

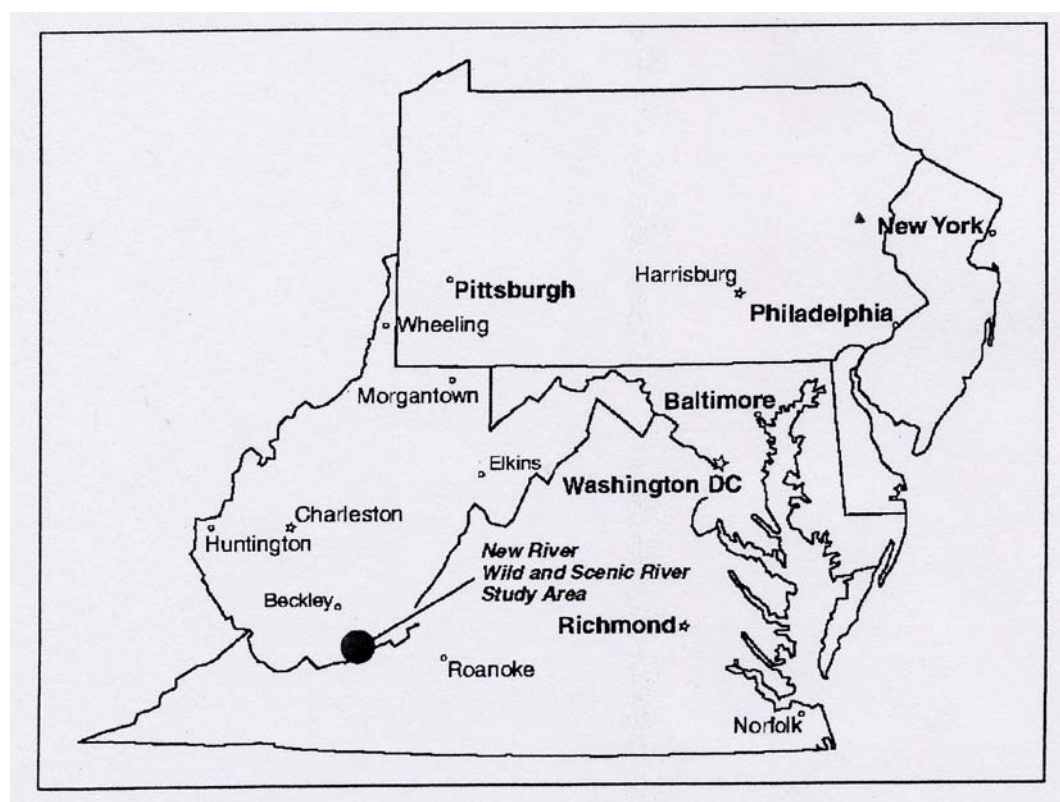
CHAPTER 2. DESCRIPTION OF THE STUDY AREA

This chapter provides an overview of the character and resources of the study area. The purposes of the chapter are (1) to familiarize the reader with the natural, cultural and recreational resources of the study area, the broader context of the surrounding region, and how the area is managed, and (2) to provide a basis for the eligibility assessment presented in Chapter 3.

Overview

The New River Wild and Scenic River Study Area straddles the border between southwestern Virginia and southeastern West Virginia. It includes portions of Giles County in Virginia and Summers, Monroe, and Mercer counties in West Virginia. The largest portion of the study area is located in Summers County, followed by Giles County. Figure 2.1 shows the location of the study area in the context of the surrounding region.

Figure 2.1. The location of the study area within the greater region.



The entire study area is located within a block of federally owned land that was purchased during the late 1930s and 1940s to construct the Bluestone Lake Project, a federal dam project operated by the U.S. Army Corps of Engineers (ACE) for flood control, hydropower, recreation, fish and wildlife management and downstream recreation. The Bluestone Dam is located on the New River one mile upstream of the point where the Greenbrier River joins the New River in Hinton,

West Virginia. Bluestone Lake was formed by the Bluestone Dam's impounding of the New River. Normally the lake extends approximately 10.5 miles upstream from the dam. During extreme flood conditions, the dam is capable of impounding water upstream along the New River to Narrows, Virginia, a distance of approximately 25.5 miles beyond the upper end of the lake. In all, including the lake and the flood storage area, the dam is capable of inundating thirty-six miles of the New River as well as a portion of the Bluestone River, a tributary to the New River that enters Bluestone Lake from river left approximately 2.5 miles upstream of Bluestone Dam.¹

The dam, the area immediately downstream from the dam, the lake, the river area upstream of the lake that is subject to occasional inundation, and surrounding uplands owned by the federal government or subject to federally-owned flowage easements are collectively referred to as the Bluestone Lake Project Area. Most of the lands in the Bluestone Lake Project Area are owned outright by the federal government and administered by either the ACE or, in the case of the lands within the Bluestone National Scenic River area, the NPS. The ACE administers approximately 85% of the lands within the Bluestone Lake Project and NPS administers approximately 15%. Also included are shorelands and islands in Virginia upstream of the Route 460 Bridge that are privately owned but subject to ACE-controlled flowage easements for flood control.

Except for lands immediately around and downstream of the dam, all lands within the Bluestone Lake Project Area in the State of West Virginia are licensed to the West Virginia Division of Natural Resources (DNR). The original license was signed in 1950. Most of these lands form the state's Bluestone Wildlife Management Area (WMA), although one small area near the mouth of the Bluestone River is managed separately by DNR as Bluestone State Park. There is no similar agreement with the Commonwealth of Virginia for management of Bluestone Lake Project Area lands in that state.

Relating this ownership, administration, and management arrangement to the New River Wild and Scenic River Study area, all of the study area is owned by the federal government and is within the ACE Bluestone Lake Project Area. The West Virginia portion of the study area is within the DNR-managed Bluestone Wildlife Management Area.²

¹ The terms "river left" and "river right" are used throughout this report. "River left" refers to the left side of a river from the perspective of someone looking downstream. In the case of the New River within the study area, the river generally runs south to north. Looking downstream a person is generally looking north, so river left generally refers to the west side of the river while river right generally refers to the east side.

² The terms "ownership," "administration," and "management" are used throughout this report, and distinctions between them are important to keep in mind. As used in this report, ownership refers to a government or private party having legal title to a given parcel of land. Administration refers to the oversight responsibility for that parcel of land being assigned to a particular party by the owner of the land. (For example, the federal government owns lands within the Jefferson National Forest that are administered by the U.S. Forest Service on behalf of the federal government.) Management refers to on-the-ground decisions and operations. It is possible for land to be owned by one party, administered by another, and managed by a third. That is the case within the Bluestone Wildlife Management Area, where the federal government owns the property and delegates administration to the ACE. ACE, in turn, delegates management to the West Virginia DNR through a license.

As authorized by P.L. 102-525, the New River study segment begins at the U.S. Route 460 Bridge in Glen Lyn, Virginia and proceeds downstream to the maximum summer pool elevation of Bluestone Lake, south of Hinton, West Virginia. The maximum summer pool elevation is defined in the authorizing legislation as 1,410 feet above mean sea level.³ This point is approximately 10.5 miles upstream of the Bluestone Dam at the mouth of Buffalo Creek, a small tributary that enters the New River from river right. The study segment is approximately 19.3 miles in length.

As described above, the study area also includes federal lands on both sides of the river that are included within the Bluestone Lake Project Area. The width of the study corridor varies from a few hundred feet (including the river) to over two miles. This corridor includes all of the river shorelands that are subject to occasional inundation during times when the Bluestone Dam is holding water to control downstream flooding. In many locations the corridor also includes adjacent uplands. The width of the corridor is greatest within the WMA in the downstream portion of the study area and less in the upstream portion. The study area is shown in Figures 2.1A & 2.1B.

Regional Setting

Description of the Region

The New River originates in the Appalachian Mountains in northwestern North Carolina and flows generally northward for 320 miles through southwestern Virginia and southeastern West Virginia to its confluence with the Gauley River in West Virginia, where it forms the Kanawha River. The Kanawha continues to flow toward the northwest past Charleston, West Virginia, until it enters the Ohio River, south of Point Pleasant, WV. Overall, the New River's watershed, which includes the Gauley River and all waters in the Kanawha-New River Basin upstream of the Gauley, encompasses a total of 6,920 square miles in the three states. The area included in the wild and scenic river study lies in the lower half of the watershed, beginning approximately 225 miles downstream of the river's headwaters and ending approximately 75 miles upstream of the confluence with the Gauley. Figure 2.2 shows the location of the study area within the Kanawha-New River Basin.

³ As will be described later in this chapter, the summer high pool actually fluctuates between 1,409.5 and 1,411.5 feet.

Figure 2.1.A. The New River Wild and Scenic River Study Area (South Section)

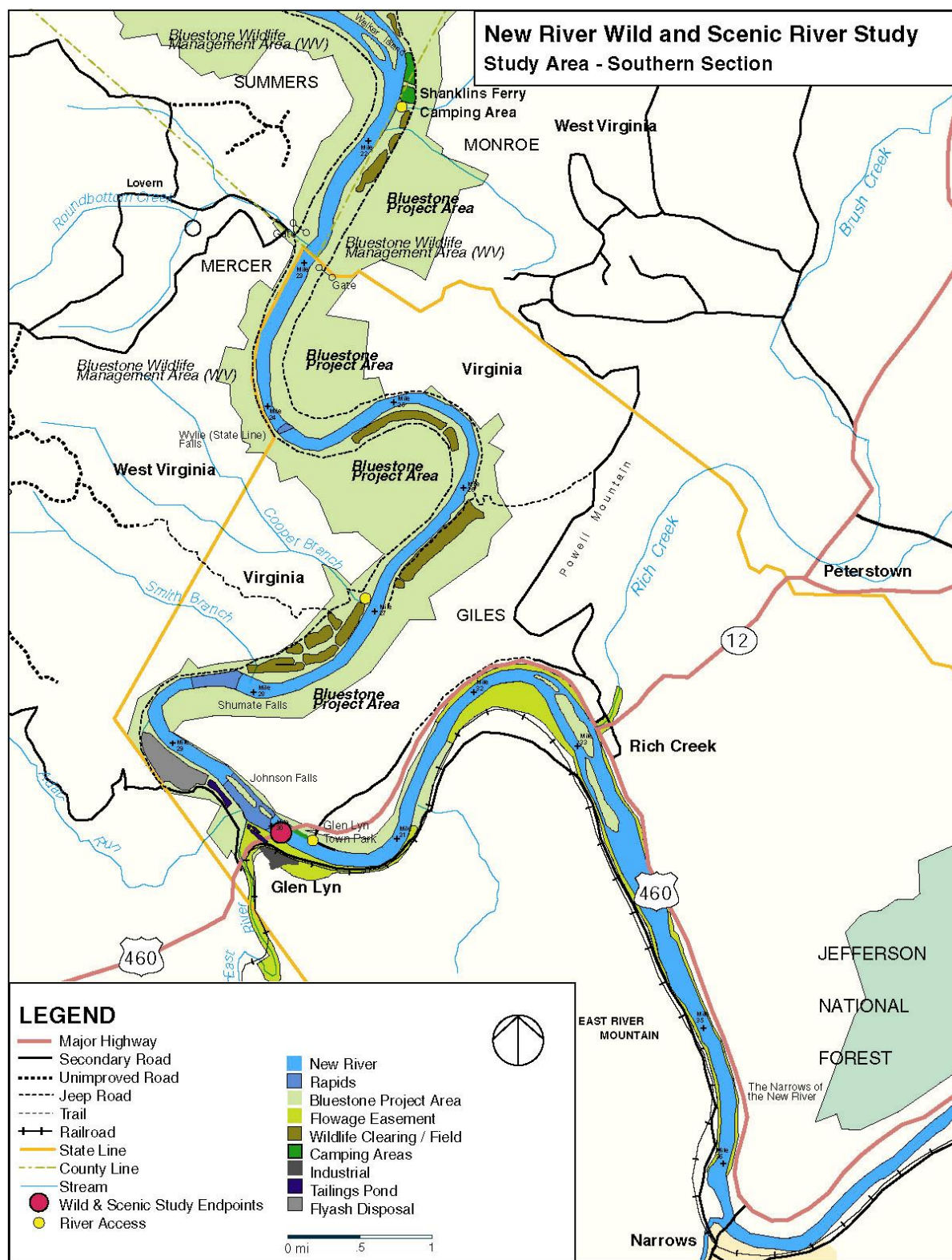


Figure 2.1.B. The New River Wild and Scenic River Study Area (North Section)

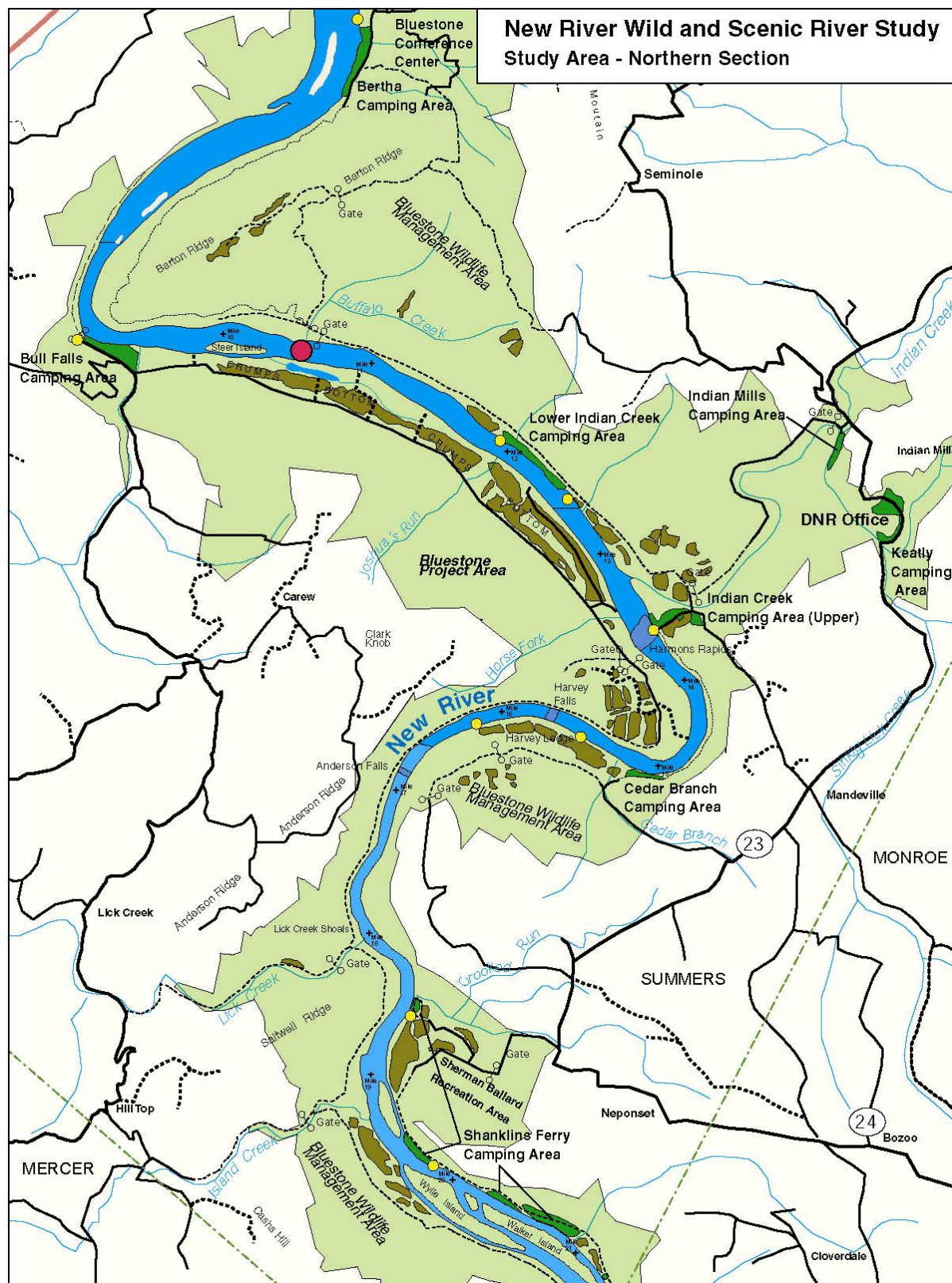


Figure 2.2. The Kanawha-New River Basin.



