

TOLEDO ZOO  
CONSERVATION

# 2021-2022 ANNUAL REPORT



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## PACIFIC BIRDS

The Toledo Zoo's Pacific Bird conservation program has grown in leaps and bounds over the last couple of years. We continue our work in the Solomon Islands where we support the Santa Cruz Ground Dove Species Recovery Center, located on a sustainable Palm Oil facility. This is the first purpose-built captive breeding program in this area.

### SOLOMAN ISLANDS

With the reopening of the international border, we have resumed work on the Santa Cruz Ground Dove Species Recovery Center (a collaboration between Toledo Zoo, New Britain Palm Oil and the Solomon Islands Government). The first phase of work on this is now complete. The birds have settled in well, and breeding has increased exponentially. Our agent in the area believes this is the first purpose-built conservation breeding facility in the history of the Solomon Islands. The doves have responded well to the facility and are actively nesting.



### PHILIPPINES

A reintroduction project for Negros Bleeding-Heart Doves is underway, which aims to establish a new population in the Bayawan Nature Reserve. The project is being implemented by the Talarak Foundation, with funding provided by the Toledo Zoo. We have played an active role in formulating a release protocol, along with the conservation team from Bristol Zoological Society, who have also been included as partners in the project. Initial results are extremely encouraging, with some individuals still being tracked with radio telemetry several months after being released. A large amount of data has been collected, which has added to our knowledge of these secretive birds and is relevant to future reintroduction attempts involving other species.



## NEPAL

Toledo Zoo funded a survey of pheasant species in the Dhopratan Valley, undertaken by Nepalese Ornithological Union. A particular focus was the threatened Cheer Pheasant, with results suggesting a marked decline in this population. We will be expanding our partnership with NOU in 2023, and have agreed to work with them in implementing a more thorough survey and an ambitious program of conservation actions.

## IUCN SSC PIGEON & DOVE SPECIALIST GROUP (PDSG)

The Toledo Zoo acts as the institutional host for the PDSG and provides operational funds to co-chair and manage the group. This group coordinates many of the dove conservation and recovery programs, including surveys and a captive breeding study for Manumea (Toothed-Billed Dove).



## WILD TOLEDO PRAIRIE INITIATIVE

### **Increasing urban biodiversity**

Pollinator decline is a global phenomenon driven primarily by loss of habitat and use of pesticides. Pollinators play a crucial role in food production as well as provide reproductive assistance to most flowering plants. Pollination services are estimated to be worth \$217 Billion globally. The prairie initiative seeks to increase pollinator habitat by utilizing abandoned and otherwise under-utilized properties for prairie plantings.

### **2013–present**

The Toledo Zoo started planting prairies on-grounds and on the Anthony Wayne Trail median in 2013 and has expanded the program to include 89 prairie plantings as of 2022. 13 prairies were installed in 2021 at a variety of private and public locations. An Owens Corning grant in 2022 funded 11 Project PRAIRIE installations, in addition to 12 independently purchased installations at schools, businesses, and private residences.





## NATIVE PLANT SALES

Wild Toledo began selling native plants, produced from seed at the Toledo Zoo, to employees and the general public in 2017. The addition of the heated greenhouse in 2019 allowed Wild Toledo to head-start plants and have full grown plants available for the Mother's Day weekend. Plant Sales in 2021 and 2022 were run primarily through the wildtoledo.org website, with pickup at the Wild Toledo nursery. The nursery experienced an increase in in-person browsing and on site purchase compared to previous years. Vending the Toledo and Ann Arbor flower day sales resulted in additional outreach opportunities.

Nursery sales grew by 18% in 2021 with \$42,000 in plant sales through the website and in-person shopping. Sales remained steady in

2022 at \$41,000, but growth plateaued due to limited nursery space. A secondary retail location for native nursery stock was set up at the North Star gift shop in late 2022. Sales were limited given that peak planting season had passed, but this secondary outlet stands as a promising source of additional sales in 2023.

In 2019, Wild Toledo began offering a native landscape service that designs, installs, and maintains formal native landscapes. Landscape revenue increased by 31% in 2021, resulting in \$15,500 in revenue. In 2022, Wild Toledo hired a full-time native landscape designer and began offering CAD renderings of landscape designs. 2022 brought in a record landscape revenue of \$41,000, a 163% increase from the previous year.

