Winous Point Marsh Conservancy

2022 Research and Activities Report

February 2023

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On the cover: Sunrise over "Norton's Ditch" and "West Big Channel", Summer 2022.

Winous Point Marsh Conservancy

Vision:

To act as a leader, facilitator, and innovator in wetland and wetland dependent wildlife conservation, education, and research in the lower Great Lakes region.

Mission:

1) *CONSERVATION: To ensure the protection and sound management of the Winous Point coastal wetlands, the greater southwest Lake Erie region, and the associated waterfowl and wildlife.*

2) *EDUCATION: To provide practical learning opportunities in wetlands and waterfowl ecology with a particular focus on training and career development of young professionals.*

3) *RESEARCH: To be a leader in delivering impactful, applied research programs and projects in wetlands ecology, with a focus on wetlands and wetland dependent plants and animals.*

Winous Point Marsh Conservancy

2022

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Executive Note

Staff: John Simpson, Executive Director
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The Winous Point Marsh Conservancy's mission is broad, but directed: Research, Conservation, and Education. Annually we work hard to support sound scientific research, to advance local and regional conservation, and to deliver meaningful educational programs.

Our research program this past year included three projects on mallard ducks that explicitly set out to further understand factors that are driving population and distribution trends in eastern and Great Lakes mallards (Pages 10, 16, and 20). Additionally, we were excited to participate in a novel ecosystem health assessment project with Dr. Emily Vincent from Ohio State University College of Veterinary Medicine (Page 5). We also continued our long-term partnership projects banding waterfowl, monitoring common terns, supporting purple martin citizen science, and monitoring Blanding's turtles. All of this research and monitoring advances science and influences management of those species and habitats as well as contributing to the education and career development of the students and interns that work on those projects (Figure 1).

Our conservation work is not formally detailed in this research report, but WPMC staff is continually involved in local and regional conservation planning committees, regional conservation partnership programs, and also delivering conservation and management projects within our 3000-acre coastal marshes. We attended wetland and waterbird conservation planning meetings and conferences around the Midwest in 2022, we were key partners in delivering regional conservation projects for invasive phragmites control and water quality initiatives, and we continued to manage our own wetlands and management infrastructure at a high standard.

WPMC delivered a number of educational programs at Winous Point Marsh in 2022. Our long-term partnership "Day on the Wild Side" was a success for the 12th year, we hosted Port Clinton middle school 7th grade science field trips as well as many other educational meetings and evening programs for partners, and we revitalized and hosted the "Great Lakes Wetlands and Waterfowl Graduate Symposium" once again this year. These investments in youth and community are important as we inspire the next generation of conservationists and foster community support for wetlands and wildlife conservation.

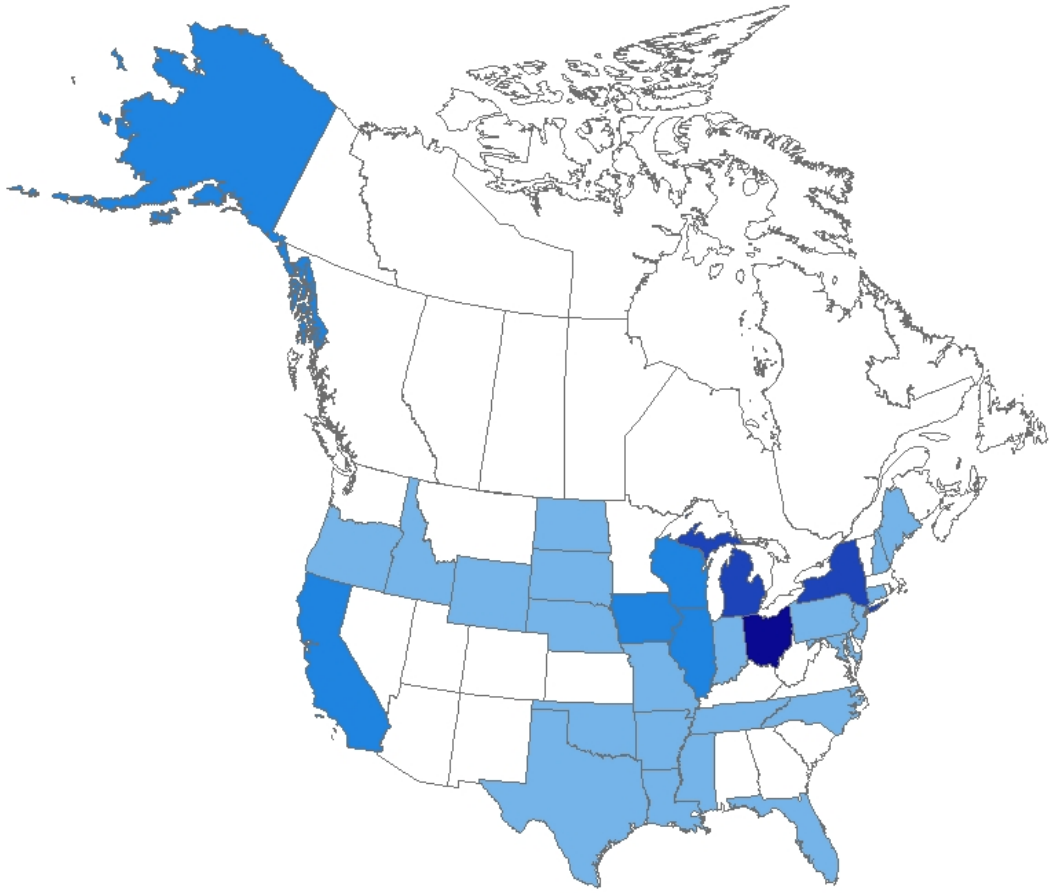

Figure 1. States (weighted shading) where 130 former WPMC students, interns, and staff have held conservation and environmental careers.

Thanks to the generosity of supportive donors, to the Legacy Endowment and Brown Fellowship, and to our network of partners, WPMC continues to make significant contributions to wetlands science, to the careers of young professionals, and to regional management and conservation of wetlands. We look forward to the challenges and opportunities that lie ahead as we continue to further our impact on Great Lakes coastal wetlands, their wildlife, and the people that support them.

Regards,

John Simpson
Executive Director

Analysis of the Effects of Anthropogenic Influences on Ecosystem Health in Southwestern Lake Erie, USA

Investigators: Dr. Emily Vincent, Zoo and Wildlife Conservation Medicine and Ecosystem Health Resident, The Ohio State University/Columbus Zoo and Aquarium/The Wilds; Brittany Fischer, PhD student, College of Veterinary Medicine The Ohio State University; Dr. Jaylene Flint, Research and Education Director-One Welfare and Sustainability Center, College of Veterinary Medicine The Ohio State University; and Dr. Mark Flint, Program Head of Zoo and Wildlife Conservation Medicine, Ecosystem Health and One Welfare, Executive Director-One Welfare and Sustainability Center, College of Veterinary Medicine The Ohio State University

Collaborators: Winous Point Marsh Conservancy, OSU Stone Laboratory

Schedule: 2021 – 2024

Introduction: Many areas of Lake Erie, especially the lake's larger harbors, are regularly dredged to maintain navigation channel depths needed for commercial and recreational boating. Much of this dredged material was previously dumped into open-water areas of Lake Erie, but as of July 2020, this practice was no longer allowed under Ohio law. Instead, disposal of dredged material is into in-water or upland Confined Disposal Facilities. These can include the creation of dredge spoil islands. Although these islands can provide for wildlife, there remain concerns about the release of any dredged industrial contaminants and other pollutants that could have long-term health implications for wildlife or the environment. This project uses a One Welfare approach to evaluate the impacts of dredge materials on wildlife health in southwestern Lake Erie and the subsequent environmental and human implications of any mitigation strategies.

Goals:

1) To compare ecosystem health parameters at two sites with different levels of anthropogenic influences in Lake Erie using a comprehensive, One Welfare-based approach.
2) To perform health assessments of sentinel wildlife species in Lake Erie to assess their overall health and the effects of anthropogenic activities such as dredging on individual animals and their populations.
3) To test free-ranging riparian mammals and freshwater turtles for ecologically important infectious diseases.

Figure 1. Ph.D. candidate Brittany Fischer, veterinary student Faith Satern, and Dr. Emily Vincent (L to R) place a hoop net to capture turtles at WPMC in May 2022.

Summary: Researchers from The Ohio State University are comparing two sites with different levels of anthropogenic influences. The first site is Winous Point Marsh Conservancy. Roughly forty miles east of Winous Point Marsh, the second site is a Confined Disposal Facility dredge spoil deposition site in Lake Erie at the mouth of the Black River in Lorain, Ohio. The Black River was previously called the "river of fish tumors" due to ecological impacts from severe industrial and environmental contamination, but extensive remediation efforts to clean up the river have been conducted over the past 30 years. This study compares water quality and sediment parameters, biomarkers of wildlife health, and prevalence of infectious diseases at these sites.

Fifty-one painted turtles (*Chrysemys picta*) were captured from the two sites for comprehensive physical exams and morphometric data. To evaluate systemic health, blood from painted turtles were used for Complete Blood Counts, biochemistry profiles, and blood lactate levels. Oral-cloacal swabs from turtles were tested for infectious diseases (*Chlamydia,* herpesvirus, *Ranavirus*/FV3-like virus, and *Mycoplasma*). Six turtles were positive for *Chlamydia*, and one turtle was positive for herpesvirus. Preliminary data analysis revealed that *Chlamydia*-positive turtles had higher absolute lymphocyte counts and lower calcium: phosphorus ratios than *Chlamydia*-negative turtles. Several sex differences were found in morphometric parameters and

chemistry profile values. Interestingly, turtles captured at the Confined Disposal Facility had higher heterophils, higher heterophil: lymphocyte ratios, and higher glucose than turtles captured at Winous Point Marsh Conservancy. These findings imply that turtles living in the site with a higher level of anthropogenic alterations have altered immune responses and higher stress levels.

Figure 2. Health assessments of painted turtles at WPMC and Lorain in May 2022.

