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↑
The striking Prothonotary Warbler relies on bottomland hardwood forests and similar habitats. Page 16

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A golden-yellow Prothonotary Warbler inspects a nest box (left) while another perches on a tree stump in a southern swamp (right). The species is one of only two warblers found north of Mexico that nest in cavities, so it regularly takes to nest boxes in appropriate habitat.

A PASSION FOR PROTHON



A photograph of a yellow and grey bird perched on a weathered wooden post. The bird is facing left. The background is dark and textured. The title 'NOTARIES' is overlaid in large white letters. The word 'NOTARIES' is partially cut off on the left side by the edge of the page.

NOTARIES

**Why birders in
Jackson, Mississippi,
pay close attention
to the breeding
success of their local
Prothonotary Warblers**

BY CHARLES PFEIFER

Most weeks during the spring and summer, Jackson Audubon Society's PROW team is a group on a mission. PROW is ornithological shorthand for Prothonotary Warbler, the drop-dead gorgeous wood warbler that is even more stunning in person than in photos. The PROW team is the adopted name of our volunteers who brave the biting insects, alligators, and muggy Mississippi weather to document the success of our long-term nest box project.

This bird is known by some as the "golden swamp warbler" or "swamp canary." Most birders and ornithologists prefer Prothonotary Warbler (*Protonotaria citrea*). The name is thought to originate from prothonotaries, clerks in the Catholic Church who wore yellow vestments.

The location of our project is LeFleur's Bluff State Park, a 305-acre urban green space that borders the Pearl River near Jackson, Mississippi. The park is a National Audubon Society Important Bird Area and provides habitat for Swainson's and Hooded Warblers, Yellow-billed Cuckoos, and other Neotropical migrants besides Prothonotaries. The Cornell Lab of Ornithology states that the warblers avoid patches of forest less than 250 acres. This is one reason for their strong presence in the park, along with the habitat that it provides.

Since 2000, JAS has been maintaining nest boxes in the park for Prothonotaries. It is safe to say that our Audubon chapter has a passion for these birds. In 2019, we decided to discover just how much the nest boxes were contributing to their reproductive success. We began collecting data on nest building, eggs, chicks, and fledging.

Why is the Prothonotary Warbler the focus of our organization's signature conservation project? The bird is a species of conservation concern and has many conservation challenges, as do many other Neotropical migrants. They are habitat specialists that prefer swampy forest, wet bottomland hardwood forest, or some mix of forest and water. This type of

habitat is routinely at risk almost everywhere. They breed almost entirely in the eastern United States, especially concentrated in the South, with a few in Canada, where they are considered an endangered species. Their migration to wintering habitat takes them into Latin America. This means that they are an international species that require international protections and international conservation solutions.

The current population is approximately 1.6 million birds. Some may say that this isn't so bad. After all, many endangered species number less than 100 individuals. The problem is that the warbler has experienced an alarming 40 percent drop in its population since

the 1960s. Moreover, after the widespread logging of cypress swamps and bottomland hardwood forests in the late 1800s and early 1900s, the number left today is a small fraction of what once was. The best time to work with birds that need our help is when their numbers are still sufficient to have plenty to work with.

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These warblers are cavity nesters that readily take to nest boxes provided for their use. This is another way in which the birds are ideal subjects for a conservation project. Suitable tree cavities can always be a limiting factor for obligate



Previous spread: Andy Mucka/Shutterstock. Ray Hennessy/Shutterstock. This page: Bill Stripling

Bill Stripling

A male Prothonotary carries mossy material to use as nest lining while the female at left tends to chicks in a nest within a natural tree cavity at LeFleur's Bluff State Park in Mississippi. Nest-building begins in late April in southern states and in mid-May in northern breeding areas, and the first chicks of the year fledge in early to mid-June.



cavity nesters, and so nest boxes can have an immediate positive impact on the population. They are secondary cavity nesters, using tree cavities excavated by woodpeckers. Prothonotary Warbler is the only eastern wood warbler that nests in cavities. The only other cavity-nesting wood warbler in the U.S. is the western Lucy's Warbler.

