

Lake Apopka National Wildlife Refuge

Preliminary Proposal

LAKE AND ORANGE COUNTIES,
FLORIDA

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Lake Apopka National Wildlife Refuge Coalition

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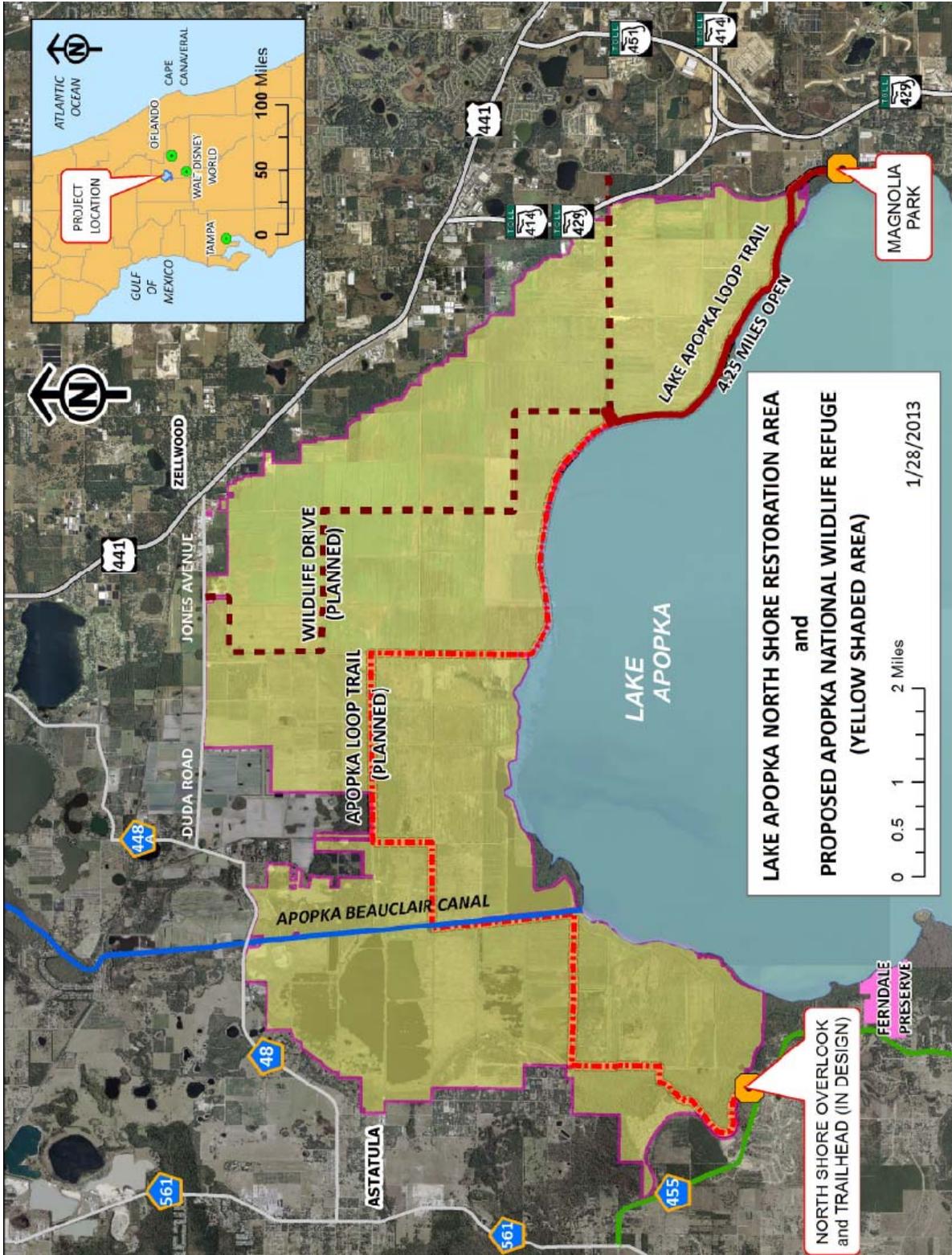


Figure 1: Map of Lake Apopka North Shore

Figure 2. (Inset) General Vicinity Map of Proposed Project

INTRODUCTION

This document proposes National Wildlife Refuge designation for the area now known as the Lake Apopka North Shore (North Shore), situated adjacent to and north of Lake Apopka (Figure 1). The proposed Lake Apopka National Wildlife Refuge would encompass property now owned and managed by the St. Johns River Water Management District (the District). The approximately 20,000 acres of District holdings have not only rich wildlife resources but also extensive potential for passive recreation and educational opportunities that have not yet been fully utilized. No additional land acquisitions would be necessary, but there would be wildlife-focused management and public access expenditures. The District and a coalition of local governments and non-profits initiating this proposal have already authorized some infrastructure expenditures.

Florida's third largest lake, Lake Apopka was once famous for bass fishing and was surrounded by extensive marshes. These marshes originally teemed with resident and migratory bird life. After World War II, vegetable farms expanded around the lake, taking advantage of the rich muck soils. Farm irrigation practices washed fertilizers and pesticides into the lake until it became highly eutrophic. The area forms the headwaters of the Ocklawaha Chain of Lakes and, in order to restore water quality in Lake Apopka and protect the entire chain of lakes, the District initiated a restoration project in 1988.

Using state and federal funds, the District purchased farm acreage on Lake Apopka's north shore—most acquisitions were completed between 1999–2000 when 13,000 acres of farmland were purchased for more than \$100 million—and allowed the farms to fallow. A Marsh Flow-Way system to filter phosphorus and suspended sediments from Lake Apopka had earlier been established near the Apopka–Beauclair Canal, leading into the Harris Chain of Lakes. Additional wetlands were recreated along Lake Apopka to serve as filtration cells for the nutrient-rich water. Management activities over the past twenty years have succeeded in dramatically improving water quality in the lake. The vast expanse and geographic position of the North Shore's restored wetlands again are providing habitat for migrating and wintering birds. In fact, the first Audubon Christmas bird count held after the farms were first flooded had the highest inland species count on record in North America! The North Shore's reputation immediately grew as an important destination for wildlife viewing as a passive recreational opportunity.

Progress toward opening the area to visitation was stopped in 1998 when bird kills occurred in flooded areas where there had been concentrated pesticide use on some of the former farms. The District quickly altered its plans to open the area to visitation and continued land and water cleanup, with work scheduled to minimize avian pesticide impacts. Years of pesticide mitigation and pesticide bioaccumulation studies (and millions of dollars) later, data show residual pesticide levels are within safe parameters to finalize flooding of the rest of the marshes. The District continues to include pesticide monitoring / mitigation options in future management plans.

When the farms were first allowed to go fallow, the District's restoration management plans worked equally well for water storage (flood control), lake water quality restoration, wildlife, and wildlife viewing. With decreasing financial resources, District management plans had to focus on lake restoration and have not been able to also emphasize maintaining or enhancing a variety of bird habitats.

Although the District has a mandate to encourage passive recreation on its properties, it has not had the resources to fully develop the infrastructure needed for wildlife viewing and environmental education on the North Shore. Over the past several years, a variety of governments and non-profit organizations have stepped up to provide the initial capital and labor to create multi-use trails to allow better public access.

It has become clear that the North Shore could become the pre-eminent eco-tourist and environmental education center in the southeast U.S. if it were given a suitable level of support. Land management plans to develop nature tourism clearly require strong partnerships to provide not only the extensive and diverse restoration needed but also the public visitation infrastructure.

For the U.S. Fish and Wildlife Service (USFWS), the proposed national wildlife refuge would have low start-up and management costs since state and federal agencies have already invested more than \$189 million dollars to acquire the land and initiate the ongoing restoration of the system. Existing impoundment infrastructure can control water levels within the marshes. Two-thirds of the marsh impoundment areas are already in various stages of restoration.

A proposed wildlife drive would utilize existing levees, eliminating need for construction of new ones. Recreational opportunities include birding and other wildlife observations, fishing, hiking, biking and equestrian trails. The Apopka Loop Trail, a pedestrian and bicycling trail, has already been started across the north shore; 4 miles have been opened, the western trailhead has been funded and additional extension of the trail is to be opened within the year.

Proximity to the culturally diverse urban areas surrounding Lake Apopka, with a wide age spectrum from school children to retirees, would provide good utilization of this natural site by local residents. This urban location perfectly furthers the USFWS goals of creating "new urban refuge partnerships" and implementing "a refuge presence in 10 demographically and geographically varied cities across America by 2015" (U.S. Fish & Wildlife Service, 2011). Additionally, the area is close to Central Florida's tourist areas that draw over 55 million tourists per year. Interesting cultural and natural history make the area ideal for environmental education programs, which could focus on the ecological restoration of upland and wetland systems.

This proposal, documenting the request that the US Fish and Wildlife Service support efforts to create the Lake Apopka National Wildlife Refuge (LANWR), was developed and supported by a coalition of non-profit, for profit and government entities (Exhibit 9).

LOCATION AND SIZE

The Lake Apopka North Shore (North Shore) is located in northwest Orange and southeast Lake counties north of the Florida Turnpike. The property lies west of the City of Apopka and 15 miles northwest of Orlando, with U.S. Highway 441 and access to the SR429 Beltway just northeast of the property.

Metro Orlando, with a resident population of more than 2.1 million, is the 3rd largest metropolitan area in Florida and is among the nation's fastest-growing regions. The cities of Daytona Beach, Melbourne, Lakeland and the Tampa Bay area are within a 2-hour drive of the North Shore, which is also close to many smaller Central Florida cities: Winter Garden, Oakland, Clermont, Minneola, Montverde, Astatula, Tavares, Eustis, Mount Dora, Zellwood, Apopka, and Ocoee.

Additionally the North Shore is within a 45–50 minute drive of Central Florida's attractions—Disney / Universal / Sea World—and the Orlando International Airport. Combining a visit to the attractions with nature tourism, visitors from around the world could easily access this wildlife refuge. One of the most popular tourist destinations in the world, Central Florida had over 55 million tourists in 2011. The national wildlife refuge would make a complementary, and very economical, destination alternative for these visitors.

The North Shore management area is approximately 20,000 acres and is the largest contiguous non-residential area located on the lake. No land purchases will be necessary for establishment of this National Wildlife Refuge. All land in the North Shore is already owned by the State of Florida. While the proposal is for designation of the approximately 20,000-North Shore acres only, the 31,000-acre Lake Apopka and interesting peripheral uplands are also owned by the State and form part of the preserved ecosystem that is available for wildlife and humans who appreciate wildlife.

DESCRIPTION OF HABITAT

Extensive marsh-impoundment acreage (14,000+ acres) is adjacent to the 31,000-acre Lake Apopka that is headwaters to the Ocklawaha River. The site falls within an historic migratory flyway that brings large flocks of waterfowl as well as other species to the diverse habitats.

Seventy percent of the property is composed of some type of treeless wetland community formerly in agriculture. Most of the areas described as Disturbed and that occur below the 70-foot contour line were Basin Marsh prior to draining for agricultural use. Currently, there exists a mosaic of wetland plant communities interspersed among the fallow agricultural fields.

Twenty-three percent of the property consists of re-flooded, recreated areas that are in the process of being restored to Basin Marsh. District restoration plans are to convert more of the Disturbed areas to Basin Marsh.

Details of habitats as classified by the Florida Natural Areas Inventory appear in Exhibit 1, and Restoration Plans are in Exhibit 2.

MAJOR WILDLIFE VALUES

This large and diverse ecosystem lies within an historic bird migration path that attracts huge numbers of migrating birds each fall—some to stop over before continuing south and many to winter there. The area has already been designated a Globally Important Bird Area by both the American Bird Conservancy and the National Audubon Society; it has also been recognized as one of Florida’s ‘Special Places’ by Audubon Florida.

Wildlife within the North Shore is extremely abundant considering that the majority of the property consists of abandoned agriculture fields instead of natural areas. The North Shore has the highest species total for an inland site in the 100-plus-year history of the annual 24-hr period of the Audubon Christmas Bird Count. Over 360 different avian species have been observed on the property during a series of Christmas Bird Counts, organized monthly bird surveys, as well as the nearly every other day sanctioned / contract surveys.

Several mammal species are found routinely and at least 65 species of butterflies have been recorded in the North Shore Area. Studies of dragonfly species have been initiated.

Twenty-three species of rare plants on the property, including its upland borders, are listed by The Florida Natural Areas Inventory (*Field Guide to the Rare Plants and Animals of Florida, Online*). On-going restoration plans include development of more biodiversity, which will continue to attract more species.

VISITATION AND EDUCATIONAL POTENTIAL

With 80% of Americans living in cities, much of their direct contact with nature will be in an urban setting, thereby shaping the nation’s conservation values, ethics, and priorities. By establishing more national wildlife refuges near urban areas, a new generation, who usually only see pavement, can learn to love the land. Children can have the opportunity to find inspiration in nature all around them instead of spending so much time indoors and plugged in. Adults as well, with busy stress-filled lives, can find solace in national wildlife refuges.

Two environmental education centers exist on or near Lake Apopka. Oakland Nature Preserve (ONP), established by The Friends of Lake Apopka, sits on the southwest shore of the lake in Orange County. Trout Lake Nature Center (TLNC) in Eustis, established by Oklawaha Valley Audubon Society, is about 15 miles to the northwest in Lake County. Both facilities, 501(c)(3) non-profits, are independent entities. These two facilities have somewhat similar educational mandates, are members of the coalition supporting this proposal, and provide a solid foundation for a more expansive program associated with a National Wildlife Refuge.

Both organizations are broadly supported by each of their own communities with some common memberships among them. The partnerships that have been established with County School Boards, charter schools, civic associations, and other non-profits form the necessary base required by a larger operation. In this case, there is no need to create educational programs from scratch. Existing programs are already in place and can be expanded as the needs and opportunities arise.

The recreational activities associated with the Lake Apopka North Shore are already numerous and would be enhanced and broadened by designation as the Lake Apopka National Wildlife Refuge (LANWR) (see Exhibit 8). The District's Recreation Management Program for this area is focused on facilitating resource-based recreational activities, through diverse recreational opportunities. The Program does not compete with local recreational opportunities and meshes with the ongoing conservation and restoration plans. The Program requires partnerships with local governments and non-profits for capital improvements and ongoing management. Granting and enabling public access to the area is the first, necessary step to grow recreational opportunities within this area.

The District has been accelerating the opportunities for public access over the last few years, and has been working with Orange and Lake counties, Friends of Lake Apopka (FOLA), Green Mountain Scenic Byway (GMSB) and others to finance, build, and maintain trailheads and trails. Additional access points and miles of trails are now being planned. The most significant to date is a proposed wildlife drive similar to Black Point Wildlife Drive at Merritt Island National Wildlife Refuge.

Walkers, runners, bicyclists, equestrians, and wildlife viewers now use some or all of the trails. Various organizations routinely sponsor group activities for bicycling, bird watching, and butterfly, damselfly and dragonfly watching. In fact, this area, so famous for its number of bird species, is a regular sold-out field trip event for Central Florida and Coastal Florida birding festivals. Although these trails allow for a wide variety of recreational uses, we understand that quite a few other recreational activities exist that may or may not utilize the trails or may even require other facilities and associated partnerships and financing. Some of those activities include: fishing, hunting, camping and boating. Lake Apopka was once well known for bass fishing; anglers traveled from throughout the United States and other countries to fish for trophy-sized bass there. Duck hunters now access the northern shores of the lake. Blueway trails connecting the North Shore to the Ferndale Preserve, Oakland Nature Preserve, and Winter Garden are in conceptual design stage today.

