River Trail Ecology

Hike the white trail along the Middle Oconee River and take this guide to learn more about Georgia's piedmont floodplain forest. Look for the numbered metal plates that correspond to stops in the guide. When you see a plate, take a moment and read the corresponding text in the brochure.

The Oconee River

The river you are hiking along, is the Middle Fork of the Oconee River. The Middle Fork joins with the Upper Fork only a few miles downstream from here to form the Oconee River. The Oconee is one of Georgia's major piedmont alluvial river systems.

The name Oconee comes from a Native American village located along the banks of the Oconee River in what is present day Baldwin County, Georgia. The word Oconee means "place of the skunk" in Hitchiti.

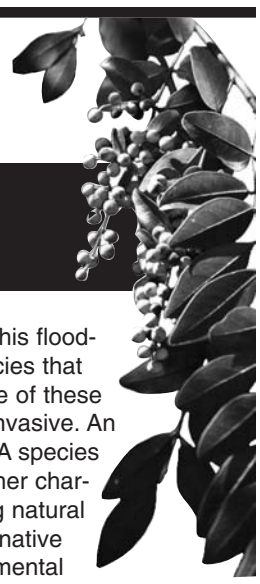
The headwaters for the Oconee are in Hall County. Both the Upper Oconee and the Middle Oconee flow from Hall County. Their confluence is 6 miles south of Athens at Whitehall Forest in Clarke County. After the confluence of the 2 rivers, the Oconee runs freely for about 20 miles until it reaches the upper end of Lake Oconee, which is created by Wallace Dam. Below Wallace Dam is Lake Sinclair formed by Sinclair Dam. After Sinclair Dam, the Oconee flows relatively uninterrupted for 143 miles, where it joins with the Ocmulgee River to from the Altamaha River. The Altamaha is Georgia's largest river and it empties into the Atlantic Ocean near Darien.

The dams mentioned above create two lakes. These lakes provide great recreational places for boating, fishing, swimming, etc. The dams that create these two lakes are used to produce electricity. While there are many attributes to the lakes, there are some definite ecological downfalls. Anytime a river is obstructed with dams or other structures it changes the natural flow of the river. Not only does it change the amount of water that flows through the channel, but it also alters the natural flow of organisms up and down the river. There are fish species that inhabit our rivers that have similar life cycles to some of the salmon species in the west. They spend some of their time in the ocean and then come to the rivers to spawn. Before the damming of many of our rivers there were records of huge fish migrations during the spawning season. These migrations were especially important to Native Americans. Because of the damming of our rivers, many of these species have become rare and some are endangered.

Floodplain Dynamics

Much of the trail you are hiking on traverses the floodplain of the Middle Oconee. The floodplain is really the high water channel of the river. "Flooding" has a negative connotation, but it is a very natural part of this ecosystem and is vital to the river's health. Although it may vary from year to year, on average Piedmont rivers flood four times a year during winter and early spring. These periodic inundations are rejuvenating for the floodplain forest and very important for the natural communities downstream. As rainfall increases, the river begins to flow faster and faster, carrying with it a large load of sediment. When enough rain falls, the river flows out into the floodplain. This process slows the river and allows much of the sediment to be deposited into the floodplain forest. The floodplain forest acts as a filter for the bay and estuary downstream helping to reduce the amount of toxins, pollutants and sediment. Estuaries, found where freshwater rivers empty into the ocean, are a fragile mix of fresh and salt water. Without the river's flooding, the estuary would be overwhelmed with large intrusions of sediment filled freshwater four times a year. This would disturb the delicate balance of the estuary.

The deposition of sediment into the floodplain forest is a major factor in the productivity of this forest system. Bottomland forests are the most productive systems in the southeastern United States, and only tropical rainforests compare with these forests in terms of productivity.



Invasive Species

Several plant species found in this floodplain ecosystem are exotic species that are not native to the area. Some of these exotic species are considered invasive. An invasive species is defined as "A species that, through rapid growth or other characteristics, is capable of altering natural ecosystems to the detriment of native species." One of the most detrimental invasive species found in this region is Chinese privet. The seeds of the species float and are carried downstream by the river and throughout the floodplain by seasonal floods. Birds also help disperse the seeds. This plant forms dense thickets that choke out native vegetation and shade out native groundcover. The U.S. Forest Service is currently conducting a project here at the Garden to determine effective ways of getting rid of this plant species in the natural environment. Plots have been cleared and different types of herbicides are being tested.

