

TOLEDO ZOO  
CONSERVATION

# 2020 ANNUAL REPORT



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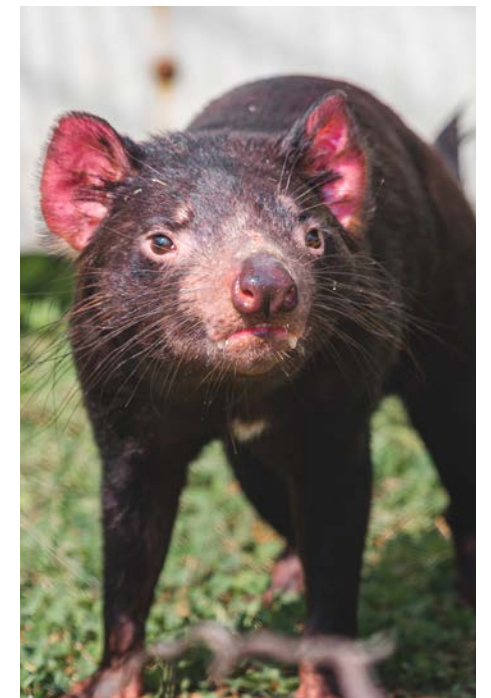
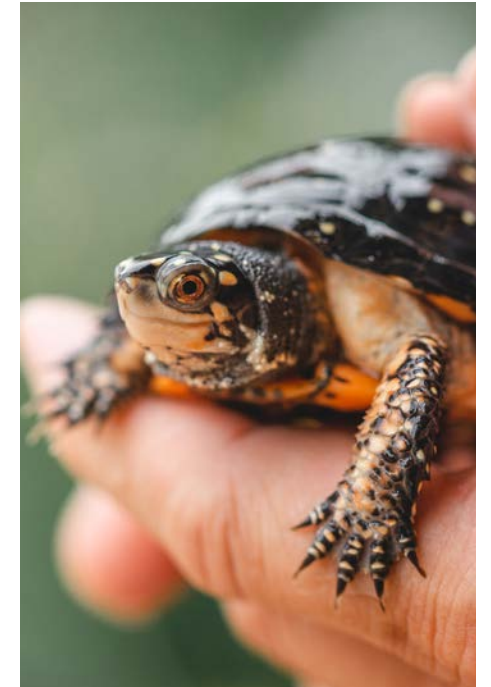
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[TOLEDOZOO.ORG/CONSERVATION](https://toledo zoo.org/conservation)



CONSERVATION AROUND THE GLOBE



**ARCTIC**  
Supporting Polar Bear International's work conserving the Polar Bear and partnering with the Alaska SeaLife Center to assist with research and recovery efforts for the Steller's Eider.



**MICHIGAN**  
Rescue-rearing and releasing Piping Plovers from abandoned nests at Sleeping Bear Dunes State Park where the endangered birds congregate prior to migration.



**WYOMING**  
Surveying and monitoring Wyoming Toad populations in Laramie Basin, Albany County.



**MICHIGAN & OHIO**  
Captive breeding, reintroduction and research of the endangered Karner Blue Butterfly.



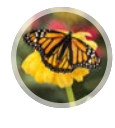
**INDIANA & MICHIGAN**  
Breeding and reintroducing endangered Mitchell's Satyr Butterflies to restored wetland sites.



**OHIO**  
Rearing more than 500 Hellbender salamanders in conjunction with Penta Career Center for release into portions of their former range in eastern and southern Ohio.



**MEXICO & OHIO**  
Assisting threatened Monarch Butterfly populations by creating summer habitats in our native prairies and rearing and releasing approximately 1,000 butterflies for their annual migration to over-wintering areas in Mexico.



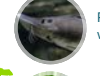
Installing more than 40+ acres of native prairies on Zoo grounds and at partner organizations throughout northwest Ohio.



**CUBA**  
Working with the US Navy to use radio telemetry to track the habitat use and activity patterns of the largest snake in the Caribbean, the Cuban Boa.