The variety of recreational opportunities and the value of each opportunity will be improved with additional partnerships that can generate additional resources. Establishing this area as the Lake Apopka National Wildlife Refuge can be the catalyst for the growth of these opportunities.

ECONOMIC BENEFIT TO THE AREA

Approximately 6 million people 16 years old and older fished, hunted, or wildlife watched in Florida and spent \$4.8 billion while doing so, according to research conducted in 2006. As far back as 2004, the famed Ding Darling National Wildlife Refuge in Sanibel, Florida, generated \$47,254,400 in total economic activity related to refuge recreational use and 490 jobs.

Considering that: 1) the Lake Apopka North Shore is over two and one-half times larger than Ding Darling, 2) almost one hundred *more* bird species have been identified at Lake Apopka than at Ding Darling, and 3) the North Shore is located in the Orlando area, which besides being a tourist mecca is also the 3rd largest metropolitan area in Florida, the potential local-area economic benefits of creating the Lake Apopka National Wildlife Refuge are huge. New lodging, equipment sales and rental, guided tours and other ecotourism opportunities would result from National Wildlife Refuge designation. Preliminary studies estimate an initial annual economic input to local communities of \$20–30 million along with the creation of 400 jobs.

For businesses, the recreational opportunities bring tens of thousands of new customers requiring rest, refreshment, or resupply. These same customers are critical components of an improving economy and expanding employment.

Besides these obvious ecotourism economic benefits, research has shown that property values increase near national wildlife refuges. These increases in value are similar to being in proximity to golf courses (during the golfing heydays) and sport/recreation parks and would create another boon to the local economy.

SUMMARY: BENEFITS OF DESIGNATION FOR USFWS, THE DISTRICT AND LOCAL ECONOMY

Designation of the Lake Apopka North Shore (North Shore) as a National Wildlife Refuge will provide habitat value for large numbers of resident and migratory birds as well as recreational, educational and economic opportunities for many local residents and visitors to the area.

The enclosed exhibits provide details of the values and advantages briefly listed here:

1. No land purchases are necessary. All the land in the North Shore is already owned by the State of Florida.
2. Furthers the USFWS goals of creating “new urban refuge partnerships” and implementing “a refuge presence in 10 demographically and geographically varied cities across America by 2015”
3. While the proposal is for designation of the North Shore only, the entire ecosystem includes the large 31,000-acre lake and interesting peripheral uplands, also owned by the State.

4. The site falls within an historic migratory flyway that brings large flocks of waterfowl as well as other species to the diverse habitats. The area has already been designated a Globally Important Bird Area.
5. Low start-up and management costs would be incurred since state and federal agencies have already invested more than \$189 million dollars to acquire the land and initiate the restoration of the system, which is on-going.
6. A proposed wildlife drive will utilize existing levees, eliminating the need for construction of new roads.
7. Existing impoundment infrastructure can control water levels within the marshes. Two-thirds of the marsh impoundment is already in various stages of restoration.
8. The Central Florida area already has a tourism economy. Eco-tourism has been determined to be the fastest growing type of tourism and this refuge could benefit from this fact. Close proximity to large tourist attractions in the area (Disney, SeaWorld, Universal) will attract visitors.
9. Proximity to the urban areas surrounding Lake Apopka, with a wide age spectrum from school children to retirees and an ethnically diverse population, would provide good utilization of this natural site.
10. Many educational opportunities exist on the site—interesting cultural history, as well as its natural wonders, makes this ideal for environmental education programs. Ecological restoration practices can be studied for both upland and wetland systems.
11. The recreational opportunities of the North Shore include birding and other wildlife observations, photography, fishing, hiking, biking and equestrian trails.
12. The opening of a wildlife refuge on the north shore combined with existing natural and cultural features will enhance opportunities for increased usage of all the venues. The additional features include the Oakland Nature Preserve, the Ferndale Preserve, Clay Island Trail, Magnolia Park, Winter Garden Heritage Museum, Railroad Museum, the restored historic downtown Winter Garden, the West Orange and South Lake Trails and the University of Florida campus on the east shore of the lake.

EXHIBIT 1 – LAKE APOPKA NORTH SHORE HABITATS

The Lake Apopka North Shore (North Shore) is located in the southern portion of the Central Valley Region. The surrounding terrain is composed of rolling hills dotted with numerous small lakes and wetland depressions. The topography is primarily a result of surficial subsidence caused by differential solution of the underlying limestone deposits. The basin is bordered on the east by the Lake Dora Ridge and on the west by the northern portion of the Lake Wales Ridge. Ridge elevations range anywhere from 75–308 feet above mean sea level; elevations in the Central Valley range from 59–89 feet; and elevations on the property range from 57–116 feet.

Historically, this property was mostly Basin Marsh grading into Basin Swamp, Mesic Flatwoods, Hydric Hammock, Wet Prairie, Sandhill, and Scrub/Scrubby Flatwoods. When the St. Johns River Water Management District (the District) began acquiring the property, most of the land had been converted to various levels of agricultural use. As the agricultural uses were removed and the lengthy restoration process was begun, native marsh vegetation began to re-colonize in wet areas. Sandhills that were once grazed by cattle have been planted with longleaf pine and wiregrass or allowed to lie fallow, resulting in the return of Sandhill species that had been stored in the seed bank. Small areas of Scrub/Scrubby Flatwoods that were overgrown have been chopped for restoration purposes. Fire is slowly being reintroduced to the uplands and selected portions of the wetlands to facilitate restoration of the native plant communities. The remnant upland plant communities still provide habitat for a number of listed (protected) plant and animal species.

Using the *Florida Natural Areas Inventory Guide to the Natural Communities of Florida*, the District's Wetland Diagnostic Characteristics, and the soil surveys for both Lake and Orange counties, the following is a list of plant communities/vegetation types that existed in 2006.

Disturbed – Seventy (70) percent of the property is composed of some type of treeless wetland community formerly in agriculture. Most of the areas described as Disturbed and that occur below the 70-foot contour line were Basin Marsh prior to draining and put to agricultural uses. Currently, there exists a mosaic of wetland plant communities interspersed among the fallow agricultural fields. The majority of the disturbed and un-flooded areas are found in Planning Units 1 and 2.

Basin Marsh – Twenty-three (23) percent of the property consists of re-flooded, recreated areas that are in the process of being restored to Basin Marsh. Basin Marsh consists of herbaceous or shrubby wetlands situated in a relatively large and irregularly shaped basin. Soils are typically acidic peats with a hydroperiod that typically lasts 200 days per year. Fire maintains the open herbaceous community by restricting shrub invasion. The normal fire interval is every 1–3 years. These Basin Marsh communities often grade into a Wet Prairie or Lake community. The recreated marshes at the North Shore support Southern Cattail, Pickerelweed, Arrowhead and a variety of other semi-aquatic species. A combination of flooding and fire will be utilized to

restore these agricultural fields that are within designated burn zones back to a functional wetland system. Appropriate fire intervals for these marshes are approximately every 1–3 years.

Some of the Basin Marshes in Planning Unit 5 are being utilized for the Marsh Flow-Way—a filtering system at the North Shore that utilizes gravity to move water through the Marsh Flow-Way while pumping the treated water back into the lake. The Marsh Flow-Way, a created wetland, was constructed to remove phosphorus and suspended materials already in Lake Apopka water. The system covers approximately 760 acres and contains four individual wetland cells, in addition to levees, canals, and ditches. Dominant vegetation communities growing in flow-way cells are shallow marsh and shrub swamp species. Shallow marsh includes species such as Pickerelweed, Arrowhead and Cattail, while shrub swamp includes Primrose Willow and some Willow species. Open-water areas are common in the wetland cells. In the long-term (through 2010), the system removed about 28% (2.7 metric tons per year) of the incoming total phosphorus load and about 90% (4,500 metric tons per year) of the incoming total suspended solids.

Mesic Flatwoods – Mesic Flatwoods, which represent 2% percent of the property, are characterized as an open-canopy forest of widely-spaced pine trees with little or no understory or a dense ground cover of herbs and shrubs. This community is found on relatively flat to poorly drained terrain with soils consisting of 1–3 feet of acidic sands. The natural fire interval is 1–8 years. This community type is found on Keen Ranch in the northwest side of the central portion of the property. Due to the lack of fire and the conversion to cattle grazing, oaks and vines have invaded this plant community. The pasture areas surrounding the overgrown flatwoods are in the process of being restored. Prescribed burns will be used as a restoration tool once planted, native species have become established.

Floodplain Forest – A small percentage (less than 1%) of the property consists of Floodplain Forest. These are hardwood forests that occur on dryer soils at slight elevations within floodplains, such as on levees, ridges and terraces. This community is usually flooded for a portion of the growing season. These areas are found mostly on the western, southern tip bordering the lake. Historically, these areas may have been Basin Swamp.

Wet Prairie – These areas are interspersed among the areas of reconstructed Basin Marsh. Wet Prairie, which represents less than 1% of the property, is characterized as a treeless plain with a sparse to dense ground cover of grasses and herbs. It occurs on low, relatively flat, poorly drained terrain. Wet Prairie is seasonally inundated for 50–100 days per year and burns every 2–4 years, preventing invasion by Wax Myrtle and other larger shrubs.

Forest Regeneration – Forest Regeneration represents less than one percent of the property. As an interim management tool, pine trees will be planted in disturbed upland areas while a formal restoration plan is developed and funded. Proceeds gained from harvesting pine trees will go towards land management activities on the property.

Pasture – The majority of the Pasture areas, which represent less than 1% of the property, occur on old Sandhills. This is evident looking at the soils and the Sandhill species that are becoming re-established. Approximately 55 acres of the 90 acres of Pasture on Ranch Road has been planted with Longleaf Pine and Wiregrass. This area is part of the burn program established on the conservation lands.

Scrub/Scrubby Flatwoods – These areas (less than 1% of the property) are found at the top of the Sandhill ridges. There are a number of Scrub endemic species found on the ridges such as Florida Scrub-Jay, Sand Skink, Florida Lady's Nightcap and Nodding Pinweed. These areas are in the process of being restored through mechanical means and fire.

Wet Flatwoods – Wet Flatwoods (less than 1% of the property) are characterized as relatively open canopy forests of scattered pine trees or cabbage palms with either a dense understory or dense ground cover of hydrophytic herbs and shrubs. They are found on relatively flat, poorly drained terrain with soils consisting of 1–3 feet of acidic sands. Water frequently stands during the rainy season, inundating the Flatwoods for one or more months per year. The natural fire rotation for this community is 3–10 years.

Dome Swamp – This community (less than 1% of the property) is characterized as shallow, forested, usually circular depressions that generally present a domed profile because smaller trees grow in the shallower waters at the outer edge, while larger trees grow in the deeper water of the interior. The normal fire cycle is 3–5 years to prevent hardwood intrusion. This community is found in a small sector of the eastern boundary of the property.

Hydric Hammock – Hydric Hammock (less than 1% of the property) is a climax community and occurs in a small portion of the eastern boundary of the property. This community is characterized as a well-developed hardwood and cabbage palm forest with a variable understory often dominated by palms and ferns. This community is typically found on low, flat wet sites where soils are sands consisting of considerable organic matter. The normal hydrological regime must be maintained to prevent a conversion to Mesic communities or a change to hydrophytic species due to flooding.

EXHIBIT 2 – RESTORATION GOALS

The basis of the land and lake restoration goals of the proposed Lake Apopka NWR lies largely in the work that the St Johns River Water Management District has implemented over the past twenty years. The most cost effective method of treating high phosphorus (P) concentrations and suspended particulates in Lake Apopka water is through the cleansing and filtering ability of vegetation in the adjacent properties. So, if the quality of the water in the third largest lake in Florida is to be significantly improved, then the acquired restoration area is absolutely essential to those ends.

The benefits of improving the water quality of the lake itself are the heart of the goals for the proposed refuge. By returning the lands to their historic vegetative communities, in particular basin swamp, thousands of acres of land can be reclaimed for wildlife, especially for aquatic-dependent wildlife. Water-dependent wildlife is one of the hallmark identities of Florida for many Americans who can now use these lands for multiple recreational purposes in perpetuity. These would be, coincidentally, the intended goals of the proposed refuge to be administered under federal management.

To accomplish the cleanup of the water in Lake Apopka, aggressive human intervention is needed on a continual basis. The remainder of this exhibit is a description of the strategies used to achieve those goals and, concomitantly, return the acquired lands to predominantly basin marsh lands for use by wildlife.

Preservation

The Department of State's Division of Historical Resources has six sites registered within the conservation lands. Land management activities will be evaluated to avoid or minimize disturbances to these sites.

Restoration/ Remediation

Uplands Restoration/Remediation

The uplands restoration is intended to return lands to their natural upland habitats and the wildlife species that existed prior to the change to agricultural uses that have dominated for decades. The areas that are suitable for supporting traditional, native vegetation will require restoration efforts that include 1) earth work, 2) fire management, 3) roller chopping / mowing, 4) removal of exotic species, and 5) planting native species.

1) Earth Work

Much of the earth work required to improve the water quality of Lake Apopka has already been finished. Drainage ditches from old agricultural lands had to be filled and unnecessary roads removed. Old citrus trees were taken down and burned and the irrigation systems in the agricultural fields were removed. Raised agricultural beds were leveled and returned to a more

natural contour. Fire breaks and fire access routes have been constructed and will be maintained / improved as needed. The construction of water barriers is essential to the overall project and most have been completed.

2) Fire Management

Fire is a natural element in some of Florida's vegetative habitats and prescribed burns are vital to reestablishing and maintaining these plant communities that historically burn at fairly predictable intervals. Prescribed burns have been and will continue to be used to support these communities that lie predominantly in the central and western parts of the acquired property. The areas maintained by burning include areas designated as freshwater flatwoods, Mesic flatwoods, old agricultural fields, pine plantations and improved pasture. Burning frequencies are determined by the plant community type and vary from one- to seven-year intervals. These lands represent approximately 15% of the total restoration area.

3) Roller Chopping / Mowing

In areas where prescribed burning is not possible, roller chopping is used to control undesirable plant growth in an effort to mimic the overall effects achieved by burning. Mowing is used to maintain roadways and access areas as well as to prevent unwanted vegetation in agricultural fields when restoration has been delayed.

4) Removal of Exotic Species

An important aspect of restoring the area to a more natural, historic condition is the control of exotic plant species. Undesirable species such as tropical soda apple, Cogongrass, Castor Bean, Chinese Tallow, Camphor Tree, Johnson and Bahia grasses are targeted and controlled by herbicides, roller chopping and/or burning.

Exotic wildlife species including feral hogs occur within the Lake Apopka North Shore. The District currently does not utilize feral hog removal agents via the Special Use Authorization (SUA) process because tissue testing of hogs removed from the property indicates toxicity, likely linked to the residual pesticides within the property.

