

Two Rivers

Coalition

Partnering

with

Prothonotary

Warblers



Audubon Society of Kalamazoo Meeting – Spring 2023

Agenda

1. Two Rivers Coalition

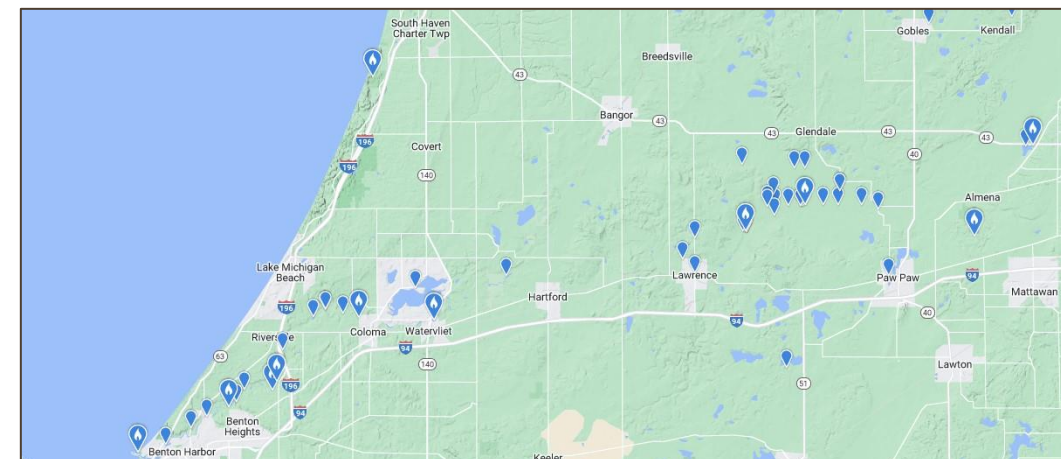
- Who we are, What we do and How we work... by partnering
- Why the Prothonotary Warbler Partnership? **Floodplain Forest**

2. Prothonotary Warbler

- The basics and some studies to better understand these indicator species of healthy floodplain forest.

3. Prothonotary Warbler Partnership

- Paddling Event
- Watershed Abundance- ebird Community Science
- Nest Boxes – NestWatch?



Two Rivers Coalition

Mission:

A citizen based group working to protect the health of the Black River and Paw Paw River Watersheds through *conservation, education, and advocacy.*



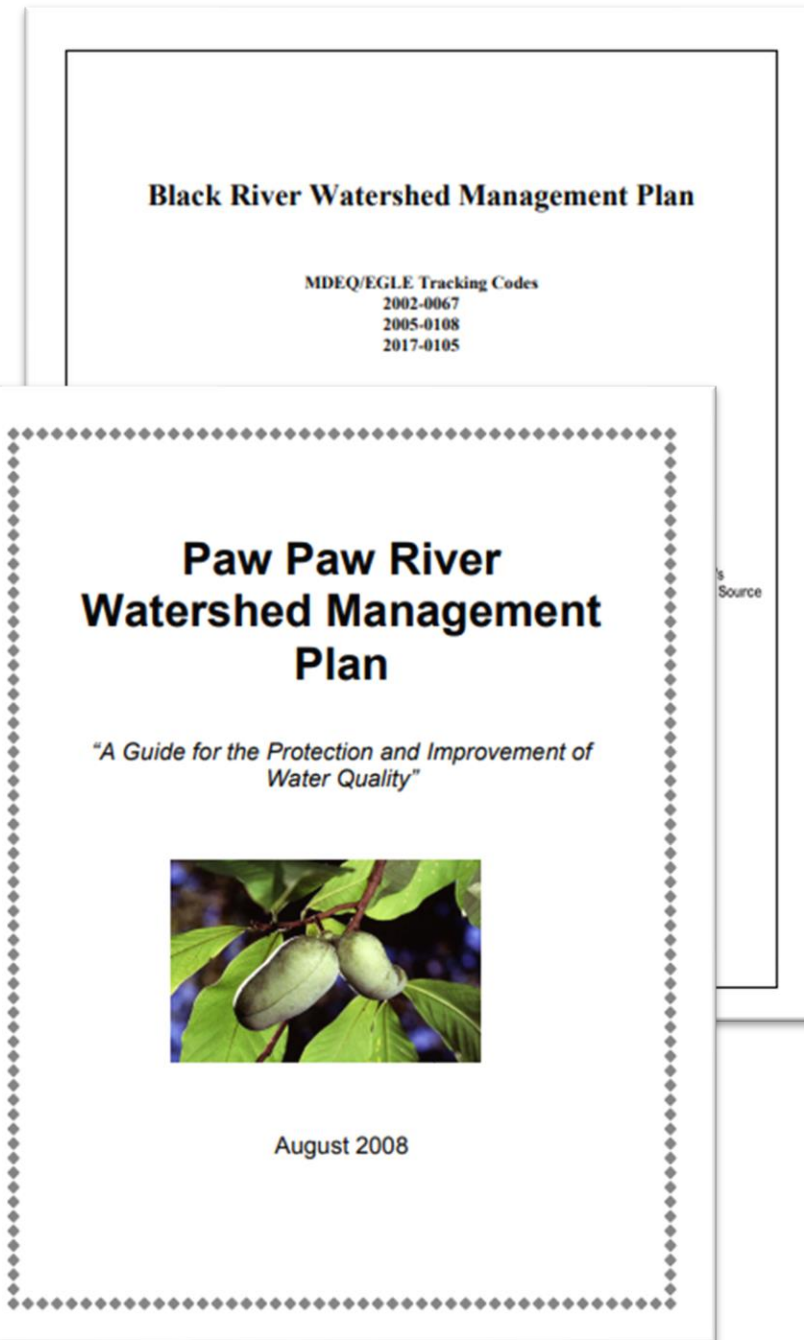
Two Rivers Coalition – Who We Are

Two Rivers Coalition grew out of public forums held in 2008 to gain community input and involvement in the creation of a sustainable watershed organization to carry out implementation of the Black and Paw Paw River Watershed Management Plans.

Two Rivers Coalition, Inc was officially incorporated in the state of Michigan on May 13th 2009.

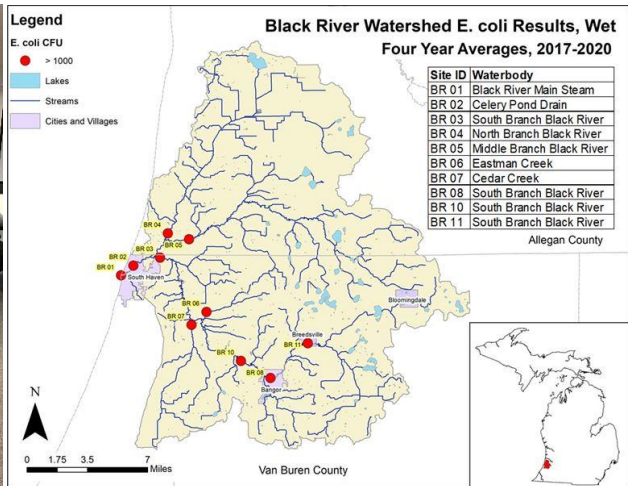
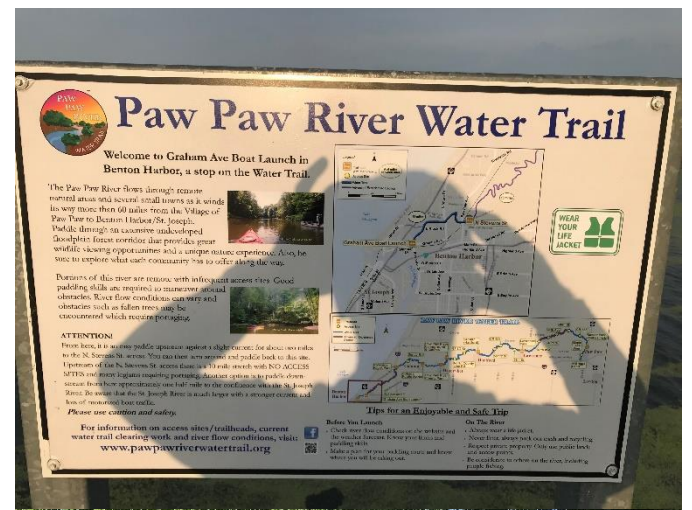
Two Rivers Coalition (TRC) is a 501(c)(3) non-profit organization working to protect and preserve our precious rivers, lakes and the water we drink - keeping the foundation of what makes life great in southwest Michigan for you and your neighbors. TRC is governed by an unpaid board and volunteers dedicated to its mission. All who depend on clean water are invited to join.

