



File Code: 1950-1

Date: May 26, 2006

Dear Interested Members of the Public and Forest Users:

Enclosed is an environmental assessment (EA) for the Lake Powhatan Dredging Project, on the Pisgah Ranger District, Pisgah National Forest. Pursuant to 36 CFR 215.5, as District Ranger for the Pisgah Ranger District of the National Forests in North Carolina, I request your written or oral comments on the environmental assessment for the proposed project listed above.

Flooding from the storm events after the hurricanes of 2004 has damaged stream banks in the Bent Creek Watershed by removing soil holding vegetation. These storm events increased sedimentation from these streams along with roads and trails in this watershed. These sources of sediment have impacted Lake Powhatan exacerbating the problems associated with existing excess sediment in the lake. This is negatively impacting water quality and aquatic habitat, which in turn affects the swimming and fishing recreational opportunities offered by the Forest Service at the lake. Two alternatives have been developed and analyzed, Alternative 1 – No Action and Alternative 2 – Proposed Action. I have identified Alternative 2 as my preferred alternative. This alternative involves mechanically dredging 11,000 cubic yards of excess sediment from the lake and depositing it on National Forest land. These activities are proposed in the Lake Powhatan Recreation Area in Buncombe County, North Carolina.

Although a preferred alternative has been identified, my final decision on which alternative to implement has not been made. You can help me in making this decision by providing written review comments on the EA. I encourage your participation during this 30-day comment period for the EA. Please note that I am requesting your comments under 36 CFR 215. Following this 30-day period, I will be publishing a decision. Pursuant to 36 CFR 215.11(a) and 215.15(a), my decision will initiate a 45-day appeal period or pursuant to 36 CFR 215.12 (e) this action will not be subject to appeal.

Only those who submit timely comments will be accepted as appellants. If you would like to comment, it would be helpful if the comments were as specific as possible. You must provide the following information: 1) Your name and address; 2) Title of the Proposed Action; 3) Specific comments on the proposed action, along with supporting reasons that the Responsible Official should consider in reaching a decision; and 4) Your signature or other means of identification verification. For organizations, a signature or other means of identification verification must be provided for the individual authorized to represent your organization.

In accordance with 36 CFR 215.6(a)(2&4), comments must be postmarked or received within 30 days beginning the day after publication of this notice in *The Asheville Citizen-Times*. Oral or hand-delivered comments must be received within our normal business hours of 8:00 a.m. to 4:30 p.m. Comments may be mailed electronically, in a common digital format, to: comments-southern-north-carolina-pisgah-pisgah@fs.fed.us. The subject line must contain the name of the project for which you are submitting comments and the sender should normally receive an automated electronic acknowledgement from the agency as confirmation of receipt. If the sender does not receive an



automated acknowledgement of the receipt of comments, it is the sender's responsibility to ensure timely receipt by other means. Comments may be sent by regular mail to: Pisgah Ranger District, Attn: Randall Burgess, Responsible Official/District Ranger, 1001 Pisgah Highway, Pisgah Forest, N.C. 28768. Or, you may fax your comments to (828) 884-7527.

If you have questions regarding this proposal, you may contact me, at (828) 877-3265. Thank you for your continued interest in management of your National Forest.

Sincerely,

/s/ Randall Burgess

RANDALL BURGESS, District Ranger
Pisgah Ranger District
Enclosure



United States
Department
of
Agriculture

Forest
Service

May 2006



Lake Powhatan Dredging Environmental Assessment

Pisgah Ranger District, Pisgah National Forest, Buncombe County,
North Carolina



For Information Contact:
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Title of Proposal: Lake Powhatan Dredging

Location of Proposal: Pisgah Ranger District, Pisgah National Forest
Buncombe County, North Carolina

Type of Document: Environmental Assessment

Lead Agency: USDA Forest Service

Responsible Official: Randall Burgess, District Ranger, Pisgah
Ranger District

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SUMMARY

In the fall of 2004, the remnants of four hurricanes severely damaged western North Carolina. The hurricanes generated heavy rains resulting in mudslides, flooding, and severe erosion. Lake Powhatan naturally accumulates sediment from many sources. These storms, as well as other storms in previous years, have accelerated the movement of sediment from the Bent Creek Watershed into the reservoir. Most of the sediment is composed of sand size or smaller particles (fines). Sediment is filling in the reservoir and creating problems with water quality, aquatic habitat, and recreational opportunities such as swimming and fishing.

The Pisgah Ranger District proposes an Action Alternative (Alternative 2) that will involve: 1) draining the reservoir and 2) dredging, and disposing of about 11,000 cubic yards (yd³) of sediment at what is known as the Power Line Field Site (Figure 1). The project area is approximately 9 miles southwest of Asheville, NC, in the Lake Powhatan Recreation Area. It is surrounded by the Bent Creek Experimental Forest on the Pisgah National Forest, located in Buncombe County, North Carolina. This action is needed because sedimentation of Lake Powhatan is negatively affecting the water quality and aquatic habitat of the reservoir and thus, negatively affecting the quality of swimming and fishing opportunities.

The proposed action would produce the following long term (≥ 1 year) beneficial effects: 1) reduce sediment in Lake Powhatan, 2) improve water quality in the reservoir, 3) improve aquatic habitat in the reservoir and 4) improve recreational opportunities on the reservoir. These results would contribute to specific goals and objectives of the Nantahala and Pisgah Land and Resource Management Plan as amended (Forest Plan). It could also produce short-term (≤ 1 year) negative effects such as: 1) disrupt off-season recreational activities in the project area such as trail use, 2) damage roads along the sediment haul route(s) and 3) shorten the camping season at Lake Powhatan Campground.

In addition to the Action Alternative, the Forest Service also evaluated the No Action Alternative (Alternative 1). Under this alternative current management plans would continue to guide management of the project area but no dredging would occur. This alternative would allow sediment to continue to fill in the reservoir. Thus, not all the management goals and objectives for maintaining high water quality, aquatic habitat and provision of quality fishing and swimming recreation opportunities would be met.

Based upon the effects of the alternatives, the responsible official will decide whether to select the No Action Alternative (Alternative 1), implement the proposed Action Alternative described in detail in this document (Alternative 2), or implement a modification of the proposed Action Alternative.

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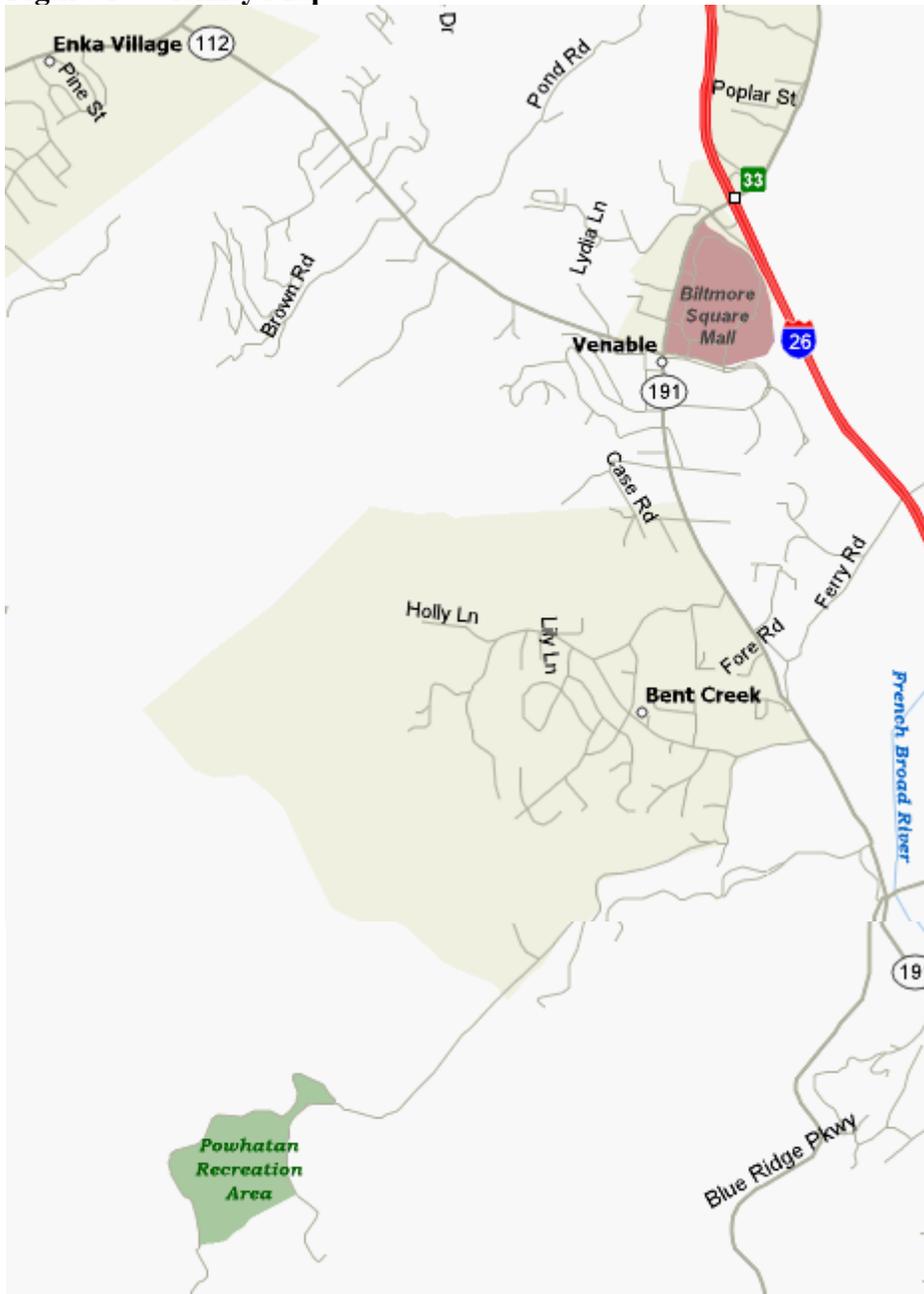
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Figure 1 - Vicinity Map



CHAPTER 1 - INTRODUCTION

Document Structure

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four parts:

- *Chapter 1 - Introduction:* The section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Chapter 2 - Alternatives, including the Proposed Action:* This section provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on key (significant) issues raised by the public, internally, and by other agencies. This discussion also includes possible mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- *Chapter 3 - Environmental Consequences:* This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by key issues developed from internal and public scoping. Within each section, the affected environment is described first, followed by the effects of the No Action Alternative that provide a baseline for evaluation and comparison of the other alternative that follows.
- *Chapter 4 - Consultation and Coordination:* This section provides a list of preparers and agencies consulted during the development of the environmental assessment.
- *Appendix A - Lake Powhatan Dredging EA Issue Tracking Sheet:* This section includes the comments received during scoping and the interdisciplinary team response to those comments.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Pisgah Ranger District Office in Pisgah Forest, NC.

Background

In the fall of 2004, the remnants of three hurricanes severely damaged western North Carolina. The hurricanes generated heavy rains resulting in mudslides, flooding, and severe erosion. Due to these storms, Lake Powhatan was the recipient of unusually heavy amounts of runoff water laden with high concentrations of sediment from the Bent Creek Watershed. The sediment from these storm events exacerbated the long-term problem of reservoir sediment deposition caused by erosion from unstable stream banks, eroding trails and eroding roads in the Bent Creek watershed. Previous sediment problems required dredging of the reservoir in 1993. However, the problem continued because there was no mitigation for

the sources of sediment (roads, trails and unstable streams banks). These sediment sources are being addressed in separate projects, which should help the long-term success of this proposed dredging.

Purpose and Need for Action_____

The purpose of this project is to improve water quality and aquatic habitat and to maintain quality swimming and fishing opportunities at Lake Powhatan. This action is needed now because sedimentation is continuing in the reservoir and it is approaching the point where water quality and aquatic habitat could be severely diminished.

This EA incorporates the Forest Plan and all relevant laws, acts, and executive orders. The proposed action addresses the following goals outlined in the Forest Plan (pages III-1 and III-2) and summarized here:

- Blend the needs of people and environmental values in such a way that the Pisgah National Forest sustains ecosystems that are diverse, productive, and resilient to short-term stress and long-term change through principles of multiple-use and sustained-yield.
- Improve the quality of life for citizens of western North Carolina by helping to meet the basic needs of people and communities who depend on National Forest resources for water, food, fuel, shelter, livelihood, recreation, and spiritual renewal.
- Maintain, and where possible, enhance the diversity of plant and animal communities of the southern Appalachians. Maintain viable populations of existing native wildlife, fish, and plants.
- Protect the beauty of the Forests through special attention to visually sensitive areas and the careful application of resource management activities.
- Provide different environmental and social settings for outdoor recreation opportunities that range from primitive to developed. Provide for a variety of recreation activities appropriate to these settings and the forest environment. Provide all recreation visitors to the National Forest the opportunity to participate in activities and programs and use facilities to the highest level of access practicable.

This action also helps move the project area toward specific desired conditions outlined in the Forest Plan's Forest-wide Management Requirements (pages III-24, III-25, and III-40) that help meet the forest-wide goals, desired future conditions and objectives. These are:

- Maintain and improve aquatic species diversity.
- Protect and improve fisheries habitat.

The Forests are administered through a combination of management areas, each of which has unique goals, management direction and standards. These management areas represent different social, physical and biological characteristics that lend themselves to such management.

Part of the area adjacent to the reservoir is within the riparian area (Management Area 18) and this action also helps move the project area toward the desired conditions as described for this management area (Forest Plan Amendment 5 pages III-179 to III-189). Direction for management of this area that is pertinent to the proposed action is highlighted here:

- Manage area so that management activities are not generally a dominant feature of the landscape.
- Maintain appropriate stream temperatures and stream environment and protect stream banks.
- Maintain the natural hydraulic and hydrologic functioning of the stream channel and protect the integrity of the stream system including channel, banks and stream bottom.
- Manage existing developed sites to be compatible with management area objectives.

The reservoir and the area around it, including the proposed sediment disposal site, are in Lake Powhatan Recreation Area, within Management Area 12 (developed recreation area) and this action also helps move the project area toward the desired conditions as described for this management area (Forest Plan Amendment 5, pages III-140 to 143). Direction for the management of this area that is pertinent to the proposed action is highlighted here:

- Manage for a pleasing forest environment and an inviting public perception.
- Manage, maintain and develop sites to enhance activities associated with a forest environment, to provide a safe, aesthetically pleasing, non-urban atmosphere.

Because this action responds to the goals and objectives in the Forest Plan and helps move the project area toward desired conditions described in that plan, no Forest Plan amendment is needed.

Proposed Action

The action proposed by the Forest Service to meet the purpose and need previously described is to 1) drain Lake Powhatan by siphoning, 2) clear about 1.5 acres of weeds and brush and about 1.5 acres of wooded forest and create a disposal site, 3) dredge and deepen a portion of Lake Powhatan and improve the structure of the reservoir bottom, 4) haul away and dispose of about 11,000 cubic yards of sediment on National Forest land near the reservoir, 5) refill the reservoir, and 6) contour and plant native plants and/or weed-free seeds at the disposal site. The best time for work to be done is during the period of September to April.

Decision Framework

Given the stated purpose and need, the deciding Forest Service official will review the proposed action, alternative(s), and analysis in order to make one of the following decisions:

- Select the No Action Alternative (Alternative 1), or
- Select the Action Alternative (Alternative 2) that has been considered in detail, or
- Select a modified version of one of these alternatives.

A permit must be obtained from the US Army Corps of Engineers for stream and wetland restoration activities. This project is expected to fit under the authority of a Nationwide Permit (NWP).

Public Involvement

The proposal was listed in the Schedule of Proposed Actions in April 2006. The proposal was provided to the public and other agencies for comment during a 20 day scoping period by

letter on April 10, 2006. In addition, as part of the public involvement process, the agency is providing those who responded to the initial scoping copies of this environmental assessment and asking for comments within a 30-day period. Approval to dredge during the State trout moratorium, October 15 to April 15, will be sought from the state of North Carolina.

A number of letters and emails were received, generally supporting the need for the project and the proposed action. Some commented that they would like to be kept apprised of actions that are taken to carry out the proposal and that surveys of species present and monitoring should be done in conjunction with the proposal. One comment suggested that the Forest Service recognize that the sediment that has been filling in Lake Powhatan does not all come from the 2004 storms. Using these comments from the public and other agencies the interdisciplinary team then developed a list of issues to address. A list of the comments received and the interdisciplinary team responses may be found in Appendix A

Issues

The Forest Service separated the issues into two groups: key issues (significant) and non-key issues (non-significant). Key issues were defined as those directly or indirectly caused by implementing the proposed action. Non-key issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)..."

Non - Key Issues

See Appendix A for the discussion of non-key issues.