In the past the District coordinated, via contract, with the United States Department of Agriculture (USDA) to assist in the removal of feral hogs from the North Shore. Field reports from the USDA indicate that for most years since 2006, the property is in maintenance phase. When the feral hog population rebounds and starts to cause damage to the natural areas and/or infrastructure, the District will have the flexibility to enter into short-term agreements with the USDA to address specific population reduction initiatives. The District may also attempt to utilize a hog removal agent through an SUA if one can be located that agrees that the hogs will be disposed of properly and not consumed.

Other exotics include feral dog and cat, Nine-banded Armadillo, Brown Anole, Cuban Tree Frog and Greenhouse Frog—with no specific plans for their control or removal.

5) Planting Native Species

There were no forested areas in the restoration area at the time of acquisition. To return the land to a more natural community, the lands above the 70-foot contour have been planted in pine, using the most appropriate pine species to compete with and shade out undesirable species and promote desirable ground cover species. The pine species are Longleaf Pine and Slash Pine, both of which are fire-dependent and appropriate under the planned burning regimes. When possible, desirable groundcover was planted prior to pine plantings.

Wetlands Restoration/Remediation

Wetlands restoration is intended to return lands that occur at the appropriate topographic elevations to their historical basin marsh habitat that existed prior to draining for agricultural purposes. Efforts for wetland restoration include 1) manipulation of water levels, 2) earth work, 3) promoting native species, 4) monitoring/managing exotic species, 5) aluminum sulfate treatment, 6) monitoring bird species, and 7) analysis of organochlorine pesticide (OCP) levels. The majority of the properties treated and restored by some/all of the wetland management efforts are in the Planning Units 1 and 2, but also include lands in Planning Units 3 (Duda Farms Property), 4 (Sand Farm South), 5 (Marsh Flow-Way), and 6 (adjoining fields) for a total of 15,708 acres or nearly 80% of the total restoration area.

1) Manipulation of Water Levels

Much of the restoration area has undergone surficial subsidence and consequently lies below the contour of the lake. Therefore, lake water moves by gravity through the Marsh Flow-Way, a series of four bermed areas totaling 656 acres, where some of the phosphorus and particulate matter is removed. The cleaner water is then mechanically pumped back into Lake Apopka or into the Apopka-Beauclair Canal. Pumping is also used to flood water-retention areas to re-create the basin marshlands. These are the regions of the proposed refuge that are to be used to support desirable aquatic vegetation, waterfowl, and other aquatic wildlife. As rainfall patterns change, seasonally or annually, pumping water into or out of retention areas is used to maintain optimal water levels for aquatic life.

2) Earth Work

As described previously, water barriers are constructed for water retention. On three- to five-year intervals, retention areas are allowed to go dry to consolidate and remove accrued sediments. Areas with high concentrations of organochlorine pesticides have been inverted (via disk plowing) to bury the OCPs below clean soils or have been buried by a foot of clean soil. (See below, Analysis of OCP levels)

3) Promoting Native Species

Existing native aquatic plant species are encouraged in the appropriate areas, while nonaquatic species are mowed or chopped (when the areas are dry) to decrease competition. When the threat of high pesticide levels is apparent, as in the Marsh Flow-Way, cattail growth is encouraged as a deterrent to fish-eating wading birds.

4) Monitor/Managing Exotic Species

Hydrilla is a newly arrived invasive species since the clarity of Lake Apopka has improved. The traditional application of herbicides to control it has been used but experimental treatments for control are also underway. The hydrilla that enters the Marsh Flow-Way from the lake is sequestered just north of the flow way in Cell G of Unit 6 where it is prevented from entering the Apopka-Beauclair Canal. Water hyacinth is the other aquatic species that is controlled by herbicides and is under constant monitoring.

5) Aluminum Sulfate (Alum) Treatment

Adding alum to the soil prior to flooding an area is a management tool used to bind to and thereby reduce the amount of soluble phosphorus that might eventually travel back into Lake Apopka. If phosphorus levels remain high in spite of treatment and retreatment, liquid alum can be added to the water before returning it to the lake or the Apopka-Beauclair Canal.

6) Monitoring Bird Species

See Exhibits 5 and 6.

7) Analysis of Organochlorine Pesticide Levels

The presence of OCPs in the restoration area presents an obstacle to the straightforward inundation of old fields because of the toxicity to and bioaccumulation within aquatic species that feed in those areas. The OCPs bind tightly to the organic matter in the soil, are not readily soluble, and thus do not migrate down into lower soil horizons. Therefore, some of these lands have been mechanically inverted via mouldboard plowing to bury the OCPs below one or more feet of clean soil. If there is sufficient cattail growth to discourage the wading fish-eating bird species, other fields can be flooded and monitored. In these areas, the OCPs will diminish as dying/dead organic matter covers the OCPs and eventually buries them below the one-foot level. OCP levels are analyzed a minimum of once per year in all areas.

EXHIBIT 3 – PESTICIDE-RELATED ISSUES

A great deal of misinformation has been circulated regarding pesticide contamination in the lake and marsh systems. Limited pesticide residues from 50 years of intensive farming are present throughout the area and, for the most part, are well documented. Where necessary, the residues have been remediated. A number of research projects related to pesticide transport as well as bioaccumulation have been completed.

All individual cells have now been approved for flooding. Current monitoring indicates that birds and fish living within the former farm fields have enough residue in them to put a limit on their consumption, but fish living in the lake are approved for consumption. Ironically, tissue mercury levels have been much lower in fish caught in Lake Apopka than fish caught from some of the cleaner lakes in Central Florida.

Extensive use of these farm lands by a wide variety of birds predates the restoration efforts. The standard muck farming technique was to flood the fields during summer for nematode control and to prevent oxidation of the organic soils. The fields were then pumped dry in early fall to begin winter planting. In all of that time, there was no evidence of any significant bird kills.

In early 1998, the first winter after the initial flooding of the farms, a large bird kill occurred in one of the marshes. Toxicology tests indicated high pesticide levels in the bird tissues that far exceeded the levels possible from farm fields. All of the old farm lands were again drained to hinder bird use as well as to allow for extensive soil testing in order to identify possible sources of contamination. Extensive tests along uniform gridlines could not identify likely acute contamination within the farmed areas, so the District focused on likely pesticide mix-loading areas. An area adjacent to a small crop duster airport where pesticides were dumped before landing planes exhibited high pesticide concentrations. The site has been remediated by removal of tons of soil for hazardous waste disposal.

EXHIBIT 4 – CULTURAL DESCRIPTION

Archaeological Resources

The proposed National Wildlife Refuge is located in the East and Central Lakes Archaeological District, generally considered to encompass the area from the St. Mary's River in the north of the state down the Atlantic coast to about Vero Beach. The southern interior boundary is undefined, but is considered by some to be in the vicinity of Lake Tohopekaliga in Osceola County.

A search of the Florida Master Site File (FMSF) GIS data found nine archaeological sites within the boundary of the proposed National Wildlife Refuge:

- FMSF Number LA03427 consists of the Apopka-Beauclair Canal. The canal is considered potentially eligible for listing on the National Register of Historic Places by the State Historic Preservation Officer (SHPO).
- FMSF Number LA02240 contains prehistoric burial(s) and prehistoric midden(s), with evidence of Orange and St. Johns cultures. The site was not evaluated by the recorder or the SHPO.
- FMSF Number LA00444 consists of ceramic scatter and was not evaluated by the recorder or the SHPO.
- FMSF Numbers OR00492 and OR09544 each contained log boats, historic or prehistoric, and were not evaluated by the recorder.
- FMSF Number OR00499 consists of low density artifact scatter (< 2 per sq. meter). The site was not evaluated by the recorder.
- FMSF Numbers OR00497, OR00496 and OR00494 contain no data.

Historical Resources

Settlers of the mid-19th century used Lake Apopka as an efficient means of local transport, but the lake had no navigable outlet and trade was restricted by a lack of adequate means to transport goods into and out of the local area. In 1879 the Apopka Canal Company was formed to dig a canal from the north shore of Lake Apopka to Lake Beauclair, which made a connection to the Ocklawaha and St. Johns rivers. The canal digging took longer than anticipated and was not completed until 1887.

The Orange Belt Railroad reached the southern shore of Lake Apopka in 1886, one year before the completion of the Apopka-Beauclair Canal. Because the railroad provided faster, more efficient transportation for perishable produce than boats, the main impact of the opening of the canal was the lowering of the level of Lake Apopka and the beginning of nearly 100 years of environmental degradation.

From the early to mid-20th century, Lake Apopka drew sport fishermen from around the country to fish for largemouth bass. A small industry developed as about two dozen fish camps ringed

the lake. The Edgewater Hotel in Winter Garden was built specifically to cater to sport fishermen.

In 1941 a levee was constructed across the northern shore of Lake Apopka to drain the remainder of the marshlands for agriculture. The constant need to pump large volumes of water off the mucklands drastically increased nutrient levels in the lake. The draining, along with waste discharges from local municipalities and industry, resulted in hypereutrophic lake conditions. Subsequent algae blooms and fish kills doomed the sport fishing industry.

As a result of the 1985 and 1996 Lake Apopka Restoration Acts, as well the 1987 Surface Water Improvement and Management (SWIM) Act, the St. John's River Water Management District has embarked on a 25- to 50-year, \$130 million project to restore the lake to a Class III water body.

Population Data

The proposed National Wildlife Refuge (NWR) is located within the Orlando-Kissimmee-Sanford Metropolitan Statistical Area (MSA). The population of the MSA in 2010 totaled 2,134,411—a 27.8% increase over the 2000 population.

While the total population of the MSA grew considerably in the decade between 2000 and 2010, several municipalities near the project area experienced even more rapid growth. The City of Minneola, which is adjacent to the project to the west, grew 73.0% over the decade. The City of Apopka, located adjacent to the project on the north and east, grew 55.9% during the same time period. Nearly all of this growth occurred before the collapse of the real estate market in 2006, which hit the area very hard. Real estate prices have only recently begun to slowly climb, but are still far below the peak that occurred in the last quarter of 2005.

The population near this proposed NWR is quite diverse (Florida Legislative Office of Census, 2010). Besides Orlando, which has about one-quarter of its population as black or African American and another one-quarter designated as Hispanic or Latino, the closest larger cities of Apopka and Winter Garden, according to the census, each have populations of approximately 20 percent black or African American and nearly 25 percent Hispanic or Latino. These numbers are approximately equal to the diversity of Orange County as a whole, which also has an Asian population of about 5 percent. Lake County has about 20–25 percent of its population as black/African American plus Hispanic/Latino.

**Populations of Cities, Counties and Census Designated Places (CDP) Near
Proposed Lake Apopka National Wildlife Refuge**

City/County/ Residential Area/MSA	Population 2000	Population 2005	Population 2010	Percent Change 2000– 2005	Percent Change 2000– 2010
City of Apopka	26,642	34,728	41,542	+30.3%	+55.9%
Town of Astatula	1,298	1,629	1,810	+25.5%	+39.4%
Ferndale CDP	233	----	472	----	+102.6%
City of Minneola	5,435	8,665	9,403	+59.4%	+73.0%
Town of Montverde	882	956	1,463	+8.4%	+65.9%
City of Mount Dora	9,418	11,474	12,370	+21.8%	+31.3%
City of Ocoee	24,391	29,849	35,579	+22.4%	+45.9%
Town of Oakland	936	1,093	2,538	+16.8%	+171.1%
Tangerine CDP	826	----	2,865	----	+246.8%
City of Winter Garden	14,351	25,500	34,568	+77.7%	+140.9%
Zellwood CDP	2,540	----	2,865	----	+12.8%
Lake County	210,528	277,035	297,052	+31.6%	+41.1%
Orange County	896,344	1,053,341	1,145,956	+17.5%	+27.8%
MSA	1,644,561	1,933,255	2,134,411	+17.5%	+29.8%

Sources: Census 2000, Census 2010, and Census 2005 (Annual Estimate)
MSA = Orlando-Kissimmee-Sanford Metropolitan Statistical Area

EXHIBIT 5 – THREATENED AND ENDANGERED SPECIES

Wildlife:

The North Shore is one of the most important ornithological sites in the Southeastern United States and, with management, it could be even better. To date 367 species have been seen, which puts this area second only to the Everglades that has open water (Gulf) habitats. The habitat diversity within the extensive abandoned agriculture fields and proximity to the 31,000-acre lake has encouraged this abundance of species.

This high number of avian species has been observed on the property during a number of surveys including a series of Audubon Christmas Bird Counts. The Florida Natural Areas Inventory (*Field Guide to the Rare Plants and Animals of Florida, Online*) lists 41 species of rare wildlife that occur in Orange and Lake counties. Listed (protected) wildlife species known to occur on or near the property include:

- Little Blue Heron
- Snowy Egret
- Tricolored Heron
- White Ibis
- Reddish Egret
- Whooping Crane
- Roseate Spoonbill
- Wood Stork
- Least Tern
- Limpkin
- Sandhill Crane
- Bald Eagle
- Crested Caracara
- Snail Kite
- Peregrine Falcon
- Brown Pelican
- Florida Scrub-jay
- Florida Black Bear
- American Alligator
- Gopher Tortoise
- Eastern Indigo Snake
- Sand Skink

Other wildlife species include:

- Great Egret
- White-tailed Deer
- Raccoon
- Virginia Opossum
- Bobcat
- Wild Turkey
- numerous waterfowl and wading birds
- Eastern Cottontail
- Gray Squirrel
- Grey Fox
- River Otter
- Cotton Rat
- Rice Rat
- Coyote

Exotic wildlife species documented to occur include:

- feral Hog
- feral Cat
- Nine-banded Armadillo
- House Mouse
- Black Rat
- Muscovy duck
- Eurasian-collared Dove
- Rock Dove
- European Starling
- Brown Anole
- Cuban Tree Frog
- Greenhouse Frog
- Tilapia
- Suckermouth Catfish

Plants:

Over 100 species of plants are known to occur within the Lake Apopka North Shore. The Florida Natural Areas Inventory (*Field Guide to the Rare Plants and Animals of Florida, Online*) lists 23 species of rare plants that occur in Orange and Lake counties. A number of listed (protected) plants found on or near the property include:

- Claspig Warea
- Scrub Plum
- Florida Lady's Nightcap
- Pygmy Fringe Tree
- Britton's Beargrass
- Nodding Pinweed

Exotic and nuisance plant species documented to occur include:

- Hydrilla
- Water Hyacinth
- Tropical Soda Apple
- Cogongrass
- Castorbean
- Chinese Tallow
- Camphor Tree
- Johnsongrass
- Bahiagrass

EXHIBIT 6 – BIRD LIFE OF LAKE APOPKA NORTH SHORE

Migrating and Wintering Birds

The following summarizes data from 1,787 surveys involving over 21,356 hours of fieldwork conducted from August 15, 1998 to November 4, 2012.

Lake Apopka North Shore is a magnet for migrating birds in part because it is a very large undeveloped space to the north and the east of one of the largest lakes in Florida. At night this large dark area by a large lake is attractive to birds migrating to the north or to the south. Birds that in the fall and the winter migrate to the east along the gulf do not all turn to the south towards migratory hotspot Fort DeSoto, but rather they make a gradual turn to the south and that brings them to Lake Apopka. With strong easterly or westerly winds, terns in particular are pushed inland and often end up at Lake Apopka. It is these facts that make this such an important bird area.