More details at tworiverscoalition.org/ and/or on Facebook.



Two Rivers Coalition – What We Do

TRC's volunteers support a variety of activities and projects to help meet our watershed management goals including aquatic macroinvertebrate studies, water quality analysis, host paddling events, support the Paw Paw River Water trail, work to improve water quality through reductions in sediment and nutrients, support invasive species educational events and host educational meetings.



More details at tworiverscoalition.org/ and/or on Facebook.

Two Rivers Coalition – How we work... by partnering

Two Rivers Coalition partners with many groups to meet its goals including the Van Buren Conservation District, Southwest Michigan Land Conservancy, Michigan Nature Association, Pokagon Tribe, Southwest Michigan Planning Commission, BCK CISMA, SWxSW CISMA, MiCORP, Michigan EGLE and DNR, Sarett Nature Center, and now **ASK!**



Southwest Michigan Planning Commission



Pokégnek Bodéwadmik
Pokagon Band of Potawatomi



Michigan Nature Association
People. Land. Legacy.



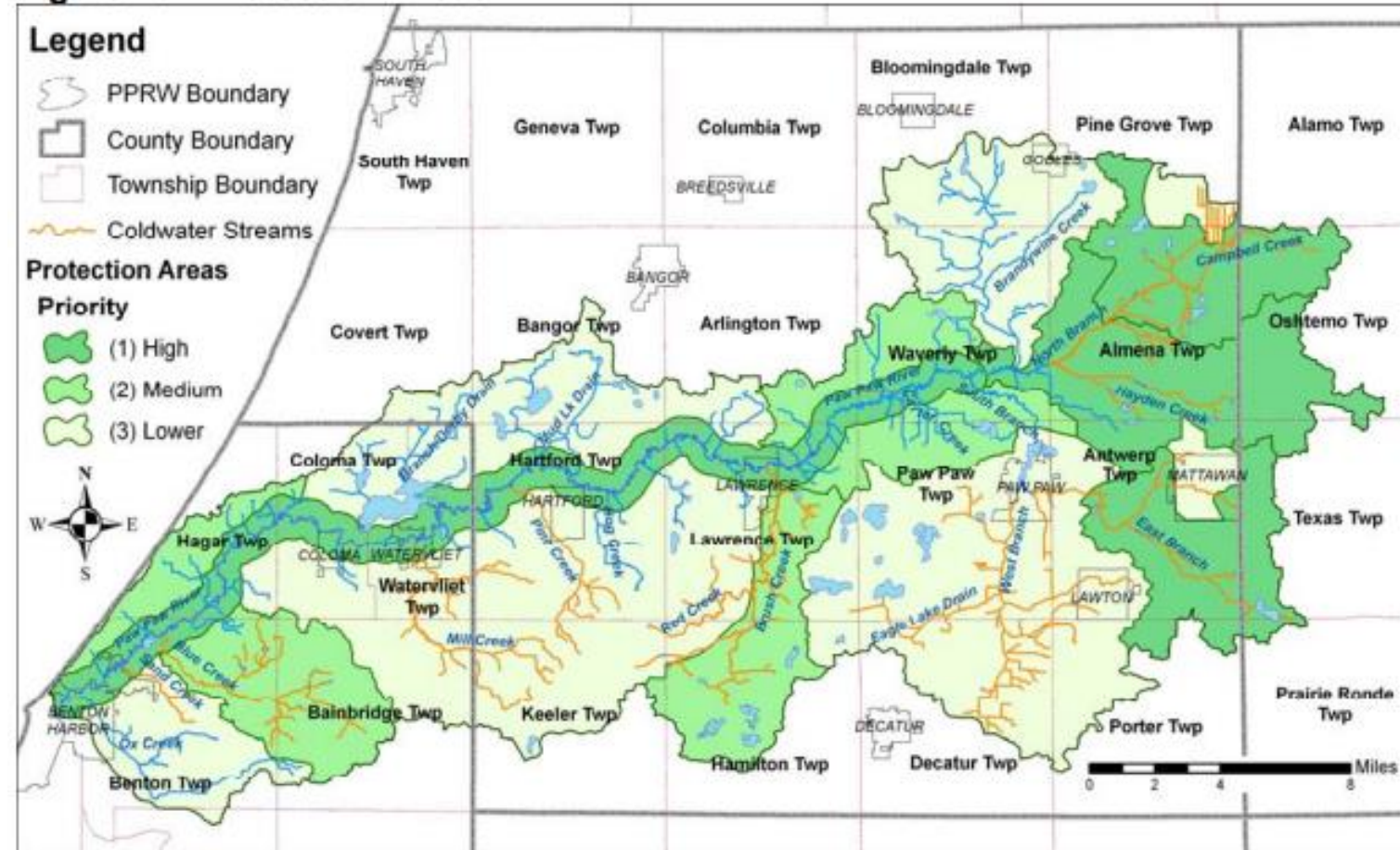
Why the Prothonotary Warbler Partnership? *Floodplain Forest*

The Paw Paw River Watershed Management Plan notes that the “largely intact floodplain forest corridor along the Paw Paw River mainstem from Benton Harbor to the Paw Paw Village is one of the greatest assets of the Paw Paw River Watershed”.

These floodplain forest play a critical role in the overall health of the watershed by providing ecologically valuable habitat for many species as well maintaining water quality, stabilizing flows and reducing flooding.

These floodplain forest are ranked as a high priority for protection from threats such as development, invasive species and other alterations (dredging, filling, pollution, etc.).

Figure 23. Protection Areas



Why the Prothonotary Warbler Partnership?

Floodplain Forest



MICHIGAN STATE UNIVERSITY

Michigan Natural Features Inventory

MSU Extension

Floodplain forest is a bottomland, deciduous or deciduous-conifer forest community occupying low-lying areas adjacent to streams and rivers of third order or greater, and subject to periodic over-the-bank flooding and cycles of erosion and deposition.

Rank - Global / State: G₃ / S₃ Vulnerable



Floodplain forests occur along major rivers throughout the state, but are most extensive in the Lower Peninsula.



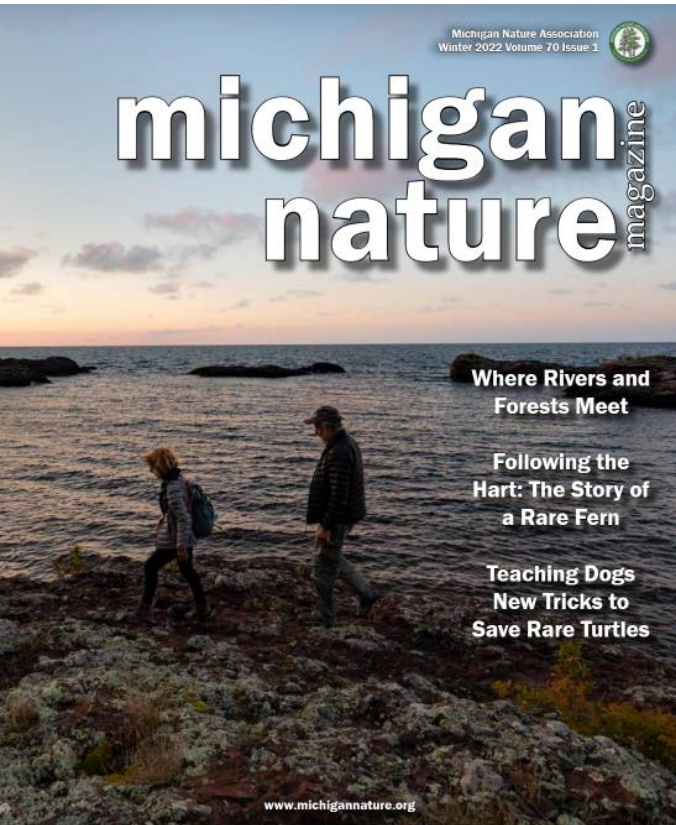
Warbler densities increased or were maintained at high levels in forested wetlands where hydrological processes had been either restored or not degraded. (Hoover, 2009)

Species richness is greatest in the southern Lower Peninsula, where many floodplain species reach the northern extent of their range. That includes the prothonotary warbler.