Key Issues

The Forest Service identified three key issues raised during scoping. These issues help us evaluate each alternative. The issues for this analysis are listed below.

Water Quality

- The proposed dredging activities may affect water quality over the short-term (less than one year) in the project area and downstream of the project by the introduction of sediment into Bent Creek below the reservoir.

Aquatic Habitat

- The proposed dredging activities may affect aquatic habitat over the short-term (less than one year) within and downstream of the project area by the introduction of sediment into Bent Creek due to dewatering and removal of sediment from Lake Powhatan.

Recreation

- The proposed dredging activities, particularly sediment hauling, may affect the recreation opportunities and safety of recreationists who use portions of the haul routes as trails.

Other Resource Concerns

While they will not drive formulation of additional alternatives the following resources are important in and around the project area. Design features have been incorporated into the alternatives to minimize or eliminate negative effects to these resources. Disclosure of effects on these resources, however, is required by law, regulation, and policy. Other resources that are not relevant to, or will not be affected by the proposed action will not be analyzed. The following resources will be discussed further in Chapter 3.

Threatened and Endangered Species: Federal agencies are mandated to analyze effects of proposed projects on threatened and endangered species (TES) according to the Endangered Species Act of 1973. To meet this requirement, a biological evaluation (BE) has been prepared by a Forest Service biologist. This BE found that no federally listed species occur in the project area or within a four mile buffer around the project area.

Sensitive Species: The Forest Service is required to analyze the effects of proposed projects on sensitive species. A Regional Sensitive Species List was provided to the National Forests in North Carolina by the Southern Region of the Forest Service. This list identifies sensitive species which may occur on the Pisgah Ranger District. A BE has been prepared by a Forest Service biologist and has concluded that three known or potential sensitive species [Northern bush katydid (*Scudderia septentrionalis*), Diana fritillary (*Speyeria diana*), and S. Appalachian salamander (*Plethodon teyahalee*)] may occur within the project area.

Forest Concern Species: A study was done to determine if the project areas included any plants, fish, or terrestrial animals listed on the Nantahala and Pisgah National Forests' List of Forest Concern Species. A Forest Concern Species Evaluation has been prepared by a Forest Service biologist and has concluded that no vascular plant species, no aquatic invertebrates, and no mussels from this list occur or are likely to occur within the project area. Only one vertebrate species, the *Vireo gilvus* (Warbling Vireo), which is listed as a Forest Concern Species, does occur in the project area.

Management Indicator Species: Management Indicator Species (MIS) serve as indicators to monitor the implementation of the Forest Plan, as well as its effects on diversity and the population viability of all native and desirable non-native plants and animals. For this project, 2 species were selected to represent the two habitats found in the project area that potentially could be impacted. Ruffed grouse was chosen to represent 11-20 year old successional forest. Large mouth bass represents the reservoir habitat.

Invasive Plant Species: Invasive plant species are those that have been introduced into an ecosystem outside their natural range as a result of direct or indirect actions by humans and, which have the potential for damaging the ecosystem in which they are present. A botanical survey of the project area has concluded that invasive plant species are present.

Heritage Resources: Under the National Historic Preservation Act, a significant or negative effect is one which may diminish the integrity of a property's location, design, setting, materials, workmanship, feeling, or associations [36 0.9(b)]. Cultural resource specialists have been involved in the planning of this project and have surveyed the project area to insure protection of this resource. Cultural resource sites were not found at any area of the project.

Visual Resources: The Forest Service is required to ensure that project work is done in a pleasing way particularly in areas of public use such as Lake Powhatan Recreation Area. This is especially important for the design, clearing, and restoration of the sediment disposal area for this project. A landscape architect has designed into the sediment disposal site features, which will achieve a visually pleasing environment. In the short-term, during project implementation, the area will appear disturbed but will be contoured to a natural appearance and revegetated within nine months from the start of project implementation. This will create a large open play field that does not now exist. Since there will be no long-term impact to the visual resource from the disposal area or the reservoir, this resource will not be discussed as part of the recreation issue in Chapter 3.

CHAPTER 2 - ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This chapter describes and compares the alternatives considered for the Lake Powhatan dredging project. It includes a description of each alternative considered. This section also presents the alternatives in comparative form, defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. Some of the information used to compare the alternatives is based on the key issues identified through the scoping and planning process.

Alternatives

Alternative 1

No Action

Under the No Action alternative, the management goal would still be to maintain quality recreation swimming and fishing opportunities at Lake Powhatan; however, no action would be taken to improve water quality and aquatic habitat through dredging the lake. Thus, the lake would continue to fill with sediment, which will continue to reduce the water volume, decrease average depth, decrease rate of flow at the inlet to the lake and increase water temperatures. These factors will continue to reduce water quality and aquatic habitat. In time, the lake would completely fill in with sediments and Bent Creek would meander through a wetland area before spilling over the dam; eventually the lake bed would become forested and the current aquatic habitat and recreation opportunities would be lost.

Alternative 2

The Proposed Action

This alternative improves water quality and aquatic habitat by increasing the volume and depth of Lake Powhatan. Improved water quality will help maintain trout populations in the reservoir and quality recreation opportunities including swimming and fishing. This will be accomplished through temporarily piping normal Bent Creek flow below the dam while mechanically dredging about 11,000 cubic yards of sediment from the lake and hauling it to a 3 acre disposal site within the Lake Powhatan Recreation Area, Figure 2. Table 1 lists specific actions and a proposed timeline for this alternative.

Figure 2 - Lake Powhatan Dredging Alternative 2: Proposed Action

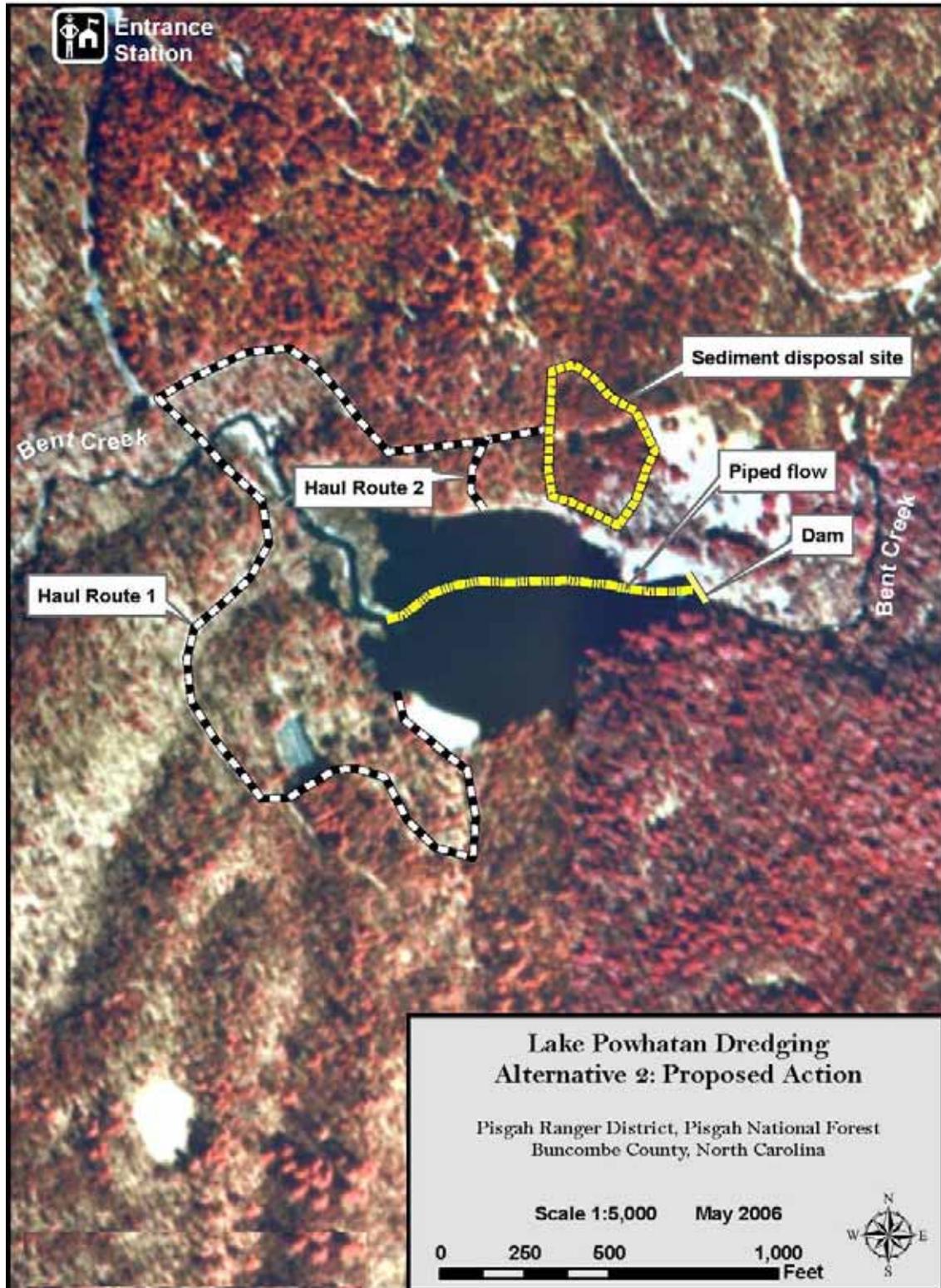


Table 1 - Actions Required to Complete Lake Powhatan Dredging

Action	Approximate Completion	Potential Start Date	Notes
1) Lake Draw-Down	2 weeks	September 18	The lake will be lowered one foot per day using two or more 8” diameter siphons with filter screens to prevent flushing bed load sediment in front of the dam and to maintain dam safety. Riprap rock may be added to the stream bed below the dam to prevent erosion while the lake is lowered (see Figure 3).
2) Divert flow from Bent Creek	one week to do the diversion and then the flow will be diverted throughout the dredging process	September 28	Water flow from Bent Creek will be captured with a temporary dam at the mouth of the lake and channeled through one or more 24” diameter flexible high density polyethylene (HDPE) pipes to the Lake Powhatan dam outlet gate valve, also 24” diameter. The flexible HDPE pipe can be moved slightly during dredging to allow access to sediments.
3) Fish populations	2 weeks	June 2 September 18	Discontinue stocking fish following kid’s fishing day, June 2. Upon draw-down, fish may be collected and moved to nearby ponds as appropriate. Some fish loss is still expected.
4) Dewater Lake Sediments In Place	2 weeks	October 2	Sediments will be allowed to dry. Once a dry crust layer is formed, in about 2 weeks, evaporation rates slow down dramatically.
5) Place Wood Mats	1 week	October 16	Wood mats will be placed on the lake bed to enable excavators and dump trucks to work.
6) Dike Construction at Disposal Site	1 week	September 28	Temporary dikes will be used to retain the sediments in the disposal area during full dewatering. Existing drainage at the site will allow water to flow out of the retained sediments (Figure 4). The dike retaining walls

Action	Approximate Completion	Potential Start Date	Notes
			will be seeded with a fast growing weed-free grass, such as annual rye, to prevent erosion.
7) Dredging and Disposal	8 to 10 weeks	October 23	Excavators will remove approximately 11,000 yd ³ of sediments to dump trucks. The dump trucks will move the sediment along forest roads to the disposal site.
8) Lake Filling	2 or more weeks	December 2006	The lake will be allowed to refill naturally from the flow from Bent Creek. This will be accomplished by removing the temporary dam at the lake inlet. About 50% of the flow from Bent Creek will be captured to provide continuous, clean flow into the downstream channel to protect aquatic habitat during lake filling.
9) Disposal Site Rehabilitation	2 weeks	April 2007	After the dredging is complete and sediments have sufficiently dried, the disposal area will be shaped and revegetated.

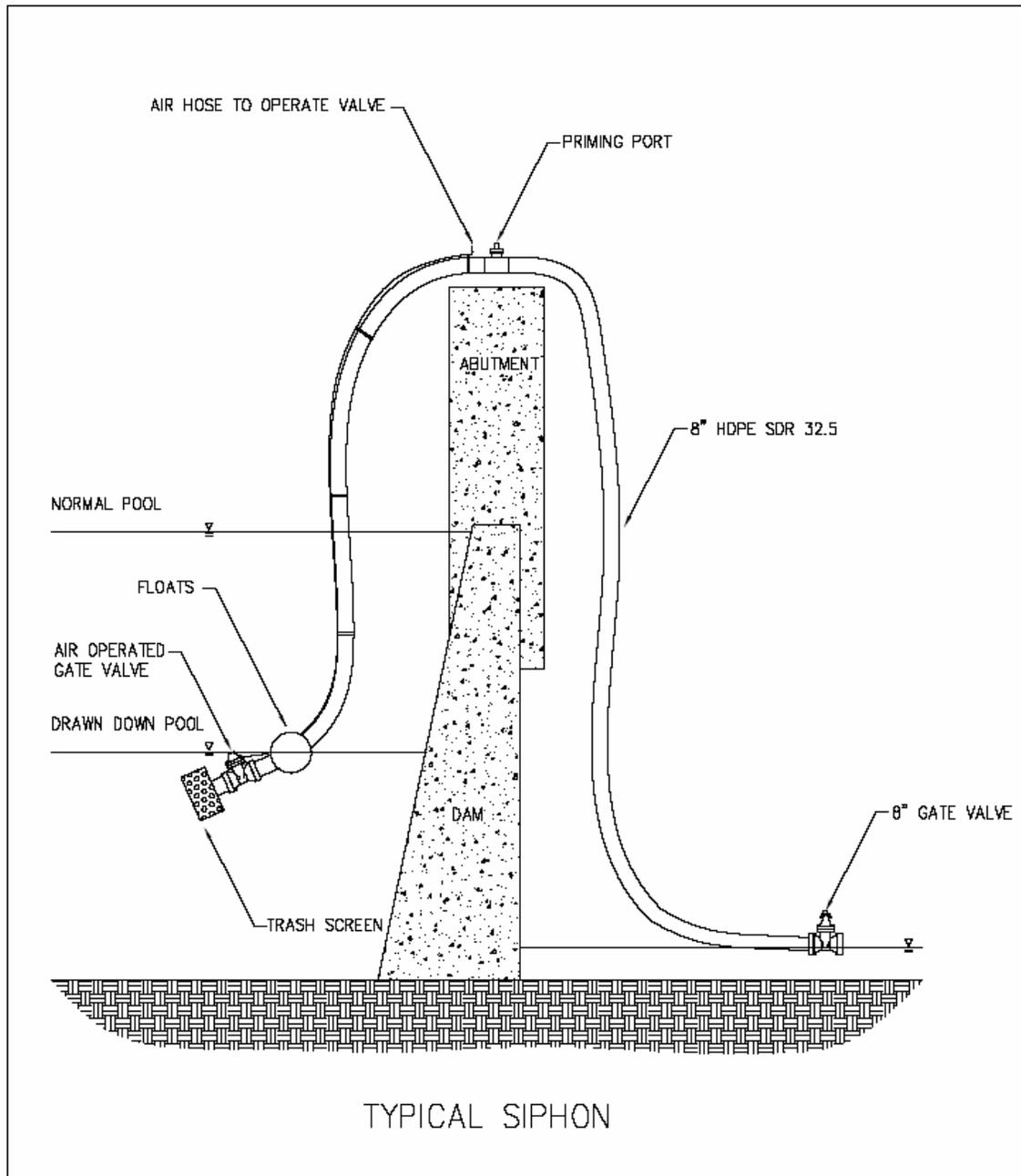


Figure 3 - Typical Siphon

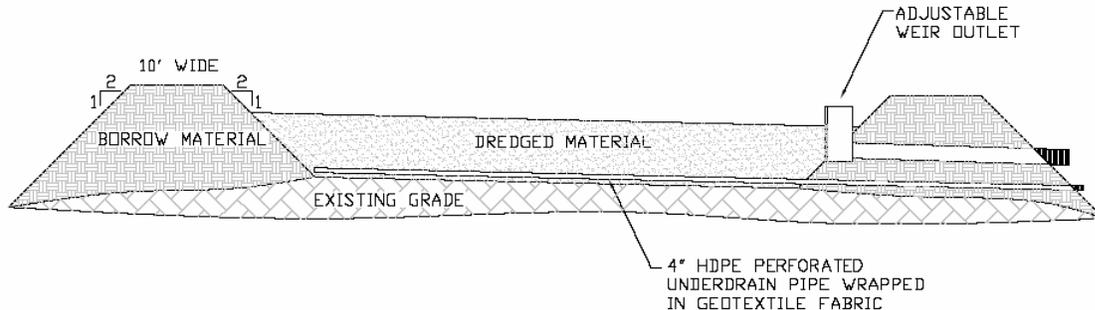


Figure 4 - Typical Dewatering Cell Cross-Section

Required Design Features

In response to internal scoping and public comments on the proposal, mitigation measures were developed to ease some of the potential negative impacts the action alternative may cause. These measures are part of any action alternative and are now required design features. These are outlined in the Forest Plan Standards and Guidelines and Best Management Practices (North Carolina Department of Environment and Natural Resources and NC Division of Forest Resources - *Forestry BMP Manual*, 2006).