The southwestern Virginia/southeastern West Virginia region is dominated by the Appalachian Mountains. Both the mountains and the adjacent lowlands are largely forested. In the lowlands the landscape is dotted with small rural agricultural, forest products, and service communities. Several of these communities are historically significant, or, at the least, have buildings and districts that are historically significant. The New River is the most prominent waterway in the area. Historically the New River corridor provided the major avenue for penetrating the otherwise imposing Appalachian Mountain chain, initially by boat and trail, and later by railroad and highway. Although the region surrounding the study area is generally quite rural, the entire study area is within a two-hour drive from Charleston, West Virginia, and Roanoke, Virginia, and within a five-hour drive from Washington, D.C.

Throughout this report frequent reference is made to “the region.” There is no one definition for a region. At its most basic level, a region is a geographic area with a set of unifying physiographic and/or human activity features. In reality, one location may be part of several overlapping or concentric regions, each defined by its purpose. The following regions, listed from larger to smaller, encompass and provide useful context for the New River study area:

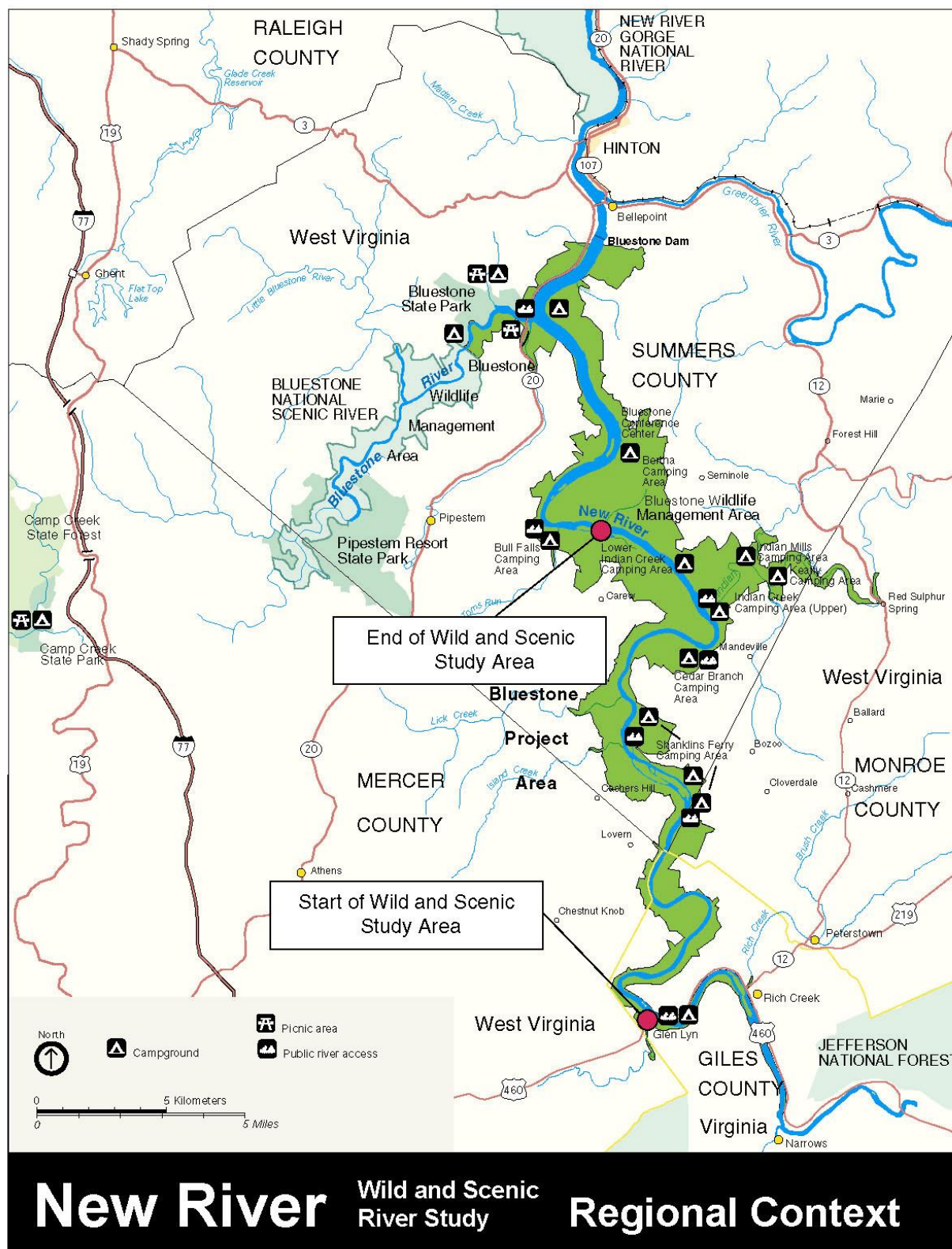
1. The eastern deciduous forest region, an ecological region covering the eastern United States from Maine to Georgia, westward to the Great Lakes and the Ohio River;
2. The Appalachian Mountain region, a physiographic region encompassing much of New England and portions of several mid-Atlantic and southeastern states;
3. The Ridge and Valley and Appalachian Plateau physiographic regions;
4. The Kanawha-New River Basin, a hydrologically-based region;
5. The New River watershed, a component of the larger Kanawha-New River Basin;
6. The Virginia-West Virginia region, which is based on the political boundaries of the two states that encompass the study area;
7. The southwestern Virginia/southeastern West Virginia region, a geographic and socio-political region that includes upwards of twenty counties surrounding the state border, and
8. The four-county region through which the New River flows within the study area (that is, Giles County in Virginia, and Summers, Monroe, and Mercer counties in West Virginia).

While all of these “regions” help to provide a context for the New River Wild and Scenic River Study, this report will focus mainly on three – the New River watershed, the southwestern Virginia/southeastern West Virginia region, and the four-county region. When regional concepts are discussed, the region will be clearly identified.

Nearby Public Lands

The study area is adjacent to, nearby, or part of several other blocks of public land. The relationship between the study area and nearby lands is shown in Figure 2.3. Adjacent to the study area downstream is Bluestone Lake, formed by the Bluestone Dam in Hinton, West Virginia. As described in the “Overview” section above, the lands surrounding the lake are owned by the federal government and administered by the ACE and actively managed by the West Virginia DNR as a WMA. Immediately downstream of the dam are additional ACE-administered lands along the New River in Hinton, West Virginia. These lands provide access to

Figure 2.3. The study area in the context of surrounding public lands.



the river, principally for fishing and hunting. At the mouth of the Bluestone River where it flows into Bluestone Lake is Bluestone State Park, which was created in the late 1960s and early 1970s and comprises approximately 2,100 acres. The park, which is located partially on federal lands administered by the ACE and partially on state lands, is managed by the West Virginia DNR Parks and Recreation Section.

Bluestone State Park offers a range of camping and boating amenities. Upstream of Bluestone State Park, the lowermost ten miles of the free-flowing portion of the Bluestone River is designated as the Bluestone National Scenic River (NSR). The designation extends from the maximum summer pool elevation of Bluestone Lake (1,410 feet above mean sea level) to approximately two miles upstream of the Summers and Mercer County line, and includes adjacent federal lands. New River Gorge National River and Bluestone NSR are two units of the National Park System within West Virginia, and host many outdoor recreational opportunities including whitewater boating, hiking, hunting, fishing, rock climbing, horseback riding and camping. The Bluestone NSR is administered by the NPS through its New River Gorge National River office in Glen Jean, WV. The upper portion of the Bluestone NSR flows through Pipestem Resort State Park, which was also created in the late 1960s and early 1970s and comprises approximately 4,073 acres. The part of the Bluestone NSR within Pipestem is administered by the State of West Virginia, not the NPS. Pipestem Resort State Park is one of West Virginia's most luxurious state parks, offering camping, lodging, and an array of recreational activities including golfing, horseback riding, hiking, and fishing.

As described earlier, the West Virginia portion of the study area, the lands surrounding Bluestone Lake, and lands within the Bluestone National Scenic River outside of Pipestem Resort State Park comprise the Bluestone Wildlife Management Area (WMA). Most of the WMA is managed by the West Virginia DNR Wildlife Resources Section in collaboration with DNR Parks and Recreation Section, which manages recreation facilities within the WMA. In the Bluestone NSR portion of the WMA, West Virginia DNR and the NPS share management responsibilities. The WMA is managed primarily for fish, wildlife, and associated public uses including hunting, fishing, trapping, camping, boating, and wildlife observation.

All told, the Bluestone Wildlife Management Area and Bluestone and Pipestem Resort State Parks comprise a contiguous block of more than 25,000 acres of high quality public conservation land offering a significant diversity of recreational opportunities.

Downstream of the Bluestone Dam and the confluence with the Greenbrier River, the New River enters the New River Gorge National River, which is administered and managed by the NPS. This area encompasses 72,189 acres between Hinton and Fayetteville, West Virginia. Near the downstream end of the New River Gorge National River is the 11,507-acre Gauley River National Recreation Area, also administered and managed by the NPS. These two NPS areas provide opportunities for limited and restricted camping, fishing, hiking, and whitewater boating, among other activities.

Moving upstream along the New River into Virginia, the U.S. Forest Service-administered and managed Jefferson National Forest (690,000 acres) begins within a few miles of the upper end of the study area in Giles County and extends along the Appalachian Mountain Range, abutting

both the George Washington National Forest in Virginia and the Monongahela National Forest in West Virginia. The Appalachian National Scenic Trail, which is administered and managed by the NPS, runs through this area and crosses the New River upstream of the study area at Pearisburg, Virginia.

Some thirty miles upstream of the study area near Radford, Virginia, is Claytor Lake State Park. The park is on the shorelands of Claytor Lake, a reservoir formed when Claytor Dam was constructed across the New River. Further upstream in Virginia, the New River Trail State Park flows for forty miles through Grayson, Carroll, Wythe, and Pulaski counties. West of the New River near the North Carolina border is Mt. Rogers National Recreation Area, which is part of the Jefferson National Forest.

In North Carolina, sections of the New River main stem and South Fork totaling 26.5 miles have been designated as a national wild and scenic river. This area includes New River State Park, managed by the North Carolina Division of Parks and Recreation.

In sum, considering both immediately adjacent public lands and others in the surrounding area, the New River study area is strategically situated at the center of a region that contains a state wildlife management area, several state parks, a national forest, two national recreation areas, a national river, a national scenic trail, and two national wild and scenic rivers.

History

The earliest known Native American peoples lived in the New River region from 10,500 to 8,000 B.C. and used the study area as hunting grounds for mammoth, musk ox, mastodon, and caribou. Approximately 6,000 years ago, there was a shift toward more reliance on agriculture. By 1,000 years ago the use of agriculture had matured to where people lived in villages and relied intensively on corn production. During this village period, as earlier, the Crump's Bottom area and the Indian Mills area along Indian Creek were favored locations, though there is evidence of use throughout the area.

Prior to European settlement the area had been home to the Creek, Cherokee, Choctaw, and Shawnee tribes. No permanent Native American communities existed in the region at the time of European settlement, but the area was still heavily used as a transportation corridor and hunting grounds. European settlement of the area began in the early 1750s. Conflicts between settlers and Native Americans ensued, and Native Americans soon vacated the area. As with the Native Americans, the Europeans' major center of activity was the Crump's Bottom area and the Indian Mills area along Indian Creek. Families living in the region survived by hunting and by farming in the narrow bench of lowlands near the river. Soon the river also supported several mills. Adjacent lands provided salt, an invaluable commodity that supported both wildlife and local residents. The Mercer Salt Works were established near Lick Creek in 1850, and became the most prominent industry in the area. Surplus salt was exported out of the region via the river and the Red Sulphur Turnpike, which ran near the river. Colonel (and later President) Rutherford B. Hayes burned the salt works during the Civil War.

Until the mid-19th century, the river was the most reliable source of transportation. Travel and transport of agricultural products down the river was accomplished using "batteau boats," narrow flat-bottomed wood carved boats that were poled along the river. Ledge drops that formed rapids inhibited use of the river for transportation, especially at lower flow levels. During the 19th century, "batteau chutes" were blasted through bedrock ledges to provide a means for batteau to navigate through the ledge drops.

Also during the 19th century, several ferry sites were established to transport people and goods across the river. Shanklin's Ferry was the most notable. Its popularity led to the development of a small business district.

During the 19th century road systems began to expand, often superimposed on the major Native American trails. The rugged terrain of the study area made travel and construction of roads extremely difficult, so roads typically skirted the area and only a few unpaved roads were constructed in the study area's river valley. While other parts of the New River Valley became a major railway route, the terrain of the study area was not conducive to tracks, leaving this the only section of the New River from Pulaski, Virginia, to Gauley Bridge, West Virginia, without railroad development in the river corridor.

By the beginning of the 20th century, several small settlements had been established in the study area, complete with homes, businesses, and cemeteries. A substantial estate had been developed at Crump's Bottom, and agriculture was practiced in several locations concentrated along the fertile river bottomlands.

The Bluestone Lake Project was authorized by Executive Order of the President, September 12, 1935, and the Flood Control Acts of June 22, 1936, and June 28, 1938, for the purposes of flood control and power development. The authorization included the construction of a dam on the New River at Hinton, West Virginia, and acquisition of land within the New River Valley from the dam upstream to Narrows, Virginia, for a reservoir. The stated purposes of the project were later expanded under the Flood Control Act of 1944 (PL 78-534) to include recreation activities and under the Fish and Wildlife Coordination Act of 1958 (PL 85-624) to include fish and wildlife enhancement.

