



**US Army Corps  
of Engineers**

Nashville District

## ENVIRONMENTAL ASSESSMENT

### **Proposed Master Plan Update Old Hickory Lake**

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**PROPOSED MASTER PLAN UPDATE  
OLD HICKORY LAKE  
ENVIRONMENTAL ASSESSMENT**

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## **1 INTRODUCTION**

The original Old Hickory Lake Master Plan was approved in 1954 and last updated in 1987. This document serves as a guide for coordination of project development and management of all land and water resources. The intent of an updated Master Plan is to present a current inventory and assessment of resources, provide an analysis of resource use, and evaluate existing and future needs required to protect and improve the value of resources at Old Hickory Lake.

With the proposed Master Plan Update, an Environmental Assessment (EA) is being completed to evaluate existing conditions and potential impacts of proposed alternatives. The EA is prepared pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality regulations (40 CFR, 1500–1517), and the US Army Corps of Engineers (Corps) implementing regulation, Policy and Procedures for Implementing NEPA, Engineering Regulation 200-2-2, 1988.

Various documents are referenced in this EA as providing background or supplemental information. Those of primary importance include the following: Old Hickory Lake Master Plan (1987); Cumberland River Environmental Impact Statement (1975 and updated 1992); Old Hickory Lake Operational Management Plan Part I Natural Resources Management, and Operational Management Plan Part II Park Management (2005). Full citations are included in Section 10. As the Master Plan Update and EA will be combined documents, this EA will refer to sections of the update when information has already been expounded and there is no need for reiteration.

## **2 PURPOSE AND NEED FOR ACTION**

Updates to the original 1954 document occurred in 1978 and 1987. Supplements to the Master Plan have been prepared as necessary to address specific actions, such as change in land use. These activities are further discussed in the Master Plan Update. Since the update was completed in 1987, changes have occurred in regards to new and revised regulations and guidance, and implementation of new and revised environmental and land use policies. Similarly, public use patterns have changed significantly and requests and demands on recreation facilities have changed with those use patterns. Therefore, reallocations of services at these facilities need to be addressed. Changes involving recreation area closures and improvements have occurred since the previous update. In addition, policy and regulations have required changes in land allocations and classifications. One specific example is identification of environmentally sensitive areas that need protection and special consideration. Another is the increased out granting of recreation areas or sites to non-Corps entities willing to assume operation and maintenance at levels meeting or exceeding Corps standards and providing quality public service.

Master Plans are periodically updated to ensure focus on three primary components: regional and ecosystem needs, project resource capabilities and sustainabilities, and expressed public interests and desires. Updates also ensure environmental mandates and considerations are incorporated (USACE 1996a). Through the implementation of updated Master Plans, project managers can provide responsible and timely protection, conservation, and enhancement of project resources. Project resources include natural, cultural, and man-made features (USACE 1996b).

### 3 ALTERNATIVES

Alternatives evaluated in the Environmental Assessment include the following:

#### 3.1 Full Implementation of Proposed Master Plan Update

With full implementation of the proposed Master Plan Update, three actions would be incorporated: 1) project land and water allocations and classifications would be made current, 2) an analysis of resource use would be conducted, and 3) an evaluation of existing and future needs and demands on the project would be completed.

Classifications for project lands and water are updated to reflect current and anticipated use. Land area classifications were changed in 1996 with new guidance. Table 1 compares former (current) and new (proposed) classes for land and water allocation. Additional descriptions of these classifications and project areas are provided in the Master Plan Update, Chapters 4 and 5.

**Table 1. Titles for Land and Water Classification**

<i>Pre 1996 guidance (currently in use)</i>	<i>Post 1996 guidance (proposed in 2015 update)</i>
<b>Land</b>	
Project Operations	Project Operations
Wildlife and Forest Management	Wildlife Management
Historic or Environmental Areas	Vegetative Management
Proposed Public Use	Environmental Sensitive Areas
High Density Recreation	High Density Recreation
Low Density Recreation	Low Density Recreation
	Future/Inactive Recreation
<b>Water</b>	
No Boat Zone	Restricted
No Wake Zone	Designated No Wake
Sea Plane Landing Area	Fish and Wildlife Sanctuary
	Open Recreation

Full implementation of the proposed Master Plan Update is the preferred alternative. This would allow the most comprehensive update that best reflects environmental stewardship and conservation of Old Hickory Lake project lands and waters while meeting public, social, and economic demands.

#### 3.2 No-Action

The No-Action alternative is defined as the Corps taking no action and therefore not implementing an update to the Old Hickory Lake Master Plan. With this action, no new resource analysis and allocation would occur, nor would a revision to project sites' inventory be completed. Requirements outlined in policy and regulation subsequent to 1987 would not be incorporated. Operation and management of Old Hickory Lake would continue as outlined in the 1987 Master Plan Update. The pre 1996 guidance for land and water classification would remain.

## 4 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Detailed descriptions of the environmental setting of Old Hickory Lake are provided in the Master Plan Update and Operational Management Plans. The following discussions provide a summary of the project area.

### 4.1 Project History and Setting

Old Hickory Dam, which impounds Old Hickory Lake, is located on the Cumberland River at Mile 216.2 in Sumner and Davidson Counties, Tennessee. Located 25 miles upstream from Nashville, Tennessee, Old Hickory Lake extends through Trousdale, Wilson and Smith Counties to the tailwaters of Cordell Hull Lock and Dam at Carthage, Tennessee. In addition to these three counties, Old Hickory Lake Watershed drains portions of Macon and Wilson Counties. The lake has 440 miles of shoreline at normal pool elevation, 445 feet above means seal level (amsl) and has 97.3 river miles between Old Hickory and Cordell Hull dams. See Figure 1 for location map.

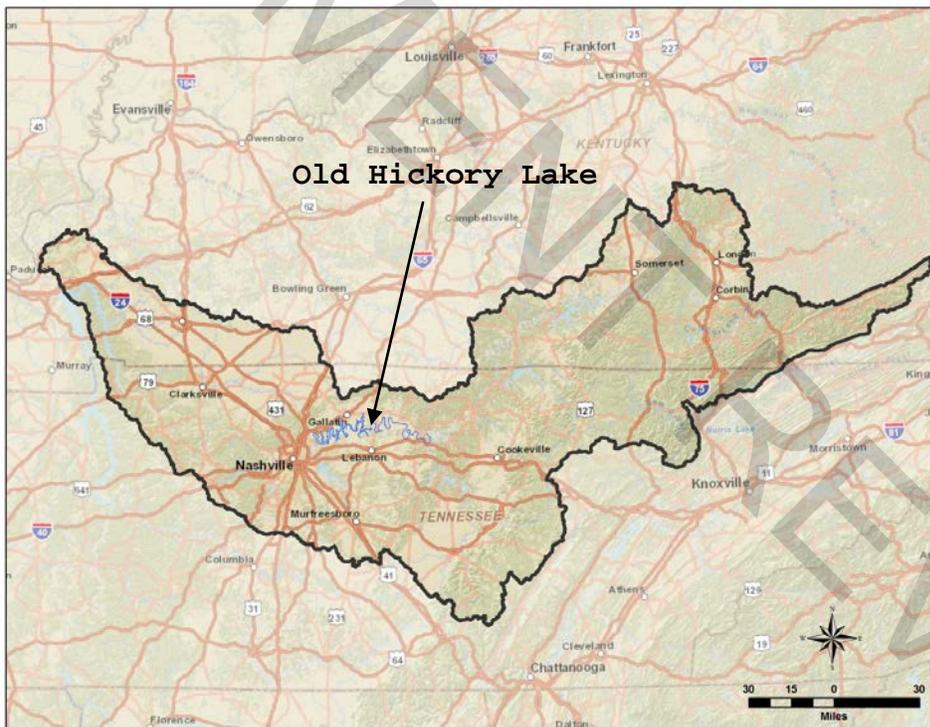


Figure 1. Old Hickory Lake Vicinity Map

Old Hickory Lock and Dam was authorized by the River and Harbor Act of 1946 as a multi-purpose project. Construction began in 1952 and was completed in 1954 with impoundment. Primary multi-purposes included navigation and hydroelectric power production. Subsequent laws added additional project purposes. Section 4 of the 1944 Flood Control Act added an ancillary purpose of recreation; the Federal Water Project Recreation Act of 1965 established development of the recreational potential; the Fish and Wildlife Coordination Act and the Fish

and Wildlife Conservation Act of 1980 added fish and wildlife management and conservation; the Clean Water Act of 1969 incorporated water quality as a Corps mission.

Real estate acquired for this project was under a minimum acquisition policy. Additional lands were acquired in the 1960s for recreational purposes; however, the amount of government land surrounding this lake is limited. There are 25,802 acres of land that were acquired in fee and 3,653 acres where flowage easements were acquired that give the government the right to flood.

The Master Plan Update specifically addresses recreation and fish and wildlife (natural resources) management authorizations. This includes operation and management of recreational facilities as well as outgrants to other public agencies and concessionaires to provide additional features. Natural resource management includes management of lands and surface waters and coordination with public agencies and non-profit organizations to protect, enhance, and conserve the environmental resources of the project. Flood control, hydropower, and water supply are beyond the scope of this review and are managed by the Nashville District Office in conjunction with other projects on the Cumberland River.

The following table (Table 2) summarizes which resources are likely to be affected by implementation of a Master Plan Update or No Action. Discussion of potential impacts then follows.

**Table 2. Resources Likely Affected With Proposed Implementation**

Affected Environment	Likely to be Affected
Climate, Physiography, Topography, Geology and Soils	Yes
Aquatic Environment	Yes
Terrestrial Resources/Land Use	Yes
Threatened & Endangered Species	Possibly
Archaeological & Historic Resources	Possibly
Air Quality	No
Socio-economics	Yes
Recreation Resources	Yes
Health & Safety	Yes
Aesthetics	Yes

#### 4.2 Climate, Physiography, Topography, Geology, and Soils

#### 4.3 Existing Conditions

*Climate.* The climate of the Old Hickory Lake area is moderate. Temperatures range from summer highs (July and August) of 89° F to winter lows of 28° F in January (TWC, 2014). The average growing season is approximately 210 days, extending from early April to the end of October. Annual precipitation for the basin averages 48 to 54 inches (EPA, 2014).