## EFFICACY OF URBAN PRAIRIES ON BIOLOGICAL DIVERSITY

Insect and small mammal diversity in the on-grounds installations have been measured since 2014, allowing us to understand the efficacy of the urban plantings. In general, urban prairie plantings result in a 20-26x increase in butterfly species abundance, ~40x increase in invertebrate species abundance and the appearance of local mammal species not often seen in the area.

In 2019 the Toledo Zoo started a new research program in collaboration with the Toledo Area Sanitary District to look at the effect of mosquito control measures on local pollinator diversity, as well as to substantially increase our biodiversity assessments in urban prairies throughout the community. Data collection paused in 2021 and 2022 due to staffing restrictions, but the collaboration is ongoing and data continues to be analyzed.

## PROGRAM SUSTAINABILITY

The Toledo Zoo began charging for prairie installations in 2019 with resounding success. Wild Toledo currently charges for all services including prairie installations, plant sales, and native landscape installations. Customers can opt to sign on for paid continued management of native plantings as well. Rates are highly competitive in comparison with other local landscapers. No decline in demand has been observed for Wild Toledo's services since charging, and this added revenue allows for the program to continue expanding in a sustainable manor.





**WILD TOLEDO**  
wildtoledo.org

NATIVE PRAIRIE HABITAT

**SAVING**  
LAKE ERIE



GLASSBORO AQUARIUM

# NATIVE BUTTERFLY CONSERVATION

## Research and captive rearing of imperiled butterflies in the region

Lepidopteran species function as ecological indicator species. The relative health of the local environment is reflective on the presence and persistence of many sensitive lepidopteran species. Environmental damage and loss of habitat has led to a global reduction in Lepidopteran abundance by more than 20% with some species such as monarchs declining upwards of 94%.

### 1997–present

Toledo Zoo conservation staff have been working with local and Federal stake-holders to help conserve butterflies since 1997. In 2018, the butterfly program was awarded a two-year, \$50,000 grant from USFWS for the purchase of a low-temperature growth chamber to be used to overwinter larvae and eggs as well as outfit the new butterfly conservation lab in the ProMedica Museum of Natural History. The new lab opened in May of 2019 as a state-of-the art lepidopteran conservation facility. The first butterflies were brought into the lab in June 2019. Since opening, the number of fatalities due to predators found in the greenhouse has significantly declined.



## MONARCH

### *Danaus plexippus plexippus*

The overwintering monarch population in Mexico has seen a 90-95% reduction of its highest population numbers. As with most pollinators, the plight of the monarch is closely tied to loss of suitable breeding habitat and an increased use of pesticides across their home range. The Toledo Zoo released 1,056 tagged, migratory monarchs during the 2021 season. In 2022, the Toledo Zoo released 2,087 migratory monarchs. With Covid restrictions lessening, more opportunities for the public were available. Private releases for Monarch tag donors were done in both 2021 and 2022.

With an entire greenhouse now devoted to butterfly conservation, the Toledo Zoo began working with the Zebra Swallowtail (*Eurytides marcellus*). Eleven adults were collected; captive breeding and egg laying was successful and 44 pupae were placed into the low-temperature growth chamber for diapause.

## MITCHELL'S SATYR

### *Neonympha mitchellii mitchellii*

The 2021 season was again marked by declines across the remaining populations of satyrs. A total of 67 satyrs were successfully brought out of diapause with 44 of those adults being released back in to the wild. Twenty-three adults were held back as rearing stock. An additional 20 adults were collected to supplement the captive population. Captive breeding and egg laying was successful and over 100 larvae were reared during the season. All larvae were cooled in the fall of 2021 and placed into the low-temperature growth chamber. This overwintering method was proven most successful in the experiment run last season.



Many challenges arose during the 2022 season. Significant declines were seen in the remaining populations causing other institutions to not collect for captive rearing. The Toledo Zoo was able to collect 20 adults for captive rearing. Captive breeding and egg laying was again successful; however, only 27 reached diapause. At that time, the U. S. Fish and Wildlife Service determined it would be better for an institution closer to the wild populations to captively rear satyrs.

## KARNER BLUE BUTTERFLY

### *Lycaiedes melissa samuelis*

Karner collection and rearing was halted during the 2021 and 2022 seasons after wild populations used for collection were deemed unsafe to collect. Furthermore, with no adults recorded at the Ohio site the year after captive-reared adults were released, it was determined that the Ohio site might no longer be suitable for Karners.