The Bluestone Dam was configured to contain a maximum flood storage pool of 1,520 feet above sea level. (With completion of the Dam Safety Assurance construction, the maximum pool elevation will increase to 1542 feet.) Looking upstream, the 1,520-foot elevation included all bottomlands along the river between the Hinton dam site and Narrows, Virginia. In order to have the right to flood shorelands, the ACE needed to either purchase or secure flowage easements on all lands upstream of the dam site that were below the 1,520-foot elevation. In actuality the ACE set an objective of acquiring rights up to the 1,530-foot elevation. Prior to the completion of dam construction in January 1949, the ACE acquired fee title to most of the lands in the project area downstream of approximately the Route 460 Bridge in Glen Lyn, Virginia, and flowage easements on much of the remaining project area lands further upstream in Virginia. Ultimately the ACE acquired ownership or rights to all of the lands to at least the 1,520-foot elevation. While the focus was on lands that would be subject to flooding, in some cases the ACE also purchased higher adjacent uplands when this proved necessary or prudent. This was

particularly the case in the West Virginia portion of the project area. This is why the federal lands in many locations within the project area extend beyond the 1,520-foot or 1,530-foot contour lines.

As the ACE assumed ownership of the New River corridor above Hinton, residents were relocated, structures removed, and roads abandoned. Under federal ownership since that time, the Bluestone Lake Project Area has been isolated from residential, commercial, and industrial development, thus allowing much of the area to revert to forest. The foundations of several houses and some roadways and other developments can still be seen within the project area. Other visible vestiges of the pre-dam era include a number of agricultural fields that have continued to be worked by local farmers under agreements with the government.

Since 1950, the ACE has had a license agreement with the State of West Virginia allowing the state's DNR to manage lands in the Bluestone Lake Project Area within West Virginia, primarily for fish and wildlife and related recreational activities. Originally called the Bluestone Public Hunting and Fishing Area, the name was later changed to the Bluestone Wildlife Management Area. The WVDNR management program is discussed in greater detail later in this chapter (see "Management" section, below). No similar arrangement has been established with the Commonwealth of Virginia for management of the portion of the Bluestone Lake Project Area within that state.

Since the early 1950s, residents of the southwestern Virginia/southeastern West Virginia region have used the area for recreational purposes, especially hunting, fishing, trapping, and camping. Boating has also been popular, especially in conjunction with smallmouth bass fishing. The area has been especially popular as a place for low-cost, close-to-home vacations. Several examples have been cited of three generations of the same family coming back to the same camping location year after year.

Management

The Bluestone Lake Project Area

As described previously, the segment of the New River under study for potential addition to the National Wild and Scenic River System is upstream of the Bluestone Dam and within the Bluestone Lake Project Area. Since the construction of the dam, all of the lands in the study area have been owned by the federal government and administered by the ACE and managed by the WVDNR-WRS. The ACE's Huntington District prepared an overall master plan for the Bluestone Lake Project Area in 1949 that is still in effect. Specific parts of the plan address resource management, forest management, recreation, and fish and wildlife management. The "physical plan of development" section allocates project lands into areas for Bluestone Dam operations, intensive use recreation, low-density use recreation, wildlife management, group use, and natural preserves. The plan also outlines a list of initial and ultimate facilities to be developed. For more contemporary guidance the ACE prepares operational management plans, the latest approved in 1997. Water use restrictions include an unlimited speed zone, no wake zone and a no ski zone. The relationship between ACE and WVDNR-WRS has been successful.

Management in West Virginia

Most of the federal lands administered by the ACE within the Bluestone Lake Project Area in West Virginia, including the West Virginia portion of the study area, are managed by the West Virginia DNR under license from ACE. (The only Bluestone Lake Project Area lands in West Virginia not licensed to DNR by ACE are lands downstream of the Bluestone Dam, lands near the dam that are necessary for its operation, and lands within the Bluestone National Scenic River for which DNR has a separate license agreement with the NPS.) There are two licenses between ACE and DNR. One provides for state management of the federally-owned portion of Bluestone State Park. The other authorizes DNR to manage 90% of the lands as the Bluestone Wildlife Management Area. The original license between ACE and DNR was for fifty years and was signed in 1950. A new twenty-five-year license was signed in 2000 and will expire in June 2025.

The Bluestone WMA is the second largest public facility of its kind in West Virginia, totaling approximately 17,893 acres. Roughly 14,990 acres are bottomlands and uplands surrounding the New River and Bluestone Lake, of which approximately two-thirds are within the New River study area. The remaining 2,903 acres are adjacent to the Bluestone River. These lands, referred to by DNR as the “Bluestone River Unit” of the WMA, lie within the boundary of the Bluestone National Scenic River administered by the NPS. A new ten-year license between NPS and DNR was signed in 2002.

DNR’s initial interest in the Bluestone Lake Project Area was its potential value as habitat for eastern wild turkey. Today, after more than fifty years of active management, the area reportedly has some of the highest densities of wild turkeys per square mile in the eastern U.S. The management objectives for the area have expanded significantly since 1950 and today the area is managed for a wide range of game and non-game species.

For the portion of the WMA under license from the ACE, DNR-Wildlife Resources Section prepares formal five-year wildlife management plans for the WMA and annual operating plans that outline management activities for the next year. These plans are reviewed and approved by the ACE. These plans reflect DNR’s management emphasis that fish and wildlife and associated public uses are the highest priority objectives for the area. Other uses of the area such as camping, boating, hiking, and horseback riding are allowed as long as these activities are consistent with wildlife management.

DNR uses an integrated system of wildlife, agricultural, and forest management practices to enhance wildlife habitat primarily for game species, particularly wild turkey, white-tailed deer, bear, squirrel, and grouse. Active habitat management activities include vegetation control through mowing, prescribed burning in both field and forest, and forest management; planting of trees, shrubs, and herbaceous plants; and creation and maintenance of wetlands. Passive management is used in areas that are too steep for timber management or areas identified by ACE as sensitive viewsheds. In a given year DNR may be involved in active management on roughly twenty percent of the study area’s upland habitat. Over a ten-year period it is estimated that active management practices occurs on roughly forty percent of the upland area. The remainder of the area is passively managed; that is, natural processes are allowed to proceed.

Passive management is used when the objective is to allow vegetation to evolve toward a mature forest.⁴ A number of cooperative research projects are undertaken in the Bluestone Wildlife Management Area including research on brood range creation, mast ecology, wildlife diseases, older age deer management, and black bear productivity. DNR activities related to public use include management of five camping areas and law enforcement, including the enforcement of state regulations for hunting, fishing and trapping.

Summaries of DNR management practices are presented in Boxes 2.1 and 2.2. For a more thorough treatment of DNR management, see Appendix 2.A, or consult DNR's 2001-2006 Bluestone WMA Wildlife Management Plan, cited in the references and bibliography section of this report.⁵

⁴ The terms "old growth" and "climax condition" are often used to characterize a mature forest. A mature forest is termed "late-successional" vegetation, while a cleared area that is just beginning to re-vegetate is "early-successional" vegetation.

⁵ Most of the readily available information about the Bluestone WMA is for the WMA as a whole, and is not specific to the portion of the WMA within the New River study area. Reasonable efforts have been made to extract information specific to the study area portion, but much of the information presented in this report for West Virginia relates to the WMA as a whole.

Box 2.1. WVDNR fish and wildlife management activities on the Bluestone WMA.

Game Management Activities

- DNR-WRS constructed and maintains a 15-acre marsh in Crump's Bottom that is flooded in the fall to provide habitat for waterfowl. A smaller water control structure on Steer Island and numerous waterholes and potholes have been established and are maintained.
- 4 miles of road are maintained annually, as are 28 informational and area signs. 35 road closures are maintained to restrict vehicular access and reduce wildlife disturbance.
- 200 acres of land in crop and hay leases are managed annually to provide wildlife habitat. DNR-WRS mows, plants, disks, or burns 334-384 acres of herbaceous vegetation per year to provide brood range for wild turkey, the featured game species of the area. DNR-WRS plants a mixture of legumes and grasses in forest clearings and fields to provide forage for a variety of wildlife species. In 2003, 28 acres were planted on the area – 8 acres of native warm season grasses, 16 acres of cool season grasses and legumes, and 4 acres of small grain (for doves). In 2004, 64 acres were planted – 4 acres were legumes and 60 acres were small grains. In 2005, 87 acres of small grains and 5 acres of legumes were planted. In 2006, 97 acres of small grains and 19 acres of legumes were planted. DNR-WRS planted 65 shrubs and 124 trees on the area in 2003, 65 shrubs and 234 trees in 2004, 156 trees in 2005, and over 204 trees in 2006. Five acres of old field were reclaimed in 2005 and ten acres of field edge were cut in 2006.
- Prescribed burning and timber stand improvement projects have been completed on the area as part of general management and as part of a research effort designed to enhance brood range for wild turkey. 100 acres in Crumps Bottom were burned in 2005 and 175 acres burned in 2006.
- River otter were successfully reintroduced into the New River watershed in the 1980s. DNR-WRS continues to monitor progress of this species.

Fisheries Management Activities

- DNR-WRS does not currently stock the New River above Bluestone Lake. The fisheries consist primarily of smallmouth bass, flathead and channel catfish, and hybrid striped bass.
- DNR-WRS is collaborating with the Virginia Department of Game and Inland Fisheries (DGIF) to assess walleye populations in the New River.
- DNR-WRS stocks Indian Creek with rainbow, golden rainbow, brown, and brook trout.

Wildlife Diversity Activities

- DNR-WRS monitors and protects the habitat of rare terrestrial species, including Black-bellied Salamander, River Cooter, Northern Red-bellied Cooter, and Meadow Jumping Mouse. DNR-WRS monitors rare mussels including Purple Wartyback, Northern Lance, Plain Pocketbook, Wavy-rayed Lampmussel, and Pistolgrip. DNR-WRS monitors the presence of Virginia Spirea, a federally-listed threatened plant species.

Box 2.2. WVDNR public use management activities on the Bluestone WMA.

Camping Area Management

- DNR-Parks manages five camping areas, with over three hundred individual campsites. Management includes policing and maintaining campsites, enforcing public use regulations, collecting fees, and visitor contact. DNR-Parks monitors these areas daily. Most are open year-round.

Road Management

- DNR-Parks and DNR-WRS collaborate in patrolling WMA roads and making plans for road repair when needed. Roads are monitored on a daily basis.
- DNR-Parks and DNR-WRS collaborate in enforcing road closures and off-road vehicle use.

Hunting and Fishing Management

- DNR-Parks and DNR-WRS collaboratively manage hunting and fishing on the WMA. DNR-Parks focuses on management of concentrated public use areas (such as camping areas and boat launches), while DNR- Law Enforcement focuses on enforcement of state hunting and fishing laws.

River and Dispersed Recreation Management

- DNR-Parks and DNR-WRS have developed and currently maintain ten public boat access sites, including carry-down areas and boat ramps with vehicular access.
- DNR-Parks is increasing its efforts to plan for and manage river recreation.
- DNR-Parks and DNR-WRS collaborate in identifying roadways and trails that are open or restricted for hiking, biking, horseback riding, and motor vehicles, and in monitoring use of these areas.

Public Safety and Law Enforcement

- DNR-Parks and DNR-WRS collaborate in enforcing WMA and state park laws and regulations. These agencies collaborate with county sheriffs in the enforcement of public safety laws.

Public Information and Coordination

- DNR-Parks maintains a visitor contact station at WMA headquarters to answer questions in person or by telephone regarding road conditions, camping area availability, etc.
- DNR-Parks and DNR-WRS coordinate with Pipestem Resort and Bluestone State Parks, the Bluestone NSR, the ACE, local governments, and other federal and state resource management agencies in the development of collaborative programs and activities.

Management in Virginia

The Virginia portion of the Bluestone Lake Project Area includes a total of 1,650 acres. Most of these lands (1,481 acres) are within the New River study area downstream of the Route 460 Bridge. Project lands upstream of the Bridge include 64 acres leased to the Town of Glen Lyn and managed as a riverfront park, some additional shorelands, and a few islands. Upstream of the town park, ACE holds flowage easements on privately owned shorelands up to at least the 1,520-foot elevation, which extends to the City of Narrows.

Unlike the situation in West Virginia, the ACE has retained responsibility for the management of Bluestone Lake Project Area lands in Virginia. In the past the ACE inquired about the potential for the Virginia Department of Game and Inland Fisheries (DGIF) to enter into a management agreement similar to that between the ACE and the West Virginia DNR. At that time DGIF declined to take on management responsibilities due to the cost and the size of the area, which DGIF considered to be small and somewhat linear from a wildlife management perspective. (While small for a wildlife management area, the area does meet the Commonwealth of Virginia's size standards for a state park.)

The only management plan for the Virginia portion is the ACE's dated overall master plan for Bluestone Lake Project Area from 1949, which does not focus significant attention on the area in Virginia. In addition, ACE's management in the area is limited due to budget and staffing limitations, and staff is unable to visit the area in Virginia on a regular basis. DGIF does conduct fisheries research in the study area and monitors hunting and fishing use. Also, the Giles County Sheriff's Office and DGIF game wardens assist in providing general law enforcement.

The ACE leases 192 acres of land on both sides of the river in Virginia to local farmers for agricultural use. This equates to approximately thirteen percent of the federally owned project lands in Virginia. The primary purpose of this arrangement is to provide habitat and forage for wildlife.

There are no developed recreational facilities downstream of the Route 460 Bridge in Virginia. There is no public vehicular access to the river from river right, and problems associated with public use on that shoreline are therefore minimal. On river left, the shoreline area is accessible by an unimproved road that parallels the river. While this road is steep near its upper end and the surface rough, it is used extensively as access for fishing, boat launching, and informal camping.

The lack of a regular management presence has resulted in a number of problems in the Virginia portion of the study area. Problems are most pronounced on river left because of the greater vehicle access on that side. Problems include four wheel-drive and all-terrain vehicle use of bottomland fields, parking and camping on eroding shorelands, and launching boats in areas without boat ramps, which compacts vegetation and increases erosion. Littering and sanitation are significant problems, as is unruly and, at times, illegal behavior. Many local residents view this area as a very important recreational resource, but express concerns about safety and a need for increased law enforcement.

The ACE's Bluestone Lake Project Area master plan recognizes the need for development of recreation facilities in this area and calls for additional coordination with the Commonwealth of Virginia.

Land Use

Land Uses Adjacent to the Study Area

The study area begins at the Route 460 Bridge in Glen Lyn, Virginia, a divided highway with moderate to high traffic volume. Just downstream from the bridge on river right is a steep-banked area. Above the bank, beyond the extent of the Bluestone Lake Project Area boundary, is an open bench area of private land that is used for dispersed housing and agriculture, primarily pasture. This area is zoned for commercial and industrial use. The Town of Glen Lyn is concerned that conservation of the river not detract from its plans for development of this area.

