



2021 Research and Activities Report

February 2022

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On the cover: Osprey photographed at Winous Point Marsh Conservancy, Spring, 2021. Credit: Art Weber, courtesy of Metroparks Toledo.



Vision:

The vision of the Winous Point Marsh Conservancy is to protect, restore and enhance wetland habitat and wildlife in the southwest Lake Erie region by serving as advocate, practitioner, and educator.

Mission:

The WPMC's area of focus is the wetlands and tributaries of southwestern Lake *Erie in pursuit of the following goals:*

- 1) To assure the protection and stewardship of the Winous Point Marsh Conservancy wetlands and property.
- 2) To aid and facilitate wetland conservation and restoration efforts in the greater southwest Lake Erie region.
- *3)* To support and develop research and educational opportunities in wetland and wildlife ecology.



2021

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Executive Note

Staff: John Simpson, Executive Director Brendan Shirkey, Research Biologist C.J. White, Maintenance and Management

The Winous Point Marsh Conservancy's programs continue to grow and diversify to support our Vision and Mission of furthering research, conservation, and education in Great Lakes wetlands ecology. As you will see in this report, 2021 was a productive year, and we once again graduated several students, furthered long-term projects and partnerships, and welcomed several new projects. As I look towards 2022, we are already planning new projects with existing and new partners and investigating options to solidify long-term research program delivery.

Formal research support at Winous Point Marsh dates to 1949 and that long history has cemented it as the focus of the WPMC's operations. This is for good reason, as we have delivered impactful and applied research and trained young ecologists who have taken the skills they developed at WPMC all across the country (recent examples, Page 37). However, while this report focuses on our Research program, our Conservation program is no small undertaking and something that has been occurring since our founders first purchased marshlands in 1856. In the pasts few years, we have invested substantially into the preservation, management, and upkeep of the 3,000 acres of coastal wetland the WPMC annually maintains and manages. Looking forward, we have both short and long-term plans to continue to steward this land with the assistance of conservation programs for invasive species management and water quality improvements.

Thanks to the generosity of committed donors, our relatively new Legacy Endowment and preexisting Brown Fellowship are already making substantial contributions to existing programs and projects. Over time, these funds will provide permanent support for graduate student research, training of young professionals, and the ongoing management of coastal wetlands in northwest Ohio. We look forward to the challenges and opportunities that program growth will mean for us 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

Winous Point Marsh Conservancy and Ohio Division of Wildlife Cooperative Waterfowl Banding

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

Collaborators: Black Duck Joint Venture, Green Creek Wildlife Society, Black Swamp Bird Observatory, The Ohio State University, Toussaint River Watershed Conservancy

Schedule: Long-term

Introduction: Winous Point Marsh Conservancy (WPMC) has a long history of bird banding in Ohio. We formalized our waterfowl banding through a cooperative agreement with the Ohio Division of Wildlife (ODW) in 2014. WPMC staff now helps the ODW meet summer and winter banding quotas established by the U.S. Fish and Wildlife Service and Mississippi Flyway Administrative Council. WPMC plays a significant role in Ohio's banding effort, accounting for approximately 34% of all mallards (*Anas platyrhynchos*), 16% of all wood ducks (*Aix sponsa*), and 73% of all black ducks (*Anas rubripes*) banded within the state over the past decade (Figures 3 and 4). Furthermore, WPMC's banding efforts have contributed data to support multiple graduate student projects and peer-reviewed publications within the past 7 years.



Figure 1. WPMC intern, Rachael Bealer, with 3 leucistic hen mallards captured during banding efforts in August of 2021.

Summary: Banding efforts in 2021 resulted in the capture and banding of 4 different duck species totalling 667 individuals. This included 304 mallards, 246 wood ducks, 110 black ducks, and 7 ring-necked ducks. Sixteen of these mallards were marked with satellite transmitters to support Michigan State University Ph.D. student Ben Luukkonen's project and that support will continue for several years (pages 24 - 29).

We have also begun preliminary discussions with Ohio State University, the ODW, and the Waterfowl Research Foundation to support a graduate student who will investigate potential changes in fall and winter waterfowl distribution in Ohio. Band recoveries from birds banded at Winous Point Marsh will undoubtedly play an important role in that project as well. One project objective is determining if and how fall migration timing might be shifting with a warming climate, with a focus on how changing distributions could impact waterfowl hunters (Figures 5 and 6).



Figure 2. Research technician, Trey McClinton, punting out to check a swim-in duck trap (left), and Trey along with intern, Blake Abt, banding a drake mallard in July of 2021 at WPMC (right).

Species	Winter totals	Summer Totals
Black Duck	104	6
Mallard	63	241
Wood Duck	0	246
Ring Neck	7	0
Seasonal Total	174	493

Table 1. Total number of banded ducks by species during the winter (January-April) and summer banding program (July – September) in 2021.

Table 2. Total number of waterfowl banded by species at the Winous Point Marshes since 2010.

Year	Mallard	Wood Duck	Black Duck	Redhead	Gadwall	Canvasback	Ring Neck	Scaup	Shoveler	Pintail	Wigeon	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
Totals	3613	1999	931	627	351	54	43	41	10	8	6	2

Grand Total 7685



Figure 3. Mallard banding effort in Ohio from 2011 to 2020. White, green, and yellow indicate low densities of banded mallards while orange and red indicate high densities of banded mallards.