Reintroducing Lake Sturgeon to the Maumee River with the help of partner organizations.



**ARUBA**  
Conserving the Aruba Island Rattlesnake through research and education for the last 27+ years.



Researching Ohio's imperiled turtle species, including Blanding's Turtles, for 12+ years.



Researching Ohio's rare snake species, including Kirtland's Snakes.



**TANZANIA**  
Utilizing our captive breeding program to reintroduce more than 600 Kihansi Spray Toads into their native Kihansi Gorge.



TOLEDO ZOO  
CONSERVATION  
IN ACTION!

**NORTH EAST CHINA**  
Managing the US assurance population of critically endangered Amur Leopards.



**KYRGYZSTAN**  
Participating in Snow Leopard radio collaring efforts with Panthera.



**PACIFIC ISLANDS**  
Conserving several species of imperiled Pacific birds, including translocation efforts to sanctuary islands.

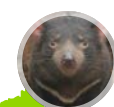


**MARIANAS ISLAND**  
**AMERICAN SAMOA**

**CHINA**  
Supporting the Scaly-sided Merganser Task Force in efforts to bolster population numbers and increase healthy habitat for this endangered bird.



**TASMANIA**  
Partnering with Save the Tasmanian Devil Program to support species recovery from Devil Facial Tumour Disease.



**SOLOMON ISLANDS**  
**NEW ZEALAND**  
Aiding Kiwis for Kiwi efforts to conserve this iconic nocturnal bird species.







## TASMANIAN DEVIL MONITORING PROJECT

Like everyone else around the world, the devil program was impacted by COVID-19 during 2020, resulting in a reduced field schedule implemented around lockdowns. Tracking trips had to take place at atypical times of year, resulting in four of the usual eight sites being monitored. Where much of the trapping usually takes place in late autumn/winter, in 2020 most of the trapping occurred in spring and summer. Two of the four sites visited showed an increase in the number of animals caught over the seven days of trapping (Buckland and Bronte) while the other two sites had a reduction in the number of devils caught compared to previous years (Narawntapu NP and Woolnorth).

However, even with a reduction in numbers caught, both Narawntapu NP and Woolnorth had a high proportion of females breeding, and the population estimate for Woolnorth was comparable to previous years. Importantly, there was no evidence of Devil facial tumour disease (DFTD) in the Woolnorth population, suggesting that DFTD has still not spread across the whole of Tasmania.

## SANTA CRUZ GROUND DOVES

Toledo Zoo's project in the Solomon Islands saw good progress during 2020, despite the impacts of COVID-19. The Zoo continued to provide funding for the maintenance of a vitally important captive flock of Santa Cruz ground doves, with a team of Solomon Islands staff assuming responsibility for the bird's day-to-day care; a testament to the success of efforts to build local capacity. The first phase of construction on a dedicated conservation breeding center is now complete, and it is hoped that this new facility will soon be operational.





## 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 have expanded the program to include 57 plantings throughout northwest Ohio as of 2020. The success of the 2017 Ohio Environmental Protection Agency Conservation Education grant helped create an educational off-shoot of the prairie program named Project PRAIRIE. Seven new prairie installs in 2018 were paid school sites participating in Project PRAIRIE while five others were paid for by the City of Toledo and Lucas County.



## 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 Mother's day weekend. Additional sales outlets, such as the Perrysburg farmers market and Toledo flower day were cancelled in 2020 due to COVID-19. All 2020 sales were the result of on-grounds sales run primarily through the WildToledo.org website.

Despite Covid restrictions and lockdowns, the Wild Toledo nursery was able to operate and

have a successful sales season due to COVID-19 exemptions for plant nurseries. Customers were offered the choice of no-contact drive through, home delivery within a 15-mile radius, as well as regular browsing. Nursery sales grew by 600% with \$34,000 in plant sales through the wildtoledo.org website and in-person shopping. A new native landscaping business was started to offer additional services through the nursery, utilizing plants grown at the zoo. Two landscapes were completed in 2020 bringing in \$11,884 in revenue.