On river right immediately upstream of the Route 460 Bridge (and outside of the study area), the Town of Glen Lyn leases lands from the ACE for park and recreation purposes. The lease covers 64.16 acres that runs in a narrow band between Route 460 and the river. It starts immediately upstream of the Route 460 Bridge and extends upriver toward Rich Creek. Within this 64 acres is an 18.4-acre parcel that is designated for a developed town park. Development in the park includes camping and picnic areas, restrooms, and a boat ramp. The lease expires in April 2031.

On river left, immediately upstream of the Route 460 Bridge, the Appalachian Power Company (APC) maintains a coal-fired power plant. APC owns this land along the shoreline, but ACE holds a flowage easement. The plant withdraws water from the river for cooling and discharges this water back into the river at a somewhat elevated temperature in accordance with permits from the Commonwealth of Virginia. APC also has permits that authorize the company to pump water out of the river and discharge water into the river in conjunction with its operation of the fly ash facility downstream of the Route 460 Bridge on river left.

In West Virginia, immediately downstream of the study area are Bluestone Lake and the surrounding federal lands that, like the study area, are part of the Bluestone Wildlife Management Area. To the west and east, private lands, principally farms, forest, and rural and low-density residential housing abut the study area.

Primary Land Uses Within the Study Area

In accordance with the executive order and subsequent legislation that authorized the Bluestone Lake Project, flood control is a primary purpose of the lands within the study area. While the Bluestone Lake summer pool is normally maintained at or near 1,410 feet above sea level (the downstream terminus of the study area), the river and shorelands upstream of this point to an elevation of 1,520 feet are subject to inundation during times that Bluestone Dam is retaining water to reduce downstream flooding. The extent and frequency of this inundation is discussed in the "Bluestone Lake Pool Elevation" section below. Consistent with the Bluestone Lake

Project's authorization, the other primary land uses within the study area are fish and wildlife, and recreation. These uses are supported by a system of unpaved roads and several camping areas.

Other Land Uses Within the Study Area

Given that the study area is owned by the federal government, private uses for project waters and lands require a lease, license, or special use permit from the ACE or, where applicable, its primary licensee, the West Virginia DNR. Uses for which leases, licenses, or special use permits have been granted include the following:

Agriculture. As referenced previously, in West Virginia the DNR issues special use permits to local farmers for agricultural use of several areas. These plots, totaling 200 acres in 2005, are located principally on river bottomlands. In Virginia, the ACE leases 192 acres for agricultural purposes, primarily on bottomlands on river right, but also on the flatlands just above the state line on river left. The objective of these agreements is to create and maintain open spaces, forest-field edge, and forage for the benefit of wildlife. The farmers involved must meet a variety of conditions, including leaving a percentage of the crop as food for wildlife.

Industrial use. A short distance downstream of the Route 460 Bridge on river left in Virginia, the ACE granted an easement to the Appalachian Power Company for an emergency fly ash treatment pond, fly ash landfill, and a landfill runoff collection pond. These lands are located between River Mile 29.8 and River Mile 28.8.⁶ During the spring, summer, and fall seasons the fly ash facility is screened from the river by trees in the riparian corridor. The only evidence of the fly ash facility is the presence of a portable water pump located at mile 28.8. The twenty-five-year easement for the fly ash facility runs through 2027. The fly ash facility is nearing capacity and the Appalachian Power Company is moving forward with plans to establish a new facility on private lands further away from the river and outside of the study area. As part of the existing easement contract, Appalachian Power is obligated to stabilize and re-vegetate the area at the end of its useful life as a fly ash disposal area. The potential exists to reuse this area to benefit the river and the public, either as open space or for some other creative and compatible public use.

Transmission line rights-of-way. The Appalachian Power Company holds rights-of-way from the ACE to maintain a 345kV transmission line that crosses the New River at River Mile 27 and a 168kV transmission line that parallels the river between River Miles 26 and 27.

⁶ River miles typically are measured going upstream from a prominent hydrologic feature, in this case the Bluestone Dam. Thus, in the case of the New River study segment, River Mile 29.8 is 29.8 miles upstream of the Bluestone Dam. On 1:24,000-scale topographic maps of the area, river miles along the New River are indicated by a cross next to the word "Mile" followed by a number. Not all river miles within the study area are indicated on these maps, but those that are serve as useful reference points.

Regional Initiatives

While this report focuses primarily on the study area, it is important to consider the broader regional context within which decisions regarding the study area will be made. There are several initiatives under way within the New River watershed and the greater southwest Virginia / southeast West Virginia area that could affect – or be affected by – actions that are taken in the study area. These are described below.

New River American Heritage River.

The American Heritage Rivers Initiative was established in 1997 by Executive Order 13061 to target financial assistance and technical support resources toward select rivers to further community-based conservation, restoration, economic development, tourism, and other river-related objectives. The New River was one of fourteen rivers throughout the nation that was designated as an American Heritage River. The ACE's Huntington District provides staff to help coordinate the initiative on the New River. Most of the efforts to date have focused on areas upstream of the study area.

New River Blueway.

The New River Blueway was initiated as a project of the New River American Heritage River Initiative. The Blueway is a three-state effort to establish a paddling trail on the New River. The Blueway project seeks to improve existing public access to the river, establish new access where needed, develop informational and educational materials such as a map and guide to the paddling trail, and create links with related conservation and tourism-related activities. Most of the attention has focused on the river in North Carolina, and the upstream portion of the river in Virginia within the New River Trail State Park. All of the agencies represented on the New River Wild and Scenic River Study's Interagency Work Group are also partners in the Blueway. Appalachian Power Company, which operates the power plant along the river in Glen Lyn and the Claytor Dam upstream, is a corporate partner.

New River Parkway.

In 1985, the West Virginia Legislature passed legislation creating the New River Parkway Authority to oversee the planning of a scenic roadway that would aid visitors in accessing and enjoying recreational and scenic amenities associated with the New River. Through the Surface Transportation and Uniform Relocation Assistance Act of 1987, Congress authorized federal funding of \$17.6 million toward planning and construction of the portion of the Parkway from Interstate 64 to Hinton, West Virginia as a demonstration project. If constructed, the scenic roadway would utilize existing road alignments along the New River wherever possible. In addition to work on roadways, the project could include boat and river access points, overlooks, trailheads, and multiple-use facilities.

While the current focus is on the area north of Hinton and away from the study area, future plans call for continuing the parkway to include Route 20 south of Hinton and to the immediate west of the study area. Route 20 provides access to Pipestem Resort and Bluestone State Parks, the

Bluestone National Scenic River, and the west side of the study area in West Virginia. Ultimately Route 20 leads to other roads that connect with Route 460, which in turn leads to the Virginia portion of the study area in Glen Lyn.

Virginia Birding and Wildlife Trail.

The Virginia Birding and Wildlife Trail is a Virginia DGIF trail system that aims to both educate the public about Virginia wildlife and spur wildlife-related tourism. This is accomplished through the designation of several automobile travel routes (or “loops”), each focused on a central geography-based theme and highlighting points along the way where wildlife can be viewed. The system includes a New River loop. While this loop currently focuses on the 53-mile roadway between Claytor Lake, Pearisburg, and Pulaski, an extension is planned that follows the New River from Pearisburg to Glen Lyn.

Mary Draper Ingles Trail.

The Mary Draper Ingles Trail seeks to commemorate the “long walk home” of Mary Draper Ingles following her escape from Native American captors in 1755. This walk followed the west bank of the New River through the study area. The initial phase of the trail would focus on the portion of the trail between Glen Lyn, Virginia, and Hinton, West Virginia. The trail is envisioned as a multi-use bicycling, horseback riding and hiking trail. The National Committee for the New River and the Town of Glen Lyn are the main sponsors, though there are other cooperators as well.

Branding Initiatives.

“Branding” is a marketing strategy whereby interested entities seek to highlight the significance of an area based on geographic or other features in an effort to increase tourism and other commercial activity. Branding can be a private sector initiative, a public sector initiative, or, more often, a combination. The concept of promoting “gateway communities” on the periphery of well-known public lands is an example. Several ideas for branding within the southwest Virginia/southeast West Virginia area have been proposed. Downstream of the study area, a branding initiative focused on the region’s NPS sites is being considered. This would highlight the significant recreational opportunities available at the New River Gorge National River, the Gauley River National Recreation Area and the Bluestone NSR. Another branding initiative that would focus on history and heritage has been proposed in Summers, Monroe, and Mercer counties in West Virginia. In addition, Giles County has considered a multiple gateway concept – to the New River, the Jefferson National Forest, and the Appalachian Trail. A broader natural resource/heritage theme has also been suggested for the bi-state/four-county region.

Socio-economics

Population

The area most directly affected by decisions regarding the study area is the four-county region of Giles County in Virginia, and Mercer, Monroe, and Summers counties in West Virginia. Cities and towns most directly affected are Glen Lyn and Rich Creek, Virginia, and Hinton, West Virginia. Table 2.1 shows the population of these counties and communities as of the 2000 census.

Table 2.1. Population of the four-county region and affected cities and towns in 2000.

	Population	Persons/ Sq. Mile
Giles County, Virginia	16,956	46.6
Mercer County, West Virginia	62,113	149.0
Monroe County, West Virginia	13,503	30.8
Summers County, West Virginia	13,917	36.0
Total for four counties	106,489	
City of Hinton, West Virginia	2,880	
Town of Glen Lyn, Virginia	151	
Town of Rich Creek, Virginia	665	
Total for affected city and towns	3,696	

Mercer County in West Virginia is by far the most populated of the four counties, primarily because of the cities of Princeton and Bluefield. However, the portion of Mercer County near the study area is similar in population density to the other counties.

Economy

Traditionally the economy in the four-county region was based largely on agriculture, forestry, industry, and the railroad. Proximity to coal country played a significant role in the economy. More recently the regional economy has shifted to more diverse service-oriented businesses. Quality of life is considered an important factor in attracting new residents and commerce, and tourism is recognized as an important component of the regional economy.

As described earlier in the “Regional Setting” section, the four-county area is home to several prominent public-land resources including several state parks, a national river, a national wild and scenic river, a national forest, and a state wildlife management area. The New River serves as a unifying element for all of these areas. The four-county region is also strategically located in the center of several additional recreation and conservation areas that, while outside of these counties, are within an easy drive. Again, the New River is a unifying theme for these areas.

Together, these areas are an important part of the tourism and recreation sector of the four-county region's economy.

Hinton, West Virginia, was at one time a thriving railroad center and during that time built up an infrastructure similar to any thriving small city. While the railroad trade has dwindled, Hinton retains the infrastructure and is poised to be a regional hub in the future. Hinton officials actively work to enhance the city's economic position by encouraging development of a diversified economy that includes service, technology, and tourism. The city is active in the development of tourism strategies and sees value in using the New River as an organizing principle in positioning the city as a recreation hub and gateway to nearby areas and opportunities. The three basic elements in this strategy are the New River Gorge National River (Hinton is the upstream terminus of this national park area), the New River Parkway (connecting Hinton with I-64), and the Bluestone Wildlife Management Area and adjacent conservation areas upstream of the Bluestone Dam, including Bluestone NSR, and Bluestone and Pipestem Resort State Parks. As part of its economic development strategy, Hinton also is pursuing local development opportunities that have a connection to the river, including a new technology center, new lodging, and a river walkway.

Glen Lyn, Virginia, and its immediate neighbor, Rich Creek, Virginia, are both small towns with agricultural and industrial foundations and emerging diversified economies. The Appalachian Power Company is the largest employer in Glen Lyn and is recognized as a major contributor to the community. Glen Lyn actively courts recreation-based tourism, as evidenced by the town's sponsorship of both a rail-to-trail project and the Mary Draper Ingles Trail discussed earlier in this chapter. Glen Lyn and Rich Creek view their proximity to the New River, and to the Jefferson National Forest, as significant assets in positioning themselves as gateways to important outdoor recreation resources. Glen Lyn uses the riverfront town park as a core element of the town's New River strategy and views the Appalachian Power Company's fly ash facility as a potential component of this strategy once the facility closes. Giles County has initiated a tourism development project that seeks to strengthen the area's position as a recreational destination. The county and towns work collaboratively on these efforts.

Physical Resources

Geology and Hydrology

The study area is located in a transition region where the New River leaves the Ridge and Valley physiographic province and enters the Appalachian Plateau province. Long, parallel mountain ridges separated by valleys distinguish the Ridge and Valley province, while the Appalachian Plateau is a dissected plateau of rolling uplands with a strong, well-defined drainage pattern.

Considered one of the oldest rivers in the world, the New River predates the mountain ranges that surround it. Instead of the river carving downward through the mountains and plateaus, as is typically the case, the lands were thrust up around the river. This superimposition of the river on surrounding land formations explains how the New River was able to penetrate the Appalachian Mountains, while the mountains confined other younger rivers in the region. The New River is

therefore unique. It is the only river in the Appalachian region to actually cut through this massive range flowing east to west. The fact that it cuts through the mountains in a northern and westerly direction makes this all the more unique. All other large rivers in eastern seaboard states flow to the Atlantic. Only the New River drains to the Gulf of Mexico. On a smaller scale, the river's age and geologic history also help to explain the meandering of the river's course in loops and oxbows, instead of a swift, straight-line tumble of water from mountaintop to valley below.

The region's surface rocks have a sedimentary origin. Gently- to strongly-folded rocks of the Mauch Chunk Group of Mississippian shale and sandstone underlie the river's course. This bedrock layer is responsible for the many ledge drops that boaters experience when navigating the New River through the study area.

The average drop of the river is roughly three to five feet per mile. Boating enthusiasts classify these rapids as class I and II, with infrequent class III and, at certain water levels, class IV. Significant rapids are identified in Table 2.2, listed from upstream to downstream.

Table 2.2. Rapids in the study area.

Name	Approximate River Mile (above Bluestone Dam)	Location
Johnson Falls	30.0	In Virginia, immediately downstream of the Route 460 Bridge
Shumate Falls	28.3	In Virginia, past first major bend
Wylie (State Line) Falls	24.2	In Virginia, where Giles County, VA, meets Mercer County, WV on river left
Anderson Falls	16.8	In West Virginia, between Shanklin's Ferry and Cedar Branch camping areas
Harvey Falls	15.8	In West Virginia, upstream of Cedar Branch camping area
Harmon's Rapids	13.6	In West Virginia, at Indian Creek Camping Area

Soils

The soils of the Bluestone WMA are mostly deep and well drained. Erosion concerns range from slight to moderate. Most are productive forest soils. Floodplain soils are generally suitable for cultivation, as demonstrated by the use of these lands over many generations by pre-contact

Native Americans and, later, European settlers. The soils found within the Bluestone WMA are indicative of those found in the study area overall, and are listed and described in Table 2.3.