The interplay of topography and hydrology creates and maintains habitat complexity and promotes high levels of biodiversity. Intact bottomland forest ecosystems are important habitats for many species of bird and are especially valuable because they support a high diversity and density of breeding Neotropical migratory birds. (Hoover, 2009)

Why the Prothonotary Warbler Partnership? *Floodplain Forest*



Where Rivers and Forests Meet

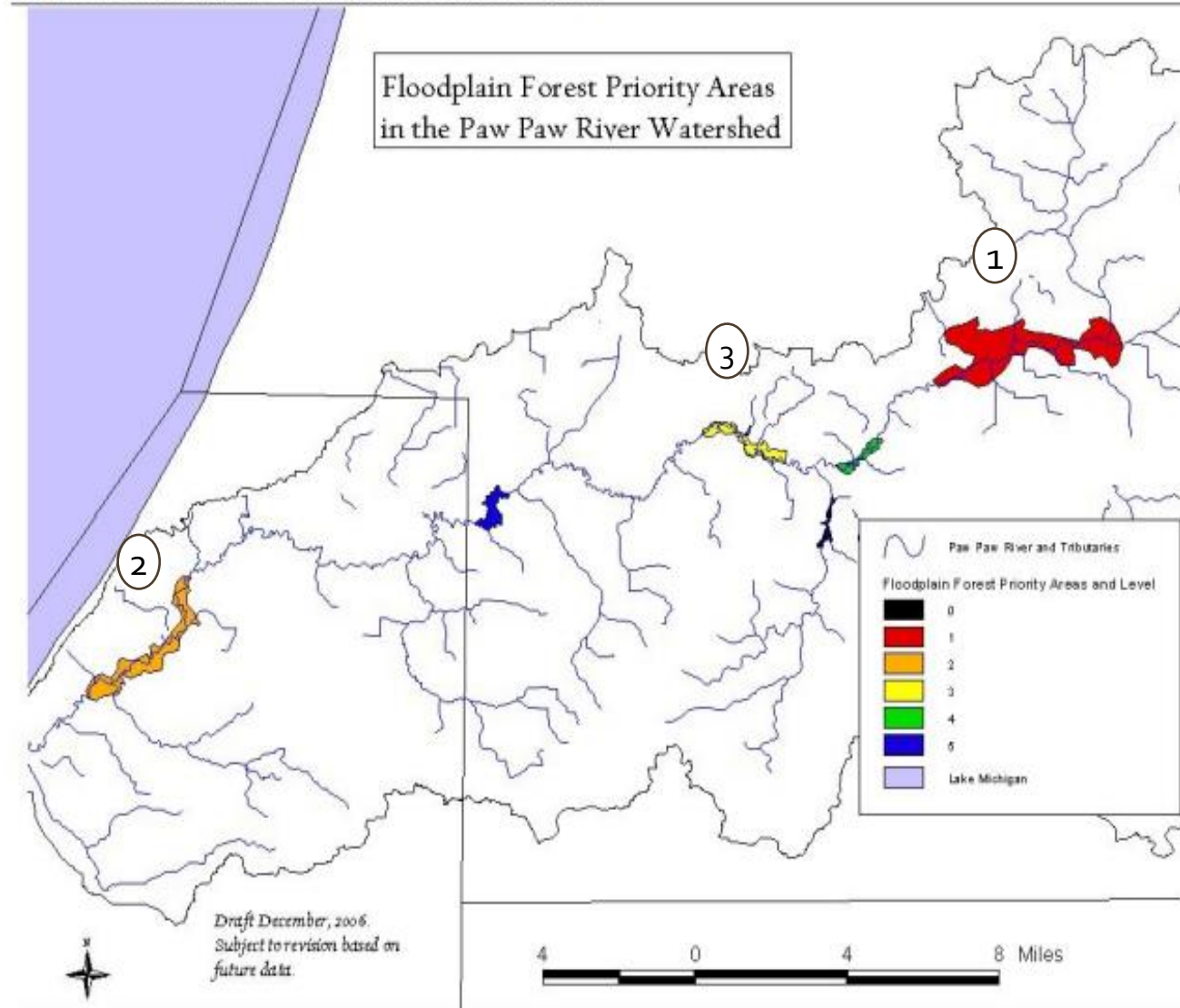
Michigan's floodplain forests are rapidly disappearing. That spells trouble for the rare, threatened, and endangered species that have evolved to exploit the natural rhythms of springtime floods where rivers and forests meet. Climate change is expected to only make matters worse with heavier rains and more extreme flooding events.

Land
+
Water
=
Diversity

A floodplain forest contains a vast array of plant and animal life throughout the seasons.
Photo by Robby Johnston.

Why the Prothonotary Warbler Partnership? *Floodplain Forest*

Map 1. Priority of Floodplain Forest Areas



In 2006, The Nature Conservancy conducted a study to prioritize the floodplain forest areas on the Paw Paw River.

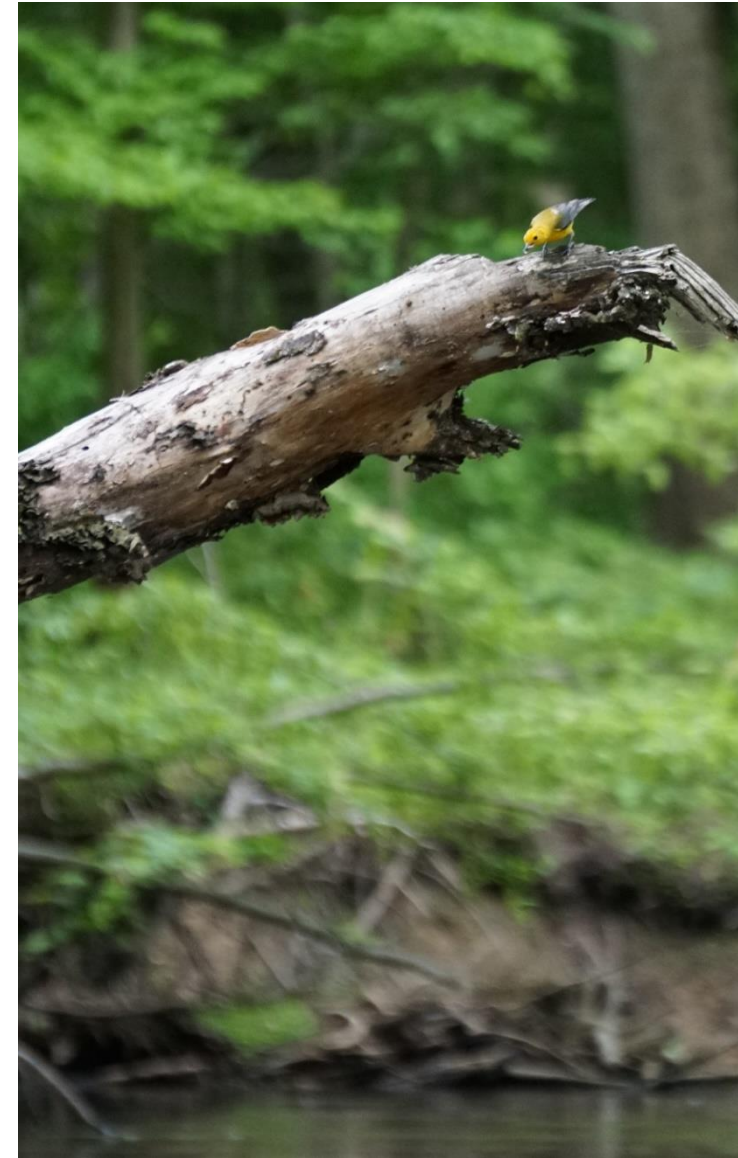
“Floodplain forests were selected as a priority for biodiversity conservation in the Paw Paw Watershed to represent high-quality occurrences of southern floodplain forest.

In addition, floodplain forests along the Paw Paw River are thought to host significant populations of several declining, forest-breeding, migratory songbirds, including the prothonotary warbler, cerulean warbler, and wood thrush.”

Why the Prothonotary Warbler Partnership? *Floodplain Forest*

Jeff Hoover's (2009) studies in Illinois highlighted how the prothonotary warbler is an indicator of hydrological conditions in forested wetlands, of ecosystem integrity, and the success of habitat restoration in bottomland forests. He noted that;

- "Habitat specificity, a tight link to hydrological processes, and the fact that they can be studied in great detail during the breeding season make Prothonotary Warblers well-suited to be an indicator species."
- "Indicator species provide important information on habitat quality and the ecological integrity of ecosystems. Indicator species have been studied to sound the alarm when ecosystems are degraded or threatened, but they also may be used to measure the success of habitat management and conservation activities."



