



HOW WETLANDS Benefit Georgia Agriculture

Wetland on a Georgia farm. Photo: Jason Schmidt

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Georgia has a wealth of wetland resources, with the Okefenokee and Chickasawhatchee swamps, the Altamaha River floodplain, and Georgia’s coastal saltmarshes being among the most renowned wetland habitats in the world.

Historically, many people have viewed wetlands as “wastelands,” having few virtues. But that perception has changed. Now it is known that wetlands provide many useful services, from improving water quality to providing habitat for important fish and wildlife. These kinds of benefits would be costly to create, so maintaining natural wetlands is good for both the economy and the environment.

Many smaller wetlands occur in Georgia farmlands, and many of the values provided by wetlands benefit Georgia farmers. In this booklet, we highlight the key virtues of wetlands to agriculture, describing how wetlands associated with Georgia farms can contribute to agricultural value.



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What is a wetland?

In general, wetlands are areas that are flooded for a portion of the year, support wetland plants (at least around their edges), and have water-logged soils (called “hydric soils”). Although the general population may not know the scientific definition of a wetland, most people are already well aware of many types of wetlands in Georgia.

- Swamps are wetlands dominated by trees (such as cypress, tupelo, black gum, and bottomland hardwoods).
- Marshes are wetlands dominated by grasses, grass-like plants (such as sedges, reeds, and cattails), or other non-woody wetland plants (such as lily pads).
- Floodplains are wetlands bordering rivers and streams that flood after large storms.
- Carolina bays, cypress domes, gum ponds, and lime sinks are smaller wetland ponds filled by rainwater and dominated by wetland trees (cypress or gum) or grassy plants.
- Beaver ponds are wetlands created by beavers damming small streams.
- Farm ponds are wetlands created by farmers damming small streams. Interestingly, small, created ponds such as farm ponds are one of the few wetland types that have increased in the U.S. over the past years.

The hydric soils in wetlands contain so much stagnant water that oxygen is eliminated (they are anoxic). As a result, the microbes (such as bacteria) that live in wetland soils have unique ways to survive; instead of using oxygen to respire, they use nitrate or other chemicals. Because farmers rely heavily on nitrogen fertilizers, the hydric soils of wetlands are an especially important feature of wetlands for agriculture. Hydric soils can be readily seen by simply digging a hole in a suspected wetland and looking for black or dark gray soil, indicating that oxygen is not present (orange or yellow soils have oxygen present).



▲ Forested wetlands, commonly referred to as “swamps,” are especially common in the Southeastern U.S. and support wetland trees like cypress and tupelo.
Photo: © 2012 Regents of the University of California, published by the University of California Press



▲ Marshes, sometimes called “wet prairies” or “wet meadows,” support grassy wetland plants like these sedges.
Photo: ©2012 Regents of the University of California, published by the University of California Press

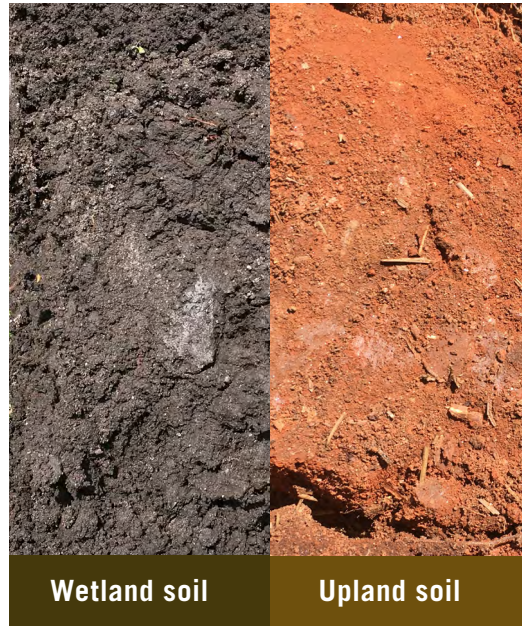


▲ Farm ponds created for watering livestock or supplying irrigation water can also support numerous wetland fish and insects and can supply drinking water for birds, wildlife, and honey bees.

Benefits of wetlands to water quality

Wetlands are low spots in the landscape, and water tends to flow toward them, especially runoff from storms. In farmlands (and urban lands, for that matter), this water often contains sediments and various chemicals.