The design features will be applied to the action alternative.

- A. The following work will be done to minimize damage to soils and/or aquatic habitat in the areas impacted by this action:

For sediment disposal area and other areas outside of the lake bed

1. Points of entry to the lake and disposal site will be designated by the Forest Service.
2. Install earthen dikes and/or sediment fences to trap potential sediment and stabilize disposal site.
3. Underdrains installed within the dewatering cell will be wrapped with a geosynthetic filter fabric.
4. Limit clearing of vegetation to the minimum required for the project.
5. Dump trucks will be of a design that will minimize loss of water and sediment during the hauling process.
6. A spill contingency plan will be developed for operations. All leaks or spills will

be cleaned up by the contractor in accordance with federal and state regulations. Any handling of petroleum products (including vehicle fueling and maintenance) will occur outside riparian areas and off Forest Service land unless otherwise approved by the responsible official.

For project work within the lake bed

1. Lake sediment will be allowed to dry for about 2 weeks after dewatering.
2. Use matting under heavy equipment to allow proper operation of dredging and hauling equipment. This matting will be removed upon completion of work.
3. Clean all heavy equipment before entering the project area to reduce the risk of chemical, oil, and grease contamination.
4. Fish habitat structures removed during work will be replaced.
5. Wetlands at the mouth of Bent Creek will not be modified during project implementation. Wetland areas within the lake will be avoided during dredging.

To ensure that erosion is controlled within the disposal site:

1. Exposed soil will be covered with straw mulch or biodegradable and certified weed-free erosion control matting at the end of each workday. Matting will be secured in place with staples, stakes, or live stakes of trees where conditions allow.
 2. Temporary seeding will occur on all bare soil/sediment within five days of ground disturbing activities to provide erosion control using a mix of certified weed-free erosion-control annuals such as wheat, millet, or rye.
 3. During shaping and vegetation of the disposal site (after sediments have dried sufficiently within the dewatering cell) sediment fences will remain in place until the vegetation has been established.
 4. Permanent revegetation will involve seeding/planting with certified weed-free species.
- B. To protect aquatic resources downstream from the dam, the following design features were developed for temporary use during project operations:
1. Install riprap in the channel at the siphon exit to protect the tailwater channel bottom from scouring.
 2. Drain the lake at a rate of about one foot per day to keep from flushing sediment and damaging aquatic habitat downstream of the dam and lessen the likelihood of releasing oxygen-deficient water.
 3. Execute the project within timeframes approved by NC Wildlife Commission.
 4. After draining and during filling the lake, continue to allow about 50% of the water flow to be diverted below the dam to maintain downstream aquatic habitat.
 5. May move fish when water is at a minimum level and place in another body of water.

- C. To provide for public safety the following actions will be taken:
 - 1. Post warning signs on roads and trails affected by the project.
 - 2. Temporarily close roads and trails where heavy hauling traffic exists or where damage to the travel route is so severe as to cause a safety problem.
 - 3. During dredging operations, trails within the project area will be closed to recreationists, including a portion of Trails 333 and 335. Visitors may continue parking at Hardtimes lot and using Hardtimes Road and Trail 333 from the parking lot, around the east and south side of Lake Powhatan to connect with the trail system at Small Creek Trail, 334. No weekend work is planned during project implementation so the above listed routes will be available on weekends.

- D. All required permits and exemptions will be acquired before project implementation including Corps of Engineers 401/404 permit and an exemption from the North Carolina trout moratorium from October 15 to April 15.

Alternatives Considered but Eliminated from Detailed Study

Dredging Area

The Engineering Evaluation for Lake Powhatan dredging (January 2006, Tennessee Valley Authority) suggested that modifying the Bent Creek inlet may improve water flow through the reservoir. Since the inlet modification would disturb a wetland area, this alternative was considered and eliminated from further study.

Dredging Methods

Hydraulic Dredging using barges and large suction pumps was considered. This method uses large pumps to move a slurry mixture of about 85% water and 15% sediment through a series of pipes lying on the ground. Booster pumps are used along the route as needed to move the slurry. The slurry is deposited in a specially constructed Confined Disposal Facility (CDF) with a capacity of four times the volume of the sediment being dredged (due to initial water volume). This alternative was not carried forward in this analysis due to the following: a) high costs (about \$220,000 for hydraulic versus \$161,000 for mechanical), b) excessive noise from hydraulic pumps, c) need to construct a CDF, d) exposed slurry pipes laying across roads and trails, and e) lack of a disposal site large enough to adequately handle the slurry.

Sediment Disposal Sites

Several alternative sediment disposal sites were examined. All of these sites would be impractical for hydraulic dredging and pumping because of size, distance, and elevation changes so the descriptions of these impacts relate to mechanical dredging and hauling by dump trucks. Except for the last listing, all sites are on National Forest lands.

- 1. **Beach Picnic Area Redesign** - This alternative was considered in hopes of limiting construction activity to close proximity and creating additional benefit to resources

- with the disposal action. In this alternative, the sediments would have been retained behind constructed walls used to create terraces within the picnic area. Due to the size of retaining walls required to hold the sediments, negative visual impact, expense, and the overall impact to resources, this alternative was not carried forward.
2. **Deer Lake Lodge** - This area is approximately 2 miles from the lake and would require haul trucks to pass 4 trailheads and 2 parking lots, and cross 1 trail. These impacts to the Bent Creek Experimental Forest are in addition to impacts inside the Lake Powhatan Recreation Area. In addition, this alternative would require hauling approximately 1,300 dump truck loads past 2 residences. The hauling would also impact roads along the 2 mile haul route. Due to the high costs of hauling and road repair and the adverse impacts to private landowners and the recreating public this alternative was not carried forward.
 3. **Ledford Branch** - This site was used previously in 1993-1994 to dispose of about 10,000 cubic yards of sediment from Lake Powhatan. It requires no clearing but it is a site that is part of the Bent Creek Experimental Forest (BCEF) and has two ongoing studies adjacent to it. Also, the haul would involve passing 1 trailhead and 1 parking lot outside of the Recreation Area. The site is about 1 mile from the lake and would impact the roads along the route. Due to potential impacts to recreating visitors, the roads, and to future research opportunities of BCEF, this site was not carried forward.
 4. **Lake Powhatan Overlook** - This site is managed as a wildlife opening by the NC Wildlife commission. It was considered due to close proximity to the lake and the fact that it is predominantly clear of trees. Due to irregular shape and relatively small size (1.95 acres) it's capacity is limited to about 5,000 yd³ of sediment. Additionally, this area would require additional study and clearance for historic/cultural resources before it could be fully analyzed in this EA or used for disposal. For these reasons, it was eliminated from further study.
 5. **Boyd Branch** - Like the Overlook site this site was considered due to its close proximity to the lake. However, is undesirable due to potential impact to historic /cultural resources. For this reason, it was eliminated from further study.
 6. **Disposal on non-Forest Service lands** - Three other sites were considered that are not on Forest Service land. None were viable and, thus, were not carried forward. One declined to accept the sediment, one site was in a flood plain adjacent to a river and the other site could leave the Forest Service responsible under "cradle to grave" rules for future use of the material since the sediment would be mixed with compost treated grease trap waste that requires testing to determine hazardous characteristics. For these reasons, the sites were eliminated from further study.

Monitoring

During project implementation, Forest Service (FS) and Tennessee Valley Authority (TVA) personnel will monitor the dredging operation. Heritage Resource specialists will be present during berm formation and a portion of the dredging to ensure that no heritage resources are impacted. The FS and TVA project managers will ensure that the dredging operation is conducted following the required design criteria. They will also monitor rains and water flow and be available to handle any questions that may arise.

After implementation, the project managers will ensure the disposal area is returned to a natural appearance and revegetated. At this time, there are no plans for further monitoring. The disposal area is outside the Bent Creek Experimental Forest and is not planned for research monitoring.

Comparison of Alternatives _____

This section provides a summary of the effects of implementing each alternative. Information in the table is focused on short- and long-term effects based on the key issues, which allows readers to compare alternatives.

Table 2 - Comparison of the potential impacts of the no action with the proposed action alternatives.

Issue	Alternative 1: No Action	Alternative 2: Proposed Action
Water Quality		
Short-term Impacts (less than one year)	Sediment levels in the reservoir will continue to increase. Water volume and depth will decrease with a build up of sediment. Because the water level is lower, water temperature within and leaving the reservoir will be higher than that coming from Bent Creek. Bacteria counts in the lake would continue to be unsafe.	<p>During the draw down of Lake Powhatan there will be increased flow into Bent Creek below the dam that will approximate a storm event flow. These flows could flush out fine sediments that are downstream of the dam. The water temperature will be cooler than water flowing over the dam and better for stream habitat. The water will have increased sediments because the sediment will not fall out in the reservoir. This will increase sediment in the creek below the dam, but not above background levels.</p> <p>As the reservoir refills, there may be higher sediment levels due to water flowing over the loose unconsolidated reservoir bottom. However, the increase would be temporary and minimal since project design features are meant to decrease high amounts of suspended sediment.</p>
Long-term Impacts	With decreasing water levels, the mixing of water in the reservoir would be limited. This will increase the likelihood that bacteria counts would be at unsafe levels. The shallower depths would increase water temperature also contributing to bacteria counts above the safe level. As the reservoir fills with sediment and water temperatures increase, water quality will likely degrade in Bent Creek	Dredging Lake Powhatan will deepen the reservoir. Deepening this area will allow for more area for mixing of the cool water flowing in from Bent Creek and the warm, still water within Lake Powhatan. The ability for the waters to mix will improve water temperatures and decrease bacteria levels in the reservoir and downstream. Also, the

Issue	Alternative 1: No Action	Alternative 2: Proposed Action
	<p>below the reservoir outlet and below the confluence with Ledford Branch.</p> <p>Without action, the lake bed would eventually fill entirely with sediment and plant succession would change the area to a riparian stream course.</p>	<p>mixing will allow for better dissolved oxygen levels. The life expectancy of Lake Powhatan will increase with the dredging operations.</p>
Aquatic Habitat		
Short-term Impacts (less than one year)	<p>The sedimentation of Lake Powhatan is filling portions of the reservoir and causing the waters to warm. These two factors are negatively affecting the trout population by reducing the amount of habitat suitable for trout. Trout that are stocked in Lake Powhatan move out of the reservoir to the upper reaches of Bent Creek during the summer.</p>	<p>There will be a temporary loss of aquatic habitat during project implementation. Some mobile species will be able to move into Bent Creek. Many fish will be removed from the project area during draw down. However, some individuals, such as the depositional aquatic insects will be lost.</p>
Long-term Impacts	<p>If sediments continue to fill the mouth of the reservoir, it could become plugged causing extensive erosion of the stream banks of Bent Creek upstream of the reservoir. Habitat for aquatic species would continue to decline and the species composition could change due to lack of habitat.</p> <p>Over time, Lake Powhatan will continue to fill in, reducing the amount of habitat that is available for aquatic species. The water will continue to increase in temperature that could make the habitat undesirable for some of the current species in the reservoir and downstream in Bent Creek.</p>	<p>In the long-term, habitat will improve within Lake Powhatan. A deeper, cooler reservoir will increase available habitat and improve water quality both in the reservoir and downstream in Bent Creek. The dissolved oxygen levels will increase providing additional habitat for coldwater species such as trout.</p>

Issue	Alternative 1: No Action	Alternative 2: Proposed Action
Recreation Resources		
Short-term Impacts (less than one year)	Public health and safety concerns increase due to shallow water, poor temperature mixing, and accumulation of harmful bacteria. Testing has shown high levels of bacterial colonies at the swimming beach causing beach closure.	<p>During the dredging operations, the lake fishery would not be available to the public for several weeks. Although the off-season, some campers may be affected due to the closure of some camping loops. The disposal site and beach area will be visible with bare soil.</p> <p>During dredging operations, some trails within the project area will be closed to recreationists, including a portion of Trails 333 and 335, on week days. Trails may be open on weekends since weekend work is not planned.</p>
Long-term Impacts	<p>The reservoir would likely no longer support swimming at any time due to the problem of unhealthy water. Beach facilities would need to be shut down and eventually removed. This would eliminate a culturally important swimming opportunity for thousands of users. Fishing would also suffer due to loss of aquatic habitat.</p> <p>Users would experience the loss of good fishing and swimming opportunities long term.</p>	A significant regional swimming opportunity will be retained and enhanced rather than lost. Fishing opportunity for the disabled will be retained and enhanced. Downstream anglers will likely benefit from more favorable water temperatures. Lakeside trail users will benefit from an esthetically enhanced and healthier lake.

Figure 5 - Portion of Proposed Disposal Site, Power Line Field



CHAPTER 3 - ENVIRONMENTAL CONSEQUENCES

This section forms the scientific and analytical basis for the comparison of alternatives as required by the National Environmental Policy Act (NEPA). Included in this section are disclosures of direct, indirect, and cumulative effects of the alternatives on the different resources relevant to the key issues. Direct and indirect effects occur at, or near, the same time and place as a result of the action [40 CFR 1508.8 (a) and (b)]. They have been combined in this chapter because it is difficult to completely separate between the two effects. Cumulative effects result "...from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such action. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7). Reports from different resource specialists supplied information for portions of the analysis in this section. The project area is the location of the proposal. The analysis area is the anticipated extent of effects by resource and is generally larger than the project area.

Effects analyses are disclosed by key issues in this section. The three key issues associated with this proposed project were identified through a public participation process, which included input from Forest Service natural resource specialists, other government agencies, organizations, and individuals (see Consultation and Coordination). The key issues were determined to be relevant to the decision to be made concerning the proposal for dredging Lake Powhatan. The following discussion describes the existing condition of the environment in the geographic area potentially affected by the project and reports the effects that would result from implementation of the alternatives. Where applicable, the scientific and analytical basis of the findings is reported in this section on environmental consequences.

Activities – Past, Present, and Future - In the analysis that was done for this proposed project (especially the cumulative effects analysis), activities of the proposed action and alternatives were considered in total and not in isolation. Table 3 shows activities and disturbances, which have occurred in the Lake Powhatan area in the past 12 years and those, which are likely to occur in the near future (next few years). The following documentation of effects and existing conditions will refer to this table. This is not an exhaustive list. Other activities, either foreseeable or not, will occur as well, however, the analysis and documentation in this Environmental Assessment is based on this list because the effects of these actions combined with the effects from the proposed action overlap in time and space.

Table 3 - Activities and disturbances within the Bent Creek watershed during the last 12 years and anticipated within the next few years.

Date	Activity	Impacts
1994	Lake Powhatan Dredging including depositing sediments on Ledford Creek slope	Ground disturbance, road reconstruction. Accidental Bent Creek fish kill from suspended solids
1996	Hurricane Opal damage and salvage operations	Forest patch blow downs from 1-10 acres in size
1998	Hurricane Burrell damage	Forest patch blow downs from 1-10 acres in size
2003	Construction of expanded Arboretum entrance facility	Ground disturbance
2003	Bridge repair on Wesley Creek and Wolf Creek	Ground disturbance and dry-working area development within the streams
2004	Arboretum entrance parking lot expansion	Ground disturbance and hazard tree removal
2004	Construction of water wells for Lake Powhatan Campground, vault toilets at Rice Pinnacle and Hardtimes Trailheads	Ground disturbance
2004	Bent Creek Experimental Forest Research timber sale	Timber harvest, road construction/reconstruction, herbicide activity
2005	Hardtimes Trail relocation and repair	Trail relocation, rock wall construction, hazard tree removal
2005	Bent Creek Experimental Forest roads and trails storm rehabilitation	Road reconstruction, trail relocation and obliteration to reduce erosion and sedimentation
2006	Boyd Branch, Bent Creek, Laurel Branch & Rich Branch watershed improvement	Ground disturbance, access road construction, rehabilitation of damaged stream sections to reduce erosion/sedimentation
Future	Arboretum canopy walk development	Removal of 50 oaks

Key Issue: Water Quality

Existing Condition

Historically, sediment input into Lake Powhatan has come from small landslides and other mass soil movement in the headwaters of the Bent Creek watershed. Soils here are a clay/silt/fine sand matrix also containing rocks of all sizes. This is the material through which the streams flow and, which is being deposited in the wide, lower gradient floodplain stream reaches. Water slows in these reaches and sediment drops into the stream bed until moved further down the watershed by storm events. Also contributing to movement of soil into streams is the number of dispersed designated and undesignated trails and roads within the watershed.