Table 2.3. Soil series of the Bluestone Wildlife Management Area.

Series	Description	Location
Calvin	Moderately deep, well drained	Slopes
Chagrin	Deep, well drained	Flood plains
Coolville	Deep, moderately well drained	Ridge tops, benches
Dekalb	Moderately deep, well drained	Ridge tops, benches, side slopes
Ernest	Deep, moderately well drained	Foot slopes, colluvial fans, drainage ways
Gilpin	Moderately deep, well drained	Ridge tops, benches, side slopes
Jefferson	Deep, well drained	Foot slopes of steep slopes, drainage ways, coves
Kanawha	Deep, well drained	High flood plains, low terraces
Lobdell	Deep, moderately well drained	Flood plains
Orrville	Deep, somewhat poorly drained	Flood plains
Monongahela	Deep, moderately well drained	High terraces
Shouns	Deep, well drained	Foot slopes, drainage ways
Udifluent	Deep, well drained and moderately well drained	Flood plains

Landscape Character

Topography. The study area consists of a large river running through mountain and rolling hill terrain. The river is the dominant feature. Landforms are diverse, including ridge tops, cliffs, steep to moderate slopes, small side valleys, bottomlands, and islands.

Development. The combination of the rugged landform and federal land ownership are largely responsible for the study area being one of the least developed areas in the four-county region. No major roads or railroads parallel the river within the study area. Once downstream of the Route 460 Bridge and the adjacent development in Glen Lyn, Virginia, the only notable forms of development visible from the river are sections of unimproved roads that parallel the river, agricultural sites, the two Appalachian Power Company transmission lines in Virginia, and three riverside camping areas in West Virginia. The areas managed for agriculture tend to blend with their surroundings, and only a few have fencing.

The only other visible signs of human activity include a portable water pump associated with the Appalachian Power Company fly ash landfill on river left in Virginia, scattered informal use sites on river left in Virginia, and trash that has accumulated at many locations, particularly the aforementioned informal use sites in Virginia and island and bottomland backwaters.

Visual Resources. The landforms and undeveloped character discussed above contribute to the high visual quality of the river area. Within the study area, and especially from the river, there are a variety of near, mid, and long views. Visual complexity is high due to both vegetation cover and diverse landforms. The green deciduous forest transforms into a carpet of color in the fall. Floodways, islands, meanders, and tributary streams all add significantly to the visual appeal. The only noteworthy visual intrusion is the transmission line that crosses high above the river. From the river, the views are more open in Virginia, with views of surrounding ridgelines being particularly striking. Views narrow in West Virginia, with distant ridgelines far less prevalent. If anything, this tends to concentrate one's focus on complex and interesting foreground and mid-ground views.

While several rivers and streams in this region could be considered scenic, this segment is distinguished from the others by its large size – both in terms of volume of water and corridor width – and the degree of its natural condition. This natural condition is especially important in the context of other nearby segments of the New River. While many of these are very scenic, none are as undeveloped.

Water Resources

Streamflow

The New River is among the Appalachian Mountain region's highest volume rivers. Flow varies greatly by season and year. Hurricanes often occur in the fall and other storm events can occur at any season. These can result in significant short-term increases in flow.

The United States Geological Survey maintains a streamflow gauging station in the New River in Glen Lyn, Virginia. (The station is next to the town park on river right.) Continuous data are available from 1927 to 2003. In some cases earlier data are also available. The immediate past year's data (in this case 2004) are not incorporated into the data system until these data have undergone verification procedures. This typically takes a year or longer. Tables 2.4, 2.5, and 2.6, and Figure 2.4 present summary information derived from Glen Lyn stream gauging station data. Table 2.4 shows the ten highest instantaneous streamflows since 1927.⁷ Table 2.5 shows the ten lowest monthly mean streamflows since 1950 (when the Bluestone Dam became operational). Figure 2.4 shows the monthly mean streamflow for all years between 1927 and 2003.

⁷ "Instantaneous" flow refers to the flow at any one moment in time. This is different from mean flow, which defines an average over a given unit of time (e.g., day, week, month, year).

Table 2.4. Ten Highest instantaneous streamflows at the Glen Lyn, Virginia, USGS Gauging Station, 1927-2003.

	Date	Cubic feet/second
1	August 14, 1940	226,000
2	November 7, 1977	110,000
3	January 20, 1996	106,000 (est.)
4	June 22, 1972	105,000
5	September 23, 1989	103,000
6	February 23, 2003	100,600
7	April 5, 1977	98,900
8	May 29, 1973	93,600
9	April 25, 1987	85,200
10	December 8, 1950	79,000

Table 2.5. 10 lowest monthly mean streamflows at the Glen Lyn, Virginia, USGS Gauging Station, 1950-2003.

	Date	Cubic feet/second
1	August 2002	1,040
2	August 1999	1,093
3	September 1998	1,127
4	October 1988	1,204
5	November 1981	1,258
6	November 2001	1,286
7	December 1997	1,305
8	October 2000	1,338
9	September 1963	1,361
10	July 1999	1,373

Figure 2.4. Monthly mean streamflow at Glen Lyn, Virginia, USGS Gauging Station, 1927-2003.

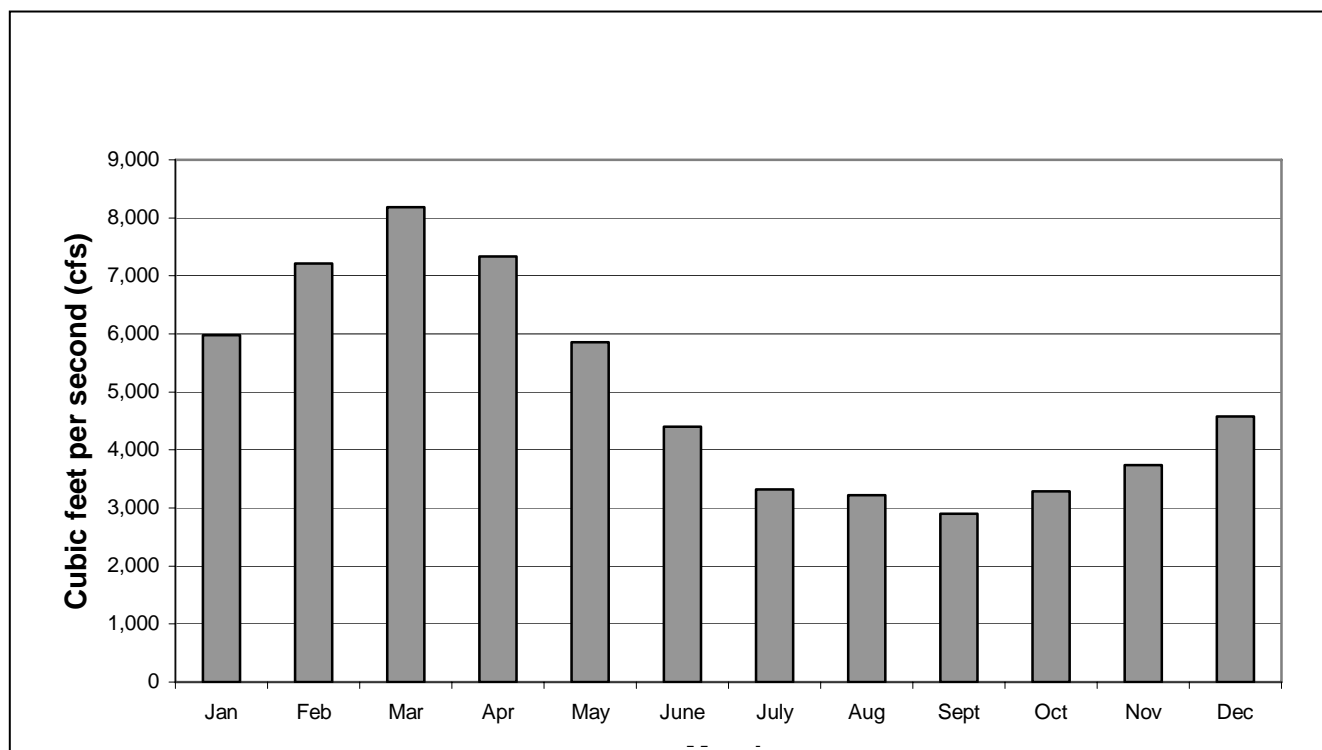


Table 2.6 shows the high and low monthly mean streamflows over the past twenty years of record. The essential conclusion from the above streamflow data is that this section of the New River experiences considerable variability in flow, both annually and monthly. Generally the first half of the year (January to June) has relatively higher flows than the last half of the year, though there are enough exceptions at both ends (particularly spring and fall) that it is difficult to make predictions with any confidence. For example, in 1989 September had the year's highest monthly mean flow, while the next year September had the lowest. Hurricanes play a role in this unpredictability, as do variable spring and fall jet stream patterns. If anything can be stated with confidence, it is that monthly mean low flow will be above 1,000 cfs, but only rarely will it exceed 2,500 cfs.⁸ Monthly mean high flow is far more variable, ranging from just over 4,000 cfs to over 20,000 cfs over the past twenty years.

Table 2.6. High and low monthly mean streamflow over twenty years at Glen Lyn, Virginia Gauging Station, 1984-2003.

Year	Low flow month	Mean low flow (cfs)	High flow month	Mean high flow (cfs)
1984	September	2,223	April	11,650
1985	September	1,663	February	6,585
1986	October	1,732	December	6,790
1987	August	1,813	April	20,890
1988	October	1,204	January	4,064
1989	January	3,080	September	11,500
1990	September	2,010	February	10,690
1991	October	1,414	March	10,780
1992	September	2,600	June	12,850
1993	October	1,620	March	18,650
1994	November	2,222	February	13,500
1995	August	1,574	January	11,540
1996	July	2,577	January	13,289
Year	Low flow month	Mean low flow (cfs)	High flow month	Mean high flow (cfs)
1997	December	1,305	March	10,250
1998	September	1,127	February	15,520
1999	August	1,093	March	5,719
2000	October	1,338	April	6,223
2001	November	1,286	May	7,680
2002	August	1,040	March	5,669
2003	September	4,733	February	12,800

⁸ Instantaneous flow does drop below 1,000 cfs during some low flow months but, as shown in Tables 2.2 and 2.3, such extreme low flows typically are not sustained over an entire month.

Gaining an understanding of the study segment's instream flow regime is made more complex by the fact that flow is influenced by releases from Appalachian Power Company's Claytor Dam, some thirty miles upstream on the New River. Claytor Dam is a 75,000-kilowatt store-and-release facility. As is the case with all store-and-release facilities, releases can vary depending on energy needs and storage capacity behind the dam. Typically a store-and-release project will be operated so as to generate more power when demand is high and less when demand is lower. Daily fluctuation is therefore common. Releases at Claytor Dam are governed by a license with the FERC, which expires in 2011. Appalachian Power intends to start developing its re-licensing application in the near future in order to have a new license in place before the current license expires. The current license requires a minimum instantaneous discharge from the dam of 750 cfs. High discharge through the dam's four turbines is 8,000 cfs. The facility can also operate using three turbines (6,000 cfs), two turbines (4,000 cfs), or one turbine (2,000 cfs, or, during, times of low inflow, less than 2,000 cfs). In other words, when water is available the outflow from the turbines can fluctuate between 8,000 cfs and 2,000 cfs. Less fluctuation is the norm.

Since 1991, Appalachian Power Company has operated Claytor Dam as a "run-of-the-river" project during the recreation season of April 15 to October 15. In a run-of-the-river project, the outflow from the dam is the same, or nearly the same, as the inflow into the reservoir. The result is that the river downstream of a run-of-the-river project flows in a near-natural pattern. Natural flows into the reservoir normally exceed the license-mandated minimum release 750 cfs. In extremely low flow years, inflow in late summer can drop below 750 cfs. In these rare cases, Appalachian Power Company consults with the Virginia Department of Game and Inland Fisheries to determine whether the 750 cfs outflow should be retained (which would result in a lower reservoir level, which, in turn, may adversely affect lake fisheries) or whether the outflow should correspond to the lower than 750 cfs inflow.

Given its April 15 to October 15 run-of-river operation, Claytor Dam has no effect on the study segment during that time period. Store-and-release operations during the rest of the year can result in fluctuation in water levels down-river from Claytor Dam. However, by the time water discharged from Claytor Dam reaches the study area, it has been joined by flow from several tributaries. Also, discharge pulses tend to diminish as river flows proceed downstream. The broad width of the river within the study area further moderates the effect of release fluctuations, in contrast to a river of similar size that is confined to an incised canyon. The net effect is that, while still detectable at some water levels, daily fluctuation is largely attenuated by the time the water reaches the study area. This effect diminishes the further the flow moves through the study area. It is important to note that under normal conditions the New River fluctuates considerably due to weather events. As suggested earlier, a month that is dry one year can be wet the next. Even in a given month, flows can rise quickly and drop just as quickly, especially during hurricane season. As a result, the New River's natural and biological systems have become accustomed to a certain amount of flow variability.

Bluestone Lake Pool Elevation

The impoundment level of Bluestone Lake above the Bluestone Dam varies over the course of any given year. The lake pool is maintained at approximately elevation 1,410 feet above mean sea level from April through October for recreation and fish and wildlife purposes. In other words, the 1,410-foot elevation defines the point where the flowing river meets the still water of the lake during the summertime. This level is commonly referred to as the “summer high pool elevation.”⁹ During the remainder of the year, the base level of the pool is dropped to approximately 1,406 feet to provide additional flood control capacity. The maximum flood control pool is 1,520 feet. The net result is that all lands below 1,406 feet in the winter period and 1,410 feet in the summer period are inundated on a regular basis, and lands between those levels and 1,520 feet are subject to temporary inundation during flood control events (that is, periods of high precipitation or runoff during which additional water is retained behind Bluestone Dam to moderate downstream flooding).

At the 1,520-foot level, temporary flood storage would extend 36 miles upstream of the dam, an area that includes the entire length of the wild and scenic study area and additional areas upstream to Narrows, Virginia. Based on the ACE’s theoretical calculations, the “probable maximum flood” is 1,548 feet, or thirteen feet higher than the top of the existing dam.

The ACE records high pool information on a daily basis and has done so since the Bluestone Lake Project became operational. The maximum pool level recorded was 1,506 feet in April 1960. The highest pool elevation in the past ten years was in March 1996, when the pool elevation reached 1,493 feet. Table 2.7 shows the number of flood control events over the past twenty years in which the maximum extent of the high pool exceeded 1411.5 feet (which is the upper end of the range of the summer high pool).

⁹ The 1,410-foot level is a reference point that represents the average summer high pool elevation of Bluestone Lake. The actual summer high pool elevation varies between 1,409.5 feet and 1,411.5 feet.