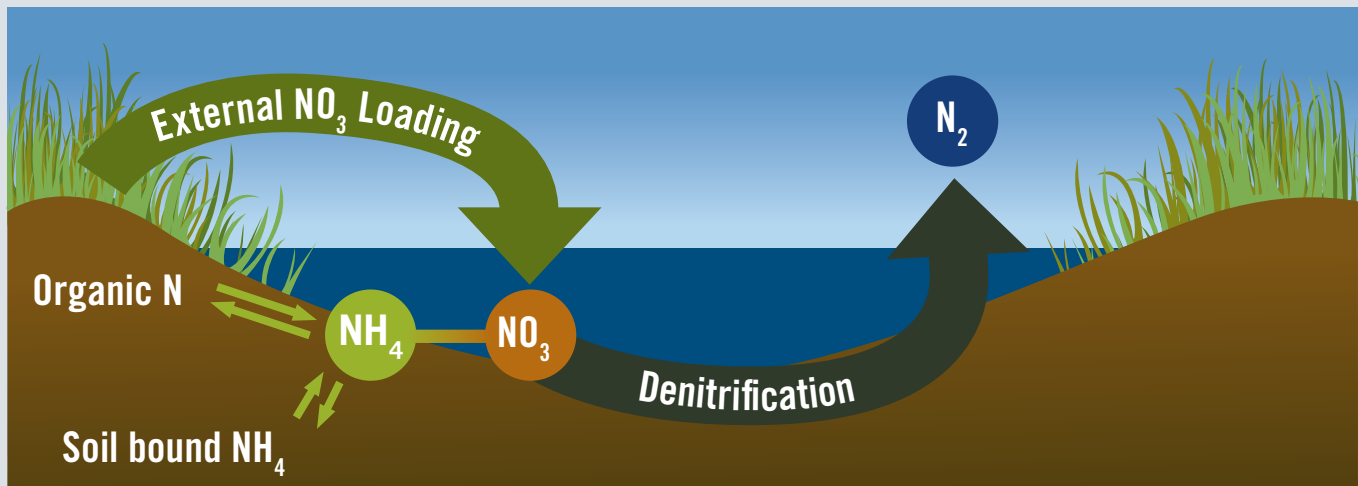
- Once runoff enters a wetland, sediments and chemicals such as nitrate tend to settle as water flows slow, and thick vegetation traps the material. Wetlands often serve as “sinks” for these materials, at least temporarily.
- Nitrate is a crucially important fertilizer for agricultural crops, but if excess nitrogen runs off of farmlands into streams, rivers, and lakes, it becomes a pollutant. Algae in streams, rivers, and lakes also need nitrogen to grow, and they can reproduce very quickly in the presence of nitrate. So if excess nitrate ends up in water, noxious algal blooms can develop. Excess nitrate in drinking water can also harm human health.



◀ **Left:** Waterlogging makes wetland soils develop a characteristic dark color resulting from a lack of oxygen. Anaerobic bacteria thrive in these soils, eliminating many pollutants from water and making wetlands especially valuable places for water purification.

▶ **Right:** Upland soils have more oxygen, and in Georgia, these soils tend to be orange or yellow in color. Characteristic Georgia red clay is colorful because iron in the soil has oxidized, becoming rusty.

- The bacteria in hydric wetland soils convert waterborne nitrate to nitrogen gases, in a process called “denitrification.” These gases vent to the atmosphere, removing the nitrogen from the water. One of the gases is common nitrogen gas, which already makes up 78% of the atmosphere, and is harmless. A small amount of nitrous oxide gas can also be produced by denitrification, and it is considered a greenhouse gas. So, while denitrification in wetlands has clear benefits for water quality, its overall environmental impacts are not as clear cut.
- Because runoff water from farmlands often flows across wetlands (such as stream and river floodplains), these wetlands provide an important service by protecting the quality of water in our rivers and streams from excess nitrate. Recent studies report that the flooding and water quality protection provided by floodplain wetlands can be worth as much as \$10,000 per wetland acre per year!



Based on diagram published by Iowa State University Master of Science in Agronomy Program, Iowa Learning Farms

Benefits of wetlands for flood control

Wetlands frequently receive excess runoff from storms, either from across the land or from overflows of streams and rivers.