*Physiology, Geology, and Topography.* Old Hickory Lake lies within Ecoregion 71h, the Outer Nashville Basin of the Interior Plateau. This ecoregion is characterized as open hills, gently rolling to steep; highly dissected escarpments; moderate gradient bedrock and gravel bottom

streams. Elevations range from 500 to 1200 feet. Much of the geology is limestone with some shale (EPA, 2014).

*Soils.* The Outer Nashville Basin is predominately Ultisols, Alfisols and Inceptisols (EPA 2014). Inceptisols have altered horizons either from weathering or removal of minerals through land practices. Alfisols are mineral soils that are relatively freely drained and have a short period of moisture deficiency. Ultisols are usually low in fertility and severely weathered (Steila and Pond, 1989). Soil types are further identified in the Master Plan update and Part I of the OMP where each natural resource management compartment is described.

#### 4.3.1 Full Implementation of Proposed Master Plan Update

Areas of geological, topographical, or soils concerns would be protected with implementation of the proposed Master Plan Update. Updating project site assessments to reflect current and potential futures uses, as well as designating environmentally sensitive areas, such as existing state natural areas, islands, and other areas with unique attributes or sensitivity, could prevent encroachment into incompatible use areas where soils, geology, or topography need to be protected. This reclassification would also reflect the best possible use(s) of project lands based on terrain, topography, access, etc.

#### 4.3.2 No-Action

With no action, areas of special concern for topography, geology, soils, and climate extremes could still be protected based on the 1987 Master Plan and individual review of proposals. However, without special consideration, these areas of concern are more likely to be encroached upon or damaged. In addition, with no action, areas of special interest discussed in the 1987 Master Plan would not be formally recognized as environmentally sensitive areas (ESA). Similarly with no action, site assessments would not be updated to reflect more realistic existing and future site uses and areas of special concern would be overlooked.

### 4.4 Aquatic Environment

#### 4.4.1 Existing Conditions

*Hydrology.* Old Hickory Lake is managed in conjunction with nine other Corps projects for hydropower and maintaining flows through the Cumberland River Basin. Drainage area for the reservoir is approximately 11,674 square miles, 1404 square miles of which is uncontrolled drainage. Table 3 provides addition statistics relative to pool size based on varying elevations.

**Table 3. Project Elevations and Statistics**

Elevations (above msl)	Description	Acres	River Miles	Shoreline Miles	Acre Feet
451	Maximum Pool	27,450			545,000
445	Normal Summer Pool	22,500	97.3	440	420,000
442	Minimum Pool; Winter Pool	19,550			357,000

Groundwater is contained in permeable soils, cracks, faults, and solution cavities in the underlying geologic formations. As this area is laden with limestone/karst features, groundwater is relatively high in calcium and magnesium concentrations.

As a navigation project on the mainstem Cumberland River, a commercial navigation channel is maintained for barge tow and related traffic operations. To ensure a 300' wide by 11' deep navigable channel, maintenance dredging does occur in areas of shoaling. However, this has not been performed in the upper reaches of the lake in several years due to a lack of commercial navigation traffic. Maintenance dredging is limited to the commercial channel and does not occur outside these boundaries. This activity is coordinated on a case by case basis for evaluation and necessary permitting by regulatory agencies.

*Water Quality.* Old Hickory is a "run of the river" lake, meaning it is an impounded mainstream Cumberland River project providing navigation. It does not have widths and deeper depths associated with non mainstem, navigation projects such as J. Percy Priest, Center Hill and Dale Hollow Lakes; Old Hickory Lake maintains a more riverine appearance and characteristics. Average water depth of the lake is 19 feet. Old Hickory receives inflows from Center Hill Lake (discharges of the Caney Fork River) and Cordell Hull Lake further upstream on the Cumberland River. Water flowing through Cordell Hull to Old Hickory is influenced by the operation of Dale Hollow, Center Hill and Wolf Creek Reservoirs. Large inflows from storm events are held back in the watersheds of these projects, and lows flows in the mainstem of the Cumberland River are supplemented by outflows from these reservoirs. Old Hickory's watershed not influenced by these reservoirs (uncontrolled flow) encompasses approximately 1404 square miles. Most direct inflows are small tributaries, many of which approach very little flow, or no flow, during summer months.

As a run of the river project, Old Hickory has very limited storage capacity. It is authorized for operation between elevations 442 and 445 for hydropower and between elevations 445 and 450 for flood surcharge (Surcharge is storage used only in the event of floods and does not add flood control benefits. This storage is used to offset the natural flood storage lost when the project was built). With this limited operating band, water passes through Old Hickory relatively quickly with a mean retention of approximately eleven days and rarely exceeds 30 days.

There are three criteria of consideration specific to water quality and the Corps' operation of Old Hickory Dam: 1) minimum daily average flow of 1,000 cubic feet per second (cfs) from the dam for wastewater assimilation in the Nashville area. Even during the most extreme droughts, this goal is relatively easily met; 2) periods of no flow release are limited to no more than six consecutive hours. During low flow periods, this may require intermittent hydropower generation, typically at minimum loads for duration of one hour; and 3) maintain a dissolved (DO) oxygen level of 5.0 milligrams per liter (mg/L) in the tailwater. This is accomplished primarily by releasing sufficient amounts of water at storage projects upstream to keep the detention time of Old Hickory Lake lower (less than 15 days). When necessary, hydropower releases are curtailed in favor of spillway releases to achieve minimum DO levels in the tailwater.

Stratification does occur within Old Hickory Lake, primarily in the lower reaches and embayments where the waters have spread out and are less confined to the river channel as is found in the upper reaches. When occurring, stratification usually begins in the April/May time frame and extends through September. Approximately one half to one third of the lake is affected, moving from the dam upstream to just above the TVA Gallatin steam plant.

Water moving through Old Hickory reservoir generally has adequate DO levels given the short retention times. Surface DO concentrations are generally stable, between 7 and 9 mg/L. Shallow areas, dry periods and algal bloom die-offs negatively influence DO levels as there is little, oxygenated water entering the stream and high biological oxygen demand from animals and dying plants deplete the DO availability in the water column. Moving downstream through the reservoir and at the dam, occurrences of DO depletion do occur with concentrations reaching less than 1 mg/L at depths below 20 feet. If retention time for outflows exceeds 15 days, decreased DO levels become a greater concern.

Total DO levels were a greater concern between 2007 and 2012, when the Cumberland River system operations were handicapped by the pool restrictions at Wolf Creek/Lake Cumberland and Center Hill Reservoirs. Spillway gate discharges from Cordell Hull and orifice and sluice gate discharges from Wolf Creek and Center Hill dams were used to supplement DO levels to maintain the state minimum standard of 5 mg/L in the tailwater. This concern has relaxed somewhat with the operations of Lake Cumberland (Wolf Creek) returning to pre dam repair pool levels.

An area of specific interest is the Tennessee Valley Authority (TVA) Gallatin steam plant which pulls water from the lake bottom for cooling its equipment. Water returned from the plant has much higher temperatures; on average the returned water is 48°F (9°C) warmer. This can cause localized issues and along the downstream flow route with the elevated temperatures until the water remixes with cooler lake water. A thermally stratified wedge keeps the heated water at the surface, thus enhancing heat transfer into the atmosphere and reducing potential impacts within the water column. Water releases from Corps lakes consider these returns from the TVA facility in order to provide colder flows to mix and lower water temperatures moving through the reservoir.

In 2008 The Tennessee Wildlife Resources Agency (TWRA) established a mussel propagation facility on the TVA Gallatin site to utilize the warmer water returning from the plant cooling towers to propagate freshwater mussels. This site operation has had very positive results for several mussel species, including state and federally listed mussels. Due to expansion of the TVA plant, the propagation facility has been relocated on the TVA footprint and is scheduled to reopen this year.

Algal blooms can be a cause of concern. Nationwide there has been an increased awareness and research on Harmful Algal Blooms (HABs) that can negatively affect lake health and recreation. Blue-green algae or cyanobacteria responsible for the outbreaks do occur in Old Hickory Lake, but no levels of concern have been documented.

As outlined in the state's 305(b) report, Tennessee Department of Environment and Conservation (TDEC) (2012) has rated the water quality of Old Hickory Lake based on seven uses: fish and aquatic life; recreation; irrigation; livestock watering and wildlife; navigation; domestic water supply, and industrial water supply. Approximately 18 streams within the Old Hickory watershed are categorized on the state's 303(d) list as failing to meet at least one of these designated uses. Those listed streams and causes of concern are shown in Table 4.

Local point and non-point source runoff has minor effects to the water quality of Old Hickory due to the short time frame water is retained within the reservoir. Historical zinc, barite and fluorite mines and past and potential phosphate extraction sites are located in the watershed and result in runoff. Much of the lands surrounding the upper reaches of the reservoir remain in agricultural use, potentially providing silt and chemical runoff. Effluents from contributing

