

Lake Apopka Wildlife Driver audio tour St. Johns River Water Management District

1 - Welcome - Entrance

Welcome and thank you for visiting the St. Johns River Water Management District's Lake Apopka North Shore Wildlife Drive. This 11-mile, one-way drive opened in May 2015 with the goal of providing visitors an opportunity to experience the wildlife and habitats found on the North Shore's wetlands, which are undergoing restoration work. For your safety, and that of the wildlife, the speed limit is 10 miles per hour. Directional signs are located along the route and gates will be closed and locked to prevent vehicles from entering areas where work is occurring. Several pull-over areas provide visitors a chance to safely stop along the drive, while allowing others to pass. A portion of the drive overlaps with the Lake Apopka Loop Trail, which is a multi-use trail, so motorists should yield to hikers, bicycle riders and wildlife who share the road. Please be mindful of your surroundings as people and vehicles will stop abruptly to view wildlife. The people you may have met at the entrance kiosk are volunteers with the Orange Audubon Society, who help the District ensure visitors have a safe and enjoyable visit.

The land that you are driving on was once underwater, as it was part of floodplain wetlands connected to Lake Apopka. Farming operations in the 1940s drained these 20,000 acres of wetlands and put the area's rich organic soils into agricultural production. Sadly, the resulting agricultural runoff, combined with other pollution sources, contributed to the eventual decline of the lake's water quality and then the world-class bass fishery.

The District was directed by the Florida Legislature to acquire the North Shore farms in 1996 with the goal of restoring Lake Apopka's water quality, fisheries and aquatic habitat within the lake. The District closed the acquisitions and took possession of the farms in 1998 and 1999 and began restoring the North Shore's historic wetlands.

These public lands now help protect water quality and provide flood water storage, and as you will see, the recovering wetlands are home to a large and increasing diversity of flora and fauna. To protect the property and its biodiversity, we ask that you do not interact with or remove any plants, animals or cultural artifacts. Do not go into the fields or canals, most of which are deep and have very steep banks. Large alligators are abundant, and all pets must be kept on a leash and not allowed to run freely. Finally, remember to drive slowly, obeying the 10 miles per hour speed limit, to avoid harming any wildlife, including turtles and snakes, with whom you share the road.

If you have an emergency, please dial 911. For immediate wildlife concerns, including a wildlife crime in progress, please call the Florida Fish and Wildlife Conservation Commission toll-free at 888-404-3922. For non-emergencies, please contact the District at 386-329-4404.

2 - Bird populations – Lust Road

The Lake Apopka North Shore has become one of the premier locations to bird watch in the southeastern United States. An extraordinary diversity of birds has been documented here, with 372 species to date. The area is so attractive to birds because of its location and expansive habitats. Lake Apopka and its North Shore is a 50,000-acre ecosystem located in the center of the Florida peninsula,

which makes it highly appealing to migrating birds. The wildlife drive enables visitors to easily access the wetland areas to observe wildlife.

This site's attractiveness to birds was highlighted during the 1998 Audubon Christmas Bird Count, which is a one-day count performed throughout the nation annually during the holiday season. At that time, 174 species of birds were identified here — the highest species total for an inland count in North America (north of Mexico) in the 115-year history of the Christmas Bird Count. Although great wildlife viewing opportunities are available year-round, the best times to birdwatch are in the fall, winter and spring. An exception is the mid-July spectacle of swallow-tailed kites foraging over the North Shore prior to their migration to South America. Kites can be seen in large numbers during July and early August, but peak counts of more than 1,500 individuals have occurred during the middle of July.

Some conspicuous species on the North Shore include osprey, bald eagle, anhinga, gallinule, great blue heron, black-necked stilt, red-winged blackbird, red-shouldered hawk, and snowy egret. Seasonally present species are the American bittern, sora rail, black-bellied and fulvous whistling duck. Songbirds are also abundant and include swamp sparrows, marsh wrens, and if you are lucky, painted buntings. Roll down your windows and listen while you watch.

