

**Catawba-Wateree Hydro Project (FERC No. 2232)**  
**Study Plan**

**Study Plan Name:** Floodplain Vegetation Assessment

**Study Plan Designation:** Terrestrial 02

**Study Short Description:** Inventory floodplain vegetation within the Project boundary and areas within the zone of Project influence (fluctuation zone)

**Applicable Hydro Projects/Developments:** Limit inventory to zone of operational influence associated with Bridgewater Development, Oxford Development, Wylie Development, Wateree Development and the Wateree River downstream of Lake Wateree (see Section III for details).

**Prerequisite Study Designation:** None

**I. Study Objective**

The objectives of this botanical study are to: 1). Identify and delineate the floodplain areas within the zone of operational influence of the river reaches; 2). Classify and characterize the vegetative species composition and structure of the floodplain areas within the zone of operational influence of the river reaches; 3). Qualify and quantify the relationship between floodplain vegetation and existing hydroperiods; 4). Assess the effects of project-related current and any proposed hydropower operations (e.g., river fluctuations and stage changes) and connectivity on the designated floodplain areas; and 5). Provide information to assist in developing any potential protection, mitigation, and enhancement (PM&E) measures.

This study will also provide information needed to support several other relicensing studies including:

- A Project-wide vegetation cover map
- Great Falls Bypass Vegetation (Terrestrial 03)
- Wetland Delineation and Mapping (Terrestrial 01)
- Hydrologic/Hydraulic Operations Model (Operations 01)
- RTE Habitat Survey (Terrestrial 04)
- Migratory Bird Survey (Terrestrial 05)

**II. Basis**

This floodplain study will provide information on the location and distribution, vegetative species composition and structure, classification, and relative condition of the existing floodplain communities within the zone of operational influence along the river reaches as required by 18 CFR 4.51 (f). This information will provide the basis for evaluating any potential Project effects on these resources which will be provided in Exhibit E of the License application. These items are required under NEPA and are required for license review under the Federal Power Act.

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### III. Geographic and Temporal Scope

The field work and analysis of this study will focus on only those designated floodplain areas directly affected by Project operations. The study will include those applicable reservoirs, bypasses, tailwater and downstream riverine areas within FERC Project boundaries and additional areas determined to be within the lateral zone of influence for the following developments:

- Bridgewater Development (including the Old Catawba River channel)
- Oxford Development
- Wylie Development
- Wateree Development
- Zone of project influence on the Wateree River downstream of Lake Wateree to the Congaree River confluence

Duke will review the FEMA floodplain maps in association with any additional reservoirs and any reservoir tributaries within the project influence.

This study will be conducted within the 2004 growing season between mid-April through mid-October.

### IV. Summary of Existing Data

There is little specific data associated with the floodplain characteristics in the designated river reaches. However, information sources such as the FEMA 100-year floodplain maps, National Wetland Inventory maps (NWI), county soil surveys, and any existing Duke Power aerial photography will be used to locate and delineate floodplain areas. Duke Power currently has Year 2000 true color, digitally orthorectified photography at a 1:10,000 scale for most of the Project.

### V. Methodology

The following methods will be used to delineate, evaluate, and analyze the designated floodplain areas. This study will focus on the four areas associated with the zone of operational influence within the river reaches for the above mentioned developments.

#### Task 1 – Identify and Delineate the Floodplain Areas within the Zone of Operational Influence of the River Reaches

- Initial determination of overall floodplain areas will be conducted through the use of existing information such as the FEMA 100-year floodplain maps, USGS 7.5 minute quadrangles, NWI maps, soil surveys for Burke, Alexander, Catawba, and Mecklenburg counties in North Carolina, and York, Lancaster, Kershaw, Chester, Fairfield, Richland, and Sumter counties in South Carolina, through the use of recent aerial photography, and through use of the relicensing Cheops model. Additional aerial photography may be required for this study. This information will be transferred and digitized into the Geographic Information System (GIS) and preliminary floodplain extent maps will be prepared.
- To the extent it can be practicably determined, the downstream and lateral zone of Project influence within each designated floodplain area will be determined by Project hydrologists through analysis of hydrologic data from the Duke Power Hydro Central (hydrographs),

