Phosphorous, nitrogen, and mercury have leached into the Everglades, polluting the water and creating biological conditions ripe for invasive plants and animals. The wading bird population, for example, has declined 90 percent over the last century. Half of the biologically rich tree islands have disappeared or succumbed to melaleuca, climbing ferns and foreign-born trees. The waters clog with hydrilla, water lettuce and cattails. Pythons — who've killed virtually every small animal in the national park — edge ever closer to Loxahatchee.

"If you're able to run fire through there, and get rid of sawgrass and cattail that are not growing too vigorously, then the new vegetation will pull nutrients like phosphorus out of the water and improve water quality," Schuette says. "And keeping a nice, natural, healthy ecosystem makes it more resilient to invasion by exotic plants."

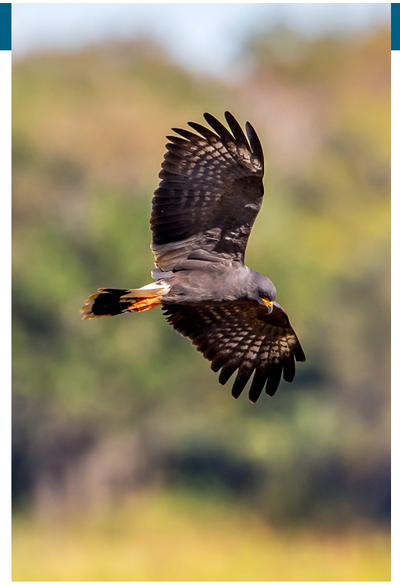
Loxahatchee is a biologically brilliant tapestry of ecosystems: wet prairies; freshwater sloughs; sawgrass fields; tree islands, cattail marshes and a 400-acre cypress swamp. It attracts roughly 250 types of songbirds, waterfowl, wading birds and raptors. Nearly 70 state or federally threatened or endangered species, including the Florida panther, American crocodile and wood stork, call the Everglades home.

"That's a snail kite over there," says Olson, halting the airboat alongside a 10-foot high thicket of wax myrtle, sawgrass and other sedges. The endangered, medium-sized hawk perches on a nearby tree limb.

"Right after we burned this area 10 years ago we found snail kite nests," Olson says. "From a biological or ecological standpoint, birds have a hard time getting in here and feeding or nesting. So when you knock it back like this (with fire), it just opens it up for feeding. Even while the brush is still smoking, the birds return. Snails and invertebrates thrive. That's food for birds."

"Every Hunter Loves Burning"

Olson trades the airboat for a Chevy Silverado and the Loxahatchee tour heads to the south end of the teardrop-shaped refuge which is open to hunters, hikers, bikers and kayakers. He stops at



Snail kite, credit Andy Morffew, CC by 2.0.

the Hillsboro Canal entrance to chat with "Wild Lyle," who runs airboat eco-tours. Nearby, two men fish for bass, catfish and crappie while an alligator patiently waits 20 feet away for non-keepers.

"There are acres and acres of cattail. It's caused by high phosphates in the water," Olson says. "Duck hunters really want it burned so they can get in there and hunt it better. So we knock back the cattails as much as we can. We burned this whole area here last year."

Olson, 56, has been at Loxahatchee since 2002 and the manager since 2005. He tries to burn 20,000 acres a year. Prescribed fires will soon take on greater importance as Olson expands recreational opportunities, hunting in particular, across the refuge.

"Every hunter loves burning. It opens up the marsh and lets the sun shine on the water increasing the submerged aquatic vegetation that is attractive to wildlife — and the duck hunter," says Newton Cook, president of United Waterfowlers Florida, Inc. who hunts and fishes Loxahatchee maybe two dozen times a year. "But burning creates liabilities with smoke. Florida has a lot of old people who have trouble breathing and they start calling 911 whenever they smell smoke."

As Palm Beach County grows — its population is expected to nearly double to 2.7 million people by 2060 — prescribed burns could become more problematic. Under-construction houses and apartments already line Loxahatchee Road all the way to the refuge's southeast corner. The refuge will soon be half-surrounded by towns, subdivisions, industrial parks, rock quarries and landfills as development shifts to the preserve's western edge. The likelihood of a wildfire running off the refuge and into a community will only grow.

"Looking at all that fuel and thinking, 'Good lord, what if that catches on fire during a drought and the wind kicks it toward Wellington?'," wonders Michael O'Dell, the assistant planning director for the town of 65,000 residents on Loxahatchee's northeastern edge. "You see what's going on in California. That's something that could be really devastating to the village of Wellington."