A total of 15 fish species at both sites were captured with fyke nets to assess biodiversity, parasite burden, immune function, and overall health of fish populations. In addition, samples from 31 muskrats (*Ondatra zibethicus*) and 9 American mink (*Neovison vison*) were collected. Serum, lung tissue, and mucosal swabs from mammals were analyzed for SARS-CoV-2 and *Chlamydia*. All mammal samples were negative for both pathogens.

Figure 3. A fyke net was used to catch fish at WPMC in May 2022.

Figure 4. Dr. Emily Vincent collects a fish blood sample at WPMC in May 2022.

Timeline: This project commenced in fall 2021 with fish sampling at Winous Point Marsh Conservancy. Mammal sampling was completed in January-March 2022. Turtle sampling and additional fish sampling was completed in May 2022. Data analysis and manuscript preparation are ongoing.

Figure 5. Dr. Emily Vincent and Ph.D. candidate Brittany Fischer demonstrate fish blood collection to Port Clinton middle school students during their field trip to WPMC in May 2022.

Winous Point Marsh Conservancy supported Year 1 of this project by assisting in fish and turtle sampling, collecting mammals, providing housing and logistical support.

Movement, Survival, Resource Selection, and Productivity of Great Lakes Mallards

Investigators: Ph.D. candidate Ben Luukkonen, Dr. Scott Winterstein, and Dr. Dan Hayes, Michigan State University; Dr. Drew Fowler, USGS Louisiana Cooperative Fish and Wildlife Research Unit, Louisiana State University

Project Partners:

- Winous Point Marsh Conservancy
- Ducks Unlimited
- Franklin College
- Great Lakes Fish and Wildlife Restoration Act
- Illinois Department of Natural Resources
- Illinois Natural History Survey
- Indiana Department of Natural Resources
- Michigan Department of Natural Resources
- Michigan State University
- United States Fish and Wildlife Service
- Upper Mississippi and Great Lakes Region Joint Venture
- Wisconsin Department of Natural Resources

Schedule: 2021 – 2024

Introduction: The Great Lakes mallard (*Anas platyrynchos*) project is a regional collaboration to learn more about factors limiting the Great Lakes mallard population. Since the early 2000s, abundance of mallards nesting in the Great Lakes region has been declining relative to mid-continent mallards. Despite ongoing research and annual monitoring, it is still unclear what factors are limiting mallard abundance. Mallards are an ecologically important waterfowl species and mallard abundance is related to wetland quantity and quality. Mallards also have social and cultural value for a variety of stakeholders. Therefore, identifying limiting factors and recovering mallards is a priority for waterfowl managers. The project goal is to estimate hen mallard survival, productivity, resource selection, and fidelity to the Great Lakes region in relation to banding location, genotype, molt and natal location, and age to identify limiting factors and recommend management actions to increase Great Lakes mallard abundance.

Summary: Research partners are capturing and attaching GPS-GSM transmitters to hen mallards during spring and summer in Michigan, Wisconsin, Illinois, Indiana, and Ohio. Transmitters are attached using elastic straps and rest on the bird's back (Figure 1). Transmitters collect GPS locations and other data which are uploaded to a database via cellular networks, enabling daily monitoring of bird movements. Mallards are captured in urban and rural areas to assess potential differences in demographic rates and movement behavior for birds that select

urban versus rural areas. Feather and blood samples collected from marked individuals will be analyzed to estimate molt or natal origin and genotype, respectively. Analysis of stable isotope composition of feathers provides a coarse estimate of molt latitude for adults, and natal latitude for juveniles. Blood samples will be analyzed to determine if each bird is a pure wild mallard or a domestic x wild mallard hybrid. Morphometric measurements will be used to create a body condition index for marked birds. Pairing these results with mallard movement data will enable us to assess how use of urban areas, molt and natal origin, genotype, and body condition affect survival, productivity, fidelity, and movement. Data collected from mallards marked with transmitters will be analyzed with mallard banding and population abundance data in an integrated population model. Population parameters limiting mallard abundance and management actions to address limiting factors will be identified.

Figure 1. Researchers fit a hen mallard with a GPS-GSM transmitter in Michigan in spring 2022 (left). A GPS-marked hen mallard ready for release in Michigan in spring of 2022 (right).

Transmitter deployments began in spring 2021 and 435 hen mallards have been marked across the study area. To date, >2.4 million GPS locations have been collected. An additional sample of at least 100 birds is planned for 2023. Winous Point Marsh Conservancy (WPMC) personnel deployed 16 transmitters in 2021, 40 transmitters in 2022, and plan to deploy 33 in 2023. Funding by WPMC enabled purchase of 30 transmitters in 2022 and 2023.

Genetic analyses by Dr. Phil Lavretsky at the University of Texas El Paso indicated 41% of the 2021 sample were wild mallards, while 59% were game farm x wild mallard hybrids. Preliminary movement data suggests hybrid mallards tend to have lower daily movement distances and are more likely to select urban areas than wild mallards. Known-fate survival models indicated that survival increases with the proportion of time spent in urban areas, regardless of genotype (Figure 2). However, band recovery analyses suggest population-level survival has been relatively constant over the last two decades. Hen mallard breeding season fidelity to the Great Lakes region appears to be high, suggesting significant emigration is unlikely. Therefore, productivity may be an important driver of population dynamics.

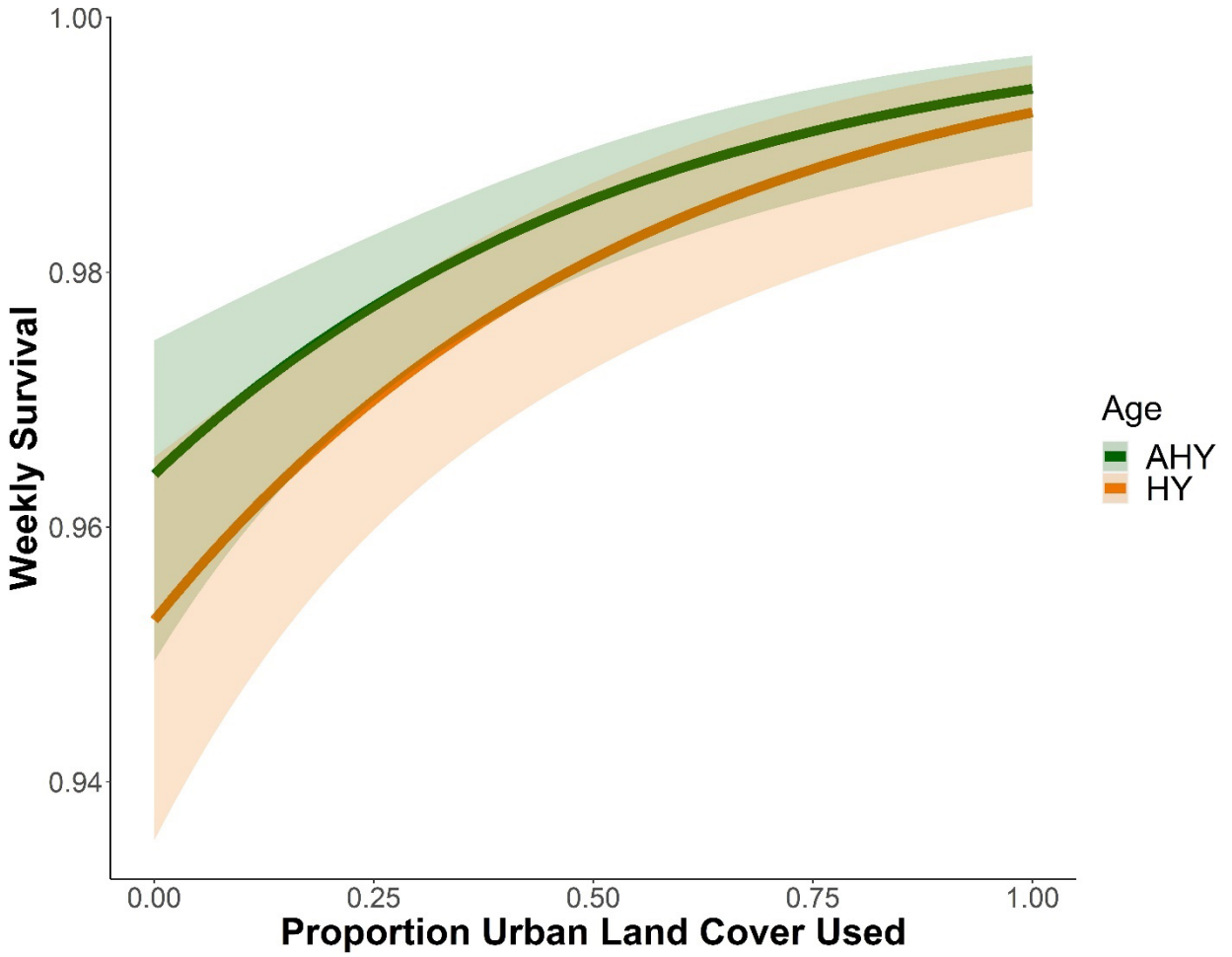

Figure 2. Estimated weekly survival probability as a function of the proportion of GPS locations in developed (urban) land cover for adult (AHY; green) and juvenile (HY; orange) hen mallards marked with GPS-GSM transmitters in Illinois, Indiana, Michigan, Ohio, and Wisconsin during 2021. Shaded region depicts 95% confidence intervals.

The sample of mallards captured and marked with GPS transmitters in Ohio during 2021 (n=16) consisted of 56% hybrids and 44% wild ducks. Hunters harvested 1 (6%) and 4 (10%) Ohio-marked mallards in 2021 and 2022, respectively. Mallards captured at Winous Point Marsh in

early spring dispersed across the Great Lakes region, with one individual located in the Prairie Pothole region by the end of May (Figure 3). Mallards captured in Ohio during the pre-season banding period (July-September) typically remained within 30 km of the capture site until autumn migration (Figure 5), although a few individuals made larger movements within northwest Ohio and southeast Michigan (Figure 4). Transmitters deployed at Winous Point Marsh during spring which continued to transmit data during autumn showed birds that spent the summer in Ontario and Quebec moved south beginning in October.

Figure 3. Spring migratory movements from March through May 2022 for hen mallards marked with GPS-GSM transmitters in Illinois, Indiana, Michigan, Ohio, and Wisconsin.