## 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. This will be an ongoing project and data is still being analyzed, but we have already found tens of insect families not previously found in urban prairies as well as parasitoid wasps typically only found in high quality remnant prairies.

## PRAIRIE UNDER GLASS

Wild Toledo staff continued to manage and diversify the plantings in the prairie greenhouse of the Toledo Zoo Promedica Museum of Natural History. The prairie roughly mimics outdoor conditions, going through a shortened and less severe winter than NW Ohio. In addition to over 50 species of prairie plants, the prairie features native box turtles and various species of native butterflies and invertebrates. Three new species were added in 2020 and all plants within the prairie collection were accessioned.



## PROGRAM SUSTAINABILITY

The zoo began charging for prairie installations in 2019 with resounding success. Installations for Project Prairie, Toledo Waterways Initiative program and Lucas County pump stations were completed in 2020 resulting in 12 new prairies and \$35,000 in revenue for the program. We have not seen any reduction in the number of prairie installs despite now charging. Between the native plant nursery, landscaping and prairie installations, Wild Toledo collected over \$80,000 in revenue in 2020. This revenue allows Wild Toledo to continue expanding in a sustainable manner with very little cost to the institution.





## 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 Toledo Zoo 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.



### 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 221 tagged, migratory monarchs during the 2020 season. Both the conservation and education departments released monarchs in 2020 with limited public releases due to COVID-19.

With plant production moving to the new greenhouse, the old conservation greenhouse now serves entirely as a monarch rearing facility. This increase in space should allow us to increase our monarch rearing capacity and potentially provide more release opportunities for the public in 2021.



### MITCHELL'S SATYR

*Neonympha mitchellii mitchellii*

The 2020 season was again marked by declines across the remaining populations of satyrs. A total of 15 satyrs were collected in 2020 to serve as breeding stock. Captive breeding and egg laying was successful and over 300 larvae were reared during the season. All larvae were cooled in the fall of 2020 and placed into one of three experimental overwintering conditions; low temperature growth chamber, walk in refrigerator and cold frame greenhouse. Wild Toledo is testing different overwintering conditions in order to elucidate best practices for overwintering of satyr larvae. Overwintering has historically been a source of high mortality in captive reared satyrs. This study will allow us to develop a better overwintering protocol and advise other institutions on best overwintering practice.