Residents saw the smoke from a June wildfire that grew to 600 acres in the refuge's northwestern corner. But a prescribed burn two weeks earlier wiped out the vegetation that could've turned the fire into a full-blown conflagration. It fizzled a few days later without causing harm.

A charred palmetto with new growth at Hobe Sound NWR, credit USFWS/Dan Chapman.

"People, especially in south Florida, are not used to prescribed burns. They're very nervous whenever they see fire or smoke," Olson says. "But we take strong precautions. We don't want any mishaps — either in town or across our beloved Everglades."

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U.S. Fish & Wildlife Service

Southeast Region
Fire Program 2018

Safe and Sound Burning

Service's prescribed burn on busy Florida coast helps head off potential catastrophic wildfires

Hobe Sound, Florida — The well-to-do on Jupiter Island wanted the wildlife refuge burned and who was to say no? Not the federal biologists at the refuge across the Intracoastal Waterway. They were eager to accommodate their neighbors and restore the pine scrub habitat.

But the stakes — and potential dangers — were high. A prescribed fire, by its nature, is carefully planned and executed to minimize mishaps. Yet, winds shift. Embers fly. Smoke swirls. And the best-laid plans of burn bosses can go awry in the blink of an eye.

Hobe Sound was no ordinary refuge either. The targeted area was sandwiched between U.S. 1, the Dixie Highway, power lines and a water treatment plant. The margin for error was very small. Plus, the folks on Jupiter Island — one of the wealthiest communities in America — didn't want black smoke wafting over their homes.

Finally, after months of preparation, the 17-acre plot was burned in March 2018.

"It was tricky, all or nothing," said Christine Eastwick who manages the Hobe Sound National Wildlife Refuge. "But it went really well. It burned, but it didn't go crazy."

The U.S. Fish and Wildlife Service prescribes about 300 fires a year in the Southeast. Most are set to rid the land of combustible underbrush near towns, subdivisions and industrial parks. But they're also lit to rejuvenate habitats that benefit threatened or endangered species.

"What you're seeing in California is a catastrophe, but it's a good example of why a solid, well-planned burn control program is necessary," said Gene Rauth, the manager of the Town of Jupiter Island. "If the Fish and Wildlife Service or the state of Florida was not doing

Prescribed fire on Sanibel Island and J.N. "Ding" Darling NWR, credit: USFWS.

controlled burns in our area we would have similar problems."

Good Stewards of the Land

Joseph and Permelia Reed and friends bought land in Hobe Sound and Jupiter Island in the early 1930s in search of "a quiet life … totally unlike booming Palm Beach" 25 miles to the south. Their exclusive winter getaway for the Northern rich added land on the far side of the Indian River to ensure pristine views.

Serenity, though, didn't preclude extravagance. Mansions sprung up owned by men named Ford, Heinz, Mellon and Doubleday. U.S. Sen. Prescott Bush and wife Dorothy entertained son George Herbert Walker Bush and grandson George W. Bush. Celine Dion had a spread with a backyard waterpark. Tiger Woods' home featured a golf course.

The Town of Jupiter Island was once listed as the wealthiest small-town enclave in America. It now ranks second with an average home value of $5 million, according to *Businessweek*. (Sagaponack, New York is number one.)

In the late '60s and early 70s, the Reeds and others in the Jupiter Island community conveyed hundreds of acres to the Service. Nathaniel Reed, who died recently, carried on the family's environmental tradition with distinction. As a boy, he fished the Indian River for sea trout and bluefish and the Atlantic for pompano and croaker. He studied the island's birds and butterflies disappearing for all-day jaunts through dunes and marshes.

Reed served as assistant secretary of the U.S. Department of the Interior for fish, wildlife and national parks under presidents Nixon and Ford. He co-authored the Endangered Species Act. Back home in Florida, Reed advised six governors on environmental issues, served on the South Florida Water Management District and the Everglades Foundation. *The New York Times*, in a

July obituary, labeled Reed a "champion of Florida's environment."

Reed, who lived across Indian River from the refuge, wanted it burned. He was all too familiar with wildfires.

More than 120 acres burned in December 2010 threatening 80 homes at the Hobe Sound Golf Club and a neighboring community. A 55-acre fire two years later neared the town's Poinciana Gardens community. And, in March 2014, a 90-acre wildfire jumped Florida's Turnpike, forcing its closure for several hours.

When a small fire last year on the 1,100-acre refuge came too close to the town's water treatment plant, Reed wanted something done.