Floodplain Birdlife

Prothonotary Warbler
As you hike along the river during the spring and summer months, look for one of the most beautiful floodplain inhabitants – the Prothonotary Warbler. These bright yellow songbirds are sometimes referred to as "swamp canaries" by local people. Prothonotaries are neotropical migrants and spend the winter months in Central and South America. Prothonotaries are unusual among warblers, as they nest in tree cavities.

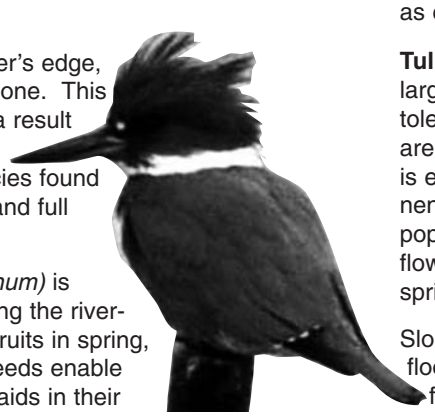
Great Blue Heron
Look carefully at the sandbars along the river banks for what appears to be a tall blue-grey statue of a bird – this is the Great Blue Heron. Blue Herons can grow up to 4 feet tall! They often stand very still along the riverbanks waiting for a fish, frog or snake to swim by. If they do spot something that they deem tasty, they quickly spear it with their long beak. When startled they produce a loud croaking sound as they fly off down the river.

Belted Kingfisher
Look for a stocky blue-gray bird darting across the river or plunging head first into the water after a fish. Kingfishers may also be spotted as they perch on limbs overhanging the river waiting for unsuspecting fish to swim by. If a kingfisher spots you first, you may only hear its loud rattling call, k-k-k-k-k-k-k, as it flies off down the river.

Barred Owl
Barred Owls are found in a variety of forested habitats, but they seem to especially prefer bottomland forests. In these forests they feed heavily on crayfish that emerge from their underground burrows at night. Look for this large gray-brown owl roosting in the lower limbs of trees during the day time. If the owl is spied by Carolina Wrens or American Crows, they will often raise quite a ruckus. Although owls are known for their night time calls, Barred Owls occasionally call during the daylight hours, especially deep in the floodplain forest. Listen for the characteristic, "Who cooks for you, who cooks for you all?"

Floodplain Zones and Their Native Flora and The Floodplain Spur

The bottomland forests along the Middle Oconee harbor a large diversity of plant species. Within this forest there are minor topographic features that alter the length of time an area is flooded, the extent to which it is flooded and affect the drainage of the soil. Each of these zones in the floodplain has a different suite of plant species.



The first zone, right at the river's edge, is the river margins and bar zone. This zone constantly changes as a result of the seasonal floods. The sites are sandy or silty. Species found here are tolerant of flooding and full sun.

Silver maple *(Acer saccharinum)* is another common species along the riverbank. This tree flowers and fruits in spring, and the large wings on the seeds enable them to float – which greatly aids in their dispersal. The tree is a fast grower and is relatively intolerant of shade. It is occasionally used as an ornamental.

The second zone is the levee -- the low ridge of soil that runs parallel to the river. When the river spills over from its channel it begins to lose its momentum, causing it to drop a large portion of its sediment load. This deposited sediment creates the levee. Although the levee is close to the water's edge, it has some of the driest soils. The water trickles quickly down through the grains of sand leaving the top layer very dry.

River oats *(Chasmanthium latifolium)* are an important component of the levee. They form clumps that help to stabilize the freshly deposited soils. The dangling seed heads of this grass are consumed by songbirds. River oats are related to sea oats, a grass type that stabilizes the dunes along the coast.

The third zone is the river bottom flats. These flats are on the back side of the levee and are lower in elevation. They are poorly drained and may be inundated with water for prolonged periods of time. Plant species that grow here are tolerant of low oxygen conditions.