In 2021, the location of the last known Ohio population of Karners was surveyed for population size in both first and second flights. Surveys were performed using DISTANCE survey techniques using a Trimble Data Logger equipped with a laser range finder. No Karners were recorded during the 22 surveys completed in 2021. In 2022, surveying continued. Wild Lupine (*Lupinus perennis*) at the location was thriving, however, after 22 surveys, no Karners were recorded.

## NATIVE TURTLE CONSERVATION



### **Monitoring local turtle populations**

#### **2005–present**

Turtles are globally on the decline, and are generally considered the most threatened of the major vertebrate groups. Turtles face many familiar threats including habitat destruction, exploitation, pollution, climate change, and disease. As populations decline there has been an increase in conservation efforts targeting turtles. Long-term studies are rare as these efforts typically require a considerable amount of resources to provide meaningful data.

The Toledo Zoo has been monitoring local turtles since 2005 in an effort to determine population sizes and conduct long-term monitoring to document potential changes. These efforts have included trapping surveys, tracking movements and habitat use with radio-telemetry and GPS loggers, and, more recently, using turtle-sniffing Spaniels to help locate box turtles.

# BLANDING'S TURTLE SURVEYS

## *Emydoidea blandingii*

In 2022, we wrapped up the surveys from our 2-year project looking at the distribution and abundance of Blanding's Turtles in Ohio. The Toledo Zoo and its partners were responsible for >26,000 trap nights, at 47 sites in Ohio, which resulted in the capture of 600 Blanding's Turtles. Population estimates varied greatly, depending on site, but highlighted areas that are doing well, and those that could benefit from conservation actions. Genetic analyses suggest there are 3-4 main Blanding's Turtle population groups in Ohio, and supplementing or translocating animals between populations may be beneficial.

In November, we hosted a small meeting for land managers and partners so we could disseminate our results, bring in other researchers, and get feedback for our proposed conservation plan. Our team is currently incorporating the discussions from this meeting into a Blanding's Turtle Conservation Plan for Michigan and Ohio.

We received a follow-up Competitive State Wildlife Grant to focus on Blanding's Turtle nesting ecology. Funds from this project allowed us to purchase a portable radiograph machine, which will tell us important information about clutch sizes. Our conservation team will also be protecting nests to determine clutch success and collect hatchling data.

### **Community Science**

Our work with community scientist, Terry Breymaier, continues and is complimented by our long-term survey efforts at the site near his house. We used six years of Blanding's Turtle plastron photos and pattern-recognition software to identify individual turtles and used those data to estimate the population size. Our photographic mark-recapture suggests the wetland has a population of 87 – 113 adult female turtles, and likely twice that number including males and juveniles. This site remains a hotspot for turtles in Ohio and we will continue to study the population.

### **Head-starting**

We are continuing our Blanding's Turtle head-starting project, with the goal to augment or establish self-sustaining populations. In 2021 and 2022, we released 55 and 75 turtles into wetlands in Ohio and Pennsylvania and monitored their movements with radio-transmitters. We are currently rearing 89 in our conservation labs for release next year.

### *What can you do?*

So much of our turtle conservation relies on partnerships and the public reporting their sightings. If you see a reptile or amphibian, please report to: [turtles@toledozoo.org](mailto:turtles@toledozoo.org)



## SPOTTED TURTLES

### *Clemmys guttata*

In 2021, we received a grant to expand our Spotted Turtle project with partners from the Ohio State University's Ohio Biodiversity Conservation Partnership, Wittenberg University, Michigan Natural Features Inventory, and Purdue University. This grant will fund Spotted Turtle surveys throughout the state with the goal of determining population statuses. Locally, we surveyed six sites and caught 73 Spotted Turtles, including some at historic locations that had not been surveyed in ~10 years.



## WOODLAND BOX TURTLE



### *Terrapene carolina*

We continued tracking box turtles in the Oak Openings Preserve and Wildwood Preserve. About half of the box turtles are outfitted with GPS loggers that will provide much more detailed information on habitat use and movements. These turtles continue to provide useful information to managers, particularly in regards to prescribed fire, and serve as ambassadors for our turtle programs.