In addition to the natural soil movement in the headwaters of Bent Creek, there has been erosion from the extensive historical logging, then farming of this watershed. Logging increased hillside erosion and runoff of sediment to the stream channels. Farming and streamside roads and more recently, recreation trails, have added additional stream sediment.

All of these factors have contributed to sediment deposition into Lake Powhatan. This deposition has caused the lake to become shallower at the upper end, especially near the campground beach. Shallow waters have slowed water movement through the lake, which increases the rate of sedimentation. This has allowed increased warming of the lake, which in turn, has created increasing problems with unsafe fecal coliform levels at the campground beach. These unsafe fecal coliform levels have required increasingly frequent beach closures and a reduction in swimming opportunities. Bacterial colony counts are made regularly at the beach and at the fishing pier. Bacteria measured have frequently been unacceptable and the swimming beach has been temporarily closed.

The power line field disposal site is located on the north side of Lake Powhatan. It is approximately 3 acres in size. The site currently drains in two directions. Part of the disposal site drains toward Lake Powhatan. The other part of the disposal site drains to an ephemeral stream that drains into Ledford Branch. This is just above the confluence with Ledford Branch and Bent Creek.

Alternative 1- No Action

If the no action alternative is implemented, the water quality at Lake Powhatan will continue to degrade. Sediment would continue to enter the reservoir and settle out further reducing water quality. Bacteria counts would continue to be unsafe. The area would still be managed under the current Forest Plan as a recreation area; however, conditions for this purpose would become less acceptable in the future as the lake continues to fill. Without action, the lake bed would eventually fill entirely with sediment and plant succession would change the area to a riparian stream course similar to what currently exists along Bent Creek.

Direct and Indirect Effects

Lake Powhatan - If the no action alternative is implemented, the water quality at Lake Powhatan will continue to degrade. Sediment would continue to enter the reservoir and settle out. The wetland areas would continue to be created at the inlet of Bent Creek into Lake

Powhatan. Over time, this will decrease the surface area of the reservoir especially near the campground beach. The beach area would become even shallower and would grow within the current lake bed. Occasionally, during drought, this area would become very shallow, eliminating the beach swimming area. With decreasing water level, the mixing of water in the reservoir would be limited. This will increase the likelihood that bacteria counts would be at unsafe levels. Also, the shallower lake depths would increase lake temperature, also contributing to bacteria counts above the safe level. The area would still be managed under the current Forest Plan as a recreation area; however, conditions for this purpose would become less acceptable in the future.

Bent Creek below Powhatan dam - Water from the reservoir will continue to flow over Lake Powhatan dam at the current rate. Water flowing over the dam and into lower Bent Creek would continue to be warmer than water flowing into the reservoir from Bent Creek. Suspended sediment concentrations would be the same as they are currently.

Power Line Field site - There would be no change to the proposed power line field site if the No Action Alternative were to be selected. This area would continue under current management direction. No ground disturbing activities would occur within the power line field site if the No Action Alternative is selected.

Cumulative Effects

Cumulative watershed effects for the Lake Powhatan dredging project are bounded at the confluence of Ledford Branch and Bent Creek. At this point, all of the ground-disturbing activities are located upstream and cumulative effects can be predicted. Below this point, it is assumed that potential affects from the project would not be noticeable, since affects would be masked by other activities.

Currently, there are several ongoing and proposed activities within the Bent Creek watershed and Experimental Forest. These activities are listed within Table 1 along with the past activities and events that have affected the Bent Creek watershed.

Streams within the Bent Creek watershed have the potential to carry high sediment loads into Lake Powhatan. Several branches of Bent Creek and their tributaries flow through terraces of past landslide or slump deposits. In response to high sediment loads after the hurricane events in 2004, Bent Creek was examined to determine the different activities or areas that were a source of sediment. The hurricane flood events caused severe erosion in several stream channels causing headcuts, bare stream banks, widening, and additional slumps. Vegetation was removed from some to the areas promoting continued high inputs of sediment into Bent Creek and downstream into Lake Powhatan. In response, stream restoration activities are planned within the area upstream of the reservoir to help stabilize several sites. These projects would be implemented in the late summer of 2006 or spring of 2007.

Another sediment source within the Bent Creek watershed is from the trail and road system, including user-created routes. Currently, road and trail maintenance is being done within the Bent Creek watershed to hydrologically disconnect the roads and trails from streams. Also, the user-created routes are being closed. This maintenance work will decrease sediment input from roads and trails.

All activities that occur within the area draining into the reservoir would not have a downstream affect below Lake Powhatan, since the reservoir environment modifies or absorbs affects such as sedimentation and peak stream flows. However as the reservoir fills and water temperatures increase with the implementation of the No Action Alternative, water quality will likely degrade in Bent Creek below the reservoir outlet and below the confluence with Ledford Branch.

Alternative 2- Proposed Action

Direct and Indirect Effects

Lake Powhatan - During implementation of this alternative, there could be an affect on water quality. When the water is being drawn down, there could be increased turbidity in the lake. However, using a floating siphon will minimize this effect by siphoning the cleaner water near the surface (Figure 3). When the lake is being dredged, sediment around the dredged areas could be loosed from the activities and more easily eroded afterwards. This would cause a short-term increase in turbidity.

Dredging of Lake Powhatan will primarily be focused on the campground beach area. Deepening the reservoir here allows a greater volume of water available for mixing of warm and cool waters. This will help keep the water temperature cooler and maintain better water quality. Also, the mixing should help reduce bacteria problems that plagued Lake Powhatan last summer. Furthermore, the mixing will allow for better dissolved oxygen levels.

There is an existing access route to the kiosk at the campground beach (Figure 2). Little to no route development will be required after this point. Wooden platform mats will be used for vehicle access through the reservoir bottom to reach the dredge material. There is a high potential for compaction of the soil to occur in the section of the access route below the kiosk. However, placement of the wooden mats and driving over them will help deter some of the compaction that could happen. Compaction of the soils would occur below the kiosk where the access route would be developed. The dump trucks would drive from the campground beach area to the power line field site. With approximately 1300 trips over the campground roads, some road damage will be expected. After the dredging operations have finished, any necessary repairs to the roads will be made.

If used, the Haul Route 2 access route (Figure 2) into Lake Powhatan will have to be built. This would require the removal of some trees within the area. Due to the slope of the bank between the fishing pier road and the lake, there would be some fill on the road. This fill will be less than ½ acre. Again wooden mats would be used wherever necessary to avoid compaction. Some soil compaction would occur in the access route area. There is a potential for this area to be used as a site for a fishing pier after the dredging operations are over.

No adverse direct and indirect impacts to water quality are expected in Lake Powhatan with the implementation of the Proposed Action.

Bent Creek downstream of the dam - During the draw down of Lake Powhatan, increased water will be flowing downstream in Bent Creek. The reservoir will be lowered approximately one foot per day for approximately 2 weeks. The increased flow in Bent Creek below the dam will approximate a storm event flow. These flows could flush out the fine sediments that are downstream of the dam.

During the dredging activities, Bent Creek will be diverted within a 24-inch pipe with a possible secondary 24-inch pipe available for possible storm flows. Water from these pipes will drain downstream of the Powhatan dam. Since water through these pipes will originate at the inlet of Bent Creek before it enters Lake Powhatan and leave the pipes below the dam, water temperatures would be cooler than water flowing over the Powhatan dam and better for stream habitat. Also, water will have background levels of sediment that would be higher than what is currently flowing over the dam since deposition in the reservoir would not occur. This would increase sediment loading to Bent Creek, but not above background levels.

While the lake is refilling, water will also be flowing through the gate valve to maintain the normal flow to downstream Bent Creek. These flows will be low flows, but will cover the flow necessary for the downstream sewage treatment plant. Initial flows of Bent Creek during reservoir filling or first waters to flow over the dam could have higher turbidity (sediment load) than normal. The additional sediment could come from the water flowing over the loose, unconsolidated reservoir bottom. However, the increase would be temporary and minimal since the design features for reservoir filling are meant to decrease high amounts of suspended sediment, avoid potential fish kills, and reduce heavy deposits downstream of the dam.

Power Line Field site - The drainage pattern for the power line field site will be modified. The land will be cleared by dozer and topsoil pushed into berms. The vegetation may be burned on site. This could cause localized areas of soils that are hydrophobic, but with small spatial extent. Since the soil will be shaped into berms, post-burning, the hydrophobic soils will be mechanically broken up quickly and should not cause increased runoff. The berms will be covered with straw matting/mulch or weed- free annual seed mix to decrease the potential for erosion during the spoils dewatering.

Under the disposal site, there will be a series of drainage pipes that are covered in filter cloth. The filter cloth will allow for water to enter in the drainage pipes and sediment will be filtered out. Water will be released from the drainage pipes in approximately two to three places. At least one site will be draining off to the north into the hardwood stand. Another drainage pipe could drain east into the wildlife area next to the disposal site. Both of the sites have soils that show high infiltration rates.

Higher rates of flow out of the dewatering cell are only expected to occur for a brief period when the spoils are dumped, after this, very small amounts are expected. Thus, there will be a higher initial pulse of water and then small background amounts of water flowing out of the drainage pipes. Design features, such as riprap aprons and infiltration basins at the pipe outlets, will help dissipate energy from the water and allow it to infiltrate into the soil quicker without causing erosion and channel formation. Water from the disposal site is not expected to reach the ephemeral tributary to Ledford Branch. Because of the current poor channel conditions of the ephemeral tributary, if water from the site reaches the tributary it would contribute to adverse effects to channel stability and water quality. Although this type of flow is not expected, design features are in place to minimize possible impacts.

Cumulative Effects

The life expectancy of Lake Powhatan will increase after the dredging operations. This alternative proposes to deepen the reservoir so that it will be able to hold and mix more water

and sediment in the future. Currently there are several upstream projects (Table 3) that will help reduce the sediment load entering Lake Powhatan. Trails within the upper Bent Creek watershed are being repaired so that they will be hydrologically disconnected from the stream system through implementation of the Bent Creek Trails Environmental Assessment. Furthermore, many roads are going to be repaired to correct flood damage. The Bent Creek Stream Stabilization EA will help reduce sediment delivery from bare stream banks. Implementation of all of these projects will reduce the sediment load within the Bent Creek system and Lake Powhatan. Water quality, as it relates to sedimentation, will be in an improved condition for a longer period with implementation of all of the above projects within Lake Powhatan. Lake Powhatan dredging, in conjunction with the upstream projects, should result in a reduced need to repeat dredging.

Dredging Lake Powhatan will deepen the reservoir. This will have a beneficial effect especially near the campground beach. The area between the campground beach and the inlet of the Bent Creek is shallow. Deepening this area will allow for more area for mixing of the cool water flowing in from Bent Creek and the warm, still water within shallow Lake Powhatan. The ability for the waters to mix will improve water temperature and lower bacteria levels in the reservoir and downstream on Bent Creek.

Key Issue: Aquatic Habitat

Existing Condition

As previously discussed in the Water Quality section, the sediment from Bent Creek watershed has caused sedimentation in Lake Powhatan, which is not only filling portions of the lake with sediment, but also causing the lake waters to warm. These two factors have negatively affected the trout populations in the lake by reducing the amount of habitat available to them. This habitat reduction is from actual water volume reduction and lack of available water that is cool enough to provide suitable trout habitat. The area north of the reservoir where dredge spoils are deposited does not contain aquatic habitat.

The fish species present in the lake include catfish; bluegill; largemouth bass; brook, brown and rainbow trout; redbreast sunfish; rock bass; shiners or minnows; brown bullhead; and dace.

Alternative 1- No Action

Direct and Indirect Effects

Aquatic species composition - Even though the upper reach of Bent Creek that feeds Lake Powhatan is considered a coldwater stream, the fish species assemblage in Lake Powhatan resembles that of a cool water and warm water habitat type. Fish species within the reservoir include largemouth bass, rock bass, bluegill and redbreast sunfish, catfish, dace, shiners, brown bullhead and all three species of trout; rainbow, brown and brook.

Because Lake Powhatan is a reservoir, there are several species of aquatic insects that inhabit the depositional areas along the perimeter of the lake. These species include fawn darner (*Boyeria vinosa*), lancet clubtail (*Gomphus exilis*), sable clubtail (*Gomphus rogersi*), southern pygmy clubtail (*Lanthus vernalis*), least clubtail (*Stylogomphus albistylus*), twin-spotted spiketail (*Cordulegaster maculate*) and ebony jewelwing (*Calopteryx maculata*).

These species commonly inhabit areas of impounded or slow moving water such as Lake Powhatan.

Average reservoir depth - Under the No Action Alternative, the existing condition of Lake Powhatan would continue. Over the past ten years, sediments have been collecting within the reservoir, decreasing reservoir depth. After the storms of 2004, the collection of sediments at the mouth of the reservoir worsened; this area is now only a few inches deep. If the sediments continue to collect in this area, it is possible that the mouth of the reservoir could be plugged and cause more extensive erosion of the stream banks of Bent Creek upstream of the reservoir. Habitat for aquatic species, such as fish, would continue to decline and the species composition could change due to lack of habitat.

Water Temperature - Water temperature directly affects habitat for aquatic organisms. The temperature of the water affects spawning processes, amount of dissolved oxygen in the water, and the metabolism of aquatic organisms. As water temperature increases, the amount of dissolved oxygen decreases. Warm water species such as bluegill, largemouth bass and catfish are able to survive in warmer temperatures; however, trout species struggle to survive due to the lack of high concentrations of dissolved oxygen.

The water temperature will continue to increase as the reservoir becomes more and more shallow. Currently, the trout that are stocked in Lake Powhatan during the summer months move out of the reservoir into the upper reach of Bent Creek to more favorable habitat conditions. Water temperature could reach a temperature that is intolerable to trout. This effect may cause conditions to change below Lake Powhatan in the lower reach of Bent Creek.

Cumulative Effects

Implementation of the No Action Alternative would allow the existing condition to perpetuate itself in the upper Bent Creek watershed and Lake Powhatan. Sediment would continue to be deposited within Lake Powhatan at the inlet of Bent Creek into the reservoir. The rate at which the sediment load is reaching Lake Powhatan would decrease due to the current and proposed activities (Table 3) within the upper Bent Creek watershed. All of these projects are designed to reduce the amount of potential sediment that can reach the stream channel and deposit within the growing Bent Creek/Lake Powhatan wetlands. However, sediment will continue to be deposited in the reservoir near the campground beach. Over time, Lake Powhatan will continue to fill in, reducing the amount of habitat that is available for aquatic species. The water will continue to increase in temperature that could make the habitat undesirable for some of the current species in the reservoir and downstream in Bent Creek to below the confluence with Ledford Branch

Alternative 2- Proposed Action

Direct and Indirect Effects

Dredging process - The dredging of Lake Powhatan will require the drainage of the water currently in the reservoir while maintaining flow through the project area for lower Bent Creek. The draw down will directly impact the availability of habitat within the project area for aquatic species. Some more mobile species, such as fish, will be able to move into the upper reach of Bent Creek. Many fish will be moved from the project area during draw down

into area ponds. The depositional aquatic insect habitat will be reduced during project activities; however, there will be other areas within the analysis area for these species to thrive during project activities.

In the long term, habitat will improve within Lake Powhatan. A deeper, cooler reservoir will increase the availability of habitat present and improve water quality both in the reservoir and downstream in Bent Creek.

Water quality will be better after the dredging operations. Water flowing over the dam will be cooler because the deeper reservoir and larger mixing area for cool and warm waters. Also, with the deeper reservoir, the dissolved oxygen levels will increase providing additional habitat for coldwater species such as trout.

During the dredging process, water from Bent Creek will be captured where it enters the reservoir and diverted through a large pipe to the Lake Powhatan dam valve. When the water leaves the pipe below the dam, it will be of approximately the same temperature as Bent Creek is above the lake. In addition, the water that bypasses the reservoir will have the normal background sediment from Bent Creek. This would mean an increased sediment load in the water in Bent Creek below Lake Powhatan dam (to background levels). The reservoir normally acts as a sediment trap, depriving lower Bent Creek of the normal sediment load.

Cumulative Effects

Dredging/ Refilling – When the reservoir is being dewatered, there may be a small fish kill. Most of the fish will be moved to other ponds or caught by fishermen before the draw down; however, some will be lost during the dewatering process.

When water returns to Lake Powhatan after dredging, there is potential for additional sediment to flow downstream into Bent Creek. The additional sediment could come from the water flowing over the loose, unconsolidated reservoir bottom. Sediment levels should not be high enough to cause a downstream fish kill; however, there is a potential for a small, localized fish kill just below Lake Powhatan dam where the high sediment loads drop out. Project design features and contract clauses will be designed to mitigate this potential affect.

