

Arthur R. Marshall Loxahatchee  
National Wildlife Refuge  
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U.S. Fish & Wildlife Service  
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U.S. Fish & Wildlife Service

# Arthur R. Marshall Loxahatchee *National Wildlife Refuge*



*Arthur R. Marshall*

*Loxahatchee is one of more than 556 refuges in the National Wildlife Refuge System which is the world's outstanding network of lands dedicated to wildlife. The mission of the National Wildlife Refuge System is "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."*

*A.R.M.  
Loxahatchee  
National Wildlife  
Refuge*



*This blue goose, designed by J. N. "Ding" Darling, has become a symbol of the National Wildlife Refuge System.*

## **Welcome to your National Wildlife Refuge**

Arthur R. Marshall Loxahatchee National Wildlife Refuge, all that remains of the once vast Everglades ridge and slough habitat, is located seven miles west of the city of Boynton Beach in Palm Beach County, Florida. Palm Beach County, is the largest county east of the Mississippi River in terms of land area and is the largest agriculture-producing county in the east in terms of dollar value. The Refuge is situated west of U.S. Highway 441, south of U.S. Highway 98, and 15 miles west of the Atlantic Ocean. The Everglades Agricultural Area, which includes large sugar cane plantations, winter vegetables, sod farms, and cattle ranches, is located to the north and west. Rapidly expanding urban communities and rapidly disappearing small farms are found to the east where more than six million people live within two hours of the Refuge from Ft. Pierce south to Miami. The remainder of the central and southern Everglades (Water Conservation Areas 2 and 3 and Everglades National Park) are located to the south.



## **Part of a Network of Lands—Born of Necessity, Managed with Care**

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National Wildlife*

Refuge System which is the world's most outstanding network of lands dedicated to wildlife. Refuges provide habitat for more than 200 endangered and threatened species as well as hundreds of other birds, mammals, reptiles, amphibians, fish, insects, and plants.

*All photos: USFWS  
except where noted*

The National Wildlife Refuge System, first started in 1903 by President “Teddy” Roosevelt, is managed by the U.S. Fish and Wildlife Service and encompasses over 150 million acres across the nation. Found in every state, refuges include arctic tundra in Alaska, coral reefs in the Caribbean, bogs in the north woods of Maine, and tropical forests at the base of volcanoes in Hawaii.

### History

Archaeologists suspect that Prehistoric occupation did not occur on the Refuge because of little dry land on which to live. Even tree islands, which are thought to have formed between 1,000 and 7,000 years ago, would have been unsuitable for prehistoric occupation. However, archaeologists have hypothesized that the Refuge may have been

used by the Belle Glade People — early Indian settlers to travel east toward the Atlantic Ocean.

Beginning with the Swampland Act of 1845, and later the 1907 Everglades Drainage Act, excessive drainage activities occurred in the Everglades to pave the way for agriculture and population expansion. Three water storage areas called Water Conservation Areas 1, 2, and 3 were constructed by the U.S. Army Corps of Engineers in the 1950s through the 1970s. The Everglades “River of Grass” no longer flowed freely then,

losing its connectivity. Bounded by levees and connected only by a series of canals, these areas were placed under the jurisdiction of what is now the South Florida Water Management District (SFWMD), an agency of the State of Florida.

In 1951, a license agreement between the State of Florida and the U.S. Fish and Wildlife Service, under the authority of the Migratory Bird Conservation Act, enabled the establishment of the 143,238-acre Loxahatchee National Wildlife Refuge which encompasses Water Conservation Area 1. “Water Conservation Area 1” or “Refuge interior” land, as it is now called, is owned by the State of Florida and SFWMD, but managed by the U.S. Fish and Wildlife Service as a unit of the National Wildlife Refuge System.

In addition to the licensed lands, the U.S. Fish and Wildlife Service owns 2,550 acres to the east and west of the Refuge interior. This acreage is sub-divided into four management compartments (A, B, C, D) and the 400 acre cypress swamp. In total, the Refuge currently includes 143,924 acres of Everglades habitat.