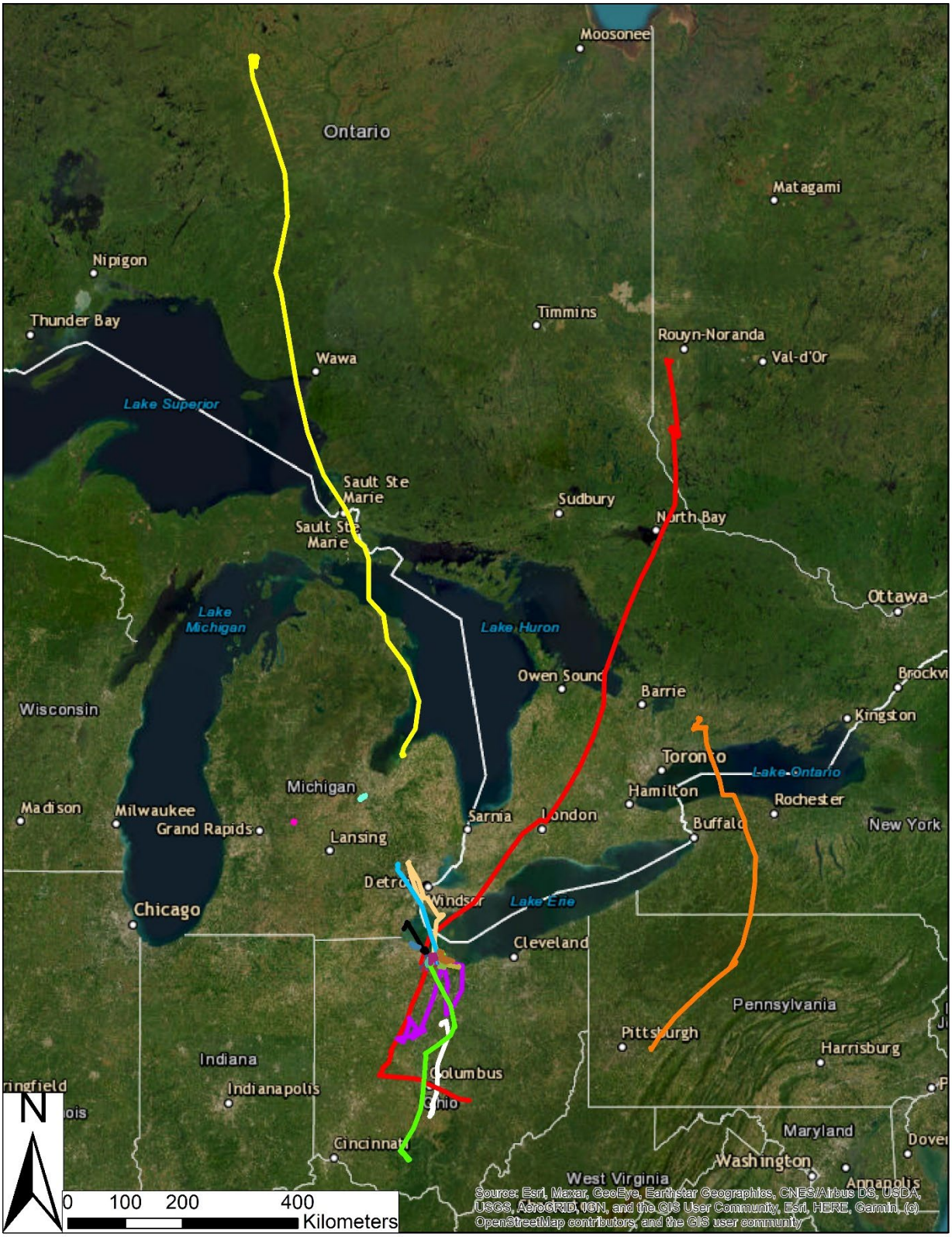

Figure 4. Fall migratory movements of hen mallards marked with GPS-GSM transmitters in Ohio during spring and summer 2022.

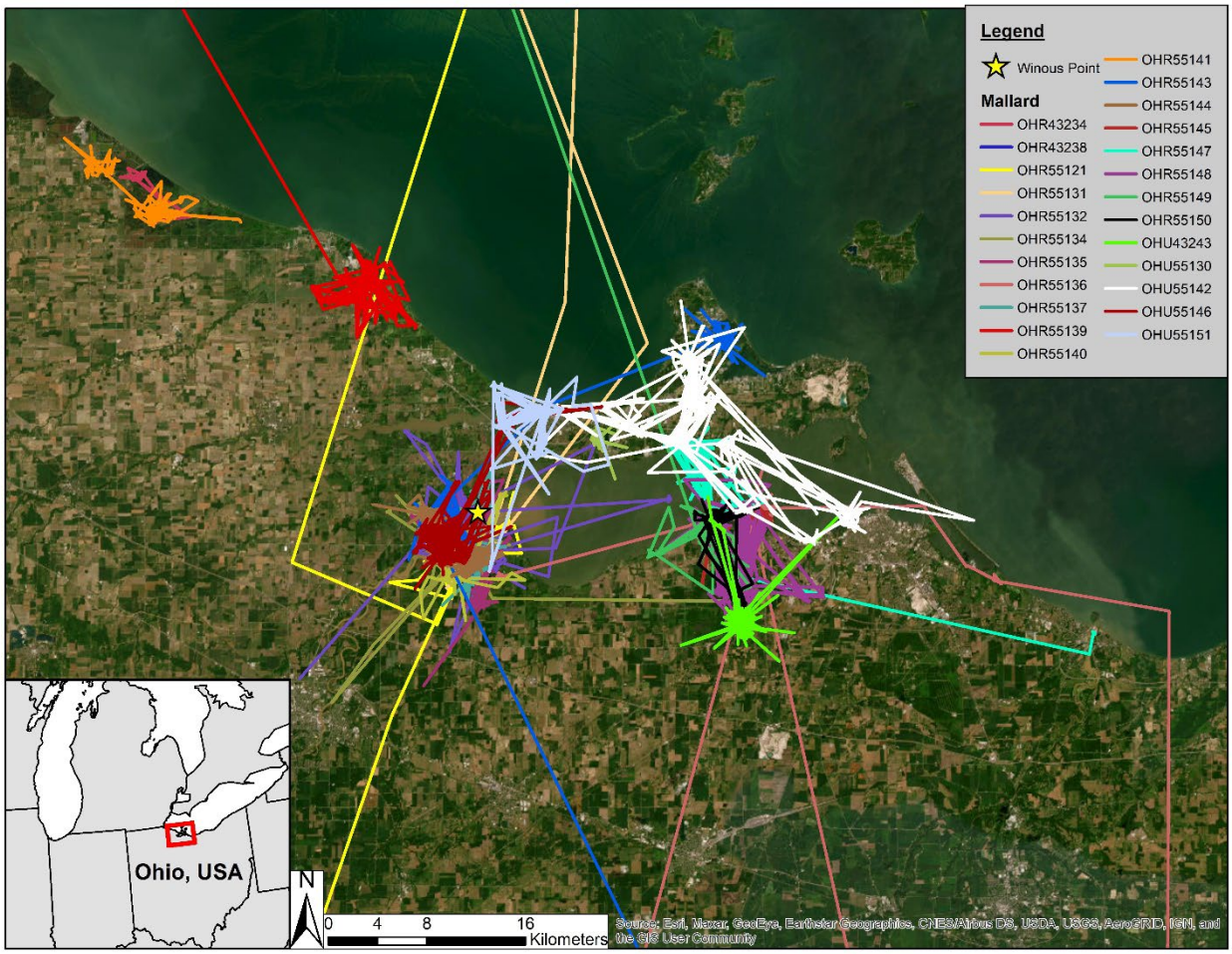

Figure 5. Local fall movements of hen mallards marked with GPS-GSM transmitters in northwestern Ohio during spring and summer, 2022.

Winous Point Marsh Conservancy funded transmitters for this project through the Legacy Endowment and Brown Fellowship in 2021, 2022, and 2023. WPMC staff captured ducks, collected samples, and deployed transmitters in-kind during our normal banding operations and during the fall hunting season.

Modeling Future Winter Waterfowl Distribution in Ohio and the Upper Mississippi River/Great Lakes Region Joint Venture

Investigators: Andrea Spurck and Dr. Robert Gates, The Ohio State University

Collaborators: Winous Point Marsh Conservancy, Waterfowl Research Foundation, and Ohio Division of Wildlife

Schedule: 2022 – 2024

Introduction: Warming winter temperatures have affected waterfowl distributions across the United States. Studies have predicted and reported delayed autumn migration, northern shifts in wintering ranges, and increased winter abundance at more northerly latitudes for many dabbling and diving duck species. However, much of this research spanned a continental scale and has not focused on how individual states or conservation regions may be affected by changing waterfowl migration and distribution patterns in the future. Changes in the abundance of wintering ducks in Ohio and the Upper Mississippi River/Great Lakes Joint Venture (UMGLRJV) could have implications for wetland conservation planning, food and resource limitations, and waterfowl hunting and viewing opportunities at different latitudes. Our research plans to describe historic changes in waterfowl distribution in Ohio and the UMGLRJV, model those changes forward using climate change data and models, and to examine specific implications for fall harvest in Ohio in the future.

Figure 1. Northern pintails and mallards overwintering at WPMC in 2016.

Objectives:

1. Model current and predict future winter waterfowl distribution and relative abundance in Ohio and UMRGLJV based on climate change models.

2. Examine factors that impact fall waterfowl distribution and hunting success using Ohio Division of Wildlife aerial survey data.

Summary: The Christmas Bird Count (CBC) is an annual survey of birds that has occurred since 1900. A study of Christmas Bird Count trends in the eastern United States reported that relative abundance of waterfowl increased more at northern latitudes for most species, with mean winter temperature influencing about half of the variation in trends for 12 of 16 species. Other research predicts that there will be delayed migration for all species based on climate projections of rising temperatures and reduced snow cover. The smallest delays are expected for northern pintails (*Anas acuta*), with +12 days by mid-21st century and +23 days by the late-21st century while the largest delays are expected for mallards (*Anas platyrynchos*), with +19-day delays by mid-21st century and +40 days to overwintering by the late-21st century.