### KARNER BLUE BUTTERFLY

*Lycaiedes melissa samuelis*

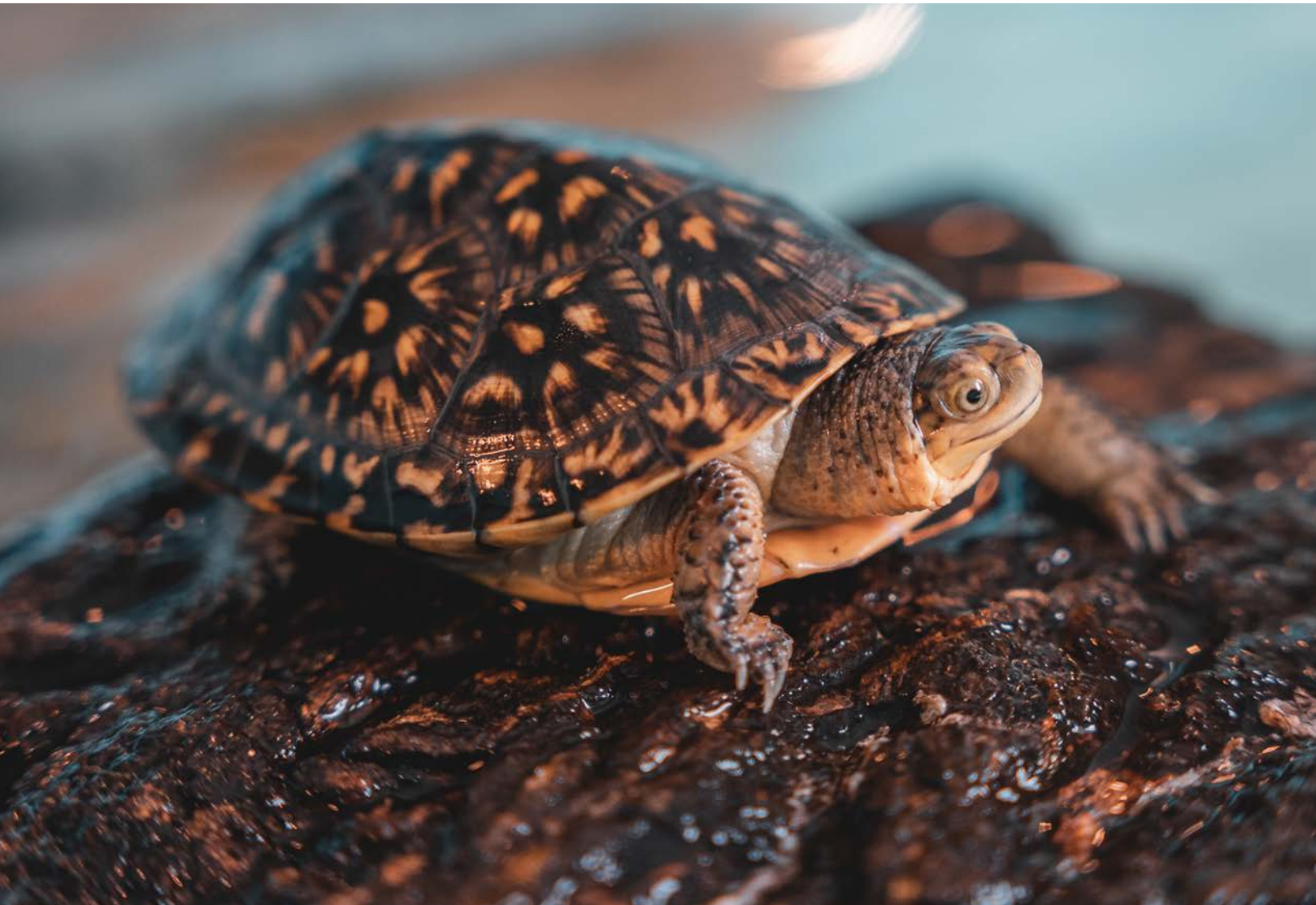
Karner blue butterfly (KBB) rearing and collection was abbreviated in 2020 due to COVID-19. A small wild collection of 12 adults was made in the first flight and 43 captive-reared adults were released in the second flight. The wild harvested breeding adults were released into the Ohio population in the first flight after laying eggs.

In 2018, we began a long-term study with a grant from the Ohio Division of Wildlife to deploy 100 temperature loggers in KBB sites in Ohio and Michigan. The loggers record temperature every five minutes throughout the year. Along with the deployed loggers, each population is surveyed for population size in both the first and second flights using DISTANCE survey techniques made possible through the purchase of a high-precision GPS unit and laser rangefinder purchased with funding from USFWS. This is the first time many of these populations have had an accurate population estimate made. This research has already allowed us to make the first accurate population estimates of the Ohio population and allowed for targeted land management at the Ohio KBB site. Over the long-term, reliable population size data, coupled with temperature data from the loggers will allow us to understand how weather impacts Karner population size and likelihood of extinction. No wild adults were recorded at the Ohio site, indicating the population may have been extirpated prior to the captive release.





## 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*

Despite obvious setbacks in 2020, we were able to continue our surveys, albeit in a limited capacity. Instead of visiting as many sites as possible, we focused on revisiting sites where we suspected Blanding's Turtles were present, but not detected during our 2019 surveys, and obtaining genetic samples from priority regions. Our efforts paid off and we captured 10 new Blanding's Turtles at two priority sites. While this may not seem like a big number, the genetic samples we collected will contribute to a range-wide assessment by our partners at Purdue University.

