and wildlife habitat (hunting, trapping, plant/wildlife/nature photography, nature observation, and aesthetics).

Wetlands are defined according to the types of vegetation, soils, and hydrology on a given site (Cowardin, et al. 1979). Appendix E provides the types of wetlands in the park and detailed definitions of each wetland type. Table 11 provides a description of each type of wetland that occurs in the park based on the classification system provided in the U.S. Fish and Wildlife Service National Wetland Inventory (USFWS 2007a). Appendix E provides detailed definitions of each of the wetland types.

The two broad categories of wetlands in the park are the lacustrine (lakes and ponds) system and the palustrine system (emergent, forested, and scrub-shrub) (Table 11). Each system is further subdivided into classes and subclasses based on the type of vegetation, whether the vegetation is persistent or not, and other features (Appendix E). Finally, hydrologic and other "modifiers" such as flooding regime or degree of modification by man (diked, impounded, or excavated) are also used to further define wetland types (Appendix E). Table 12 summarizes the number of acres of each wetland type estimated to occur in the park based on a detailed map of the wetlands; this map is provided by the park.

Table 12. Number of Acres of Each Wetland Type Present in Cumberland Gap National Historical Park[1]

National Wetland Inventory Wetland Type	Total Number of Acres in Park
Emergent	
PEM1A	0.5
PEM1C	0.1
Subtotal Emergent:	**0.6**
Forested	
PFO1A	22.7
PFO1Ah	21.2
PFO1C	18.3
PFO1Eh	1.2
PFO4A	19.5
PFO1/4A	25.9
PFO4/SS1A	3.1
Subtotal Forested:	**111.9**
Scrub-Shrub	
PSS1/EM1C	1.8
PSS1/FO4A	13.0
PSS1/FO4C	1.9
PSS3/FO4A	4.8
Subtotal Scrub-Shrub:	**21.5**
Lakes and Ponds	
L1UBHh	108.7
PUBFh	0.5
PUBHh	0.4
PUBHx	1.2
Subtotal Lakes and Ponds:	**110.8**
Estimated Total Acres of Wetlands:	**244.8**

[1] Acreages and types of wetlands based on U.S. Fish and Wildlife Service National Wetland Inventory maps (USFWS 2007b).

Emergent, Forested, and Scrub-Shrub Wetlands

A total of approximately 0.6 acres of emergent wetlands occur at two locations in the southwestern area of the park. A seasonally flooded emergent wetland is located near the park border southeast of the City of Harrogate. A temporarily flooded emergent wetland is located near Sugar Run along the northern border of the park. Emergent wetlands are typically dominated by sedges and rushes. These are relatively small wetlands but they are typically highly productive and provide valuable habitat for wildlife and amphibians. Emergent wetlands are also typically important in recharging groundwater.

A total of approximately 111.9 acres of forested wetlands occur in the park, comprising six different types of forested wetlands (Table 12). Forested wetlands are associated with the floodplain of Fern Lake and along stream drainages in the vicinity of the park maintenance building area, visitor center, and stream drainages in other parts of the park. The majority of these wetlands are dominated by broad leaved deciduous trees, or a combination of broad leaved deciduous trees with either scrub-shrub vegetation or needle-leaved evergreen trees. The hydrology of these forested wetlands ranges from temporarily flooded to seasonally flooded/saturated habitats. Two of the forested wetland types

have been mapped as being either diked or impounded. Primary functions and associated values of forested wetlands include high rates of primary production, shoreline stabilization, flood control, groundwater recharge, and provision of valuable wildlife habitat.

A total of approximately 21.5 acres of scrub-shrub wetlands occur in the park, consisting of four different types. All these are combinations with either emergent or forested types (with scrub-shrub being the dominant type). Scrub-shrub wetlands are associated with stream drainages near the campground, in the vicinity of Sugar Run, and along Shillalah Creek. The majority of these wetlands are dominated by woody vegetation less than 6 feet in height, or a combination of this with broad leaved deciduous trees or needle-leaved evergreen trees. The hydrology of scrub-shrub wetlands in the park ranges from temporarily flooded to seasonally flooded habitats. Primary functions and associated values of scrub-shrub wetlands are similar to forested wetlands.

Bogs

Several bogs have been identified within the park. These are shown on a map provided by the park service depicting the park. The National Wetland Inventory does not show these wetlands, perhaps due to their small size.

The term "bog" is not fully applicable to these types of wetlands but has been used in the past as a general term to describe "hydric inclusions and mountain wetlands within the southern Appalachian region" (Sandefur 2002). Sandefur (2002) stated that the bogs in the park are actually defined as "open fens" because they are characterized primarily by groundwater inflows from surrounding mineral soils. These bogs have developed on the tops of mountains in poorly drained areas in headwater streams. For purposes of this general management plan, the more general term "bog" is used to describe these systems, since it is more commonly used and recognized in the region.

Three bogs that occur within the park have been studied by Sandefur (2002). These bogs cover approximately two acres and represent the largest are of mountain bogs in the State of Kentucky. Vegetation in these wetlands is dominated by cinnamon fern (*Osmunda cinnamomea*), royal fern (*Osmunda regalis*), Sphagnum moss (*Sphagnum* spp.), goldenrod (*Solidago* spp.), and various species of sedges, rushes, and grasses. Bogs are relatively rare habitats that have many unique biological features, and they also harbor several species of rare plants.

Fern Lake

The National Wetland Inventory maps (USFWS 2007b) define Fern Lake as a lacustrine system created by an impoundment. Fern Lake occupies approximately 150 acres in the southwest end of the park. The lake is located in a heavily wooded, relatively undisturbed watershed associated with Little Yellow Creek that ultimately drains into Yellow Creek.

Water quality of the lake is described in the "Water Resources" section of the plan. No studies have been conducted on the aquatic ecology of Fern Lake since the surrounding 4,500 acre watershed has been protected for the last 20 years and water quality is good. It is expected that the lake supports healthy populations of fish, benthic invertebrates, and plankton.

Ponds

Eight small ponds of three different National Wetland Inventory classifications, totaling 2.1 acres, occur in the southwest end of the park, within the Fern Lake watershed. Ponds range from semi-permanently flooded to permanently flooded habitats and have been formed either from impoundments or excavations. These wetlands occur in relatively undisturbed areas and, therefore, are expected to provide a good habitat for aquatic organisms and wildlife.

Vegetation –Native Plant Communities

The majority of the park consists of naturally vegetated habitat. In fact, 14,091 acres of the park is designated as Recommended Wilderness area and is relatively undisturbed. The University of Georgia

Center for Remote Sensing and Mapping Science (UGA 2007) mapped the terrestrial vegetation in the park. Information resulting from this study is provided in Appendix G. A total of nine major categories of vegetation were identified:

- Montane Cold – Deciduous Forests
- Submontane Cold - Deciduous Forests
- Needle – Leaf Evergreen Forests
- Mixed Evergreen - Deciduous Forests
- Successional Forests
- Temporarily Flooded Cold Deciduous
- Shrublands
- Herbaceous
- Wetlands and Bogs

The University of Georgia map shows the location of each vegetation type within the park and can be used as the basis for conducting site-specific impact assessments of future construction projects. These would be conducted as part of environmental assessments that would be tiered to the general management plan/environmental impact statement.

Invasive plants are a problem in the park (Butler, et al. 1981). Even if the park eradicated all invasive plants, they would still continue to invade from the surrounding areas and pose a management issue. For instance, privet (*Ligustrum sinense*), autumn olive (*Elaeagnus umbellate*), Kudzu (*Pueraria Montana*), and honeysuckle (*Lonicera spp.*) could have a major effect on the park if not managed properly. The Princess tree (*Paulownia tomentosa*), tree of heaven (*Ailanthus altissima*), crown vetch (*Coronilla varia*), and colts foot (*Tussilago farfara*) are also problem species in the park. The park is already required to control exotic species via its existing resource management plan, however. Invasive plants will, therefore, not be addressed further in the general management plan/environmental impact statement.

SPECIES OF SPECIAL CONCERN

Species of special concern include those listed by the U.S. Fish and Wildlife Service, the three state resource agencies in which the park is located, or the Natural Heritage programs in each state. Appendix H provides detailed lists of species of special concern known to occur, or to potentially occur, in the park based on an analysis of available information from the U.S. Fish and Wildlife Service (USFWS 2007c) the Kentucky Department of Fish and Wildlife (KDFW 2007), Tennessee Department of Environment and Conservation (TDEC 2007b) the Virginia Department of Inland Game and Fisheries (VDIFG 2007), and the Natural Heritage Program (NatureServe 2007). The lists in Appendix H were prepared by comparing lists of rare, threatened, and endangered species of plants and animals that have been actually observed in the park (Barbour, et al. 1979; Pounds, et al. 1989; Copeland, et al. 1984, 1992; Burger 1958) with published information on special status species in the counties in which the park occurs. Appendix H represents only known species that have been reported in the park.