# COPPERBELLY WATERSNAKE RESEARCH



*Copperbelly Watersnake*  
Photo courtesy of Ryan Wagner

## **2022–present**

The Toledo Zoo partnered with the U.S. Fish and Wildlife Service to aid in recovery of the Federally Threatened Copperbelly Watersnake. This species is currently found in only a few sites in Ohio and researchers have documented severe population declines over the last decade. The Service purchased a modular facility to be used for breeding and captive-rearing that will be housed at the Toledo Zoo. During spring surveys in 2022, the Service and its volunteers captured six adult Copperbelly

Watersnakes, the first time they had been seen at this particular site in three years. One of the adults was gravid and she gave birth to 18 neonates, which are currently growing in the rearing facility.

## **Report Reptile and Amphibian Sightings**

An important part of conserving our local reptiles and amphibians is simply knowing where they occur. Excellent examples of this come from our Kirtland's Snake and Blanding's Turtle projects where reported sightings led us to new sites within the state and even a new county record! The Toledo Zoo has partnered with HerpMapper to gather reptile and amphibian sightings from citizen scientists and contribute data to understanding the distribution of these unique animals. Download the HerpMapper app and start submitting your observations today!



*To use: Scan the QR code with your phone's camera. You should be prompted with a request to follow a link to [herpmapper.org](https://herpmapper.org).*

# LAKE STURGEON REINTRODUCTION

## Restoring an iconic species to the Maumee River 2018–present

Lake sturgeon (*Acipenser fulvescens*) were historically abundant in Lake Erie, but overfishing in the late 1800's led to drastic declines and eventual extirpation. These long-lived fish, which can grow to 8' long and weigh >300 lbs, were prized for their caviar and meat. Their decline was further compounded by anthropogenic changes in river conditions which blocked access to or degraded spawning and nursery sites. The Maumee River once supported a large number of spawning lake sturgeon, but an in-depth 2015 survey determined there was no evidence of spawning and the sturgeon were unlikely to repopulate without intervention.

Streamside rearing facilities have been shown to be an effective measure for sturgeon conservation because the young imprint to the rivers where they were born and will return to that river to spawn. Eggs are collected from a stable population, transferred to a streamside rearing facility, and raised on local water to allow the fish to imprint on that waterway. As a pilot study, the Toledo Zoo partnered with the U.S. Fish & Wildlife Service and U.S. Geological Survey to compare long-term results of fish raised at our streamside facility to fish raised at the National Fish Hatchery in Genoa, Wisconsin. The plan is to release 3,000 sturgeon, equally represented from the two hatcheries, into the Maumee River every year for the next 15-20 years.

2021 and 2022, saw a return to normal operations with collection of gametes from adult Lake Sturgeon captured in the St. Claire River. Our videographer was able to follow our partners during the whole collection process, and produced an amazing video showing a new side of the sturgeon project. Fertilized eggs were transported to our Streamside Rearing Facility on the Maumee River where our conservation team raised them to release size. An important addition was a large chiller system, sponsored by the Ohio Division of Wildlife. One of the challenges with this project is the sturgeon eggs develop best at ~65°F and we frequently have prolonged water temperature spikes of >80°F. High water temperatures during the summer months can also impact the growing fry. This chiller system allows us to rapidly cool the water flowing into the rearing facility and maintain temperatures the sturgeon prefer.