In 1986, the Refuge’s name was changed from Loxahatchee National Wildlife Refuge to the Arthur R. Marshall Loxahatchee National Wildlife Refuge to honor former U.S. Fish and Wildlife Service employee and noted South Florida conservationist, Arthur Raymond Marshall.

The Refuge is managed within the framework of the Comprehensive Conservation Plan (CCP), a document developed from 1998 - 2000 with extensive public input. The vision to guide the Refuge’s future management in the CCP is ...”To serve as an outstanding showcase for ecosystem management that restores, protects, and enhances a portion



of the unique northern Everglades biological community. This public asset provides for the enjoyment and enhanced quality of life for present and future generations.”



### Wildlife Habitats

The Everglades habitats of the Refuge consist of sloughs, wet prairies, sawgrass, and tree islands. Cypress swamp is the fifth major plant community lying along the eastern edge of the Everglades habitat within the Refuge.

Sloughs have deeper water and hold water longer than other Everglades plant communities. They vary in depth from a few inches in the dry season to two feet or more in the wet season. The slough is characterized by a scarcity of visible surface plants. Among the surface plants that do grow there are white

water-lily and spatterdock. There is an abundance of submergent plants such as fanwort and chara.

The Wet Prairie community is characterized by short emergent plants and relatively shallower water levels than sloughs. It is the most prevalent vegetative community in much of the central and eastern



portions of the Refuge. Plants include duck potato, pickerelweed, spikerushes, and redroot.

The Sawgrass community gets its name from the characteristic sawgrass sedge that dominates this



type of habitat. Sawgrass may grow in solid strands or in the presence of other species. In some areas, a mixture of sawgrass, wax myrtle, and dahoon holly grows abundantly. A ring of sawgrass often encircles tree islands, separating them from the wet prairie or slough.



Tree Islands are formed on slightly higher elevation areas within the marsh, including where peat has “popped up” to the surface. Small water-tolerant plants are the first to germinate, followed by shrubs and trees. The canopy



of well-developed tree islands is usually a dense growth of swamp bay intermixed with dahoon holly. A narrow border of wax myrtle, buttonbush, and coco-plum surrounds the typical island. Occasionally, other trees such as red maple and willow are found on tree islands in the Refuge. The Refuge boasts the largest concentration of tree islands in the remaining Everglades.



The Cypress community is composed of pond cypress trees, pond apple, myrsine, lichens, and ferns such as giant leather, sword, strap, hottentot, royal, resurrection, and swamp ferns. The moist microclimate of the cypress swamp also provides for a profusion of epiphytes (air plants), such as cardinal, leatherleaf, needleleaf, and southern needleleaf, as well as ball moss and Spanish moss. This 400-acre cypress swamp is part of the largest cypress forest left on the east side of the Everglades that once ranged from Lake Okeechobee south to Fort Lauderdale.



The managed compartments are composed of Compartments A, B, C, and D. A survey was completed in 1951 for developing agriculture as a type of habitat enhancement. Over the years Compartment C has been cultivated with experimental plantings to attract waterfowl and wildlife for public viewing. There were several experimental

studies conducted in Compartment C. Currently, Compartment C is subdivided into impoundments which are actively managed in a mosaic of habitats to benefit wildlife.

### **Wildlife on the Refuge**

#### *Birds*

In any given year, as many as 257 species of birds may use the Refuge. Of these birds, approximately 93 species are considered to be common or abundant during certain seasons.



*Charles Slavens*

For the snail kite, limpkin, smooth-billed ani, white ibis, glossy ibis, roseate spoonbill, wood stork, American swallowtail kite, short-tailed hawk, Florida sandhill crane, purple gallinule, black-neck stilt, and a variety of herons and egrets, the Refuge can provide important habitat for both nesting and migration. Many neotropical migratory birds (which may include songbirds, raptors, and shorebirds), also depend on the Refuge for habitat.



#### *Waterfowl*

A variety of duck species such as the ring-neck, mottled, fulvous-whistling, wood, and ruddy duck, as well as blue-winged teal, green-winged teal, lesser scaup, northern shoveler, hooded merganser, and gadwall may be found on the Refuge when water levels are appropriate and adequate cover is available. The mottled and wood duck nest on the Refuge.