- Many wetlands act as environmental “sponges,” absorbing and storing excess runoff from storms, and diminishing flood severity downstream.
- Reductions in flood peaks caused by wetlands can protect people and their property from destructive flooding.
- For farmers, agricultural fields located on floodplains are enriched by floodwaters (by sediment and nutrient supplements to the soils). Water retained in wetlands maintains levels of surficial (shallow) aquifers, enhancing adjacent soil moisture, and potentially reducing the need for irrigation.



▲ Wetlands absorb excess water from large floods, reducing how high the water rises, and protecting people's property. Croplands on floodplains are enriched by the flooding, and those lands can become especially productive for crops after the floods subside. Photo: Chris Boyer, kestrelaerial.com

Benefits of wetlands to fish and wildlife

Being connected to the land, farmers have a special appreciation for fish and wildlife and realize that many wild animals live on or around their lands.

- Wetlands are especially important habitats for fish and wildlife. Game species such as ducks, turkeys, bobwhite quail, deer, raccoons, fish, and many others, live in or visit wetlands.
- For farmers who enjoy hunting, it is likely that many of their favorite hunting spots are in or near wetlands.
- Besides game animals, wetlands provide a valuable habitat for many beneficial non-game animals, such as herons and other water birds, raptors, songbirds, frogs and salamanders, dragonflies and other aquatic insects, and pollinator insects such as butterflies and honey bees.
- Any wetlands in farmland environments will provide food, water, and cover for many different animals, and floodplain wetlands along streams can provide migration corridors for animals to safely move from place to place.



▲ Wetlands are hot spots for many game animals. Raccoons frequent wetlands to search for crayfish and other foods.



▲ A wide range of birds use wetlands as habitats, such as these Florida sandhill cranes in the Okefenokee Swamp. Photo: © 2012 by the Regents of the University of California. Published by the University of California Press



▲ Many aquatic insects, such as this dragonfly, develop in wetlands, and after they emerge, will fly into the surrounding areas, including croplands, in search of other insects to eat. Photo: Clesson Higashi, University of Georgia, Graduate Student



▲ Wetlands are homes for a diversity of small animals. Georgia is renowned for supporting an especially high number of frog and salamander species, almost all of which breed in wetlands. Pictured are ornate chorus frogs. Photo: Kevin M. Enge, Florida Fish and Wildlife Conservation Commission

Benefits of wetlands to pest control and pollination services

It is well known that natural areas on farms provide habitat for many natural enemies of insect crop pests, enhancing valuable biological controls. Beneficial pollinators will also live in residual natural habitats on farms. Wetlands are a type of natural area that may be especially valuable habitat for an assortment of organisms beneficial to agriculture.

- Many predatory (ants, spiders, ground beetles, dragonflies) or parasitic (parasitoid wasps) arthropods, insectivorous birds (swallows, quail, songbirds), and pollinators (bees and butterflies) use wetlands as habitat, and readily move from the wetlands into croplands to forage. These animals will target plant pests or pollinate flowering fruit trees, enhancing agricultural production.
- Unlike upland natural areas, wetlands are less likely to harbor crop pests or noxious weed plants because the plants that grow in wetlands typically only occur there (reeds, sedges, wetland trees and shrubs) and will not grow in adjacent drier cultivated areas. Insect herbivores that feed on wetland plants are unlikely to feed on unrelated crop plants.
- Unlike upland natural areas, wetland areas are typically not conducive to crop production, and so they enhance natural biological control and pollination services without a reduction in potential crop acreage.



▲ Did you know that in their native South America, the imported fire ant lives in wetlands, and during floods colonies can float? Studies in Georgia indicate that these wetland ants are especially effective predators of pest insects in cotton and other crops. © 2014 Regents of the University of California. Published by the University of California Press. Photo by Jennifer Henke, University of Georgia, Graduate student.