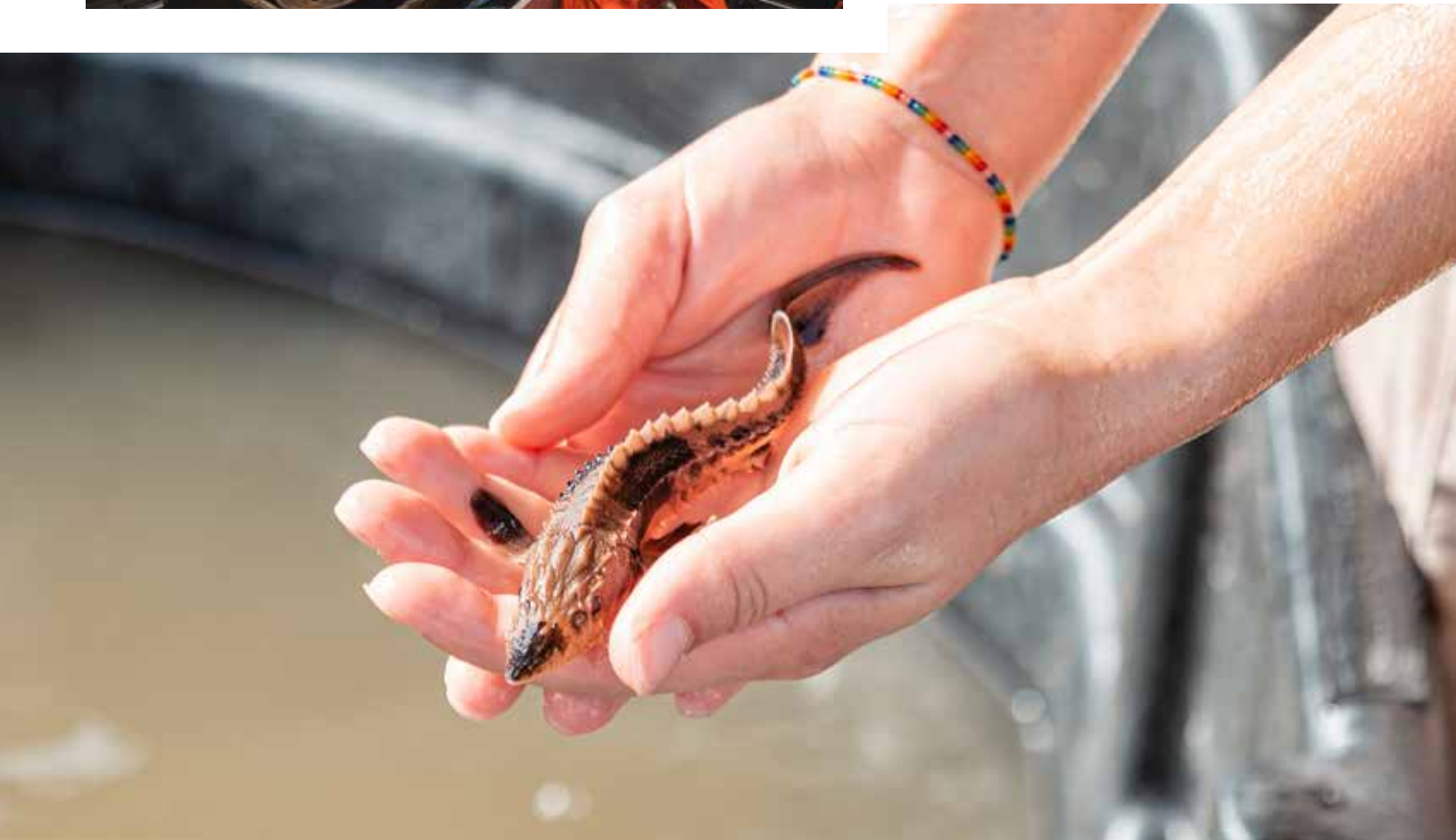
All the released sturgeon receive PIT tags (small identification chips) and a subset are implanted with acoustic transmitters, which allow researchers to track their movements in the Maumee River and Lake Erie. In 2022, we received funding from the Ohio Division of Wildlife to purchase additional transmitters, bringing our yearly tracked fish total to 100. Some of the fish with transmitters were released farther upstream so researchers could see if a different release location might encourage them to stay in the river longer.

Our annual Sturgeon Fest release continues to be a success, seeing >700 attendees helping us release Lake Sturgeon one bucket at a time into the Maumee River. Our project partners setup educational booths and activities for Sturgeon Fest participants to enjoy while they waited to release their fish. To date, the Toledo Zoo and its partners have released ~12,000 juvenile Lake Sturgeon back into the wild.



## What can you do?

The Lake Sturgeon reintroduction program on the Maumee is very much a partnership that includes numerous entities. This long-term program is made possible through grants and the support of our community. Please consider sponsoring a Lake Sturgeon at one of our annual releases: sponsorship proceeds go directly into the sturgeon program and support the PIT tagging, radio-transmitters, and rearing efforts. Additionally, please consider your role in helping to keep our waterways clean to help maintain a healthy ecosystem for the sturgeon and all of the organisms that share its habitat.



## TOLEDO CANID CAMERA-TRAPPING

### 2018–present

In 2021, during our regular mesopredator surveys, our Conservation team captured a young red fox on grounds. Foxes are frequently seen on grounds by staff or on security cameras, but this was the first time we had captured one. Our veterinary team anesthetized the fox, then Conservation staff recorded data and fitted the fox with a GPS collar. The collar recorded 396 GPS locations, and showed the fox using some of the urban prairies managed by Wild Toledo.