**Table 4. 303(d) Listed Streams in Old Hickory Watershed**

<b>Waterbody</b>	<b>County</b>	<b>Miles Impacted</b>	<b>Cause/TMDL Priority</b>	<b>Pollutant</b>
Brunley Branch	Wilson	2.13	Loss of biological integrity due to siltation; alteration of banks or littoral vegetation	Pasture grazing
Dry Fork Branch	Wilson	7.9	Loss of biological integrity due to siltation; alteration of banks or littoral vegetation	Pasture grazing
Silver Spring Branch	Wilson	2.54	Loss of biological integrity due to siltation; alteration of banks or littoral vegetation	MS4 discharges
Black Branch	Wilson	3.29	Nutrients; alteration of banks or littoral vegetation	Pasture grazing
Spring Creek	Wilson	9.0	Escherichia (E.) coli	Pasture grazing; unrestricted cattle access
Cedar Creek	Wilson	10.9	Escherichia (E.) coli	Pasture grazing; unrestricted cattle access
Neal Branch	Wilson	3.7	Escherichia (E.) coli	Unrestricted cattle access
Beech Log Creek	Wilson	8.5	Escherichia (E.) coli	Pasture grazing
Round Lick Creek	Wilson	3.96	Nitrate/nitrite; loss of biological integrity due to siltation; low DO; alteration of banks or littoral vegetation; E. coli	Municipal point source; pasture grazing
Round Lick Creek	Wilson	3.16	Loss of biological integrity due to siltation; alteration of banks or littoral vegetation; E. coli	Pasture grazing
Sinking Creek	Wilson	7.4	Nutrients; other anthropogenic substrate alternations; E. coli	Collection system failure; MS4 discharge
Sinking Creek	Wilson	10.0	alteration of banks or littoral vegetation; other anthropogenic substrate alternations; E. coli	Pasture grazing; land development; highway, road and bridge construction
Little Goose Creek	Trousdale	12.7	alteration of banks or littoral vegetation; E. coli	Urban high density area; pasture grazing
Rankin Creek	Sumner	3.3	alteration of banks or littoral vegetation; total phosphorus; E. coli	Pasture grazing; channelization; MS4 discharges
Town Creek	Sumner	12.1	Loss of biological integrity due to siltation; other anthropogenic habitat alterations	MS4 discharges; hydromodification
Unnamed Tributary (UT) to Old Hickory Reservoir	Sumner	2.57	Nutrients; loss of biological integrity due to siltation	MS4 discharges
UT to Drakes Creek	Sumner	3.16	alteration of banks or littoral vegetation	MS4 discharges
Wilburn Creek	Smith	9.9	Loss of biological integrity due to siltation; alteration of banks or littoral vegetation	Nonirrigated crop production

sewage treatment plants (largest being Carthage; Hartsville, Lebanon, Gallatin and Hendersonville) total approximately 13 cfs of the lakes average of 20,000 cfs. Old Hickory Lake is also a “discharge lake”, meaning marine vessels are allowed to dispose of treated sewage within the reservoir.

The Corps instituted a Clean Marina Program in 2004, which is a voluntary incentive program to encourage marina operators to be more environmentally aware and protect natural resources at Old Hickory Lake. The program encourages implementation of best management practices regarding the use/dispensing/management of fuels, oils, and other solid and hazardous wastes. To date, of the eight commercial facilities on Old Hickory Lake, Anchor High and Drakes Creek Marinas have participated and are recognized in this program. This program is further discussed in Section 6 of the Master Plan Update.

*Water Supply.* Several cities surrounding Old Hickory Lake use the reservoir as their municipal water supply. There are currently fifteen municipal water withdrawals from Old Hickory Lake. Six community water systems—White House, Hendersonville, Gallatin, West Wilson, Lebanon, Hartsville, Nashville-Old Hickory, and Carthage service 300,000 residents (TDEC 2014). The Corps instituted a moratorium on all new municipal and industrial (M&I) water withdrawals from Old Hickory in January 2010 because the amount of withdrawals had reached the amount of natural inflows from the Old Hickory watershed during periods of critical drought. There is currently no surplus water or available storage to reallocate for additional M&I water withdrawals. Additional loss of water quantities as needed for M&I users would negatively affect navigation, hydropower, water quality and existing water supply users. The moratorium will remain in place until studies (which are beyond the scope of the Master Plan update) can be completed to fully define the scope of the issue and determine whether additional withdrawals are permissible.

Residential water supply for minor, non-potable use is evaluated and permitted in accordance with the project’s Shoreline Management Plan as long as the use does not conflict with the project’s operating purposes. Licenses may be granted to individuals owning private property adjoining public land allocated as “Limited Development” and who have current, valid shoreline use permits. Agricultural or household residential use is not permitted. Applicants must provide water withdrawal quantities and usage to ensure there are no concerns or cumulative impacts occurring to project resources or authorized uses.

*Aquatic Resources.* TWRA has primary responsibility for fisheries management in Old Hickory Lake. A comprehensive list of fish commonly to the reservoir is found in the 2005 Operation Management Plan (OMP). Popular game fish include smallmouth bass (*Micropterus dolomieu*), spotted or Kentucky bass (*Micropterus punctulatus*), largemouth bass (*Micropterus salmoides*), rockfish or striped bass (*Morone saxtilis*), walleye (*Stizostedion vitreum*), sauger (*S. canadense*), white bass (*Morone chrysops*), channel catfish (*Ictalurus punctatus*), white and black crappie (*Pomoxis annularis*, *P. nigromaculatus*), bluegill (*Lepomis macrochirus*) warmouth (*Lepomis gulosus*) and other sunfish, and rockbass (*Ambloplites rupestris*). Rockfish, however, do not successfully spawn in Old Hickory Lake. Fauna of commercial interest include catfish, drum, rough fish and river mussels.

TWRA has stocked lake sturgeon (*Acipenser fulvescens*) in the Cumberland River, including Old Hickory Lake. In the lake’s uppermost riverine reaches nearing Carthage native mussel beds remain from the original pre-impoundment Cumberland River. With the decline in mussel populations due to extreme cold water temperatures released from dams, this area is of

significant interest. Anecdotal information from TWRA suggests the existing mussels benefited during the Wolf Creek/Center Hill Dams rehabilitations and pool drawdown periods as less cold water moved through the river system.

In addition to fisheries management, restrictions or special designations to surface water areas is coordinated with TWRA for its management. Classifications include restricted; designated no wake; fish/wildlife sanctuary; and open recreation. Additional discussion is found in 4.03 of the update.

Historically Old Hickory Lake resource managers, state agencies and adjacent landowners spent a great deal of time, energy and effort on reducing the abundance and preventing the spread of exotic, invasive aquatic plants such as hydrilla and Eurasian water milfoil (*Myriophyllum spicatum* L). Methods implemented as needed to control nuisance aquatic plants include mechanical removal and use of herbicides approved for aquatic application. Adjacent landowners can request to treat areas around boat docks. Corps and state permits are required, along with notification to adjacent owners.

Aquatic nuisance fish are also a concern for managing Old Hickory Lake. Asian carp are abundant in Lake Barkley on the Cumberland River below Cheatham Lake. However reports have been made to TWRA that Asian carp inhabit Old Hickory Lake.

There are several active fishing clubs and sportsman organizations in the area that have an interest in habitat structure in Old Hickory Lake. These activities are coordinated with the Resource Manager's Office.

#### **4.4.2 Full Implementation of Proposed Master Plan Update**

The aquatic environment, specifically the lake's water quality and aquatic fauna, is less likely to receive direct impacts from a proposed Master Plan Update. However, secondary impacts to this resource would be realized. These impacts would be concentrated to the transitional zone adjacent to the shoreline. With environmentally sensitive areas identified, impacts can be more easily avoided or minimized. Protection or conservation of these areas around the lake provides positive impacts to aquatic resources. Where these areas are islands or provide riparian corridors, benefits include canopy cover/vegetation, thereby reducing temperatures, increasing habitat at the water's edge, and providing a source of detritus, as well as tree roots holding the banks in place. In addition, a wider riparian corridor with mature trees serves to filter runoff before reaching the reservoir. As impervious surfaces increase, the amount of runoff increases and the quality of this water source is impaired with sediment, oils, and other pollutants. An area surrounding the reservoir to capture this runoff becomes increasingly important as more development beyond the project lands continues. As mentioned above, protection and/or conservation of areas recognized as areas of special concern due to topography or soils would benefit aquatic resources by eliminating or minimizing erosion issues. Continuing to encourage implementation of the Clean Marina Program and the best management practices it entails would provide benefits to the aquatic resource.

#### **4.4.3 No-Action**

Impacts to hydrology, water quality and aquatic resources would most likely be affected with increased land disturbance, which is mostly non-point source pollution from areas within the watershed, but beyond Corps control. Management of project lands would continue as outlined in the 1987 Master Plan and the Resource Manager would continue to work with local

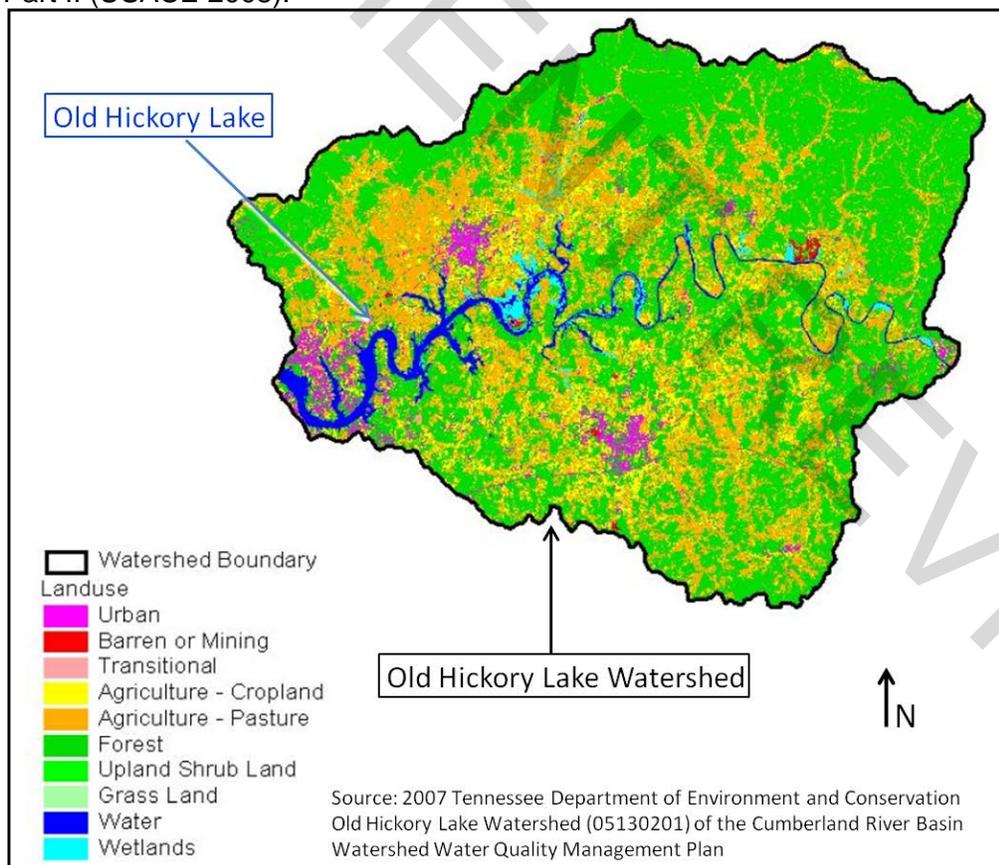
municipalities and interest groups to alleviate concerns to water quality and the aquatic resources outside Corps control but influencing the conditions of the reservoir and its resources. The pre-1996 guidance would be maintained, which is not as protective of land and water resources as the proposed alternative.