"Nathaniel would always say we don't want to have a catastrophic outcome here, something that would endanger the health, safety and welfare — or worse," recalled Rauth. "But you've got to pick your time and do it right. Mr. Reed made it clear that, to be good stewards of the land, you have be involved. You can't take a hands-off approach."

Heading Off Catastrophe

Hobe Sound is a schizophrenic refuge. The 3.5 mile beachfront portion connects to a state park and, combined, comprises the largest section of undeveloped beach in southeastern Florida. It is also considered one of the prime sea turtle nesting areas in the Southeast.

The mainland portion, across the Intracoastal, consists of rare sand pine scrub habitat which once covered large swaths of central and coastal Florida only to disappear under the farmer's plow and the developer's bulldozer. Its mix of sandy patches and low-slung vegetation — sand pine, myrtle oaks, saw palmetto, Florida rosemary — across dunes and ridges is typically ideal habitat for two dozen threatened and endangered species.

Federally threatened scrub-jays, at-risk gopher tortoises, and endangered Lakela's mint and four-petal pawpaws, once flourished on Hobe Sound and neighboring pine scrubs. Florida's scrub-jay population has declined 90 percent over the last century.

"Scrub-jays don't like trees above six feet tall where hawks can see them from," said Eastwick, the refuge manager. "There are a lot [of species] that could potentially be in our scrub, but it's so overgrown we haven't seen them in a while."

Airboats monitor a prescribed fire at ARM Loxahatchee NWR, credit: USFWS.

Fire routinely burned the vegetation, renourished the soil and bolstered wildlife. Development, though, has wiped out most scrub territory. Roads, railroads and buildings act as firebreaks keeping the flames from reaching scrub pockets. Fear of fire, and liability concerns, further curtailed burning.

The feds, the state of Florida, The Nature Conservancy and private citizens prescribe fire for 1 million acres each year. At Loxahatchee National Wildlife Refuge, 30 miles south of Hobe Sound, Rolf Olson aims to burn 20,000 acres annually. Restoring fire-dependent Everglades habitat is one reason; clearing out brush that could fuel a disastrous fire in Boynton Beach, Wellington, Boca Raton or other adjacent communities is another.

Olson, the Loxahatchee manager, recalled a 2004 wildfire that scorched 4,000 acres. It fizzled when it came up against an area that had been carefully burned earlier in the summer.

"It was a real monster. It jumped the levee and the canal," Olson said. "If not for the prescribed burn, it probably would've burned the entire refuge. It had a lot of potential to be catastrophic."

The Waiting Game

Firefighters at Hobe Sound took no chances. They set out to burn 17 acres along a triangle-shaped plot bordered by U.S. 1 and the Old Dixie Highway. They were under no illusions.

"It's challenging because either scrub doesn't burn or it burns real intensely," said Tom Ledbetter, a fire management officer with the Service in Florida. "And when it does burn can you keep it on the refuge? And how do you keep smoke on the refuge?"

Planning meetings with local, state and federal partners began before Christmas 2017. A fire break surrounding the triangle was carved into the sandy soil with bulldozers and skid steers. Backup fire breaks were added as security. Any brush within 20 feet of the power line alongside U.S. 1 was cleared away. Tall sand pines were cut down and left to dry to help spread the fire.

Refuge staff invited neighbors to a prescribed fire meeting at the refuge. They also visited close-in neighbors like Joe Hamilton whose unique, octagon-shaped home, nicknamed the Dome House, sits perilously close to the burn area.

"I was pretty concerned. I've seen wildfires before and I know what can happen," said Hamilton who'll soon quit Massachusetts for full-time living at Hobe Sound. "But these guys were very explicit and articulate and they put us at ease."

Wildland firefighters were called in from Okefenokee, Avon Park, Merritt Island, Tyndall, Everglades and Jonathan Dickinson parks, refuges and military bases. Hobe Sound alerted local media and took to social media to warn of the impending fire. Reverse 911 calls went out to neighbors living within a mile of the burn site. Firefighters cut a firebreak around Hamilton's house and, eventually, positioned a fire truck in his driveway and turned sprinklers on nearby vegetation.

U.S. Fish & Wildlife Service

And then they waited. For the weather — precipitation chances and timing, wind direction and speed, air temperature, relative humidity — to be just right. And for the Florida Forest Service to grant them a burn permit.

They applied for the permit at 8 am on March 2. They started burning at 10:30 am. Time, though, was limited. The ideal northwesterly wind — which blew the smoke out over the Atlantic — was due to shift by 1 pm.