Over the long-term, aquatic habitat will improve both within the reservoir and downstream due to cooler water temperatures and increased dissolved oxygen in the deeper waters.

Key Issue: Recreation Resources _____

Existing Condition

Lake Powhatan is an important fishing lake with a swimming beach that gets use all summer long. This is the only public lake swimming beach in a heavily populated area of the county. It is located on the edge of a rapidly increasing suburban population area. Concerns surround water quality as it affects both of these activities. Public health and safety concerns increase due to shallow water, poor temperature mixing and accumulation of harmful bacteria. Testing has shown high levels of bacterial colonies at the swimming beach and closures have been put in place.

Alternative 1- No Action

Direct and Indirect Effects

Implementation of the No Action alternative would perpetuate the problem of unhealthy water for swimming to the point that the reservoir would likely no longer be able to support swimming at any time. Beach facilities would need to be shut down and likely removed eventually. This would eliminate a culturally important “natural” swimming opportunity for thousands of users each year. Under this alternative fishing would also suffer due to loss of aquatic habitat. It is also possible that the increasing reservoir water temperatures would affect downstream temperatures and the fish population in the stream below the dam. While the lake is stocked with trout, the ability to support these fish would decrease with time and increased sedimentation.

Cumulative Effects

Loss of good fishing and swimming opportunities, would add to other recreation losses that occur. Users would experience a loss of these opportunities long term as they search for recreation elsewhere. Also, there will be a loss of vital income to this privately managed recreation area.

Alternative 2- Proposed Action

Direct and Indirect Effects

Dredging the lake would cause short term effects. During the dredging operation, the lake fishery would not be available to the public for several weeks. The fishery would have to be restocked when the reservoir was refilled. Several trout fishing opportunities exist nearby so the effect on anglers is expected to be minimal. The disabled anglers would be affected more than others as there are very few nearby angling opportunities for them that are similar to Lake Powhatan.

Campers and the campground concessionaires may be affected for a short period of time as one or two of the camping loops may have to be closed during the operation. Since the dredging would occur in the non-peak season, it is anticipated that the campground managers would have sufficient capacity in the remaining loops to accommodate anticipated visitors on all but two or three weekends.

Visually, the disposal site will be visible from the campground and the beach areas; however, by spring the seeding will have covered the bare soil and the area should blend well with the background.

Trail users would be affected during the dredging operation as some trails within the project area would be closed to recreationists, including a portion of Trails 333 and 335, on week days. Trails may be open on weekends if weekend work is not planned. Visitors may continue parking at Hardtimes lot and using Hardtimes Road and Trail 333 from the parking lot, around the east and south side of lake, to connect in with the system at Small Creek Trail, 334. Other similar alternative trail opportunities exist in the immediate area so the affect would be more inconvenience than temporary elimination of a recreation opportunity.

Cumulative Effects

Cumulatively, there are no anticipated negative long-term effects that will be caused by the proposed action. In contrast, there are positive cumulative long term effects that will occur. A viable recreation concessionaire operation will be maintained, which provides a high level of public service, which the Forest Service cannot provide at this time. A significant regional swimming opportunity will be retained and enhanced rather than lost. Fishing opportunity for the disabled will be retained and enhanced. Downstream anglers will likely benefit from more favorable water temperatures. Lakeside trail users will benefit from an esthetically enhanced and healthier lake. The spoils from lake dredging will be deposited between the lake and a nearby camping loop, thereby creating a significant and large open playfield recreational opportunity that does not now exist.

Non-Key Issues: _____

Proposed, Endangered, Threatened, and Sensitive Species

Existing Condition

Few rare species have been documented both within the Bent Creek watershed and in particular surrounding the Lake Powhatan area. Proposed, endangered, and threatened (PET) species considered in this analysis are those currently listed by the U.S. Fish and Wildlife Service. Sensitive species are those listed by Region 8 in 2001. Analyses of potentially affected species were identified by the following methods:

- Reviewing the list of TES species on the Nantahala and Pisgah National Forests and their habitat preferences;
- Consulting element occurrence records of TES species maintained by the North Carolina Natural Heritage Program (NCNHP), the U.S. Fish and Wildlife Service (USFWS), and the North Carolina Wildlife Commission (NCWRC);
- Consulting with individuals both in the public and private sector who are knowledgeable of the area and/or TES species habitat characteristics; and,
- Conducting field surveys for TES species in areas designated for ground disturbing activities. Proposed activity areas were surveyed by Gary Kauffman, National Forests in NC botanist, for rare plant species or the presence of special habitats (such as wetlands, boulder fields, caves or mines) that could be adversely affected by project activities.

Discussions were conducted with the Pisgah National Forest botanist David Danley, National Forests in NC fisheries biologist Sheryl Bryan, Pisgah National Forest fisheries biologist Lorie Stroup, and National Forests in NC wildlife biologist Mae Lee Hafer. A description of the process of species evaluation and the rationale to select potentially affected rare species follows for each of the three biological disciplines. No rare species has been documented as being in the proposed activity areas.

Aquatic Resources - All aquatic animal species that might occur on the Pisgah National Forest were initially considered. Two federally listed and three sensitive aquatic species have been listed by NCWRC, USFWS, or NCNHP as occurring or potentially occurring in Buncombe County. These species are included in the aquatic animal portions of the

Biological Evaluation (BE). All of these species were eliminated from further analysis based on either analysis area surveys or recent project area surveys conducted by the USFS and/or the NC Wildlife Resources Commission. All five of these species are only known from the main stem of the French Broad River downstream of the Bent Creek watershed in this portion of the Pisgah Ranger District (Sheryl Bryan, pers. comm.). There will be no direct, indirect, or cumulative effects to these five species since they do not occur within project area. Therefore, these species will not be analyzed further in this document.

Botanical Resources - Seven endangered, seven threatened, and 148 sensitive plant species occur or could occur within the Pisgah and Nantahala National Forests. All of these plant species were initially considered. Of these 162 plant species, 5 federally threatened or endangered and 44 regional sensitive botanical species have been listed by the US Fish and Wildlife Service or North Carolina Natural Heritage Program (NCNHP) as occurring or potentially occurring in Buncombe County. This list of 49 plant species would have the greatest likelihood of occurrence within the proposed activity areas. These species are included in the botanical portion of the BE in the project record, which contains habitat information by individual species.

A field survey within all the activity areas did not locate any populations or any suitable habitat for these federally listed or sensitive plant species. Many of these species previously documented in other portions of Buncombe County occur in habitats, such as Spruce-Fir Forest, Northern Hardwood Forest, High Elevation Rocky Summit, Rich Cove Forest, or Southern Appalachian Bogs, that will not be affected by project activities. Previous surveys near this area have located two sensitive species *Trillium rugelii* and *Hexastylis rhombiformis*. Neither was located nor was any suitable habitat located during the field survey for this project. There will be no direct, indirect, or cumulative effects to any plant species with implementation of the proposed Lake Powhatan dredging project. Therefore, these species will not be analyzed further in this document.

Wildlife Resources - All 10 federally listed and 33 sensitive terrestrial animal species that might occur on the Pisgah and Nantahala National Forests were initially considered for analysis for the proposed project. All but 4 federally listed and 18 sensitive species were dropped since these were listed by the North Carolina Wildlife Resources Commission (NCWRC), North Carolina Natural Heritage Program (NCNHP), and the US Fish and Wildlife Service (USFWS) as occurring or probably occurring in Buncombe County. Of these 22 species, all but 6 sensitive species were dropped from the list for analysis as a result of the likelihood of occurrence evaluation based on surveys, habitat elements and documented records (Table 4).

Gray Bats (*Myotis grisescens*), a federally endangered mammal, has been previously documented in Buncombe County. The historical occurrence (1968) of one individual was a vagrant from a cave in Rhea County, Tennessee. Gray bats are known to forage on aquatic insects along open water and lakes (US Fish & Wildlife Service Asheville Field Office web site). Typically the summer roosting habitat, caves, for this species is 2 miles or less from rivers or lakes. There are no known caves within 2 miles of Lake Powhatan and for that reason the activity area is not considered suitable habitat for gray bats.

Eastern small-footed bat (*Myotis leibii*) and Rafinesque's Big-eared Bat (*Myotis rafinesquii rafinesquii*) roost in hemlock forests, hollow trees, rock crevices, caves, mines, bridges or

buildings, usually near water. The species uses other habitats for feeding. While both of these species roost near water like Lake Powhatan, the proposed project activities should not affect any individuals since there will be no hollow trees impacted at the potential spoil egress road on the north side of the Lake or within the scrubby disposal site. For that reason both these bats were excluded from further analysis

Table 4 - Known and potential sensitive species evaluated for the project*

Northern bush katydid (<i>Scudderia septentrionalis</i>)	Insect	Treetops at edges of broadleaved forest	May occur
Diana fritillary (<i>Speyeria diana</i>)	Butterfly	Deciduous and pine woodlands	May occur
S. Appalachian salamander (<i>Plethodon teyahalee</i>)	Amphibian	Moist forests at all elevations	May occur

*All the species are terrestrial animals.

Alternative 1- No Action

The no action alternative will not have any affect on any federally listed species since TE species or their associated habitats do not occur within the project area.

Implementation of the no action alternative would perpetuate the existing condition within Lake Powhatan and the forested community surrounding it. Lake Powhatan would not be dredged and would accumulate sediments from further upstream in the Bent Creek watershed. The accumulation of the sediments will slowly result in more wetland creation around Lake Powhatan.

Direct and Indirect Effects

The no-action alternative will have no direct or indirect impact on northern bush katydid since potential habitat for this species within the forest adjacent to Lake Powhatan and within the proposed disposal site will not change. For Diana fritillary, there will be no direct impacts at the proposed disposal site to the *Viola* plants that may serve as hosts for the larvae of this species. This vegetation should persist within this area for the foreseeable future. Currently, some suitable habitat may be present within the wetland surrounding Bent Creek. Blue marsh violet is present on portions of this wetland. If the wetland continues to slowly accumulate, there will be greater habitat for the violet which may indirectly benefit Diana fritillaries. This benefit, if realized, is expected to be slow since wetland formation will be relatively slow. Thus, the lack of implementation of this project may improve suitable habitat for Diana fritillary only slightly within the foreseeable future, 10 years. For Southern Appalachian salamander, there would be no direct or indirect impacts to individuals or habitat since the mesic forest surrounding Lake Powhatan would not be modified.

Cumulative Effects

Cumulative effects are those resulting from incremental impacts of the proposed action added to other past, present and reasonably foreseeable future actions. Cumulative effects can result from individually minor, but collectively significant actions that take place over a period of time. Previous, on-going, and anticipated activities within the Bent Creek watershed include the activities listed in Table 3.

Since there are no direct or indirect impacts to northern bush katydid or Southern Appalachian salamander with implementation of the no-action alternative, there will be no cumulative effects to either species.

Past activities, such as detailed in Table 3, in the Bent Creek watershed resulted in opposing effects to Diana fritillary. Specifically, some activities could have crushed plants with eggs or caterpillars, or overwintering caterpillars or eggs on the ground could have been run over. Opening up the forest following blow downs may have decreased habitat for Diana fritillary. However, constructing road or edge habitat may have increased habitat for the Diana fritillary. The Bent Creek watershed restoration projects to be completed this year, may negatively impact individuals of Diana fritillary from ground disturbance activities while increasing edge habitat and potentially beneficially impacting the species. Edge habitat may be increased with removal of scattered oaks for the proposed canopy walk trail within the Arboretum. The no action alternative with the slow increase in potential suitable habitat for Diana fritillary will result in a beneficial cumulative affect on the species because of past and ongoing activities within the Bent Creek watershed.

Alternative 2- Proposed Action

Direct and Indirect Effects – by Species

(1) Northern bush katydid (Scudderia septentrionalis)

A recent survey for this species within mature Oak-Hickory Forest communities in western North Carolina was completed by Dr. Forrest of UNC-Asheville. While this katydid is known to fly and sing from tree tops, Dr. Forrest's team found no discernable differences between sites where the katydid occurred and those where it did not occur. Some occupied sites included the edge of grass/forb openings and residential areas. No structural forest differences were noted to more closely define optimal habitat for this grasshopper. Individuals were located across a wide range of elevations, from 1500 to 3600 feet above sea level. One of the new records for the species was within the Bent Creek watershed along Hardtimes Trail. It is conceivable the species occurs within the activity area such as the potential access road on the north side of Lake Powhatan or within the disposal site and the adjacent grass dominated open area. If the species is present, project activities could impact individuals through direct crushing.

The species has been located within the edge of grass/forb openings by Dr. Forrest. More edge habitat will be created with the disposal site construction as a mixed grass/forb opening. This 3-acre area will be adjacent to an upland pine-hardwood community and another grass/forb opening, which may result in an indirect benefit to the katydid.

(2) *Diana fritillary butterfly (Speyeria diana)*

Direct and Indirect effects - There is a site occurrence for the Diana fritillary, *Speyeria diana*, in the lower slopes of the Bent Creek watershed. This species utilizes nectar species found along roadsides, streams, and linear grass/forb areas. Diana fritillary occurs in different forest types but seems to prefer roadsides through cove forests. Potential habitat for this butterfly is present within the proposed disposal site where the existing partial opening is adjacent to another opening with a mixed component of shrubs, small trees, and grasses. Eggs and larvae are typically found on violets (*Viola* spp.). *Viola sororia* and *V. pubescens* were noted within the proposed disposal site. The construction of the disposal site, if completed during the egg or larval season, could directly impact individual eggs or larvae by trampling the existing violets. Project activities could impact individuals through direct crushing. If the potential lake egress road is constructed on the north side of Lake Powhatan, a minor amount of edge habitat through an existing forested landscape will be created.

(3) *Southern Appalachian salamander (Plethodon teyahalee)*

Direct and Indirect effects - This species is found in moist forests in the southwestern mountains at all elevations. Several populations have recently been located within the Bent Creek watershed. It is conceivable the species could occur under the leaf litter and downed wood debris at the potential spoil material egress route on the north side of the lake. It is less likely the species could occur within the proposed disposal site since there is little downed woody debris, the overstory is young and site conditions may not be moist enough. If southern Appalachian salamander individuals do occur, project activities could directly impact individuals by crushing them. Habitat may be temporarily decreased in the potential road lake egress area if the action results in drying of the leaf litter.

Cumulative Effects – by Species

(1) *Northern bush katydid (Scudderia septentrionalis)*

Past ground disturbance for projects within the Bent Creek watershed may have crushed individuals of this katydid. The greatest lasting impact to any populations within the Bent Creek watershed upstream or downstream of Lake Powhatan would be from those projects with larger disturbance openings and that have occurred during the past 5 years. Most of the edge habitat created with previous storm events during the 1990s will have aged and may no longer provide suitable habitat for the grasshopper. Some edge habitat has been created during the past few years with the on-going Bent Creek Experimental Forest Research timber sale less than one aerial mile northwest of Lake Powhatan. This same project will also result in crushing katydid individuals if they are present within the harvested stands. Other habitat was impacted with recreation parking lot construction at the entrance to Ledford Branch Road north of Lake Powhatan. This project may have crushed northern bush katydid individuals. Small patch forest edge will be created with the anticipated project of removal of scattered oaks for the canopy walk trail within the Arboretum. Thus, the cumulative beneficial effect of more edge creation versus potential individual's crushed with past, ongoing and foreseeable projects is anticipated to be beneficial for the species.

(2) *Diana fritillary butterfly (Speyeria diana)*

Past activities resulted in similar effects to Diana fritillary as the effects described above. Specifically, some activities could have crushed plants with eggs or caterpillars, or overwintering caterpillars or eggs on the ground could have been run over. Opening up the forest following blow downs may have decreased habitat for Diana fritillary. However, constructing road or edge habitat may have increased habitat for the Diana fritillary. The Bent Creek watershed restoration projects, to be completed this year, may negatively impact individuals of this butterfly from ground disturbance activities while increasing edge habitat and potentially beneficially impacting the species. Edge habitat may be increased with the anticipated project of removal of scattered oaks for the canopy walk trail within the Arboretum. Although watershed restoration and other past and ongoing disturbance activities may directly impact Diana fritillary individuals, the construction/reconstruction of roads and edge has or will increase habitat and mitigate any loss of individuals in activity areas.

(3) *Southern Appalachian salamander (Plethodon teyahalee)*

Habitat has been lost in the past and with the ongoing timber sale and Bent Creek watershed improvement project due to road construction activities, storm events, regeneration cuts, parking lot construction, and other disturbance activities. The habitat loss is probably of a temporary duration (10 years or less). The activities associated with the Arboretum canopy walk are not anticipated to affect this species or its habitat. The proposed project will add a very minor amount to the cumulative loss of individuals or habitat for southern Appalachian salamanders within the Bent Creek watershed.