#### *Resident Wildlife*

There are 23 species of mammals known to occur on the Refuge, including the Mexican free-tailed bat, cotton mouse, grey squirrel, raccoon, bobcat, gray fox, round-tailed muskrat, river otter, and the nine-banded armadillo. There are at least 17 species (exotic and native) of frogs, toads, and amphibians on the Refuge. A few of the most common

are the greater and lesser siren, amphiuma, Florida cricket frog, green treefrog, pig frog, and southern toad. Approximately 18 species of turtles and lizards use the Refuge, including the stinkpot, Florida redbelly, peninsula cooter,



and Florida softshell turtles, green anole, and ground skink. Up to 24 different snake species have been found on the Refuge, including garter



snake, racers, Florida cottonmouth, dusky pygmy rattlesnake, and a variety of watersnake species. Alligators, an important “keystone” species in the Everglades, occur on the Refuge in large numbers. The Refuge supports the densest, and arguably healthiest, alligator population south of Lake Okeechobee.



*Threatened and Endangered Species*

There are at least 63 plant and animal species listed by the state or federal government as endangered, threatened, or of special concern known to occur or that could occur on the Refuge. These species include wading birds such as the wood stork and Florida sandhill crane, raptors such as



the Everglades snail kite and bald eagle, and other species including the eastern indigo snake and the tropical curley-grass fern.

**Habitat Management**

A variety of management programs enhance wildlife habitats on the Refuge. There are four major concerns that Refuge staff have with respect to habitat – degraded hydropatterns, poor water quality, exotic plants and animals, and urban and agricultural development in adjacent areas – any one of which could compromise the future of the Refuge. Hydropatterns refers to the water depth, the distribution of the water, the seasonal timing of the water, and the flow of water. The Army Corps of Engineers (COE)



considers these parameters when implementing a water regulation schedule. This schedule was last updated in 1995 to enhance the ecological communities in the Refuge, particularly habitat for snail kite nesting and apple snail reproduction. The water regulation schedule varies water levels seasonally and discussions between SFWMD, COE, and the Refuge determine if it is appropriate to deviate from the schedule. Refuge staff participates in evaluating the Comprehensive Everglades Restoration Plan (CERP) programs related to hydropattern and water quality.

Good water quality is critical to achieving Refuge objectives and those of Everglades ecosystem restoration. To achieve effective water management, the Refuge relies upon developing progressive partnerships with the SFWMD, COE, and other entities.

In 2000, the Refuge and the National Park Service jointly created the Everglades Program Team (EPT). This joint venture team between the two agencies was charged with



monitoring restoration progress outlined in the Consent Decree resulting from a 1988 Everglades water quality lawsuit filed by the federal government. The EPT headquarters is located at the Refuge.

Another management effort is controlling exotic and invasive plants.

Serious threats to native plant communities and wildlife habitats (entire South Florida ecosystem) include invasive exotic plants, such as melaleuca (*Melaleuca quinquenervia*), Old World Climbing fern (*Lydogium microphyllum*), and Brazilian



pepper (*Schinus terebinthifolius*). These alien plants, lacking natural predators and insects to keep them in check, rapidly expand, forming dense forests or thickets which are undesirable to humans and wildlife. These degraded

habitats have been shown to support much less species diversity than native plant habitats. Refuge staff work with scientists and land managers from key federal, state, and local agencies as well as private organizations that deal directly with invasive exotics pest plants.

Adjacent proposed development is a potential threat to the ecological communities of the Refuge. Examples of adjacent development that have been proposed include mining in the Everglades Agricultural Area (EAA), power plants, a landfill, a wedge of land south of Refuge being annexed for a housing development, a gold course, and a

chemical warehouse. The potential negative impact to the Refuge differs depending on the nature of the proposed development. Friends of the A.R.M. Loxahatchee NWR and other advocacy groups along with concerned citizens are assisting Refuge staff in increasing county and state lawmakers' awareness of the environmental ramifications of development.

Prescribed fire is an important tool used for managing wildlife habitat. The Refuge staff and partners conduct prescribed burns to enhance a variety of habitats and to control invasive and exotic plants. The Refuge has a variety of vegetation types which are either dependent upon fire, susceptible to fire, or spread fire.