As the bulk of the restoration area involves the now closed muck farms, vegetation grows very quickly and most plant species seem to be taller. This leads to the situation that the bird population is constantly in a state of flux as it all depends on the habitat of the day. For example, an area well utilized by shorebirds in 2011 was by fall 2012 full of 18-foot tall pigweed (*Amaranthus* sp.). Because of this habitat flux, the types of birds utilizing the sites are also in flux.

It is very important to note that the extensive monitoring data cover only half the area (Units One and Two of the former Zellwood Water Control and Drainage District)—some 8,000 acres—plus the Zellwin Sand Farm property. For the purposes of this exhibit, the Sand Farm is excluded, but is an important habitat in its own right (Northern Bobwhite, Eastern Meadowlark, etc.).

In 1998 and again in 2009, 2010 and 2011, there were large areas of open water in this monitored area. In 1998 the farms had just been closed so the flooded fields could be observed uninterrupted by lines of willows or cattails. In the fall of that year some 5,000 acres of Unit Two were flooded. In 2009, 2010 and 2011 parts of Unit One and Two were flooded and approximately 2,000 acres could be checked for birds. In 1998/1999 the following were the highest counts:

Species	Count	Date
Pied-billed Grebe	750	Nov 18, 1998
American White Pelican	4370	Jan 29, 1999
Fulvous Whistling-Duck	250	Oct 21, 1998
Snow Goose	90	Dec 18, 1998
American Wigeon	186	Dec 18, 1998
Blue-winged Teal	10,500	Nov 2, 1998
Northern Shoveler	770	Jan 27, 1999
Northern Pintail	420	Dec 16, 1998
Green-winged Teal	12,565	Dec 18, 1998
Ring-necked Duck	11,900	Dec 3, 1998

Species	Count	Date
Hooded Merganser	100	Jan 12, 1999
Common Gallinule (Moorhen)	1890	Oct 21, 1998
American Coot	16,720	Nov 18, 1998

The data span the period from October 21 to January 29. Because of the pesticide issue the fields were drained, otherwise there might have been some peak counts in February.

In 2009, 2010 and 2011, with less open water, there were far fewer very high counts. The counts were:

Species	Count	Date
Pied-billed Grebe	945	Nov 26, 2010
American White Pelican	600	Mar 23, 2011
Fulvous Whistling-Duck	610	Nov 25, 2009
Snow Goose	9	Dec 24, 2010
Gadwall	812	Dec 16, 2011
American Wigeon	65	Jan 24, 2010
Blue-winged Teal	2,400	Nov 6, 2009
Northern Shoveler	523	Feb 16, 2011
Northern Pintail	200	Jan 30, 2011
Green-winged Teal	3,725	Jan 30, 2011
Ring-necked Duck	1,800	Dec 11, 2009
Bufflehead	34	Dec 31, 2010
Hooded Merganser	23	Jan 22, 2010
Common Gallinule	6,600	Sep 18, 2011
American Coot	24,900	Nov 7, 2010

Even with far less open water there were still some new high counts. What these figures show is that with sufficient open water of variable depths, very large numbers of waterfowl can occur.

One species left out of the above, however, requires mentioning. That is the Black-bellied Whistling-Duck, a species that is currently invading the eastern United States through Texas and Florida. There were three on Aug 31, 1999 with six on Jul 19, 2003; 57 on Apr 7, 2004; 270 on Dec 2, 2005; 345 on Jan 1, 2006; 556 on Dec 31, 2009; and 1,660 on Feb 5, 2010. This species appears to need well-vegetated, very shallow flooded areas for feeding and loafing, but they prefer to roost on islands of higher ground. With the drought and lack of water, these birds have moved on.

Shorebirds are different—their greatest numbers are often in the spring and fall, although there are species such as the Long-billed Dowitcher that are winter visitors. The following details a selection of the highest counts.

There were:

Species	Count	Date
Black-bellied Plover	346	Dec 3, 1998,
Semipalmated Plover	134	May 15, 2002
Killdeer	2,815	Jan 2, 2009
Black-necked Stilt	432	Aug 4, 2010
American Avocets	75	Jan 11, 1999
Greater Yellowlegs	415	Dec 16, 1998
Lesser Yellowlegs	1,195	Dec 16, 1998
Solitary Sandpiper	76	May 7, 2006
Semipalmated Sandpiper	1,540	May 23, 2002
Western Sandpiper	1,250	Sep 7, 2011
Least Sandpiper	2,450	Dec 31, 1998
White-rumped Sandpiper	118	May 21, 2011
Pectoral Sandpiper	965	Sep 12, 2008
Dunlin	210	Nov 13, 1998
Stilt Sandpiper	490	Oct 21, 1998
Buff-breasted Sandpiper	23	Sep 11, 1998
Short-billed Dowitcher	670	Oct 29, 1998
Long-billed Dowitcher	1,890	Jan 12, 1999
Wilson's Snipe	1,090	Jan 4, 2004
Wilson's Phalarope	21	Sep.2, 1998

The highest counts were in May and from September to January. To get these kinds of numbers there must be extensive areas of wet mud, which will require careful control of water levels.

The third group of wetland birds is the herons, egrets, ibis and rails. The highest counts often came from the years mentioned above, but for this group the after effects of the three hurricanes in 2004 provided a major wetland habitat for three months until the fields drained. While the rails look for a shallow-flooded habitat with an extensive growth of cattails, the herons, egrets and ibis look for shallow-flooded fields with large areas of open water. The following peak counts give an indication of the numbers that this area can support.

Species	Count	Date
American Bittern	105	Dec 30, 2009
Least Bittern	76	Jul 9, 2008
Great Blue Heron	395	Dec 3, 1998
Great Egret	2,390	Dec 5, 2004
Snowy Egret	2,585	Nov 7, 2004
Little Blue Heron	735	Dec 1, 2004
Tricolored Heron	466	Jul 13, 2011

Species	Count	Date
Cattle Egret	6,400	Sep 16, 2004
Green Heron	242	Aug 23, 2008
Black-crowned Night-Heron	242	Mar 20, 2011
Yellow-crowned Night-Heron	28	Apr 24, 2011
White Ibis	11,210	Jun 17, 2011
Glossy Ibis	3,825	Dec 1, 2004
Roseate Spoonbill	139	Oct 2, 2011
Wood Stork	1,130	Nov 18, 1998
King Rail	523	Aug 23, 2006
Sora	415	Nov 28, 2008

The majority of the American Bitterns and the rails came from the Sand Farm Cattail Marsh. What these counts show is that there are very few months when very high numbers of water birds have not been recorded.

Also using the flooded fields or, more specifically, any unvegetated islands in 1998/1999 were the terns, skimmers and gulls that used these locations for loafing and roosting. In 1998 these sites were available, but in the later years the only such roost was on the former Duda property. Terns will use these sites at any time of the year, but they might have to give up possession to any American White Pelicans. The gulls are absent during the summer months. The only large gull counts directly linked to the fields were of 21 Franklin's Gulls on Dec 4, 1998 and 88 Herring Gulls on Feb 3, 1999. For the terns there were:

Species	Count	Date
Forster's Tern	500	Sep 2, 1998
Black Tern	500	Sep 2, 1998
Black Skimmer	120	Feb 3, 1999

The Black Tern count in these fields has now risen to 532 on Aug 24, 2008.

The roost at Duda is a summer event, i.e. it involves non-breeding birds. The great majority were Forster's Terns with a high count of 189 on Jun 13, 2007. This species then attracted other species such as:

Species	Count	Date
Caspian Tern	140	Apr 25, 2008
Common Tern	5	Jun 1, 2008
Arctic Tern	2	Jun 10, 2007
Roseate Tern	1	May 20, 2008
Least Tern	127	Jun 25, 2008
Black Tern	7	Jun 6, 2008
Black Skimmer	80	May 11, 2008

This is the only inland record of a Roseate Tern for Florida and most birders have never seen an Arctic Tern. If the habitat were provided, this would be a major draw during the summer months.

These flooded fields not only provide a diet of fish, but they are also the home of the larval stage of countless aquatic insects. At times there are columns of midges swirling up into the sky or a host of dragonflies hunting over the water or the vegetation. These aquatic insects attract a range of aerial feeders—of these the Swallow-tailed Kite is the most spectacular. After breeding they gather into large roosts and feed at selected sites, thus putting on weight for the migration to their winter grounds in Brazil. The local roost is at Lake Woodruff National Wildlife Refuge in Volusia County; these birds travel daily to Lake Apopka to feed. When the conditions are right very large numbers can be seen hunting over the fields. The highest counts are 1,560 on Jul 26, 2006 and 1,642 on Aug 3, 2012. To put this into perspective, most birdwatchers think they have had a great day if they see 20 of these birds.

Large numbers of Common Nighthawks also visit the area to feed on insects. On Sep 11, 2002 1,233 were observed and 470 were observed a week later on Sep 18. The kites and nighthawks are spectacularly graceful as they swoop and glide over the fields—a truly major draw for any location. There are other aerial feeders such as:

Species	Count	Date
Purple Martin	2,850	Jun 20, 2004
Tree Swallow	71,000	Mar 10, 2006
Bank Swallow	265	Aug 20, 2008
Cliff Swallow	71	Oct 1, 2006
Cave Swallow	14	Oct 28, 2005
Barn Swallow	19,500	Aug 29, 2012

There are many groups of birds that have taken advantage of the varied habitat offered on the North Shore. One such group is the birds of prey and premier among these is the Northern Harrier. In the United States there are two communal roosts that have each topped 100 birds once. In this restoration area, there has been a major roost near Laughlin Road with secondary roosts at the Sod Farm, the Sand Farm and by Airport Road. Except for 2012, a year in which the vegetation has grown too tall, it has been normal to see 100 plus on many days each year. The highest count is actually 305 on Dec 12, 2004. This has been the most important winter site in the United States for this species. To detail some of the other high counts:

Species	Count	Date
Bald Eagle	109	Nov 13, 2005
Sharp-shinned Hawk	26	Nov 30, 2007
Cooper's Hawk	45	Aug 25, 2006
Red-shouldered Hawk	133	Sep 29, 2006
Red-tailed Hawk	175	Nov 30, 2007
American Kestrel	38	Nov 5, 2003

Of the numerous rarities that have been seen, the Eurasian Kestrel requires special note. This kestrel, present from Feb 26, 2003 to Mar 23, 2003 was the first one to be recorded in the south-eastern United States.

The flycatchers are also a special feature and some species are more likely to be seen here than at any other location in Florida. The specialties are the Least Flycatcher, Ash-throated Flycatcher and Western Kingbird, whose highest counts are, 23 on Dec 19, 2007; 16 on Dec 14, 2007; and 72 on Jan 27, 2002, respectively. There have also been a number of rarer species such as Olive-sided, Yellow-bellied and Brown-crested Flycatchers with Tropical and Cassin’s Kingbirds. To date there have been three Fork-tailed Flycatchers—a national rarity!

Breeding Species

While this is mainly about the migrating and wintering species, unexpected breeding species have also been observed. Monitoring of breeding species was conducted from 1999 to 2004. Monitoring ceased when accessing the area became too difficult. The North Shore has succeeded in re-writing the book regarding what breeds regularly in Central Florida. The Yellow-breasted Chat now breeds there every year; there were 103 pairs in 2004. The buntings are well represented with 87 pairs of Blue Grosbeaks in 2003 and 157 pairs of Indigo Buntings in 2004. Although not known to breed on the North Shore, there were 22 singing male Painted Buntings in 2004. There were up to 142 pairs of Dickcissels in 2005 and they now breed on the North Shore in very low numbers each year. This species normally breeds no nearer to Central Florida than Northern Georgia. Finally, 26 pairs of Orchard Orioles were observed in 2003. Orange County is right at the southern end of the breeding range so to have so many pairs here is special.

*Highest daily bird counts Lake Apopka, Florida
August 15, 1998 to January 20, 2013*

Below is a list of the highest counts for the eastern half of the Lake Apopka North Shore Restoration Area, this area is described as Zellwood. More specifically these counts relate to some 10,200 acres of this 20,000 plus acre site—it covers the former Zellwood Drainage and Water Control District’s Units One and Two together with the Zellwin Sand Farm property and the former W.F.R. foliage business. All are in Orange County, Florida.

Species	Highest Count to Jan 20, 2013	Date of highest count
White-faced Whistling-Duck	1	May 7, 2000
Black-bellied Whistling-Duck	1660	February 5, 2010
Fulvous Whistling-Duck	840	October 22, 2003
Greater White-fronted Goose	3	October 28, 2001
Snow Goose	90	December 18, 1998

Species	Highest Count to Jan 20, 2013	Date of highest count
Ross's Goose	2	December 7, 1998
Canada Goose	3	October 29, 1998
Egyptian Goose	3	July 23, 2006
Black Swan	1	June 10, 2002
Muscovy Duck	4	November 18, 2005
Wood Duck	316	September 9, 2011
Gadwall	812	December 16, 2011
Eurasian Wigeon	1	November 19, 2010
American Wigeon	186	December 18, 1998
American Black Duck	6	December 26, 2010
Mallard	103	October 24, 2004
Mottled Duck	397	September 2, 2011
Blue-winged Teal	10,500	November 2, 1998
Cinnamon Teal	3	January 19, 1999
Northern Shoveler	770	January 27, 1999
Northern Pintail	420	December 16, 1998
"Common Teal"	1	January 22, 2006
Green-winged Teal	12,565	December 18, 1998
Canvasback	5	December 7, 1998
Redhead	18	January 3, 2002
Ring-necked Duck	11,900	December 3, 1998
Greater Scaup	22	December 19, 2010
Lesser Scaup	3300	January 23, 2009
Surf Scoter	6	November 21, 2012
Black Scoter	2	November 22, 2006
Bufflehead	34	December 31, 2010
Common Goldeneye	2	November 22, 2005
Hooded Merganser	100	January 12, 1999
Common Merganser	1	January 20, 2013
Red-breasted Merganser	14	March 15, 2009
Ruddy Duck	34,000	January 4, 2006
Northern Bobwhite	105	June 1, 2008
Gray Partridge	2	September 14, 2003
Ring-necked Pheasant	1	May 6, 2002
Common Peafowl	1	September 10, 2006
Wild Turkey	13	October 21, 2009
Pacific Loon	1	December 11, 2005
Common Loon	3	December 8, 2006