Forest Concern Species

Existing Condition

The Nantahala and Pisgah National Forests list of Forest Concern species includes 262 plants, 56 terrestrial animals, and 87 aquatic animals. These species are either known or could occur on the Forests. All of these species were initially considered for this analysis. The following discussion analyzes each of the three biological resources.

Aquatic Resources - All Forest Concern aquatic animal species that might occur on the Pisgah National Forest were initially considered. Twenty-three have been listed by NCWRC or NCNHP as occurring or potentially occurring in Buncombe County. Some of the species, such as hellbenders, have a well known range within this area of the Pisgah Ranger District and are only expected within the main stem of the French Broad River downstream of the Bent Creek watershed (Sheryl Bryan, pers. comm.). No rare aquatic species have been documented from Lake Powhatan nor does the lake provide suitable habitat for any rare species. Thus, there will be no direct, indirect, or cumulative effects to any Forest Concern aquatic species with implementation of the Lake Powhatan dredging project.

Botanical Resources - Fifty-five Forest Concern plant species have been listed by the North Carolina Natural Heritage Program (NCNHP) as occurring or potentially occurring in Buncombe County. This list of 55 plant species would have the greatest likelihood of occurrence within the proposed activity areas. A field survey in the spring of 2006 did not locate any of these 55 species. Many of these species previously documented in other portions of Buncombe County occur in habitats, such as Spruce-Fir Forest, Rich Cove Forest

or Southern Appalachian Bogs, that will not be affected by project activities. Previous surveys within the Bent Creek Experimental Forest have not located any Forest Concern plant species. There will be no direct, indirect, or cumulative effects to any Forest Concern plant species with implementation of the Lake Powhatan dredging project.

Wildlife Resources - All 40 Forest Concern terrestrial animal species that might occur on the Pisgah and Nantahala National Forests were initially considered for analysis for the proposed project. All but 13 species were dropped; these 13 were listed by the North Carolina Wildlife Resources Commission (NCWRC), North Carolina Natural Heritage Program (NCNHP), and the US Fish and Wildlife Service (USFWS) as occurring or probably occurring in Buncombe County. Of these 13 species, warbling vireos (*Vireo gilvus*) are known to occur within riparian zones in the tops of deciduous trees, typically at least 40 feet up or more. There are no other rare terrestrial Forest Concern wildlife species with a high probability of occurrence within the proposed activity areas.

Table 5 - Habitat for Forest Concern rare species likely to occur in project area

Species	Type	Habitat	Occurrence
Forest Concern Species			
<i>Vireo gilvus</i> (Warbling Vireo)	Bird	Deciduous hardwoods along rivers and streams	May occur in the activity area

Alternative 1- No Action

Implementation of the no action alternative would perpetuate the existing condition within Lake Powhatan and the forested community surrounding it. Lake Powhatan will not be dredged and will accumulate sediments from the Bent Creek watershed. The accumulation of the sediments will slowly result in more wetland creation around the mouth of Lake Powhatan. The no-action alternative will have no direct or indirect impact on *Vireo gilvus* since potential habitat for this species within the forest adjacent to Lake Powhatan will not change.

Cumulative Effects

Since there are no direct or indirect impacts to *Vireo gilvus* with implementation of the no-action alternative, there will be no cumulative effects to this species.

Alternative 2- Proposed Action

Direct and Indirect Effects

Dredging activities such as construction of road access corridors and a disposal site could potentially affect rare species directly through the trampling of animals or the uprooting or crushing of plants. Dredging activities could directly affect aquatic organisms that are non-mobile, particularly during draining of Lake Powhatan. Indirect effects are also caused by the project activity but they occur after the activity has taken place or at some distance from the activity area. While they do not cause immediate death to an individual, they do negatively alter some condition of an individual’s environment, which can lead to a loss of viability.

Indirect effects include changes in the amount of shading or an increase in turbidity or water temperature.

Vireo gilvus (Warbling Vireo) - This bird is known to use the upper canopy, typically 40 feet above the forest floor within a riparian forest. While the forest landscape surrounding Lake Powhatan is riparian, it is fairly narrow in extent and may be only marginal for suitable habitat for warbling vireos. However, no breeding bird survey was conducted around Lake Powhatan and it cannot be documented the species does not occur within the activity area surrounding Lake Powhatan. If the species is nesting within some of the trees that may have to be removed to access the lake bed on the north side of Lake Powhatan, there could be an indirect affect in a marginal loss of habitat, less than 0.25 acre, for the species. If eggs were present within the nest, there could be a direct affect on potential recruitment. However, since implementation is planned to start in September, the possibility of eggs in a nest is remote.

Cumulative Effects

Forest riparian regulations will have reduced any impacts to warbling vireo from past and ongoing projects within the Bent Creek watershed (Table 3). Disturbance from past storm events during the mid 1990s may have affected riparian canopy trees and indirectly affected this species. Ongoing watershed improvement projects within the Bent Creek watershed may have a negative affect on a small amount of potential habitat present across the watershed. The cumulative negative impact to warbling vireos from the proposed dredging project should be minimal and localized primarily to the activity area.

Summary of Effects - Warbling vireos have been documented within seven western North Carolina counties. In Buncombe County, the bird has been documented at Beaver Lake, Fletcher Park, and French Broad River Park within portions of the French Broad River drainage near Asheville. The dredging project may impact individuals of warbling vireo, primarily by affecting nesting habitat. The habitat affected will be very minimal in comparison to the availability of riparian habitat within the Bent Creek watershed and across the Pisgah and Nantahala National Forests. Therefore, this dredging project is not likely to cause a loss of viability across the Forest for this species. For the remaining Forest Concern rare species, there will be no impact from the activities associated with this project.

Management Indicator Species _____

Existing Condition

Management Indicator Species (MIS) serve as the system to monitor Forest Plan implementation and effects on diversity and population viability of all native and desirable non-native plants and animals. At the project scale, MIS are used to focus the effects of proposed activities on habitat types. When these effects are evaluated within a forest wide context, it is determined whether or not any trends for MIS would change. An assessment of habitat changes linked to management indicator species (MIS) is documented in this section. The assessment provides an evaluation of project level activities, the change in habitat used by MIS, and the likely contribution to forest wide trends.

The amount of habitat changed by the project is checked for consistency with the Forest Plan and the recent trends in activities. If any inconsistencies are uncovered, then further

investigation should be made to determine effects on MIS. However, if the project activities are consistent with recent trends, then effects of habitat changes to MIS should remain constant. Tables 6 and 7 list each MIS species and the biological communities and special habitats they are indicating. For the Lake Powhatan dredging project one species, large mouth bass, was selected to represent the reservoir habitat that potentially could be impacted and one species, ruffed grouse, was selected to represent 11-20 year old successional forest.

Communities and Special Habitats Effects

Most of the biological communities and special habitats in the project area are not affected by management activities proposed by the Proposed Action. What changes that are anticipated to occur, and discussed above, are consistent with the Nantahala and Pisgah Forest Plan.

Riparian forests occur along streams and rivers and are only marginally represented adjacent to reservoirs. The habitat surrounding Lake Powhatan, although highly modified, is primarily an ecotone¹ forest of Mesic Oak-Hickory Forest and Rich Cove Forest. If the lake bed access route is constructed on the north side of Lake Powhatan, approximately 0.25 acre of this type will be impacted. While this type has some Rich Cove Forest associated species, the plant community is closer to a Mesic Oak-Hickory Forest based on the sparser herbaceous species and the drier site conditions. Representative Rich Cove Forest probably was only associated with Bent Creek, a habitat now submerged under Lake Powhatan, and is no longer present within the proposed activity area. For these reasons, both Acadian flycatchers, the MIS for riparian forests, and American ginseng (*Panax quinquefolius*), the MIS for Rich Cove Forest, were not further analyzed.

Reservoirs - There are approximately 35,950 acres of reservoirs on the Nantahala and Pisgah National Forests (NFs). Implementation of the dredging project will result in a short-term, 6-8 months, direct loss of reservoir habitat. This negative affect represents less than .02 % of reservoir habitat available across the Nantahala and Pisgah National Forests. The Proposed Action alternative will not result in a long term loss of reservoir habitat within the project area. The reservoir acreage will be the same following completion of the project and should be higher quality since there will be less sediments on the lake bed. The forest wide trend is static for the amount of reservoir acreage. There have been no impoundments constructed during the past 10 years nor are any anticipated within the foreseeable future. This project will not change that trend.

Early Successional Forest (11-20 year old) - The forest wide trend for 11-20 year old forest is declining. As a result of hurricane blow downs in the mid 1990's, this age class from 11-20 year old forest is just starting to accumulate over 200 acres in the Bent Creek Experimental Forest. Of these 200 acres, at least 45 occur around the Lake Powhatan Recreation Area. The 3 acre proposed disposal site is a previous blow down area. Within 9-12 years there will be another 25-35 acres aging to 11 years within the Boyd Branch and Ledford Branch areas. Implementation of the dredging project will reduce early successional habitat characteristics across 3 of the available 45 acres in the Lake Powhatan Recreation Area. This loss is consistent with and will add to, although at an almost imperceptible percentage, the forest wide trend observed over the past 10 years.

¹ Ecotone: the transition zone between two different plant communities, as that being between forest and prairie.

Table 6 - Biological communities and associated MIS*

Biological Community	MIS	Analyzed Further/ Evaluation Criteria
Fir dominated high elevation forests	Fraser fir	No/1
Northern hardwood forests	Ramps	No/1
Carolina hemlock bluff forests	Carolina hemlock	No/1
Rich Cove forests	Ginseng	No/1
Xeric yellow pine forests	Pine warbler	No/1
Reservoirs	Largemouth bass	Yes/1
Riparian forests	Acadian flycatcher	No/1
Coldwater streams	Brook, brown, and rainbow trout; blacknose dace	No/1
Coolwater streams	Smallmouth bass	No/1
Warmwater streams	Smallmouth bass	No/1

*Forest Plan EIS, Table III-8

¹ Biological community and its represented species do not occur in the project area; therefore, this biological community will not be affected. Given no effects to the community, the alternatives will not cause changes to forest-wide trends or changes in population trends of species associated with this community.

Table 7 - Special Habitats* and associated MIS (using Forest Plan EIS, Table III-9).

Habitat Components	MIS	Analyzed Further/ Evaluation Criteria
Old Forest Communities (100+ years old)	Black bear	No/1
Early successional (0-10 years old)	Rufous-sided (eastern) towhee	No/1
Early successional (11-20)	Ruffed grouse	Yes/1
Soft mast producing species	Ruffed grouse	No/1
Hard mast-producing species (>40 yrs)	Black bear	No/1
Large contiguous areas with low levels of human disturbance	Black bear	No/1
Large contiguous areas of mature deciduous forest	Ovenbird	No/1
Permanent grass/forb openings	White-tailed deer	No/1
Downed woody debris	Ruffed Grouse	No/1
Snags	Pileated woodpecker	No/1

* Special Habitat and its represented species will be protected in accordance with LRMP standards and guidelines (open road density will not change, snags and den trees will be retained); therefore, this special habitat will not be affected by the proposed action alternative. Given no effects to the habitat, this project will not cause changes to forest-wide trends or changes in population trends of species associated with this habitat

1 - Biological community and its represented species do not occur in the project area; therefore, this biological community will not be affected. Given no effects to the community, the alternatives will not cause changes to forest-wide trends or changes in population trends of species associated with this community.

Table 8 - Biological communities, special habitats, and estimated change in each alternative

Biological Community	No Action	Action Alternative
Fraser fir forests	None affected.	None affected.
Northern hardwood forests	None affected.	None affected.
Carolina hemlock bluff forests	None affected.	None affected.
Rich cove forests	None affected.	None affected.
Yellow pine successional communities	None affected.	None affected.
Reservoirs	None affected.	Short and long-term affects, 9 acres
Riparian forests	None affected.	None affected
Cold water streams	None affected	None affected
Warm water streams	None affected.	None affected.
Special Habitats		
Old forest communities (100+ years old)	None affected.	None affected.
Early successional communities (0-10 yr)	None affected.	None affected.
Early successional communities (11-20 yr)	None affected	Reduction of 3 acres
Soft mast-producing species	None affected.	None affected.
Hard mast-producing species (>40 yr)	None affected.	None affected.
Contiguous areas with low disturbance (< 1 mi. open road / 4 sq. miles)	No change.	No change.
Large contiguous forest	None affected.	None affected.
Permanent grass/forb openings	None affected.	None affected.
Snags and dens (>22" dbh)	None affected.	None affected.
Down woody material	None affected.	None affected.

Species Evaluated and Rationale – All management indicator species potentially affected by project activities were initially evaluated (see Tables 6 and 7). Information about forest-wide MIS habitats and population trends is contained in the Forest MIS report, “*Management Indicator Species Habitat and Population Trends*”, which is available for review by contacting the Pisgah National Forest office. Brook, brown, and rainbow trout are known to occur within Lake Powhatan. All three species represent MIS for coldwater streams. The trout populations within Lake Powhatan are the result of an active stocking program. None of these species are naturally reproducing within the reservoir. For that reason, they will not be analyzed as a MIS species for this dredging project.

MIS: Ruffed Grouse

Ruffed grouse utilize a diversity of habitat, varying from early successional vegetation stages to more mature forests with downed wood. Younger mesic to sub mesic forests with abundant stems, typically 11-20 years of age, provide protection from prey for brood rearing and development plus food throughout the year. Ruffed grouse presence and abundance is partially dependent on this early successional stage and is analyzed as a MIS for this special habitat across the Nantahala and Pisgah NFs.

Alternative 1- No Action

Direct and Indirect Effects

The no-action alternative will maintain the available early successional habitat (11-20 acres) for ruffed grouse. This habitat is just starting to age to 11 since the harvesting of scattered blow down patches occurred approximately 10 years ago.

Cumulative Effects

Within the Lake Powhatan Recreation Area, approximately 45 acres of this age class are present. At least another 155 acres are present across other portions of the Bent Creek Experimental Forest.

Alternative 2- Proposed Action

Direct and Indirect Effects

The proposed dredging project will require a 3 acre disposal site. Half of the proposed site is currently aging to greater than 10 and provides dense multiple woody stems for ruffed grouse brood protection. However, with its proximity to the campground, this area is only marginal habitat for ruffed grouse. The implementation of the project will directly reduce by 1.5 acres the availability of this age class and possibly affect ruffed grouse individuals within the Lake Powhatan Recreation Area. However, this impact probably will be imperceptible to the grouse population in this area since only 1.5 acres of potential ruffed grouse habitat will be impacted and other forests within the Lake Powhatan Recreation Area and the Bent Creek Experimental Forest are aging to provide dense woody stems.

Cumulative Effects

Cumulatively, there will be an increase in potential ruffed grouse habitat, forests at 11-20 years of age, within the Lake Powhatan Recreation Area and the Bent Creek Experimental Forest for the next 10 years.

Ruffed grouse populations are considered to be small across the Nantahala and Pisgah NFs and are declining. Data is collected for the species with annual grouse drumming surveys and harvest data from the NC Wildlife Resources Commission. The proposed project will eliminate 1.5 acres of younger forest from the Lake Powhatan Recreation Area. The implementation of this project may further add to the forest-wide decline of ruffed grouse. However, this impact probably will be imperceptible since only 1.5 acres of potential ruffed grouse habitat will be impacted and other forests within the Lake Powhatan Recreation Area and the Bent Creek Experimental Forest are aging to provide dense woody stems.

MIS: Largemouth Bass

Changes in the presence and absence of largemouth bass help indicate the effects of management on reservoirs and the ability of the national forests to provide public fishing opportunities. Largemouth bass are adapted to warm waters of above 80 degrees F and are found in all reservoirs across the Nantahala and Pisgah NFs. Reservoir habitat containing submerged trees and or/ brushy debris provides both protection and feeding opportunities for largemouth bass. This habitat component is critical to maintain self-sustaining vigorous largemouth bass populations. The species is actively harvested by recreational fisheries all across the Nantahala and Pisgah NFs.

Alternative 1- No Action

Direct and Indirect Effects

With the no-action alternative, Lake Powhatan will not be dredged and will accumulate sediments from the Bent Creek watershed. The accumulation of the sediments will slowly result in more wetland creation around the mouth of Lake Powhatan. For the short-term, this will not result in a habitat reduction for largemouth bass. In the long-term, 10 years or more, this will result in less open water for the species to occupy at Lake Powhatan. Indirect effects of not implementing the dredging project may enhance growth of largemouth bass since the species prefers warmer waters which will result from the shallower waters slowly filling with sediments. However, largemouth bass are not naturally reproducing in the lake. All the individuals present are the result of an active stocking program. The only break in this stocking program occurred in 1994 when Lake Powhatan was previously dredged. There has been no habitat enhancement project, nor is any planned, for this species at Lake Powhatan. Thus, the periodic restocking is critical to maintain largemouth bass populations in Lake Powhatan.