The Endangered Species Act of 1973 requires an evaluation of the potential effects of proposed actions on all federally-listed endangered and threatened species. The U.S. Fish and Wildlife Service determines if a species needs protection under the Endangered Species Act and whether to classify a species as endangered, threatened, proposed for listing, or as a candidate species. Endangered species are considered to be in danger of extinction throughout, or in a significant portion, of their range; threatened species are those likely to become endangered in the foreseeable future; species proposed for listing are in the process of being listed; and candidate species are determined to warrant

protection and are being considered for listing as an endangered or threatened species. Candidate species do not have legal protection.

NPS policy also requires examination of impacts on state-listed threatened, endangered, candidate, rare, declining, and sensitive species (NPS 2006a). Species listed as endangered or threatened by the states are defined in the same way as federally listed species.

The U.S. Fish and Wildlife Service has jurisdiction over species listed under the Endangered Species Act. A total of four federally-listed species occur in the park. These include the Indiana bat (*Myotis sodalis*), the Gray Bat (*Myotis grisescens*), the Red-cockaded woodpecker (*Picoides borealis*), and the Blackside dace (*Phoxinus cumberlandensis* Starnes and Starnes). One partial status species – the Peregrine Falcon (*Falco peregrines)*, also occurs in the park (Table 12). Table 13 provides more detailed information on each of the federally listed species.

SOUNDSCAPE

A soundscape refers to the total acoustic environment of an area. Both natural and human sounds may be desirable and appropriate in a soundscape, depending on the purposes and values of the park. Soundscapes often vary in their character from day to night and from season to season and can be affected by changes in numbers of visitors who introduce human-caused sound into the environment.

The soundscape of the park includes existing and potential sources of natural sound and potential sources of interference (noise) to natural sounds in the park. The natural soundscape at the park is created by natural processes, including but not limited to sound created by biological and physical components such as wind, running water, birds, and insects. Natural ambient sound is the natural soundscape condition that exists in the park in the absence of noise made by humans. Noise is defined as undesirable human-caused sound (NPS 2000d). Sound can be perceived as noise because of loudness, frequencies, duration, occurrence at unwanted times or from an unwanted source, or because it interrupts or interferes with a desired activity. A sound that is considered neutral or desirable by one person (such as a radio or car engine) may be considered unpleasant noise by another person because of a perception of inappropriateness or disturbance. Noise can adversely affect park resources or values, including the natural soundscape, wildlife, and visitor experience. Sound levels have not been recorded at the park to date.

Cumberland Gap National Historical Park is a serene environment with a soundscape consisting predominantly of wind, birds and other wildlife, insects, and running water. In certain areas of the park where visitors congregate, such as the Visitor Center, the Wilderness Road Campground and picnic area, Daniel Boone Visitor Information Center, Pinnacle Overlook, park headquarters, and some trail heads, human activity sounds can be heard during the day. Sounds expected to be heard in some of these areas are those associated with visitors socializing, automobiles in the vicinity of parking areas and roads, and maintenance equipment. Sounds that would have been expected to have been heard at the Gap such as horses, wagon wheels, and associated sounds are part of the interpretive display at the Daniel Boone Visitor Center. This provides the visitor with an opportunity to "step back in time" and try to imagine what those early pioneers experienced. In more remote areas of the park such as the Recommended Wilderness area, sounds are primarily natural, interspersed with human sounds on trails, campsites, and more popular overlooks and natural features. Sounds associated with the Hensley Settlement are primarily natural, interspersed with voices when visitors are present. Modern day noises most commonly associated with human settlements are absent at the Hensley Settlement. During special events at the park, sounds may be recreated to associate the visitor with historic uses.

Table 13. Federally Listed Species Reported From Cumberland Gap National Historical Park[1]

Common Name (*Scientific Name*)	Federal Status[1]	Habitat and Occurrence
Mammals		
Indiana bat (Myotis sodalis)	E	The Indiana bat is a temperate, insectivorous, migratory bat that hibernates colonially in caves and mines in the winter. The upstream section of Gap Cave is a critical hibernating area for the federally endangered Indiana bat. In spring, reproductive females migrate and form maternity colonies where they bear and raise their young in wooded areas. Males and non-reproductive females typically do not roost in colonies and may stay close to their hibernaculum or migrate to summer habitat. Summer roosts are typically behind exfoliating bark of large, often dead, trees. Both males and females return to hibernacula in late summer or early fall to mate and enter hibernation (Recovery Plan).
Gray bat (Myotis grisescens)	E	Probably the most restricted to cave habitats of any U.S. mammal. Roosts in caves year round. Because of specific rooting and nesting requirements of the species, less than 5% of the available caves are suitable (various authors in USFWS 1982) (Recovery Plan). Summer caves are almost always located within 1 km of rivers or reservoirs over which the bats feed (Tuttle 1976b in USFWS 1982). Feeds exclusively most of year over water along river or reservoir edges (various authors in USFWS 1982). Gray bats may also use Gap Cave for summer habitat (NPS 1998a).
Birds		
Bald Eagle (Haliaeetus leucocephalus)	Delisted / Monitored	Breeding habitat most commonly includes areas close to (within 4km) coastal areas, bays, rivers, lakes, or other bodies of water that reflect the general availability of primary food sources including fish, waterfowl, and seabirds (Andrew and Mosher 1982, Green 1985, Campbell, et al. 1990 in NatureServe 2007). Preferentially roosts in conifers or other sheltered sites in winter in some areas; typically selects the larger, more accessible trees (Buehler, et al. 1991, 1992 in NatureServe 2007). Perching in deciduous and coniferous trees is equally common in other areas (Bowerman, et al. 1993 in NatureServe 2007). Communal roost sites used by two or more eagles are common, and some may be used by 100 or more eagles during periods of high use. Winter roost sites vary in their proximity to food resources (up to 33 km) and may be determined to some extent by a preference for a warmer microclimate at these sites. Avoids areas with nearby human activity (boat traffic, pedestrians) and development (buildings) (Buehler et al. 1991in NatureServe 2007) (Quoted from NatureServe 2007). General habitat characteristics include large to medium sized rivers, deep and shallow water lakes, forested wetlands, riparian areas, cliffs, and various forest and woodland types (conifer, hardwood, and mixed) (Quoted from NatureServe 2007).

Table 13. Federally Listed Species Reported From Cumberland Gap National Historical Park[1] (Continued)

Common Name (*Scientific Name*)	Federal Status[1]	Habitat and Occurrence
Peregrine Falcon (Falco peregrinus)	DELISTED 1999	Various open situations from tundra, moorlands, steppe, and seacoasts, especially where there are suitable nesting cliffs, to mountains, open forested regions, and human population centers (AOU 1983 in Nature Serve 2007). When not breeding, occurs in areas where prey concentrate, including farmlands, marshes, lakeshores, river mouths, broad river valleys, cities, and airports (Quoted from NatureServe 2007) Often nests on ledge or hole on face of rocky cliff or crag. River banks, tundra mounds, open bogs, large stick nests of other species, tree hollows, and man-made structures (e.g., ledges of city buildings) are used locally (Cade 1982 in NatureServe 2007). Nests typically are situated on ledges of vertical rocky cliffs, commonly with a sheltering overhang (Palmer 1988 in NatureServe 2007; Campbell, et al. 1990 in NatureServe 2007). Substitute man-made sites include tall buildings, bridges, rock quarries, and raised platforms (Quoted from NatureServe 2007).
Red-cockaded woodpecker (Picoides borealis)	E	Recorded from the park by Dorothy McConnell in stands of pines on the White Rocks Trail, October 21, 1973 (Barbour, et al. 1979). Today the red-cockaded woodpecker has been extirpated in Kentucky and Tennessee and is found in the far southeastern portion of Virginia. Red-cockaded woodpeckers require open pine woodlands and savannahs with large old pines for nesting and roosting habitat (clusters). Large old pines are required as cavity trees because the cavities are excavated completely within inactive heartwood, so that the cavity interior remains free from resin that can entrap the birds. Also, old pines are preferred as cavity trees because of the higher incidence of the heartwood decay that greatly facilitates cavity excavation. Cavity trees must be in open stands with little or no hardwood mid-story and few or no overstory hardwoods. Hardwood encroachment resulting from fire suppression is a well-known cause of cluster abandonment. Red-cockaded woodpeckers also require abundant foraging habitat. Suitable foraging habitat consists of mature pines with an open canopy, low densities of small pines, little or no hardwood or pine mid-story, few or no overstory hardwoods, and abundant native bunchgrass and forb groundcovers (USFWS 1985) (Recovery Plan).