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deployment of additional level loggers, available flow models, stage discharge curves, IFIM or similar studies (e.g., wetted perimeter) and any pertinent U.S. Geologic Survey (USGS) river gages or other gage records. This information will be entered in the GIS database created in the preceding sub-task to show the zone of operational influence within the larger 100-year floodplain area. The floodplain boundaries, especially the zone of lateral influence will be determined in early 2004. This GIS floodplain overlay will also be incorporated into an overall habitat or cover type map detailing all the habitat areas found in the project area or influenced by the project. This overall habitat map will incorporate wildlife information gathered from the resource studies including attribute list data on representative and indicator wildlife species for each habitat type, habitat preference, and related wildlife guild (groups of species using the same habitats). An impact analysis will include a summary of existing literature, a matrix of each habitat/wildlife guild (e.g., bottomland forest wildlife guild), and a discussion on the seasonal effects of the project on each guild (see Attachment A for guild examples).

- Based on these preliminary floodplain maps, field surveys will be conducted to more accurately delimit the zone of operational influence within the floodplain. These surveys will assess the zone of operational influence within Project boundaries and also the estimated zone of downstream and lateral influence (i.e., out of bank flooding). Field indicators such as signs of inundation (e.g., silt stained leaves and rafted debris), water marks on trees, and soil type will also be used as supplemental information to determine the zone of operational influence.

#### Task 2 –Classify and Characterize the Floodplain Areas within the Zone of Operational Influence

The classification and characterization of existing floodplain botanical communities will involve several subtasks as described below. This task will be used to provide information and help identify representative floodplain vegetation communities.

- Using the preliminary floodplain maps prepared in Task 1, field assessments will be conducted to determine the composition and distribution of vegetation within the zone of operational influence. The types of data to be collected includes general cover type information associated with the herb, shrub and tree layers, the dominant species, and the vegetation zonation and distribution. The vegetation zonal concept (Wharton et. al., 1982) is important in describing the average percentages of the growing season during which saturated soil conditions occur in the various zones from permanently flooded (Zone 1) through the bottomland hardwood floodplain (Zones 2-5) to the adjacent upland. The relative flooding percentages and associated vegetation has been found to be accurate in depicting community characteristics. The flood tolerance index of the representative vegetation (typically canopy trees) also provides an indicator of the hydrologic regime. The zone of operational influence areas identified in Task 1 will also be verified during this task.

To accomplish this task, vegetation transects will be established in areas associated with each designated floodplain area. The transects and associated multiple sample plots along the transect and throughout the five vegetation zonal areas (where applicable) will be determined by the Project scientists, as well as consultation with any interested agency representatives. In the floodplain areas, transect locations will be determined through stratified random sampling. The representative transects will be located in floodplain areas that are both floristically and structurally diverse in an effort to gather the most information possible and to provide a comparison of cover types, elevations, and their relationships to factors such as inundation magnitude, duration and frequency. The number of transects within each representative

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floodplain area will be determined based on the information obtained in Task 1 and will be adequate to determine the variation in species composition and strata within each site.

The vegetation transects will be located perpendicular to the river flow and shoreline and will start at the shoreline and extend upslope the full extent of the zone of operational influence and terminate approximately 50 feet outside of the boundary, if applicable. Sample plots will be established along the transects to collect quantitative information to characterize the floodplain vegetation. The distance between the plots and the number of sample plots along the transects will be determined by the homogeneity of vegetative communities (vegetation zones) and the relative width of the lateral zone of project influence. Two different sample plots will be used and are as follows:

- 1). To collect information on tree and shrub species, canopy and sub-strata cover, and tree size (dbh), a 10 meter radius plot will be established along the transect. The information collected, through use of a standard field form, will include percent cover by strata, dominant species, height of canopy and/or strata, elevation above shoreline, distance from edge of bank, amount of seedling reproduction/recruitment, amount of downed woody debris, and amount of leaf litter; and
- 2). Nested plots of four meter radius will be used for shrubs and a one meter radius plot will be used to sample the herbaceous vegetation

Other general information gathered at along the transects will include wildlife observations and sign (along with a list of representative and indicator species and the specific habitats), general health of community, evidence of erosion, and site quality conditions. An Abney™ level and surveyor's stadia rod and/or GPS will be used to measure the range in elevation and overall slope of the floodplain, as well as the locations, along each transect. Floodplain communities will be classified through use of the North Carolina, South Carolina natural community classifications (Nelson 1986; Schafale and Weakly 1990), and the NatureServe community classification (NatureServe 2001), and mapped via the GIS.

- A determination of the inundation phenology (season inundated), duration (percentage of time inundated), magnitude (extent or depth in which inundated), and frequency (number of inundation times per unit time) will also be conducted in this task with the objective of determining and predicting water surface elevations for the current discharges in association with the floodplain vegetation community requirements.

#### Task 3 – Determination of Project Effects

The objective of this task is to assess and summarize the effects of the current and any reasonable future water regimes resulting from Project operations on the floodplain areas within the zone of operational influence for the four developments. The current condition of habitats within the zone of operational influence will be assessed through their vegetative structure, species composition, evidence of disturbance, distribution within the floodplain, presence of representative plant and wildlife species, and the presence of non-native or invasive plant species. These factors will be related to the existing water regime to assess potential Project effects. This assessment will incorporate a spatial analysis using GIS overlay maps of vegetation cover-types, inundation characteristics, topographic contours, and other relevant information. Cross-sections will also be prepared for each of the transects depicting the normal pool or ordinary high water elevation, maximum/minimum drawdown levels, distance along the transect,

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vegetation relative abundance, and substrate types. The elevational cross-sections at the representative transects will be used as a predictive model that relates water level, duration, frequency, magnitude, and seasonality (timing) to the specific floodplain types. The calibrated hydrodynamic computer model (River Modeling System, v4, Hauser, 2003) will be used in the major floodplain areas (e.g., Wateree River floodplain) to determine the extent, frequency, magnitude, and duration of inundation and the relation to project operations. This information will be used along with the digital elevation model (DEM) based aerial photography (2 foot contours) and the GIS overlay maps. The impact analysis will be presented in both graphic and tabular form.

**Task 4 - Prepare Technical Report**

A Draft and Final technical report will be prepared for this Project that includes the following elements:

- a) Project Introduction and Background
- b) Study areas;
- c) Methodology;
- d) Discussion and Analysis
- e) Results (includes impact discussion)
- f) Location maps, GIS analysis and photos;
- g) Any agency correspondence and or consultation;
- h) Literature citations

**VI. Schedules and Required Conditions**

The schedule, timeline and required conditions for this project area as follows:

- Task 1 Identify and Delineate the Floodplain Areas Early Spring 2004
- Task 2 Classify and Characterize Floodplain Areas Spring-Fall 2004\*
- Task 3 Determination of Project Effects Fall 2004
- Task 4 Prepare Technical Report Fall/Winter 2004 and Winter 2005

\* the Task 2 field component of the study will be conducted to coincide with the normal Piedmont stream flooding phenology so adequate data is collected during the appropriate periods (e.g., March-April and October).

**VII. Use of Study Results**

This study and associated results will provide both quantitative and qualitative information that will be important in characterizing existing conditions as well as providing any information on Project impacts as they related to preparation of the License Application and specifically Exhibit E. The technical report will provide sufficient information for development and incorporation into any associated NEPA documentation. The floodplain information associated with the technical report can also be used as a basis for any future PM&E discussions.