Cumulative Effects

While the no-action alternative will slowly decrease available habitat for the species, the cumulative effects of periodically stocking Lake Powhatan with young largemouth bass will maintain the species there for the foreseeable future. The no-action alternative will not change the stable trend for this species across the Pisgah NF.

Alternative 2- Proposed Action

Direct and Indirect Effects

The direct affect of dredging Lake Powhatan will eliminate any largemouth bass population for the short-term, 6-8 months, while the project is being completed. Once the project is complete and Lake Powhatan is refilled, there should be a greater amount of water habitat available for largemouth bass. Since water depths will be greater after the dredging, it may result in a loss of some of the increased volume since the deeper water will be cooler and not optimal for this species.

Cumulative Effects

Largemouth bass have remained relatively stable across the Nantahala and Pisgah NFs. The dredging project will not change this trend. As indicated in the no-action alternative analysis above, largemouth bass are not naturally reproducing in Lake Powhatan. The cumulative periodic restocking program will maintain this species within Lake Powhatan.

Non-native Invasive Plant Species _____

Existing Condition

Exotic plants are species that have been introduced into an ecosystem outside their natural range as a result of direct or indirect actions of humans. Typically, exotic plants come from other countries or continents, although they can be from another state or region within the United States. Once introduced, an exotic plant may remain noninvasive for a number of years until some unknown environmental factor triggers a change. Exotic species are known to be a problem throughout the southern Appalachians (Bowen 1996) and the southeast (Miller 1997), and a major ecological problem worldwide. They are considered a major threat to the integrity of native plant communities (White and Bratton 1980). Over 180 non-native species have been recorded in an ongoing inventory of the Pisgah and Nantahala National Forests (NP) (Danley & Kauffman 2002). This represents more than 12% of the recorded flora. However, only a few of these species have been found to be highly invasive within western North Carolina. A systematic exotic plant survey was conducted across the NP in 2002 and 2003 to determine those species that currently have dense invasions and exotic species area hotspots. The following invasive species are known to pose the greatest risk of infestations across the NP.

Table 9 - Invasive species on the Nantahala and Pisgah National Forests

Scientific Species	Common Name
<i>Ailanthus altissima</i>	Tree-of-heaven
<i>Albizia julbrissin</i>	Silk Tree
<i>Celastrus orbiculata</i>	Oriental Bittersweet
<i>Centaurea biebersteinii</i>	Spotted Knapweed
<i>Dioscorea oppositifolia</i>	Chinese Yam
<i>Ligustrum sinense</i>	Privet
<i>Lonicera japonica</i>	Japanese Honeysuckle
<i>Microstegium vimineum</i>	Japanese Stilt Grass
<i>Miscanthus sinensis</i>	Chinese Silver Grass
<i>Paulownia tomentosa</i>	Princess Tree
<i>Polygonum cuspidatum</i>	Japanese Knotweed
<i>Pueraria montana</i>	Kudzu
<i>Rosa multiflora</i>	Multiflora Rose
<i>Spiraea japonica</i>	Japanese Meadowsweet

The degree of infestation by any of these species varies by the associated plant community and prior land use history. Many species are more prevalent during the initial stages of succession and decrease with age. A temporary increase in the abundance and diversity of ruderal² plant species is expected within recently disturbed areas. Within the Bent Creek watershed restoration sites, many species have been documented partly due to past intense land use. Within the proposed disposal site, numerous invasive exotic plant species are abundant and dominant. Species noted included tree-of-heaven (*Ailanthus altissima*), Oriental bittersweet (*Celastrus orbiculatus*), multiflora rose (*Rosa multiflora*), autumn olive (*Elaeagnus umbellata*), privet (*Ligustrum sinense*), Japanese honeysuckle (*Lonicera japonica*), Japanese stilt grass (*Microstegium vimineum*), Chinese silver grass (*Miscanthus sinensis*), Japanese barberry (*Berberis thunbergii*) and tall fescue (*Lolium arundinaceum*). All of these species were noted, although less abundant, in the forested areas surrounding Lake Powhatan. Japanese stilt grass, oriental bittersweet, multiflora rose and Japanese barberry were also noted within the wetland adjacent to Bent Creek at the inlet to Lake Powhatan.

² Ruderal plant species are those that colonize soils disturbed by human activity.

Alternative 1- No Action

Direct and Indirect Effects

There will be no proposed soil disturbance activities with the “no-action” alternative.

Thus, there will be no direct effects to any of the invasive plant species current occupying the project area. Lake Powhatan will not be dredged and will accumulate sediments from the Bent Creek watershed. The accumulation of the sediments will slowly result in more wetland creation around the mouth of Lake Powhatan. The increased wetland will indirectly affect invasive plant species by providing open disturbed areas for invasion by many of the invasive plant species recorded in the area surrounding Lake Powhatan. The species with the greatest likelihood to invade would be Japanese stilt grass, oriental bittersweet, multiflora rose, and privet. These four species will be favored either because they particularly thrive in wet soils (Japanese stilt grass and privet) or they produce abundant fruit dispersed by birds and can persist in wet soils (multiflora rose and oriental bittersweet).

With selection of the no-action alternative, there is no anticipated soil disturbance at the proposed disposal site that will result in additional new habitat for invasive plant species to spread. Thus, there will be no direct or indirect affects to invasive plant species with selection of this alternative

Cumulative Effects

The cumulative effects analysis area is the same as described for the rare species analysis in the Biological Evaluation (BE) in the project record. Past, present and reasonably foreseeable management actions are also the same. Past actions have increased the spread of the ten invasive plant species located within the area surrounding Lake Powhatan watershed. Past land use and previous storm events have increased local abundance of many of these species. The eventual reforestation of much of the area allowed shade tolerant species such as oriental bittersweet, Japanese honeysuckle, Japanese stilt grass, and privet to persist at greater densities than the remaining species.

Control of invasive plant species has not been implemented within this area of the Bent Creek watershed. While it is difficult to detail the eventual spread of any of the 10 species in an area that already is almost completely occupied by aggressive non-native plant species, it is anticipated the one species that will spread with no control methods is the shade tolerant oriental bittersweet. Existing vines will climb more of the short tree canopy and eventually fruit more abundantly at the top of the crown. Since the disposal site is present on top of the ridge adjacent to a drier habitat, an aggressive invasion by oriental bittersweet into this community is not anticipated. Generally, this vine and most other Southern Appalachian invasive plant species invade moderately wet to wet areas most frequently. Fewer impacts are documented within closed canopy dry forest communities.

The selection of the no-action alternative slightly increases the likelihood of the spread of Japanese stilt grass, oriental bittersweet, multiflora rose, and privet within the project area, which might add to possible other outbreaks on other adjacent lands in the watershed.

Alternative 2- Proposed Action

Direct and Indirect Effects

The proposed action alternative would directly affect all 10 invasive species when the disposal site is graded and shaped prior to receiving the dredged material. Most individuals of all 10 species would be removed from the site. Indirect effects to the 10 species would be the change in habitat. The previous site would change to open recently disturbed soils seeded with a weed-free grass mix. The rate of expansion of any of these 10 invasive plant species into the disposal area depends on the success of establishment of the seed mix and the amount of seed rain from adjacent areas. The newly established disposal site will be moist and provide suitable habitat for establishment of all 10 species. As indicated for the no-action alternative for Lake Powhatan lake wetland areas, the species with the greatest likelihood to invade would be Japanese stilt grass, oriental bittersweet, multiflora rose, and privet. Again these four species will be favored either because they particularly thrive in wet soils or they produce abundant fruit dispersed by birds and can persist in wet soils. Most of the remaining 6 species also spread from root fragments. It is unknown how many root fragments will remain following the creation of the disposal site; however, it is anticipated that all 10 of the invasive plant species will eventually be present on the new disposal site.

The abundance of these 10 species may not be at the abundance as the existing site since the site will be a mixed grass/forbs opening and may be periodically mowed. If this area is developed into a play field, mowing will inhibit growth of woody shrubs and trees, tree-of-heaven, multiflora rose, autumn olive, privet, and Japanese barberry, keeping them from attaining any size and producing more propagules. In addition the periodic maintenance will slow the spread of the two vines, oriental bittersweet and Japanese honeysuckle. It is uncertain what mowing will do to the three invasive grass species present around Lake Powhatan.

The dredged material will be transported from the lake bed either on the north side of Lake Powhatan near the dam or the south side of the lake by the existing beach area. The north egress will require construction of a gravel ramp within the lake bed and new road construction for approximately 100 feet from the lake's edge to an existing road/trail (# 333). Egress from the south side of the lake will be completed with wooden ramps across the beach and lawn area and will not require road reconstruction or construction. All 10 exotics species could invade the roadside edge of the north egress site following completion of the construction since all occur within the adjacent forest or roadside edge on 333. Multiflora rose, autumn olive, privet, Japanese honeysuckle, Japanese stilt grass, and oriental bittersweet were noted in the currently forested portion of this access site and probably have the greatest likelihood of reinvasion soon after the construction.

Cumulative Effects

The cumulative effects analysis area and the past, present and reasonably foreseeable management actions are the same for this alternative as the no-action alternative. Within the Lake Powhatan area, all 10 species are known to be prevalent across USFS lands. Past land use practices have supported the invasion and spread of these 10 species. Heavy recreation usage increases the likelihood of propagules such as seed continuing to be transported to the area on car tires and undersides, bike tires, and hiking shoes. The selection of this action

alternative will not eliminate these 10 invasive exotic species. There are no current plans to eliminate these 10 species from the Lake Powhatan area; limited control dollars will be focusing on more threatened areas on the Pisgah National Forest such as sites with unique habitats or rare species. With implementation of the action alternative, the abundance of these 10 species will be less in comparison to the no-action alternative since the new disposal site will be a grass opening and therefore will not support the high densities currently present.

Other Wildlife Species

Existing Condition

Other wildlife species, not covered in the above categories, inhabit Lake Powhatan and the surrounding area. Many of these animals are viewed on a daily basis by visitors to the reservoir and campground.

Alternative 1 – No Action

Direct, Indirect, and Cumulative Effects

Some other marsh and riparian associated wildlife such as the turtles, snakes, frogs, raccoon, beaver and Canada geese that use the area could benefit as the lake gradually fills and the marsh-like area expands. For Southern Appalachian salamander, there would be no direct or indirect impacts to individuals or habitat since the mesic forest surrounding Lake Powhatan will not be modified.

Alternative 2 – Proposed Action

Direct, Indirect, and Cumulative Effects

These species as well as animal species such as frogs, newts, turtles, and some aquatic plants could be impacted directly by the activities associated with dredging such as construction of road access corridors and the disposal site and be killed as a result.

The small resident flock of Canada geese will probably be temporarily displaced during this activity and this will probably cause them to utilize other nearby ponds and lakes to a greater extent.

Indirect effects would also include changes in the amount of shading or an increase in turbidity or water temperature. Some die back would occur; however, cumulatively, there would be no effects to these species and they are expected to return as the lake refills.

Heritage Resources

Existing Condition

The Lake Powhatan area of the Pisgah Ranger District, and within the Bent Creek Experimental Forest, has a high probability for heritage sites. The area has a long history of use by prehistoric and historic peoples. There are approximately 30 known sites in the Bent Creek Experimental Forest area with many of them in close proximity to waterways. These sites consist of eligible, not eligible, and unevaluated sites. Past management practices have not always evaluated these properties for eligibility to the National Register of Historic

Places (NRHP). Historic properties that are unevaluated are managed as if eligible, and mitigations for these properties follow management prescriptions. Currently, the Heritage Program management attempts to relocate sites, monitor sites for damage and deterioration, evaluate sites for NRHP eligibility, and preserve and protect sites. Under the National Historic Preservation Act (NHPA), a significant or adverse effect is one which may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or associations (36 CFR 800.9[b]).

Alternative 1- No Action

Direct and Indirect Effects

The project would not be implemented under the No Action Alternative. There would be no direct immediate adverse effect to heritage resources in the project area. However, heritage sites located adjacent to the project area may continue to be affected by increased erosion and sedimentation over time if the No Action Alternative is selected.

Cumulative Effects

Under the No Action Alternative, historic properties within the project area would be expected to continue to experience effects from other past, present, and reasonably foreseeable future actions; however, there would be no cumulative effects resulting from this project (Table 3).

Alternative 2- Proposed Action

Direct and Indirect Effects

The project area was surveyed for cultural resources and no sites were found in the Power Line Field disposal site. However, heritage resource sites were found outside the disposal site within or adjacent to the Lake Powhatan Recreation Area. These heritage sites will be avoided when the project design features are applied; no adverse effects are expected under this alternative.

Cumulative Effects

If the Proposed Action is implemented, historic properties within the project area would not be impacted by the planned actions. Archaeological surveys have shown that no heritage resources are in the impacted areas. Design features of the Proposed Lake Powhatan dredging and spoil deposition, if followed, would insure that no impacts to heritage resources would occur. The heritage resources that have been identified will continue to experience the normal effects from recreation and other ongoing actions; however, there would be no cumulative effects resulting from this project (Table 3).

CHAPTER 4 - CONSULTATION AND COORDINATION

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

ID TEAM MEMBERS:

Lisa Alcorn	Engineer
Melissa Amentt	Hydrologist
Megan Best	Archaeologist
Randall Burgess	District Ranger
Tim Chesley	Engineer
Dennis Danner	District Wildlife Biologist
Brady Dodd	Hydrologist
Gary Kauffman	Forest Botanist
Fred Marriott	NEPA Writer
John Preston	Archaeologist
Rodney Snedeker	Forest Archeologist
Lori Stroup	District Fisheries Biologist
Bob Wilhelm	NEPA Writer

FEDERAL, STATE, AND LOCAL AGENCIES:

David Baker	U.S. Army Corps of Engineers
Kevin Barnett	North Carolina Department of Water Quality
Steve Chapin	U.S. Army Corps of Engineers
Brian P. Cole	U S Fish and Wildlife Service
Stuart Harris	Tennessee Valley Authority
Susan Jeheber-Matthews	Southern Research Station
David McHenry	North Carolina Wildlife Resources Commission
Ronnie Smith	U.S. Army Corps of Engineers

TRIBAL REPRESENTATIVE CONSULTED:

Mr. Russell Townsend	Tribal Historic Preservation Officer - Eastern Band of Cherokee Indians
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Appendix A - Lake Powhatan Dredging EA ISSUE TRACKING SHEET

Comment or Statement	Commenter	Issue: Key or Non-Key Issue with Brief rationale	Response
<p>While we appreciate the need to accommodate the recreational demands on the forest, we also are curious as to the actual source of the sedimentation entering Lake Powhatan. Your letter implies that the only source of sedimentation to the Lake derive from the storms of 2004. Bent Creek is an actively managed experimental forest, however, and surely some amount of sedimentation has been coming from the ground-disturbing activities over the course of time. In short, we think that it is appropriate for you to consider in the EA the amount sedimentation occurring from the Bent Creek forest;</p>	<p>Wildlaw</p>	<p>Non-Key Issue - Comment does not require development of an alternative.</p>	<p>We apologize; we did not intend to imply that the sediment originated with the 2004 storms. Sedimentation has long been a concern for Lake Powhatan, which was exacerbated by the 2004 storms. In the early 90’s, Lake Powhatan was dredged due to sedimentation. Due to the types of soil and activities, both natural and human caused, in the watershed above the reservoir, sediment will continue to be a problem. In order to reduce some of the sediment load, several projects are underway to repair trails and roads and restore damaged areas in the watershed. A list of past, present, and reasonably foreseeable projects in the Lake Powhatan area is shown in EA Table 3.</p>
<p>We would also like to see some sort of ongoing monitoring set up for after the dredging is completed. This should provide you not only with information relevant to the health and water quality of Lake Powhatan, but should provide a side benefit of providing more information for the research being done at Bent Creek.</p>	<p>Wildlaw</p>	<p>Non-Key Issue - Comment does not require development of an alternative.</p>	<p>If the action alternative is selected, disposal of dredge material would occur on a site within the Lake Powhatan Recreation Area, not within the Bent Creek Experimental Forest. Pisgah National Forest, Forest Plan Monitoring protocols will be met including beach water quality monitoring. There is not plan at this time for monitoring by the Bent Creek Experimental Forest.</p>
<p>Another issue we feel proper for consideration in the EA is the presence (or absence) of any toxins, heavy metals, or other contaminants in the dredge material. Certainly, the composition of this material needs to be known before it is placed on another location. Any potential contaminants need to be identified and safety and/or mitigation measures put in place.</p>	<p>Wildlaw</p>	<p>Non-Key Issue - Comment does not require development of an alternative.</p>	<p>If the dredging takes place, we will follow all laws, regulations, and Forest Plan standards and guidelines, including implementation of Best Management Practices as shown in the Required Design Criteria in Chapter 2. We will also obtain all of the necessary permits and follow all of the stipulations in the permits. However, the permits may not require dredge material testing.</p>