#### 4.5 Terrestrial Resources and Land Use

##### 4.5.1 Existing Conditions

Not only has the landscape of Old Hickory changed in 60+ years, but the viewshed varies significantly moving along the shoreline from the dam upstream to the farthest reaches at the tailwaters of Cordell Hull Dam. The lake's lower end is primarily residential, commercial and industrial development. The upper reaches contain more agricultural and forested lands. Figure 2 below shows the varied land use within the watershed.

*Vegetation.* Detailed descriptions of terrestrial resources, both vegetative and wildlife can be found in the OMP, Part I (USACE 2005) and Section 2.12 of the Master Plan Update. Where lands are designated as recreational areas, these sites are identified and discussed in the OMP, Part II (USACE 2005).



**Figure 2. Land Use of Old Hickory Lake Watershed**

Forests surrounding Old Hickory Lake have been historically logged. Regeneration has resulted in a mixed hardwood forest, primarily an oak (*Quercus* spp)- hickory (*Carya* spp) complex. Common understory trees include redbud (*Cercis canadensis*), sourwood (*Asimina triloba*) and dogwood (*Cornus florida*). On rockier, poor soil landscapes Eastern redcedar (*Juniperus virginiana*) stands can be found. Since impoundment, loblolly (*Pinus taeda*), white (*P. strobus*) and Virginia pine (*P. virginiana*) stands were planted on approximately 150 acres (USACE 2005). In the upper reaches of the tributaries where soils are more moist, trees commonly referred to as cove hardwoods can be found; these include sycamore (*Plantanus occidentalis*), poplar (*Liriodendron tulipifera*), cottonwood (*Populus deltoides*) and basswood (*Tilia americana*).

According to the US Fish and Wildlife Service's National Wetlands Inventory (NWI) (2014) there are approximately 1,170 acres identified as wetlands adjacent to or within Old Hickory Lake's area; this does not include open water habitat. Approximately 32,890 acres of project area are classified under the Cowardin system; this, other ponded areas (112.5 acres) and 22 acres of 'miscellaneous' classification bringing the total acres at Old Hickory Lake to 34,070 acres of wetlands. Most common classifications, beyond lake, are palustrine forested or scrub shrub (734.5 acres), palustrine emergent (152.5 acres), and riverine (149.5 acres). Some areas are identified as having artificial structures (dikes, impoundments) associated with historic farming practices. Much more of the fringe uplands around the perimeter of the lake that are now pastureland were likely wetlands prior to pasture conversion. If these areas were no longer grazed by cattle and/or pasture haying ceased, plants indicative of wetland areas would likely return as in many areas soil and hydrology are present.

As noted above several acres of project lands are outgranted to individual farmers for agricultural uses--cattle grazing and/or hay pastures. As of 2011 there were 26 leases around the lake. These leases have been phasing out over recent years. Natural regeneration/succession has been allowed on those areas. Much of the project lands in the upper reaches of Old Hickory Lake are licensed to the TWRA (4234 acres as noted below) for wildlife enhancement activities; this includes agricultural leases.

Table 5 below lists several common invasive plants that occur within Old Hickory project lands and waters. Project staff work hard to educate visitors and adjacent landowners on the negative impacts associated with exotic, invasive plants, such as outcompeting and eliminating native fauna and resulting in monotypic plant communities. Even though some of these plants may provide food and habitat for wildlife, the lack of plant diversity inhibits the wildlife and productivity. When property owners are required to plant vegetation along Corps boundaries, native plant species suitable to the landscape are required. Old Hickory Lake project staff can provide assistance to landowners wanting to know more about native plants.

**Table 5. Common Invasive Plants**

<b>Trees</b>
Mimosa ( <i>Albizia julibrissin</i> Durazz)
Princess tree ( <i>Paulownia tomentosa</i> (Thunb.) Sieb. & Zucc.Stevd.)
Tree-of-heaven ( <i>Ailanthus altissima</i> (Mill) Swingle)
<b>Shrubs</b>
Autumn olive ( <i>Elaeagnus umbellata</i> Thunb.)
Japanese Bush honeysuckles ( <i>Lonicera japonica</i> .)
Amur Bush honeysuckle ( <i>Lonicera maackii</i> .)

<b>Trees</b>
Marrows Bush honeysuckle ( <i>Lonicera marrowii</i> .)
Japanese barberry ( <i>Berberis thunbergii</i> DC.)
Multiflora rose ( <i>Rosa multiflora</i> Thunb. Ex Murr.)
Privet ( <i>Ligustrum</i> spp.)
<b>Herbaceous Plants</b>
*Eurasian water-milfoil ( <i>Myriophyllum spicatum</i> L.)
Garlic mustard ( <i>Alliaria petiolata</i> (M. Bieb.) Cavara & Grande)
Japanese grass ( <i>Microstegium vimineum</i> (Trin.) A. Camus)
Japanese Knotweed ( <i>Polygonum cuspidatum</i> Sieb. & Zucc.)
Japanese spiraea ( <i>Spiraea japonica</i> L.f.)
Musk thistle ( <i>Carduus nutans</i> L.)
*Purple loosestrife ( <i>Lythrum salicaria</i> L.)
<b>Vines</b>
Climbing euonymus ( <i>Euonymus fortunei</i> (Turcz.) Hand.-Mazz.)
Japanese honeysuckle ( <i>Lonicera japonica</i> Thunb.)
Japanese wisteria ( <i>Wisteria floribunda</i> (Willd.)DC.)
Kudzu ( <i>Pueraria montana</i> (Lour.)Merr.)
Oriental bittersweet ( <i>Celastrus orbiculata</i> Thunb.)
*aquatic nuisance species

Vegetative management requires definitive guidance to balance certain private exclusive uses of public resources while providing for protection and restoration of natural environmental conditions. Vegetative alteration is permitted through a shoreline use permit for approximately 50 percent of the shoreline of Old Hickory Lake. Management of shoreline use by private landowners is the predominant work effort at this project. Activities are managed through the Shoreline Management Plan, an appendix to the Operation Management Plan that undergoes review on a five year cycle. Examples of activities that adjoining landowners may apply for include control of woodland understory vegetation such as weeds, vines, briars, invasive plants or mowing of grassed areas within the allocated area determined by the Resource Manager. Cutting trees greater than one inch in diameter at the base is prohibited. Removal of exotic invasive vegetation is encouraged. In addition adjacent property owners are allowed and encouraged to plant native vegetation on public property. All new and renewal mowing permittees are be required to plant and maintain trees on the public land to maintain a minimum density of 24 trees per acre along with marking the boundary line between their property and public property. Changes and restrictions on permissible activities are evaluated in accordance with the Shoreline Management Plan and its updates.

Tree vandalism on public lands has become more common in recent years. Some encroachments occur from individuals or adjacent landowners failing to understand boundary line demarcations. Other offenses have been blatant violations. This not only results in loss of vegetation providing habitat and aesthetics for the lake, damages incurred can result in hundreds of thousands of dollars to public property. The Resource Manager and lake staff has worked and continue to educate landowners and lake users on the Corps boundary line policy. Similarly there are several avenues instituted to address vandalism: warnings, restitution agreements, citations and court actions. Additional information can be found in Chapter 6 of the Master Plan Update and the project's Shoreline Management Plan as this document was updated in 2014 and allows placement of a moratorium on issuing permits/licenses in damaged areas.

Old Hickory Lake staff has previously identified several areas as Environmental Restoration and Conservation Areas in its Shoreline Management Plan. The goal for these areas is to apply best management practices that would enhance and restore habitat and in some instances limit public access for protection of natural, historical or cultural resources. Based on the ranking criteria listed in Section 4.02.4 in the Master Plan Update, the project staff identified 86 sites to be classified as ESAs under this proposed update. These sites are shown below in Table 6. Seventy-two of these sites are islands, which are captured as a single listing in the table.

**Table 6. Sites Proposed for ESA Designation**

Lock 5
Lock 6
Islands ranging in size of less than 1 acre to approximately 30 acres
Hartsville Battlefield
Hartsville Bluffs
Promontory Way Peninsula ERCA
Cages Bend Island Area ERCA
East Camp Creek Mud Flats ERCA
Headwater E. Camp Creek ERCA
Cedar Creek Upper End ERCA
Little Creek/Benders Ferry ERCA
Lone Branch Cover ECRA
Spencer Creek/Davis Corner ERCA
Bartons Creek ERCA
Spring Creek Field

*Wildlife.* An extensive list of species occurring on project lands can be found in the OMP, Part I. Species commonly seen around the lake include those associated with an urban setting: whitetail deer (*Odocoileus virginianus*), turkey (*Meleagris gallopavo*), rabbit (*Sylvilagus floridanus*), squirrel (*Sciurus spp*), raccoon (*Procyon lotor*), skunk (*Mephitis mephitis*), opossum (*Didelphis virginiana*), coyote (*Canis latrans*), and numerous species of songbirds, raptors, and waterfowl. Though not seen as often, there is also a wide variety of reptiles, amphibians, and small mammals. The upper reaches of the Old Hickory project are less populated and include a 4,234 acre Wildlife Management Area that is intensively managed by the TWRA (USACE 2014), thus the diversity of wildlife would likely be greater and include those animals with larger blocks of area for habitat requirements.

Land use beyond public lands indirectly affects Old Hickory Lake public lands and waters. Project lands serve as vegetated buffers to stormwater and land runoff from private lands. As private land continues to develop and less wildlife habitat is available, animals crowd into the grassed and forest project lands for food and cover.

*Invasive fauna.* Fortunately, there are currently no invasive animal species documented on project lands that are deteriorating the forests. Gypsy moth (*Lymantria dispar*) and southern pine beetles (*Dendroctonus frontalis*) were insects of great concern in past years, but infestations and loss of trees and habitat to these species has subsided. The closest current threat is Emerald ash borer (*Agrilus planipennis*) which has been documented in Tennessee counties east of the project. Project staff coordinates with Tennessee Division of Forestry

personnel for monitoring and tracking this and other pests known in the state and of potential concern.