**VIII. Study Participants**

	<b><u>Name</u></b>	<b><u>Organization</u></b>	<b><u>Phone #</u></b>	<b><u>E-Mail</u></b>
<b>Applicant Lead</b>	Jay Wylie	Devine Tarbell	704 342 7376	Jay.Wylie@devinetarbell.com

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		& Associates		
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<b>Other Participants</b>				

**IX. List of Attachments**

Attachment A: Example Wildlife Guilds

**X. List of References**

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**ATTACHMENT A**

**EXAMPLE WILDLIFE GUILDS  
FOR USE IN IMPACT ANALYSIS**

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**CATAWBA-WATEREE TERRESTRIAL WILDLIFE SPECIES GUILDS  
WITH SEASONALITY OF HABITAT USE**

**BOTTOMLAND HARDWOOD FLOODPLAIN WETLANDS (PIEDMONT)**

Known from study area? (x)	Relative Abundance	Seasonal use of Habitat	Scientific Name	Common Name	Habit Requirements / Notes	Potential Project Impacts
x	c	Sp Su F W	<i>Odocoileus virginianus</i>	White-tailed Deer	White-tailed deer are at home in many of the natural communities of the region. Prime habitat is broken areas of re-generating forest with cropland interspersed throughout.	Increased recreational use of the project area by humans (i.e. access for hunting) has the potential to affect this species negatively causing them to seek other suitable area with less human activity.
x	c	Sp Su F W	<i>Procyon lotor</i>	Raccoon	Associated with wetland habitats and stream corridors.	High water events have the potential to reduce the available suitable habitat for this species impacting food and den site availability.
x	c	Sp Su F W	<i>Castor canadensis</i>	Beaver	Typically found along small wooded streams which it dams to form small impoundments called beaver ponds. Also found in large rivers and lakes where it often forms bank dens as opposed to open water lodges when it forms an impoundment of its own.	Extremely low water events have the potential to de-water bank den sites. This could expose this species to additional predation lowering population levels.
x	c	Sp Su F	<i>Sciurus carolinensis</i>	Gray Squirrel	The preferred habitat of gray squirrels is extensive tracts of mature forests of oaks, hickories, and	High water events during the winter months could potentially inundate stored food sources causing increased mortality rates and lowered reproductive

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		W			beeches mixed with other hardwoods and various species of conifers.	success.
x	c	Sp Su F	<i>Eptesicus fuscus</i>	Big Brown Bat	This species is normally a forest dweller, but it does not hesitate to utilize attics and crevices in buildings, caves, and crevices in rocks for daytime retreats. Favorite roosts are under the loose bark of dead trees and in cavities of trees. These bats emerge rather early in the evening and feed among the trees, often following a regular route from one treetop to another and back again.	Extremely dry years could lower water levels within the project area causing lower production of preferred food sources forcing this species to abandon roost sites within the project area and relocate to areas with better food sources.
x	c	Sp Su F W	<i>Scalopus aquaticus</i>	Eastern Mole	Eastern moles prefer moist, sandy, or loamy soil. They occur in meadows, gardens, cultivated fields, river bottoms, mountain slopes, and forests.	High water events have the potential to inundate the tunnel system and nests of this species forcing relocation to higher ground outside the project boundary within suitable soil types.
	u	Sp Su F W	<i>Blarina carolinensis</i>	Southern Short-tailed Shrew	Short-tailed shrews occur in forested areas and their associated meadows and openings. Adequate cover and food appear to be more important in determining their presence than type of soil or vegetation.	High water events have the potential to inundate the tunnel system and nests of this species forcing relocation to higher ground outside the project boundary.
	u	Sp Su F W	<i>Sorex longirostris</i>	Southeastern Shrew	The Southeastern Shrew prefers floodplain forests and the borders of swamps. It has also been found in dry upland locations, including fields and pastures.	High water events have the potential to inundate the tunnel system used by this species forcing relocation to higher ground outside the project boundary.
x	c	Sp Su F W	<i>Didelphis virginiana</i>	Virginia Opossum	The species is present in a wide variety of habitats from relatively dry upland areas to those of considerable wetness, but it prefers wooded bottomlands near streams, ponds, swamps, and other sources of water.	Increased recreational use of the project area by humans (i.e. access for hunting) has the potential to affect this species negatively causing them to seek other suitable area with less human activity.
x	c	W	<i>Anas platyrhynchos</i>	Mallard	Typically found in marshes, rivers, lakes, wooded swamps and bays with shallow water where it is able to	High water events can inundate food sources necessary for this dabbling duck; Low water (de-watering) events can cause food sources to be