Species	Highest Count to Jan 20, 2013	Date of highest count
Pied-billed Grebe	945	November 26, 2010
Horned Grebe	4	December 21, 2011
Red-necked Grebe	1	November 24, 2006
Eared Grebe	4	January 1, 1999
Sooty Shearwater	1	August 15, 2004
Wood Stork	1130	November 18, 1998
Neotropic Cormorant	1	June 3, 2009
Double-crested Cormorant	7800	February 22, 2004
Anhinga	873	July 2, 2010
American White Pelican	4370	January 29, 1999
Brown Pelican	6	April 30, 2005
American Bittern	105	December 30, 2009
Least Bittern	76	July 9, 2008
Great Blue Heron	395	December 3, 1998
Gray Heron	1	December 17, 2003
Great White Heron	3	June 22, 2008
Great Egret	2390	December 5, 2004
Snowy Egret	2585	November 7, 2004
Little Blue Heron	735	December 1, 2004
Tricolored Heron	466	July 13, 2011
Reddish Egret	1	March 21, 2000
Cattle Egret	6400	September 16, 2004
Green Heron	242	August 23, 2008
Black-crowned Night-Heron	241	March 20, 2011
Yellow-crowned Night-Heron	28	April 24, 2011
White Ibis	11,210	June 17, 2011
Glossy Ibis	3825	December 1, 2004
White-faced Ibis	3	March 5, 2010
Roseate Spoonbill	139	October 2, 2011
Black Vulture	1340	February 28, 2007
Turkey Vulture	2800	February 11, 2009
Osprey	201	July 11, 2012
Swallow-tailed Kite	1642	August 3, 2012
White-tailed Kite	1	June 30, 2000
Snail Kite	1	July 16, 1999
Mississippi Kite	1	May 5, 2004
Bald Eagle	109	November 13, 2005
Northern Harrier	305	December 12, 2004

Species	Highest Count to Jan 20, 2013	Date of highest count
Sharp-shinned Hawk	26	November 30, 2007
Cooper's Hawk	45	August 25, 2006
Red-shouldered Hawk	133	September 29, 2006
Broad-winged Hawk	3	September 29, 2006
Short-tailed Hawk	1	September 30, 1999
Swainson's Hawk	2	November 11, 2007
Red-tailed Hawk	175	November 30, 2007
Rough-legged Hawk	3	February 23, 2000
Golden Eagle	1	January 8, 1999
Yellow Rail	1	March 9, 2003
Black Rail	1	June 4, 2003
Clapper Rail	1	November 28, 2003
King Rail	523	August 23, 2006
Virginia Rail	9	February 16, 2005
Sora	415	November 28, 2008
Purple Gallinule	97	April 25, 2004
Common Gallinule	6600	September 18, 2011
American Coot	24,900	November 7, 2010
Limpkin	6	March 8, 2009
Sandhill Crane	375	January 16, 2009
Whooping Crane	8	March 21, 2000
Black-bellied Plover	346	December 3, 1998
American Golden-Plover	6	October 26, 1999
Wilson's Plover	1	September 10, 2008
Semipalmated Plover	134	May 15, 2002
Piping Plover	1	May 10, 2002
Killdeer	2815	January 2, 2009
Black-necked Stilt	432	August 4, 2010
American Avocet	75	January 11, 1999
Spotted Sandpiper	13	May 15, 2002
Solitary Sandpiper	76	May 7, 2006
Greater Yellowlegs	415	December 16, 1998
Willet	8	July 27, 1999
Lesser Yellowlegs	1195	December 16, 1998
Upland Sandpiper	6	April 20, 2009
Whimbrel	2	April 30, 2008
Long-billed Curlew	1	June 25, 1999
Hudsonian Godwit	1	June 22, 2011

Species	Highest Count to Jan 20, 2013	Date of highest count
Marbled Godwit	3	August 19, 2011
Ruddy Turnstone	8	May 6, 2002
Red Knot	12	May 14, 2001
Sanderling	5	May 20, 2002
Semipalmated Sandpiper	1540	May 23, 2002
Western Sandpiper	1250	September 7, 2011
Least Sandpiper	2450	December 31, 1998
White-rumped Sandpiper	118	May 21, 2011
Baird's Sandpiper	2	August 6, 2000
Pectoral Sandpiper	965	September 12, 2008
Sharp-tailed Sandpiper	1	September 26, 2002
Dunlin	210	November 13, 1998
Curlew Sandpiper	1	September 2, 1998
Stilt Sandpiper	490	October 21, 1998
Buff-breasted Sandpiper	23	September 11, 1998
Ruff	2	November 25, 1998
Short-billed Dowitcher	670	October 29, 1998
Long-billed Dowitcher	1890	January 12, 1999
Wilson's Snipe	1090	January 4, 2004
American Woodcock	12	December 7, 2005
Wilson's Phalarope	21	September 2, 1998
Red-necked Phalarope	5	August 22, 2008
Red Phalarope	1	September 16, 2001
Pomarine Jaeger	2	May 6, 2001
Parasitic Jaeger	1	August 20, 2008
Bonaparte's Gull	1013	January 17, 2010
Little Gull	1	January 7, 2001
Laughing Gull	174	February 14, 2010
Franklin's Gull	21	December 4, 1998
Ring-billed Gull	18,000	February 8, 2005
Herring Gull	88	February 3, 1999
Thayer's Gull	1	March 31, 2004
Lesser Black-backed Gull	2	December 11, 1998
Great Black-backed Gull	1	January 27, 2006
Least Tern	92	June 10, 2009
Gull-billed Tern	4	April 20, 1999
Caspian Tern	208	February 10, 1999
Black Tern	532	August 24, 2008

Species	Highest Count to Jan 20, 2013	Date of highest count
Roseate Tern	1	May 20, 2008
Common Tern	103	October 31, 2007
Arctic Tern	3	October 31, 2007
Forster's Tern	611	January 16, 2008
Royal Tern	8	August 22, 2008
Sandwich Tern	4	May 7, 2007
Bridled Tern	6	August 20, 2008
Sooty Tern	16	August 22, 2008
Black Skimmer	120	February 3, 1999
Rock Pigeon	106	June 25, 1999
Eurasian Collared-Dove	36	June 7, 1999
Diamond Dove	1	August 6, 2010
White-winged Dove	35	August 12, 2009
Mourning Dove	2370	July 30, 2008
Common Ground-Dove	111	May 21, 2003
Budgerigar	1	July 23, 1999
Cockatiel	1	September 2, 2002
Yellow-billed Cuckoo	52	June 8, 2006
Black-billed Cuckoo	1	May 10, 1999
Smooth-billed Ani	1	June 26, 2003
Groove-billed Ani	6	February 6, 2005
Barn Owl	25	December 22, 2006
Eastern Screech-Owl	3	February 1, 2009
Great Horned Owl	10	January 30, 2005
Burrowing Owl	1	June 18, 2003
Barred Owl	11	October 8, 2006
Long-eared Owl	1	January 11, 2004
Short-eared Owl	9	December 29, 2006
Northern Saw-whet Owl	1	November 5, 2002
Lesser Nighthawk	1	December 16, 1998
Common Nighthawk	1233	September 11, 2002
Chuck-will's-widow	16	May 23, 2004
Whip-poor-will	7	March 15, 2009
Chimney Swift	8100	September 24, 2008
Ruby-throated Hummingbird	2	October 13, 2002
Black-chinned Hummingbird	1	December 19, 1999
Belted Kingfisher	45	November 1, 2009
Red-headed Woodpecker	3	September 10, 2003

Species	Highest Count to Jan 20, 2013	Date of highest count
Red-bellied Woodpecker	91	October 1, 2006
Yellow-bellied Sapsucker	10	December 13, 2006
Downy Woodpecker	49	March 28, 2007
Hairy Woodpecker	1	March 13, 1999
Red-cockaded Woodpecker	1	June 23, 2003
Northern Flicker	16	October 8, 2006
Pileated Woodpecker	12	November 4, 2007
Crested Caracara	1	July 27, 1999
Eurasian Kestrel	1	February 26, 2003
American Kestrel	38	November 5, 2003
Merlin	8	September 30, 2007
Peregrine Falcon	4	October 12, 1999
Olive-sided Flycatcher	1	April 20, 2005
Eastern Wood-Pewee	7	September 27, 2006
Yellow-bellied Flycatcher	1	October 11, 2004
Acadian Flycatcher	4	September 10, 2003
Alder Flycatcher	1	September 14, 2003
Willow Flycatcher	1	July 27, 1999
Least Flycatcher	23	December 19, 2007
Eastern Phoebe	416	October 26, 2003
Vermilion Flycatcher	2	March 4, 2002
Ash-throated Flycatcher	16	December 14, 2007
Great Crested Flycatcher	45	May 16, 2007
Brown-crested Flycatcher	2	March 1, 2006
Tropical Kingbird	1	December 9, 2001
Cassin's Kingbird	2	February 29, 2004
Western Kingbird	72	January 27, 2002
Eastern Kingbird	347	August 31, 1999
Gray Kingbird	2	October 21, 1998
Scissor-tailed Flycatcher	8	December 11, 2005
Fork-tailed Flycatcher	1	July 23, 2000
Loggerhead Shrike	18	February 3, 2002
White-eyed Vireo	74	October 5, 2008
Bell's Vireo	1	February 6, 2000
Yellow-throated Vireo	2	April 3, 2002
Blue-headed Vireo	19	November 23, 2008
Philadelphia Vireo	1	October 14, 1999
Red-eyed Vireo	17	September 21, 2000

Species	Highest Count to Jan 20, 2013	Date of highest count
Black-whiskered Vireo	1	Sep 10, 2006
Blue Jay	180	October 17, 2007
Florida Scrub-Jay	2	April 17, 2002
American Crow	38	November 9, 2008
Fish Crow	4400	January 27, 2002
Purple Martin	2850	June 20, 2004
Tree Swallow	71,000	March 10, 2006
Northern Rough-winged Swallow	28	October 11, 2004
Bank Swallow	265	August 20, 2008
Cliff Swallow	71	October 1, 2006
Cave Swallow	14	October 28, 2005
Barn Swallow	19,500	August 29, 2012
Carolina Chickadee	7	May 3, 2009
Tufted Titmouse	16	September 15, 2010
Red-breasted Nuthatch	3	November 12, 2012
Brown-headed Nuthatch	1	December 17, 2003
House Wren	674	November 5, 2000
Winter Wren	1	January 19, 2003
Sedge Wren	108	November 26, 2000
Marsh Wren	211	November 9, 2005
Carolina Wren	103	April 24, 2003
Bewick's Wren	1	February 25, 2000
Blue-gray Gnatcatcher	173	December 7, 2007
Golden-crowned Kinglet	3	November 17, 2006
Ruby-crowned Kinglet	67	November 17, 2006
Eastern Bluebird	6	December 21, 2002
Veery	12	October 2, 2002
Gray-cheeked Thrush	6	October 15, 2008
Bicknell's Thrush	1	May 27, 2000
Swainson's Thrush	36	September 26, 2001
Hermit Thrush	9	December 12, 2004
Wood Thrush	1	October 19, 1999
American Robin	240,000	December 29, 2006
Gray Catbird	713	October 17, 2008
Northern Mockingbird	126	October 8, 2006
Brown Thrasher	74	October 8, 2008
European Starling	2040	July 13, 2007
Common Myna	1	July 11, 2005

Species	Highest Count to Jan 20, 2013	Date of highest count
American Pipit	820	January 2, 2009
Cedar Waxwing	2240	April 8, 2007
Ovenbird	92	September 27, 2006
Worm-eating Warbler	2	September 22, 2004
Louisiana Waterthrush	98	August 27, 2010
Northern Waterthrush	188	September 28, 2004
Blue-winged Warbler	2	September 3, 2000
Black-and-white Warbler	10	September 22, 2004
Prothonotary Warbler	2	April 14, 2002
Swainson's Warbler	1	August 16, 2000
Tennessee Warbler	29	October 21, 2004
Orange-crowned Warbler	36	December 15, 2000
Nashville Warbler	1	January 11, 1999
Kentucky Warbler	1	April 14, 1999
Common Yellowthroat	856	September 22, 2004
Hooded Warbler	2	April 17, 1999
American Redstart	48	May 14, 2001
Cape May Warbler	16	April 30, 2008
Cerulean Warbler	2	September 21, 2000
Northern Parula	52	March 18, 2005
Magnolia Warbler	4	October 17, 2009
Bay-breasted Warbler	2	November 2, 2007
Blackburnian Warbler	4	September 19, 2000
Yellow Warbler	232	September 15, 2006
Chestnut-sided Warbler	6	September 21, 2000
Blackpoll Warbler	73	May 5, 2006
Black-throated Blue Warbler	15	April 30, 2008
Palm Warbler	3120	February 26, 2003
Pine Warbler	24	December 9, 2011
Yellow-rumped Warbler	10,220	February 23, 2007
Yellow-throated Warbler	8	September 26, 2007
Prairie Warbler	83	September 10, 2003
Black-throated Gray Warbler	1	September 15, 2010
Black-throated Green Warbler	4	October 15, 2010
Canada Warbler	1	August 24, 2003
Wilson's Warbler	2	January 26, 2005
Yellow-breasted Chat	41	May 23, 2004
Eastern Towhee	228	July 30, 2003

Species	Highest Count to Jan 20, 2013	Date of highest count
Bachman's Sparrow	1	January 16, 2005
Chipping Sparrow	19	December 17, 2008
Clay-colored Sparrow	46	February 3, 1999
Field Sparrow	32	January 30, 2009
Vesper Sparrow	45	January 16, 2009
Lark Sparrow	1	February 9, 1999
Savannah Sparrow	860	December 8, 1998
Grasshopper Sparrow	12	February 17, 1999
Henslow's Sparrow	1	November 20, 1998
LeConte's Sparrow	1	December 16, 1998
Nelson's Sparrow	1	November 5, 2000
Fox Sparrow	1	February 17, 1999
Song Sparrow	16	December 16, 2002
Lincoln's Sparrow	5	November 17, 2002
Swamp Sparrow	1126	November 21, 2004
White-throated Sparrow	7	March 4, 2009
White-crowned Sparrow	51	February 3, 1999
Dark-eyed Junco	1	December 17, 2003
Lapland Longspur	1	October 16, 1998
Summer Tanager	2	October 19, 1999
Scarlet Tanager	2	October 10, 2007
Western Tanager	1	December 9, 2007
Northern Cardinal	344	April 9, 2008
Rose-breasted Grosbeak	3	October 21, 2009
Blue Grosbeak	72	October 1, 2006
Lazuli Bunting	1	January 7, 2002
Indigo Bunting	840	October 26, 2007
Painted Bunting	12	May 26, 2004
Dickcissel	143	May 22, 2005
Bobolink	16,550	April 30, 2008
Red-winged Blackbird	303,000	July 17, 2005
Eastern Meadowlark	74	February 27, 2009
Yellow-headed Blackbird	5	December 31, 1998
Rusty Blackbird	13	December 3, 1998
Brewer's Blackbird	1	December 19, 2001
Common Grackle	117,000	July 17, 2005
Boat-tailed Grackle	167,000	July 14, 2005
Shiny Cowbird	13	July 3, 2005

Species	Highest Count to Jan 20, 2013	Date of highest count
Bronzed Cowbird	2	December 13, 2009
Brown-headed Cowbird	3600	February 27, 2009
Orchard Oriole	28	June 19, 2009
Bullock's Oriole	1	January 22, 2003
Baltimore Oriole	7	September 29, 2003
Purple Finch	1	November 26, 2006
House Finch	27	July 11, 2012
Pine Siskin	2	December 26, 2008
American Goldfinch	196	February 20, 2008
House Sparrow	7	December 8, 1998
Orange Bishop	1	April 6, 2003
Bronze Mannikin	1	November 18, 2001
Zebra Finch	1	September 7, 2005
Pin-tailed Whydah	2	September 22, 2005

The following six species were recorded by others at Zellwood prior to the start of this survey on August 15, 1998 and they have not been seen since.