Eastern Bluebirds, a species that has benefitted handsomely by having their own nest box projects, will take over a nest box from Prothonotaries at the park if they can. A 1.25-inch nest hole excludes bluebirds while allowing the warblers to enter. Brown-headed Cowbirds would enter the boxes if they could

and parasitize the nest by laying their eggs with the warbler eggs. The host bird would then raise the cowbird chicks as if her own. The 1.25-inch nest hole stops the cowbirds as well but not the tiny Carolina Wrens. We have had two instances of wrens taking over a box.

During our project, we discovered that the warblers gained tremendously by having nearby nest boxes that provide additional breeding opportunities. We monitored 15 nest boxes over the last three years, 13 of which were used in 2021. So far, we have kept the boxes in the same locations for the sake of consistency. Ten other "conservation project" nest boxes are provided that are not monitored weekly.

We know from direct observation that the Prothonotaries also use natural tree cavities in the park, as they have since long before humans arrived on the scene. Nest boxes are mounted on poles in shallow water about 6 feet above the water and away from branches that could allow swamp-dwelling snakes access to eggs and chicks. Incubation is by females for 12 to 14 days, and the male defends the territory and does participate in feeding the chicks. The birds tend to return to the same nesting location for the next breeding season, a behavior ornithologists call "site fidelity." Breeding starts in April and most often abruptly ends at the end of July. In rare cases when nesting activity of

some kind occurs after July, it doesn't produce viable results.

We calculated that 57 chicks were fledged (successfully left the nest) from our boxes in 2021. It is nearly impossible to witness the moment chicks leave the nest by direct observation. Constant surveillance by camera could, perhaps, capture images of that. We know the situation in each nest as eggs hatch and chicks develop, and then when the chicks are gone with no signs of mortality, we assume successful fledging.

Many Prothonotaries use the island of green that is LeFleur's Bluff State Park. Over two decades of consistently implementing the project is sure to have enhanced population numbers. Site fidelity will ensure that many of the birds will return over their lifespan of up to eight years, although most don't survive nearly that long. Our nesting numbers compare very favorably with Louisiana, a well-recognized epicenter of the Prothonotary Warbler population.



Our priority is always the birds' wellbeing. When we believe that the chicks are close to the end of the 10-day fledging period, we stop checking that box until we estimate that the chicks are gone, and it's safe to resume. This is to avoid "forced fledging" young birds, a term used to describe frightening the nestlings into leaving the nest prematurely. The chicks and eggs are never touched by our team. We want to make sure nothing of any conceivable nature can be transferred to them. We perform nest checks quickly to minimize the time that the female is kept away from incubating eggs or that the pair is kept away from feeding chicks.

What's next in the life of our newly fledged and growing young birds? First, the parents continue to feed the young for up to 35 days. Soon, they are developed and strong enough for the next big step in their life cycle, a 5,000-mile migration to their distant wintering grounds. The more westerly breeding Prothonotary Warblers, such as those in Mississippi and Louisiana, make an epic nocturnal flight across the



Reese Partridge, one of the volunteers with Jackson Audubon Society's Prothonotary Warbler Program, checks on the status of a nest in a warbler nest box. The team does not check on nests when the chicks are close to fledging, to avoid frightening them into leaving early.

BUILD YOUR OWN

If you are lucky enough to live or bird in locations that have Prothonotary Warblers, place some nest boxes, stand back, and enjoy the birds! If you're not trained and experienced with this kind of project, please leave the boxes untouched during the breeding season while the birds are using them. This eliminates any chance of nest disturbance or forced fledging. Before the birds arrive in the spring and after they leave in the fall, the nest box should be cleaned out and any repairs made.

To learn how to place nest boxes for the species, see this excellent resource from the Cornell Lab of Ornithology: nestwatch.org/learn/all-about-birdhouses/birds/prothonotary-warbler. For more information about the bird's nesting behaviors, nest box requirements, and much more, see www.sialis.org/prow.htm.

Charles Pfeiler

BM Stripling

The male Prothonotary like this bird has a golden yellow head, and its dark eyes stand out against the yellow plumage. The female's head is duller and less golden.