Table 13. Federally Listed Species Reported From Cumberland Gap National Historical Park[1] (Continued)

Common Name (*Scientific Name*)	Federal Status[1]	Habitat and Occurrence
Fish		
Blackside dace (Phoxinus cumberlandensis (Starnes and Starnes)	T	This minnow (described by Starnes and Starnes in 1978) is endemic to the upper Cumberland River basin, where it is localized in clear headwater streams, usually first and second order. Very few populations have been discovered, and the widespread effects of strip mining are likely to further reduce these. Because of this major threat to survival, the blackside dace has been proposed for rare and endangered status with the Office of Endangered Species. Davis Branch has supported a thriving population of blackside dace in the past. Near the headwaters it predominated over its relative, the southern redbelly dace, but it diminished in numbers and disappeared in lower Davis Branch, where the southern redbelly dace persists (Stephens 2006-2007). Over the years, beaver have become established in Davis Branch and greatly altered the stream habitat in the upper reaches of the creek. The blackside dace numbers in Davis Branch have decreased since the mid 1990s. The blackside dace also occurs in the Fern Lake watershed. The blackside dace was initially identified in Little Yellow Creek by McCoy and McCoy Environmental Consultants (1993) as part of baseline environmental information provided in an application by Apollo Fuels, Inc. to conduct surface mining in the Little Yellow Creek watershed. The Office of Surface Mining Environmental Impact Statement (OSM 1996) information on this in the Fern Lake watershed as follows: Although results of the TDEC and McCoy and McCoy investigations indicate moderate stress to the uppermost reaches of Little Yellow Creek, a thriving population of blackside dace persists in Little Yellow Creek above Fern Lake. Blackside dace were common at all sampling locations, third in frequency of occurrence only to the creek chub and blacknose dace. The continued survival of a healthy population of blackside dace can be attributed to the presence of silt free areas downstream of riffles, which afford suitable spawning habitat, and to an undisturbed zone of riparian vegetation, the shading of which attenuates stream temperature increase during the summer months. Little Yellow Creek was impounded to form Fern Lake. As a result of impoundment, aquatic habitat in Little Yellow Creek was altered. A biological survey of Fern Lake has not been conducted; however, biological community structure following impoundment of upland streams, shifts from minnow and darter dominated stream species to lacustrine species such as bass, bream, and catfish. As a consequence of impoundment, the downstream extent of the blackside dace population in Little Yellow Creek is limited by Fern Lake. In addition, Fern Lake is a barrier to downstream "seeding" of blackside dace to lower reaches of the Yellow Creek watershed. Consequently exchange of genetic information is not possible without direct intervention through transplanting or rearing. Although Fern Lake is a limiting factor to blackside dace, the lake serves as a pollutant sink for moderate siltation and chemical loading associated with upstream land use activity.

Relocation of U.S. 25 East and restoration of the Gap has recreated a more natural soundscape compared to previous conditions. Automobile sounds may be heard in the vicinity of U.S. 25 East; however, once beyond the influence of the highway, natural sounds on the trail predominate, interspersed by visitors walking and hiking the Wilderness Road Trail.

During periods of peak visitation, such as weekends, human-caused sound is of greater intensity than during weekdays when the natural soundscape prevails. This also varies by season and location within the park. Some human-caused sound can be considered acceptable in that it is attendant to purposes and uses for which the park was created. Director's Order 47 (NPS 2000d) requires park units to determine the level of human-caused sound necessary for park purposes, and to achieve that level by reducing noise and restoring the natural soundscape to the greatest extent possible.

CULTURAL RESOURCES

This section describes the characteristics of cultural resources in the park. This assessment is based on a review, the available information in the literature, and contacts made with NPS staff at the park.

Overview of Prehistory

Around 12,000 B.C. Paleoindian groups are thought to have migrated into the Cumberland Gap region. In some areas, these mobile hunter-gatherers subsisted on Pleistocene megafauna, but it is likely that the rich assortment of wild plant foods, white-tailed deer, and small game of the area likely played a "vital role in subsistence strategies" (Ahlman, et al. 2005). During the Archaic Period (ca. 8,000 B.C. to 1000 B.C.), a number of Pleistocene game species became extinct, subsistence strategies became more diversified in response to environmental changes, and ground stone tools appear as Archaic peoples increasingly relied on aquatic resources, wild plant foods, and small game. Settlements consisted of main residential camps with smaller specialized gathering and hunting camps in the uplands (Ahlman, et al. 2005). About 2000 B.C. long-distance trade of copper and artifacts of marine shell began, and toward the end of the Archaic period, numbers and types of stone tools increase and traces of horticulture appear.

About 1,000 B.C. the Woodland Period is indicated by shifts in settlement and subsistence patterns, increased sedentism, and changes in social organization. People began growing plants, making pottery, and using bows and arrows. Burial mounds were erected.

The late prehistoric period (Mississippian Period) began about A.D. 900 with increased social complexity and profound changes in prehistoric settlement and subsistence patterns. Earmarks of this period include the rise of chiefdoms and a reliance on maize agriculture. Toward the end of the period (ca. A.D. 1600) populations in the area reached a peak in prehistoric social complexity and organization, with settlements varying in size from small hamlets to large towns surrounded by defensive palisades. Numerous raw materials and specialized tools and ornaments were imported or traded.

By 1575 A.D. the first European trade goods (metal ornaments made from pieces of kettles) appear in Kentucky and by 1675 European diseases (possibly smallpox) had killed numerous native peoples in the region. By 1750, Lower Shawneetown, the main village of the Shawnee in the eighteenth century, had been established in Kentucky.

History Overview

Virginian Abraham Wood had written about the existence of Cumberland Gap in 1670 (Ahlman, et al. 2005), and recorded history refers to the Gap area as early as 1674, when a young explorer, Gabriel Arthur, followed the Warrior's Path enroute to Fort Henry, Virginia from a trip into the wilderness. Arthur made no direct mention of the Gap, but presumably he crossed through it. However, this was about 80 years before the first formal Euroamerican [English] expedition was made through the Gap.

For many centuries, the 100- to 300-mile-wide Appalachian Mountains, extending from Newfoundland and Labrador in Canada 1,500 miles southwest to central Alabama, had been a natural barrier that inhibited east-west human movement across the North American continent. This vast system of mountains formed a geographical dividing line between the eastern seaboard and the American Midwest.

Cumberland Gap and the adjacent land corridors form a natural passageway through the mountains. Cumberland Gap is a natural feature cut into Cumberland Mountain by the original course of Yellow Creek as it flowed south into Powell River. Adjoining the Gap is Middlesboro Basin, a relatively level area that extends between Pine Mountain and the Cumberland Mountains. The basin is thought to be the remains of an ancient meteor crater or perhaps caused by the collapse of an underground cavern. Adjacent to the basin is the Yellow Creek Valley leading into an area known as "The Narrows," a gap that crosses Pine Mountain and opens up access into the Bluegrass county of Kentucky.

For centuries, Native Americans had followed the Warrior's Path from the Potomac River down along the southeast side of the Appalachian Mountains, crossed through the Gap, and then turned north to what later became known as the "Dark and Bloody Ground" in the States of Kentucky and Ohio. The path connected the Ohio and the Shenandoah valleys and gave prehistoric and historic people access to the Mississippi River. The Warrior's Path was a crucial transportation route to many generations of Native Americans who used it for trade, travel, raiding, and to follow game herds. Migrating bison were known to use Cumberland Gap to reach Kentucky where Daniel Boone reported large herds of bison grazing on the verdant pastures.

The Gap was first explored, described, and mapped by Dr. Thomas Walker in 1750 after hearing Native Americans describe the pathway that went through— not over— the mountains. The previous year King George II had granted the Loyal Land Company eight hundred thousand acres of land west of the Cumberland Mountains, and Walker served as the chief agent and surveyor for the company. There were no requirements for settlement, only survey of parcels that grantees wanted. However, onset of the French and Indian War in 1754 effectively closed the new frontier to further exploration until the late 1760s when Daniel Boone and other long-rifle hunters began to hunt in the wilderness country.

In 1775, a group of North Carolina entrepreneurs under the leadership of Colonel Richard Henderson formed the Transylvania Company, which acquired 20 million acres of western lands from the Cherokee Indians to create the new state of Transylvania. Because of their knowledge of the area, frontiersman Daniel Boone and about 30 other long-rifle hunters/woodsmen were hired to blaze a trail through this wilderness from what is now Kingsport, Tennessee to the vicinity of the present day City of Richmond, Kentucky (Shattuck 1999). The land deal was hotly contested by a second group of homesteading pioneers who successfully petitioned the newly formed Virginia legislature to establish the new county of Kentucky west of the Cumberland Mountains, effectively quashing the proposed state of Transylvania (Shattuck 1999).

Despite frequent loss of lives in encounters with Native Americans, over the next 17 years more than 20,000 settlers followed "Boone's Trace" through Cumberland Gap to Kentucky, and by the time Kentucky had been admitted to the Union, over 100,000 people had passed through the Gap. In 1795, the Kentucky legislature mandated the construction of a "good wagon road" between Crab Orchard and Virginia, and by 1796 the toll route had become known as the "Wilderness Road." Until the National Road (the Cumberland Road) was completed in 1818, the Wilderness Road was a main commerce conduit (both east and west) and the primary overland route for travelers and livestock moving west (Ahlman, et al. 2005). Eventually, development and use of other transportation routes caused a decline in the importance of the Wilderness Road, and it was abandoned by 1840.