Species	Highest Count to Jan 20, 2013	Date of highest count
Brant	1	Oct 24, 1981
White-cheeked Pintail	1	Aug 18, 1973
Ferruginous Hawk	2	Dec 19, 1983
Southern Lapwing	1	Jul 23, 1961
Brown Noddy	1	Sep 10, 1965
Golden-winged Warbler	1	Aug 17, 1974

Summary

Total species August 15, 1998 to January 20, 2013	361
Additional species pre-survey reported here	6
Grand Total	367

EXHIBIT 7 – LAKE RESTORATION

The North Shore management area is approximately 20,000 acres and is located within the St. Johns River Water Management District’s Upper Ocklawaha River Basin. Lake Apopka is headwaters of the Ocklawaha River and the first lake in the Ocklawaha Chain of Lakes.

The Future Land Use designation for the North Shore property in Lake County is Conservation and Recreation. The Conservation Future Land Use Category includes property managed for natural resources that are to be maintained in a natural condition. The property in Orange County has been designated as Rural.

Lake Apopka was once the second largest lake in Florida and noted for sport fishing; through the 1940s, it was one of central Florida’s main attractions. Anglers traveled from throughout the United States to fish for trophy-sized bass in Lake Apopka. A large industry related to fishing was built around the lake, with 21 fish camps, hotels and motels and other associated businesses.

Lake Apopka receives water from Apopka Spring (Gourd Neck Spring), rainfall, and runoff. Historically, the floodplain marsh, or areas below the 70-foot National Geodetic Vertical Datum, encompassed much of the littoral wetlands along the north shore of Lake Apopka. The intensification of farming activities beginning in the 1940s resulted in the clearing and draining of the marshes along the north shore. Prior to acquisition of the properties on the Lake Apopka North Shore by the State, water resources within them were extensively altered. At the time of acquisition, the property was a combination of drainage-controlled muck farms, woodlands, and improved and feral pasture—with few areas of intact natural systems. Since acquisition, restoration efforts have increased the size of the lake to the third largest in Florida (31,000 acres).

[Note that an historical overview of Lake Apopka and a timeline, produced by the Friends of Lake Apopka, documenting the series of events that contributed to the decline of Lake Apopka from the late 1800s to the present is included at the end of this section.]

Lake Apopka suffered a century of abuse beginning in the 1890s when construction of the Apopka-Beauclair Canal lowered lake levels by a third; consequently it was once considered Florida’s most polluted large lake. The decline of Lake Apopka can be traced to:

- The loss of 20,000 acres of wetlands along the lake’s north shore to farming operations in the 1940s.
- Agricultural discharges laden with phosphorus until the late 1990s.
- Treated wastewater discharges from shoreline communities prior to the 1980s.
- Discharges from citrus processing plants prior to the 1980s.

The increase in nutrients discharged into the lake led to a chronic algal bloom and Lake Apopka’s waters turned pea green. The cloudy water prevented sunlight from reaching underwater vegetation critical to fish and wildlife habitat. The continual settling of dead algae created a thick layer of soupy muck, which also destroyed the habitat necessary for fish and wildlife to thrive. The bass population declined significantly as gizzard shad became the

predominant fish species in the lake. Once the bass disappeared, all the fish camps closed. Downstream to the north, the pollution spread throughout the Ocklawaha Chain of Lakes. Lake Beauclair received 85 percent of its phosphorus pollution from Lake Apopka. In Lakes Dora and Eustis, the numbers were 65 percent and 24 percent, respectively. To protect the Ocklawaha Chain, the flow of pollutants from Lake Apopka had to be stemmed.

In 1996, Lake Apopka legislation was amended to authorize the District to set criteria limiting the amount of phosphorus discharge into the lake and provided acquisition funding to purchase muck farms along the north shore on the east side of the Apopka-Beauclair canal. The sources for the purchase of the North Shore were ad valorem, Preservation 2000 (P2000), Save Our Rivers (SOR), and Florida Forever funds. Beltway Mitigation also contributed to the acquisition. Many parcels include conservation easements purchased by the Natural Resource Conservation Service (NRCS) under the Wetland Reserve Program (WRP)

Efforts to restore water quality within Lake Apopka have been extensive and range from legislative acts and extensive land acquisition accomplishments to the implementation of marsh management and enhancement projects. These efforts have included the 1985 Lake Apopka Restoration Act, which was passed by the state legislature and directed the District to develop a restoration plan for the lake. The Surface Water Improvement and Management Act (SWIM) was passed by the state legislature in 1987 and provided authorization to all water management districts to develop surface water improvement and management plans for identified priority water bodies, including Lake Apopka; it also mandated that the District develop and implement plans to restore Lake Apopka to Class III water quality (suitable for recreation purposes). In 1988 the District began acquiring land on the north shore of Lake Apopka, on the west side of the Apopka-Beauclair canal, in order to implement the Marsh Flow-Way Project—a major component of the developing SWIM restoration plan. The Lake Apopka SWIM plan was first written for Lake Apopka in 1989 and revised in 1993 and 2003. In 1996, Lake Apopka legislation was amended to authorize the District to set criteria limiting the amount of phosphorus discharge into the lake and provided acquisition funding to purchase muck farms along the north shore on the east side of the Apopka-Beauclair canal. In 1999, the District completed the mandated purchase of the large muck farms and continued through 2011 to acquire smaller parcels that fell beneath the seventy-foot contour line that historically marked the lake's approximate high water line.

The 2003 SWIM plan includes extensive descriptions of water resource projects. In 2002, to protect the significant investment involved in the restoration of Lake Apopka and to aid in the continued improvement in water quality within the lake, the District Governing Board adopted the Lake Apopka Stormwater Rule, which limits the amount of nutrient discharge associated with new construction that may be discharged within the watershed. In 2003, the Marsh Flow-Way was completed and operational. Since that time, the system has filtered approximately “2.7 metric tons per year of the incoming total phosphorus load, and approximately 4,500 metric tons of suspended solids per year” (Water bodies, watersheds and storm water - Lake Apopka, 2011.

<http://www.sjrwmd.com/lakeapopka/>). Additionally, the District has facilitated the harvest of gizzard shad from the lake, which has removed significant amounts of phosphorus and nitrogen via the interruption of nutrient cycling and the removal of fish bodies from the lake. Also, staff and other agency staffs have planted several species of native wetland plants along the lakeshore to aid in the restoration of fish and wildlife habitat.

Since 1987, water quality within the lake has shown an overall improving trend with exceptions in years of extreme weather conditions including major storms and drought. As of 2010, water quality data indicate encouraging changes from baseline conditions, which include a 62 percent decrease in total phosphorus concentrations and a 53 percent increase in Secchi depths, indicating improved water transparency (Water bodies, watersheds and storm water -Lake Apopka, 2011).

A summary of the improvements in water quality were reported in Water Quality Changes in Lake Apopka, Florida St. Johns River Water Management District's Restoration Program March 2010 that is available through the District or from

<http://www.fola.org/PDFs/Water%20Quality%20in%20Lake%20Apopka%2030Mar2010.pdf>.

History of the Lake – Overview

Historians do not agree as to when the first human settlers arrived in the Lake Apopka area. Aboriginal culture, especially on the northeast shore of the lake, has been documented as occurring continuously from at least 10,000 B.C. to about 400 A.D. These unnamed tribes were undoubtedly ancestors to the natives thriving in the area when the Spanish arrived. The Spanish called them Timucuan.

Historic outfall from the lake was primarily through Double Run Swamp, on the west side of the lake, to Lake Harris. By the mid-1800s, white settlers began farming the south shores.

Lake Apopka has experienced dramatic changes in its environmental health over the past century. A once plentiful and productive lake, the second largest in Florida, it was a renowned fishing paradise where anglers from all over the world came hoping to land a trophy bass. The clear, pristine lake was home to 21 fish camps on its 40 miles of shoreline.

This changed, starting in 1941, with the establishment of 20,000 acres of vegetable muck farms. The filtering marshes on the north shores were drained to make room for the farms. Massive quantities of nutrients were pumped into the lake from the farms, municipal sewage, and effluent from citrus processing. The high nutrient loading encouraged widespread algae blooms— blocking sunlight, choking productive submerged plants, and causing a decline in game fish populations. Clean-up measures failed. Eventually only undesirable fish, feeding on the algae, could survive in these extreme conditions.

The fish camps all closed and the “green” lake became known as the most polluted large lake in Florida. This condition endured for more than 40 years. In 1991, The Friends of Lake Apopka (FOLA) organized, advocating the restoration of the lake. This broad based citizens’ group

appealed to agricultural interests to change their farming practices, and sought public support to restore the lake. After years of work, FOLA endorsed the Lake Apopka Restoration Act of 1996 in the Florida Legislature. This led to the \$100 million public purchase of the muck farms to stop the nutrient pollution flow. St. Johns River Water Management District was the Florida public agency charged with the responsibility of purchasing the farms and restoring the lake.

The restoration of the lake has begun, although it is anticipated to be a slow, complicated process. At the end of the decade of the 1990s, measurement of water quality variables indicate that the condition of the lake improved more than 30 percent. However, the unprecedented scale and complexity of the restoration will be challenges for years to come. Cumulative pesticide residues, unexplained bird fatalities, involvement of the Federal Government and urban development are all part of the scientific, political and economic landscape of restoration.

FOLA continues to actively advocate for a healthy lake—supporting efforts for recreational trails and access to the lake, development guidelines to control pollution from development, and a rule to decrease future phosphorous discharge to the lake. All citizens must continue to monitor and be informed about the progress of the restoration.

Timeline for Lake Apopka

- 1880 Construction of Apopka-Beauclair Canal started by Apopka Canal Company to create a waterway for navigation and agricultural use.
- 1883 Lake levels drop three feet and expose sediment surface of marshes. Small farms spring up around the lake.
- 1885 Land around the lake was going for the high price of 25¢ per acre because people expected future demands for property in the area.
- 1893 Delta Canal Company successfully completes 12 miles of canal connecting Lake Apopka through Lakes Beauclair, Dora, Eustis, and Griffin to the Ocklawaha River. This lowered the water surface of Lake Apopka by approximately 1 meter, exposing the sediment surface of most of the sawgrass marsh on the north shore.
- 1894 Category I hurricane passes over lake.
- 1895 Disastrous freezes kill more than half of the citrus trees in Orange County.
- 1910 Due to crop failures because of difficulty in water table management and cold waves, canal becomes filled with vegetation and lake water returns, more or less, to its normal levels.
- 1915 Zellwood Produce Company improves the canal to reduce water table fluctuations. Farmers on the south shore protest, fearing water supply shortages, decreased cold protection and threatened navigation.
- 1922 Winter Garden Pollution Control Facility (sewage treatment plant) constructed—serving a population of between 1,500 and 3,250. Effluent enters Lake Apopka.

- Discharges from citrus packing process begin entering the lake.
- 1926 Severe hurricane leaves entire north shore under 6 to 8 feet of water.
- 1940 Dense growths of aquatic weeds appear.
- 1941 Zellwood Drainage and Water Control District (ZDWCD) is created by the legislature.
Levee is constructed by ZDWCD between north marsh lands and lake. Lake level rises two feet above farm lands.
- 1942 Farms begin discharging into the lake.
- 1945 Category II hurricane passes over the lake.
Lake water is clear and dense growth of Illinois pondweed covers much of the lake bottom.
- 1946 Beginning die-off of submerged vegetation is documented.
- 1947 Half the marsh area is in row crops and the rest is being prepared for farming.
Game fish make up 35% of fish populations; shad is 20% by weight.
First algae bloom in lake is documented.
Hurricane destroys large amounts of eelgrass on bottom of the lake.
Intense algal growth is first described.
Rooted aquatic vegetation begins to decline.
- 1948 Hyacinth eradication program using chemicals begins.
Winter Garden Citrus Products is now producing citrus concentrate, effluent is discharged to Lake Apopka.
Enormous increases in the game fish populations documented now and up to 1955.
- 1949 Illinois pondweed is no longer in the lake. Algal blooms are increasingly dominant over rooted plants.
- 1950 Control structure placed in Apopka-Beauclair Canal.
Winter Garden sewage treatment plant is enlarged; effluent (one million gallons per day) is still discharged into Lake Apopka.
Game fish make up 60% of fish population.
- 1952 Lake stabilization program begins—lake water levels are regulated.
Trash fish poisoned; 30 million pounds die in lake.
Quality and quantity of game fish fishery begins to deteriorate.
- 1956 Present lock and dam structure is built; canal is deepened.
21 Fish Camps are operating on the lake.
- 1957 Gizzard Shad make up 82% of fish population; 18% are game fish.

- Hyacinth eradication programs are accelerated; dead plants decay in the lake.
- 1962 Fish kills are becoming widespread.
- 1963 More than \$1 million spent by farms on pesticide programs.
- 1964 Winter Garden sewage treatment plant is now serving a population of 5,000; effluent is still discharged to Lake Apopka. Effluent enters mile-long ditch (channelized Lulu Creek), which also serves the Winter Garden Citrus Products plant. Combined effluent provides second largest amount of nutrients to the lake from human activities.
- 1965 Almost all former marsh land on the north side of the lake is now being farmed; most farms are producing three crops annually.
- Commercial catfish harvesting is stopped because DDT concentration in fish exceeds allowable limits.
- Only nine fish camps are still operating on the lake.
- 1966 Haul seine survey of Lake Apopka is funded by Game and Fresh Water Fish Commission and Orange County Conservation Fund. Results: Gizzard Shad and Gar fish make up most of fish population (jumps from 2% in 1964 to 48% in 1966).
- State threatens citrus plant with legal action over discharges to Lake Apopka.
- Radio station WTLN schedules weekly program on Lake Apopka problems.
- Large group of citizens meet in Apopka to organize to stop pollution. Central Florida Anti-Pollution Association, Inc. presents a petition to stop pollution of Lake Apopka; it is signed by 5,000 people.
- Orange County and Lake County share cost of a biochemical study of Lake Apopka (\$5,000).
- Orlando Sailing Boat Club holds sailing regatta on Lake Apopka and draws 100 boats.
- 1967 Lake Apopka Technical Committee is established to study and coordinate restoration plans.
- Governor's aide says Lake Apopka is restorable in four years.
- 1968 Lake Apopka Technical Committee needs funds for engineering studies.
- Federal grant of \$12,000 obtained for cleanup; farmers will also contribute.
- Plans for fishmeal plants using Apopka roughfish are studied.
- 1969 Winter Garden Citrus Products adds treatment process and reduces strength of effluent discharged to Lake Apopka.
- 1970 State and Federal restoration efforts start.
- 1971 Test drawdown is completed and lake is lowered 4 feet. Cost for total drawdown is estimated at \$1.5 million. Total of \$96,075 spent to date on the project.