In addition to the GPS collaring, 42 trail cameras were re-deployed throughout the region in areas where red fox and coyote overlap, as well as historic sites for gray foxes. These cameras help survey for cryptic species such as gray foxes and bobcats, but will also help our researchers examine how red foxes and coyotes are co-occurring on the landscape and to what degree they may be sharing their habitat. The cameras will remain active through 2023 and fine-scale habitat data will be recorded seasonally around each camera site.





## HELLBENDERS

### **2014–present**

The Toledo Zoo is a key member in the Ohio Hellbender Partnership, where we hatch wild-caught Hellbender eggs and rear them in captivity for three years before release. This head-starting gives the eggs greater hatching success and increases survivorship and growth of individuals released into the wild. This effort includes a partnership with the PENTA Career Center that provides students with the opportunity to gain hands-on animal husbandry experience and participate in endangered species recovery. In 2021 and 2022, 205 Hellbenders from the Toledo Zoo and PENTA were released into Ohio streams.

## ALLEGHENY WOODRATS

Allegheny Woodrats were once widespread in southern Ohio, but are found in one county. Among the typical factors leading to their decline, the raccoon roundworm parasite, found in raccoon feces, is lethal to the woodrats. In areas with a large number of raccoons, woodrat populations tend to do poorly. One way to combat this is by dispersing anti-roundworm baits into the habitat as a way to passively de-worm the raccoons. Our ZooTeens took on the task of creating anti-roundworm baits for the Ohio Division of Wildlife and have already produced >1,400 to be deployed next year.

## CONSERVATION INTERNS

In 2022, through a generous grant from the Greater Toledo Community Foundation, the Toledo Zoo launched the first stages of a new program to hire high school students to join our conservation turtle crew as paid interns. The goal of this program is to increase sociocultural diversity, provide transformative experiences to youth, and jumpstart careers for those interested in STEM fields. To achieve this, the Toledo Zoo tackled barriers that ordinarily are hurdles for inclusion: cost, scheduling, information, specialized equipment, and staff role models. We ensured students were hired for a paid summer internship, provided daily lunches, gifted field equipment (such as boots, waders, hats, backpack, and water bottles), and offered transportation to and from work.

The Toledo Zoo's long-term turtle surveys provided the perfect opportunity for the interns to be involved with our local conservation efforts and gave them firsthand experience working as a team with wildlife, and exposed them to professional skills such as data collection and management, handling techniques, implanting animals with PIT tags, collecting genetic samples, radio-telemetry, and interacting with the public. The interns also assisted with our reintroduction programs for Blanding's Turtle, Lake Sturgeon, and Copperbelly Watersnakes.

We evaluated the effectiveness of our conservation intern program by giving the students surveys focusing on assessing knowledge changes, feelings of inclusion, and career influences. We found the interns gained confidence in applying, interviewing, and obtaining conservation positions, as well as increased knowledge using field equipment. Our surveys also showed the interns felt a stronger sense of support and belongingness among conservation biologists.





## WILDLIFE TECHNOLOGY

### Using technology to aid conservation efforts 2005–present

We received funding from the Ohio Environmental Protection Agency: Educational Grants program to run a series of our DIY GPS logger workshop for high schools and the public. We worked with our teacher contacts in the area and around the state to identify interested classes and brought our workshop to their schools, or hosted the students at the Toledo Zoo. Students were taught the basics of soldering, wiring, uses of electronic components, coding, and GIS. Students learned and practiced soldering on LED blinker exercises, then constructed and tested their own GPS data loggers. Pre and post-workshop surveys showed an overall increase in students' understanding of the applications of DIY technology to the conservation field and gained experience with many transferrable skills. In total, we interacted with ~100 students, their teachers, and other interested parties.

## ECOTOURISM



This year saw the launch of our birding ecotourism program, which seeks to get community members outside to enjoy nature and support our bird conservation programs. Activities include surveys for the Lights Out Program in Toledo, educational talks to Zoo groups, and guided tours. The TZ Bird Club has 5 members who get to participate in monthly bird walks, receive newsletters, attend quarterly workshops and annually meet with our President and CEO. To date, we have led over a dozen outings in the Toledo area, hosted two educational workshops, and have three out-of-state birding trips booked for 2023. All proceeds from our birding and ecotourism program go toward our field conservation with the Santa Cruz Ground Dove in the Solomon Islands, Negros Bleeding-Heart Dove in the Philippines, and Cheer Pheasant in Nepal.