▲ Ground beetles (Carabidae) are voracious predators of other insects, thrive in wetlands, and studies show they readily move from the wetlands to upland fields to forage. Photo: Joseph Berger, Bugwood.org



▲ Spiders thrive in wetlands, and many are highly mobile (like wolf spiders and this jumping spider) and move from the wetlands into adjacent crop lands to capture their insect prey. Photo: Mary Legg, Bugwood.org



▲ Researchers at the University of Georgia Iron Horse Research Farm are conducting studies to identify which insect natural enemies move between a wetland (background) and an adjacent corn field, and are using experimental cages (circular structures) to determine how corn plants (and other crops) benefit from the pest control exerted by these wetland natural enemies.

What about wetland regulation?

Many farmers may be concerned that having a “wetland” on their farm could lead to additional restrictions. This worry is unfounded.

- Wetlands that have been farmed for decades are considered “agricultural wetlands” and routine agricultural activities conducted in the past are still permitted.
- In Georgia, it is already required to maintain a protective 25-ft. buffer along streams and rivers (50-ft. buffer for trout streams), whether the buffer is a wetland or not. Most floodplain wetlands along streams will occur in these buffers, and so are already protected.
- Draining or filling a wetland is a restricted activity, because this results in the conversion of a wetland to non-wetland status. But many routine farming activities in wetlands, such as planting, grazing, logging, mowing, fertilization, or pest control, among others, are not prohibited as long as the activity does not convert the wetland to a non-wetland. However, best management practices should be followed to maintain beneficial attributes of both wetlands and farmlands.
- Draining or filling existing natural wetlands on most Georgia farms is likely impractical. After decades (or centuries) of agriculture, remnant natural wetlands in Georgia are usually places already proven unusable for productive cultivation (too wet). As described earlier, maintaining wetlands in their current condition can still provide tangible values to agriculture.

What can I do to enhance the value of my wetlands?

- The simple answer is to just leave wetlands alone. Most of the benefits from wetlands are natural and occur on their own.
- Do not extend crop treatments (fertilization, sprays) into the wetlands, as they are unnecessary, and this will save you money.
- Minimize mowing, as wetland vegetation is habitat for most of the beneficial wildlife, insect natural enemies, and pollinators in wetlands. However, studies show that occasional haying or grazing in wetlands can benefit some wetland plants and animals.
- If you are interested in maximizing the quality of your wetlands, many restoration techniques have been developed to rehabilitate degraded wetland habitats. Local conservation groups such as Ducks Unlimited, the Adopt-a-Wetland program, or the Georgia Department of Natural Resources may provide useful advice (as might the senior author of this booklet; dbatzer@uga.edu).

Georgia wetlands

In summary, wetlands can provide Georgia agriculture with a wide range of beneficial services, usually at no cost to the farmer. We hope that after reading this booklet, farmers will no longer view wetlands as wastelands, but instead as valuable additions to their farms, to be enjoyed.

For additional information about wetlands in Georgia, refer to:

- Cowardin, L. M., Carter, V., Golet, F. C., & LaRoe, E. T. (1979). Classification of wetlands and deepwater habitats of the United States. Washington, DC: U.S. Fish and Wildlife Service, FWS/OBS-79/31.
- Batzer, D. P., Day, F., & Golladay, S. W. (2012). Southeastern swamp complexes. In D. P. Batzer & A. H. Baldwin (Eds.), *Wetland habitats of North America: ecology and conservation concerns* (chapter 16). Berkeley, CA: University of California Press.
- King, S. L., Battaglia, L. L., Kiem, R. F., & Lockaby, B. G. (2012). Floodplains wetlands of the Southeastern coastal plain. In D. P. Batzer & A. H. Baldwin (Eds.), *Wetland habitats of North America: ecology and conservation concerns* (chapter 18). Berkeley, CA: University of California Press.
- Kirkman, L. K., Smith, L. L., & Golladay, S. W. (2012). Southeastern depressional wetlands. In D. P. Batzer & A. H. Baldwin (Eds.), *Wetland habitats of North America: ecology and conservation concerns* (chapter 15). Berkeley, CA: University of California Press.

For additional details about the economics of wetland services to agriculture, refer to:

- Heimlich, R. E., Wiebe, K. D., Claassen, R., Gadsby, D., & House, R. M. (1998). Wetlands and agriculture: private interests and public benefits. Resource Economics Division, U.S. Department of Agriculture Economic Research Service. Agricultural Economic Report No. 765.

These publications are all freely available electronically from the senior author (dbatzer@uga.edu).

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