Boxelder *(Acer negundo)* is a member of the maple family. It produces seeds in fall but disperses most of them in spring. These seeds float on water – a great dispersal agent for a floodplain tree species. The tree is relatively shade tolerant and is recognized by its bright green twigs. Boxelder is the only tree species that is found in all of the lower 48 states of the US.

Another zone within the floodplain forest is the river bottom ridges and terraces. These areas are found dispersed through the river bottom flats. They are areas that are slightly higher in elevation, therefore they afford better drainage and are not inundated with water as long as the surrounding flats. Because of this increased drainage, trees and plants that are not able to tolerate as extensive flooding, are able to grow on these ridges.

Tulip poplar *(Liriodendron tulipifera)* is one of the largest trees in the eastern United States. It is not very tolerant of flooding, and will not be found in areas that are flooded for more than one week at a time. This tree is especially important for gray squirrels (Sciurus carolinensis). They strip the bark from the branches of tulip poplar to use in the construction of their nests. The flowers of this tree are an important food source in spring, when few other foods are available.

Sloughs form another zone. They are low spots in the floodplain that hold over ponds of water from the last flood.

Overcup oak *(Quercus lyrata)* tolerates longer periods of flooding better than any other oak species. This species is found naturally only on very poorly drained sites, because it is out competed in other areas. The acorn cap almost completely encloses the nut, which is where this species gets its name. There is a gap between the cap and the nut that holds air and enables the acorn to float. After the flood water recedes, the acorn is deposited on the bare soil and is able to germinate. The acorns of overcup oak are an important wildlife food source.

Sandbar and Animal Tracks

Sandbars are formed by the deposition of sediment from the river and are great places to look for tracks. Look for beaver, otter, raccoon, mink, deer and great blue heron tracks in these areas of exposed soil. Raccoon tracks are especially easy to recognize. They resemble miniature versions of the hand and footprints of a small child. Otter and beaver tracks are easy to identify because of they have webbed feet. The back paw print of the beaver is much larger than the paw print of an otter.

Watersheds

A watershed is the land area that surface runoff drains from, into a particular body of water. Think of a watershed as a sink. Any water that falls onto the inside edges of the sink or in the bottom of the sink eventually finds its way to the central drain. The same is true with a river's watershed. The edge of the watershed is usually marked by hills or ridges like the edges of the sink, and the water that falls within this area eventually reaches the river, which is the equivalent of the drain. The Oconee River's watershed includes all of the area that drains into the river and its tributaries – a total area of about 5,330 square miles! This includes part of 27 Georgia counties. The Oconee's watershed is a very rapidly developing part of Georgia, and the measures that are taken to preserve the environmental integrity of the watershed will directly affect the integrity of the Oconee River. Currently, more than 400,000 people inhabit the Oconee's watershed, and the populations of several of the counties within the watershed are steadily increasing. Contaminants are a direct effect of development and high levels of human activity in a watershed, as rainwater runoff often carries these contaminants, and they eventually become concentrated in the Oconee River. Slight changes of measurements like pH

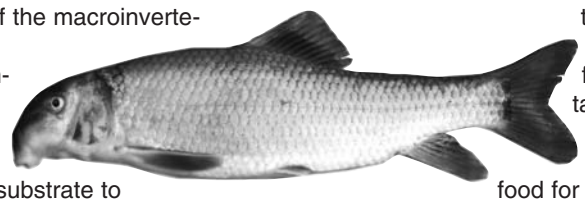
can completely destroy the natural balance of rivers. It is important to take steps to reduce contaminants and minimize negative effects from development.

Riparian Zones and their Effects

Forestry and development can greatly impact the natural integrity of our streams and rivers. One practice that is used to help reduce stream degradation due to these practices is streamside management zones (SMZs). Streamside management zones are buffer zones of forest that are left along the banks of streams and rivers. The width of the SMZ depends on the size of the stream and the gradient leading down to the water. These zones have a number of benefits. They keep the stream shaded, which keeps the water temperature from unnatural warming, which can negatively affect fish and other animal species that live in the stream. They also help to reduce the effects of soil erosion into the stream. The zones also provide a corridor for many types of animals to travel, in areas that might otherwise be cleared and developed.