Sawgrass marsh is extremely combustible, but well-adapted to fire. Beakrush and spikerush wet prairies have insufficient fuel to carry a fire under high water levels. Sloughs act as natural fire breaks because the

vegetation is sparse and wet most of the year. However, if the surface sediments dry out, muck fires may develop in the peat, burning away hundreds or thousands of years of peat accumulation. Tree islands, found interspersed among the sloughs and wet prairies, will rarely carry fire during the wet season. However, when the water table drops below ground level, tree islands are susceptible to destructive fires.

All of the impoundments (2,550 acres) adjacent to the Refuge headquarters are actively managed to enhance wildlife habitat. Portions of the impoundments are being restored to cypress swamp, beginning with cypress plants, invasive exotic

removal, and restoration of hydrology (water movement). In 2003, the Refuge and the SFWMD partnered to develop the Loxahatchee Impoundment Landscape Assessment (LILA). The project, located in Impoundments 3 and 4, assists in developing performance measures for Everglades restoration by mimicking water depths and flows to induce responses by wildlife in different Everglades habitats. The remaining impoundments are managed as a mosaic of habitats to benefit a variety of wildlife.

### **Wildlife Calendar**

This calendar is a general guide to seasonal wildlife events. Weather may cause slight variations. The best times to observe wildlife are generally early morning and just before sunset.

#### *January*



Many bird groups spend the winter season at the Refuge. Many raptor species can be seen foraging over the wetlands or in the trees, including resident and migratory red-shouldered hawks. Hundreds of American robins, cedar-waxwings, and tree swallows are sometimes foraging in trees. Winter warblers such as prairie, orange-crowned, yellow-rumped warblers, northern waterthrush, and ovenbirds also are found.

#### *February*

Wintering shorebirds can be seen in addition to the wintering raptors, waders, and passerines. Wintering secretive marsh birds can sometimes be heard. Florida and migrant red-shouldered hawks continue to be abundant this month. Eagles should be sitting on eggs, and snail kites are engaged in courtship behavior.

#### *March*

Some northern waterfowl species remain. Thousands of tree swallows begin gathering for their northern migration in late spring. Usually, water levels are slowly dropping in the interior portions of the Refuge



G. Forrest

and most of the smaller wading birds and great egrets are starting courtship behaviors and are in full breeding plumage. The first black-neck stilts start to arrive for their nesting season. Most of the shorebirds wintering on the Refuge have migrated to the northern parts of their ranges, and spring shorebird migrants will be arriving in April. Kingfishers and common snipe begin to migrate north this month.

#### *April*



Alligators may be heard bellowing. Snail kite nests should have chicks near fledging age. As the water levels continue to lower during this dry down season, wading birds such as little blue herons, tri-colored herons, snowy and great egrets, and glossy and white ibis should be into full phase nesting; sitting on eggs or having chicks. A few American bitterns still remain, but most have migrated north. Least bitterns are in full breeding color. Late month reveals an increase in migrating shorebirds on exposed mud flats. Resident red-shouldered hawks are courting and beginning nesting activities.

#### *May*



C. Slavens

Black-necked stilts are nesting on mud flats. American bitterns and belted kingfishers have probably migrated north by now. Alligators continue to bellow this month. If water levels are quite low, alligators may be concentrated in the canals or in small pools of open water (alligator holes) in the interior of the Refuge. Numerous turtle nests (soft-shelled, red-bellied, snapping, and peninsula cooters) are being dug. Migrant shorebirds move northward. Some species that could be observed include lesser and greater yellowlegs, and solitary stilt, spotted, least, semipalmated, pectoral, and white-rumped sandpipers. White-tailed deer buck's antlers are covered in velvet.

## June



Continued hot and dry conditions keep most species out of the sun during the day. During this time of year, wildlife hunkers down for survival, and few animals are easily observed. Unless the wet season rains come, the water levels are usually quite low. Extended periods of hot temperature and no rain can contribute to decreased oxygen availability, resulting in the fish kills along the L-40 canal. Alligators are building nests. Daytime raccoon activity seems to increase. By the end of the month, rain usually brings water levels up. Red-shouldered hawks may have chicks in their nests.