Gulf of Mexico. It is an amazing journey for such a tiny bird to fly at night, nonstop, across an expanse of ocean as the first part of their migration. There are no landmarks over open water to take advantage of and quite obviously no sun to orient with. Flying at night likely means that they are using the Earth's magnetic field and possibly stars to navigate in the dark.

The more easterly breeding warblers tend to migrate farther east through the Caribbean. This path still goes over bodies of water but not the marathon distance of the open water of the Gulf of Mexico. In the spring, the birds do it all over again with a journey back to their North American breeding territories.

Recent research shows how they may be accomplishing this. Another species of

nocturnal migratory bird has been shown to have a specific protein in their eyes that may hold the key to understanding nocturnal migration. European Robins have such proteins, known as cryptochromes, in their retinas. Scientists suspect that a specific cryptochrome, Cry4, gives the robins magnetic field sensitivity. I believe that with more study, we will find more birds, such as the Prothonotary Warbler, that navigate in this way. It is a question that will have to be addressed scientifically.



Prothonotary Warblers are literally birds without borders and are a shared responsibility with the Latin American countries that they migrate through and winter in.

Through scientific research and the scientific method, we now know just how important Colombia in northwestern South America is to the conservation of the species. The migratory connectivity from breeding areas to stopover sites on the way to their wintering areas presents challenges to the bird's conservation that must be understood to know where to concentrate habitat-preservation efforts.

Erik Johnson, director of conservation science for Audubon Delta, and others of the Prothonotary Warbler Working Group have deployed geolocators and nanotags, secured on birds captured by mist netting, on their breeding grounds in the U.S. The technology has developed to the point that devices light enough not to impair the flight of the small (14- to

10 PLACES TO FIND PROTHONOTARY WARBLER

- **Atchafalaya Basin, Louisiana.** Hosts about 5 percent of the global breeding population. Go to Whiskey Bay Road and Indian Bayou Road. The basin is larger than the Florida Everglades and five times more biologically productive than any other river basin in North America.
- **Jean Lafitte National Park and Preserve (Barataria Preserve), near New Orleans, Louisiana.** Try the Bayou Coquille Trail.
- **Mississippi Coastal Birding Trail, Ward Bayou WMA, Vancleave, Mississippi.**
- **Pascagoula River WMA in southern Mississippi.**
- **Francis Beidler Forest, South Carolina.** An Audubon center and sanctuary. World's largest virgin cypress-tupelo swamp forest.
- **Congaree National Park, South Carolina.** The largest intact expanse of old-growth bottomland hardwood forest remaining in the southeastern United States.
- **Sloughs WMA, Corydon, Kentucky.**
- **Upper Mississippi River National Wildlife Refuge, along Iowa/Illinois border.**
- **Minnesota Valley National Wildlife Refuge and Fort Snelling State Park, Minneapolis, Minnesota.**
- **Salamanca Island Road National Park, Colombia.** Hosts 2 to 3 percent of the wintering population.



A Prothonotary rests in a bander's grip while receiving a nanotag at Jean Lafitte National Park and Preserve in Louisiana. The device will track the bird on its migratory cycle. Researchers have learned a lot about the species in recent years thanks to nanotags.

16-gram) birds are possible. A geolocator is a 0.5-gram device that records sunrise and sunset information to estimate daily locations of birds throughout the year. This information is used to calculate the longitude and latitude of the bird each day. The catch is that the warblers must be recaptured when they return to the breeding grounds to access the data contained in the geolocator.

The other tracking device is the nanotag. A collection of antennas, known as the Motus network, automatically receives signals from radio-tagged birds. The birds do not have to be physically captured and handled. When this information is taken together, a revealing picture of where and how the Prothonotary Warbler migrates has emerged. What was discovered shows something profoundly important. Most Prothonotary Warblers, about 88 percent, winter in Colombia. This means that most birds converge on their wintering grounds in an area about 20 percent the size of the area used for breeding in North America.