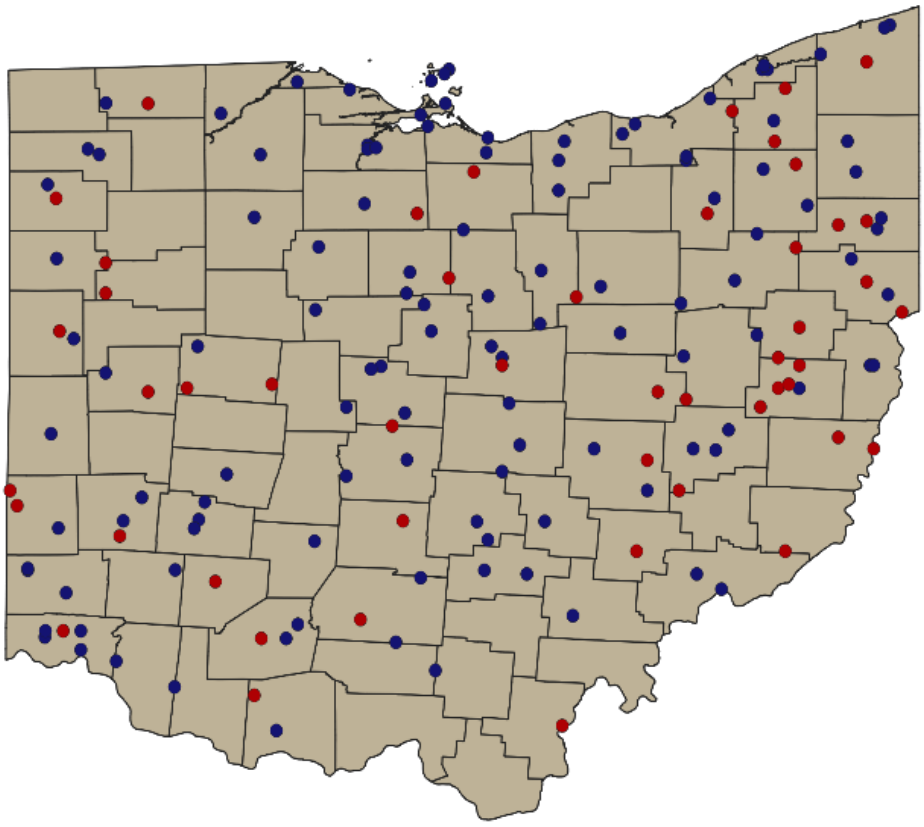

Figure 2. Christmas Bird Count points in Ohio from 1950 to 2020. Blue dots represent points that have counted ducks, red dots represent survey points where ducks have never been counted.

We conducted initial analyses of Christmas Bird Count survey points in Ohio during 1950 to 2020. Forty-nine of the 168 locations did not report duck species during the surveys (Figure 2). Changes occurred across the landscape over several decades, so points that reported ducks before might no longer have suitable habitat. Northern Ohio experienced a larger increase in ducks over time and there was also higher abundance compared to southern Ohio (Figure 3). Additional modeling with the CBC data showed that Ohio also displayed longitudinal differences in duck abundance. Western Ohio had larger increases in duck abundance compared to central and eastern Ohio, much of which likely corresponds to wetland habitat availability.

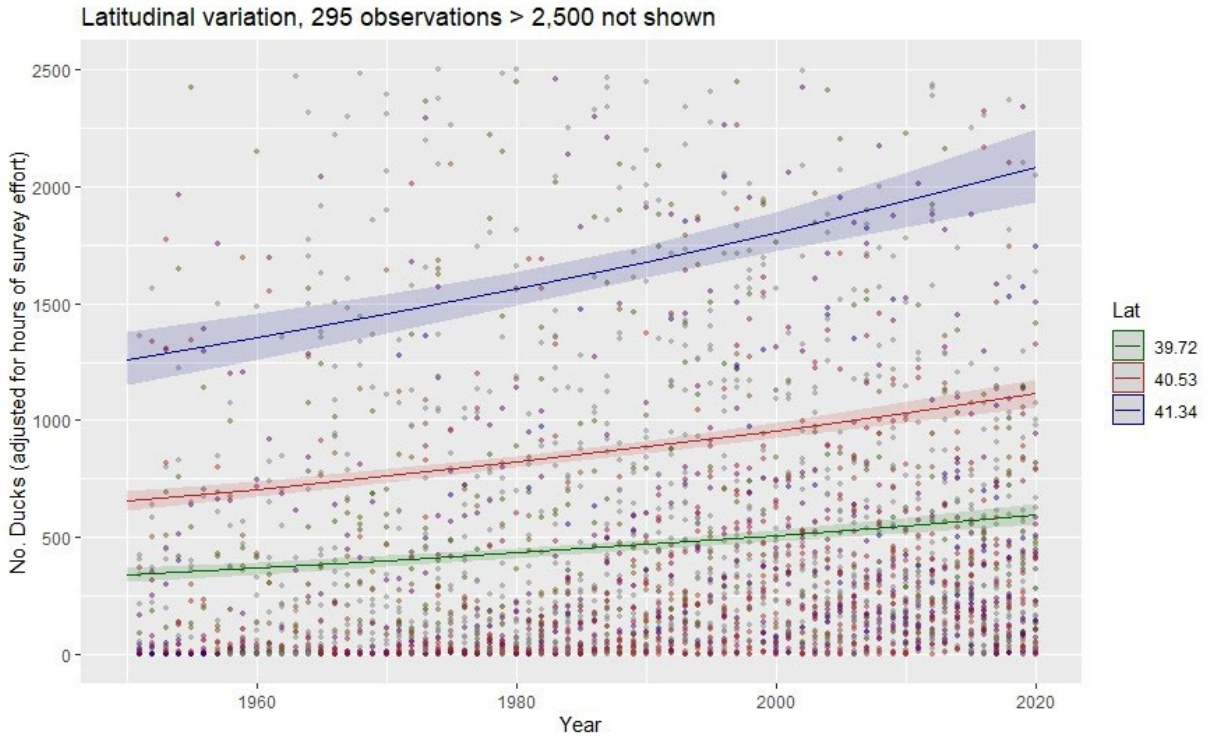

Figure 3. Latitudinal trends of duck abundance from Christmas Bird Counts in southern (green, central (red), and northern (blue) Ohio.

Warming temperatures have caused declines in snow and ice cover in the Great Lakes region. Consequently, milder winters have enabled some species to remain north later in the season. Abundant food resources are available to migrating ducks in fall but additional numbers of overwintering waterfowl will increase competition for food among ducks in this region. Food resources in spring could become increasingly limited if large numbers of waterfowl begin to overwinter in Ohio. Projecting increased abundance of overwintering waterfowl in Ohio is important to proactively address the potential future constraints of resources and to maintain hunting opportunities.

Figure 4. Mallards, green-winged teal, northern shovelers, American black ducks, American coot, and gadwall in March 2022 at Winous Point Marsh. Bonus point if the reader can spot the 7th species we did not list!

Winous Point Marsh Conservancy is a co-lead investigator with Andrea Spurck and Dr. Bob Gates of Ohio State University. The project is funded by Ohio State University, The Waterfowl Research Foundation, and the WPMC's Legacy Endowment and Brown Fellowship. We thank Mike Ervin of the Ohio Division of Wildlife and Tim Meehan of the National Audubon Society for their help with project development and data access.

Comparisons of Morphology and Feathers Patterns Among Mallards Genotypes: Implications for Mallard Population Dynamics Modeling

Investigators: Hunter Collins and Dr. Michael Schummer, SUNY College of Environmental Science and Forestry

Collaborators: Winous Point Marsh Conservancy, University of Texas-El Paso, Birds Canada (Long Point Waterfowl), and Delta Waterfowl

Schedule: 2022 – 2024

Introduction: Over the last 20 years, the mallard (*Anas platyrynchos*) population in the Atlantic Flyway has declined by approximately 40 percent. Although there are numerous potential reasons for this decline, the release of pen-raised, game-farm mallards is one which must be investigated further to fully understand its impacts on wild mallard populations. Annually, an estimated 250,000 mallards are released to supplement hunting opportunities in the eastern United States. Although many of these birds are harvested, a small number become feral and breed the following spring. Game-farm mallards and wild mallards differ in size and shape, but little research has been done to understand the morphology of game-farm x wild mallard hybrids in the wild. Over 90 percent of the eastern mallards are genetically at least 10% game-farm, and these game-farm genes are spreading west into the mid-continent mallard population. Thus, it is important to differentiate hybrids from their pure wild mallard counterparts to refine future population models and understand to what extent game-farm genetics could be affecting morphology and thus reproduction and survival of mallards in the eastern United States.

Figure 1. Mallards exhibiting unique characteristics captured and sampled during pre-season banding efforts at Winous Point Marsh Conservancy in July 2022.

Summary: Research was and will be conducted August-December at Winous Point Marsh Conservancy in 2022 and 2023. Research sampling will concurrently occur at Onondaga Lake in Syracuse, New York and harvest sampling occurring at the Montezuma Wetlands Complex. Each year, we will sample 40 mallards during pre-season banding efforts and 200 hunter-harvested mallards during hunting season at Winous Point Marsh. In New York, we will sample 40 mallards during pre-season banding and 80 hunter-harvested mallards. Winous Point Marsh Conservancy, located in the Mississippi Flyway, can provide a complete genetic representation of the mallard population as it captures mallards from farther west (more likely pure wild) and from the east (hybrid swarm). New York provides a range of varying percentage game-farm x wild mallard hybrids that are representative of what we expect from the Atlantic Flyway population. The research protocol consists of taking thirteen morphological measurements and obtaining genetic samples through blood samples from live birds or muscle samples from harvested birds will be processed at the University of Texas-El Paso. We also take a series of photographs, each highlighting a different morphological attribute, to be used with artificial intelligence technology to determine if feather patterns can be used to determine genetic cohort.

Figure 2. Hunter Collins of SUNY ESF taking measurements from a harvested hen mallard at WPMC in October 2022 (Photo Credit Matt Hicks Photography and Delta Waterfowl).