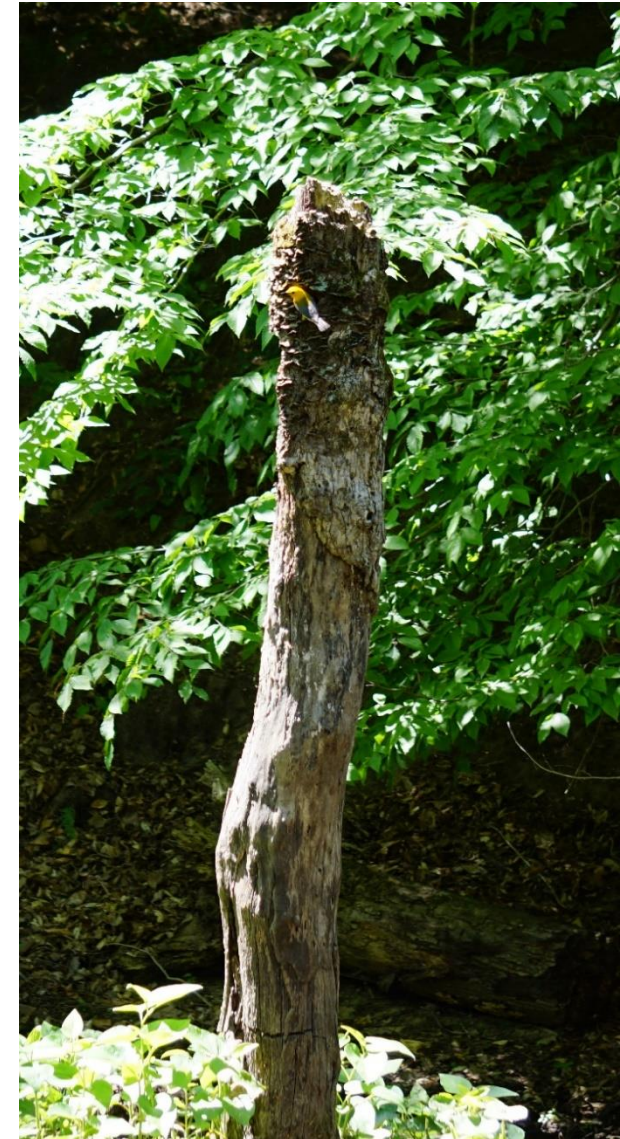
Why the Prothonotary Warbler Partnership?

Floodplain Forest

Cooper and others (2009) reported that, “the nature of the responses shown by prothonotary warblers to anthropogenic and natural perturbations suggests that this species can serve a valuable role as an indicator of floodplain forest ecosystem integrity.

Usually abundant in functioning floodplain forests, this species is less common in floodplain forests that do not flood regularly due to altered hydroperiod.

Prothonotary warblers were largely unaffected by timber harvests designed to mimic natural disturbances, but were influenced by both the presence and timing of flooding, an integral ecological process in these ecosystems, and fragmentation which exposes interior forest birds to brood parasites.”



Why the Prothonotary Warbler Partnership? *Healthy Watersheds*

The EPA defines a healthy watershed as one in which natural landcover supports:

- *dynamic hydrologic and geomorphologic processes within their natural range of variation,*
- *habitat of sufficient size and connectivity to support native aquatic and riparian species,*
- *physical and chemical water quality conditions able to support healthy biological communities.*

Research suggest the prothonotary warbler may be a good indicator of the first and second bullet points.



Prothonotary
Warblers

(*Protonotaria
citrea*)

Golden Swamp
Warbler



Prothonotary Warblers *(Protonotaria citrea)*

Prothonotary warblers have several unique characteristics that help in their identification. They are bright golden yellow on the head, breast, and belly (males more so than females) with an olive green back, gray wings, and white undertail coverts. Males have a darker bill than females. [Prothonotary Warbler - eBird](#)



They are one of only two cavity nesting warblers in North America and the only one in Michigan. In southern Michigan the preferred habitat is bottom land forests with streams from 20-40 m wide bordered by red maple and associated trees.

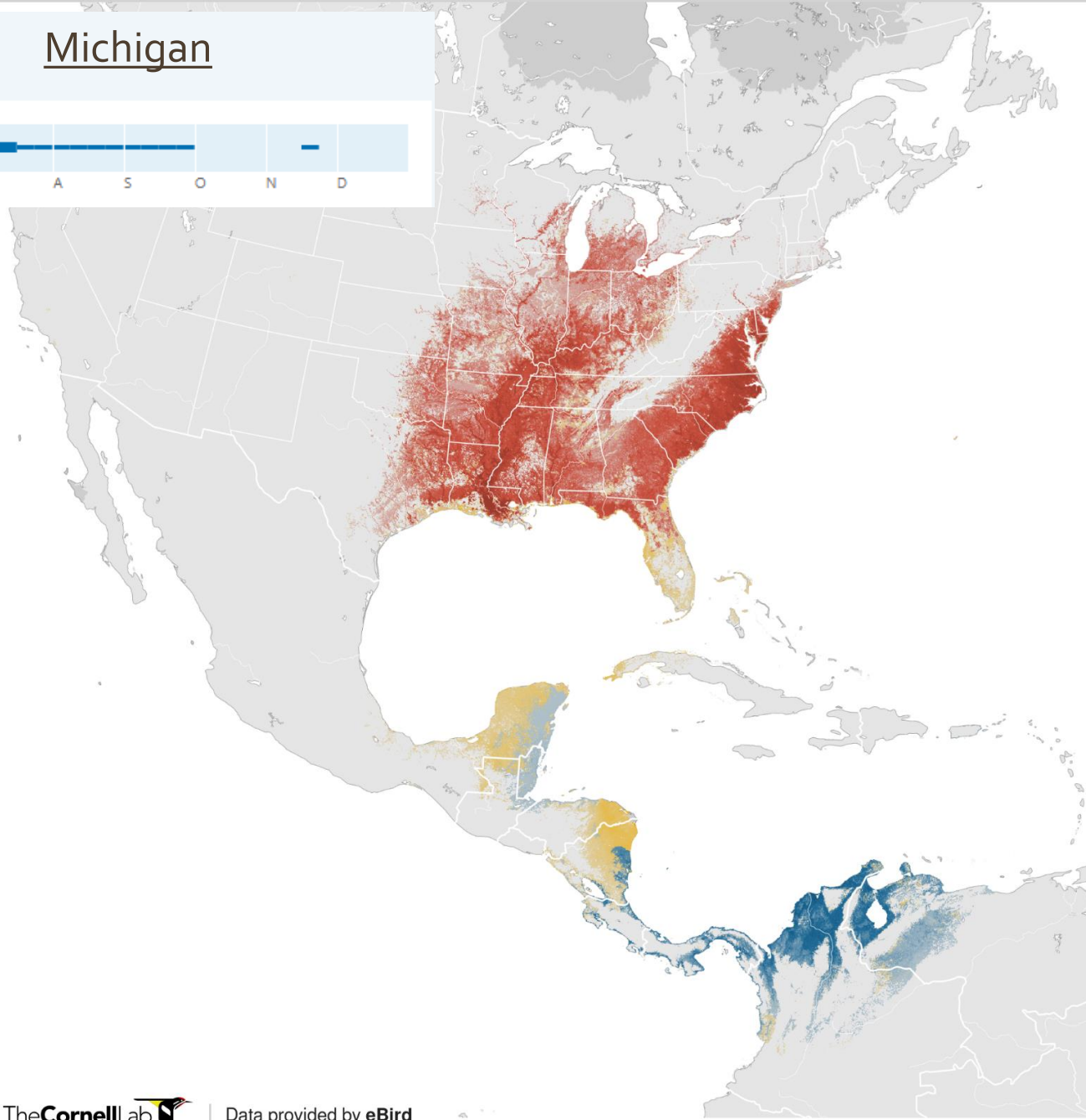
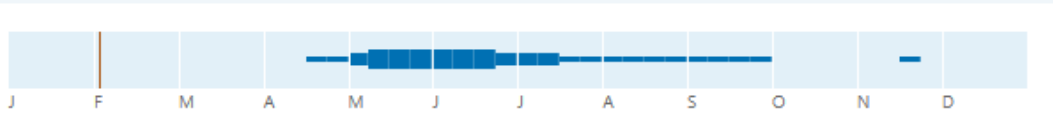
State Status: SC - Special Concern (rare or uncertain; not legally protected), S3 – Vulnerable
Included in the Michigan's Wildlife Action Plan 2015-2025 as a Species of Greatest Conservation Need List.

Nature Serve Conservation Status: Globally Secure (G5)

Long-term Trend: Decline of 30-50%. The latest BBS data for 1996 - 2012 shows an estimated 1.08% annual decline over the entire time period, which translates to a 40% decline (Sauer, et. al. 2014).

Weekly Bar Chart

Michigan



Prothonotary Warbler *Protonotaria citrea*

Abundance

This map depicts the seasonally-averaged estimated relative abundance, defined as the expected count on an eBird Traveling Count starting at the optimal time of day with the optimal search duration and distance that maximizes detection of that species in a region.