### *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)

### Community Science

Our work with community scientist, Terry Breymaier, continued this year and complimented our continued 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

In 2020, we initiated a Blanding's Turtle head-starting project with the goal to augment or establish self-sustaining populations. A combination of our long-term and large-scale surveys from previous years, and partnerships with local agencies, identified areas that had undergone recent habitat restoration and either have depauperate or extirpated Blanding's Turtle populations. The 55 turtles in our care will be released next year when they are large enough to avoid most of the predation risk that affects young turtles.

### Implementation

An important part of our head-starting efforts is making sure there is suitable habitat available for the turtles once they are released. In 2020, we partnered with Metroparks Toledo to work on a wetland restoration project that would specifically benefit turtles. Using data from our radio-telemetry projects, we were able to recommend creating habitat features that would attract turtles, like nesting areas, basking sites, and deeper pools. The Toledo Zoo has been conducting turtle surveys at this site since 2017, so we will be able to look at how the restoration affects the populations.





## SPOTTED TURTLES



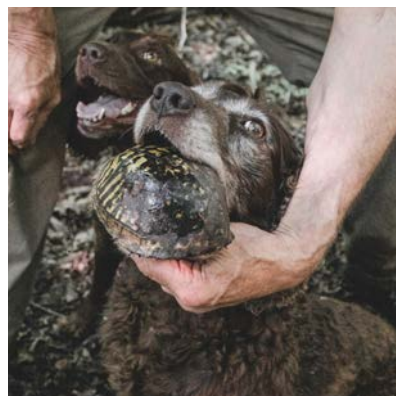
### *Clemmys guttata*

In 2020, we expanded our Spotted turtle surveys to a new site and captured 21 individuals. Population estimates for our study site range from 34-79, including several young individuals. This area has undergone restoration work in recent years and long-term studies like this are critical to understanding how turtle populations respond to management.



Box Turtle

## WOODLAND BOX TURTLE



### *Terrapene carolina*

We continued tracking Box turtles in the Oak Openings Region 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.

## KIRTLAND'S SNAKE RESEARCH



Kirtland's Snake

### Exploring the ecology of a rare snake 2015–present

In 2017, the Kirtland's Snake was petitioned for listing under the endangered species act, but was declined citing lack of data. Little is known about this cryptic species, making conservation planning difficult. There have been recent efforts within Ohio to census populations and revisit locations with historical sightings.

### Kirtland's Snake Surveys

We continued our long-term surveys of Kirtland's Snakes in northwestern Ohio. In 2020, we captured seven new individuals, bringing the count at our long-term site to 86. In addition to our annual surveys, in the spring, our conservation staff observed Kirtland's Snakes mating and noted the presence of copulatory plugs in female snake. These plugs are a form of competition and this is the first reported incidence of copulatory plugs in Kirtland's Snakes.

### Education and Outreach

Conducting surveys in so many places gives us plenty of opportunities to interact with interested people and form partnerships. In August, we received a call from the owners of property we survey, saying contractors had dug up some eggs while fixing a drain by their pond. Mindful of the rare reptiles in the area, they asked the contractors to stop their work, reburied the eggs, and waited to see what hatched. Toledo Zoo conservation staff went out to check the eggs and found 18 newly hatched milk snakes. The contractors even came back out to help us corral all the snakes. A great example of how people caring can make a big difference!

### 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 and Wildlife Service (USFWS) and United States Geological Survey (USGS) 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.