## CONTINUED SUPPORT FROM ODO

The Ohio Division of Wildlife presented the Toledo Zoo with a check for \$250,000 to be put towards conservation of local aquatic species. These funds enabled us to put a new roof on our Lake Sturgeon rearing facility and begin planning a facility specifically for head-starting Eastern Hellbenders and Blanding's Turtles.

## PUBLICATIONS & GRANTS

### Mission Focused Research

#### 2020 Summary

##### Publications

- Bekker, K.B., and Stanford, K.M. 2021. Eastern Foxsnake (*Pantherophis vulpinus*, Baird and Girard 1853). In: Davis, J.G., Lipps, G.J., Jr., Wynn, D. Armitage, B.J., Matson, T.O., Pfingsten, R.A., and Caldwell, C. (Eds.). Reptiles of Ohio – Part II. Ohio Biological Survey, Inc., Columbus, Ohio. Pp. 649-660.
- Cross, M.D. 2021. Woodland Box Turtle (*Terrapene c. carolina*, Linnaeus 1758). In: Davis, J.G., Lipps, G.J., Jr., Wynn, D. Armitage, B.J., Matson, T.O., Pfingsten, R.A., and Caldwell, C. (Eds.). Reptiles of Ohio – Part I. Ohio Biological Survey, Inc., Columbus, Ohio. Pp. 211-226.
- Cross, M.D., and J. Mayer. 2022. Captive Propagation for the Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) in Ohio. Final Report to the U.S. Fish and Wildlife Service, Columbus Ecological Field Office, 4625 Morse Rd., Suite 104, Columbus, OH 43230. Grant Agreement #F20AC12077-00. 32 pp.
- Cross, M.D., J. Mayer, and D.T. Cross. 2021. Necropsy of eastern box turtles (*Terrapene c. carolina*) following a prescribed fire. *The Journal of Zoo and Wildlife Medicine* 54: 1047-1051.
- Cross, M.D., J. Mayer, T. Breymaier, J.A. Chiotti, and K. Bekker. 2021. Estimating population size of a threatened turtle using community and citizen science. *Chelonian Conservation and Biology* 20: 43-49.

##### Presentations

2021. Let's talk turtles, Toledo! Toledo Naturalists' Association.  
Blanding's Turtle Conservation in Ohio. Black Swamp Conservancy Seminar Series.  
Conservation status of Blanding's Turtles in the Lake Erie Watershed. Ohio Wildlife Management Association 61st Annual Conference.  
Hard exteriors face harder times: conservation of long-lived species in the Great Lakes. Toledo Zoo Conservation Series.
2022. Hard exteriors face harder times: conservation of long-lived species in the Great Lakes. Friends of Ottawa National Wildlife Refuge Seminar Series.  
Status and Assessment Updates for Threatened Turtles in Northwest Ohio. Oak Openings Green Ribbon Initiative 2022 Science Summit.  
Increasing diversity and inclusion in conservation: a case study using rare turtles. 2022 Midwest Partners in Amphibian and Reptile Conservation. Restoration of Lake Sturgeon in the Maumee River. Ohio Woodland, Water, and Wildlife Conference.  
Estimating population size of a threatened turtle using community and citizen science. State of Lake Erie Conference.

##### Grants & Awards

- Ohio EPA Educational Grants  
U.S. Fish and Wildlife Competitive State Wildlife Grant  
Greater Toledo Community Foundation  
Toledo Public Schools Appreciation Award: Conservation Interns  
U.S. Fish and Wildlife Recovery: Endangered Species Conservation  
Great Lakes Fish and Wildlife Restoration Act

##### Graduate Student Projects

- Guinto, D. 2022. Conservation genetic analysis of Blanding's Turtles across Ohio, Indiana, and Michigan. Thesis, University of Purdue Ft. Wayne, Ft. Wayne, Indiana, USA.
- Earl, D. 2022. Blanding's Turtle occupancy and abundance in southern Michigan and Ohio. Thesis, University of Purdue Ft. Wayne, Ft. Wayne, Indiana, USA.

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