RELATIVE ABUNDANCE

Breeding season May 10 - Jul 13

Non-breeding season Oct 26 - Feb 22

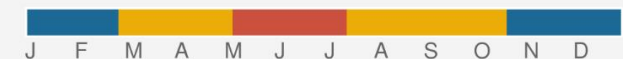
Pre-breeding migratory season Mar 1 - May 3

Post-breeding migratory season Jul 20 - Oct 19

0 0.42 13.87

Note: Seasonal ranges overlap and are stacked in the order above; view full range in season maps.

SEASONS TIMELINE



eBird data from 2014-2018. Estimated for 2018.

Fink, D., T. Auer, A. Johnston, M. Strimas-Mackey, O. Robinson, S. Ligocki, B. Petersen, C. Wood, I. Davies, B. Sullivan, M. Iliff, S. Kelling. 2020. eBird Status and Trends, Data Version: 2018; Released: 2020. Cornell Lab of Ornithology, Ithaca, New York. <https://doi.org/10.2173/ebirdst.2018>

Michigan Natural Features Inventories:

Spring Migration

- 3rd week of April to 1st week of May, males first

Nesting

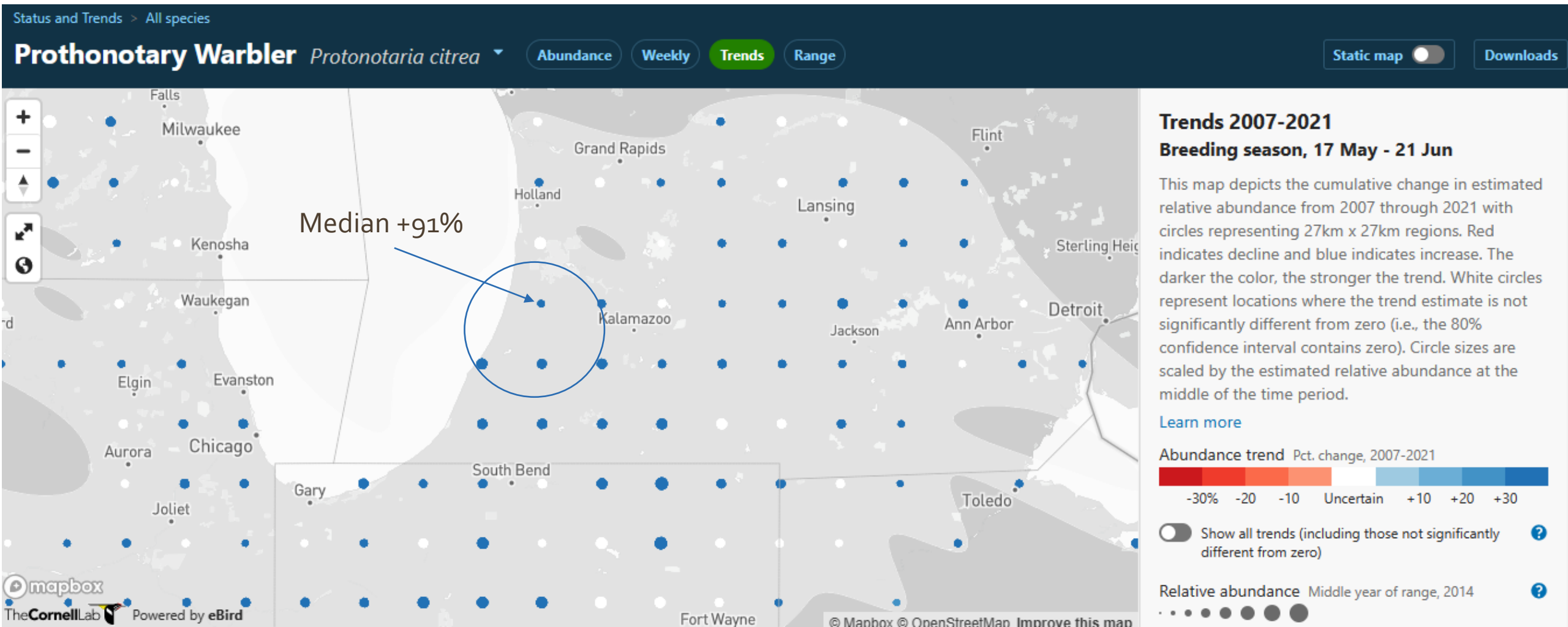
- 1st week of May to 4th week of June

Fall Migration

- 3rd week of August to 4th week of September

Prothonotary Warblers – eBird Population Trend Models

The lower half of Michigan is expected to see an increase in prothonotary warblers based in eBird Population Trend Models.



Prothonotary Warblers - Surveying



While Prothonotary warblers, like most songbirds, sing most actively near sunrise their vibrant coloration and strict requirement for floodplain / swamp forest makes them relatively easy to spot throughout the day while canoeing in habitat.

The song is a series of 5 - 12 up-slurred "sweet" or "tweet" notes.

Michigan Natural Features Inventories

[Prothonotary Warbler Sounds, All About Birds, Cornell Lab of Ornithology](https://www.allaboutbirds.org/prothonotary-warbler-sounds)

Prothonotary Warblers – Some Studies

One of the earliest studies of Prothonotary Warblers was conducted in Southwest Michigan. Lawrence H. Walkinshaw studied Prothonotary Warblers along the Battle Creek River between 1935 and 1945. His report titled "Life History of the Prothonotary Warbler" provides many details of this warbler's life and can be read at:

[LIFE-HISTORY OF THE PROTHONOTARY WARBLER \(unm.edu\)](http://unm.edu)

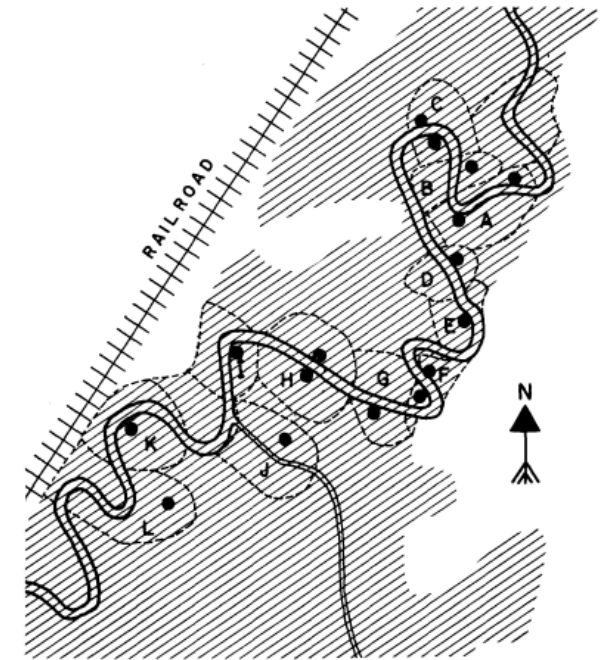
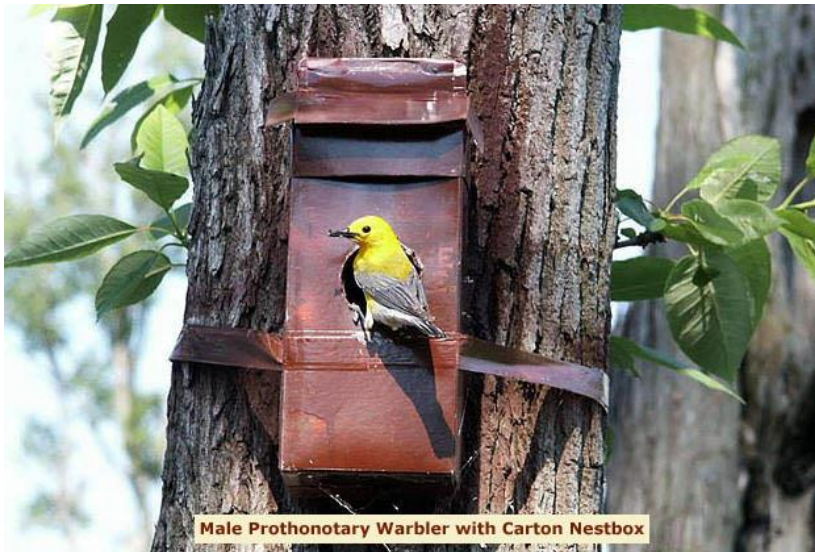


FIG. 2. Nesting territories (enclosed by dotted lines) of the Prothonotary Warbler along the Battle Creek River, Michigan, in 1941. The shaded portion represents bottomland woods; black circles represent nests. Figs. 3-7 reproduce the same area.