During the Civil War, the Gap was thought to be strategically important to both the Confederate and Union armies; that is, both sides felt invasion would come through the Gap. There was no military railroad near the Gap, so portions of the Wilderness Road (also known as the State Road, the

Wilderness Turnpike, or the Kentucky Road) were used to transport supplies, troops, and ordnance. Called the "Keystone of the Confederacy" and the "Gibraltar of America," the Gap exchanged hands three times and was held and fortified "against the invasion that never came" (FHWA 2006). Confederate General Zollicoffer first occupied the Gap on Nov. 13, 1861 but retreated when a superior force under Union General Morgan approached. After fortifying the Gap, General Morgan also was forced to retreat when Confederate General Bragg and his troops entered the area in 1862. Union Generals Shekelford and DeCourcy approached the Gap in 1863, forcing Confederate General Frazier and his 2,000 men to surrender. Cudjo's Cave (also known as King Solomon's Cave and now known as Gap Cave) was used for shelter and mined for saltpeter for gunpowder, leading to the contemporary description as "Soldier's Cave."

During the Civil War, Confederate Brigadier General Felix Zollicoffer personally supervised the construction of the earthen fortifications at Cumberland Gap. Preparations for battle by both sides involved construction of earthworks and battlements, leaving some areas badly scarred. As described on September 9, 1863 by O.G. Swingburg from the 125th Ohio:

"The trees, which had formerly covered the mountains, were all cut down. Their trunks lie tangled and scattered in all directions to prevent rapid charges of infantry. Surely, a valley of death could not have been more skillfully constructed. All who walked that road today would agree that had the charge been made, it would have been the last road walked in eternity. It would have been murder to have ordered that assault." (FHWA 2006).

After exchanging the road through the Gap several times with the Confederacy, the Union Army abandoned the road in 1866, but it continued to serve as a transportation corridor and trade route. Settlers and entrepreneurs purchased plots of land near the Gap and at intervals along the route. At these trading posts and other establishments, local products could be shipped eastward, and merchandise moved to the west.

During the 1880s and early 1890s, English capital financed a local "boom and bust" cycle based on utilization of the natural wealth of mineral deposits in the untapped seams of coal and iron ore in the Cumberland Mountains. This activity resulted in the establishment of Middlesborough (now Middlesboro), Kentucky, Cumberland Gap, and Harrogate, Tennessee. Millions of dollars were invested in railroad building, tunnels, steel mills, and coal mines. Railroads bypassed the Gap after the Civil War, and it was not until advent of the automobile that interest in the Gap was rekindled.

In 1908 the U.S. Bureau of Public Roads built the Government Pike, a 2.5 mile-long "macadamized road" (e.g., made of layers of compacted crushed stone) to connect Middlesboro, Kentucky to Cumberland Gap, Tennessee. This was one of several "Object Lesson Roads" constructed to "prove the efficacy of new road building techniques" (Woods 2003). Unfortunately increased traffic led to numerous accidents on the narrow roadway, so, in 1916, the Government Pike was further extended, becoming part of the Dixie Highway system in 1916 (FHWA 2006). By 1925 the Gap was included in planning for U.S. 411, and a year later, the eastern leg of U.S. 25 passed though the Gap. U.S. 58 replaced U.S. 411 in 1934.

Tourist attractions, such as Soldier's Cave (Cudjo's Cave, now known as Gap Cave), helped attract visitors to the area. the Gap, the cave, and the surrounding area had been purchased by Lincoln Memorial University in 1920. Electricity was installed, and accommodations for overnight lodging were provided. The University leased the cave to various operators over the years until it was acquired by the NPS in 1992.

Recognizing the national significance of Cumberland Gap in the early years of American westward expansion, Congress established the park in 1940 to protect 20,000 acres of forested mountain shared among Tennessee, Kentucky, and Virginia. However, the existing transportation systems did not reflect the historic nature of the Gap and the Wilderness Road as they had appeared during the years from 1780 to 1810, so in 1973 the restoration of the Gap began with enactment of Public Law 93-87.

This law directed the NPS to construct tunnels through Cumberland Mountain to remove traffic from the historic corridor and improve traffic safety.

In 1979, design began for the enormous project of rerouting two U.S. highways through twin tunnels 4,600-feet in length, new four lane approaches, highway interchanges, bridges (pedestrian, railroad, and roadway), hiking trails, and parking. Despite encountering systems of underground streams that played havoc with designs, the tunnels were opened to traffic (about 32,000 vehicles per day) in 1996.

Once the new tunnels were in place and traffic was removed from the historic scene, the second part of the project began. NPS historian Jere Krakow (1987) conducted extensive historical research that led to descriptions of physical features of the area, using historic documents, photographs, journals, and traveler's accounts. Visual Information Specialist Michael Hart combined fieldwork, cartography, survey, and artistic skills with Krakow's research to help verify the original landscape. These efforts eventually led to discovery of what is thought to be the original alignment of the Wilderness Road and other significant early routes "as well as the approximate 'historic' contours of the topography of the "saddle of the Gap" (Woods 2003). A three-dimensional grading plan was developed, allowing engineers and landscape architects to return the Gap to contours that likely existed in 1780. In 2002, a massive planting effort used native plants and trees to restore "the barren landscape into a virtual forest overnight" (Woods 2003).

The National Register eligibility of the park's cultural resources is based on several factors: first, the way in which they reflect the westward expansion of the United States via the Gap and the Wilderness Road. Secondly, part of the eligibility is the importance of the Warrior's Path in Native American history and the association of the area with frontiersmen and explorers such as Daniel Boone. Other resources reflect development of isolated mountain communities and the Appalachian lifestyle such as the Hensley Settlement during the 20th century.

Archeological Resources

As of August 2008, the NPS Archeological Sites Management Information Systems contained entries for 136 archeological sites in the park. Of the known sites, 92 are in Kentucky, 9 are in Tennessee, and 35 are in Virginia. In the last five years, most of the sites have been re-located and examined for condition issues. Currently, 116 are listed in Good condition, 5 in Fair condition, and 6 in Poor condition. Nine others have not been checked. Most of the sites have been photographed and recorded with a GPS. It should be noted there several sites currently classified as "potential" that may be added once they have been found and verified. Also, additional entries are expected once the results of projects conducted during FY2008 are available.

Only a minute portion of the park has ever been examined beyond the cursory pedestrian level so the depth of information is limited. The majority of the sites are historic because these tend to have visible surface features and/or artifacts, whereas very few surveys have been conducted using methods that detect prehistoric sites. The list includes 57 domestic sites such as house and farmsteads, generally occupied during the early 20th century. There are also several manufacturing sites such as a brewery and coal processing facility. At least three coal mines have been identified. Transportation-related resources include three railroads and six roads. As for the Civil War, the database currently includes four camps, six forts, nine rifle pits, seven batteries, and several other related sites. Smaller categories of historic sites include a school, hotels, and a tavern. Prehistoric sites include ten rock shelters and caves, plus three other sites.

Cultural Landscapes, Including Historic Buildings, Structures, and Districts

The entire Cumberland Gap National Historical Park is listed on the National Register of Historic Places (National Register), along with the Cumberland Gap Historic District (east of Middlesboro), and the Hensley Settlement. The Cumberland Gap Historic District includes historic roadways, three segments of the Wilderness Roads, Civil War features, the ruins of an Iron Furnace, and Daughters of

the American Revolution markers. Because these structures are such an integral part of the park's potential cultural landscape, they have been described further under "Cultural Landscapes" below.

Buildings within the Hensley Settlement have been designated as a Historic District eligible for the National Register of Historic Places. Thirty-five structures, including the Brush Mountain School, contribute to the National Register significance of the District.

Despite the fact that none of the landscapes at Cumberland Gap National Historical Park have been formally inventoried or designated as cultural landscapes, it seems apparent that at least two historic areas of the park – the Hensley Settlement and Cumberland Gap Historic District – include many characteristics of a cultural landscape.

The potential vernacular cultural landscape at Hensley Settlement consists of a community of 12 scattered farmsteads situated on an isolated plateau on Brush Mountain. This landscape was first carved out of the wilderness during the 1800s by C. and R.M. Bales who cleared much of the 500-acre plot of trees and brush, and fenced meadows for grazing and farming. They also leased and cleared the nearby Bailes [Bales] Meadows. Burton Hensley purchased the land from the Bailes in 1903 and divided it into 16 portions that were deeded to each of his principal heirs, including his son-in-law, Sherman Hensley (Cox 2001). Sherman Hensley purchased additional acreage and moved his family onto the mountain in December 1903. Shortly after, other members of the Hensley and Gibbons families came to the settlement, began planting crops, and erecting homes, eventually creating what has come to be known as Hensley Settlement.

The potential cultural landscape at Hensley includes the buildings described above, as well as other landscape elements such as trails, meadows, native vegetation, spatial organization, transportation routes, and scenic mountain viewsheds. The strategic and isolated location of the Hensley Settlement contributes to the landscape.

Several trails ran from Virginia or Kentucky to the Hensley Settlement; early settlers carried their belongings over these trails onto the mountain using sleds and mules. Location of these trails was based on topography, stream courses, homesteads, and connections to roadways outside the mountain community. Using readily available timber, the cleared meadows were often fenced with split rail "worm" fences of oak or chestnut. Woods surround the cleared areas. The balance of cleared, farmed, and grazed areas reflects the amount of land and type of farming products families could cooperate to produce, as well as area topography, soils, and historic uses.