- 1972 Outbreak of bacterial disease kills thousands of fish and many birds, alligators, snakes and turtles; gets nationwide attention.
State reveals a \$2.3 million restoration plan that includes 50% drawdown (not funded).
- 1973 Bass production is failing.
- 1975 Muck farmers propose to dike off 500 acres of lake for holding ponds.
- 1976 Four fish camps now operating on the lake.
“Final” feasibility study grant of \$287,000 approved to study drawdown; \$500,000 already spent.
- 1977 Winter Garden Citrus Products completes percolation ponds and spray fields—reduces discharge to cooling water.
Peat mining has begun on southwestern shore. Effluent and stormwater are collected in a man-made lake that connects to Lake Apopka.
University of Florida researchers say the lake is “not getting any dirtier” after a half-century of deterioration.
- 1978 Restoration plan is proposed by DER; it includes a drawdown. Cost is \$14 million.
First public hearing to begin Environmental Impact Statement process is held in March (100 people attend).
- 1979 Restoration plan to include a drawdown with an estimated cost of \$20 million is proposed. Citrus growers on the south side of the lake object because of potential freeze damage.
Restoration plan proposed that would include dredging the lake to form an island, a north-south causeway across the lake, and construction of an airport on the island. Cost: \$200 million.
Final Environmental Impact Statement for restoration project is completed (required by U.S. Environmental Protection Agency).
- 1980 Winter Garden completes percolation/evaporation system for sewage disposal; most effluent is no longer discharged to the lake.
- 1981 Massive fish kills in Lake Apopka are reported.
Revised restoration plan that includes a partial drawdown at a cost of \$ 3 million is proposed.
- 1985 Passage of the Lake Apopka Restoration Act of 1985 establishes the Lake Apopka Restoration Council and Technical Advisory Committee. A total of \$2.265 million is appropriated to initiate feasibility studies, evaluate restoration techniques, and develop a nutrient budget. The District and the Council reviewed a full range of proposals and reported to the Legislature on the plan’s development and the consensus for action.

Strategies such as the marsh flow-way, shad harvesting, and littoral zone were reviewed, debated, and endorsed as the best plan to clean up Lake Apopka.

In order to stop pollutant discharges from the farms, SJRWMD issues Intent to Deny for Duda Farm's and Zellwood Drainage and Water Control District's (ZDWCD) consumptive Use Permits (CUPs), and requests cease and desist order and criminal charges.

No fish camps left operating on the lake.

- 1986 Initiation of comprehensive pilot projects is recommended by the Lake Apopka Restoration Council to the St. Johns River Water Management District. The development of internal and external nutrient budgets for the lake is begun.
- 1987 SWIM (Surface Water Improvement and Management) Act is passed by the Florida Legislature. Lake Apopka is named as a priority for restoration—one of seven statewide. Complete, holistic approaches are encouraged for the restoration of selected water bodies. August – Marsh Flow-Way concept is formalized.
- 1988 Initiation of the Marsh Flow-Way Demonstration Project.
SJRWMD acquires approximately 5,000 acres, for approximately \$15 million, to build a Marsh Flow-Way lake filtration system on the northwest corner of the lake.
Authority to regulate agricultural discharges into Lake Apopka is delegated to SJRWMD by Florida Department of Environmental Regulation (FDER).
SJRWMD and Duda Farms sign consent order. Duda Farms begins construction of holding ponds.
- 1989 SJRWMD issues permit to Duda to construct detention system.
SWIM Plan for Lake Apopka is approved by FDER.
Pilot-scale Marsh Flow-Way Demonstration Project begins construction.
SJRWMD and Zellwood Drainage District sign consent order, which is challenged by farmers and citizens group.
- 1990 Experimental Marsh Flow-Way begins to operate.
- 1991 Testing of methods to expand shoreline vegetation areas that will provide habitat to the lake's game fish begins as other methods are employed to clean up the lake water.
Portable barriers and planting methods to disrupt wind mixing and stabilize shallow sediments in fish spawning areas are tested in near-shore areas of Lake Apopka.
Zellwood Consent Order is upheld after challenge and becomes effective.
Friends of Lake Apopka organizes.
- 1992 Planting of littoral zone aquatic plants begins.

- Model shoreline ordinance is developed and proposed in conjunction with the University of Florida. Ordinance to put protections for the lake due to expected environmental pressures post-restoration into place.
- Duda/Whittle parcel is acquired for the Marsh Flow-Way Demonstration Project.
- Duda agricultural discharges meet Consent Order goals.
- Wilkinson-Cooker farm acquired on May 15, 1992, as required for Marsh Flow-Way Project, at a cost of \$669,296.25 from P2000 Trust Fund.
- 1993 SWIM Plan for Lake Apopka updated and revised.
- Pilot-scale mass harvest of rough fish for nutrient removal is begun.
- 1994 External nutrient budget project is finished and scientific basis for phosphorous load limit is completed.
- Pollutant Load Limit (Wasteload Allocation rule) for phosphorous is endorsed and published by SJRWMD Governing Board (Chapter 40C-61 F.A.C.). Limitations are challenged.
- 1995 District's proposed phosphorous load limit rule is successfully challenged by Zellwood Drainage and Water Control District and is found invalid by courts.
- Early indices of water quality observed. Improved water quality—lower phosphorous, less algae, less turbidity—is noted. (Though modest, they are important signs that the lake can improve through the restoration program.)
- Conceptual plan for full-scale Marsh Flow-Way is completed.
- Several small patches of eelgrass are observed near north shore.
- 1996 The Florida Legislature passed legislation introduced by Kelly, Sublette, and Dyer. The Lake Apopka Restoration Act of 1996 set a phosphorus criterion for the lake, giving SJRWMD the legal authority to set a phosphorus discharge limitation and providing \$20 million to acquire northern shore farm land.
- Up to \$26 million is guaranteed by federal government under the Dept. of Agriculture WRCS Program.
- 1997 Design of full-scale Marsh Flow-Way is approved. Construction is initiated with \$35 million contract.
- The Florida Legislature approves \$45 million for muck farm purchases. Farm land purchases are either closed or purchase contracts are executed on Zellwin Farms (5,254 acres), Duda's Jem Farm I (3,400 acres), Grower's Precooler, Inc., Crakes and Sons, Inc., and the Clarence W. Beall, Jr. property.
- Sixty-three patches of eelgrass, totaling 2.87 acres, and small areas of musk grass and southern naiad are mapped. These areas are the greatest extent of submersed vegetation found since the start of monitoring.

- Experimental operation of the Marsh Flow-Way Demonstration Project completed with 375 tons of suspended sediments, 98 tons of nitrogen, and 4 tons of phosphorous removed from the lake water. Additionally, there was 90% removal of suspended sediments and 30–60% removal of total phosphorous.
- 1998 \$100 million buyout of almost 15,000 acres of muck farms is completed with 75% funding from the State of Florida and 25% from the U.S. Federal Wetlands Reserve Program. Farming and pesticide applications cease with the last farm crop, June, 1998. SJRWMD begins reflooding the former marshes and hopes for their restoration and restoration of the lake are high.
- Gizzard shad harvesting continues with 6.5 million pounds of shad harvested since 1993. First draft of restoration plans for the farmlands is presented to public.
- 1999 Massive bird migrations visit the area with over 175 different species logged. Sudden, large scale avian deaths bring intervention of U.S. Fish and Wildlife and Department of Justice. Residues and accumulations of pesticides are the suspected culprits. Restoration efforts are delayed pending results of scientific and other investigations. Realization of the complexity of restoration becomes a reality. Measurement of water quality variables indicates an average 30% improvement in Lake Apopka for the prior five years, as compared with the less modest improvement of the early 1990s. Oakland Nature Preserve is established with an initial purchase of 95 acres.
- 2000 Scientists continue to study the complexities of muck soils and pesticide residues to design the restoration program. A three-year drought lowers lake levels to a record low of 62 feet above sea level. With the help of the Lake Apopka Steering Committee and professional land planners, FOLA recommends Land Development Guidelines to the eight political jurisdictions in the basin. FOLA spearheads the cooperation of the municipalities and Orange and Lake counties to plan for greenways, trails, and ecotourism and recreational opportunities around the lake.
- 2002 June & July – Approximately 700-acres of the Duda property were re-flooded creating habitat for migrating birds. No bird deaths associated with the re-flooding have been reported. The flooding also allows SJRWMD to store water on the North Shore Restoration Area.
- 2003 Phosphorus limitation rule is passed by SJRWMD with support from FOLA.
- FOLA completes Greenways and Trails design project, which includes a loop trail around the lake.
- October 8 – Memorandum of Understanding was agreed upon by USFWS and the District, creating a framework for future restoration of the former farmlands.
- November – Phase I of the marsh flow-way begins operation on the North Shore Restoration Area and treats approximately 50% of the lake's volume of water during its first year of operation.

All but one of the remaining Duda fields were re-flooded. A total of approximately 1,700 acres have been re-flooded.

2004 On April 13th, an intergovernmental agreement was signed between the District and the Lake County Water Authority for the use of the 225-acre CC Ranch parcel for their Alum Treatment Facility on the Apopka-Beauclair Canal. FOLA objects. The CC Ranch parcel was bought in 1992 with Preservation 2000 funds for restoration.

2005 Ferndale Preserve, a 192-acre parcel on the northwest shore of Lake Apopka was purchased with funding from SJRWMD, Lake County, Lake County Water Authority and a grant from Florida Communities Trust. The Preserve is part of the FOLA Master Plan for the Lake Apopka basin.

On November 18th, the City of Apopka applied for a Consumptive Use Permit that proposes withdrawing 5 million gallons of water a day from Lake Apopka and the North Shore Restoration Area to supplement re-use for irrigation. FOLA objects.

2006 October – FOLA celebrates the 10-year anniversary of the signing of the bill for the restoration of Lake Apopka with a ceremony at the Oakland Nature Preserve to honor those who played a major role in supporting the bill.

December – 700-acres of the Duda property are re-flooded— creating habitat for migrating birds. No bird deaths associated with the re-flooding have been reported.

2007 As of July, more than 13,750,000 pounds of gizzard shad have been harvested since the program began in 1993. This translates into removal of about 96,000 pounds of total P by simply removing the fish. In addition 1,000,000 pounds of shad are estimated to produce about 25,000 pounds of total P per year.

After years of studies on residual pesticides, deep soil inversion was begun in the North Shore Restoration Area.

In April, two of the four treatment cells of the Marsh Flow-Way were drained for maintenance. These cells were successfully re-flooded nine months later and began treating lake water again.

2008 Phase 1, a 1,200-acre parcel, was the first section of the former ZDWCD farm area to be flooded for wetland restoration after completion of research following the bird mortality. Soil Inversion work in the North Shore Restoration Area continues.

The gizzard shad program removed 1,601,056 lbs. from Lake Apopka.

November – the remaining two of the four treatment cells of the Marsh Flow-Way were drained for maintenance. These two cells were successfully re-flooded nine and twelve months later, respectively.

2009 The District completed deep soil inversion on 4,000 acres of highly contaminated land at a cost of approximately \$2,500 per acre. The remediation resulted in a 68% average reduction of DDE. The District flooded Phase 2 (1,400 acres) for wetland restoration.

The District also began construction of infrastructure to allow controlled flooding of the remainder of the former farm area for wetland restoration.

The Marsh Flow-Way treated 2.5 times the volume of Lake Apopka since November 2003. Total removals from 2003 to December 2009 are 62 million lbs. of suspended solids and 37,300 lbs. of total phosphorus.

The Gizzard Shad program removed only 674,803 lbs., reflecting an effective reduction of gizzard shad biomass in Lake Apopka. Experimental gill net catches of gizzard shad from Lake Apopka in February and March were the lowest on record.

City of Apopka receives a consumptive use permit for reuse water from the North Shore Restoration Area. The restrictions and conditions on the permit place the restoration of the lake and North Shore Area as a priority before water will be available to the City of Apopka. FOLA stands firm in commitment against surface water withdrawal.

Harris Chain Council publishes a negative report on the restoration efforts of Lake Apopka and the North Shore Restoration Area that is met with a great deal of criticism based on lack of scientific evidence and misuse of data.

- 2010 In October the lake concentration of total phosphorus averaged 76 parts per billion, approaching the target goal of 55 ppb.

October – shad harvesting is begun and 650,000 pounds of shad had been harvested when the season completed December 31. Toward the end of the season the fish size declined rapidly and catch rates were much lower for the second year in a row. This is a good sign that populations of gizzard shad are decreasing. Sunshine bass were released into the lake to feed on the smaller shad, which is a major part of their natural food chain.

Restoration of wetlands on the North Shore Restoration Area reduces discharge, and related nutrient loading, to Lake Apopka—accelerating the restoration of the lake. Approximately 5,000 acres have been re-flooded.

Infrastructure construction is completed and as the biological assessments are completed with U.S. Fish and Wildlife, saturation and restoration flooding may begin creating a wide range of water levels on the North Shore Restoration Area. Monitoring of soil pesticide concentrations will be on-going.

A study of mercury contamination in Florida shows mercury levels in Lake Apopka fish are significantly lower than fish from other water bodies in the state.

Because of low lake levels and forecast low rainfall, SJRWMD reduced discharge at the Apopka, Burrell and Moss Bluff structures during the winter to help protect lake levels from falling even lower.

- 2011 The total list of bird species observed on the north shore of Lake Apopka is 346, highest total for any site in Florida (even greater than Everglades National Park with 340 species).

Minimum discharges are resumed at all the basin structures on May 2; in February Lake Apopka was up 3.6 inches.

The Marsh Flow-Way has filtered as much as 3.1 times the entire volume of water found in Lake Apopka since it began in 2003. The Flow-Way has removed tons of suspended solids, nitrogen and phosphorus to date.

Wetland and marsh restoration and management remains the key to restoration of the lake. More than 85 percent of the phosphorus going into the lake was caused by farming on the north shore. The goal in restoring this area is to reduce the amount of discharge and related nutrient loading to the lake, reduce the use of alum, and increase wetland habitat. The District flooded Phases 6 & 7 (1,900 acres) for wetland restoration. The District hopes to get approval to flood the remaining acres in the fall of 2012.

Data shows the health of the lake continues to improve. Eelgrass beds continue to expand.

There is increased expansion of exotic apple snail.

FOLA has concerns over several issues being proposed:

- Changes by Fish and Wildlife Services in their policy for controlling Hydrilla.
- Airport adjacent to the North Shore Restoration Area.
- Sewage Compost Facility in Lake County near Apopka-Beauclair Canal.

August – Ribbon cutting at Magnolia Park for the Trailhead that gives access to bikers, hikers and naturalists to cross the first 4 of 17 miles of the North Shore Restoration Area on existing dikes.

Lake County approves matched funding for the Lake Apopka Scenic Overlook and Trailhead off of the Green Mountain Scenic Byway north of Ferndale in Lake County. The project is part of the Master Plan for Greenways and Trails in the Lake Apopka Basin developed by FOLA. The Byway Committee designed the project and they are raising the funds with the help of FOLA.

EXHIBIT 8 – RECREATION AND ECONOMIC ASPECTS

Outdoor recreation generates more than \$646 billion in annual spending in the United States (Outdoor Industry Foundation, 2012). “Outdoor recreation is shaped by America’s public lands and waters” (American Recreation Coalition, 2010). Another aspect of the economic benefits of outdoor recreation is the 6.1 million American jobs (Outdoor Industry Foundation, 2012), jobs that cannot be outsourced to other countries. Further, it is estimated that the total value of ecosystem services provided by the National Wildlife Refuge System in the contiguous U.S. is approximately another \$26.9 billion/year (Ingraham and Foster, 2008).