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					dabble	dried out.
x	c	Sp Su F W	<i>Aix sponsa</i>	Wood Duck	This species is typically found in wooded swamps, rivers and ponds.	Low water events can cause the necessary bottomland hardwood forests that are usually flooded providing suitable habitat to be dry; This can also concentrate birds on the remaining suitable habitat exposing larger concentrations of birds to predators.
x	c	Sp Su F W	<i>Scolopax minor</i>	American Woodcock	This species is found in damp woods or older thickets, with moist soil where earthworms are easily found. It prefers areas with woody vegetation for singing grounds, and feeding areas with cover or near forest edges as opposed to large, open areas. They nest in a variety of habitats such as open fields, mixed forests, bushfields, and coniferous forests. It is a forest-dwelling shorebird, and is less aquatic than most of its relatives, though it still often frequents bottomlands and wet meadows.	The flooding of foraging habitat (i.e. damp areas with earthworms present) as well as nesting habitat through extreme water level fluctuations can cause negative stress for this migratory game bird.
x	c	Sp Su F W	<i>Meleagris gallopavo</i>	Wild Turkey	This is a species of woods, especially hardwood forests, and wooded swamps.	High water events can have a potential negative impact on this species by inundating favored food sources such as seeds, nuts, acorns, buds, and berries; especially during the fall.
x	c	Sp Su F W	<i>Buteo lineatus</i>	Red-shouldered Hawk	This species is typically found in woodlands, wooded rivers, and timbered swamps.	This raptor can be negatively impacted by the project in an indirect way; by impacting its prey including small mammals, the largest of these being rabbits and squirrels as well as reptiles, such as snakes, amphibians, including toads, frogs and lizards, small birds and large insects.
x	c	Sp Su F W	<i>Strix varia</i>	Barred Owl	This species is typically found in woodlands, wooded river bottoms, and wooded swamps.	This raptor can be negatively impacted by the project in an indirect way; by impacting its prey including meadow voles its main prey, followed by shrews and deer mice. Other mammals include rats, squirrels, young rabbits, bats, moles, opossums, mink, and weasels. Birds are taken occasionally, including woodpeckers, grouse,

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						quail, jays, blackbirds, and pigeons. They also eat small fish, turtles, frogs, snakes, lizards, crayfish, beetles, crickets, and grasshoppers. The project could potentially negatively affect all of these species thereby affecting the barred owl.
x	u	Sp Su F	<i>Caprimulgus carolinensis</i>	Chuck-Will's-Widow	This species is typically found in pine foresees, river woodlands, and wooded groves.	This species could be negatively impacted by the project through water fluctuations affecting insect populations, its main food source.
x	c	Sp Su F	<i>Prothonotaria citrina</i>	Prothonotary Warbler	This species inhabits wooded swamps, flooded bottomlands, riparian corridors along rivers.	This species could be negatively impacted by the project through water fluctuations affecting insect populations, its main food source.
x	c	Sp Su F W	<i>Nerodia sipedon sipedon</i>	Northern Water Snake	This species of snake is at home in almost any aquatic habitat including swamps, marshes, bogs, streams, ponds, lakes and their adjacent habitats.	The northern water snake would most likely be impacted by the project in an indirect way: through lowering populations of prey species due to water fluctuations affecting those species breeding habitats (frogs, salamanders, insects, crayfish, and small mammals).
	u	Sp Su F W	<i>Eurycea guttolineata</i>	Three-lined Salamander	Usually found in swamps, wet ditches, and seepages along springs, and in forested floodplains throughout all of North Carolina.	The project has the potentially negatively affect on this species through de-watering the breeding and larval-stage habitats causing lower reproductive success and increased mortality.
x	c	Sp Su F W	<i>Rana palustris</i>	Pickerel Frog	Pickerel frogs commonly inhabit cool, wooded streams, seeps and springs although they are also found in many other habitats. In the South, it can also be found in the relatively warm, turbid waters of floodplain swamps. These frogs tend to wander far into grassy fields or into weed-covered areas in the summer.	The project has the potentially negatively affect on this species through de-watering the breeding habitat (permanent and semi-permanent pools) causing lower reproductive success.