*Land Classification.* Project staff completed a thorough evaluation of the identified recreation areas at Old Hickory Lake. This evaluation included consideration of the 1987 MP use classifications and reallocating sites to the revised classification system now required by guidance. Section 8 of the Master Plan include a comprehensive table that lists all project sites based on the new classification and identifies if there was a land use change when compared to the 1987 outline. In addition, the table includes any discussion of proposed development for individual sites. The discussion of proposed development is preliminary in nature and would require additional coordination and evaluation if plans were to proceed with any site modifications.

#### **4.5.2 Full Implementation of Proposed Master Plan Update**

Classification or reclassification of project lands as proposed in the update would allow proper designation of lands as they are currently being used or have future potential for use. By properly designating the lands, protection and most appropriate uses could more easily be accomplished. The update also more accurately demonstrates the activities and actions project staff utilize for implementing conservation and management of the land resources of Old Hickory Lake. Potential impacts from land use activities such as vandalism and vegetative management would continue to be evaluated on a case by case basis and in accordance with existing guidance. Where vegetation is permitted for removal or alteration, impacts are minimized by what is allowable and conditions are incorporated that result in positive impacts such as additional plantings of native vegetation. In cases of vandalism tree loss is remediated with replanting where possible or natural regeneration occurs.

Additional sites may be added as ESAs in the future. Or, ESA designations may be removed if material changes occur that would substantially alter the conditions for which a site was originally selected. Proposed designation changes, inclusion or removal of designation, would include notification to the public and federal, state and local agencies before final decisions were made. The intention of ESA designation is to promote the recreational aspect of the sites while giving an added layer of protection to the environmental, aesthetic, or historic values for which they were selected. Sites designated as inactive and/or future recreation areas (Section 4.02.5(4) in the MP Update) would require further environmental review beyond the scope of the EA if development of the site for specific use was identified.

#### **4.5.3 No-Action**

With no implementation of a Master Plan Update, there would be no classification or reclassification of project lands to better represent current or future uses. Similarly, as this update is being made available to the public, they would not be advisement of various changes that have occurred at recreation and management areas at Old Hickory Lake. Project staff would continue to operate and maintain the lands and waters as outlined in previous planning documents.

### **4.6 Threatened and Endangered Species**

#### **4.6.1 Existing Conditions**

A list of endangered species within the Old Hickory Lake counties is found in Table 7. Bird species such as the peregrine falcon (*Falco peregrinus*) and the bald eagle (*Haliaeetus leucocephalus*), which have been delisted, may migrate through the area. Several of the listed species are mussels, which may still survive in the upper reaches of the river or historically occurred prior to impoundment. Indiana bat calls were isolated from an acoustic survey

**Table 7. Federally Listed Species Recorded in the Old Hickory Lake Project**

Group	Species	Common Name
<b>Mammals</b>	<i>Myotis sodalis</i>	Indiana bat
	<i>Myotis grisescens</i>	gray bat
	<i>Myotis septentrionalis</i>	Northern long-eared bat
<b>Mussels</b>	<i>Quadrula sparsa</i>	Appalachian monkeyface
	<i>Lampsilis abrupt</i>	Pink mucket
	<i>Dromus dromas</i>	Dromedary pearlymussel
	<i>Epioblasma brevidens</i>	Cumberlandian combshell
	<i>Obovaria retusa</i>	Ring pink
	<i>Pleurobema plenum</i>	rough pigtoe
	<i>Cumberlandia monodonta</i>	Spectaclecase
	<i>Epioblasma o. obliquata</i>	purple catspaw
<b>Plants</b>	<i>Lesquerella perforate</i>	Spring creek bladderpod
	<i>Physaria globosa</i> *	Short's bladderpod
*critical habitat designation		

Data obtained from USFWS website and consultation with state and federal agencies

completed by the TVA in 2012 for its habitat assessment of the Gallatin Fossil Plant (TVA 2013). The endangered gray bat has been recorded for several years wintering in a cave on the south bank of the lake across from the Gallatin Fossil Plant. Through a Corps and TWRA cooperative agreement the cave was gated as a protection measure.

Recently, in 2014, the USFWS identified areas within the Corps area of responsibility at Old Hickory Lake as critical habitat for Short's bladderpod. Short's bladderpod, a plant in the mustard family, typically grows on steep, rocky, wooded slopes and talus slopes and along tops, bases, and ledges of bluffs - often near rivers or streams and on south- to west-facing slopes. Most populations are closely associated with calcareous outcrops. In 2015 USFWS identified Spring creek bladderpod as occurring within project lands.

#### **4.6.2 Full Implementation of Proposed Master Plan Update**

Threatened and endangered species would benefit most from full implementation of a proposed Master Plan update with the designation of Environmental Sensitive Areas. With this special designation there would be limitations and restrictions to land uses that would further protect and conserve species of concern. However, more detailed evaluation of areas proposed for

various public or concessionaire uses would occur to ensure impacts were avoided and coordination with USFWS, TWRA and Tennessee Department of Natural Heritage would occur as needed.

#### **4.6.3 No-Action**

Threatened and endangered species would continue to be protected. In addition, sensitive areas would still be considered areas of special significance. Project staff would continue to work with state and federal staff for access and monitoring of sites designated as critical habitat for Short's bladderpod. However, without the Master Plan Update, there would not be a formal designation for Environmental Sensitive Areas.

### **4.7 Archaeological and Historic Resources.**

#### **4.7.1 Existing Conditions**

The record of human settlement along the upper Cumberland River in Middle Tennessee dates back to at least 10,000 B.C. In the mid-south, human occupation is generally divided into five broad cultural-chronological periods: Paleoindian (10,000-8,000 B.C.), Archaic (8,000-1,000 B.C.), Woodland (1,000 B.C.-A.D. 1000), Mississippian (A.D. 900-1000 - 1700-1750), and Historic (A.D. 1700- present). Cultural resources of all periods exist within the Army Corps of Engineers Old Hickory Lake project area. These include small prehistoric campsites, rockshelters, Woodland and Mississippian villages, and historic towns. Detailed descriptions and discussion of the periods are available in Section 2-12 of the Master Plan Update.

There are numerous Federal laws, executive orders, and regulations that provide guidance regarding the identification, consideration, and management of cultural resources on federal lands and projects. The most prominent of these include The National Historic Preservation Act of 1966, as amended (NHPA), The Archaeological Resource Protection Act of 1979, as amended (ARPA), Native American Graves Protection and Repatriation Act of 1989, (NAGPRA), Executive Order 11593, and ER 1130-2-540. The project has developed a Cultural Resources Management Plan as an appendix to the Master Plan that further outlines management and protection of these resources.

Prior to the inundation of Old Hickory Lake, the River Basins Survey completed a reconnaissance survey of the inundation zone (Solecki 1954). This survey recorded 23 archaeological sites that were easily identifiable on the land surface through the presence of mounds and dense lithic scatters. Seventy-four additional archaeological sites have been recorded on Old Hickory lands over the last several decades. Many of these sites were recorded as part of a Section 106 review. Overall the vast majority of the lands have not been surveyed; therefore, it is highly likely that unrecorded archaeological sites exist within the Old Hickory Dam/Old Hickory Lake project area.

In addition to archaeological sites, the extant buildings at the Old Lock 5 complex and the Old Hickory Dam form historic properties requiring management under Section 110 of the National Historic Preservation Act. The Old Hickory Dam and the facilities associated with this structure are considered eligible for listing on the National Register of Historic Places (McCroskey 2015).

New developments within the project area would likely require archaeological survey and historic structure inventories to identify previously unknown sites during project planning and

prior to project execution in order to comply with Section 106 of the NHPA. In accordance with Section 110 of the NHPA the Corps shall continue a program that identifies, evaluates, and nominates properties to the National Register. In addition, in accordance with the NHPA the Corps preservation-related activities shall be carried out in consultation with other Federal, State, and local agencies, Indian tribes, and provide for the disposition of Native American cultural items from Federal or tribal land in a manner consistent with section 3(c) of the Native American Grave Protection and Repatriation Act.

#### **4.7.2 Full Implementation of Proposed Master Plan Update**

Management and protection of archeological and historic resources would benefit with full implementation of a proposed Master Plan update. Each request for land use would also be further evaluated to ensure consideration of historic resources. Coordination with Tennessee State Historic Preservation Office would occur as needed.

#### **4.7.3 No-Action**

Management and protection of archeological and historic resources would continue without an updated Master Plan. However, full implementation of the proposed Master Plan update would provide the greatest coverage of these sensitive resources.

### **4.8 Air Quality**

#### **4.8.1 Existing Conditions**

For air quality sampling, the metropolitan area includes Davidson, Rutherford, Sumner, Wilson and Williamson Counties. There is an air quality monitor station for ozone on Corps property at Rockland Recreation area (TDEC, 2015). This region is in ozone non-attainment; however, this designation is deferred as long as the area continues to meet EPA milestones for its Early Action Compact (EAC). Areas that maintain their EAC status are not required to complete conformity determinations. Once an area reaches attainment, it is reclassified as an air quality maintenance area. This region has reached this classification for 1-hour ozone. With this classification the area is eligible for the Congestion Mitigation and Air Quality Improvement (CMAQ) program which provides funds for transportation projects that reduce air emissions; this funding program is administered by the state's department of transportation.

#### **4.8.2 Full Implementation of Proposed Master Plan Update or No-Action**

There are no large scale activities implemented by the Corps that would affect air quality conditions or local area attainment status. Management of Old Hickory Lake lands currently promotes, and would continue to promote under both alternatives, conservation of natural areas which in turn encourages vegetated natural areas that can help buffer air quality concerns.

### **4.9 Socio-Economic Resources**

#### **4.9.1 Existing Conditions**

Additional details and social and economic statistical information can be found in the Master Plan update, Sections 2-13 and 2-14. Old Hickory Lake straddles the boundaries for Davidson, Sumner, Wilson, Trousdale and Smith Counties. The primary industries for employment for

these counties surrounding the lake are education, healthcare and social assistance; arts, entertainment, accommodations and food services; retail trade; and manufacturing (US Census Bureau 2014).