Sedimentation

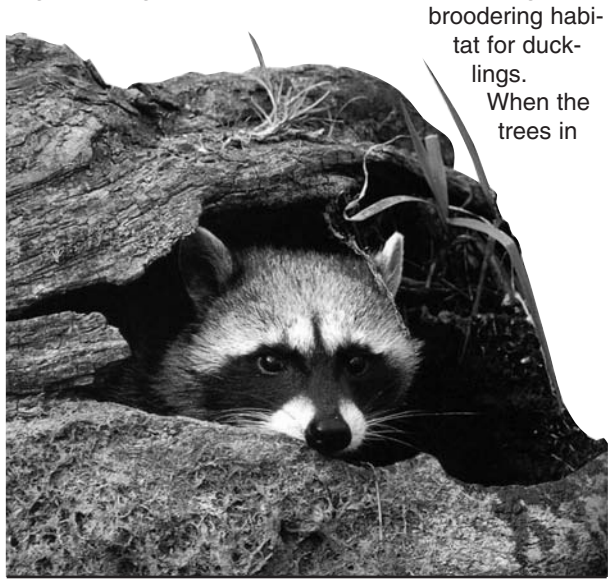
Depending on recent rainfall, the color of the Oconee River ranges from cocoa brown to reddish orange. The Oconee River is an alluvial river that is characterized by carrying a large sediment load, but the Oconee and many other alluvial rivers now carry an unnaturally high sediment load. William Bartram described Georgia's Piedmont streams in the 1770s as"crystal clear." Much has changed since Bartram first visited the Oconee. Since the time of early settlement, forest land has been cleared along the river for agriculuture and development. As the trees are removed and the soil is disturbed, the easily erodeable soil readily washes into the lowest places, in this area it is the Oconee River and its tributaries. The reduced forest cover allows water flowing down the slopes to attain higher speeds, which causes it to erode the soil more easily. The result is that much of the top soil of Georgia's piedmont has ended up in the river bottoms and in the river channels as sediment loads. With all of the extra sediment, the river no longer runs clear, but is permanently stained. The substrate along the bottom of the river has also changed as a result of sedimentation. The river beds used to consist of a gravelly substrate, but they are now covered with sediment. This has changed the habitat in the river, and has had negative effects on some of the macroinvertebrate and fish species. Surveys of macroinvertebrates and fish are conducted on rivers (like the Oconee) and their tributaries to get an overall picture of the river's health.



Some fish species require a gravel substrate to spawn. Because of the increased sediment load, much of this gravel substrate is now covered in silt. This is likely one of the factors that has led to the decline in many fish species, like the Robust Redhorse. The Robust Redhorse was once thought to be extinct but was rediscovered in the Oconee River in 1991.

Beaver Ponds

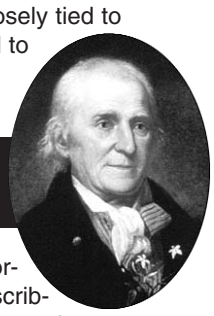
Beavers do more to alter the southeastern landscape than any other animal, besides man. Beavers are a keystone species – meaning that a large number of animal species within the ecosystem depend on them for their survival. Beavers do much to change the hydrology of floodplains. They dam streams in the floodplains and areas that would typically be flooded only periodically are under permanent inundation. This permanent water coverage affects the plants and animals that inhabit the area. Water throughout the year causes many of the trees in beaver ponds to die. These snags provide good habitat for woodpeckers and other cavity nesting birds. Wood ducks use old woodpecker cavities to nest in, and when the nests are in snags surrounded by water they are better protected from predators. The open water encourages the growth of grasses, like woolrush, that provide good broodering habitat for ducklings. When the trees in the pond die, sunlight is allowed to penetrate the forest floor, and a shrubby edge habitat is formed around the edge of the pond. The saplings and shrubs that grow here provide food for the beavers and habitat for a host of other species. Beaver ponds also provide habitat for water dependent species like muskrats, otters, great blue herons, belted kingfishers, and a variety of reptiles, amphibians, and fishes.



Native Americans found beaver ponds very useful in their agricultural pursuits. They often drained ponds or used abandoned ponds for crop fields. The beavers had already completed much of the hard work of getting rid of the trees, and the soil beneath the ponds was very rich. Native Americans also used beaver ponds for food sources. They would gather seeds from buckeye trees and crush them. The crushed seeds were then thrown into the ponds. The buckeye fruit contain a chemical, aesculin, that stuns fish and causes them to float to the top for easy collection.