Jeffrey P. Hoover has been studying these warblers in Southern Illinois since 1994 using milk cartons as nest boxes. His publication "Prothonotary Warblers as Indicators of Hydrological Conditions in Bottomland Forests" provides a summary of some of his work and details why they are important indicator species of floodplain forest.

Hoover, Jeffrey P. 2009. "Prothonotary Warblers as Indicators of Hydrological Conditions in Bottomland Forests." In Proceedings of the Fourth International Partners in Flight Conference: Tundra to Tropics, edited by Terrell D. Rich, Coro Arizmendi, Dean W. Demarest, and Craig Thompson, 128–137. Partners in Flight.



Male Prothonotary Warbler with Carton Nestbox

Prothonotary Warblers – Some Studies



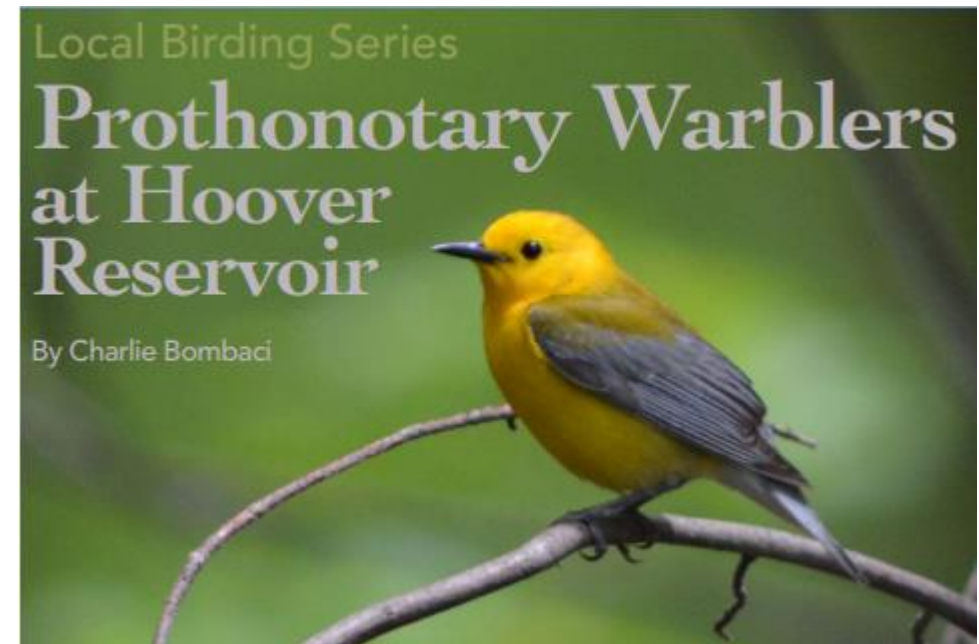
Dan Best took the picture to the left and has studied Prothonotary Warblers along the Cuyahoga River in Northern Ohio using old Metamucil jars as nest boxes. A video (recorded Zoom meeting) created in 2021 explaining much of his work is available on YouTube and is an entertaining and informative watch.

[Going for the Gold Three Decades of Prothonotary Warbler Husbandry by Dan Best and Rachel McKinney - YouTube](#)

A population near Columbus, Ohio has been studied by Dr. Christopher M. Tonra at Ohio State University:

[Christopher M. Tonra | SENR \(osu.edu\)](#).

This population has also been studied by Charlie Bombaci who has monitored those nest boxes for many years. A nice summary of his work can be found at: [Cerulean-Summer-2016.pdf \(ohiobirds.org\)](#)



Prothonotary Warbler Partnership – Nest Boxes

The larger nest box projects in Ohio (mentioned earlier) provide some guidance for such a project and another potential model was recently published by the National Wildlife Federation, “Shelter from the Storm: In South Carolina, conservationists provide much-needed nesting habitat for declining prothonotary warblers”.

The article tells the story of Project Prothonotary being led by the South Carolina Wildlife Federation to help reverse declining populations due to development. Launched in 2019 the project has put up some 500 boxes on federal, state, and private lands statewide. Getting landowners to fall in love with these birds through public education is an important element of the project.



Two Rivers
Coalition's

Prothonotary
Warbler
Partnership



That circled tree/log in the middle of the river was the nesting log from the cover slide.

The nest is about 3ft above the water's surface in this pictures, but I have seen it at least 10ft above the water at times.



This is a picture of the jugged out tree nest from down stream a few weeks after the previous slide. The log broke off at the nest location, so the nest may have been 1 foot off the water surface. The river had risen another 2-3 feet. Note the two new nest boxes in the background. A mini test of box style preference.



Prothonotary Warbler Partnership – Paddling Event

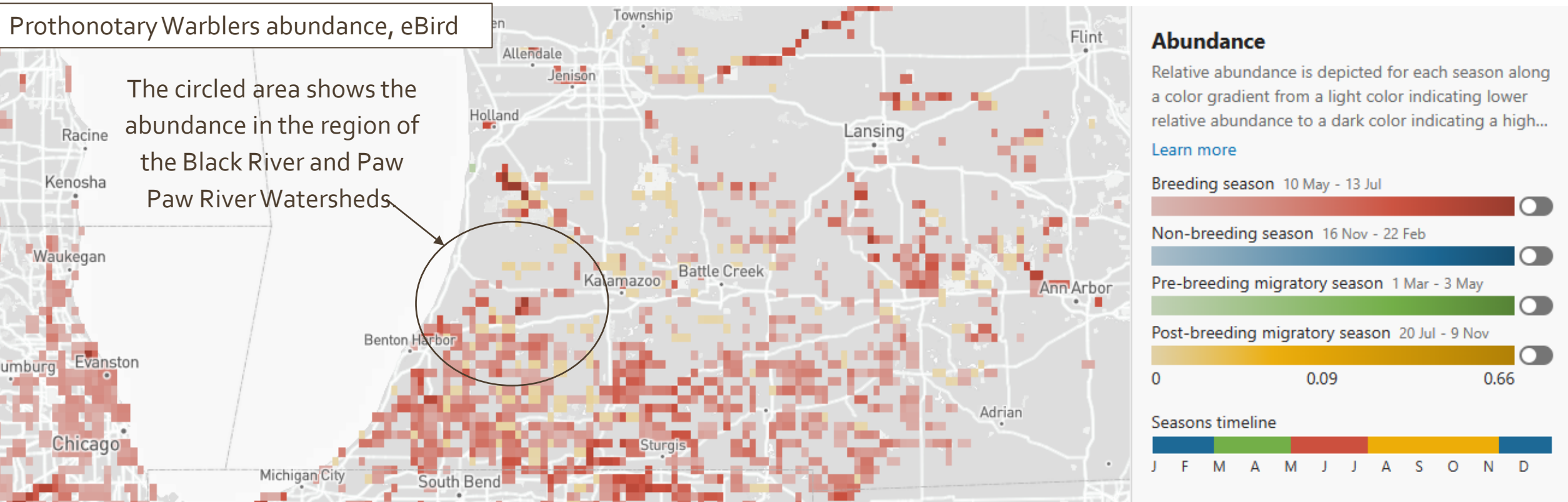
Our partnership with the Prothonotary Warbler began as a paddling event on the Paw Paw River in 2021. TRC has a goal to promote appropriate recreational activities in the watershed, so we host several paddle trips a year to bring people out onto the rivers for some fun and to interact with the public. We thought if we built nest boxes for Prothonotary Warblers, we could introduce paddlers to these emblematic floodplain forest birds and create an educational paddling event along with simply enjoying the waterways.

However, the ability to access these nest boxes depends on water levels and the amount of tree fall in the river. Accessing the nest boxes has been a challenge the last two years. We plan to install a few more nest boxes in an easier section of the river in 2023. We have not succeeded in getting a warbler to nest in the man-made nest boxes yet, but generally have no problem seeing and hearing these warblers while on the water. The paddling event is held during nesting season around the 3rd - 4th week of June.



Prothonotary Warbler Partnership – Watershed Abundance

A goal identified by community stakeholders in the Paw Paw River Watershed (PPRW) Management Plan was to, “Continue and increase monitoring efforts to better understand issues in the PPRW and to create baselines for future reference”. eBird sighting records for Prothonotary Warblers help us meet that goal.



Prothonotary Warbler Partnership – Watershed Abundance

The eBird data can also be beneficial in conservation efforts (stewardship, land acquisition and easements) by land trust as noted by the Land Trust Bird Conservation Initiative.