We sampled 45 mallards during pre-season banding operations and 200 hunter-harvested mallards at Winous Point Marsh Conservancy in 2022. We sampled an additional 15 mallards during banding and 91 hunter-harvested birds in New York. Genetic samples are currently being analyzed at the University of Texas-El Paso. Our goal for 2023 is to repeat our sampling effort, providing the most complete sample of genetics, morphology, and feather patterns to date for mallards and providing novel information on the prevalence of game-farm mallard genetics throughout the eastern and midwestern United States.

Figure 3. Example of differences in bill morphology of two harvested drake mallards at WPMC in November 2022.

Figure 4. Demonstrating head and culmen morphological measurements taken from each sampled bird.

WPMC Legacy Endowment and Brown Fellowship funding supports this project by employing and housing field staff to perform data collections as well as providing mallards for sampling during our winter and summer banding. We thank the Winous Point Shooting Club for providing access to hunter-harvested mallards.

Conservation Status of Blanding's Turtles in the Lake Erie Watershed

Investigators: Dr. Greg Lipps, Ohio State University

Collaborators: Toledo Zoo Conservation; Ohio Biodiversity Conservation Partnership; Purdue University; Michigan Natural Features Inventory; Michigan DNR; Ohio DOW; US Fish and Wildlife Service; Winous Point Marsh Conservancy

Schedule: 2019 – current

Winous Point Marsh Conservancy has been involved in several research and management projects investigating the productivity and distribution of state-listed Blanding's turtles (*Emydoidea blandingii*) in the last 20 years. Blanding's turtles are a long-lived (> 80 years) emydid turtle, easily identified by their prominent yellow chin and appearance of a smile. Blanding's turtle life history traits including delayed sexual maturity, low annual fecundity, and longevity exacerbate the effects of negative impacts on populations. Although once common throughout the Great Lakes, Blanding's turtles have become increasingly rare. Fragmentation and loss of habitat has led to drastic declines in many areas, many of which have not been assessed in the last 25 years. Blanding's turtles are listed as *threatened* in Ohio and are currently under review for listing under the federal Endangered Species Act, with a listing decision expected in 2023.

For the tenth consecutive year United States Department of Agriculture Wildlife Services conducted trapping efforts as part of an integrated approach to managing meso-predator populations, mainly raccoons (*Procyon lotor*), in northwest Ohio. The goal of the project is to decrease nest predator populations with the hope of increased nesting success and survival rates of Blanding's and spotted turtles (*Clemmys guttata*). Winous Point Marsh Conservancy acts as a study area and logistic hub for housing and storage for this Great Lakes Restoration Initiative-funded project.

Winous Point Marsh Conservancy also hosted a meeting of turtle conservation partners to discuss experimental habitat management ideas and appropriate conservation programs for turtle nesting habitat in 2022. We hope to continue these discussions and pilot nesting habitat management actions in the near future.

Figure 1. Researchers track a Blanding's turtle marked with radio-telemetry transmitter in summer of 2021.

Blanding's Turtle Ecology and Conservation

The Toledo Zoo, OSU's Ohio Biodiversity Conservation Partnership, Michigan Natural Features Inventory, Purdue University Ft. Wayne, Ohio Division of Wildlife, and Michigan Department of Natural Resources were awarded a federal Competitive State Wildlife Grant to assess Blanding's turtle populations in the Lake Erie basin. Objectives of this project are: 1) develop and implement a comprehensive monitoring strategy, 2) develop and refine distribution models to inform survey efforts and identify priority areas, 3) determine the genetic composition of Blanding's turtles within and among populations in the Lake Erie watershed, and 4) develop and begin implementing a Blanding's turtle conservation strategy. To accomplish these goals, we surveyed wetlands using collapsible hoop traps and visual searches. When captured, all turtles were measured and marked by placing notches along the margins of the shell. Blanding's turtles were permanently marked with a Passive Integrated Transponder (PIT) tag and a blood sample was collected for genetic analysis.

In 2022, we conducted an abbreviated trapping campaign to focus efforts on Blanding's turtle nesting and telemetry, resulting in 294 trap-nights at Winous Point Marsh Conservancy with nightly nesting surveys throughout the nesting season beginning in June. This effort resulted in the capture of 2 new male Blanding's turtles and tracking of two females turtles for the second consecutive season. In addition, we captured 10 snapping turtles (*Chelydra serpentina*) and 29 painted turtles (*Chrysemys picta*) with 1 recaptured from prior years. Telemetry resulted in the capture and x-raying of both females determining both individuals to be gravid (Figure 2). One female was observed digging "test nests" prior to nesting alongside of Lattimore Road. The second female had a reduced clutch size commonly found in doubling brooding animals possibly indicating Blanding's turtles are capable of laying two clutches. Further research will be focused on partnering with Winous Point Marsh Conservancy to create and monitor nesting habitat to protect the nests of female turtles and increase our understanding of the reproductive dynamics of the species.

Along with those of our partners at the Toledo Zoo, we expanded upon the collection of the largest data set on turtles in Ohio history, adding Blanding's turtles (117), painted turtles (880), snapping turtles (208), spotted turtles (111), a northern map turtle (*Graptemys geographica*; 1), eastern box turtles (*Terrapene c. carolina*; 7), and stinkpot turtles (*Sternotherus odoratus*; 7) in 2022. Additionally, nest protection for Blanding's turtles and the radio telemetry of 10 adult females continues into 2023. This data set will provide valuable information to ensure turtles continue to be a part of the rich natural heritage of the Lake Erie Basin.

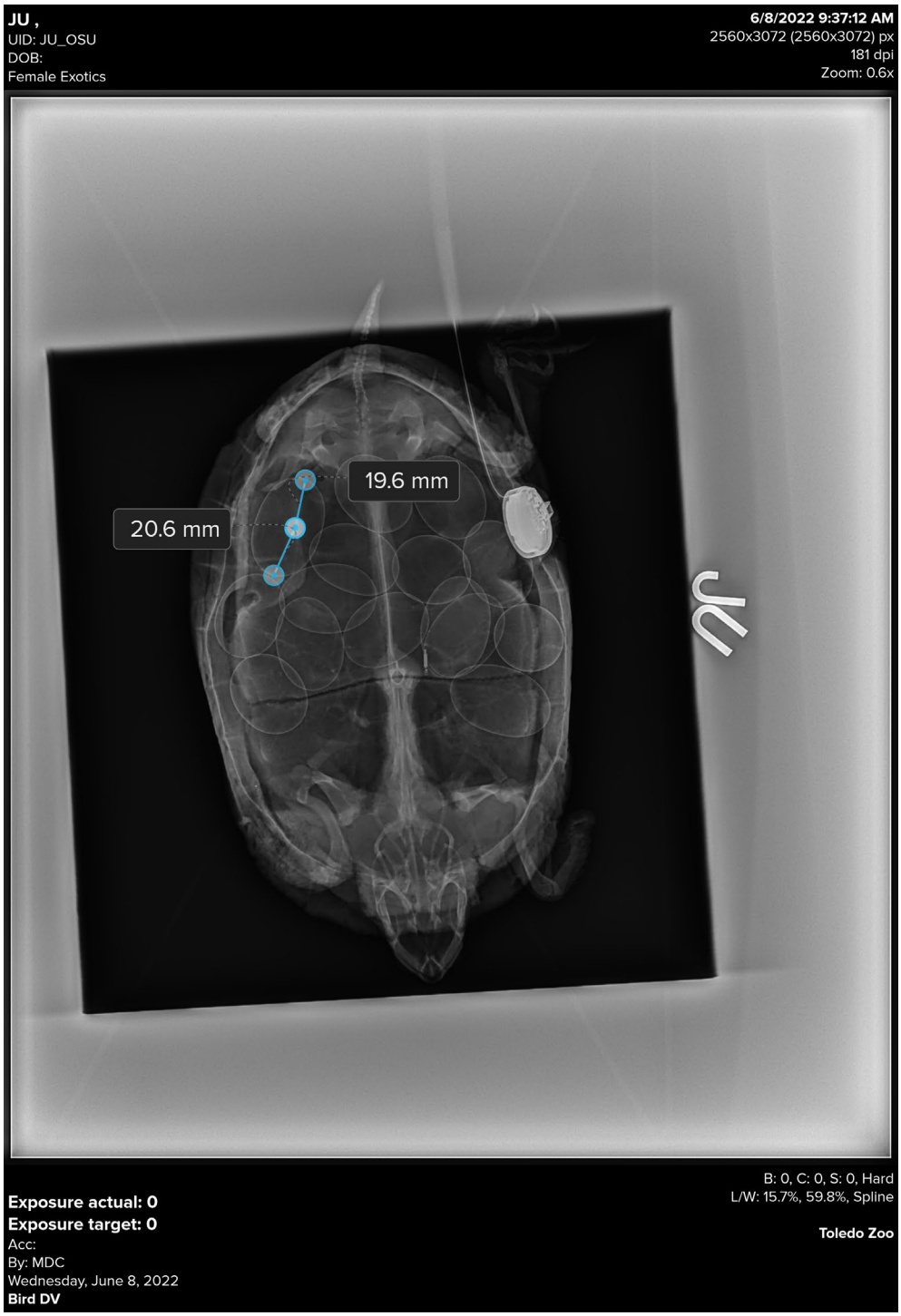

Figure 2. X-ray of female Blanding's turtle shows eggs within the body cavity. The tracking transmitter is also clearly visible (outside the body, upper right), as well as blue measurements of egg size.

Winous Point supports this project by acting as one of several field research sites, by providing housing and logistical support to project technicians, and by capturing turtles for the project.

Long-term Cooperative Waterfowl Banding Program

Investigators: Brendan Shirkey and John Simpson, Winous Point Marsh Conservancy; Nathan Stricker and Michael Ervin, Ohio Division of Wildlife

Collaborators: Tom Kashmer, Green Creek Wildlife Society; Mark Shieldcastle, Black Swamp Bird Observatory; Bob Gates, The Ohio State University

Introduction: Winous Point Marsh Conservancy's (WPMC) cooperative waterfowl banding program was initially formalized to assist the Ohio Division of Wildlife with meeting statewide banding quoatas established by the U.S. Fish and Wildlife Service, but since then the program has become instrumental in providing data that directly informs many graduate-level research projects. WPMC supported three diffferent waterfowl graduate projects in 2022 with direct links to our banding efforts including: 1) Movement, Survival, Resource Selection, and Productivity of Great Lakes Mallards (Page 10), 2) Comparisons of Morphology and Feathers Patterns Among Mallards Genotypes: Implications for Mallard Population Dynamics Modeling (Page 20), and 3) Modeling Future Winter Waterfowl Distribution in Ohio and the Upper Mississippi River/Great Lakes Region Joint Venture (Page 16).