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**CATAWBA-WATEREE TERRESTRIAL WILDLIFE SPECIES GUILDS  
WITH SEASONALITY OF HABITAT USE**

**BOTTOMLAND HARDWOOD FLOODPLAIN WETLANDS (COASTAL PLAIN)**

Known from study area? (x)	Relative Abundance	Seasonal use of Habitat	Scientific Name	Common Name	Habit Requirements / Notes	Potential Project Impacts
x	c	Sp Su F W	<i>Sus scrofa</i>	Wild Pig	Wild pigs are most often associated with bottomland hardwood forests along coastal plain rivers.	Extreme flows (high or low) have the potential to reduce the available food sources; lowering reproductive success.
x	r	Sp Su F W	<i>Mustela vison</i>	Mink	Never far from water (Semi-aquatic); has associated with most types of wetlands.	The dewatering of wetland habitats would reduce the total available usable habitat in the project area; thereby reducing the total number of individuals.
x	c	Sp Su F W	<i>Procyon lotor</i>	Raccoon	Associated with wetland habitats and stream corridors.	Extreme flows (high or low) have the potential to reduce the available den sites and food sources; lowering reproductive success.
x	r	Sp Su F	<i>Ursus americanus</i>	Black Bear	Black bears are most often found in swamps and bottomland hardwood forests. This species needs large	Increased recreational use of the project area by humans has the potential to affect black bears negatively causing them to seek other suitable area

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		W			areas of refuge generally with thick forest cover inaccessible to humans.	with less human activity.
x	c	Sp Su F W	<i>Peromyscus gossypinus</i>	Cotton Mouse	The cotton mouse favors lowland deciduous forests, cane and cypress swamps, thickets, and river floodplains, but also inhabits upland pine-hardwood forests, buildings, and scattered piles of vegetation in clear-cut forests.	Extreme high water events have the potential to inundate nest sites causing lower reproductive success.
	r	Sp Su	<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared bat	This species prefers to roost in dilapidated houses and buildings near permanent water; however, specimens have been found in hollow trees, behind loose bark, or at the entrances to caves and mines.	Extremely dry years with limited flow releases and little or no floodplain inundation have the potential to limit the food source of this species.
	r	W	<i>Myotis austroriparius</i>	Southeastern Myotis	This species prefers to roost in buildings, hollow trees, and sewers. Roost sites are always near rivers or other permanent bodies of water.	Extremely dry years causing limited flow releases and little or no floodplain inundation have the potential to limit the food source of this mammal.
x	c	W	<i>Lophodytes cucullatus</i>	Hooded Merganser	Typically found in wooded lakes, ponds and river where fish are present.	The project has the potential to increase hunting opportunities (an access issue); thereby increasing mortality rates.
x	c	Sp Su F W	<i>Ardea herodias</i>	Great Blue Heron	Associated with marshes, swamps, shores and tide flats as well as bottomland hardwood forests for nesting.	Low water levels in the project have the potential to de-water the normally shallow water areas needed by this species for feeding causing negative impacts.
x	c	Sp Su F W	<i>Eudocimus albus</i>	White Ibis	Barriers, marshes, spoil islands on the coast, and islands in inland lakes are the preferred nesting sites for the White Ibis. These sites are in interior and coastal wetlands, in environments ranging from bottomland hardwood forest to outer coastal plain forest, savanna, prairie parkland, and prairie bushland.	Low water levels in the project have the potential to de-water the normally shallow water areas needed by this species for feeding causing negative impacts.
x	r	Sp Su F W	<i>Haliaeetus leucocephalus</i>	Bald Eagle	This species is typically found in association with coasts, rivers, and large lakes and nests in tall trees adjacent to these habitats.	Bank erosion associated with extremely high flow releases has the potential to undercut banks potentially causing shoreline nest sites to collapse.