## July

Rainy season is usually in full swing. Juvenile otters can be occasionally seen along the roads or levees near the water. Some white-tailed deer bucks are still in velvet. Female alligators are attending their nests.

## August



Butterflies are becoming more numerous as summer rains encourage grass and other plant blossoming. Alligator nests hatch at the end of the month and hatchlings may be visible. An early migrant, blue-gray gnatcatchers can be sometimes heard this month.

## September

Early passerine migrants can be seen. Six to nine species of warblers and occasionally Baltimore orioles, scarlet and summer tanagers, and hermit thrushes can be found during this fall migration.

## October

Raptors start arriving for the winter, including vultures, American kestrels, Cooper's and sharp-shinned hawks, and northern harriers. The first merlins and peregrine falcons of the fall season are usually seen this month. Florida red-shouldered hawks are abundant, and fall migrants are arriving. Bobolinks and eastern kingbirds can be heard and seen migrating southward. Generally

speaking, teal and pied-billed grebes show up, but ducks do not appear until later in the year. Belted kingfishers arrive and are commonly seen on the impoundments. Secretive marsh birds such as king, sora, black, and Virginia rails can often be heard, but not seen.

## November



G. Forrest



Hurricanes occasionally approaching from the west side of the state in the fall will enhance the sightings of passerines such as blackburnians, Brewster's, blue-winged, ceruleans, and chestnut-sided warblers. Pied-billed grebes have migrated in for the winter and are easily observed in the impoundments. When they arrive they tend to stay in tight feeding groups, but soon disperse and forage individually. Northern wintering migrants continue to arrive to increase our year-round resident bird numbers. Some of these are palm warblers, grey catbirds, blue-grey gnatcatchers, great-crested flycatcher, blue jays, northern cardinals, and white-eyed vireos.

Bobcat kittens can be seen with their mother occasionally. River otters are observed regularly. Hundreds of tree swallows can occasionally be seen over the impoundments. Wintering waders are foraging in many locations and can be observed easily.

## December

With cooler weather, small mammals are seen more frequently. Early morning visitors may see grey foxes, otters, and marsh rabbits along the impoundment edges in the tall grasses. The number of wading and marsh birds have increased with the cooler and drier weather.

## Public Use Opportunities

These recreational activities are available on the Refuge. In all cases, public access, public use, or recreational activities not specifically permitted are prohibited. Please inquire at the Visitor Center or consult an information kiosk as to whether a specific activity is permitted.

### *Refuge Hours:*

The Refuge is open daily from sunrise until sunset. Night use is prohibited. Exact times are posted at each entrance and change seasonally.

### *Access:*

Public entry into the Refuge is available at either the Headquarters Area (off US 441/SR 7 between Boynton Beach Blvd and Atlantic Avenue), the Hillsboro Area (at the west end of SR 827, Loxahatchee Road), or the 20-Mile Bend Area

(off SR 80 and CR 880 on 20-Mile Bend Boat Ramp Road). Entry at any other point is not authorized. An entrance fee is charged daily. Other annual passes are available upon request. Entrance fees apply at all three Refuge entrances.

## Visitor Center

The Center is open daily except Thanksgiving and Christmas Day. Hours are 9 am - 4 pm seven days a week. Exhibits and information are available at the Center.

## Programs and Activities

A variety of activities, including guided tours and audiovisual programs, are offered throughout the year. Inquire at the Visitor Center and check our website for information.

### *Environmental Education*

The environmental education and outreach program showcases the Everglades ecology and human influence on the southeast Florida ecosystem. The Refuge offers area educators an outdoor classroom. Call 561/732 3684 at least two weeks prior to your requested day to book your trip.

### *Wildlife Observation*

Nature observation, photography, canoeing, and hiking are encouraged. Observation is best along the Cypress Swamp Boardwalk, the Marsh Trail, the Everglades Canoe Trail, the L-40 Levee, and Management Compartment C. Hiking is allowed only in areas open to public use and on designated trails. Hiking is permitted from the Headquarters Area north to Acme 1 pump station, south to the Hillsboro Area, and west to the S-6 pump station. Hiking is also permitted on the hiking trail at 20-Mile Bend entrance. There is no entry or exit at the Acme pump station or the west side of the Refuge at this time.