Economic benefits received from the tourism industry are tremendous to the local economies. In 2012, Old Hickory Lake had 7,902,347 visits. The recreation industry that has developed in this region includes many businesses, such as marinas, boat repair shops, bait and tackle shops, eateries and diners, resort proprietors and vacation home builders, recreation watercraft dealers, etc. In 2012, visitation to Old Hickory Lake resulted in \$176.5 million in spending. Fifty four percent of these dollars were captured by the local economy (MSU and USACE 2012). These estimates are based on the Recreation Economics Assessment System (REAS), an economic input-output model developed for Corps projects. REAS is based on recreation visits and a set of economic ratios and regional multipliers. Additional discussion of this model and economic impacts associated with recreation are found in Section 2.15 of the Master Plan update.

Population statistics for the Old Hickory Lake region are provided in Table 8. Old Hickory Lake borders the very populated Davidson County as well as the very rural counties of Smith and Trousdale Counties. Nashville-Davidson-Murfreesboro (in Rutherford County)-Franklin (in Williamson County) is the “metropolitan statistical area”. Statistics have shown that 80 percent of the lake’s visitors live within a 50-mile radius of the lake.

**Table 8. Population Statistics for Old Hickory Lake Area**

	Sumner County	Trousdale County	Wilson County	Smith County	Davidson County	Tennessee
<b>Population</b> 2013 estimate	168,888	7,828	121,945	19,074	658,602	6,495,978
<b>% Pop Change</b> 4/1/10-7/1/13	5.1	-0.5	7.0	-0.5	5.1	2.4
<b>Housing Units</b> 2013	67,143	3,371	47,627	8,522	288,863	2,840,914
<b>Person Per Square Mile</b> 2010	303.4	68.9	199.7	61.0	1243.3	153.9
<b>Median Household Income</b> 2008-2012	\$55,560	\$43,613	\$61,353	\$44,116	\$46,676	\$44,140

Data obtained from US Census Bureau website

#### 4.9.2 Full Implementation of Proposed Master Plan Update

Full implementation of the proposed Master Plan Update would accurately reflect project facilities inventory and conditions. In addition this would allow allocation of resources to project facilities that are used most by project visitors. This in turn addresses socioeconomic benefits gained from project visitation. Municipalities in proximity to Old Hickory Lake receive economic benefits from visitors to the lake. Furthermore, the Master Plan updating process has solicited and incorporated comments from tourism and recreation managers in affected municipalities

and counties, as well as state officials who manage tourism. As project facilities are best managed to provide for recreation and environmental conservation, adjacent municipalities could continue to benefit from visitation.

#### **4.9.3 No-Action**

By implementing no action, the Master Plan would not be updated to accurately reflect current project inventories, classification, and future needs. Project facilities in need of reallocation would remain as outlined in the 1987 Master Plan Update. Therefore optimization of project resources would be limited. Economic benefits to surrounding municipalities would continue based on visitation to Old Hickory Lake.

### **4.10 Recreation Resources**

#### **4.10.1 Existing Conditions**

In addition to flood control and hydropower, recreation was added as an authorized purpose of Old Hickory Lake in 1944. There are many recreational opportunities at this project. Fishing, swimming, boating, hiking, picnicking, camping, and sightseeing are a few. Old Hickory Lake supports 59 recreation areas, 264 camping sites, 55 improved boat launching ramps, 231 picnic sites, 21 playgrounds, 10 swimming areas, 4 trail miles, 10 fishing docks, 8 marinas, 1498 marina slips and an archery range (USACE 2014). In addition the project has several outgranted areas identified for group camp facilities as well as environmental study areas where educational organizations can bring students for learning opportunities in an outdoor classroom setting. Additional information describing the various recreation areas is available in the Master Plan Chapter 5 and OMP Part II (2005). This area provides numerous other recreational opportunities to draw visitors to the region. Approximately 7.9 million people visit Old Hickory Lake annually; this visitation continually ranks in the top five most visited Corps lakes in the nation.

With limited funding sources available, operation and maintenance of recreational facilities has been challenging. This intensifies with increased population of this region and residential development surrounding the project area. As an effort to better use project facilities and meet the public's requests for recreation, the Nashville District Corps of Engineers developed its Recreation Excellence at Army Lakes (REAL) Program. Under this program, five recreation areas on Old Hickory Lake were outgranted to adjoining county governments. These actions were implemented to achieve more efficient use of intensively used areas while providing improved facilities and services to project visitors. In addition the Corps allowed concessionaires to assume maintenance responsibilities within their operating recreation areas in exchange for authority to charge reasonable fees for public launching and managed parking as a means to recoup their invested costs.

#### **4.10.2 Full Implementation of Proposed Master Plan Update**

Recreation needs of the visiting public would be better accommodated with implementation of a Master Plan Update. Reallocation of facilities and services would be reflected in the Master Plan by having an inventory and assessment that accurately reflects existing project facilities as well as those proposed to accommodate future needs and demands. If non-Corps entities expressed an interest to assume operation and maintenance of existing recreation facilities,

these requests would be considered. With this consideration would be a case by case evaluation, including NEPA compliance and further coordination.

#### **4.10.3 No-Action**

Provision of recreational facilities and services would continue at Old Hickory Lake without an update to the Old Hickory Lake Master Plan. However, the plan by which the Resource Manager and staff operate would not accurately reflect the current status of project facilities. Nor would there be additional measures in place, such as land use designations, to better accommodate recreational needs while protecting the natural resources.

### **4.11 Health and Safety**

#### **4.11.1 Existing Conditions**

Safety of project visitors and staff is highest priority in daily project operations. Facilities and recreational areas are routinely evaluated to ensure sites are safe for visitor use. In implementing the REAL program, safety is better achieved where resources are allocated to areas most needed. Project staff conducts numerous water safety programs and public announcements to educate children and project visitors about ways to be safe on the lake. In coordination with TWRA, water safety hazards and no wake zones are marked with buoys. Park Rangers provide visitor assistance and work with the state and county law enforcement agencies to ensure public safety. In addition to the Corps, TWRA and Metro Nashville/Davidson County Police provide water safety patrols on the reservoir.

#### **4.11.2 Full Implementation of Proposed Master Plan Update**

As status and classification of project land and facilities are revised and future needs and demands are outlined, resource staff at the reservoir would be more readily prepared to address health and safety issues with an update to the Master Plan. As outlined, health and safety of project visitors and staff have been considered in the analysis of current and future needs of project resources. Therefore, implementation of the update would assist resource staff in ensuring health and safety is addressed.

#### **4.11.3 No-Action**

Safety will remain highest priority for daily park operations. Projects and programs to promote visitor safety and awareness, and coordination with other Federal, state, and local agencies, would continue even with no implementation of a Master Plan Update.

### **4.12 Aesthetics**

#### **4.12.1 Existing Conditions**

The viewshed around Old Hickory Lake varies between its upper and lower reaches. The area closer to the dam is more heavily residential and has industrial development. The land acquisition policy in place when lands were acquired for the reservoir resulted in minimal federal lands being acquired and adjacent property owners having lands to or very near the water's edge. In addition, fifty percent of the lands of Old Hickory Lake are managed under the

Shoreline Management Plan and there are numerous individual boat mooring facilities along much of the lake's shoreline. Therefore these reaches appear more like private property. The upper reaches of the lake are in more rural development areas where agriculture still remains active.

Land development and conversion of lands to residential and commercial uses continues to grow in the area surrounding the Old Hickory Lake project and is encroaching along lands farther upstream in the project area.

#### **4.12.2 Full Implementation of Proposed Master Plan Update**

Requests for outgrants of project lands is quite common and growing yearly in popularity. Private, individual use facilities are managed through the Shoreline Management Plan. Implementation of the proposed Master Plan update would reduce potential impacts to the aesthetics of Old Hickory Lake through the designation of land use areas and amount and type of development allowed. By designating environmentally sensitive areas and limiting disturbance and potential uses of these sites, the aesthetic qualities of these areas would be maintained or enhanced.

#### **4.12.3 No-Action**

Old Hickory Lake project lands and waters would continue to be managed in accordance with the 1987 update. Without updating site characteristics and classifications, areas needing special attention for protecting aesthetics or opportunities to concentrate activities in areas already aesthetically disturbed could be more difficult. Federal lands of Old Hickory would continue to provide a buffer between commercial/residential development and the lake itself.

### **4.13 Cumulative Impacts**

Cumulative impacts would result from the incremental impact of the proposed action added to those of other past, present, or reasonably foreseeable future actions in the local area. Geographical boundaries for this discussion of cumulative impacts are Old Hickory Lake and counties the project lies within. Temporal boundaries established span from reservoir impoundment (1954) to fifty years future projection.

#### **Past and Present Actions**

The Cumberland River was impounded for the creation of Old Hickory Lake. Initially authorized purposes for construction were flood control and hydropower generation. Other project uses such as recreation; fish, wildlife, and natural resources management; and water quality have also placed a demand on project resources. Project purposes for recreation and associated natural resource management is the focus of the Master Plan Update.

Recreational usage of Old Hickory Lake has been tremendous due to proximity to metropolitan Nashville. Visitation to recreation areas has been steady and/or increasing. As a result, the reservoir contributes heavily to the local economy in visitor spending and local jobs. Associated with the high volume of visitation is use of recreational facilities. Many areas reach and sometimes exceed capacities for parking, camping and picnicking facilities. Boat traffic on the reservoir is often heavy, primarily during summer months and holidays such as Memorial Day, Fourth of July, and Labor Day. Not only have numbers of recreational users increased, but the type of recreational equipment being used has changed. Vehicles, such as campers and motor homes, have gotten larger, longer and truly can function as second homes given their amenities. With this, the electrical, water and sewage treatment demands at campgrounds

have increased to accommodate capacities. Boats have also gotten larger and faster. There has been an increase in demand for wider, longer ramps to accommodate launching these vessels.