Switch Cane

Switch cane or river cane is the only native species of bamboo in North America and is a member of the grass family. Before the arrival of European explorers to the Southeast, Native Americans cleared and farmed large fields taking advantage of the rich bottomland soil. The early European explorers brought with them a host of diseases that were foreign to the Native Americans' immune systems and large percentages of native people died from these epidemics. After the severe reduction in the population of native people, many of these large fields went fallow. It is speculated that switch cane (which probably always grew along the edges of these fields) quickly filled in forming vast cane thickets (known as canebrakes). Canebrakes were described by William Bartram and other early explorers and settlers. These thickets were despised by early travelers to the area, as they were nearly impenetrable. The early settlers soon realized that their cattle herds were more productive and produced better milk when grazed in canebrakes. They also realized that some of the richest agricultural soils were found beneath the thickets of cane. As a result, many of the canebrakes were destroyed. The absence of fire (which was once a natural part of southeastern ecosystems) is also thought to have influenced the decline of canebrakes. Switch cane is now a common component of bottomland forests, but the vast expanses of cane thickets that once occurred across the southeast are now rare. The destruction of this habitat has directly affected several species of wildlife that depended on cane. Bachman's Warbler, now believed to be extinct, once nested almost exclusively in cane thickets and possibly fed almost entirely on insects found living on cane. Swainson's Warbler, a species in decline across its range, is also thought to be closely tied to cane thickets. Other wildlife species tied to canebrakes include swamp rabbits (also know as canecutters) and golden mice.



William Bartram

William Bartram was an early plant explorer that traveled across the southeast describing the native flora and fauna, the native peoples, streams, forest types and other regional characteristics. Bartram visited the Oconee River near present day Athens in 1773, and provided the first literary description of the area. He specifically mentions the great "cane swamps" along the Oconee. In other accounts Bartram describes Georgia's piedmont streams as "transparent" and "crystal clear." This is hard to imagine now as you look at the cocoa brown Oconee River of today. Accounts from early explorers are very important today. They give a picture of what the landscape was like near the time of settlement. These accounts can be compared to the landscape today to get an idea of how drastically humans have impacted the natural environment.

Water Snakes vs Cottonmouths

People often assume that any snake found in or near the river is the venomous cottonmouth or water moccasin (*Agkistrodon piscivorous*). However, there are quite a few species of water snakes (*Nerodia* sp.) that reside in the same types of habitats as cottonmouths. Nerodia species are usually heavy bodied and have broad heads. These snakes are often confused as cottonmouths and as a result are frequently killed. It is important to remember that it is illegal to kill any nonvenomous snake in the state of Georgia. Nerodia species are quite arboreal and when they feel threatened they often fall out of trees into the water. Cottonmouths rarely climb trees. If you encounter a snake along the trail as you hike, you can be almost certain that it is not a cottonmouth, as they are not known to occur in Clarke County. One must travel south or west to enter their natural range.