More than three quarters of Americans participate in active outdoor recreational activities (Outdoor Industry Foundation, 2006). Active outdoor recreation includes activities such as bicycling, boating, camping, fishing, hiking and trail running, paddling, wildlife viewing and others. Furthermore, tourists visiting from other countries also have a high interest in enjoying outdoor recreation while visiting the U.S. For example, almost 64% of Australian visitors to the U.S. said that they had visited a national park or natural area (Uysal et al., 1994).

Additionally, the U.S. Fish and Wildlife Service, the agency that administers National Wildlife Refuges, has as one of its goals to create “new urban refuge partnerships” and implement “a refuge presence in 10 demographically and geographically varied cities across America by 2015” (U.S. Fish & Wildlife Service, 2011). The Lake Apopka North Shore certainly fits the bill since the land is already owned by the government, most of the infrastructure is already in place, and it is close to a highly diverse large population.

Recreation Opportunities

The recreational activities associated with the Lake Apopka North Shore (North Shore) are numerous—off-road bicycling, nature photography, bird watching and other wildlife viewing, fishing, hiking, horseback riding, hunting and trail running— and would be enhanced and broadened by designation as the Lake Apopka National Wildlife Refuge (LANWR).

Portions of the 17-mile-long trail across the North Shore are already open and the remainder is nearing completion (SJRWMD, 2012). Additionally, plans are to have the North Shore trail become part of a 47-mile-long loop trail extending completely around Lake Apopka (Land Design Innovations, 2002). The loop trail will connect to the 22 miles of the West Orange Trail that have already been constructed to the east and to additional trails heading west from the lake. Orange County’s Magnolia Park, which has group, tent and RV camping facilities, is already established as a trailhead for the North Shore trail on the east side. A trailhead on the west side of Lake Apopka has been designed and funding has been obtained for construction (Green Mountain Scenic Byway, 2012). A flexible, drivable wildlife viewing trail, similar to Black Point Wildlife Drive at Merritt Island National Wildlife Refuge, is planned (SJRWMD, 2012). The driving trail would utilize the roadways that are already present throughout the North Shore.

Sport fishing, for which Lake Apopka was once renowned (Florida Fish and Wildlife Conservation Commission, 2004; Friends of Lake Apopka, 2011), has been improving as the water quality has improved (SJRWMD-ESD, 2010). In addition, \$4.8 million was appropriated in 2012 by the Florida Legislature for additional projects to restore this Lake Apopka fishery (FWC, 2012). Hunting is another possible recreational activity if the LANWR is established. Because of the large numbers of waterfowl that occur at the North Shore, the waterfowl hunting potential is great. Teal, both Blue-winged and Green-winged, have been observed by the thousands (Robinson, 2003). Many other desirable waterfowl also use the North Shore.

Boating and paddling (canoeing and kayaking) opportunities could abound along the North Shore. There are currently two public boat docks that are open directly on the lake, one in Winter Garden and one in Apopka. Boat access is also available, when water levels are high enough, from the Apopka-Beauclair canal that cuts through the North Shore. At least one boat ramp at the North Shore, currently not open to the public, is planned to be opened for public access in the future. Additionally, canoe and kayak launch site locations are already being identified.

Wildlife viewing, especially bird watching, is another important recreational activity. In 2006, the participation and expenditure patterns of 48 million birders was summarized in the following way: “Trip-related and equipment-related expenditures associated with birding generated over \$82 billion in total industry output, 671,000 jobs, and \$11 billion in local, state, and federal tax revenue” (U.S. Fish & Wildlife Service, 2006). The one-day 1998 Christmas bird count (CBC) that included the North Shore identified 174 species of birds, the highest species total for an inland count in over 100 years of the life of the annual CBCs (LeBaron, 2013). Bird enthusiasts will “flock” to the North Shore, the premier inland site for bird species in North America, where 351 native bird species along with numerous exotics have been documented (SJRWMD, 2012). In addition, butterfly, damselfly and dragonfly enthusiasts will frequent the LANWR, as will folks interested in viewing alligators, bears, coyotes, otters and other wildlife.

“The primary objective of the Recreation Management Program is to facilitate resource-based recreational activities on District lands” (SJRWMD, 2012). Informational kiosks, observation towers, parking areas, picnic shelters, weather shelters and more are already in place or planned for the North Shore.

Ecotourism/Economic Opportunities

Central Florida is already one of the premier tourist destinations in the world. As home to primary attractions such as theme parks Walt Disney World, Universal Resort, and Sea World, over 55 million tourists visited Central Florida in 2011, thereby setting a record as the top U.S. travel destination (Clarke, 2012). Interestingly, research has shown that “‘secondary’ attractions were the single most influential factor affecting tourists’ overall satisfaction with Orlando” (Fallon and Schofield, 2004). A LANWR could become one of those secondary attractions since many people also want to see the wildlife while here in Florida (Uysal et al., 1994). Also, the

construction of a world-class visitor/nature/arts center would increase the appeal of the LANWR as a tourist destination. The local Audubon chapter, the second largest in Florida, has as one of its goals the creation of such a center (Orange Audubon Society, personal communication).

Research conducted in 2006 found that approximately 6 million people 16 years old and older fished, hunted, or wildlife watched in Florida and spent \$4.8 billion (U.S. Fish & Wildlife Service, 2008). As far back as 2004 the famed Ding Darling National Wildlife Refuge in Sanibel, Florida, generated \$47,254,400 in total economic activity related to refuge recreational use and 490 jobs (Caudill and Henderson, 2005). Considering that the Lake Apopka North Shore Restoration Area 1) is over two and one-half times larger than Ding Darling; 2) almost one hundred more bird species have been identified at the North Shore than at Ding Darling; and 3) is located in the Orlando area that, besides being the number one tourist mecca in the U.S., also has a resident population of over 2.1 million (3rd largest metropolitan area in Florida), the potential economic benefits of creating the Lake Apopka National Wildlife Refuge are huge. New lodging, equipment sales and rental, guided tours and other ecotourism opportunities would result from NWR designation. Besides these obvious ecotourism economic benefits, research has shown that property value increases near national wildlife refuges are similar to being in proximity to golf courses (in their heydays) and sport/recreation parks (Neumann et al., 2009), thus creating another boon to the local economy.

EXHIBIT 9 – PARTNERSHIPS

Following passage of the Lake Apopka Restoration Act of 1985 and the Surface Water Improvement and Management Act (SWIM) in 1987, a number of informal partnerships began to form to assist in the long awaited restoration plans for the lake. A number of community groups began volunteer work parties to help with clean-up. The Friends of Lake Apopka (FOLA) formed a non-profit to focus on political support, volunteer support and educational support.

After a legislative mandate that provided some funds through ad valorem taxes, most of the existing farms were acquired. The time period was 1996–1998. Other funding sources included Preservation 2000 (P2000), Save our Rivers (SOR), Florida Forever, Beltway Mitigation and Natural Resource Conservation Service (NRCS) under the Wetland Reserve Program (WR).

More partnerships developed, including an agreement with the United States Fish and Wildlife Service (USFWS) for the development of an Avian Protection Plan (APP) and NRCS in management. Other partnerships involved Orange County for construction of a regional storm water management project; the Lake County Water Authority for construction of an alum treatment facility; USDA Wildlife Services for feral hog control; and several agreements with various other agencies and individuals for research projects. Local organizations around the lake continue to respond to anything that may threaten the ongoing restoration efforts.

The main curriculum in the education program for the Oakland Nature Preserve includes interpretation of the restoration programs on Lake Apopka.

THE COALITION

The initiation of the Lake Apopka National Wildlife Refuge Coalition (Coalition) was accomplished by a working group comprised of a number of representatives of environmental organizations, local governments and interested individuals including:

- American Bird Conservancy
- Audubon Florida
- Florida Wildlife Federation
- Friends of Lake Apopka
- Green Mountain Scenic Byway
- Lake Beautyberry Chapter of the Florida Native Plant Society
- Mosquito Creek Outdoors
- Oakland Nature Preserve
- Orange Audubon Society
- Sierra Club, Central Florida Group
- West Volusia Audubon Society

The Coalition is supported by numerous, other organizations, local governments and individuals. We are now collecting letters of support and resolutions and will attach them to future copies of this proposal.

BIBLIOGRAPHY

Cultural Description Sources of Information:

- Florida Legislative Office of Census. 2010. *Economic and Demographic Research Redistricting Data (Public Law 94-171) Summary File*. Web: <http://edr.state.fl.us>

Lake Apopka North Shore Habitats Sources of Information:

- *Field Guide to the Rare Plants and Animals of Florida, Online*. Lake & Orange Counties. Florida Natural Areas Inventory. Website <http://www.fnai.org/FieldGuide>.
- *J58. Lake Apopka Restoration Area: North Shore*. 2012. The Great Florida Birding Trail. Website http://floridabirdingtrail.com/index.php/trip/trail/lake_apopka_restoration_area_north_shore
- *Lake Apopka*. 2012. St. Johns River Water Management District. Basin website <http://www.sjrwmd.com/lakeapopka>.
- *Lake Apopka, A decade of improvement now accelerating*. 2006. St. Johns River Water Management District Notice.
- *Lake Apopka North Shore Restoration Area, Biological Assessment Unit 1 – Phases 6 and 7*. November 2010. St. Johns River Water Management District. Document location SJRWMD: H:\apopka\Biological Assessments\...\Phases 6 & 7.
- *Lake Apopka Restoration Area Land Management Plan*. August 8, 2006. St. Johns River Water Management District. Board Final Approval.
- *The Lake Apopka Agreement*. March 2007. Heath Rauschenberger. *Endangered Species Bulletin*.

Bird Life of Lake Apopka North Shore Sources of Information:

- Robinson, H. 2003. *Bird Migration - A Florida Study: The Birds of Zellwood, Five Years*. Self published, DeLand, Florida.
- Robinson, H. 2011. *Bird Migration a Florida Study*. Self published, DeLand, Florida.
- Robinson, H. 2011. *Bird Migration a Second Florida Study*. Self published, DeLand, Florida.
- Robinson, H. 2012. *The 8th Zellwood Bird Report*. Self published, DeLand, Florida.
- Robinson, H. 2012. *The 9th Zellwood Bird Report*. Self published, DeLand, Florida.
- Robinson, H. 2012. *The 10th Zellwood Bird Report*. Self published, DeLand, Florida.
- Robinson, H. 2012. *The 11th Zellwood Bird Report*. Self published, DeLand, Florida.
- Robinson, H. 2012. *The 12th Zellwood Bird Report*. Self published, DeLand, Florida.
- Robinson, H. 2012. *The 13th Zellwood Bird Report*. Self published, DeLand, Florida.
- Robinson, H. 2013. Personal communication.

Lake Restoration Sources of Information:

- *Water bodies, watersheds and storm water -Lake Apopka, 2011*
<http://www.sjrwmd.com/lakeapopka/>
- *Water Quality Changes in Lake Apopka, Florida* St. Johns River Water Management District's Restoration Program March 2010

Recreation and Economic Aspects Sources of Information

- American Recreation Coalition. 2010. *Outdoor Recreation Outlook 2011*. American Recreation Coalition.
- Caudill, J. and E. Henderson. 2005. *Banking on Nature 2004: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation*. U.S. Fish and Wildlife Service, Division of Economics.
- Clarke, S.K. 2012. Orlando announces record 55.1 million visitors in 2011. *Orlando Sentinel*. <http://articles.orlandosentinel.com/2012-06-05/business/os-visit-orlando-record-year-20120605_1_travel-tourism-industries-orlando-area-destination>.
- Fallon, P. and P. Schofield. 2004. First-time and repeat visitors to Orlando, Florida: a comparative analysis of destination satisfaction, p. 203–214. In: G.I. Crouch, R.R. Perdue, H.J.P. Timmermans, and M. Uysal (ed.). *Consumer psychology of tourism, hospitality and leisure*. CABI Publishing, Wallingford, UK.
- Florida Fish and Wildlife Conservation Commission. 2004. *Northeast Region Freshwater Fishing Guide*. 19 Dec. 2012. <http://myfwc.com/media/300613/freshwater_nefishingguide.pdf>.
- Friends of Lake Apopka. 2011. *Lake Apopka Timeline*. Friends of Lake Apopka. 19 Dec. 2012. <<http://www.fola.org/PDFs/LakeApopkaTimelineAug2011.pdf>>.
- FWC. 2012. *Black Bass Management Plan off to great start*. Florida Fish and Wildlife Conservation Commission. 2 Jan. 2013. <<http://myfwc.com/news/news-releases/2012/october/02/fb-october/>>.
- Green Mountain Scenic Byway. 2012. *Current Projects: The North Shore Trailhead and Scenic Overlook*. 19 Dec. 2012. <<http://www.greenmountainbyway.org/currentprojects.html>>.
- Ingraham, M.W. and S.G. Foster. 2008. The value of ecosystem services provided by the U.S. National Wildlife Refuge System in the contiguous U.S. *Ecological Economics* 67:608–618.
- Land Design Innovations. 2002. *Lake Apopka Trail Loop Design Guidelines*. Land Design Innovations, Inc.
- LeBaron, G.S. 2013. *Results: Annual Summaries*. 2 Jan. 2013. <<http://web4.audubon.org/bird/cbc/99thsummary.html>>.

- Neumann, B.C., K.J. Boyle, and K.R. Bell. 2009. Property price effects of a national wildlife refuge: Great Meadows National Wildlife Refuge in Massachusetts. *Land Use Policy* 26:1011–1019.
- Outdoor Industry Foundation. 2006. *The Active Outdoor Recreation Economy - a \$730 billion annual contribution to the U.S. Economy*. Outdoor Industry Foundation.
- Outdoor Industry Foundation. 2012. *The Outdoor Recreation Industry*. Outdoor Industry Foundation, Boulder, Colorado. 9 Dec. 2012.
<http://www.outdoorindustry.org/images/researchfiles/OIA_OutdoorRecEconomyReport2012.pdf?167>.
- Robinson, H. 2003. *Bird Migration - A Florida Study: The Birds of Zellwood, Five Years*. Self published, DeLand, Florida.
- SJRWMD. 2012. *Lake Apopka North Shore Land Management Plan* (draft). St. Johns River Water Management District.
- SJRWMD-ESD. 2010. *Water Quality Changes in Lake Apopka, Florida, St. Johns River Water Management District's Restoration Program*. St. Johns River Water Management District, Environmental Sciences Division.
- U.S. Fish & Wildlife Service. 2006. *Birding in the United States: A Demographic and Economic Analysis: Addendum to the 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation*. 2006-4.
- U.S. Fish & Wildlife Service. 2008. *2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation - Florida*. U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau FHW/06-FL.
- U.S. Fish & Wildlife Service. 2011. *Conserving the Future - Wildlife Refuges and the Next Generation*.
- Uysal, M., C. McDonald, and B. Martin. 1994. Australian visitors to US national parks and natural areas. *International Journal of Contemporary Hospitality Management* 6:18–24.

RESOLUTIONS & LETTERS OF SUPPORT

(IN PROGRESS)