### *Fishing*

Sport fishing is permitted in the L-40 perimeter canal and public use areas of the interior. Fishing is prohibited in Management Compartment A, B, C, D and other areas posted as closed to the public.





A state freshwater fishing license is required. Anglers, their vehicles, boats, equipment and other belongings are subject to inspection by Service law enforcement officers.

### *Boating*

Boating, canoeing, and kayaking are permitted in canals and in the public use area, except for Management Compartment C and other areas marked as being closed to the public. Only water-cooled outboard boats (no airboats, “go-devils”, mud boats) are allowed. U.S. Coast Guard, state, and Refuge regulations apply. All Coats Guard regulations apply pertaining to boat speeds.



There is an idle speed no wake zone at each boat launch area. There is a speed limit of 35 MPH in all waters of the Refuge and the canal at 20-Mile Bend is a slow speed zone for safety. The 5.5 mile Everglades Canoe Trail

is well-marked and provides a unique opportunity to explore the Everglades. No motors are allowed on the canoe trail. All canoes must conform to boating regulations. The trail may be closed during drought conditions due to low water levels. Canoes and kayaks for rent are available through local outfitters. A listing may be obtained from the Visitor Center.



### *Biking*

Biking is permitted along the L-40 Levee from the Headquarters Area to the Hillsboro Area. The 12-mile trail is recommended for mountain or hybrid bikes. There is no shelter along the levee, but two benches have



been installed at roughly the one-third and two-thirds points.

*Hunting*  
Waterfowl hunting is permitted by permit only in designated areas. Special Refuge dates, times, and

regulations apply. The refuge also participates in the both the early teal and regular season.



A weekend waterfowl youth hunt occurs the last weekend of the hunt season in January. All hunters must possess a valid Florida State Hunting License and Florida State Duck Stamp. Call the Refuge Administration office at 561/732 3684 for permit information.

### *Firearms*

The possession of firearms shall be in compliance with all applicable federal and state laws. The discharge or brandishing of a firearm is prohibited, except during authorized activities.

### *Volunteering on the Refuge*

A growing number of volunteers assist the Refuge with a variety of public use, maintenance, and biological projects, including leading tours, staffing the Visitor Center, building boardwalks and benches,



assisting with wildlife surveys, and checking nest boxes. For volunteer information contact the Refuge Volunteer Coordinator at 561/732 3684 or call 561/734 8303. In addition, a non-profit friends group, the Friends of the A.R.M. Loxahatchee NWR, has formed to help staff the



Visitor Center, operate a book and gift store, and help the Refuge to fulfill its mission.

For more information write to:

The Friends of the  
A.R.M. Loxahatchee NWR  
P. O. Box 6777  
Delray Beach, FL 33482-6777

Their website is  
[www.loxahatcheefriends.com](http://www.loxahatcheefriends.com)

### **Enjoying the Refuge**

The public is welcome to visit the Refuge any time of the year from sunrise to sunset. There are several motels and numerous restaurants and gas stations within a 15 minute drive of the Refuge. For more information, contact:

The Greater Boynton Beach  
Chamber of Commerce  
1880 North N. Congress Avenue  
Suite 106, Boynton Beach, FL 33426  
or telephone 561/732 9501

Be prepared to observe Refuge regulations concerning: posted hours, closed areas, fishing and hunting license requirements, boat registrations, life jackets, and other required safety equipment. Please do not leave valuables in your vehicle, and allow time to return to your vehicle and leave the Refuge before the posted closing time. Tell a relative or friend where you are going and when you should return. Please contact Refuge personnel for emergency assistance.

**The emergency dispatch number for the Refuge is 1-800-307-5789 or dial 911.**



All government property including natural, historic, and archaeological features are protected by Federal Law. Searching for or removal of objects of antiquity or other objects is strictly prohibited. Do not pick flowers or other vegetation, or harass, capture, or remove wildlife.



Alligators have a natural fear of humans. When they are fed they lose that fear and may become dangerous. Please, do not feed the alligators or any other wildlife.



Picnicking/pets/littering are not permitted.

All-terrain vehicles are prohibited.