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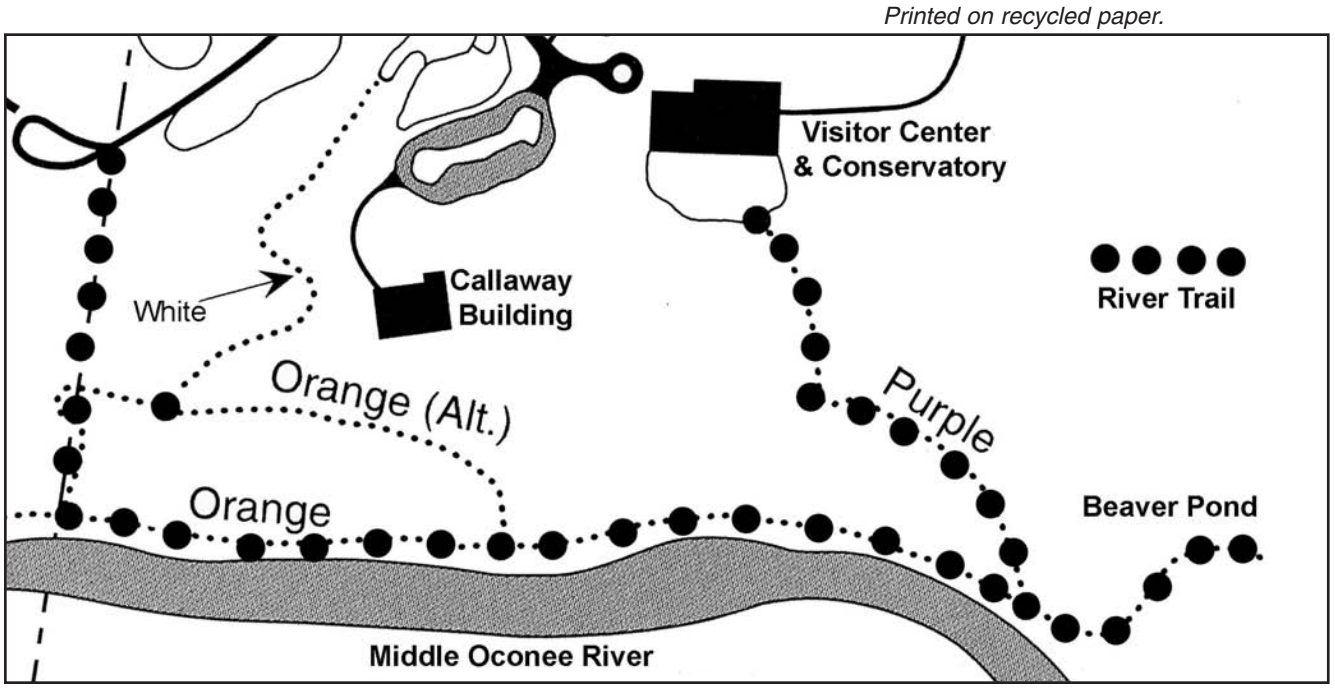

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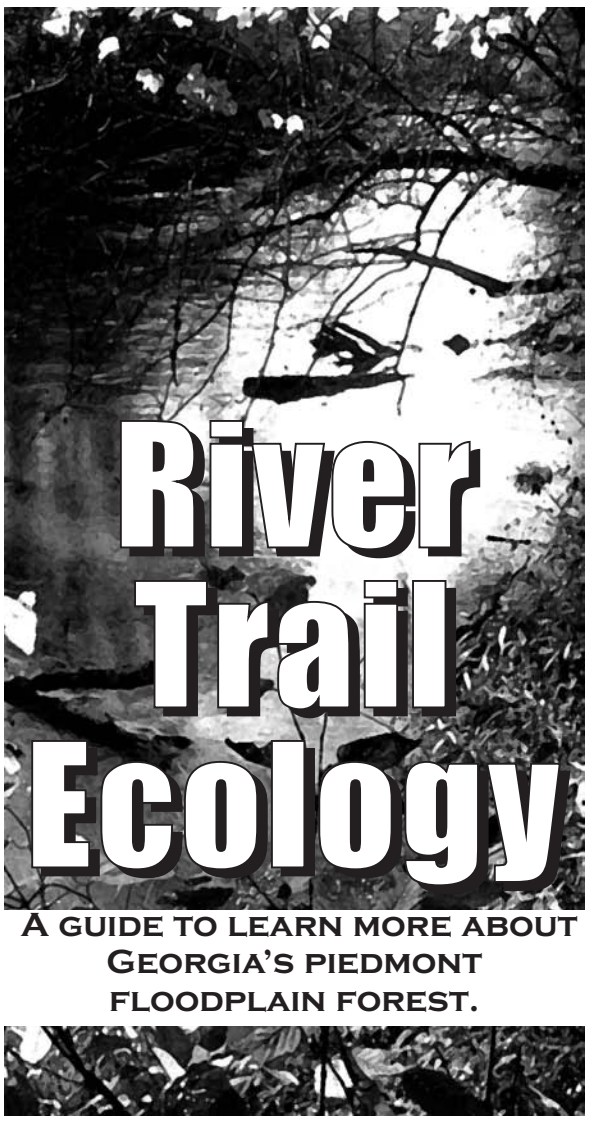

A GUIDE TO LEARN MORE ABOUT GEORGIA'S PIEDMONT FLOODPLAIN FOREST.