The prothonotary warbler is listed in Michigan's Wildlife Action Plan (2015-2025) under Species of Greatest Conservation Need.

- Nearly half of land trust put land under easement due to birds in the past 5 years.
- 79% of land trusts agree that they would increase their bird habitat conservation with availability of volunteers to inventory of monitor birds.



Land Trust Bird Conservation Initiative



Birdwatchers = Citizen Science = Benefits for Land Trusts

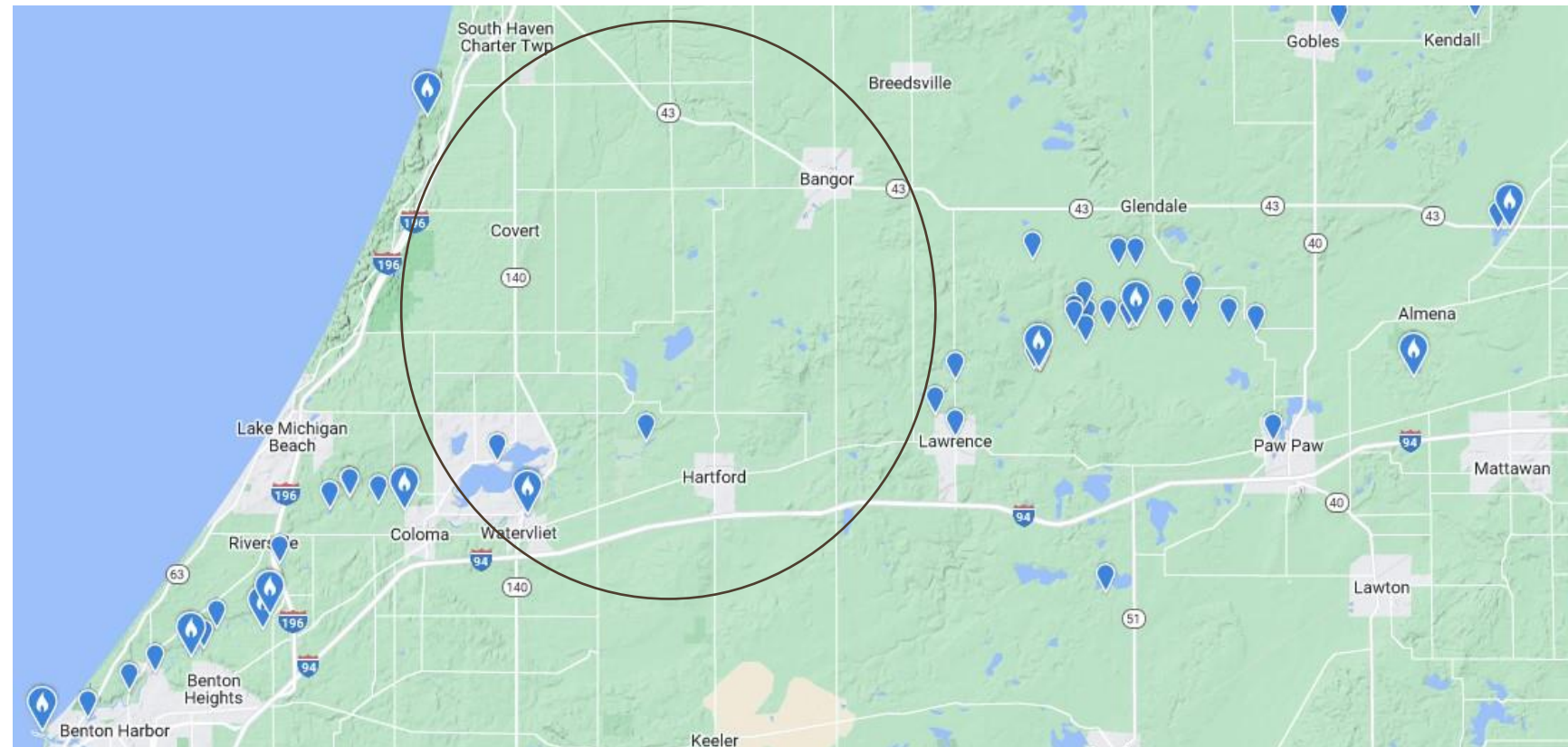
- Selection of land for protection
- Data for grant proposals
- Justification of easements
- Repository for inventory and monitoring efforts
- Connection to citizen scientists → volunteers → supporters → donors?

Prothonotary Warbler Partnership – Watershed Abundance

This map is another view of the data set from eBird and shows a zoomed in look of the watersheds individual sight recordings for the Prothonotary Warbler. The circled area shows where we lack Prothonotary Warblers and/or sight recordings.

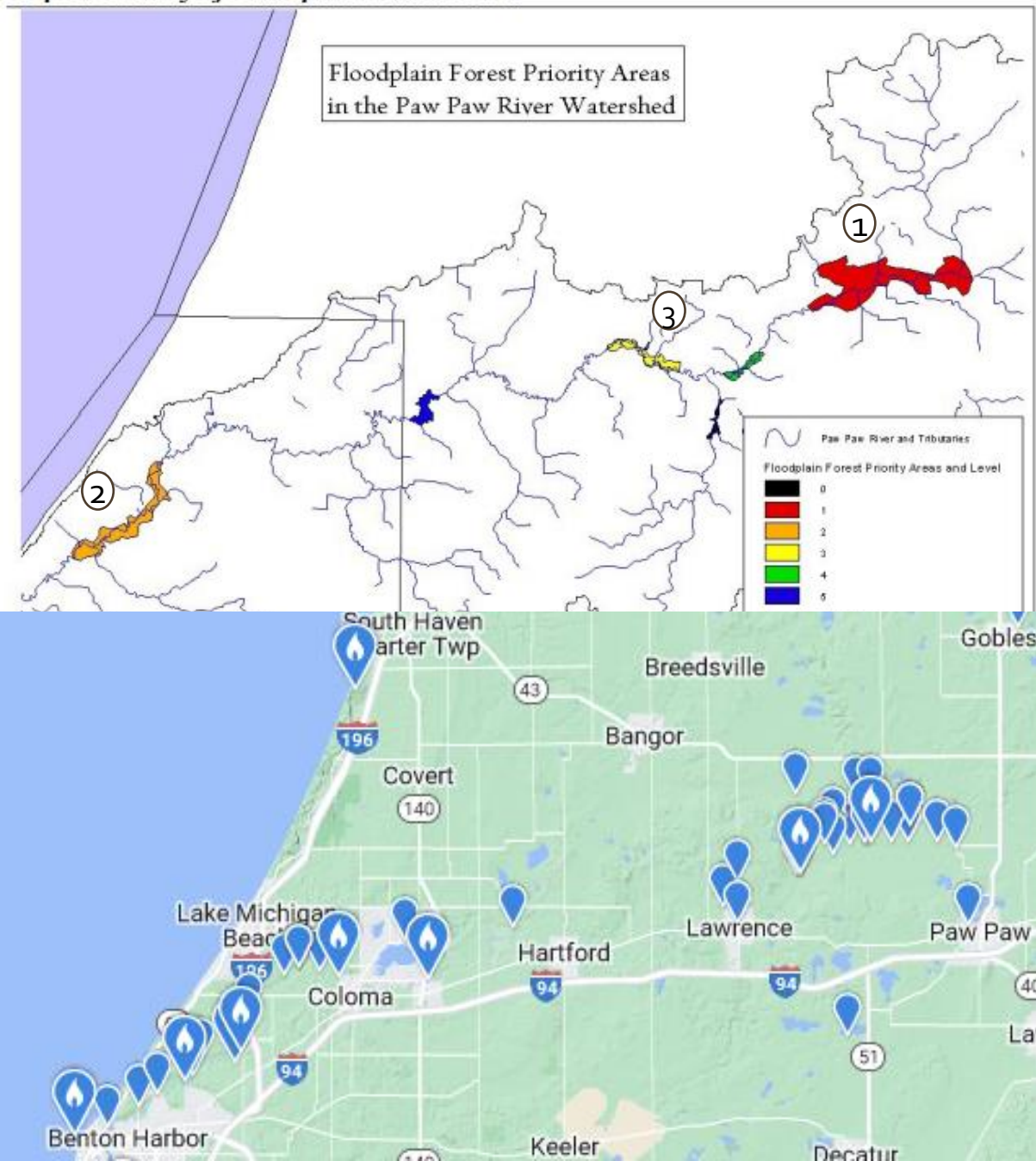
By participating in this community science program (eBird) and surveying the circled area during the breeding season, we can help answer the question:

Does the circled area lack Prothonotary Warblers or is it empty due to no one surveying that area for Prothonotary Warblers?