Table 2.7. Number of flood control events from 1985-2004 in which the maximum Bluestone Lake pool elevation exceeded 1,411.5 feet.

Year	1,411.5- 1,420	1,420- 1,430	1,430- 1,440	1,440- 1,450	1,450- 1,460	1,460- 1,470	1,470- 1,480	1,480- 1,490	1,490- 1,500	Total
1985	2		1							3
1986	2									2
1987	2			1	1		1			5
1988										0
1989	3	2		1						6
1990	2		1							3
1991	2	1	1							4
1992	2			2						4
1993	1		1				1			3
1994	2	1	2	1						6
1995						1				1
1996	2		2						1	5
1997						1				1
1998	2	1	2							5
1999										0
2000										0
2001	2	1								3
2002	1	1								2
2003	2	1	1			1	1			6
2004	1	1								2
Total	28	9	11	5	1	3	3	0	1	61
Avg.	1.40	0.45	0.55	0.25	0.05	0.15	0.15	0	0.05	3.05
Range	0 - 3	0 - 2	0 - 2	0 - 2	0 - 1	0 - 1	0 - 1	0	0 - 1	0 - 6

As Table 2.7 illustrates, there is significant variability between years. In three of the twenty years there were no events that exceeded 1,411.5 feet, and there were two years with only one such event and one year with only two events. At the other extreme, there were three years with six events and three years with five events. Five of the twenty years witnessed pool elevations that temporarily exceeded 1,450 feet. Table 2.7 demonstrates that it is difficult to predict high pool variability for any given year. However, it is safe to surmise that downstream portions of the New River study segment are likely to be affected by flood control events to some degree in most years, while the furthest upstream portions are likely to experience any inundation far less frequently, perhaps once a decade.

Recognizing the importance of the fact that flood control events and associated upstream inundations are temporary, Table 2.8 shows the number of days since the Bluestone Dam became operational in 1950 that the pool reached given elevation ranges.

Table 2.8. Summary of Bluestone Lake pool elevations by day from January 1950 to September 2004.

Pool Elevation Range	# of Days	% of Time
1390.00 - 1400.00	147	0.74
1400.01 - 1410.00	12,175	61.37
1410.01 - 1420.00	7,124	35.91
1420.01 - 1430.00	154	0.78
1430.01 - 1440.00	106	0.53
1440.01 - 1450.00	33	0.17
1450.01 - 1460.00	34	0.17
1460.01 - 1470.00	25	0.13
1470.01 - 1480.00	24	0.12
1480.01 - 1490.00	12	0.06
1490.01 - 1500.00	4	0.02
1500.01 - 1510.00	2	0.01
Total	19,840	100.00

Of the total of 19,840 days from January 1950 through September 2004, the impoundment level of Bluestone Lake was below 1,410.0 feet for 12,322 days. This is equivalent to 62.11 percent of the total days. On 6,774 days the pool was between 1,410.0 and 1,411.5 feet, or 34.15 percent of the total number of days. The pool level exceeded the normal summer range of 1,409.5 to 1,411.5 feet on 744 days, or 3.75 percent of the time. Conversely, the pool elevation did not exceed 1,411.5 on 19,096 days, or 96.25 percent of the time.

The data confirm that flood control inundations are short-term in nature, typically lasting from a few days to one or, in a more limited number of instances, two weeks. Sharp peaks during flood events are typical. That is, in all but a very few instances, flood events reached their peaks and quickly receded to the normal summer or winter pool elevation. The record high pool of 1,506 feet that occurred in April of 1960 was part of a major event where the pool elevation exceeded 1,410 feet for sixteen days. However, during that event the pool elevation exceeded 1,500 feet for only two days. The longest duration for one event was March of 1963, when the pool elevation exceeded 1,410 feet for twenty-five days. The maximum pool elevation during that event was 1,489 feet.

Table 2.9 demonstrates the relationship between the pool elevation of Bluestone Lake and the occasional inundation in the study area. The downstream boundary of the study area is at pool elevation 1,410 feet, or River Mile 10.5. The table lists pool elevations in ten-foot increments starting at that elevation and ending at 1,520 feet, the maximum flood control elevation for the Bluestone Lake Project. For each increment, an approximate river mileage is given indicating the upstream point that would be inundated by that pool elevation. A description of that location is also provided to help the reader locate this point on a topographic map. To correlate pool elevations to actual inundation events, the table indicates the number of days since the Bluestone Dam went into operation in 1950 that the pool was above a given elevation (out of the total of 19,840 days during that period). Also indicated is the number of flood control events that have occurred in the past twenty years in which a given elevation was inundated. The inundation

numbers in the two right-hand columns of Table 2.9 come from the same data that were used to create Tables 2.7 and 2.8, and correlate directly to those tables. However, Table 2.9 reflects aggregated data, so the numbers shown are not identical those in Tables 2.7 and 2.8.

Table 2.9. Relationship between Bluestone Lake pool elevation and inundation of the New River upstream.

Bluestone Lake Pool Elevation	River Mile	Location	Days above this elevation (1950 – 2004)	Events above this elevation (1985 – 2004)
1,410	10.5	Mouth of Buffalo Creek (river right)	7518 (37.9%)	61 (above 1411.5 ft)
1,420	14.5	Where river bends sharply to the left at the upper end of Crump's Bottom (river left) and upstream of Indian Creek (river right)	394 (1.99%)	33
1,430	18.0	Mouth of Lick Creek (river left)	240 (1.21%)	24
1,440	19.8	100' above the mouth of Island Creek (river left)	134 (0.68%)	13
1,450	21.5	Upper end of Walker Island, which is just upstream of Wiley Island (West Virginia)	101 (0.51%)	8
1,460	24.8	3,000 feet upstream from Wiley Falls (Virginia)	67 (0.34%)	7
1,470	27.0	Mouth of Cooper Branch (river left)	42 (0.21%)	4
1,480	27.9	Downstream of Smith Branch (river left)	18 (0.09%)	1
1,490	29.7	500' downstream of the mouth of the East River (river left)	6 (0.03%)	1
1,500	33.0	Near mouth of Rich Creek (river right)	2 (0.01%)	0
1,510	34.8	Upper end of upstream-most island adjacent to the Town of Rich Creek	0	0
1,520	36.0	1,200' downstream of the mouth of Wolf Creek (river left)	0	0

To place Table 2.9 in context, the maximum-recorded pool level of 1,506 in March 1960 backed water to River Mile 34.1, roughly one mile above the mouth of Rich Creek in the Town of Rich Creek, Virginia. Effects of the highest pool of the past ten years, 1,493 feet in March 1996, were evident at the Route 460 Bridge in Glen Lyn, Virginia. However, such events are extremely rare

and of short duration. Over the past fifty-plus years, the pool elevation has moved above the Virginia state line only one-third of one percent of the time, or on 67 of the total 19,840 days. Over the past twenty years, only seven flood events have backed the pool into Virginia. Looking further downstream in the study area, since 1950 the pool has reached the upstream-most part of Crump's Bottom only two percent of the time. Over the past twenty years, the pool reached this point a total of thirty-three times.

Understanding Bluestone Lake pool elevations and their effects is admittedly difficult. To aid in understanding, Table 2.10 presents a simple summary of the various pool elevations discussed above.

Table 2.10. Important Bluestone Lake pool elevations.

Bluestone Lake Pool Elevation	Description
1,406 feet	Winter pool
1,410 feet	Typical summer high pool; downstream boundary of study area
1,409.5-1,411.5 feet	Range of summer high pool
1,455 feet	Pool reaches VA/WV state line (approximate)
1,493 feet	Highest pool in the past decade; pool reaches Rt. 460 Bridge in Glen Lyn, VA (approximate)
1,500 feet	Pool reaches Rich Creek, VA
1,506 feet	Pool of record (highest pool since 1950)
1,520 feet	Maximum flood control pool; pool reaches Narrows, VA
1,535 feet	Top of existing dam
1,548 feet	Probable maximum flood (ACE estimate)

Water Quality

The water quality within the study area generally is very good. Conventional pollutants fall within each state's standards. Water quality supports the Federal Clean Water Act's swimmable goal and supports the fishable goal except for elevated zinc and polychlorinated biphenyls (PCB 1254) levels in carp tissue. Because of PCB levels, the Virginia Department of Health advises fishermen not to consume carp caught in the New River from Radford downstream to the Virginia/West Virginia state line. The State of West Virginia also has recently issued a fish consumption advisory for the New River. A water quality monitoring station is located just upstream of Appalachian Power's Glen Lyn plant near the Route 460 Bridge. In one two-year sampling period, including twenty-four samples, a single violation was reported for fecal coliform.

The Commonwealth of Virginia's water quality standard for the New River in Giles County is Class IV (Mountainous Zones Waters). This reach of the New River has a special water quality

standard requiring a maximum temperature of 27 degrees Centigrade (81 degrees Fahrenheit), unless caused by natural conditions. This maximum temperature limit was established to ensure Virginia temperature standards for the New River would be consistent with those in West Virginia.

Sedimentation in Bluestone Lake resulting from upstream sediment loading is currently an issue. Sedimentation lowers the holding capacity of the lake, thereby reducing its flood control capacity. In extreme cases it can also cause powerboat propellers to come into contact with the lake bottom. This is especially a concern immediately downstream of where the river and lake meet, as the lake is naturally shallower in this location and this is where flow decreases and suspended solids start to fall to the bottom. Lake sedimentation is beginning to become a problem in some areas already and the problem will almost certainly intensify in the future. Management of upstream sediment loading could help to forestall this problem, but is unlikely to completely eliminate it. If the problem increases, dredging of portions of the lake bottom will likely be considered.

Floodplains and Bottomlands

Bottomlands are found along the New River throughout the study area, with Crump's Bottom being the largest. Typically formed over long periods of time by the slowing of water and the deposition of sediment on the inside of large river bends, and sustained by flooding during spring run-off and significant weather events, these bottomlands are some of the most dominant and ecologically significant features of the New River. The periodic flooding caused by floodwater retention at Bluestone Dam does not appear to have changed the essential character of these naturally occurring bottomlands. The study area also contains numerous islands, many of which likely were adjacent bottomlands that were cut off from the shorelands during high flow events. Much of the area of the bottomlands and islands are within what would be considered the river's floodplain.

Wetlands

Wetlands are areas where soils are saturated with water or covered by water for all or a significant part of the year and where vegetation is habituated to a wet environment. While river and stream courses fit a broader definition of wetlands, here the focus is on wetlands where the water is not flowing. According to the U.S. Fish and Wildlife Service's wetlands classification system, these non-tidal, non-flowing wetlands are called "palustrine." There are three types: (1) emergent vegetation wetlands, (2) scrub or shrub wetlands, and (3) forested wetlands. Emergent vegetation wetlands are commonly called marshes. In marshes, the vegetation consists of reeds, sedges, grasses, and cattails. Shrub and forested wetlands are commonly called swamps. Wetlands are important to a variety of wildlife species from butterflies to large game species such as black bear. They are especially important as habitat for furbearers and birds. Birds that make use of wetlands include waterfowl, waders, and a wide range of smaller perching birds.

All three types of palustrine wetlands occur in the study area, primarily on bottomland floodplains and islands. These bottomland wetlands are subject to both natural flooding and flooding associated with operation of the Bluestone Dam. Crump's Bottom contains the largest area of wetland in the study area, with 138 acres of naturally occurring wetland. The West

Virginia DNR created an additional fifteen-acre seasonally flooded wetland at Crump's Bottom to support waterfowl. A two-acre impoundment and several potholes also have been established in the floodplain upstream of the Bulls Falls camping area.

Vegetation

Plant Communities

In ecological terms, the area where the New River cuts through the Appalachian Mountains is an ecotone. An ecotone is the transitional area between different plant communities, habitat types, or ecosystems. The New River area is the northern limit for southern plant communities and the southern boundary for northern plant communities. It is also where the higher elevation Appalachian Mountain plant species transition into species of the lowlands. The flora of the study area is a combination of coastal plain and prairie species, and high and low altitude species. Not necessarily coincidentally, the area is also a north-south and east-west migration corridor for animals, birds, and humans, each carrying plant species with them both wittingly and unwittingly. This has contributed to the area's diversity of vegetation.

Roughly eighty percent of the study area is forested. The study area's uplands contain vegetation associated with the Appalachian Plateau's Mixed Mesophytic Forest Type. Lowlands to mid-elevation areas contain vegetation from the Oak-Hickory Forest Type of the Ridge and Valley Province. Primarily an oak-hickory forest, the study area associations also include oak-pine-hickory, white pine, hard pine, hemlock hardwoods, and bottomland hardwoods. As described in the previous section, marsh, scrub, and forested wetland associations are found in riparian and bottomland locations.

Common trees include species of the red, white, black, scarlet, and chestnut oaks; black locust; basswood; tulip poplar; American beech; hickory; eastern hemlock; white, pitch, Virginia, and short-leaf pines; black walnut; sycamore; and sugar and black maples. Flowering dogwood, sassafras, sourwood, striped maple, American holly, witch hazel, and magnolia are common understory trees in the study area. Mountain laurel, pawpaw, viburnums, gooseberry, elderberry, poison ivy, and nettles dot the forest floor. Bottomland wetland vegetation includes box elder, silver maple, slippery elm, ash, river birch, and black gum. Shrub species include black alder, buttonbush, black willow, spicebush, swamp privet, and ninebark.

The forest that covers the study area is not virgin forest. Much of the area was cutover and converted to cropland and other uses in the 19th century. With the purchase of these lands by the federal government in the 1930s and 1940s, the area began to revert to forest. After some sixty years the forest is now reaching maturity.

While most of the land in the study area is forested, some twenty percent is unforested – including agricultural lands and other clearings, camping areas, and open ridge tops. Camping areas are primarily grass with a semi-open tree canopy and vegetation buffers in some locations where campsites meet the river. Clearings provide an opportunity for native plants to get established that require a more open canopy. Ridge tops provide locations for additional non-forest plant communities that add to the vegetative diversity of the area.

Plant Species of Special Concern

Virginia spirea (*spiraea virginiana*) is the only federally-listed endangered or threatened species suspected to inhabit the study area. It is classified as threatened. Three plant species contained on the West Virginia Natural Heritage Program's list of species of concern are known to occur in the study area: the nodding onion (*allium oxphilum*), Steele's aster (*aster steeleorum*), and a sedge (*carex molesta*). An additional twenty-nine plant species recognized as rare by the Natural Heritage Program are thought to be likely to occur in the area.

Fish and Other Aquatic Species

Fish Species

The geomorphology of the New River and its tributaries creates high quality habitat for a wide range of fish species. A 1980 biological study identified fifty-eight fish species in the upper portions of the New River in West Virginia. Game species present at that time included largemouth, smallmouth, spotted, striped, hybrid striped, white, and rock bass; muskellunge; walleye; sunfish; yellow perch; and brook trout. The river also contains stable populations of black crappie, white crappie, channel catfish, flathead catfish, golden shiner, bluntnose minnow, white sucker, and alewife. Rainbow, golden rainbow,¹⁰ and sometimes brown and brook trout are stocked seasonally in Indian Creek by the West Virginia DNR, and may be present in the New River near the mouth of Indian Creek during spring months.