As additional Gibbons and Hensley relatives came to the settlement, they built farms adjacent to existing homesteads, often along creeks. All the farmsteads in the settlement have a definite pattern of organization centered on the focal point of home, barn, and outbuildings. Lacking electricity, roads, or mechanized equipment such as tractors or chainsaws, land clearing and construction of the buildings and fences at the Hensley Settlement involved an extraordinary amount of human labor and talent. Stone and log buildings were erected using little more than hand tools, with mules used to haul the heavier loads. Design of these structures and their furnishings was drawn from personal experience and remembered pioneer techniques from earlier times. The use of indigenous native materials contributes heavily to the feeling and historic ambiance of the area.

Cumberland Gap Historic District, also a National Register property, forms a second potential cultural landscape within the park. Initially, the landscape at Cumberland Gap was shaped by the geology of the area, native vegetation, and the associated land forms and spectacular viewsheds. Over nearly three centuries, human use of the Gap added transportation corridors, Civil War facilities, a variety of structures and landscape, and vegetation features, resulting in major changes to the original historic scene viewed by Daniel Boone and other long-rifle hunters. Recent removal of intrusive modern facilities and restoration of the Gap returned the overall area to the approximate historic setting/cultural landscape visible during the period from 1780 to 1810 and helped preserve historic resources at Civil War sites.

Primary among the character-defining landscape features at Cumberland Gap are the historic roadways, including the restored Wilderness Road, the Upper and Lower Virginia roads, Kentucky State Road, Harlan Road, Fort McCook-Fort Lyon Road, Battery # 7 Road, and the Fort Farragut Trail Road.

The types and arrangement of Civil War features and structures on the landscape afford a glimpse into the strategies of the two armies and into the relationship of topography in this area to the war effort. These installations include Fort Foote, Fort Nathaniel Lyon, Fort Robert L. McCook, Fort Farragut, Fort Edgar, Morgan's Commissary Site, Battery # 7, and the Union Powder Magazine site.

Also present in this landscape are the Iron Furnace Ruin, representative of the period of industrial expansion in the area, and the Indian Rock and Daniel Boone's Trail D.A.R. markers.

Ethnographic Resources

As defined by the NPS, an ethnographic resource is a site, structure, object, landscape, or natural resource feature assigned traditional, legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it.

In this environmental document, the term "ethnographic resources" will also be used to refer to a special community of people, including the descendents of the original settlers, who have a shared identity and close relationship to the park. Despite having been physically relocated outside the park, this ethnographic community continues to assign significance to remembered places and lifeways. Their practices and beliefs are rooted in the history of the park, and continuing association with the park is essential to the survival of their cultural traditions.

They have deeply felt long-term interest in the integrity of resources within the park. Sites identified as traditional cultural properties by the ethnographic community would be evaluated for their potential National Register significance and would be considered eligible for the National Register until evaluation is completed.

Ethnographic resources are "about people and the ethnographic resources, or traditional park sites, structures, objects, landscapes and natural resources, they define as significant to their present way of life" (NPS 1998c). Ethnographic resources at Cumberland Gap National Historical Park are related to two different cultural groups. First, ancestors of Native Americans such as the Shawnee, Iroquois, Delaware, and Cherokee lived in the region and used these mountains for centuries for hunting, gathering, and resource procurement. While most of these tribal groups no longer reside in the general area, their tribal history and beliefs may still commemorate the valued places and events they remember. Representatives of the Absentee-Shawnee Tribe of Oklahoma, Cherokee Nation of Oklahoma, Eastern Shawnee Tribe of Oklahoma, Eastern Band of the Cherokee Indians, Shawnee Tribe, and United Keetoowah Band of Cherokee Indians were contacted during the course of scoping for this plan and coordination with these tribes continues.

A second group of people, former park residents and their descendents, form a traditional users group as defined in Management Policies and NPS-28, Cultural Resource Management Guideline (1998). During the 1700s and 1800s, immigrants from countries such as Scotland, England, and Germany came to settle in the isolated valleys and along streams in the mountains of Kentucky, Virginia, and Tennessee. As many as 250,000 Scotch-Irish immigrated to America between 1717 and 1776, and were the dominant cultural group in settling the entire length of the Appalachians. Ulster provided far more immigrants in this area than Germans or Scots (Jones 1992). In the early 1900s, as most of the more fertile land had become occupied by settlers, some latter-day pioneers moved farther into the mountains.

These fiercely independent and deeply religious pioneers forged their own traditions in what is sometimes known as Appalachian culture. They were self sufficient, relying on each other for support in farming, raising barns, and stock rearing. Mountain communities were isolated and difficult to reach because no formal roads led to the new settlements, such as the one at Hensley. These settlers

drew upon cultural traditions and remembered lifeways of their parents and grandparents to create a community, literally, built by hand of wood, stone, and earth. Most of their basic subsistence was either home made or grown, and solutions to problems were innovative. Education was important to these settlers, so they built schools, and recruited teachers. The resulting community was a "way of life more similar to the pioneer period of the 1780s than that of the twentieth century" (Shattuck 1999). An example of this is the Hensley Settlement, a remarkable community on Brush Mountain that maintained a 19th century life style well into the 20th century. Two families, Gibbon and the Hensley, made the settlement their home. The last person to occupy the settlement was Sherman Hensley, who left the mountain in 1951. Over 400 relatives of the Gibbon and Hensley families hold reunions on a regular basis, and many still live in the immediate area.

SOCIOECONOMICS

Cumberland Gap National Historical Park is located in Bell and Harlan Counties in Kentucky; Lee County, Virginia; and Claiborne County, Tennessee. Only a small portion of the park is located in Harlan County. The area is primarily rural, but several communities are located near the western portion of the park (see Figure 1). The City of Middlesboro, Kentucky is located near the northwestern section of the park and the City of Harrogate, Tennessee is located near the southwestern section of the park. The Town of Cumberland Gap, Tennessee is surrounded by the park and is located between Middlesboro and Harrogate.

Harlan County contains the largest estimated 2004 population in the region with 31,927 persons, followed by Claiborne County (30,726), Bell County (29,672), and Lee County (23,846) (Epodunk 2006). Middlesboro, the gateway to the park from the north, is the largest community in the region with an estimated 2003 population of 10,266 persons. Harrogate had an estimated 2003 population of 3,974 persons and Cumberland Gap had an estimated 2003 population of 195 persons. The population of Claiborne County and Lee County was estimated to have grown 2.9 percent and 1.1 percent, respectively, from 2000 to 2003, while the population in Bell and Harlan Counties dropped 1.3 percent and 3.8 percent, respectively, during the same period. The City of Middlesboro lost approximately 1.1 percent of its population between 2000 and 2003, and the Town of Cumberland Gap lost approximately 4.4 percent of its population during the same period (Epodunk 2006; U.S. Census Bureau 2006). Statistics for Harrogate indicate that the population grew by 38.7 percent between 2000 and 2003, but this growth is reportedly attributed to a geographical change in reporting for this community (U.S. Census Bureau 2006).

The population of the Kentucky counties is projected to decrease slightly in the future. The University of Louisville Kentucky State Data Center projects that 28,118 persons will reside in Bell County and 29,136 persons will reside in Harlan County by 2020 (University of Louisville 2006). The population of Lee County is also projected to decrease slightly in the future. The Virginia Employment Commission projects that 22,001 residents will be living in Lee County in the year 2020 (Virginia Employment Commission 2006). Claiborne County is projected to increase in population slightly to approximately 32,039 in 2010 according to the state Department of Health (Tennessee Department of Health 2006).

In Bell and Harlan Counties, retail trade is the largest employer, followed by manufacturing in Bell County and accommodation / food service in Harlan County. Bell County contained 1,955 retail employees in 1997 and Harlan County contained 1,261 retail employees during that year. Manufacturing employed 858 employees in Bell County and accommodation / food service employed 457 employees during 1997. Middlesboro is defined as a micropolitan statistical area by the U.S. Census Bureau. The Middlesboro market serves approximately 100,000 retail customers in northern Tennessee, western Virginia, and southeastern Kentucky (Bell County 2004). The park often buys supplies and parts from venders in Bell County. To the south of the park, manufacturing led the employment ranks in Claiborne and Lee Counties, followed by retail. Claiborne County had 3,584 persons employed in manufacturing in 1997, while Lee County had 784. Claiborne County had 736 retail employees and Lee County had 578 retail employees during that year. Many of the manufacturing employees in Claiborne County were employed in the household and institutional

furniture manufacturing sector. The major employer in this sector was England, Inc. (Claiborne County Chamber of Commerce 2006). Recent (2003 – 2007) developments in the vicinity of the park include the following activities.

- A 500 acre T.J. Asher Industrial Park in eastern Bell County, near the Harlan County Line.
- Whitmer Industrial Park, located in Bell County.
- Bell County Technology and Training Park, located in Bell County.
- Industrial parks in Lee County: Lee County Industrial Park, located south of Pennington Gap.