Figure 1. WPMC interns and graduate students, Hunter Collins, Andrea Spurck, and Jeffrey Edwards (L to R) with mallards captured in August 2022.

Summary: 2022 was a banner year for our waterfowl banding program. We banded 1,491 ducks, our highest single-year total ever. We banded 784 mallards (*Anas platrynchos*), 40 of which were marked with satellite transmitters to support Ph.D. student Ben Luukkonen, 498 wood ducks (*Aix sponsa*), 201 black ducks (*Anas rubripes*), and 8 redhead ducks (*Aythya americana*). WPMC's cooperative banding program is now closing in on 10,000 ducks banded since 2010 (Table 1). We look forward to continued banding efforts in 2023 in which will also include another 30 mallards and 10 black ducks with satellite transmitters for graduate research, as well as continuing to support genetic and morphormetric work on game-farm x wild mallards. Futhermore, WPMC is beginning to develop a long-term data set with consistent banding effort that can be used to improve our understanding of when and where ducks banded at Winous Point Marsh might be spending other parts of their annual life cycle (Figure 3).

Figure 2. An American black duck (left), and an American redhead (right) banded in March 2022.

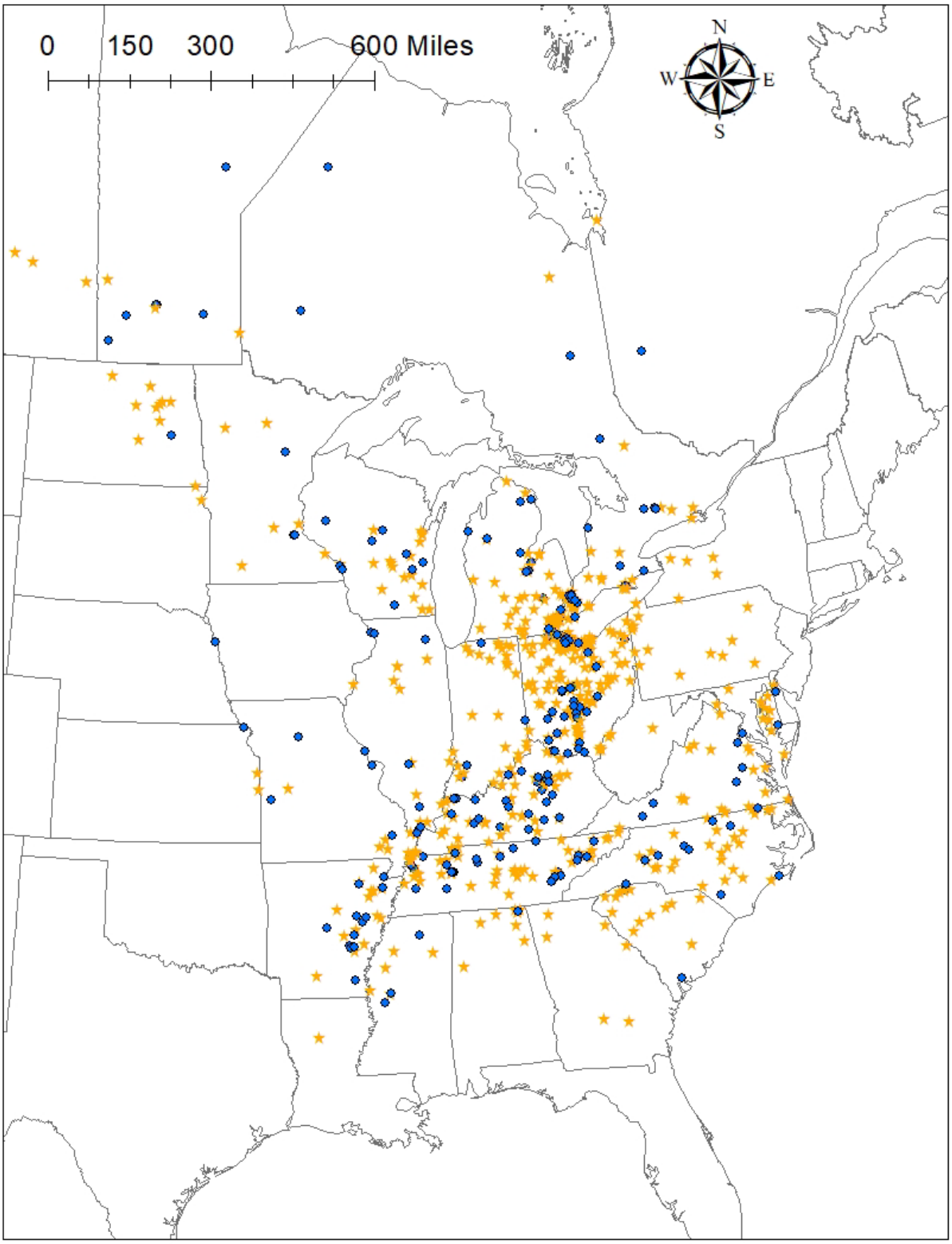

Figure 3. All band recovery locations (n=910) of mallards and black ducks banded at WPMC between 2010 and 2021. Orange stars represent ducks banded during summer banding (July-September) and blue dots represent ducks banded during winter banding (January-March).

Table 1. Total number of waterfowl banded by species at WPMC from 2010 to 2022.

Year	Mallard	Wood Duck	Black Duck	Redhead	Gadwall	Canvasback	Ring Neck	Scaup	Shoveler	Pintail	Widgeon	Hooded Merganser
2010	3	0	41	0	0	0	0	0	0	0	0	0
2011	186	39	42	0	0	0	0	0	0	0	0	0
2012	49	143	125	0	0	0	0	0	0	0	0	0
2013	237	140	51	123	0	1	0	10	9	0	0	0
2014	181	164	23	7	341	5	2	5	1	7	6	0
2015	582	232	9	126	0	35	32	13	0	0	0	0
2016	679	307	127	80	10	0	2	0	0	1	0	0
2017	575	266	84	148	0	13	0	11	0	0	0	0
2018	71	150	169	0	0	0	0	0	0	0	0	0
2019	440	67	64	143	0	0	0	2	0	0	0	0
2020	306	245	86	0	0	0	0	0	0	0	0	2
2021	304	246	110	0	0	0	7	0	0	0	0	0
2022	784	498	201	8	0	0	0	0	0	0	0	0
Totals	**4397**	**2497**	**1132**	**635**	**351**	**54**	**43**	**41**	**10**	**8**	**6**	**2**
										Grand Total		**9176**

Winous Point Marsh Conservancy supports this project through a cooperative agreement with the Ohio Division of Wildlife whereby WPMC supplies field staff, time, and materials to band waterfowl and analyze data. In addition to Ohio Division of Wildlife and WPMC, project funding has also been sourced from the Black Duck Joint Venture and Ohio State University. Green Creek Wildlife Society and Black Swamp Bird Observatory provide additional volunteer staff and resources.

Community Purple Martin Monitoring and Citizen Science

Investigators: Lisa Rock and Tom Kashmer, Green Creek Wildlife Society; Seasonal interns and Kaylie Simpson, Winous Point Marsh Conservancy

Collaborators: Ohio Division of Wildlife - Wildlife Diversity Program

Summary: The purple martin (*Progne subis*) is a colonial cavity nesting swallow that now relies almost solely on artificial nesting cavities. The Winous Point Marsh Conservancy (WPMC) has provided purple martin housing since the 1940's, and there is evidence of colonial farms providing nesting cavities as early as the first half of the 18th century. Purple martin housing traditionally had an ornamental design consisting of a pole with several dozen cavities on the sides. These houses could not be lowered for cleaning or monitoring and resulted in cavities being overrun by invasive species like European starlings (*Sturnus vulgaris*) and house sparrows (*Passer domesticus*). Many purple martin landlords, including WPMC, decided to upgrade their nesting structures to contribute to Green Creek Wildlife Society's purple martin research and monitoring program. WPMC used Ohio Division of Wildlife grant funds in 2018 and 2019 to purchase supplies for eight nesting towers with 144 nesting cavities at the Winous Point Marsh.

Figure 1. Purple martins at Winous Point Marsh nesting rigs, 2022.

The purple martin monitoring project is a great citizen science opportunity and a great way for volunteers to get involved in wildlife conservation. Our students, school groups, and community volunteers again assisted with nest monitoring, and this was the most successful year yet at Winous Point Marsh with 608 nestlings banded and fledged total (Previous year totals banded include 522 in 2021, 373 in 2020, 495 in 2019, and 310 in 2018). We are also part of a bigger regional nesting program. Overall, 3507 nestlings were fledged at 32 locations in northwestern Ohio. Our facilities once again hosted the Green Creek Wildlife Society summer ice-cream social and volunteer appreciation day as well. WPMC is looking forward to continuing support for this project in 2023.

Figure 2. Volunteers cleaning and disassembling purple martin nesting rigs at Winous Point Marsh in August 2019.

Winous Point Marsh Conservancy staff continue this research out of self-interest and community service. We appreciate the hard work of the graduate students and volunteers who assisted with maintenance and monitoring on this project.

Winous Point Marsh Conservancy and Ohio Division of Wildlife Cooperative Common Tern Monitoring

Investigators: Brendan Shirkey, Winous Point Marsh Conservancy, and Laura Kearns, Ohio Division of Wildlife

Introduction: The Ohio Division of Wildlife (ODW) utilizes a unique management approach to providing nesting habitat for common terns (*Sterna hirundo).* Common terns have been listed as state endangered in Ohio since 1974, are state endangered or threatened in many of the states and provinces surrounding the Great Lakes and are still at risk of extirpation in Ohio due to loss of their natural beach and island nesting habitat along the shores of Lake Erie. To combat potential extirpation, the ODW started deploying artificial nesting platforms in the 1990's and WPMC took the lead in monitoring nest success and chick survival in 2017. Last year was an exciting year because the former Willow Point colony was relocated to WPMC's Metzger property (Figure 1).