Real estate policy in place at the time of impoundment for this project resulted in limited acquisition of lands above the normal pool elevation of 445. Additional lands were acquired for recreation in the 1960s. However, the public land managed by the Corps is a narrow fringe around Old Hickory Lake. These lands have been managed for recreation with establishment of day use areas, campgrounds, boat ramps, etc. or outgranted to entities to further provide recreational amenities (such as marinas). Most areas not actively managed for more intensive public use were designated for fish and wildlife management and have remained relatively undeveloped for natural areas or passive recreations. Outgrants were also established in some areas for agricultural use such as haying or cattle grazing. Long range management of the shoreline resources of Old Hickory Lake are established in the project's Shoreline Management Plan (SMP), an appendix to the OMP Part II. The plan provides definitive guidance and balances certain private exclusive uses of public resources (e.g. vegetation management, construction of shoreline structures, dredging and channel excavation for recreational use and shoreline stabilization) while protecting and restoring the natural environment. This plan undergoes review and revision, if applicable, every five years. The SMP was updated in 2014 and therefore is not part of this review.

In the areas immediately surrounding the public lands of Old Hickory Lake, there is quite a transition moving between the rural northern end of the lake to the metropolitan area along the southern border. Much of the land along the lower end has been converted to residential, commercial and industrial use. In contrast, much of the lands along the northern end of the lake are still timberland or pastureland with little residential or commercial development. This is evident in the socioeconomic statistics of Section 4.8 when comparing the five county area.

Old Hickory Lake is the most intensively used project for water supply in the Cumberland River basin. During the recent historic drought, in the summers of 2007 and 2008, significant impacts occurred to hydropower, navigation, and water quality due to a system-wide shortage of water. Water supply users were also negatively affected; however, withdrawals made by M&I users and Shoreline Management Plan licensees contributed to the project impacts. Water supply will continue to be a need for evaluation as well as an impact to be evaluated.

### **Reasonably Foreseeable Future Actions**

Urbanization surrounding the lake is expected to continue; however, the rate may be more moderate in the southern end due to the current level of buildout. Populations in the southern counties are expected to continue to rise as seen with recent trends (Table 8). If development were to continue the 'urban sprawl' northward, Trousdale and Smith counties would see land use changes; however in comparing population statistics between 2008 and 2012, both experienced declines as noted in Table 8. Nevertheless, pressures on the lake's resources are expected to continue. Carrying capacities for recreational facilities would continue to be maximized and/or exceeded, especially during summer months and holidays. In addition, damages such as water quality due to runoff, continued requests for outgrants, and encroachments on public lands are expected to continue and possibly become worse. Necessary precautions would need to be implemented to ensure the resources are not overused or damaged to an unacceptable level. The Master Plan Update is one tool that Resource staff implements to ensure optimal use of facilities and resources and conservation and protection of natural resources while providing recreational opportunities to the visiting public. Along with the Master Plan, project staff will continue to manage project resources in

accordance with project Operational Management Plans and Shoreline Management Plans; these documents will also continue to be evaluated and updated as necessary to provide the most effective management tools to balance resource protection and public use.

Climate Change. Climate change is a topic to be considered along with project area activities and factored into discussions for resource availability and potential impacts and consequences. Lands identified as vulnerable to extreme climate impact (flood and drought) would need to be managed to protect natural resources and human safety; this could include most, if not all, of Old Hickory project lands. Although information available for review specific to climate change varies, most will acknowledge similar expected trends. Noted generally for the Southeast section of the United States, thus applicable for the Old Hickory project area, temperatures are expected to increase over the next century. Regional average increases are expected between 4° and 8° F. With this is the projection of an average of an additional ten to twenty days per year where temperatures would exceed 95°F and an average of sixteen to twenty days less per year where temperatures would fall below 32°F (NCA 2014). These projections were calculated for years 2041 through 2070. Trends evaluated more directly to the Ohio River Basin estimate average temperature increases to be 5-7°F looking outward through 2055 (USACE 2015).

Views on changes in precipitation are less aligned among scientists than temperature changes (NCA 2014). Most will agree with projections of decreased amounts of precipitation and increased storm frequencies (USACE 2015, NCA 2014). Thus the rainfall that is received would be in more intense rainstorms, resulting in sudden and extreme flooding.

### **Effects**

As the area around Old Hickory Lake continues to experience pressure from residential development, terrestrial resources surrounding the reservoir become even more of a limited resource. With the loss of vegetated land area outside Corps boundaries, wildlife is likely to be concentrated in the remaining forested lands. In addition, more pressure is placed on the public lands for the facilities and amenities that are provided.

Water quality and aquatic resources within the lake have been termed as generally good. Land development, livestock, and coal mining are primary pollution sources. With the new technologies afforded by modern recreational vehicles, emissions and waste management and containment have improved. As development around the reservoir continues to increase, urban runoff will continue to be a source of pollution that could affect water quality of the lake. This increases the need to maintain the forested buffer surrounding the lake. With urban development and loss of pervious surfaces such as grass and trees comes loss of water being infiltrated into groundwater. This will place additional pressures on the reservoir, which is already experiencing heavy water uses and demands. Addressing water supply and how to meet increasing demands is a concern that will require comprehensive studies to address.

Factoring in consideration of climate change introduces additional management challenges. With expected warmer temperatures, scientists are expecting the range of non-native invasive plants to spread. Not only are invasive plants likely to increase in range, but disease-infesting pests such as hemlock woolly adelgid (*Adelges tsugae*), could also spread. One positive note here is that southern pine beetle epidemics have decreased, with this attributed to rising temperatures. Increase in algal growth that could affect water quality has been raised as a concern. (NCA 2014). Land and water management practices by the Corps at the Old Hickory project would continue to protect and conserve natural resources.

Water resources are expected to be further compromised with increased temperatures resulting in increased plant transpiration and soil and water evaporation plus expected population growth. There would be a loss of forested lands as they are converted to make room for the added population. Managing flashy storm events, potential flooding and surface water runoff, and likely water quality impacts associated with these events, is another challenge for land managers.

With the increase in residential development in the surrounding counties, visitation to Old Hickory Lake will continue to increase. Demands for recreational facilities will also continue to increase. Facilities will need continual repair and upgrade to satisfactorily meet visitor expectations. In addition there will be conflicting demands for recreational opportunities on the reservoir and project lands. The continued request for various uses of project lands by municipalities and other interests will also add more demands on the limited project lands and waters.

A Master Plan Update would provide a tool for the Resource staff of Old Hickory Lake to ensure natural resources and project facilities are being used to the greatest extent possible without degradation to the resources. Revising existing data to reflect current status and classification, as well as project future uses, demands and potential challenges, would better provide for accommodating demands for varying recreational opportunities while avoiding potential conflict.

## 5 ENVIRONMENTAL COMPLIANCE

Compliance with Federal Acts (Acts) and Executive Orders (EO) are summarized in Table 9. For those identified as “not applicable (N/A)” under Compliance, there would be no effect from implementation of Master Plan Update as it is a planning document. Future land and water use requests would be further evaluated in accordance with each Act and/or EO.

**Table 9. Federal Act/Executive Order Compliance**

<b>Act/Executive Order</b>	<b>Status</b>	<b>Compliance*</b>
Wetlands (EO 11990)	No effect	N/A
Prime/Unique Farmlands	No effect	N/A
Floodplain Management (EO 11988)	No effect	N/A
Clean Water Act		
Section 404	No effect	N/A
Section 401	No effect	N/A
NPDES	No effect	N/A
Fish and Wildlife Coordination Act	No effect	C
Endangered Species Act	No effect	C
National Historic Preservation Act	No effect	C
Environmental Justice (EO 12898)	No effect	C
Clean Air Act	No effect	N/A
Comprehensive Environmental Response Compensation and Liability Act (CERCLA)	No effect	N/A
Resource Conservation and Recovery Act (RCRA)	No effect	N/A
Wild and Scenic Rivers Act	N/A	N/A
Rivers and Harbors Act	No effect	N/A
Climate Change (EO 13653)	No effect	
*N/A—not applicable C--Compliant		

## **5.1 Fish and Wildlife Coordination Act**

The Corps is required to coordinate with the USFWS and TWRA under the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 USC 661 et seq.). Coordination is initiated with a scoping notice and continues with review of the EA. Comments received are summarized in Section 7.

## **5.2 Endangered Species Act**

The Endangered Species Act requires the determination of possible effects on or degradation of habitat critical to Federally-listed endangered or threatened species. Implementation of an updated Master Plan would benefit listed species. Individual requests for use of project lands would be evaluated and coordinated as necessary to ensure compliance with this Act.

## **5.3 Environmental Justice**

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, requires Federal agencies to promote “nondiscrimination in Federal programs substantially affecting human health and environment”. In response to this directive, Federal Agencies must identify and address disproportionately high and adverse human health and environmental effects of their programs, policies, and activities on minority and low-income populations. The final step in the environmental justice evaluation process is to evaluate the impact of the project on the population and to ascertain whether target populations are affected more adversely than other residents. Implementing the proposed Master Plan Update would not disproportionately affect minority or low-income populations. Project lands are available for use by all members of the general public.

## **5.4 Cultural Resource Requirement**

Compliance with the National Historic Preservation Act of 1966, as amended, and its implementing regulations at 36 CFR 800, require Federal agencies to take into account the affect of their undertakings on historic properties. Historic properties are any archaeological site, prehistoric or historic district, site, building, structure or object included in, or eligible for inclusion in, the National Register of Historic Places. The NHPA also requires Federal agencies to consult with State Historic Preservation Officers, and Indian Tribes who have an interest in the area, and the public. The NHPA also includes provisions that provide the Advisory Council on Historic Preservation an opportunity to comment on Federal undertakings.

This document is for planning purposes and does not propose specific ground disturbing activities. Therefore, there would be no effect to cultural resources with implementation of an updated Master Plan. Cultural resource inventories of unsurveyed land would occur if an activity is considered in a location where cultural resource information is lacking. When a request for use of project lands is presented to the Corps, the request would be evaluated, and inventories and evaluations performed as necessary, to ensure compliance with the NHPA.

# **6 SCOPING AND PUBLIC CONCERN**

## **6.1 Public Involvement**

Scoping letters were mailed to state and Federal governments with jurisdiction by law or special expertise and members of the public. (See Appendix for mailing list.) This EA, unsigned Finding of No Significant Impact (FONSI) and Master Plan Update are being circulated for a thirty-day comment period.