The 500-acre T.J. Asher Industrial Park is being constructed in eastern Bell County near the Harlan County line. A 250-acre airport may be constructed adjacent to this industrial park, if approved by the Middlesboro / Bell County Airport Board (Southern Kentucky Economic Development Corporation 2003).

Coal mining is predicted to continue into the future in the region. Harlan County has the third largest estimated coal reserve in Kentucky, and Bell County has the eleventh largest estimated coal reserve (Kentucky Coal Association 2006). Lee County has the fifth largest estimated coal reserve in Virginia, although the reserve is less than one percent of the estimated reserve located in Harlan County (Virginia Polytechnic Institute and State University 2006). Coal reserves in the entire State of Tennessee are estimated to be just slightly greater than the Lee County estimated reserves (Knoxville News Sentinel 2005).

Local officials in Bell and Claiborne Counties anticipate that completion of U.S. 25E as a four lane divided roadway from I-81 in Tennessee to I-75 in Kentucky, will attract motorists looking for a "short cut" alternative to I-40 / I-75. Tennessee officials are also working to obtain "national scenic byway" status for U.S. 25E. The roadway currently has that designation to the north of the Kentucky state line. Additional traffic could raise awareness of the region, as well as attract additional highway related services.

The Cumberland Gap National Historical Park is the largest tourist attraction in the area and the park adds a great deal to the local economy. A 2001 study determined that visitors to Cumberland Gap National Historical Park spent from $35 to $163 per party per day depending upon whether the visitors were local day visitors or visitors staying in an area hotel (Michigan State University 2001). Visitors that were camping spent approximately $83 per party per day. In 2001, visitors to the park spent $38.98 million, which supported a total of $46.84 million in sales, $16.91 million in personal income, 1,006 jobs, and $26.6 million in value added to the local economy. As a result, increasing the number of tourists that visit the area and expanding their length of stay is a priority of the local communities.

Middlesboro and Bell Counties are trying to promote tourism to attract visitors to the area. Middlesboro is the northern gateway to the park, and the park visitor center is also located in Middlesboro. Bell County has a desk at the park visitor center to promote tourism in its county. Other attractions include the Bell County Coal Mining Museum and Coal House, the Alexander A. Arthur Museum, the Bell County Historical Society and Museum, the Henderson Settlement & Log House Craft Shop, the annual Cumberland Mountain Fall Festival, and Pine Mountain State Resort Park in nearby Pineville.

Harlan County is also trying to promote tourism in its area. The county has a number of different attractions such as the Kentucky Coal Mining Museum, Black Mountain Recreational Park for off-road vehicles, Big Black Mountain (the highest peak in Kentucky), Kingdom Come State Park, Blanton Forest, and Portal 31 (coal mine). The county is also home to several annual festivals such as the Black Bear Festival, the Southern Shine Crawl, the Poke Salad Festival, the Harlan Bluegrass Festival, and others.

Claiborne County contains the Abraham Lincoln Museum and Library at Lincoln Memorial University, the Speedwell Academy, and the historical Town of Cumberland Gap. Prior to construction of the Cumberland Gap tunnel, U.S. 25E passed through Cumberland Gap, Tennessee. Construction of the tunnel and relocation of U.S. 25E resulted in people bypassing businesses in the town. The community is trying to revive its economy by promoting a mountain lore theme and becoming a destination (NPS 2004).

Lee County contains a number of tourist attractions including Wilderness Road State Park, Gap Cave, Cave Springs Recreation Area, and Daniel Boone Wilderness Trail. A hotel developer has expressed interest in a hotel in far western Lee County along U.S. 58, but lack of sewage treatment has been a problem in gaining approval of this facility (Lee County 2004).

The Comprehensive Regional Development Strategy, prepared by the Cumberland Valley Area Development District, set a goal to escalate efforts to develop the tourism industry throughout the district (Cumberland Valley Area Development District 2005). The strategy encourages improving the parks in the area, including Cumberland Gap National Historical Park, to attract more visitors. The strategy also encourages the development of new industrial parks to attract industry to the region.

VISITOR USE AND EXPERIENCE

Recreational visitation at the park increased from 85 to 93 percent during each decade of the 1960s, 1970s, and 1980s. Between 1990 and 2000, the visitation increase lowered slightly to 69 percent. By 2000, over 1.5 million recreational visitors were going to the park each year, according to park statistics. The count procedure was refined in 2000 to eliminate potential double counting, resulting in a count of 887,000 recreational visitors in 2001. Between 2001 and 2005, visitation increased approximately 13 percent, resulting in slightly over one million recreational visitors in 2005. Summer months are generally the highest visitation months for the park. However, October was the strongest month for recreational visitation in 2003, probably due to an article featuring the park that was published in a national magazine, in addition to this being the season of fall colors.

Cumberland Gap National Historical Park is not considered a destination park. Most visitors stop at the park on their way to some other destination, with 67 percent of the visitors at the park staying less than four hours (University of Idaho 1999). The park also attracts families from the surrounding area. According to a visitor study conducted in 1999, approximately 65 percent of the visitors are family groups and approximately 47 percent of the visitors to the park are from Kentucky and Tennessee. The most popular activity at the park is sightseeing from the Pinnacle Overlook. Pinnacle Overlook is the most visited feature in the park. At an elevation of 2,440 feet, visitors have a spectacular view of Kentucky, Tennessee, and Virginia. Low cost shuttles between the visitor center and the Pinnacle Overlook are offered when staff is available. The survey indicated approximately 81 percent of the recreational visitors drive to the Pinnacle.

Other popular activities at the park are tours of the Hensley Settlement and the Gap Cave. Hensley Settlement is a restored mountain community located atop isolated Brush Mountain. Visitors can walk through hewn chestnut cabins and learn about the self sufficient lifestyle of the Hensley and Gibbon families, who continued living a pioneer life style into the 1950s. The settlement is accessible by hiking, horseback, or seasonal shuttle. Tours are provided by NPS staff from May through October. The Hensley Settlement shuttle tour is $10 for adults and $5 for children and senior citizens with a Golden Age passport. In 2005, approximately 3,266 persons toured the Hensley Settlement via the shuttle tour. Gap Cave is located in the park just to the north of Cumberland Gap, Tennessee. The cave is characterized by mammoth rooms, impressive stalagmites and stalactites (including one of the largest known stalagmites at 60 feet tall), and a stream that flows out of the cave that has historically powered a saw mill, a granary mill, and blast machinery for the Iron Furnace. In the past, the cave contained electric lighting and was subject to vandalism. However, the park recently removed the lights and restored the cave to near original condition. Tours begin in the Daniel Boone parking lot. The Gap Cave tour is approximately 1 mile long and travels through four levels of the cave. Tours are provided

throughout the entire year and on weekends only from January 1 through March 31. The Gap Cave tour is $8 for adults and $4 for children and senior citizens with a Golden Age passport. The Hensley Settlement shuttle trip takes four hours and the Gap Cave tour takes two hours. Visitors tend to choose one tour over the other, but many take both tours.

A fitness trail is located near the Visitor Center. The fitness trail is 2 miles long. Approximately 100 people from Middlesboro area come each day to use the fitness trail.

A proposal to strip mine coal in the Fern Lake watershed was defeated, partially due to the impact on the viewshed from the Pinnacle (NPS 2004). In 2001, Congress approved the Fern Lake Conservation and Recreation Act (NPS 2006b). Its goal was to protect Fern Lake and its surrounding watershed lands to ensure the drinking water supply for the City of Middlesboro. The act authorized the purchase of 4,500 acres of Fern Lake watershed lands and expands the Cumberland Gap National Historical Park boundary to incorporate the lake and its watershed. This acquisition would also protect the vista from the Pinnacle Overlook, one of the park's most valuable scenic resources. It will also provide an excellent opportunity for additional recreational activities in the park.

Wilderness Road Campground is located on the south side of the park to the east of Cumberland Gap, Tennessee. The campground has 160 wooded campsites for tent, trailer, and recreational vehicle campers. In addition, the park has backcountry campsites located at Gibson Gap, Chadwell Camp, Martin's Fork, Hensley Camp, and White Rocks. Permits are required for backcountry camping. Table 14 shows the number of campers that stayed in the park overnight from 2003 to 2005.

Table 14. Overnight Campers at Cumberland Gap National Historical Park From 2003 to 2005

Location	2003	2004	2005
Wilderness Road Campground	12,142	13,271	11,761
Backcountry campers	1,742	1,734	1,579

During 2005, September was the busiest month for the Wilderness Road Campground with 2,120 campers, and October was the busiest month for camping in the backcountry with 333 campers.

SCENIC RESOURCES AND VISUAL QUALITY

The park features a wide variety of high quality scenic resources, including:

- Pinnacle Overlook, which provides a breathtaking view of Fern Lake and the surrounding valley, the tri-state corners area, the southern end of the park, Town of Cumberland Gap, Powell River Valley, and Middlesboro, Kentucky.
- The Fern Lake watershed consists of approximately 4,500 acres and contains Fern Lake and the surrounding heavily wooded valley. These resources provide high quality scenic vistas.
- Hensley Settlement, which combines highly scenic qualities of a remote mountain top plateau with over 40 restored historic structures.
- Gap Cave and numerous other caves, which provide a high quality subterranean visual experience. For example, Gap Cave is known to contain one of the most highly diverse series of cave formations in the region.
- White Rocks and White Cliffs, located at the northeastern end of the park that provide a breathtaking view of massive vertical cliffs used by pioneers as a landmark as they travelled the Wilderness Road.
- Wilderness Road restoration area, which provides the visitor with a unique view of the original path taken by pioneers traveling through the Gap.