Figure 1. WPMC research technician, Chuck Farrell, assisting with the deployment of relocated nesting platforms to WPMC property in April of 2022.

Summary: The ODW, Toledo Metroparks, and United States Department of Agriculture Wildlife Services (USDA) staff deployed 6 platforms at Howard Marsh Metropark (Lucas County, OH) and 6 platforms at WPMC's Metzger property (Sandusky County, OH) in 2022. WPMC research staff monitored success rates at the platforms weekly beginning in mid-May and continuing through late August (Figure 2). We banded 103 chicks in 2022 down significantly from 2021. The total number of successfully fledged chicks was only 47 also down significantly from 2021 (Figure 3). Nest success at the Howard Marsh colony was 65% but only 37% at the WPMC Metzger colony. We suspect this difference was caused by snake predation of eggs at the WPMC colony.

Fledging success was down significantly because of some of the first ever documented predation by mink (*Neovison vison*) on Ohio's artificial platforms. USDA Wildlife Services was able to curb predation attempts by Great-horned owls (*Bubo virginianus*) at both colonies, however in July of 2022 multiple adult mink discovered the Howard Marsh tern platforms and began predating chicks. Within one week, all chicks were either missing or confirmed dead (n = 351) and the adult terns had abandoned the colony despite the removal of several mink. USDA plans to employ additional predator deterrents for the 2023 nesting season and both colonies will remain in their current locations.

Figure 2. Summer research intern, Andrea Spurck, beginning her assessment of nest and chick survival at the Howard Marsh tern colony in June of 2022.

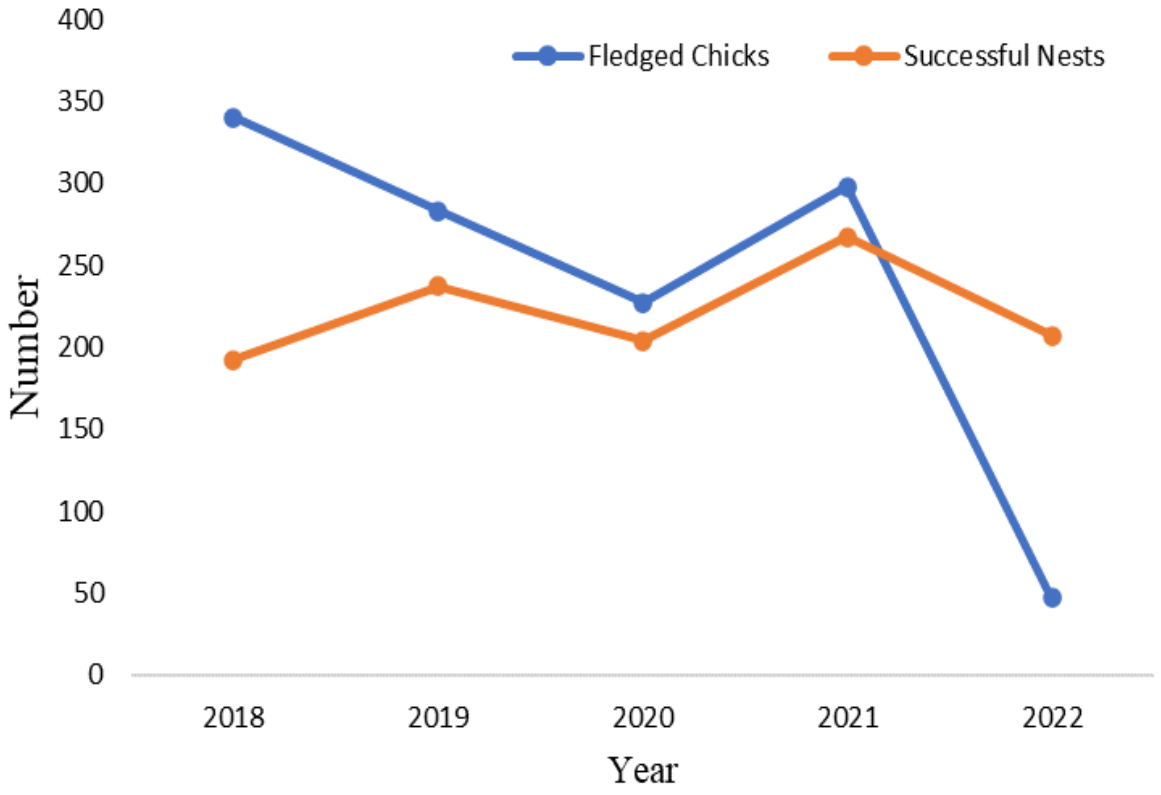

Figure 3. Total number of successful nests (orange) and fledged chicks (blue) at Ohio's artificial nesting platforms from 2018 to 2022.

Table 1. Total number of nests, number of succesful nests, and the success rate by platform at the Howard Marsh and WPMC Metzger colonies during the summer of 2022.

2022 Howard Marsh Colony			
Platform ID	**Total Nests**	**Successful Nests**	**Raw Success Rate**
1	32	19	0.594
2	46	31	0.674
3	45	31	0.689
4	59	37	0.627
5	50	34	0.680
6	49	32	0.653
Total	**281**	**184**	**0.655**

2022 WPMC Metzger Colony			
Platform ID	**Total Nests**	**Successful Nests**	**Raw Success Rate**
1	11	7	0.636
2	11	5	0.455
3	10	7	0.700
4	14	0	0.000
5	11	4	0.364
6	5	0	0.000
Total	**62**	**23**	**0.371**

Table 2. Number of tern chicks banded, the number of confirmed and presumed mortalities, and the estimated fledging rate of common tern chicks at the Howard Marsh and WPMC Metzger colonies in 2022.

2022 Chick Banding, Mortality, and Fledging			
Colony		**Howard Marsh**	**WPMC Metzger**
Birds Banded		103	13
Mortalities			
	Presumed Mortalities	*38*	*0*
	Confirmed Mortalities	*313*	*4*
Fledged Young		0	47
Fledging Rate		**0.000**	**0.922**

Winous Point Marsh Conservancy supports this project through a cooperative agreement with the Ohio Division of Wildlife whereby WPMC supplies field staff, time, and materials to monitor and maintain the artificial nesting platforms.

Additional Research Supported by WPMC in 2022

Estimating Crippling Loss Using a Novel Methodology

The United States Fish and Wildlife Service (USFWS) currently uses an estimate of 20% crippling loss to adjust harvest and harvest rate estimates to account for waterfowl that are shot by hunters but not retrieved. A variety of previous research has been conducted to estimate crippling loss estimates with self-reported hunter questionnaires yielding the results used by the USFWS. However, other studies that have mostly used observers at a distance have resulted in crippling loss estimates higher than 20%, suggesting there may be self-reporting bias on hunter questionnaires.

WPMC hopes to investigate self-reporting bias by collecting data from Winous Point Shooting Club guided hunts that allow for close-range observers (hunting guides) to track downed and wounded ducks by hunters they guide. At the same time, these guides self-report wounded and crippled ducks on their own hunts, thus allowing us to test for observer bias between self-reporting and observer-based estimation methods. WPMC is collecting this data from 2021 through 2023 and hope to publish a short scientific note on our findings.

Specials thanks to former research technician Trey McClinton who helped start this project and Hunter Collins who led data collection efforts in 2022.

Summarizing Ohio's Historical Waterfowl Banding Data

The Ohio Division of Wildlife, the Terrestrial Wildlife Ecology Lab at Ohio State University, and WPMC began an initial summary of Ohio's mallard, black duck, and wood duck banding data in 2022. Project goals were generally to better understand temporal patterns in banding effort and band recoveries and specifically to assess the potential impact of increasing both the hen mallard and black duck daily bag limit from 1 to 2 individuals in Ohio during the 2018 hunting season. We found that mallard and black duck bandings have been highly variable since the 1960s with few mallards or black ducks banded during the 1990s and early 2000s. Lack of bandings greatly reduced the power of our analysis to determine if increases in harvest rates have occurred in black ducks and hen mallards after increased bag limits from 1 to 2. Based on the available data, we found no evidence suggesting harvest rates have increased from increased daily bag limits on those species. Interestingly, we did find recoveries of banded black ducks and mallards occur on average 20-30 days later in the year now than in the 1970's and 1980's, but the average date of wood duck recoveries has remained constant over time (Figure 1). This highlights the importance of Andrea Spurck's Master's research investigating changing winter waterfowl distribution and abundance in Ohio (Page 16).