More recently, boat electro-fishing by the Virginia DGIF in the Giles County portion of the New River (which includes the Virginia portion of the study area) identified the 33 species listed in Table 2.11.

Table 2.11. Fish species recorded in the New River main stem in Giles County, Virginia.

Bass, largemouth	Darter, Roanoke	Shiner, swallowtail
Bass, rock	Darter, snubnose	Shiner, telescope
Bass, smallmouth	Logperch	Shiner, white
Bass, spotted	Madtom, margined	Shiner, whitetail
Bluegill	Minnow, bluntnose	Stoneroller, central
Carp, common	Muskellunge	Sucker, northern hog
Catfish, channel	Sculpin, mottled	Sucker, white
Catfish, flathead	Shad, gizzard	Sunfish, green
Chub, bigmouth	Shiner, rosyface	Sunfish, redbreast
Chub, creek	Shiner, silver	Sunfish, redear
Darter, greenside	Shiner, spottail	Trout, rainbow

¹⁰ A golden rainbow is a rainbow trout variation. The only difference is coloration.

The Virginia DGIF and the West Virginia DNR-Wildlife Resources Section are collaborating in an assessment of walleye populations in the New River. Researchers at Virginia Polytechnic Institute and State University have identified a genetically unique stock of walleye in the New River.

Fish native to the New River included brook trout, channel catfish, flathead catfish, and green sunfish. Many of the river's native species are believed to have originated in the Mississippi River basin, which is thought to be the center for North American fish evolution and distribution. The Teays River, the prehistoric predecessor to the New River, was thought to have been a principal corridor for the movement of fish from the Mississippi to the Atlantic side of the Appalachian Mountains. The Mississippi theory is supported by the fact that there are 90 native fish species in the lower Kanawha/New River basin and only fifty species in the upper reaches of the New River. This is likely due to the presence of Kanawha Falls, near the confluence of the New and Gauley Rivers, which is likely to have blocked the upstream movement of many species. Over time, humans introduced most of the lower river fish upriver, and today the numbers of species below and above Kanawha Falls are about the same. Exotic fish species also have been introduced and some have become naturalized, that is, they maintain self-supporting populations without additional stocking.

Other Aquatic Species

The New River also provides habitat for a variety of other aquatic species, including several crayfish species and the six species of mussel listed in Table 2.12. All of these are native species except the Asiatic clam. The Asiatic clam is an invasive species that is transported by boats and other means. Biologists are concerned that this species could out-compete native species.

Table 2.12. Mussels occurring in the New River study area.

Scientific name	Common name
<i>Corbicula manilensis</i>	Asiatic clam
<i>Cyclonaias tuberculata</i>	Purple wartyback
<i>Elliptio dilatata</i>	Northern lance
<i>Lampsilis cardium</i>	Plain pocketbook
<i>Lampsilis fasciola</i>	Wavy-rayed lampmussel
<i>Tritogonia verrucosa</i>	Pistolgrip

Aquatic Species of Special Concern

There are no federally endangered or threatened fish, mussel, or other aquatic species known to inhabit the New River study area.

In addition to the federal endangered species program, the states of Virginia and West Virginia each have natural heritage programs that track other species of special concern. In accordance

with natural heritage program protocol, the states rank species of concern using the following ranking system:

- S-1 = 5 or fewer known occurrences in the state
- S-2 = 6 to 20 known occurrences in the state
- S-3 = 21 to 100 known occurrences in the state
- S-4 and S-5 indicate more common species

Each state ranks species within its borders and the “S” rankings may differ between states.

Table 2.13. West Virginia S-1 through S-3 aquatic species known to occur in the New River study area.

Scientific name	Common name	Natural Heritage Program ranking
Fish:		
<i>Etheostoma osburni</i>	Finescale saddled darter	S-3
<i>Nocomis platyrhynchus</i>	Bigmouth chub	S-3Q (question)
<i>Percina roanoka</i>	Roanoke darter	S-1
Scientific name	Common name	Natural Heritage Program ranking
Mussels:		
<i>Cyclonaias tuberculata</i>	Purple wartyback	S-1
<i>Elliptio dilatata</i>	Northern lance	S-2/3
<i>Lampsilis cardium</i>	Plain pocketbook	S-2
<i>Lampsilis fasciola</i>	Wavy-rayed lampmussel	S-2
<i>Tritogonia verrucosa</i>	Pistolgrip	S-2

Aquatic species recognized as being of concern by the West Virginia Natural Heritage Program that are known to inhabit the study area are listed in Table 2.13. Species suspected to occur are listed in Table 2.14.

Table 2.14. West Virginia S-1 through S-3 aquatic species suspected to occur in the New River study area.

Scientific name	Common name	Natural Heritage Program ranking
Fish:		
<i>Exoglossum laurae</i>	Tongue-tied minnow	S-3
<i>Exoglossum maxillingua</i>	Cutlips minnow	S-2
<i>Notropis scabriceps</i>	New River shiner	S-3
<i>Phoxinus oreas</i>	Mountain redbelly dace	S-2

Aquatic Habitat

Each aquatic species has its own life history and habitat needs. The entire New River upstream of Bluestone Lake is considered to be important spawning, rearing, adult, and migration habitat for multiple game species of fish. This is principally due to its size and geomorphologic variety, including ledge drops, pools, runs, side eddies, islands, backwaters, large woody debris, bank overhangs, forested bank cover, and substrates suitable for spawning.

Perhaps the most limiting of the aquatic habitat factors is the water itself, both in terms of water quality and flow. From the perspective of an aquatic organism, water quality must be subdivided into at least three factors – chemistry, temperature, and sediment. All three may be affected by upstream land use and commercial activities. Currently the river appears to be within acceptable bounds for all three, with the exception of the PCB problem noted in the “Water Quality” section, above. With the strong federal and state laws that govern point source discharges, both chemical and thermal pollution are generally well managed. Aside from the challenges of addressing the PCB contamination in Virginia, the most significant threat to water quality is likely to be from so-called “nonpoint source” discharges, such as runoff from roads, parking lots, and disturbed land. These sources can adversely affect water chemistry, temperature, and especially sedimentation. Effective management of nonpoint source pollution will be an ongoing challenge in maintaining the New River’s high quality aquatic habitat.

From a habitat perspective there are two aspects of flow that are of concern – maintaining minimum flows, especially during late summer, and ensuring that daily flow fluctuations do not disrupt key ecological functions. Concerns with minimum flows relate mostly to water withdrawals that are not returned to the river. Beyond natural flow variations from rainfall, flow fluctuations are primarily a function of upstream dam releases. Fortunately, the size of the New River and its distance from the closest upstream impoundment help to attenuate issues related to flow. As described earlier in the “Streamflow” section, Claytor Dam, the nearest dam upstream of the study area, operates as a run-of-river facility from mid-April through mid-October. This operating regime essentially eliminates human-induced daily fluctuations for half of the year.

Wildlife

Wildlife Species

The Bluestone WMA, including the portion within the study area, is recognized for both its production and its diversity of wildlife.

Examples of mammals that inhabit the Bluestone WMA include white-tailed deer, black bear, squirrel, cottontail rabbit, woodchuck, raccoon, gray and red fox, beaver, opossum, muskrat, weasel, striped skunk, bobcat, otter and mink.

With respect to birds that use the area, migratory waterfowl include Canada geese, snow geese, gadwall, pintail, scaup, goldeneye, bufflehead, ruddy duck, ring-necked duck, redhead, common

and hooded merganser, mallard, wood duck, and black duck. Upland game birds include eastern wild turkey, mourning dove, woodcock, ruffed grouse, and bobwhite quail. The area has one of the highest concentrations of wild turkeys per square mile in the eastern United States, a result of a successful reintroduction and management effort by the WVDNR. Bald eagles can often be seen soaring above the river. Other raptors include red-tailed, broad-winged, and red-shouldered hawks. The study area is a migration corridor for songbirds, many of which also use the area's riparian corridor, fields, and forests for nesting. All told, some 218 species of birds can be expected to use the study area at some time during the year.

Common amphibian and reptile species in the study area include the green frog; spring peeper; American toad; box and stinkpot turtle; a variety of salamanders; and copperhead, timber rattlesnake, and other, nonpoisonous snakes. At certain seasons river bottomlands are also a magnet for butterflies. The area is noteworthy both for its species variety and the concentration of individuals from single species. The number of swallowtail butterflies in certain areas along the river is particularly striking.

Hunting is allowed for raccoon, coyote, gray and red fox, white-tailed deer, black bear, squirrel, cottontail rabbit, woodchuck, wild turkey, waterfowl, mourning dove, woodcock, ruffed grouse, and bobwhite quail. Trapping is permitted for beaver, fisher, muskrat, mink, opossum, weasel, raccoon, and striped skunk, but requires a special permit.

Wildlife Species of Special Concern

There are no federally listed endangered or threatened animal species known to frequent the study area. While a frequent seasonal visitor, the bald eagle is not known to breed in or near the area. The Northern red-bellied cooter is also technically a component of the federal endangered species program due to similarities with a population in Massachusetts that is listed as endangered. Terrestrial species listed as S-1 through S-3 through the West Virginia Natural Heritage Program that are known to occur in the study area are listed in Table 2.15. Suspected occurrences are listed in Table 2.16.

Table 2.15. West Virginia S-1 through S-3 terrestrial species known to occur in the New River study area.

Scientific name	Common name	Natural Heritage Program ranking
<i>Desmognathus quadramaculatus</i>	Black-bellied salamander	S-3
<i>Hendersonia occulta</i>	Cherrystone drop snail	S-U (unknown)
<i>Pseudemys concinna</i>	Eastern river cooter	S-2
<i>Pseudemys rubriventris</i>	Northern red-bellied cooter	S-2
<i>Zapus hudsonius</i>	Meadow jumping mouse	S-3

Table 2.16. West Virginia S-1 through S-3 terrestrial species suspected to occur in the New River study area.

Scientific name	Common name	Natural Heritage Program ranking
<i>Calephelis borealis</i>	Northern Metalmark	S-3
<i>Cyllopsis gemma</i>	Gemmed satyr	S-U (unknown)
<i>Erora laeta</i>	Early hairstreak	S-3
<i>Eurycea lucifuga</i>	Cave salamander	S-3
<i>Myotis septentrionalis</i>	Northern long-eared bat	S-2
<i>Paravitrea reesei</i>	Round supercoil snail	S-U (unknown)
<i>Reithrodontomys humulis</i>	Eastern harvest mouse	S-U (unknown)
<i>Satyrium caryaevorum</i>	Hickory hairstreak	S-U (unknown)
<i>Satyrium edwardsii</i>	Edwards' hairstreak	S-3
<i>Satyroides appalachia</i>	Appalachian brown	S-U (unknown)
<i>Sorex disper</i>	Long-tailed shrew	S-2/3
<i>Speyeria dian</i>	Diana	S-3
<i>Sylvilagus transitionalis</i>	New England cottontail	S-3
<i>Triodopsis juxtidens</i>	Atlantic three-tooth snail	S-U (unknown)

Wildlife Habitat

The study area provides high quality habitat for a wide range of wildlife species. This is a result of several factors including location, size, physiographic diversity, vegetation, land use, and management. Each is summarized below.

Location. The study area is strategically located along both a major neo-tropical migrant north-south flyway and a cross-Appalachian travel corridor. In addition, significant areas of public conservation land are found throughout the New River watershed, both upstream and downstream. These lands are beneficial for a variety of species, including those that require larger areas of open space. Among other benefits, the attributes of the study area's location combine to provide opportunities for interchange between different populations of the same species.

Size. The Bluestone WMA covers nearly 18,000 acres and is the second largest public facility of its kind in West Virginia. The size of the WMA and adjacent public conservation lands collectively encompass more than 25,000 acres, a substantial amount of undeveloped land that makes this study area ideal for large game and raptors, both of which require large areas to fulfill life cycle needs, as well as for a wide range of other species that benefit from large swaths of undeveloped habitat.

Physiographic Diversity. Habitat quality is often associated with variety and interfaces. The study area contains a wide range of landforms including mountains, hillsides, benches, valleys,

cliffs, bottomlands, and islands. The interface between these landforms is especially important for wildlife. The habitat quality of these landforms is significantly enhanced by the presence of a large and hydrologically diverse river. In combination, the river and adjacent landforms provide a variety of habitat types that is conducive to use by a wide range of species.

Vegetation. The predominantly oak-hickory forest is attractive to a wide range of wildlife species, notably bear. This forest, which for the most part is now nearly sixty years old, is approaching maturity, a stage when the production of mast (nuts, seeds, etc.) upon which many wildlife species depend is high. While oak-hickory predominates, the diversity of landforms supports numerous pockets of other plant associations that provide cover and food for diverse species.

Land Use. Outside of the national forests that follow the Appalachian Mountains, the study area and the remainder of the Bluestone Lake Project Area is one of the region's least developed areas.

Management. The portion of the study area in West Virginia has been actively managed by the WVDNR as part of the Bluestone WMA for over 50 years. Management objectives and activities emphasize enhancing wildlife habitat primarily by providing food, cover, and habitat diversity, and protecting wildlife from disturbance (e.g., protecting brood rearing areas). While many habitat management actions aim primarily at a single species to provide greater hunting opportunities for this species, actions typically benefit larger associations of species with similar habitat requirements. For example, WVDNR has determined that habitat actions undertaken to support turkey also benefit smoky shrews, hermit thrushes, towhees, woodpeckers, great crested flycatchers, dusky salamanders, Fowlers toads, and black snakes, among other species.

Cultural Resources

Prehistoric Resources

The term “prehistoric resources” refers to evidence of the existence of cultures that lived in, or traveled through, an area prior to the arrival of European explorers and settlers. In almost all cases along the New River in and near the study area, readily apparent physical evidence of such activity is lacking without further archeological investigation. Some evidence of Native American trails may be found, though these were almost always transformed to roads by later cultures. Typically, evidence of prehistoric cultures is in the form of artifacts located in settlement or burial areas. In some cases these artifacts indicate the presence of villages that housed many people, often for many generations.

There are several distinct prehistoric periods characterized by the cultures associated with those periods. Table 2.17 presents a very abbreviated summary of periods relevant to the New River.

Table 2.17. Prehistoric culture periods relevant to the New River.