- Martin's Fork Wild and Scenic River, which provides views of a Kentucky State protected river in an isolated wilderness setting.
- Over 70 miles of backcountry trails, largely within the Recommended Wilderness area, which provide a wide variety of high quality scenic views from the top of Cumberland Mountain.

These scenic resources, when combined, provide a highly diversified visual experience for park visitors.

TRANSPORTATION

The history of Cumberland Gap is based upon transportation. The Gap was the geologic gateway to the west through the central Appalachian Mountains. Before 300,000 pioneers traveled the Wilderness Road through the Gap in the late 1700s and early 1800s, migrating animals used this path in search of food and shelter. Native Americans also used the Warrior's Path to travel between the Great Lakes and the coasts of Carolina and Georgia to trade, hunt, and conduct warfare (NPS 1979b).

Cumberland Gap National Historical Park is located at the juncture of the Kentucky, Tennessee, and Virginia state lines. The western section of the park is located near Cumberland Gap, Tennessee, and the park straddles the Kentucky / Virginia State line for approximately 18 miles northeast of that community. The park is approximately 2-3 miles wide and parallels U.S. 58 in Virginia. U.S. 58 traverses the southern portion of the state from west to east near the Virginia / Tennessee and the Virginia / North Carolina state lines. While the western terminus of U.S. 58 is Cumberland Gap, Tennessee, only a very small portion of the roadway is located in Tennessee. The roadway primarily provides access to a number of Virginia communities, including Martinsville, Danville, and Virginia Beach. The roadway is a four lane divided facility near the park and is either under construction or planned for construction as a four lane divided roadway throughout Virginia. In Lee County, approximately 5 miles of U.S. 58 remain to be improved to four lanes.

Primary north-south access in the area is provided by U.S. 25E. U.S. 25E connects with I-75 at Corbin, Kentucky, approximately 47 miles north of the park, and with I-81 near Morristown, Tennessee, approximately 51 miles south of the park. I-81 intersects I-40, one of the primary east-west routes in the United States, only 8 miles to the west of Morristown. Truck drivers and other long distance travelers have discovered that U.S. 25E will save nearly 30 miles over using I-75 and I-81/I-40 between Corbin and Morristown. The grades are also less severe and allow heavy trucks to avoid the five percent grade on I-75 at Jellico Mountain, near the Tennessee – Kentucky state line. As the roadway is a four lane divided facility in Kentucky and Tennessee, the "short cut" may save time as well as mileage.

In 1996, the Cumberland Gap Tunnel was opened to traffic after five years of construction. The tunnel is in the park and is owned by the NPS. The States of Kentucky and Tennessee operate and maintain the tunnel for the park, but the park provides law enforcement in the tunnel and approaches - one mile into Kentucky and one-third mile into Tennessee (NPS 2004). The tunnel was created to eliminate a dangerous 2.3-mile section of U.S. 25E across Cumberland Gap that linked Cumberland Gap, Tennessee and Middlesboro, Kentucky. Elimination of this segment of U.S. 25E also allowed restoration of the original Wilderness Road across the Gap. The tunnel consists of twin tubes, each 4,600 feet in length, with two lanes, one way roadways in each tube. The tunnel is a state-of-the-art facility, with polyvinyl chloride lining, high pressure sodium lighting, and jet fan ventilation. Sensors collect data on air quality and traffic characteristics, and cameras monitor 100 percent of the tunnel for safety and security (Cumberland Gap Tunnel Authority 2004). All employees are trained in emergency medical response, firefighting, and hazardous materials. An ambulance and a fire truck are housed at each tunnel portal. Approximately 100 vehicles per day, transporting hazardous materials, are escorted through the tunnel while other traffic is stopped. Explosives are banned from the tunnel without escort. Pedestrians and bicycles are also banned from the tunnel for safety; the escort vehicle is used to transport these modes. The tunnel is considered a regional Intelligent Transportation

System center. Employees report to the Kentucky Transportation Cabinet Traffic Center in Frankfort. There are dynamic message signs on I-75 and I-81 that provide information on traffic problems on I-75, I-81, I-40, and U.S. 25E.

The tunnel is constructed to handle an earthquake of 4.0 magnitude or less on the Richter scale. The tunnel also has other safety features for motorists. Turbine fans are mounted on the ceiling every 600 feet in the tunnel and turn on automatically when air quality deteriorates to a specific level. Fluorescent and low pressure sodium lights provide illumination in the tunnel and include a transition zone at tunnel entrances and exits to help drivers vision adjust to the artificial or natural light, as required. Pedestrian cross-overs connect the tunnel tubes every 300 feet and contain fire hose and extinguishers, an alarm, and a telephone.

The Tunnel Authority can monitor all parts of the tunnel 24 hours a day. At the first sign of an accident, traffic is stopped in that tube. Firefighters are dispatched to the scene and the On Scene Commander assesses the situation and calls for added help, if required. An ambulance is usually the next responder. Ambulances and fire trucks are housed at each portal. If additional support is needed, appropriate personnel from Claiborne County, Bell County, or Middlesboro are called. Tunnel emergency personnel can respond to emergencies as far away as the campgrounds if needed. However, since their primary responsibility is the tunnel, they only respond off site when absolutely necessary.

In the case of apparent Homeland Security issues, traffic is stopped and a National Park law enforcement ranger takes over enforcement. Breakdowns are treated as potential Homeland Security issues. The vehicle is quickly towed outside the tunnel by a Tunnel Authority wrecker.

Kentucky S.R. 988 is located in the northwest section of the park and provides access between Pinnacle Road and the Sugar Run Picnic Area. The roadway is a two lane facility with ten- to eleven-foot striped lanes and no paved shoulders. This section is owned by the park. To the north of Sugar Run, S.R. 988 continues north and intersects with S.R. 188, which provides access to U.S. 25E near Meldrum, Kentucky. To the north of Sugar Run, the roadway is outside of the park boundaries and is owned and maintained by the State of Kentucky.

The Shillalah Creek Trail is an unpaved roadway from Kentucky S.R. 217 to Hensley Settlement. This roadway is closed to general motor vehicle traffic with the exception of landowners that live along the roadway. This trail is also used by the NPS to provide van tours to the Hensley Settlement.

Tiprell Road is a paved roadway located in Tennessee in the southwest section of the park. The two lane roadway is 18 feet wide and is not striped. The roadway provides access between Cumberland Gap, Tennessee and Tennessee S.R. 63 near Arthur, Tennessee. Tiprell Road also provides sole access to Tiprell, Tennessee.

Harlan County, Kentucky, located at the northeast tip of the park, has no vehicular access to the park. Lee County, Virginia has access at Civic Park trailhead and at Route 690 at Caylor, which leads to the Chadwell Gap trailhead.

U.S. 58 near U.S. 25E had an average annual daily traffic of 6,380 vehicles per day in 2005 (Tennessee Department of Transportation 2006). In Lee County, U.S. 58 had an average annual daily traffic of 6,900 vehicles per day in 2004 near the Tennessee state line (Virginia Department of Transportation 2006). Near the east end of the park, average annual daily traffic on U.S. 58 was 3,400 vehicles per day in 2004. The level of service on U.S. 58 near Cumberland Gap, Tennessee and Lee County, Virginia is an "A," which is a measure of traffic congestion on a roadway facility that ranges along a continuum from level of service "A" (free-flowing conditions) to level of service "F" (bumper to bumper congestion). Traffic volumes on U.S. 58 have remained relatively consistent since 2003.

U.S. 25E near Salisbury Avenue in Middlesboro, Kentucky had an average annual daily traffic of 25,226 vehicles per day in 2004 (Kentucky Transportation Cabinet 2006). Average annual daily traffic on U.S. 25E to the north of Middlesboro was 17,252 vehicles per day in 2004. To the south of U.S. 58,

U.S. 25E had an average annual daily traffic of 22,671 in 2005 (Tennessee Department of Transportation 2006). In the tunnel, the average annual daily traffic in 2005 was 32,199 vehicles per day (NPS 2006a). To the south of Tennessee S.R. 63, U.S. 25E had an average annual daily traffic of 16,875 in 2005. U.S. 25E was operating at level of service "C" in the tunnel, but the remainder of U.S. 25E was operating at level of service "B." The 2005 traffic counts in Tennessee showed an increase of approximately 1,200 to 1,400 vehicles per day from 2003 traffic counts. Historic traffic counts were not available at the count stations in Kentucky, but 2002 and 2003 traffic counts at nearby locations were slightly lower than the 2004 counts.