Comment or Statement	Commenter	Issue: Key or Non-Key Issue with Brief rationale	Response
<p>Another concern we feel warrants discussion in the EA is what measures will be put in place to prevent damage should another major flooding event occur during construction, especially during the period when the flow is diverted through the 24” piping. Simply assuming that there will not be adverse weather events during the construction is inadequate.</p>	<p>Wildlaw</p>	<p>Non-Key Issue - Comment does not require development of an alternative.</p>	<p>We agree that measures need to be in place during project implementation in case there is another major flooding event. The exact specifications for the system to handle excess water will be determined in the TVA dredge design. The plan is to use one or two 24” pipes during the dredging to connect Bent Creek to the dam and handle any possible storm flows. Since the work site is a reservoir, any excess water due to storms can be easily contained within Lake Powhatan. If needed, excess water can be siphoned off from the pool area at the dam without increasing sediment above the Bent Creek level below the dam. Excess flow may slow the dredging but will not impact water quality or aquatic resources.</p> <p>The disposal site is designed to contain possible excess water from storm events (EA Figure 4). Adjustable weir outlets will be built into the disposal site to slowly release excess water.</p>
<p>Surveys for aquatic species are especially important. The Southern Appalachians in general hosts one of the most diverse freshwater stream ecosystems on earth. We are concerned about how the project may impact any federally threatened and endangered aquatic species, as well as sensitive, rare and species of concern, and just as importantly their communities. Sedimentation is one of the primary threats to endangered fish and mussel species in the region. Road building, in some cases, logging, and particularly the use of herbicides can result in serious pollution problems even when mitigation measures are attempted.</p>	<p>Wildlaw</p>	<p>Non-Key Issue - Comment does not require development of an alternative.</p> <p>This issue was used to analyze the affects of the proposed action.</p>	<p>A Biological Evaluation (BE) was completed for this project that included TES and Forest Concern species. The BE found that there were no federally listed threatened or endangered species. The EA did analyze the known and potential sensitive species: Northern bush katydid (<i>Scudderia septentrionalis</i>), Diana fritillary (<i>Speyeria diana</i>), and S. Appalachian salamander (<i>Plethodon teyahalee</i>) in the Proposed, Endangered, Threatened, and Sensitive Species section in Chapter 3.</p> <p>Only one Forest Concern species was identified, the warbling vireo (<i>Vireo gilvus</i>). No Forest Concern vascular plants, aquatic invertebrates, or mussels were found.</p> <p>Due to the nature of dredging, some individuals within populations may be impacted but every effort will be</p>

Comment or Statement	Commenter	Issue: Key or Non-Key Issue with Brief rationale	Response
			<p>made to keep these impacts to a minimum.</p> <p>TVA is designing the dredging to minimize sediment discharge downstream of the dam by clearing the dam valve of sediment, building a cofferdam, and creating a pool area at the dam site. This will minimize the amount of sediment released below the dam while maintaining enough flow for the downstream habitat. This should help maintain habitat for all aquatic species below the dam.</p> <p>This project will not involve use of herbicides so there will be no impact from them.</p> <p>If the action alternative is selected, about 1.5 acres of brush and weeds and about 1.5 acres of trees will be cleared to create enough space to dispose of the dredge material. A short access route will be constructed. Once the material dries for a few months this area, including the temporary access route, will be contoured and seeded with native weed-free seed.</p>
<p>Please disclose methodologies and all data and results for streams that could be impacted by the project (both within the planning area and downstream), including sediment and herbicide transport modeling.</p>	<p>Wildlaw</p>	<p>Non-Key Issue - Comment does not require development of an alternative.</p>	<p>There will be no herbicide use in this project. Project design will limit the amount of sediment transported into Bent Creek below the dam (Chapter 2, Required Design Criteria). The small amount of sediment transported will dissipate in a short distance to natural background level. All Best Management Practices, Forest Plan standards and guidelines, and permit regulations will be followed to eliminate or minimize impacts.</p>
<p>Please disclose how each alternative will affect sediment levels in streams and how these sediment levels will affect populations of PETS fish, mussels, or other aquatic species.</p>	<p>Wildlaw</p>	<p>Non-Key Issue - Comment does not require development of an additional alternative.</p>	<p>Sediment levels in Bent Creek above Lake Powhatan will not change with this proposed project. The influx of sediment into Bent Creek below the dam should be minimal and dissipate to normal levels within a short distance. There should be no impact to PETs fish, mussels, or other aquatic species in Bent Creek. Please</p>

Comment or Statement	Commenter	Issue: Key or Non-Key Issue with Brief rationale	Response
			see the Proposed, Endangered, Threatened, and Sensitive Species section in Chapter 3 of the EA for this analysis.
We urge the Forest Service to avoid any actions, which could harm water quality and the associated communities and values.	Wildlaw	Key Issue - This issue was used to refine the proposed action alternative.	The proposed action design will improve water quality over the long-term. Project design elements that avoid harmful actions are discussed in the EA in Chapter 2, Required Design Features.
If the data does not exist or is not current, please collect basic water quality and aquatic community data according to the established ecological methodologies [such as those contained in Brower, J.E., J. H. Zar and C.N. von Ende's Field Laboratory Methods for General Ecology (wm. C. Brown Publishers, 1990)].	Wildlaw	Non-Key Issue - Comment does not require development of an alternative.	An analysis of the current condition, impacts expected from implementing the proposed action, and cumulative effects associated with any past, present, or reasonably foreseeable actions is in EA Chapter 3. Water quality data is taken at the beach and fishing pier sites during the summer season; this information is included in the project record. A BE that assessed impacts to wildlife, fish, and plants was completed and is included in the project planning file. The water quality analysis can be found in Chapter 3 in the Key Issue: Water Quality section.
Finally, we are curious as to the source of your authority for providing a 20 day comment period. We welcome a more full and documented explanation of this process in subsequent documents.	Wildlaw	Non-Key Issue - Comment does not require development of an alternative.	The original notice you received was a 20-day scoping period to get a quick look to determine public concerns about the Lake Powhatan dredging project. We selected 20 days for scoping due to the need for action at Lake Powhatan this calendar year. Public comment and involvement is an important aspect of NEPA planning and we appreciate your time and thoughtful response to the short scoping period. Where appropriate, we have incorporated your concerns into the analysis. We took some of the comments that you made as key issues and added measures in the Required Design Criteria to address some of your concerns. Through your involvement, we were able to refine the proposed action to meet

Comment or Statement	Commenter	Issue: Key or Non-Key Issue with Brief rationale	Response
			<p>both the Purpose and Need and resource concerns.</p> <p>The required 30-day comment period began with the distribution of this EA and the notice of the availability in the newspaper as required by 36 CFR 215.5. This plan for public involvement gives you two opportunities to express your concerns and influence the final decision on this project. All other regulated time lines will be met for this project.</p>
<p>I am fully supportive of this however, I have several comments. First, it looks as though it would be feasible to move the sand to the Lake Powhatan picnic area redesign. This is cost effective in the long term and picnic areas need sand for the high traffic of users.</p>	<p>W. Charles Parris</p>	<p>Non-Key Issue - Comment does not require development of an alternative.</p>	<p>We did look at depositing the dredge material in the beach area. After closer review, this alternative was eliminated from further study for the following reasons:</p> <ul style="list-style-type: none"> • Dredge spoils are not all sand and would require considerably high expense to refine for recreational area use; • In order to get 11,000 yd³ in the picnic area, many trees would have to be removed, which would decrease the scenic quality of the beach and may impact lake water quality; and • A historic site was found within the area where the deposits were planned.
<p>Water quality should be observed during this assessment and considered a high priority if it is not already.</p>	<p>W. Charles Parris</p>	<p>Key Issue - Water Quality This issue was used to refine the proposed action alternative.</p>	<p>Water quality is a key issue and drove the development and refinement of the proposed action alternative. Please refer to Chapter 3 for the analysis in the Key Issue: Water Quality section.</p>
<p>Protection of the Aquatic habitat, in my opinion is also another high priority.</p>	<p>W. Charles Parris</p>	<p>Key Issue - Aquatic Habitat This issue was used to refine the proposed action alternative.</p>	<p>We agree that aquatic habitat is a high priority and have used it as one of the key issues to analyze the effects of dredging Lake Powhatan. Please refer to Chapter 3 for the analysis in the Key Issue: Aquatic Habitat section.</p> <p>During dredging, aquatic habitat within the reservoir</p>

Comment or Statement	Commenter	Issue: Key or Non-Key Issue with Brief rationale	Response
			<p>will be lost for a short time due to the dewatering of the reservoir. Aquatic habitat in Bent Creek, both above and below the reservoir will be maintained by releasing water from the dam release valve; thus, retaining in stream flow and preventing back up into Bent Creek. Measures are planned to remove individual fish and other aquatic species from the reservoir before project implementation. Some individual fish and other aquatic species will be lost; however, populations should not be impacted.</p> <p>In the long-term, aquatic habitat will improve both within the reservoir and downstream due to cooler water temperatures and increased dissolved oxygen in the deeper waters.</p>
<p>How many weeks/months/days prior the assessment will stocking of trout and other fish cease to a stop? I feel that stocking should cease several months in advance to minimize the number of fish taken out of the lake into ponds. This will also minimize the number of fish that will potentially be lost.</p>	<p>W. Charles Parris</p>	<p>Non-Key Issue - Trout Stocking</p> <p>Comment does not require development of an alternative.</p> <p>Comment does not require development of an additional alternative.</p>	<p>The North Carolina Wildlife Resources Commission determines when to stock and not stock Lake Powhatan with fish. We are working with them to have the least impact on the stocked trout possible. At the present time, they plan to stop stocking the reservoir with fish after the Kid's Fishing Day on June 2, 2006 (Table 1 in the EA). We presume that people will continue to fish throughout the summer and remove most of the stocked fish.</p>
<p>...we don't think adherence to the (trout) moratorium will be necessary if the protocol discussed at the meeting is followed (all flow through lake is piped/isolated). I recommend that the contractor understand the water quality standards for trout classified streams. I suspect that DWQ will require turbidity monitoring of the outflow.</p>	<p>NCWRC – McHenry(1)</p>	<p>Non-Key Issue - Trout</p> <p>Comment does not require development of an alternative.</p> <p>Comments were made in conjunction with a meeting with FS to discuss the proposal.</p>	<p>TVA is designing and implementing the dredging at Lake Powhatan. We will request that they inform the contractor of the water quality standards for trout classified streams.</p>

Comment or Statement	Commenter	Issue: Key or Non-Key Issue with Brief rationale	Response
I discussed item two with our district fish biologist. USFS should look at relocation possibilities they may want to pursue.	NCWRC – McHenry(1)	<p>Non-Key Issue - Trout</p> <p>Comment does not require development of an alternative.</p> <p>Comments were made in conjunction with a meeting with FS to discuss the proposal.</p>	We would like to discuss relocation possibilities with you district fish biologists.
I also spoke with our wildlife biologist about the primary disposal area. He has no concerns with using that site, which is a wildlife opening, provided it gets reclaimed with plants that are beneficial to wildlife.	NCWRC – McHenry(1)	<p>Non-Key Issue - Wildlife</p> <p>Comment does not require development of an alternative.</p> <p>Comments were made in conjunction with a meeting with FS to discuss the proposal.</p>	Due to concerns about using the Ledford Branch site, the proposed action was developed with a new disposal site inside the recreation area. This site will be cleared for dredge disposal and could be reclaimed with plants beneficial to wildlife.
Regarding the meeting notes, there are two things I mentioned that were not included. First, the amount, if any, of wetlands and vegetated shallows that would be affected by the project should be determined...	NCWRC – McHenry(1)	<p>Non-Key Issue - Wetlands</p> <p>Comment does not require development of an alternative.</p> <p>Comments were made in conjunction with a meeting with FS to discuss the proposal.</p>	There are no plans to impact any wetland areas. The Required Design Criteria in Chapter 2 includes protection of wetland areas.
...And second, while the lake is drawn-down, we encourage the USFS to examine whether the dam could be operated in the future to release partial flow from near the bottom of the lake. This may improve temperature conditions for trout below the lake as well as improve water quality in the lake.	NCWRC – McHenry(1)	<p>Non-Key Issue - Dam Operation</p> <p>Comment does not require development of an alternative.</p> <p>Comments were made in conjunction with a meeting with FS to discuss the proposal.</p>	<p>The TVA design will use the existing valve to maintain flow in Bent Creek below the dam.</p> <p>The Forest Service manages the dam but currently does not open the gate valve at all. After cleanout, the gate valve could (and probably should) be used to for partial releases regularly to improve trout habitat below the dam. However, this is only a recommendation and not part of the proposed action or design criteria.</p>

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<p>The Commission has no objection to the overall project. However, the Environmental Assessment should <u>characterize the anticipated effects</u> of the project <u>on fish and wildlife resources</u> and measures that would be used to mitigate any deleterious effects.</p>	<p>NCWRC – David McHenry(2)</p>	<p>Non-Key Issue - Fish and WL Comment does not require development of an additional alternative. Comments were made at a meeting with FS to discuss the proposal.</p>	<p>Chapter 3 of the Environmental Assessment contains the analysis of effects on fish and wildlife resources. Measures to mitigate any deleterious effects can be found in Chapter 2 in the Required Project Criteria section.</p>
<p>A discussion (should occur) of the amount of shallow, vegetated lake bottom and wetland that may be affected by the project, if applicable.</p>	<p>NCWRC – David McHenry(2)</p>	<p>Non-Key Issue - Fish and WL Comment does not require development of an additional alternative. Comments were made at a meeting with FS to discuss the proposal.</p>	<p>The proposed action does not include any impact to wetlands. Specific language about impacts to wetlands can be found in Chapter 2 in the Required Project Criteria section.</p>
<p>A description of how sediment will be contained during the dredging (e.g. flow bypass).</p>	<p>NCWRC – David McHenry(2)</p>	<p>Non-Key Issue - Fish and WL Comment does not require development of an additional alternative. Comments were made at a meeting with FS to discuss the proposal.</p>	<p>Table 1 describes the proposed action including the use of a bypass pipe from Bent Creek to the Lake Powhatan dam valve. Water will pass through the pipe exactly how it enters from Bent Creek. Any sediment in the water from Bent Creek may be deposited in the creek below the dam. No measures will be taken to prevent the deposition of sediment suspended in the creek water. Sediment from within the reservoir will be contained by the dam. At the disposal site, berms will contain the sediments while they dry. Pipes within the disposal site will be wrapped with a geotextile to prevent the sediment from leaving the disposal site (EA Figure 4).</p>

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<p>A discussion of how stream flow will be maintained in Bent Creek downstream of the lake during refilling. The bypass pipe may need to remain during refilling so that partial flow in the creek is maintained.</p>	<p>NCWRC – David McHenry(2)</p>	<p>Non-Key Issue - Fish and WL Comment does not require development of an additional alternative. Comments were made at a meeting with FS to discuss the proposal.</p>	<p>TVA will design a refilling process to maintain stream flow below the Lake Powhatan dam while filling the reservoir (Table 1 and Figure 4). Approximately 50% of the Bent Creek flow will continue through the valve to maintain habitat downstream.</p>
<p>A description of any available water quality data for Bent Cr. Downstream of the dam and a discussion of possible opportunities to improve water quality, if applicable, concurrent with the dredging project (e.g. deep water retrofit/modifications).</p>	<p>NCWRC – David McHenry(2)</p>	<p>Non-Key Issue - Fish and WL Comment does not require development of an additional alternative. Comments were made at a meeting with FS to discuss the proposal.</p>	<p>By increasing the depth of Lake Powhatan, the water quality, specifically water temperature and dissolved oxygen, should improve. For a complete discussion, please see the Key Issue: Water Quality section in Chapter 3.</p>
<p>We have no objections to the proposed project. However, obligations under section 7 of the (Endangered Species) Act must be reconsidered if: (1) new information reveals impacts of this identified action that may affect endangered and threatened species or critical habitat in a manner not previously considered, (2) this action is subsequently modified in a manner not considered in this review, or (3) a new species is listed or critical habitat is determined that may be affected by the action. Please refer to this project as Log Number 4-2-06-230.</p>	<p>Brian P. Cole United States Fish and Wildlife Service</p>	<p>Non-Key Issue - Comment does not require development of an alternative.</p>	<p>We will follow all of the requirements under Section 7 of the Endangered Species Act.</p>