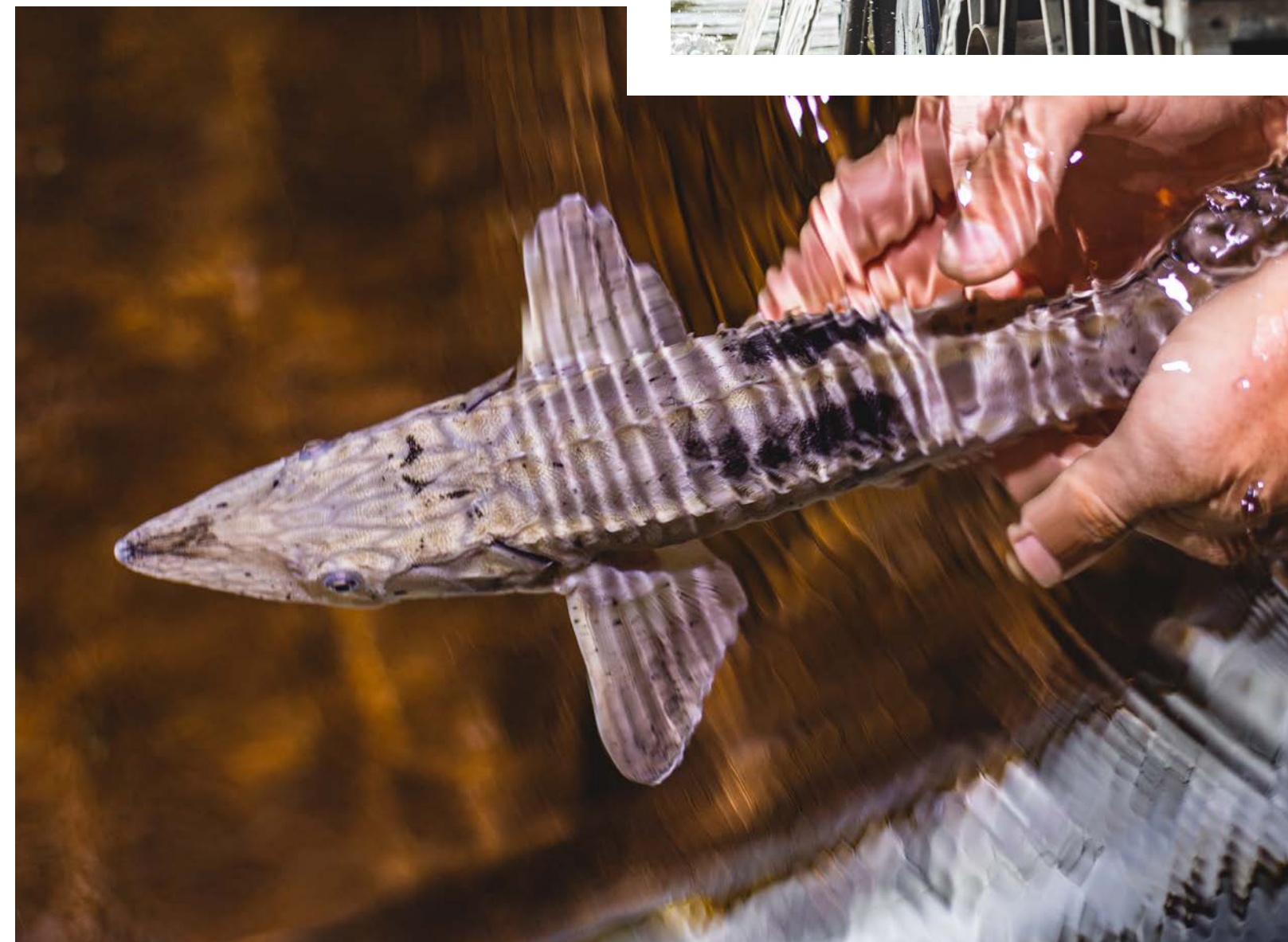
In 2020, border restrictions prevented us from obtaining eggs for the rearing facility. This temporary hurdle did not deter our partners and our group was awarded a joint grant from the USFWS & USGS for the recovery efforts on the Maumee River.

Additionally, 2020 saw more recaptures from our 2018 and 2019 release events. To date, five sturgeon have been recaptured, including the first from our streamside facility on the Maumee River (Table 1). Recaptures and growth rates are some of the key measures of success for a program like this, and these results are promising.