S.R. 988 in the park had an average daily traffic of 285 vehicles per day entering the park in 2005 (NPS 2006a). Assuming an even split for outbound traffic, the two-way average daily traffic on this facility was 570 vehicles per day. During the month of March 2005, traffic peaked on this roadway, but only averaged approximately 936 vehicles per day using the same assumption. Traffic operated at level of service "A" on this facility during 2005, including the peak month.

Pinnacle Road had an average daily traffic of 120 vehicles per day entering the park in 2005 (NPS 2006a). Assuming an even split for outbound traffic, the two-way average daily traffic on this facility was 240 vehicles per day. During the month of May, 2005, traffic peaked on this roadway, but only averaged approximately 840 vehicles per day using the same assumption. Traffic operated at level of service "A" on this facility during 2005, including the peak month.

From 2000 to 2005, annual traffic accidents in the park ranged from a low of 23 accidents in 2003 to a high of 59 accidents in 2004 (NPS, 2006e). Most of these accidents occurred along the 2.5-mile section of U.S, 25E located within the park boundaries. During 2005, 33 of 41 accidents that occurred in the park were on U.S. 25E. The accident rate of 112.9 accidents per 100 million vehicle miles of travel was 24 percent higher than the statewide rate of 91 accidents per 100 million vehicle miles of travel for similar major arterial roadway facilities in 2005. In addition, there was one fatality reported during 2005 for this segment of U.S. 25E. This equates to 3.4 fatalities per 100 million vehicle miles of travel, or 131 percent over the statewide rate of 1.47 fatalities per 100 million vehicle miles of travel for similar major arterial roadway facilities. Over the last ten years, this section of U.S. 25E experienced accidents that were 15 percent higher than the average accident rate for a major arterial roadway and experienced fatalities at a 33 percent lower rate than average for a major arterial roadway. Prior to construction of the Cumberland Gap tunnel, there were three to five deaths each year on "Massacre Mountain," the section of U.S. 25E that was replaced by the tunnel.

From 1989 to 2006, most of the accidents in the park occurred during the summer months. However, November experienced the third highest frequency of accidents during this period.

The park has over 70 miles of hiking trails. Distances for the trails range from a one-quarter mile loop trail to the 21-mile Ridge Trail. Some of the trails allow equestrian use as well as hikers, and several also allow mountain bikes. The Wilderness Road Trail that provides access through the Gap has been restored since U.S. 25E was relocated. A 2-mile fitness trail is located near the Visitor Center. Approximately 100 people from the Middlesboro area come each day to use the fitness trail. A trail connecting Breaks Interstate Park with Pine Mountain State Park and Cumberland Gap National Historical Park is in the planning stages. It would connect with the park trail system.

A greenway that begins in Harrogate, to the south of Lincoln Memorial University, and follows U.S. 25E to the north into Cumberland Gap, Tennessee, was constructed on an abandoned railroad bed. This facility connects with the park trails near the Daniel Boone Visitor Contact Center. The Tennessee Cumberland Trail is planned to connect the park to Chattanooga.

Several of the trails cannot be accessed without crossing privately owned property. The Chadwell Gap Trailhead is located on private property approximately 3/8 mile from Virginia Route 688. This trail has been closed due to lack of parking. The Shillalah Creek Road — access to Hensley Settlement from Kentucky State Route 217 — is located on private property. The road crosses the property of several landowners over its 5-mile length. One landowner has not provided the park with a written easement.

Although all-terrain vehicles are prohibited from the park, visitors often use these vehicles on and off formal trails and in wooded areas. Most of this unauthorized use takes place in wilderness areas of the park, particularly on the more remote east end of the park. In 2005, ten citations were issued for unauthorized all-terrain vehicle use in the park (NPS 2006c). Citations issued in 2005 were considerably higher than previous years due to the discovery of an unauthorized trail that was being used by all-terrain vehicles from private and state lands to the White Rocks area in the southeast portion of the park. Rangers patrolling that trail led to the additional citations. Unauthorized all-terrain vehicle use is also a problem on Bannerfield Road in Tiprell, Shillalah Road, and Brush Mountain Road. Vegetation is damaged by unauthorized ATV use due to riding off trails and also illegal camping. Riders occasionally travel through the Hensley Settlement, disrupting the historic ambiance.

There are a number of parking lots in the park, as shown in Table 15.

Table 15. Parking Lot Location and Number of Spaces for Cars, Handicapped Access, and Bus/Recreational Vehicles

Parking Facility	Automobile	Handicapped	Bus or Recreational Vehicle
Visitor Center	130	5	16
Daniel Boone Visitor Contact Center	55	3	8
Iron Furnace	12	2	2
Entrance road to Wilderness Road campground	24	1	0
Picnic area near Wilderness Road campground	40	3	0
Park headquarter visitor parking	12	0	0
Park headquarter employee parking	13	0	0
Park headquarter picnic area	16	1	0
Thomas Walker	51	4	7
Picnic area along Pinnacle Overlook Road	4	1	0
Pinnacle Overlook	73	3	0

Parking at some of the trailheads that border the park is limited or non-existent. As mentioned, the Chadwell Gap trail head was closed due to lack of parking at the trail head. The Chadwell Gap trail provided the most direct route to the Hensley Settlement from Virginia. No easement is provided to allow access to the trailhead, and no parking is available. There is also no parking available at the Shillalah Creek trail head for persons who want to access Hensley Settlement from the Kentucky side by hiking, biking, or horseback.

Norfolk Southern has a railroad track that traverses the park using a tunnel located between Cumberland Gap, Tennessee and Middlesboro, Kentucky. This tunnel is part of a mainline rail line that operates between Middlesboro and Knoxville, Tennessee. The track generally carries two trains per day with 50-70 rail cars, and primarily transports coal (Norfolk Southern 2006).

The Middlesboro Bell County Airport offers a variety of services including 24 hour, 7 days a week self service fuel, mechanics, aircraft hanger storage, aviation weather services, flight instruction, courtesy car, and a 3650 foot asphalt runway with taxiway and apron area (Commonwealth of Kentucky 2007).

PARK OPERATIONS

In 1940, Congress authorized the Cumberland Gap National Historical Park for preservation of historically important "land, structures, and other properties . . . as a public park." The establishing legislation specified a number of associated natural and scenic features also be included as part of the park. The park's purpose is to preserve and interpret these historic resources and associated natural features for the benefit and inspiration of the people. To achieve this purpose, the Cumberland Gap National Historical Park employs approximately 54 full time personnel and 22 temporary personnel to manage and operate the nearly 25,000 acre park. The number of employees in each department is shown in Table 16.

Table 16. Cumberland Gap National Historical Park Employment, 2006

Department	No. of Permanent Employees	No. of Temporary Employees
Administration / Management	7	1
Resource Management	3	4
Interpretation	4	7
Ranger Activities	8	0
Fire Use Module	8	0
Maintenance	20	10
Total	50	22

Temporary workers in the Interpretation Division are employed from May 1 to October 31 and the temporary Maintenance Division workers are employed from March 1 to September 30. In addition, the park receives assistance from a stable of talented volunteers. During 2005, 154 volunteers contributed 16,303 hours of their time to the park. This is equivalent to nearly eight additional full time employees. Approximately 36 percent of the volunteer hours were spent on trail maintenance, 25 percent was spent on campground host duties, and 21 percent was spent on resource management activities. In addition, approximately 18 percent of the volunteer hours were spent on interpretive activities.

The park has two non-profit organizations that operate shops in the visitor center that sell educational, interpretive, and traditional Appalachian craft items to the public. The Eastern National Bookstore and the Southern Highland Craft Guild operate under cooperative agreements with the NPS.

There are no current concessions in the park. Tours to Hensley Settlement previously operated by the concession Wilderness Road Tours are now operated by the NPS. The Wilderness Road Campground is also operated by the NPS.

Emergency Response

Emergency medical services are provided by Bell County Emergency Medical Services, Harlan County Emergency and Rescue Squad, Inc. (a non-profit corporation), Claiborne County Rescue Squad, and Lee County Rescue Squad. These agencies and organizations also provide emergency services within the park. Park rangers are First Responder Emergency Medical Service qualified, and most of the law enforcement rangers are EMT-B (Basic Emergency Medical Technician) qualified. Law enforcement rangers perform first response medical assistance, but usually give control to local emergency medical service personnel when they arrive (NPS 2006f).

Fire Protection

All local firefighting agencies will respond to fires within their jurisdiction, including fires within park boundaries. NPS law enforcement rangers serving Cumberland Gap National Historical Park are trained in fighting wildfires, but are not trained in fighting structural fires. However, law enforcement rangers would be involved in any firefighting that occurred within park boundaries.

Law Enforcement

Law enforcement in unincorporated Bell County is provided by the Bell County Sheriff's Office. The Cities of Middlesboro and Pineville are each served by their own police department. Law enforcement agencies in Harlan County include the Harlan County Sheriff and police departments in the communities of Harlan, Loyall, Cumberland, and Evert. In addition, Post 10 of the Kentucky State Police is located in Harlan and serves the region. These agencies have concurrent jurisdiction; i.e., each state or county agency has jurisdiction in their respective locale within park boundaries.

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