Time	Period	Characteristics
10,500 – 8,000 B.C.	Paleo-Indian	Big game hunting culture
9,000 – 7,500 B.C.	Terminal Paleo-Indian	Corner and side-notched projectile points.
8,000 – 6,000 B.C.	Early Archaic	Broad-spectrum hunting and gathering.
6,000 – 3,000 B.C.	Middle Archaic	Continuation of broad-spectrum hunting and gathering.
3,000 – 1,000 B.C.	Late Archaic	Shift toward agriculture.
1,000 – 200 B.C.	Early Woodland	Increasing use of agriculture.
200 B.C. – A.D. 400	Middle Woodland	Refinement in tools.
A.D. 400 – 1200	Late Woodland	More refinement in tools.
A.D. 1200 – 1550	Late Prehistoric	Intensive corn agriculture and more sedentary village life.
A.D. 1550 – 1753	Proto-Historic	No direct contact with Europeans but received European goods in trade.
1753	European contact	Start of hostilities and displacement.

For each of the periods identified in Table 2.17, one or more cultures evolved and became established within the New River area. Within the Bluestone Lake Project Area (not including the Bluestone National Scenic River area), the ACE’s archeology records document fifty-six open habitation sites, five prehistoric rock shelters (one with a pictograph), ten prehistoric village sites, four prehistoric hamlets, and one rock pile/cairn. It is significant that these sites include multiple associations with each of the periods listed in Table 2.17.

Of the sites identified, three are especially significant and may be eligible for registration on the National Register of Historic Places. All three of these are located within the wild and scenic river study area portion of the Bluestone Lake Project Area. The first site has Late Prehistoric, Late Archaic, Early Archaic, and Middle Woodland components. This site has 145 documented burials, one-third of which contained shell necklaces, wrist, and ankle bracelets. The second site has Late Prehistoric, Middle Woodland, and Late Archaic components. The third site has Late Prehistoric components. It is likely that additional sites exist that would be eligible for the National Register of Historic Places, but more investigation would be needed to confirm this.

All told, the archeological evidence demonstrates that the New River corridor, including the study area and immediate environs, is a particularly significant prehistoric resource and is perhaps the most significant in the southeast Virginia/southwest Virginia region. This significance is the result of (1) continuous use over such a long time frame, (2) the high

concentration of use during a given period, and (3) the presence of particularly important sites and a diversity of site types.

Historic Resources

The term “historic resources” refers to sites and events associated with the time period since the arrival of the first European explorers and settlers. Historic sites can include both extant sites, that is, structures, roadways, or landscapes where physical evidence remains readily apparent, and archeological sites, that is, sites where physical evidence is not as readily apparent but where the remains of structures and/or artifacts may be located through site investigation, often including excavation. Historic events include historically significant events, regardless of whether physical evidence is available.

Within the Bluestone Project Area along the New River and Bluestone Lake (but not including the Bluestone River), the ACE’s archeology records document the presence of four historic forts, eight historic residential sites, ten historic industrial sites, and two sites of reported historical use. The forts were actually small stockade buildings built as protection for inhabitants. They did not play a significant role in either the French and Indian (Seven Years) or Revolutionary Wars. Their real significance is as the earliest buildings in the area. Early written records confirm that these forts were constructed along the river within the Bluestone Lake Project Area. However, archeological investigations have failed to uncover physical evidence of their precise locations.

During the 19th century, sluices or “chutes” were opened through several of the rapids in the study area to provide passage for batteau, large canoe-like boats used to transport cargo. These passageways, which were often up to thirty feet long and typically two feet in depth, were opened by blasting. Also constructed to aid in batteau passage were wing dams and hauling walls. Remnants of these chutes may be found even today. They continue to serve their intended purpose by allowing canoe passage through otherwise difficult rapids. Batteau chutes are rare, both nationally and regionally. While a comparative study has not been completed, it is reputed that this part of the river possesses one of the best collections of batteau navigation structures in the United States.

From 1855 to 1939, the Crump estate at Crump’s Bottom consisted of a stately home and several outbuildings. The main house was the most substantial building ever constructed in the study area and at the time of its construction was recognized as among the finest residences in southeast West Virginia. While the buildings have been removed, the site is well documented, including period photographs, a site plan, written history, and ample physical evidence. The Mercer Salt Works, the Lick Creek Trail and Road, and Shanklin’s Ferry Crossing are significant due to their role in late 19th century commercial and industrial development in the Lick Creek area.

While there are several interesting stories concerning human use of the study area that are locally significant, there were few events that occurred in post-colonial period that are noteworthy from a regional or national perspective. An event that holds high local significance was the escape of Mary Draper Ingles from her Native American captures and her long walk back home, a walk that took her through the length of the study area. Perhaps the most noteworthy events were,

first, the establishment of early forts, and second, the decision to remove residents to make way for the Bluestone Dam. The story of attempts to improve the navigation of the New River by blasting batteau chutes holds interest, due in part to the heroics involved in running these chutes and the fact that these are still very much in evidence.

Management of Prehistoric and Historic Resources

Although many of the prehistoric and historic sites have been mapped, documented, and identified on the state registry, additional archival and field research will be required to fully understand the role this area played in prehistoric and historic cultures. According to the ACE's draft *Bluestone Lake Historic Properties Management Plan*, "Major priorities include conducting a systematic historic and prehistoric archeological survey to record previously unknown sites, conducting deep testing at Crump's Bottom to record deeply buried sites, and conducting historic research and nominating Crump's Bottom as a National Register of Historic Places District." To date, historic research has focused on the prehistoric and early historic periods. Interpretation of the culture and industry that existed in the study area in decades immediately pre-dating the construction of Bluestone Dam may prove to be both interesting and informative.

Illegal artifact collecting is a problem in the study area. In West Virginia, the regular presence of staff from DNR-Parks and DNR-Wildlife Resources Section helps prevent major digging operations, though artifact hunters are known to scavenge in plowed fields for archeological remnants. While the ACE monitors public use in the Virginia portion of the study area, the more limited management presence there means that archeological resources are particularly vulnerable.

Recreation and Public Use

Traditional Public Uses

Recreational uses within the study area that are considered to be "traditional" include fishing, hunting, trapping, camping, boating, and wildlife observation. These are considered traditional uses particularly because they are the uses most closely associated with the primary purpose of the Bluestone WMA, that is, fish and wildlife management. (The same activities also have occurred over time in the Virginia portion of the study area, although in a less managed setting.) A tradition has built up over the years of local and regional residents using this area as a favored location for these activities; in many cases, multiple generations of the same family have visited the area regularly, and annual or more frequent visits are considered a ritual.

According to West Virginia DNR data, the Bluestone WMA major roads and camping areas received 111,000 visitor days of use in 2004, including 58,000 overnight stays. This includes the three camping areas in the study area and Bertha and Bull Falls camping areas, which are located just downstream of the study area. It does not include Barton Ridge, a popular hunting area accessed by a secondary road. It is estimated that 25,000 hunters and anglers use the WMA annually. Reliable statistics on the use of undeveloped camping sites along the Virginia portion

of the river are not available, but it is reported that the area receives frequent to near continuous use during the spring, summer, and fall seasons. Visitation both in Virginia and West Virginia is particularly high during holidays, summer weekends, and the spring and fall hunting seasons.

Historically, most boating use has been associated with fishing. Small motorboats are often launched from boat ramps at the Glen Lyn town park and the West Virginia camping areas. The boats are then used for fishing between the nearest upstream and downstream rapids. Fishing from canoes as part of a one-way trip that includes boating through one or more rapids also appears to be fairly common. Recently, longer boat trips appear to have become more popular, either in combination with fishing or as a stand-alone activity.

One-way canoe trips in the study area are popular with organized youth groups. Canoe liveryes use the study area only infrequently, but have expressed interest in adding trips through the area to their list of offerings. In West Virginia, overnight camping is allowed only at established camping areas, although interest has been expressed in establishing boat-only campsites. Table 2.18 identifies the various opportunities for one-way canoe trips that are entirely or primarily within the study area, the longest of which is 21.5 miles in length. It would also be possible to make this part of a much longer trip by starting further upstream or extending the trip downstream. This is part of the vision for the New River Blueway, described above in the “Regional Initiatives” section. Trips continuing downstream of Bluestone Lake would require portaging around Bluestone Dam and large rapids in some locations.

Table 2.18. Canoe trip opportunities in the New River study area.

Boat launch site	River Mile	Miles to next take-out	Distance from Glen Lyn put-in
Glen Lyn Town Park	30.5	8.8	--
Upper Shanklin’s Ferry	21.7	2.1	8.8
Middle Shanklin’s Ferry	19.6	1.1	10.9
Lower Shanklin’s Ferry	18.5	3.3	12.0
Cedar Branch	15.2	1.6	15.3
Indian Creek	13.6	4.6	16.9
Bull Falls	9.0	2.0	21.5
Bertha	7.0	--	23.5

Other Public Uses

Recreational activities that have not been pursued extensively in the past in the study area but that are becoming increasingly popular elsewhere include hiking, mountain biking, and horseback riding. In the West Virginia portion, hiking is permitted throughout the Bluestone WMA but may be limited by the closure of gates during certain seasons for the protection of

wildlife. Horses must stay on trails designated for their use. Mountain bikes are restricted to the same roadways that are used for automobile traffic. All-terrain vehicle use is not permitted in the WMA due to the likelihood of adverse impacts on the area's wildlife.

An evaluation of recreation opportunities provided within the study area should not be conducted in a narrow context, but rather should consider the opportunities afforded by other nearby lands available to the same group of users (in this case residents of and visitors to the four-county region and, more broadly, the greater southwest Virginia/southeast West Virginia region). Such a regional recreation opportunity analysis would consider both supply and demand, and would look to provide a range of opportunities, rather than duplicate the same opportunities at all sites. Such an analysis also would seek to avoid or resolve conflicts, both between uses and between public use and resource conservation. While a formal recreation opportunity analysis of this type is beyond the scope of this study, it is useful to recognize the broader spectrum of recreational opportunities in the region. To this end, Table 2.19 offers a simplified view of the recreational opportunities afforded by the various public lands in the southwest Virginia/southeast West Virginia region.

Access and Facilities

Access. The eastern portion of the Bluestone WMA is accessed from West Virginia State Highway 12. Spur roads including County Roads 23 and 24 lead to three camping areas in the wild and scenic river study area – Indian Creek, Cedar Branch and Shanklin's Ferry. A fourth, the Bull Falls Camping Area, is located on the left-hand shoreline less than a mile downstream of the northern terminus of the study area; and a fifth, the Bertha Camping Area, is located along the right-hand shoreline of Bluestone Lake approximately three miles further downstream from Bull Falls. The western portion of the WMA is accessed from West Virginia State Highway 20 and County Road 44. Spur roads are unpaved but typically open year-round. They are impassible during heavy storm events. Where these roads come near the river, typically in camping areas, they are subject to flooding during times when Bluestone Dam is impounding floodwaters.

In Virginia, Route 460 and Glen Lyn town roads provide the primary access to the study area. On river left a road primarily used to access the Appalachian Power Company's fly ash facility continues past the fly ash facility and parallels the river to the state line. Beyond Appalachian Power's facility, the road is rough and in some places steep. During wet periods it is impassible. On river right, agricultural lease areas along the river are accessed from a primitive county road that crosses private land. This road does not currently provide public access to the study area.

Facilities. Developed river-related recreation areas in or near the study area are summarized in Table 2.20. The five camping areas and boat launches in West Virginia are managed by DNR-Parks. DNR-Parks also manages two camping areas in the study area that are not located on the New River – Keatley and Indian Mills camping areas, both of which are located along Indian Creek near the Bluestone WMA Office just off of Route 12. Each has fifteen campsites. All campsites in the study area are classified as "primitive," and typically include a picnic table, a fire ring, and, in some cases, a vehicle pad. Each camping area has one or more sanitation

facilities and trash receptacles. In addition to camping areas, DNR-Parks maintains the Sherman Ballard pavilion and a horse stable, both located near the entrance to the Shanklin's Ferry camping area. The pavilion is billed as "rustic." It is equipped with a stove, refrigerator, bathrooms, and a fireplace. It is available for rent and is popular for group activities.

The Glen Lyn town park is the only developed recreational facility in the Virginia portion of the Bluestone Lake Project Area. While the park is technically upstream of the study area, it provides a key access point for use of the study area.

Table 2.20. Developed river-related recreation sites in and near the New River study area.

Site name	River Mile	Size	Facilities	Notes
Bertha Camping Area (WV)	6.1	23 acres	55 campsites, pit toilets, 1 boat launch	Important to consider from a management efficiency perspective. Located on the right-hand shoreline of Bluestone Lake downstream of the study area.
Bull Falls Camping Area (WV)	9.2	30 acres	79 campsites, pit toilets, 1 boat launch	Road to camping area also is important for access to Crump's Bottom. Located on river left less than a mile downstream of the northern endpoint of the study area.
Indian Creek Camping Area (WV)	13.5	50 acres	145 campsites, pit toilets, 3 boat launches, picnic areas, archery range	The second largest camping area in the study area. Located on river right.
Cedar Branch Camping Area (WV)	15.5	10 acres	17 campsites, pit toilets, 2 boat launches	A smaller camping area located on river right midway between Indian Creek and Shanklin's.
Shanklin's Ferry Camping Area (WV)	18.5	35 acres	177 campsites, playground and beach area, pit toilets, 3 boat launches, picnic areas, Sherman Ballard Rec. Area with pavilion and barn	Located on river right. The largest of the camping areas in the study area.
Glen Lyn Town Park (VA)	30.5	18.44 acres	Picnic areas, paved boat ramp, camping, ball field, restrooms	Located on river right just upstream of the Rt. 460 Bridge.

Table 2.19. Public lands recreation opportunities in the region.

Site	Biking	Camping	Canoeing	Fishing	Hiking	Horses	Hunting	Lake Boating	Family resort	Rafting Kayaking	Trapping
Appalachian Trail (VA)		X (remote)			XX						
Bluestone Lake (Bluestone WMA)		XX (primitive)		XX		X	XX	XX			XX
Bluestone NSR (Bluestone WMA)		XX	X	XX	X	X	XX			X	XX
Bluestone State Park (WV)	X	XX	X	XX	X			XX			
Camp Creek State Park (WV)	X	XX			X						
Claytor Lake State Park (VA)		XX		XX				XX			
Gauley River NRA (WV)	X	XX		XX	X		X			XX	
Jefferson National Forest (VA)	X	XX		XX	XX	X	XX				X
Mt. Rogers NRA (VA)	XX	XX	X	X	XX	XX					
New River Gorge Nat. River (WV)	XX	XX	X	XX	XX		XX			XX	
New River Trail State Park (VA)		XX	XX	XX							
Pinnacle Rock State Park (WV)					X						
Pipestem Resort State Park (WV)	X	XX			XX	XX			XX		
Study Area (Bluestone WMA)		XX (primitive)	XX	XX	X	X	XX				XX

XX = Primary activity, X = Secondary activity

Note. This table identifies only the most noteworthy uses. Individual sites may offer other uses not highlighted in this table.