#### 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.

Event	Release Date	Release length (mm)	Capture Date	Capture length (mm)
Herr Lake	6 Oct 2018	189	6 Nov 2019	470
July Recap	6 Oct 2018	176	22 Jul 2020	328
August Trawl	6 Oct 2018	191	17 Aug 2020	540
October Catch	5 Oct 2019	185	11 Nov 2020	482
October Catch	5 Oct 2019	177	11 Nov 2020	414





## TOLEDO CANID CAMERA-TRAPPING

### 2018–present

Trail cameras were deployed in new locations around NW Ohio in an attempt to assess the occurrence of our native canids and other cryptic mammal species. The target species (Gray fox) was not detected, however numerous occurrences of Red foxes and Coyotes were recorded. Cameras will be consolidated in fall of 2021 to investigate smaller scale patterns of habitat use in locations where red foxes and coyotes co-occur.

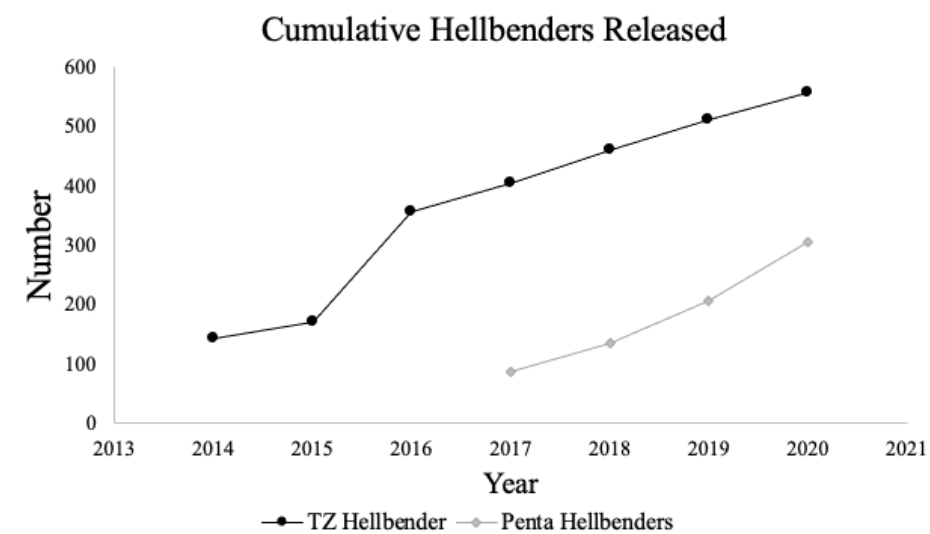


## HELLBENDERS



### 2014–present

Toledo Zoo is a key member in the Ohio Hellbender Partnership (OHP), 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 2019, 120 Hellbenders from the Toledo Zoo and PENTA were released into Ohio streams.



## PUBLICATIONS & GRANTS

### Publications

Cross et al. 2020. 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. 2020. *Clonophis leirtland*; (Kirtland's Snake) Reproduction/Copulatory plug. *Herpetological Review* 51:862.

### Presentations

Cross, M.D. 2020. Conservation Status of Blanding's Turtles in the Lake Erie Watershed. 18th Annual Symposium of the Conservation and Biology of Tortoises and Freshwater Turtles.

Cross, M.D. 2020. Restoration of Lake Sturgeon in the Maumee River. Lucas County Public Libraries – Virtual Series.

Cross, M.D. 2020. Turtles of Northern Ohio wetlands. Ohio Woodland, Water, and Wildlife Conference.

Cross, M.D. 2020. Conservation status of Blanding's Turtle in the Lake Erie Watershed. Ohio Natural History Conference.

Cross, M.D. 2020. Citizens capturing cryptic and charismatic chelonians for conservation: photographic capture-recapture and app development. 9th World Congress of Herpetology.

### Grants

USFWS Recovery: Endangered Species Conservation

USFWS/USGS Science Support Partnership Program

AZA Chelonian Taxonomic Advisory Group Small Grants Program



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[TOLEDOZOO.ORG/CONSERVATION](http://TOLEDOZOO.ORG/CONSERVATION)

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