3 - HISTORIC PUMP HOUSE – Pump house

The story of Lake Apopka is familiar to many — the state's fourth-largest lake was once a world-class bass fishery, Central Florida's original tourist attraction. However, impacts to the lake over many decades led it to being named Florida's most polluted large lake. This followed a century of degradation that began in the 1890s with construction of the Apopka-Beauclair Canal which lowered the lake's water levels. Compounding that problem was decades of runoff of agricultural fertilizer and pesticide making its way into the lake from the North Shore's farms, while wastewater from towns on the south shore discharged to the lake. These events substantially increased nutrients, primarily phosphorus, in the lake, which triggered a persistent algal bloom which turned Lake Apopka's historically clear water pea green. The green water prevented enough sunlight from reaching the lake's bottom to sustain the submerged plants. This submerged aquatic vegetation, referred to as SAV, was critical habitat for the food web that sustained the lake's bass fishery. SAV plays this critical role in many lakes, rivers, spring runs and lagoons throughout Florida. Without enough light, the SAV died, leading to the demise of the lake's sport fishery. With the bass fishery in decline, the dozens of fish camps around the lake closed their doors.

In recent years, the District and its partners have been writing a new chapter in Lake Apopka's story — a story about nature's resiliency and recovery. This story includes reducing the availability of phosphorus and intensity of algal blooms, which allows sunlight to reach the lake's bottom so the SAV critical to fish and wildlife habitat can recolonize and flourish.

The large building on the shore is called the pump house. The pump house was originally used by farmers in the 1940s to drain the North Shore, pumping water into the lake to dry out the floodplain and make the North Shore dry enough to farm. During the many years of active farming, the fields' organic soils around you lost about one foot of elevation per decade through a process called soil oxidation. As the soil oxidized, it released phosphorus and exposed residual pesticides originally bound to the soil. Today, the pump house is still in use, but with a different purpose. The pumps' diesel engines have been converted to efficient electric motors and now the pump house helps maintain water levels on the North Shore's wetlands — just the right amount of water prevents further soil oxidation and subsidence and dramatically reduces the amount of phosphorus pumped to the lake. While up on the lake levee,

compare the relative water levels in the lake and North Shore to see how soil oxidation and loss has lowered the North Shore's land elevation roughly five feet over the five decades of farming.

In addition to maintaining the wetlands' water levels, the pump stations are a component of a larger water treatment system in which a chemical called aluminum sulfate, or alum for short, can be added into the water at the Unit 2 basin. The addition of alum helps improve the water quality by binding to things like dirt and sediment and making phosphorus unavailable to the algae, which helps prevent algal blooms. This is the same alum that you see for sale in the spice aisle of grocery stores and that is used to treat drinking water.

5 - LAKE APOPKA BASIN WATER QUALITY HISTORY – Lakeside Trail/Drive intersection

Located in northwest Orange and southeast Lake counties, Lake Apopka is the headwaters of the Ocklawaha Chain of Lakes, so the improvements created here will help downstream lakes. Lake Apopka is fed by rainfall, stormwater runoff and a natural spring at the south end of the lake. Years of excessive phosphorus discharges, residual farm pesticides and periods of drought impacted the health of the lake. These factors led to chronic algal blooms, and a loss of the SAV critical to fish and wildlife habitat.

The District's approach to improving the lake's water quality and habitat is similar to a diet and exercise program we use to keep ourselves healthy. The "diet" efforts reduce the amount of phosphorus entering the lake. This is being accomplished by restoring the North Shore to wetlands and halting the drying and oxidation of the organic soils and the resulting release of phosphorus. The District's wetland restoration efforts have been meeting the North Shore's phosphorus diet goal since 2009.

To accelerate improvements in the lake's water quality, the District implemented several "exercise" projects. These are projects that remove phosphorus already in the lake. More on these exercise projects later. As a result of the diet and exercise, the lake has experienced a 67% decrease in the concentration of phosphorus and a 70% decline in algae from 1990 to 2020. This means clearer water and enough light to now support SAV growth and healthy fish populations. With the improved water quality, the District has planted submerged aquatic species in Lake Apopka to jump start the recolonization process. These planting efforts can be thought of as "physical therapy," which accelerates the lake's natural recovery. As the plant beds have expanded in recent years, they promote continued water clarity improvements, while providing the habitat critical to recovering bass populations.

Improving the lake's water quality is critical because of Apopka's size and its impact on downstream water bodies such as lakes Dora, Eustis and Griffin. Not only do improvements mean a return of plants, wildlife and sportfish in each of these lakes, it also means improved downstream opportunities for nature-based recreation.