Firefighters armed with drip-torches dropped fire in straight lines across the targeted triangle, section by section. It burned hot and high in places, low and slow in others. Sandy spots inhibited the flames; dead trees fueled it. By noon, though, the wind shifted — and carried the smoke over U.S. 1. Visibility dropped to less than 500 feet. The northbound lane was shut down for about an hour.

Still, the fire was a success. Three-fourths of the scrub was burned off. More than half of the tall sand pines succumbed. And tons of wildfire fuel went up in smoke.

Soon, the scrub habitat rebounded with palmettos, rosemary and scrub oaks pushing through the ashes.

"All in all we're pretty happy with this burn," Ledbetter said. "It will re-sprout and when it gets to be six-feet high again we'll have to burn. One fire will not get us to where we want to be."

Fire as Tool, and as Friend

In Florida's Everglades, the Service understands how prescribed burning helps head off larger wildfires

Boynton Beach, Florida — Rolf Olson idles the airboat alongside a spindly melaleuca tree and ticks off the endless list of invasive plants bedeviling the 145,000-acre Arthur R. Marshall Loxahatchee National Wildlife Refuge.

The Australia-native melaleuca, of course. Old world climbing fern. Australian pine tree. Brazilian pepper tree. Water lettuce. Hydrilla. Cattail.

Nearly one-third of the refuge is covered in invasives, strangling exquisite plants, harming wildlife, clogging waterways, hindering recreation and blotting out some of the Everglades' most memorable vistas.

Olson, the refuge manager, offers a solution.

"We can treat huge areas with fire," he says as a young buck ambles across the wet prairie one recent summer morning. "It's a very effective tool."

In more ways than one. Fire — prescribed and carefully managed — can be a wildlands' best friend. Wildlife officials tout its ecological benefits. Hunters, fishermen and birders laud its cattail-clearing, nutrient-adding attributes. Hydrologists praise unimpeded water flows.

And, perhaps most importantly, controlled burns reduce the vegetative fuel that builds up year after year and can turn an otherwise inconsequential lightning strike into a catastrophic fire. Yet another disastrous wildfire season out West underscores the wisdom of prescribed fire.

Smokey Bear was wrong. Fire is our friend.

Rolf Olson, refuge manager, Arthur R. Marshall Loxahatchee NWR, credit USFWS/ Dan Chapman.

"Prescribed fires are very critical," says James Schuette, the land manager for the South Florida Water Management District, which leases the refuge land to the Service to manage. "The lightning capital of the U.S. is not too far from the refuge and the wildlands are going to burn — either on our schedule or Mother Nature's. If we didn't [proactively] burn a million acres in Florida each year we'd be on the news a lot more than we are."

No region of the country purposefully sets more fires than the Southeast. Prescribed fire is a "management tool" used, on average, 300 times a year by the U.S. Fish and Wildlife Service from North Carolina to Louisiana. In the 2016 fiscal year, for example, the Service burned more than 205,000 acres. Nationwide, the agency torched 384,000 acres. More acreage is burned annually at Loxahatchee than any other refuge.

"Ever since we started managing fire we've seen a dramatic drop in wildfire acres," says Jon Wallace, the Service's No. 2 fire coordinator in the Southeast. "Burning Loxahatchee is imperative to the well-being of our three million neighbors in Palm Beach and Broward counties. It also helps restore the Everglades to its historical, natural state."

"Even while the brush is still smoking, the birds return"

The deer disappears onto a tree island as Olson steers the airboat south over sawgrass marshes and water lily sloughs. It isn't yet 9 am, but the heat builds and cumulus clouds form over the Atlantic Ocean 10 miles eastward. Loxahatchee is surprisingly alive with wildlife this July day: snowy egrets and great blue herons fly languorously away as the Cline airboat zips by. Male alligators, protecting turf, bellow at the engine's thrum.

The water is unusually high. It has been a wet spring and summer. A budding algae bloom, outside Loxahatchee, complicates the already delicate water-management dance.

Hurricanes and ensuing flooding in the 1940s kept millions of northern Everglades acres underwater for months. A massive flood-control project created more than 1,000 miles of canals and levees with pumps sending water to farms or the ocean. Loxahatchee was created in 1951 from one of the water conservation areas primarily as a migratory bird reserve. The Service manages the 221-square mile refuge for the state.

Decades of messing with Mother Nature came with a steep price, though. A century ago, the Everglades covered 11,000 square miles. The "River of Grass" rolled, albeit slowly, down the Kissimmee River through Lake Okeechobee and into Florida Bay. Today, it's half the size, and agriculture, urbanization and flood control projects have siphoned off 40 percent of the water that once flowed through today's Everglades National Park.