If you find no prothonotary warblers send TRC an email noting that at healthywatersheds@tworiverscoalition.org.

Map 1. Priority of Floodplain Forest Areas



Floodplain Forest Prioritized Areas and eBird Watershed Abundance

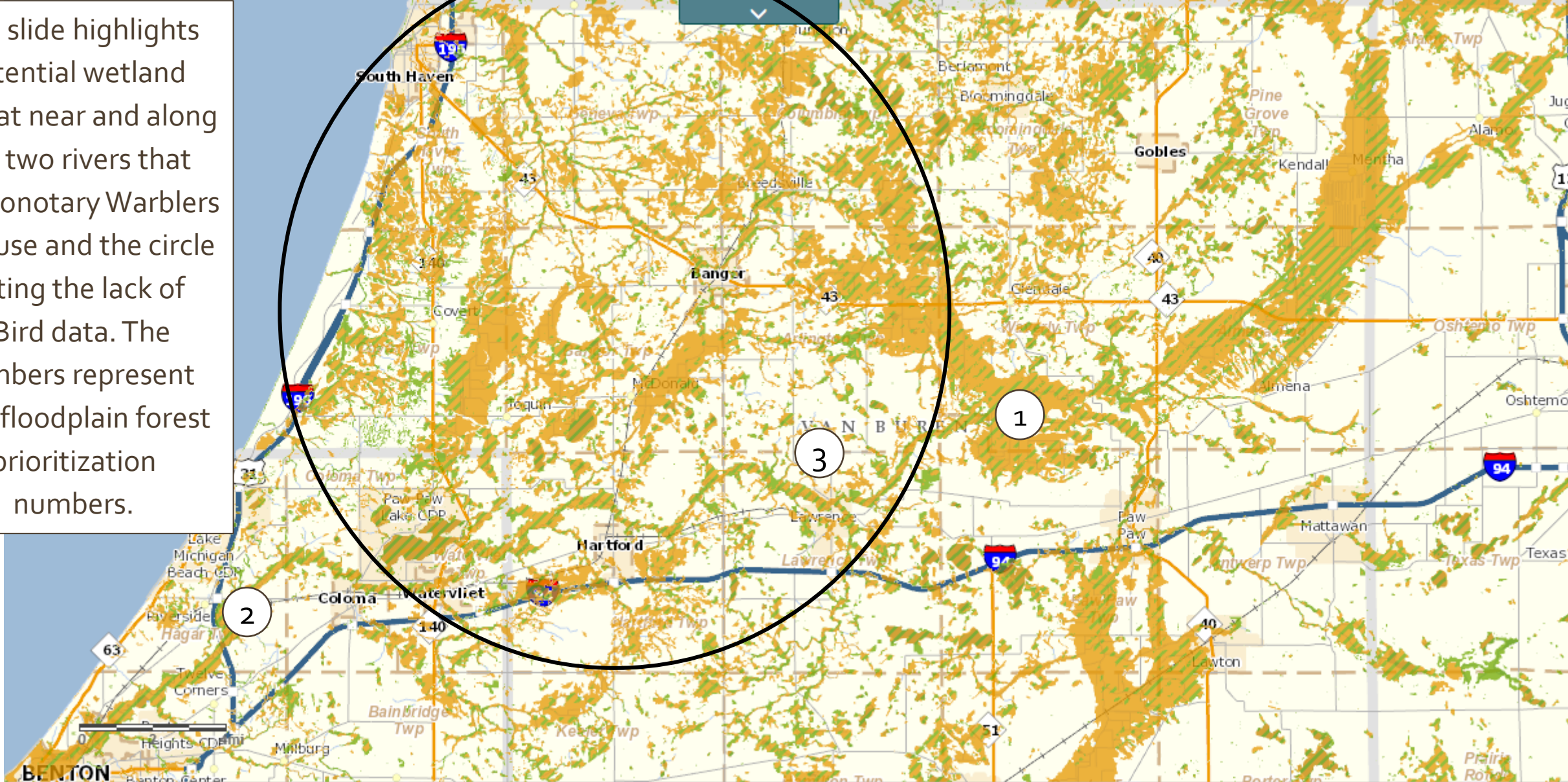
When The Nature Conservancy's 2006 floodplain forest prioritization map for the Paw Paw River is compared to recent eBird sighting data, it shows a pretty good match of up between prioritized areas and abundance sighting data.

The top 3 prioritized areas were noted in that study for having prothonotary warblers in 2006, but they also noted that the bird population data was limited and unequal between sites.

By surveying the bridges, parks and rivers in the watersheds, we can help fill in some holes in the data set and get a better picture of the presence of the prothonotary warbler in the watersheds.

Prothonotary Warbler Partnership – Watershed 2023 Review

This slide highlights potential wetland habitat near and along the two rivers that Prothonotary Warblers may use and the circle noting the lack of eBird data. The numbers represent TNC floodplain forest prioritization numbers.



Prothonotary Warbler Partnership – Nest Boxes

A longer term project may be to help riparian landowners along the rivers to obtain / build Prothonotary Warbler nest boxes for their properties.

Ideally, these nest boxes would be monitored as part of the community science program NestWatch. This would provide additional community science data to be publicly available and allow us to better understand the distribution of this indicator species of our floodplain forest.

The challenge is that Prothonotary Warblers prefer to nest over standing water which makes installing, monitoring and maintenance of these nest boxes a challenge. Also problematic is that TRC has yet to have a successful nesting in our man-made boxes. There is still much to learn and develop here.



Prothonotary Warbler Partnership - Take Home Message

Partnering with Prothonotary Warblers will help TRC meet its mission of *conservation, education* and *advocacy* of the Black River and Paw Paw River Watersheds while helping this state species of special concern and the ecologically vulnerable floodplain forest it and many other species calls home.

Join with us in exploring this partnership and preserving the Black and Paw Paw River Watersheds by entering your prothonotary warbler sightings in eBird and adding to this community science effort.



Additional Resources and References

- Columbus Audubon: [The 2009 Quest for Nesting Prothonotary Warblers – Columbus Audubon](#)
- Cooper, R.J., Wood, L.A., Gannon, J.J. et al. Effects of timber harvest and other factors on a floodplain forest indicator species, the prothonotary warbler. *Wetlands* 29, 574–585 (2009). <https://doi.org/10.1672/08-139.1>
- The Cerulean, Summer 2016: [Cerulean-Summer-2016.pdf \(ohiobirds.org\)](#)
- eBird: [Prothonotary Warbler – eBird](#)
- EPA Healthy Watersheds: [Healthy Watersheds Protection | US EPA](#)
- Going for the Gold Presentation: [Going for the Gold Three Decades of Prothonotary Warbler Husbandry by Dan Best and Rachel McKinney – YouTube](#)
- Hoover, Jeffrey P. 2009. “Prothonotary Warblers as Indicators of Hydrological Conditions in Bottomland Forests.” In *Proceedings of the Fourth International Partners in Flight Conference: Tundra to Tropics*, edited by Terrell D. Rich, Coro Arizmendi, Dean W. Demarest, and Craig Thompson, 128–137. Partners in Flight.
- Michigan Nature Association: [Michigan Nature Magazine Winter 2022 by Michigan Nature Association - Issuu](#)
- Michigan Natural Features Inventory (MNFI): [Protonotaria citrea \(Prothonotary warbler\) - Michigan Natural Features Inventory \(msu.edu\)](#)
- NestWatch: [NestWatch | Prothonotary Warbler – NestWatch](#)
- Nature Serve: [Protonotaria citrea | NatureServe Explorer](#)
- Peoria Audubon, Dr. Jeff Hoover: [Peoria Audubon Society - Jeff Hoover: Warbler Research](#)
- Sialis: [All About Prothonotary Warblers - species bio \(sialis.org\)](#)
- Dr Christopher Tonra: [The Tonra Lab of Avian Ecology - Home \(christophertonra.com\)](#)
- Two Rivers Coalition: [Two Rivers Coalition: An Alliance of the Black River and Paw Paw River Watersheds](#)
- Lawrence Walkinshaw, Nesting Studies of the Prothonotary Warbler: [Nesting Studies of the Prothonotary Warbler on JSTOR](#)
- National Wildlife Federation, Spring 2023: [Shelter from the Storm \(nwf.org\)](#)
- South Carolina Wildlife Federation: [Project Prothonotary: Restoring Bird Nesting Habitat in the Catawba-Wateree Watershed — South Carolina Wildlife Federation \(scwf.org\)](#)

Thank You
for
Attending!

Questions?



Additional questions or feedback can be sent to healthywatersheds@tworiverscoalition.org