Given the low height of the levee you're driving on, the District hopes you'll understand why we close this property and the Wildlife Drive when hurricanes approach. The storms of 2004 and 2005, and more recently Hurricane Irma in 2017 sent lake water over this levee into the North Shore.

4 - ALLIGATOR POPULATION – Welland Road

These days, there's a high diversity of wildlife that call the North Shore home. In addition to the abundance of birds, there are also mammals, including bobcats, coyotes, raccoons, armadillos, rats, mice, otters and occasionally hogs and bears on the property. There are also a great number of

amphibians, including frogs, toads, salamanders and the eel-looking amphiumas (an-fe-u-mas). Additionally, many reptiles call this place home — turtles, lizards, and snakes. The most common type of snake you'll see is a water snake, either the banded water snake or brown or green water snake. These are all non-venomous snakes. And then there's everyone's favorite reptile — the alligator.

Alligators play an important role in the ecosystem as top predators. Because of the abundance of prey on the North Shore, there is an abundance of alligators here as well. Visitors to the North Shore usually have a lot of alligator questions, the most common being how big can they get? Well, Florida's state record is 14 feet, three and a half inches. The diversity of wildlife you'll witness is evidence of an active food chain, where birds eat fish and mature alligators are the top predator. Remember, these animals are a natural part of this ecosystem, and they belong here, and we want you to enjoy viewing them safely. To ensure you are safe around these ancient top predators, respect them from afar. Alligators do not naturally prey on people, but you should always be careful. So if you want a close-up photo, we recommend using a long camera lens. Do not walk dogs near the water's edge and keep children at a safe distance as well. Most importantly, never feed wildlife, especially an alligator — not even a small one, because feeding them causes alligators to associate people with food.

6 - AGRICULTURAL HISTORY – Roach Road

Much of Lake Apopka's North Shore was drained in the early 1940s for farming to support food production during World War Two. Farmers constructed levees to drain the land, exposing the rich organic soils that grew a wide variety of crops, such as carrots, the famous Zellwood sweet corn, and other vegetables. The Drive was built on some of those remaining farm levees.

In addition to the phosphorus pollution problems associated with fertilizer use and draining the North Shore, farming practices of the time involved the use of organochlorine pesticides to control insect pests. These pesticides were banned decades ago because they continue to exist in the environment, especially in organic soils, and their breakdown products could also harm animals. After the District acquired the farms, work began to reduce decades of residual pesticide accumulation in the soils. The District realized the magnitude of the work in the late 1990s, when many suggested the challenges were too great to remedy the situation. Determined to move forward with wetland restoration, the District approached the challenge with science-based management efforts and implemented the largest remediation of residual pesticides in former farmland ever undertaken.

7 – North Shore RESTORATION PROJECTS – Laughlin, south of canal

The residual organochlorine pesticides remaining from agricultural practices accumulated in fish and then in wading birds as they ate the contaminated fish. This resulted in an avian mortality event in late 1998 and early 1999 that resulted in the death of 626 birds, including American white pelicans, wood storks, and great blue herons.

In response, the District conducted research to better understand the accumulation of the pesticide residues through the food chain — from soil to fish, and from fish to fish-eating birds. The knowledge generated through this research continues to guide restoration of the North Shore and other muck farms in the Ocklawaha basin and across the District. It's also applicable to other projects designed to restore wetland ecosystems impacted by agriculture, which you will hear about later on the drive.

As part of the District's pesticide remediation work, the agency developed an innovative technique to reduce wildlife exposure to pesticide residuals in the soil. Knowing that the vast majority of the residuals

were tightly bound to the top foot of tilled soil, the District worked with a contractor to modify a huge plow to flip, and invert, the top three feet of soil in the most contaminated fields. The inversion process was applied to 4,000 acres, burying residual pesticides in the top one foot of soil three feet below the soil surface and making them less accessible to wildlife. The residuals are now in a carbon-rich, anaerobic environment; conditions that accelerate their further breakdown while being more isolated from wildlife. Careful monitoring of the inverted fields demonstrated that wildlife's pesticide exposure was reduced sufficiently, which allowed continuation of the wetland restoration by inundating these remediated areas. The soil inversion was completed in 2009 and thus all the North Shore's fields were inundated, stopping the soil oxidation and reducing phosphorus pollution. Since fully inundating the North Shore, the amount of phosphorus reaching the lake has been less than our phosphorus diet goal, also known as the Total Maximum Daily Load (TMDL).