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x	c	Sp Su F W	<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	This species is typically found in wooded savanna, open woodlands, bottomland hardwood forests, orchards, suburbia, and agricultural lands. Preferred habitat includes dead trees for use as nest sites, relatively open undergrowth, and access to the ground for foraging.	High water levels have the potential to inundate ground foraging areas limiting feeding areas within the project area.
x	u	W	<i>Sphyrapicus varius</i>	Yellow-bellied Sapsucker	Yellow-bellied Sapsuckers live in northern deciduous and mixed coniferous forests in summer. During winter they live in forests, including bottomland hardwood forests and various semi-open habitats.	Extreme fluctuations in water levels have the potential to cause bank side cavity trees to fail or topple over. This species would then have to construct a new cavity nest expending large amounts of energy at a critical time in the breeding period.
x	c	Sp Su F W	<i>Corvus brachyrhynchos</i>	American Crow	This species is typically found in woodlands, farmland, agricultural fields, river groves, and shores	The project is likely to have few if any negative effects on this highly adaptable species.
x	c	Sp Su F	<i>Tyrannus tyrannus</i>	Eastern Kingbird	This species is typically found in wood edges, river groves, farms, shelter-belts, orchards and many other habitats	Extremely dry years with limited flow releases and little or no floodplain inundation have the potential to limit the food source of this species.
x	c	Sp Su F	<i>Piranga rubra</i>	Summer Tanager	This species is typically found in woods and groves and is often times found in river bottom forests.	The project could potentially affect this species by causing its preferred food source (bees, wasps, etc.) to be limited forcing it to find other suitable locations with more food sources.
x	c	Sp Su F	<i>Prothonotaria citrina</i>	Prothonotary Warbler	This species inhabits wooded swamps, flooded bottomlands, riparian corridors along rivers.	This species could be negatively impacted by the project through water fluctuations affecting insect populations, its main food source.
x	u	W	<i>Spizella arborea</i>	American Tree Sparrow	This species is typically found in arctic scrub and willow thickets during the breeding season; and brushy roadsides, weedy edges, marshes and wet hardwood forests.	Extreme high water events have the potential to inundate nesting sites (at or near ground level) of this species lowering reproductive success.
x	c	Sp Su F W	<i>Agkistrodon piscivorus piscivorus</i>	Eastern Cottonmouth	This is a snake of southern lowlands, a denizen of swamps, lakes, and river margins.	The project has the potential to conduct water pollution (point and non-point source pollution) into the home range of this sensitive species possibly causing habitat degradation.

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	c	Sp Su F W	<i>Liren intermedia</i>	Lesser Siren	This species spends daylight hours burrowed in debris that accumulates at bottoms of ditches, ponds, pools and other shallow bodies of water.	A water level fluctuation (de-watering egg sites) during the breeding period (spring) has the potential to reduce or eliminate reproductive success during any given year.
	c	Sp Su F W	<i>Nerodia erythrogaster</i>	Redbelly Watersnake	This species is at home on the river swamps and numerous other aquatic habitats of the southeast. This species often wanders well away from water in hot, humid weather.	The project has the potential to conduct water pollution (point and non-point source pollution) into the home range of this species possibly causing habitat degradation and lowering the availability of favored food sources (frogs, tadpoles, and small fish).