In addition a stakeholders group was identified to provide input into the most relevant and current issues surrounding Old Hickory Lake. This group consisted of local city and county officials, state and Federal agencies, and non-governmental organizations. This group met on July 30, 2014 and provided valuable information for developing the Master Plan Update.

An open house/public workshop will be held at the Old Hickory Lake Resource Manager's office to provide the public an opportunity to review and comment on the Master Plan Update.

## **6.2 Scoping Responses**

A scoping letter was issued on June 9, 2014. Comments received are summarized below; full comments are included in the Appendix. These issues have been addressed in this Environmental Assessment.

The Natural Resources Conservation Service provided a letter on July 3, 2014, advising of its role to provide technical and financial assistance to private landowners and local public entities to address agricultural land and natural resource issues. NRCS does not have any long term contracts to purchase permanent or 30-year agricultural easements in the project area. The agency's Emergency Watershed Protection Program provides assistance to public entities to stabilize streambanks and shorelines damaged by natural events has not, to date, been utilized in the Old Hickory Lake area.

## **6.3 Environmental Assessment Responses**

The Old Hickory Lake Master Plan Update, Environmental Assessment, and unsigned Finding of No Significant Impact are circulated for a 30-day comment period. Responses are summarized and all letters and transmittals will be included in the Appendix.

## **6.4 Master Plan Update Comments**

Comments to the Master Plan Update have been consolidated in Appendix D of the document. The update was made available for a public review period as well as the project hosting two workshops where the public was invited to meet with staff and provide comments.

## **7 CONCLUSIONS**

This Environmental Assessment did not reveal significant onsite impacts with the preferred alternative, full implementation of the proposed Master Plan Update. By adopting this preferred alternative, the resources at Old Hickory Lake would be allocated to best provide services for public recreation as well as ensuring environmental protection and conservation. In addition, classification and inventory would be updated to reflect the most accurate use of project lands. The Master Plan Update has evaluated past, present, and anticipated future uses of project lands and resources. Implementation of this proposed update would provide the best representation of how the project can best carry out its authorized purposes while ensuring best use and conservation of all natural, cultural, and man-made resources. Specific actions and requests for work within Old Hickory Lake project lands and waters would continue to be

evaluated on a case-by-case basis and all necessary coordination with Federal and state agencies with jurisdiction would occur to ensure project compliance.

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Assisting Author for Master Plan Update

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Principal Author of Master Plan Update

## APPENDIX

Environmental Assessment Review Responses  
Scoping Letter and Responses  
Mailing Lists

## Scoping Letter and Responses Mailing Lists

Initial scoping letter issued for this project, comments received during the 30 day review period and initial mailing lists are inserted in this section.



**DEPARTMENT OF THE ARMY**  
NASHVILLE DISTRICT, CORPS OF ENGINEERS  
Post Office Box 1070  
NASHVILLE, TENNESSEE 37202-1070

REPLY TO  
ATTENTION OF:

Project Planning Branch

**JUN 09 2014**

To All Interested Parties:

The U.S. Army Corps of Engineers (USACE), Nashville District, in accordance with the National Environmental Policy Act (NEPA), is preparing an Environmental Assessment (EA) to assess impacts of a proposed update to the Old Hickory Lake Master Plan. Old Hickory Lake, authorized for hydropower and navigation, is located near Nashville, Tennessee (Figure 1) and has more than 31,000 acres of land and water providing recreation and natural resources.

The original Old Hickory Master Plan was approved in 1954 and last updated in 1987. This document serves as a guide for coordination of project development and management of all project land and water resources. The intent of an updated Master Plan is to present a current inventory and assessment of resources, provide an analysis of resource use, and evaluate existing and future needs required to protect and improve the value of resources at Old Hickory Lake.

By way of this letter, we are soliciting public and agency comments concerning social and environmental issues that should be addressed. We encourage comments not only about project lands and waters, but also of plans or proposals for any other development that may impact or influence project resources.

The following alternatives will be evaluated: No action and updating the Master Plan. No Action means that there would be no supplement to the existing Master Plan and no new resource classification, assessment, and inventory would occur. Updating the Master Plan would mean permanent changes to the existing document.

USACE will prepare an integrated cultural resource management plan (ICRMP) for the Old Hickory Lake project to assist with the update of the Master Plan. The ICRMP will be developed through consultation with the State Historic Preservation Officer, American Indian Tribes, and other consulting parties, as appropriate.

This letter also serves to initiate public involvement that is an integral part of supplementing or updating Nashville District project master plans. This evaluation will not include the Old Hickory Lake Shoreline Management Plan (SMP) which outlines private land and water use and dock allocations. The SMP was reviewed in 2013-2014 and included public input; therefore, this management plan will not be revisited in the Master Plan update.

If you have any information, comments, or questions concerning the EA, please contact Kim Franklin by writing to the above address or calling (615) 736-7954. If you

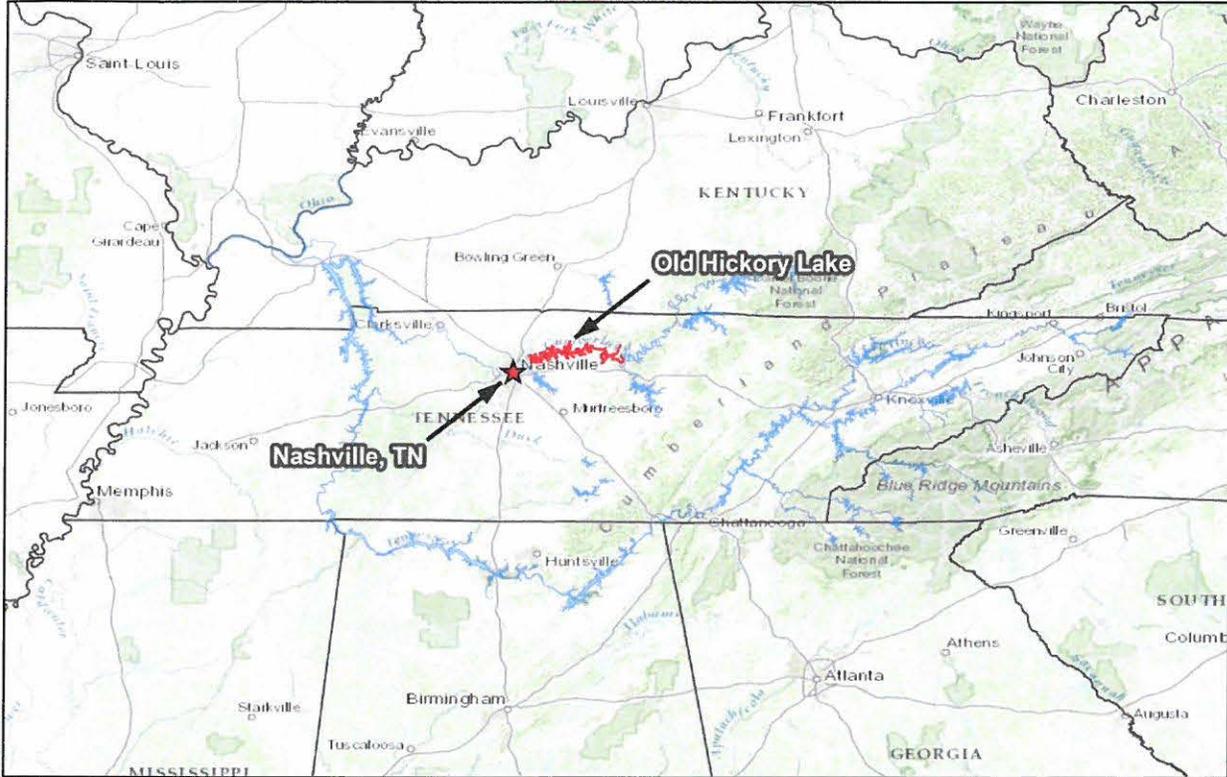


Figure 1. Old Hickory Lake Vicinity Map

have comments or questions specific to Old Hickory Lake, you can contact the Resource Manager's Office at (615) 822-4846. Please submit your comments no later than thirty days from the date of this letter to assure evaluation and inclusion in the process. Your participation is appreciated.

Sincerely,

for Russ L. Rote, P.E., PMP, CFM  
Chief, Project Planning Branch

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United States Department of Agriculture

Rec'd 7-7-14

July 3, 2014

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Dear Ms. Franklin:

Thank you for the June 9, 2014 notice of the U.S. Army Corps of Engineers' (USACE) initiation of an Environmental Assessment to update the Old Hickory Lake Master Plan. The Natural Resources Conservation Service (NRCS) in Tennessee provides technical and financial assistance to private landowners and public (city or county) entities to address agricultural land and natural resource issues. Programs of the 2014 Farm Bill allow NRCS to apply conservation practices that reduce off-farm runoff impacts, protect sensitive resources such as wetlands and wildlife habitats, and respond to natural events.

Regarding plans or proposals that may impact or influence Old Hickory Lake resources, NRCS does not have any long-term contracts to purchase permanent or 30-year agricultural easements in the project area. The agricultural conservation easement program (ACEP) allows NRCS to conserve agricultural lands and wetlands for their related future benefits. This program is available statewide and can be used to provide long-term conservation of agricultural lands in the Old Hickory Lake project should that resource be raised during the project update.

The Emergency Watershed Protection (EWP) Program provides assistance to public entities to stabilize streambanks and shorelines damaged by natural events such as floods. Regarding the integrated cultural resource management plan (ICRMP) of the Master Plan, NRCS coordinates with the Tennessee State Historic Preservation Office (SHPO) to evaluate EWP project impacts. EWP is event-driven and available to counties within the Old Hickory Lake vicinity. To date, EWP has not been utilized in the Old Hickory Lake area.

If you need additional information about NRCS activities in the project area, please contact Frank Sagona at [frank.sagona@tn.usda.gov](mailto:frank.sagona@tn.usda.gov) or (423) 894-1687, Extension 100.

Sincerely,

A handwritten signature in blue ink that reads "Kevin Brown, Acting".

KEVIN BROWN  
State Conservationist

Natural Resources Conservation Service  
675 US Courthouse, 801 Broadway  
Nashville, Tennessee 37203  
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## Environmental Assessment Review Responses

Comments received during the 30 day review period are inserted in this section.