In 2018, the District received concurrence from the U.S. Fish and Wildlife Service that pesticide concentrations were low enough to allow the District a full range of hydrologic management. Three years later, the District received additional concurrence from the Service stating that monitoring for biological impacts of the organochlorine pesticides was no longer required. As fields received a clean bill of wildlife health, management changed from using dense cattail and willow vegetation to reduce the ability of wading birds to feed, to the creation of a variety of wetland vegetation types that are more attractive to wildlife. Years of science, hard work and patience are now being rewarded with healthy wetlands, growing wildlife populations and the associated recreational opportunities.

Realizing the extent of the pesticide contamination, the District also assessed any potential human health risks for staff working on the property and for members of the public engaged in various recreational activities. While safe for wildlife, there are still enough residual pesticides in the North Shore's fish that fishing for human consumption is currently not allowed. It is advisable to consult the Florida Department of Health Fish Advisory Book that is published periodically to alert consumers about the health risks of fish consumption from possible chemical contamination.

Some of the educational signs you see along the Drive were created and donated by the Orange County Audubon Society. The pavilion, tables and raptor roosts at the corner of McDonald Canal and Laughlin roads were made possible by generous donations from visitors to the North Shore. Thanks to everyone who has contributed to improving this location's dining opportunities for both people and raptors.

8 – RESTORATION PROJECTS CONTINUED – Laughlin, north of canal

Over the last several years, the District has implemented a strategy to restore the North Shore in a manner that is safe for wildlife and that increases the quality of valuable wetlands. Lake Apopka has also benefited tremendously from the wetland restoration on the North Shore. The phosphorus "diet" has been successful and there has been a substantial decrease in phosphorus loading from the North Shore to the lake. The diet and is largely responsible for the lake's improved water quality. To accelerate the lake's recovery, the District has implemented two "exercise" projects that remove phosphorus from the lake. These projects are like "exercise" that hasten the return to health beyond a healthy diet.

The first project began in 1993 and involved the harvest of gizzard shad fish from Lake Apopka. The harvesting of these native fish, which thrive in algae-polluted lakes, removes the nutrients contained in their bodies. Each year about one million pounds of fish are caught by commercial anglers. This directly removes phosphorus and also reduces the stirring up of the lake's sediments caused by the fish and thus reduces the internal phosphorus recycling within the lake. This helps improve water clarity by reducing

the intensity of algal blooms. The gizzard shad are most often sold as bait for crayfish farmers in Louisiana, and the sales earnings help offset the cost of catching the fish. This public-private partnership makes this harvest a cost-effective tool to improve water quality.

Another innovative “exercise” project is operation of the Lake Apopka Marsh Flow-Way. The Flow-Way is a 760-acre recirculating treatment wetland located on the western edge of the North Shore. The Flow-Way filters about 30% of the lake’s volume each year. As lake water passes through one of the Flow-Way’s four treatment cells, algae and sediments settle out of the water and are stored as sediments. The Flow-Way began operation in 2003 and as of 2022, the system had removed about 32.5 tons of total phosphorus and more than 65,000 tons of total suspended solids from Lake Apopka.

Combined, the phosphorus diet and exercise approach has dramatically improved the lake’s water quality and ongoing SAV plantings in the lake function as “physical therapy” to help speed up the lake’s habitat recovery.

The lake’s recovery has not gone unnoticed. In 2016 and 2017, the Florida Fish and Wildlife Conservation Commission (FWC) increased its stocking of bass and other sportfish in Lake Apopka. Subsequent bass surveys found that growth rates for bass and crappie in Lake Apopka were among the highest in any Florida lake. In recent years, bass fishing tournaments on the Ocklawaha Chain have included Lake Apopka. In 2021, the Friends of Lake Apopka and FWC hosted a bass tournament on Lake Apopka, with the winner’s catch including a 12-pound trophy.