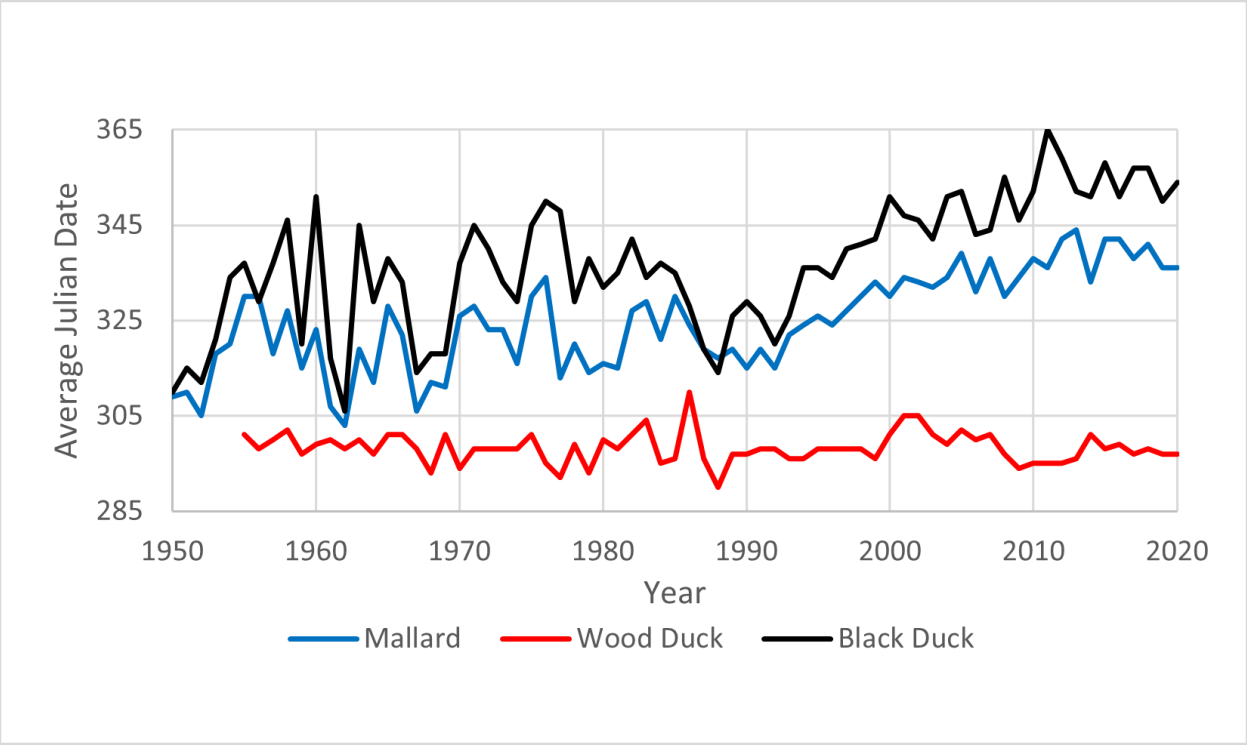

Figure 1. Average Julian date of band recoveries of mallards, wood ducks, and black ducks harvested in Ohio, 1950 – 2020.

WPMC staff collaborated with Dr. Bob Gates at Ohio State University to summarize and analyze banding data. We thank Mike Ervin, Mike Reynolds, and Nathan Stricker with the Ohio Division of Wildlife for providing funding and logistical support.

Highly Pathogenic Avian Influenza (HPAI) Surveillance

The largest recorded outbreak of highly pathogenic avian flu (HPAI) in North America started in early 2022 and is on-going today. WPMC staff was on the front-lines of the outbreak, as we assisted United States Department of Agriculture (USDA) staff by collecting 200 winter samples and 80 summer samples from ducks captured during our banding operations. USDA staff also came to WPMC in October of 2022 to collect an additional 100 samples from hunter-harvested birds. Unfortunately, WPMC recorded our first ever records of HPAI with approximately 25 mallards and black ducks testing positive during the winter of 2022. HPAI has now been detected in commercial poultry operations throughout the United States. In Ohio, 10 different operations in 9 different counties affecting over 3 million domestic poultry have been confirmed with HPAI by the National Veterinary Services Laboratory (Ohio Department of Agriculture).

WPMC staff have assisted with HPAI surveillance since the 1980's in cooperation with both the Ohio State University College of Veterinary Medicine and USDA Wildlife Services. This past year WPMC staff led spring and summer sampling efforts while USDA biologist (and former WPMC intern) Tyler Genders led fall collection efforts.

Highlighting 2022 Interns and Technicians

Jeffrey Edwards, Internship 2022: Jeffrey completed his internship with WPMC this past December and immediately started his graduate research at the University of Missouri. Jeffrey will be co-advised by Dr. Lisa Webb and Dr. Drew Fowler studying migratory ecology and habitat use of blue-winged teal in the Central Flyway. Much of the data for Jeff's project will come from GPS-GSM satellite transmitters that he will attach to blue-winged teal on their wintering and breeding grounds, similar to the transmitters that Jeffrey helped deploy at WPMC this past summer.

Chuck Farrell, Research Technician 2022: After leaving WPMC in August, Chuck accepted a job working for the United States Department of Agriculture Wildlife Services (USDA). Chuck is currently working for Wildlife Services outside of Chicago on projects targeting meso-predator and urban deer population control. Chuck is one of several former WPMC interns that has gone on to a career with the USDA.

Hunter Collins, Internship 2022: Hunter's internship included collecting morphometric measurements and photos from summer banded and fall hunter-harvested mallards as part of his graduate research at the State University of New York in Syracuse. Hunter will continue to work on that project this coming year and will determine how morphological characteristics can be used to differentiate wild mallards from those with game-farm genetics.

Andrea Spurck, Internship 2022: Andrea started with WPMC this past May as a freshly graduated student from Ohio State University (OSU) with a Bachelor's degree in wildlife science. After completing her internship at WPMC, Andrea went back to OSU in August to begin her Master's research modeling predicted changes in winter waterfowl abundance and distribution in the Upper Midwest, USA, with a focus on Ohio. Andrea will be advised by Dr. Bob Gates at OSU and Brendan Shirkey at WPMC.

2022 WPMC Activities and Presentations

January	Attended Upper Mississippi River and Great Lakes Region Joint Venture Waterfowl Committee (UMGLRJV) meeting
January	Attended UMGLRJV Waterbird committee meeting
January	Attended Ohio Bird Conservation Initiative meeting
March	Attended UMGLRJV Waterbird committee meeting
March	Attended Ohio Bird Conservation Initiative meeting
March	Attended Lake Erie Marsh Association annual meeting
March	Attended Long Point Waterfowl Scientific Advisory Committee meeting
March	Presented at UMGLRJV Management Board meeting
April	Hosted Ohio Decoy Collectors and Carvers Association meeting
April	Attended Master's thesis defense, "Evaluation of Metal Levels in Tissue of Reptiles, Mammals, and Fish Between Strip-mined and Coastal Wetlands in Ohio"
April	Attended New York DEC Meeting, "Discussing Analytical Techniques and Management Implications of Marsh Bird Surveys Data Findings in New York"
May	Attended Ohio Bird Conservation Initiative meeting, Columbus Ohio
May	Hosted Winous Point Marsh Conservancy annual meeting (Photo 1)
May	Hosted Black Swamp Bird Observatory "Biggest Week in Birding" field trips
May	Presented at Joint Aquatic Sciences Meeting and conference, Grand Rapids, MI
May	Hosted Cleveland Museum of Natural History birding field trip
May	Led three Port Clinton Middle School field trips, "Applying Course Curriculum in the Field" (Photo 2; also Page 8)
June	Hosted UMGLRJV Waterfowl Committee meeting
June	Hosted Women in Conservation workshop
June	Hosted Ohio State University Stone Lab invertebrate sampling class field trip
July	Hosted "Day on the Wildside" youth event (Photo 3)
July	Hosted "Great Lakes Wetland and Waterfowl Graduate Student Symposium" (Photo 4)
August	Attended Ph.D. Dissertation Defense Seminar, "Land Stewardship Motivations for Different User-Groups on Michigan's Managed Waterfowl Areas"

August	Hosted Green Creek Marsh Conservancy summer meeting and social
September	Guest Lecturer for Ohio University ornithology class
September	Hosted Ottawa County Leadership field trip
October	Attended H2Ohio monitoring workshop
October	Hosted Delta Waterfowl University Hunt Program with Ohio State University and Ohio Division of Wildlife (Photo 5)
October	Hosted Ohio Division of Wildlife officer cadets waterfowl training
October	Hosted Cedarville University Biology class field trip
November	Attended Blanding's turtle project update and conservation workshop
November	Attended UMGLRJV Waterfowl Committee meeting, Havana, IL

Photo 1. WPMC Annual meeting attendees learn about turtle trapping from Ohio State Veterinary student researchers.

Photo 2. Port Clinton middle school 7th-grade science students work through water quality and wetland ecosystem classroom exercises.

Photo 3. Community and conservation partner volunteers work hard to organize and deliver the annual "Day on the Wild Side" middle-school education event each July at WPMC.

Photo 4. Twenty graduate students and science professionals from across the midwest spent two days at WPMC in July 2022 for the "Wetlands and Waterfowl Graduate Symposium".

Photo 5. Nine Ohio State University students participated in the Delta Waterfowl University Hunt Program hosted by the Winous Point Marsh Conservancy and Toussaint River Watershed Conservancy in October. In addition to the actual hunt, the students received classroom instruction on wetlands, wildlife, and conservation; Hunter and Firearms safety instruction from Ohio Division of Wildlife Staff; and bird cleaning and preparation. (Photo Credit Matt Hicks Photography and Delta Waterfowl).

2022 WPMC Publications

Published:

To improve existing marsh bird survey protocols, we need to evaluate closure assumptions. Wildlife Society Bulletin, online December, 2022. Fournier, A M. V., T. M. Bradshaw, H. M. Hagy, and B. Shirkey.

Harvest mortality of mallards (*Anas platyrhynchos*) banded at Lake St. Clair, CAN and Western Lake Erie, USA. Waterbirds 45:51-61. 2022. Palumbo, M. D. and B. T. Shirkey.

In Review:

Vocalization behavior of resident and migrant Virginia rails (*Rallus limicola*) and soras (*Porzana carolina*) in northwestern Ohio, U.S.A. Waterbirds, *in review.* Shirkey, B. T., J. W. Simpson, J. M. Hansen, N. M. Henst, R. J. Gates, and C. M. Tonra.

Population genetics and geographic origins of mallards harvested in northwestern Ohio. Plos One, *in review.* Schummer, M. L., J. W. Simpson, B. T. Shirkey, S. R. Kucia, P. Lavretsky, and D. C. Tozer.

King Rail home range and microhabitat characteristics in western Lake Erie coastal marshes. Ecology and Evolution, *in review.* Brewer, D., T. M. Gehring, M. Garcia, B. T. Shirkey, J. Simpson, and A. M. V. Fournier.

King Rail response to audio playback: implications for population estimation, monitoring methodology, and trapping approach. Journal of Field Ornithology, *in review.* Brewer, D. E., T. M. Gehring, B. T. Shirkey, and J. W. Simpson.

In Preparation:

Departure probabilities and spring migratory movement of Virginia Rails marked in northwestern Ohio. Hengst, N.M, B.T. Shirkey, R.J. Gates, and J.W. Simpson.

Advancing secretive marsh bird conservation: Monitoring methodology, habitat association, and conspecific attraction. Dustin B. Ph.D. Dissertation, Central Michigan University. Mount Pleasant, MI, U.S.A.