No matter where a Prothonotary Warbler was hatched in North America, most converge on that relatively small

area, unlike many Neotropical migrants. The consequences are that an acre of habitat destruction in Colombia is five times more damaging than an acre lost in North America. With this knowledge, we can concentrate conservation efforts in the areas that will do the most good. (Of course, Colombia is of extreme importance to birds. It has the highest number of bird species in the world at around 1,900.)

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For more than 60 years, the Colombian government was locked in a civil war with a rebel group known as FARC. In 2016, a negotiated end to this tragic conflict earned President Juan Manuel Santos a Nobel Peace Prize. Unfortunately, there was one undesirable side effect. The armed conflict had been keeping out loggers, miners, and farmers who now entered areas that had previously been too dangerous. Now, one of our favorite birds is wintering in an area with Colombia's least remaining forest cover and its second-highest rate of deforestation.

The key to conserving the Prothonotary Warblers will be protecting as much habitat as possible and showing the value of the birds to local economies. Birders who travel to Colombia and other bird hotspots can make real contributions to bird conservation by spending money to bird in these places and giving local communities a reason to want to save their birds. Our current COVID pandemic has put a damper on international ecotourism that we hope will end sooner rather than later.

Well-protected national parks and nature reserves will be vital. Conservation organizations can play a vital role in this. In a development reported previously in *BirdWatching*, American Bird Conservancy, Rainforest Trust, World Land Trust, and Fundación Biodiversa Colombia collaborated to double the size of the El Silencio Nature Reserve. The reserve is in the Magdalena Valley, a recognized Prothonotary Warbler hotspot. Over 98 percent of the lowland rainforest in the Magdalena Valley has been destroyed for cattle ranching, illegal coca production, and illegal logging. Like LeFleur's Bluff State Park, El Silencio is not just about the Prothonotary Warblers. The critically endangered Blue-billed Curassow and brown spider monkey, jaguars, nearly 300 bird species, and much more live there. It's an amazing biodiversity hotspot.

By no means are all the Prothonotary Warbler's conservation problems located in Latin America. Destruction of prime wildlife habitat is always a looming threat in the U.S. as well. We need to look no further than our very own project site, LeFleur's Bluff State Park here in Mississippi. A development has been proposed for over 20 years known as One Lake, previously Two Lakes, on the Pearl River, which borders the park. It involves dredging and widening nearly 10 miles of the river, building a dam to form a 1,900-acre lake, and using the dredged material to build up land for real estate development in the Pearl River floodplain.

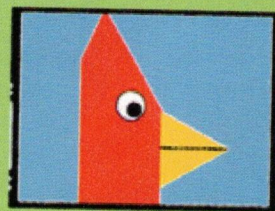
This ecologically destructive project would cause unavoidable damage to park land and the quality habitat that supports thriving bird populations. Some of this quality habitat is 80-year-old bottomland hardwood swamp and sloughs that support Prothonotary Warblers. At the end of the day, One Lake would create new

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a species
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developable waterfront property along with questionable flood-control benefits for the Jackson metropolitan area. A diverse coalition that includes conservation organizations, outdoor businesses, and political leaders has emerged to stop One Lake from moving forward.

The Prothonotary Warbler is a fascinating and charismatic bird that deserves our stewardship. All birders should be bird conservationists. I encourage all birders and birding organizations to choose your own "Prothonotary Warbler" — a species or habitat that you can champion. The Cornell Lab of Ornithology and several conservation and research groups have assessed that nearly 3 billion North American birds have been lost since 1970. The stakes are just too high for every birder to not become engaged on behalf of the birds that we enjoy. 🐦

Charles Pfeifer is a zookeeper and a board member of the Louisiana Wildlife Federation, where he chairs the Avian Conservation Committee. He also serves on the boards of the Orleans and Jackson Audubon Societies and the Orleans Sierra Club. He is the coordinator of Jackson Audubon Society's Prothonotary Warbler Program, its signature conservation project. Pfeifer thanks the program's dedicated team: Reese and Louise Partridge, Wes Shoop, William Mitchell, Douglas Watson, Don Ogden, Clyde Burnett, and Shivam Patel.



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