9 - LAND MANAGEMENT TACTICS – Interceptor Road

You might not know it, but the St. Johns River Water Management District has ownership in over 750,000 thousand acres of land across the District, used to protect water resources. The District manages approximately 425,000 acres of land across its 18-county service area, acquired for the purposes of water quality, water supply, flood protection and the conservation and protection of water resources and natural systems. The remaining 335,000 acres owned by the District are managed in partnerships with other agencies and local governments. These conservation lands are teeming with plant and animal life.

Lake Apopka’s North Shore property is approximately 20,000 acres. Some of the more remarkable plant species have been documented within the upland portions of the North Shore include Florida bonamia (bo-name-e-a), pygmy fringe tree, scrub buckwheat, Britton’s beargrass, scrub plum, and clasping warea (ware-e-a), all federally listed plants. The surrounding area is also home to listed animal species such as sand skink, gopher tortoise, eastern indigo snake, Florida scrub-jay, bald eagle, Florida black bear, and wood stork.

Here at the Lake Apopka North Shore, land managers use a variety of tactics to protect native plants and animals. Let’s talk about two of those methods.

Prescribed fire is one way the District protects native plants and animals, as there are many fire-adapted species that are dependent on it for their survival. A prescribed fire, also known as a controlled burn, is the use of carefully planned fire purposefully set under a specified set of environmental conditions to control the fire’s effects and accomplish certain resource management objectives. Without fire or similar disturbance, the plants and animals unique to the original habitat maintained by fire are lost. These prescribed burns also reduce the accumulation of flammable fuels, which if allowed to

accumulate, increase the risk of destructive wildfire. The periodic use of prescribed fire is not only vital toward the survival of fire-adapted species, but it is also the most efficient tool that land managers utilize to manage the fire-dependent natural plant communities that occur on the North Shore while also reducing the threat of wildfires.

Land managers also administer an Invasive Plant Management Program that helps to bring invasive, nonnative aquatic and terrestrial plants, under what's called maintenance control. The goal of maintenance control is to minimize the total management effort of these harmful species. These invasive nonnative plants cover thousands of acres of the Florida's forests, wetlands and waterways. These harmful species often choke out native plant species and dominate an area in addition to interfering with the ability to move water through the North Shore's canal network. The District works to control the plant species through the integrated use of mechanical treatments, prescribed fire, managing the hydrology, biocontrol agents and EPA and Florida-approved herbicides.

The District's restoration goal is to create a mosaic of wetland types on the North Shore to encourage a diversity of habitats. During the early years of restoration, when pesticide exposure was more problematic, the District allowed the growth of dense monocultures of cattails and willows to help reduce the area's use by fish-eating wading birds. Now that monitoring data have demonstrated the area's fish and soils are safe for wildlife, the District is using various vegetation management techniques to transition the wetlands to more open and diverse wetland habitats, attractive to wildlife.

10 - WATER QUALITY PROJECTS - Canal Road

As you near the exit of the Lake Apopka Wildlife Drive, work to improve the lake's water quality continues. Similar to the large pump house near the beginning of the Drive, this pump station is also used to manage wetland water levels. The diet continues here too as this pump station has the ability to use alum to reduce the amount of phosphorus reaching Lake Apopka.

Just as the District's work continues, everyone can contribute to improving water quality. One way is by conserving water at home and lessening runoff from your yard. Additionally, when using fertilizer around your home or business, ensure that it is phosphorus-free as another way to help reduce the amount of nutrients that run off into nearby water bodies.

11 - EXITING THE DRIVE

When most farming operations ceased on the North Shore in the late 1990s, the region suffered significant economic hardships in addition to ecological hardships. It's the District's intent that the recovering wetlands support ecotourism opportunities on both Lake Apopka and the North Shore, and that the return of sport fishing will stimulate new economic activity to help fill the void created when the farms were retired. The fish camps may not return, but a healthy Lake Apopka and North Shore can attract people wanting to view wildlife, fish or hunt.

Thank you for visiting the Lake Apopka North Shore's Wildlife Drive. To learn more about sustainable use of Florida's water and the St. Johns River Water Management District's work to protect Florida's natural resources, visit www.sjrwmd.com or search for us on Facebook, Instagram, and Twitter. If you'd like to donate to support the North Shore's restoration and features on the Wildlife Drive, use the QR codes you see on signs. Thank you for your generosity.