Figure 4. Wood duck banding effort in Ohio from 2011 to 2020. White, green, and yellow indicate low densities of banded wood ducks while orange and red indicate high densities of banded wood ducks.



Figure 5. Distribution of harvest of mallards banded at WPMC in July and August of 2011 through 2020. Red dots represent September – November and blue stars represent December – January harvest during the first hunting season following banding.



Figure 6. Distribution of harvest of wood ducks banded at WPMC in July and August of 2011 through 2020. Red dots represent September – November and blue stars represent December – January harvest during the first hunting season following banding.

Winous Point Marsh Conservancy and ODW supplies field staff, time, and materials to band waterfowl and analyze data. Additional project funding is also sourced from the Black Duck Joint Venture and Ohio State University. Green Creek Wildlife Society and Black Swamp Bird Observatory provide additional banding staff and resources and Toussaint River Watershed Conservancy supplies additional banding site and logistical resources.

Winous Point Marsh Conservancy Purple Martin Monitoring

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

Schedule: 2017 – current

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 to erect 8 nesting towers with 144 nesting cavities at the Winous Point Marsh.



Figure 1. Adult female purple martin tending to her nest at the Winous Point Marsh in spring of 2020.

As in years past, the purple martin, tree swallow, and bluebird monitoring projects encourage citizen science and are a great way for volunteers to get involved in wildlife conservation. Our students and volunteers again assisted with nest monitoring at the Winous Point Marsh and 522 purple martin hatchlings were banded here in 2021. Previous year totals banded include 373 in 2020, 495 in 2019, and 310 in 2018. Our facilities also 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 2022.



Figure 2. Volunteers cleaning and disassembling purple martin nesting rigs at Winous Point Marsh in August of 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 and Trey McClinton, Winous Point Marsh Conservancy; Laura Kearns, Ohio Division of Wildlife, USDA Wildlife Services, Toledo Metroparks

Schedule: Long-term

Introduction: Common terns (*Sterna hirundo*) have been listed as state endangered in Ohio since 1974 and are state endangered or threatened in many of the states surrounding the Great Lakes. Once frequent nesters on the sand and gravel islands and shorelines of western Lake Erie, common terns are now entirely dependent on artificial nesting platforms to sustain a breeding population in Ohio. These artificial platforms were established in 1994, and the Ohio Division of Wildlife (ODW) now has one of the longest running datasets for this species in the Great Lakes region.



Figure 1. Summer interns Rachael Pierce and Blake Abt assisting with banding of common tern chicks in July of 2021 at the Willow Point colony.

Summary: The ODW, Toledo Metroparks, and USDA Wildlife Services staff deployed 6 artificial nesting platforms at Howard Marsh Metropark (Lucas County, OH) and 6 platforms at Willow Point State Wildlife Area (Sandusky County, OH) in 2021. Winous Point Marsh Conservancy research staff monitored the platforms weekly to band chicks and record recapture status beginning in the middle of May and continuing through late August. We banded 367 chicks in 2021 up slightly from 360 chicks banded in the summer of 2020. The number of fledglings was up considerably from the 227 that fledged in 2020 with an estimated 286 chicks surviving to fledging in 2021. Both are higher than the long-term average goal of 184 chicks established by the Detroit River – Western Lake Erie Common Tern Management Plan.

Despite control efforts by USDA Wildlife Services, great-horned owls (*Bubo virginianus*) continue to be the primary threat to common tern chick survival on the artificial platforms, and we believe one of the primary factors limiting tern production at Ohio's colonies. Other factors such as site location, extreme weather events, and summer precipitation and temperature patterns could also play a role in the breeding productivity of common terns. However, further research is needed to better understand the role of these variables, and ultimately, improve our management of common tern colonies in Ohio.



Figure 2. Banded adult common tern perched on a nesting platform at the Willow Point colony in July, 2021.

Table 1. Number of common tern nests detected and the number of succesful nests by platform at the Howard Marsh and Willow Point colonies during the 2021 season. Successful nests are defined as any nest hatching at least 1 chick.

2021 Howard Marsh Nests				
Platform ID	Total Nests	Successful Nests	Success Rate	
1	44	25	0.568	
3	44	26	0.591	
4	39	23	0.590	
5	35	28	0.800	
6	53	39	0.736	
7	44	39	0.886	
Total	259	180	0.695	

2021 Willow Point Nests				
Platform ID	Total Nests	Successful Nests	Success Rate	
1	16	9	0.563	
2	19	15	0.789	
3	28	19	0.679	
4	21	12	0.571	
5	27	21	0.778	
6	19	11	0.579	
Total	130	87	0.669	

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 Willow Point colonies in 2021.

2021 Fledging Rates				
Colony		Howard Marsh	Willow Point	
Birds Banded		287	80	
Mortalities		49	32	
	Presumed Predation	28	15	
	Confirmed Mortalities	21	17	
Fledglings		238	48	
Fledging Rate		0.829	0.600	

Winous Point Marsh Conservancy (WPMC) supports this project through a cooperative agreement with the ODW whereby WPMC supplies field staff, time, and materials to monitor the tern nests and conduct maintenance on the artificial nesting platforms.

Developing Habitat Occupancy Models and Addressing Call-Response Biases for King Rails in the Great Lakes Region

Investigators: Dustin Brewer and Dr. Thomas Gehring, Central Michigan University

Collaborators: Brendan Shirkey and Trey McClinton, Winous Point Marsh Conservancy; Auriel Fournier, Forbes Biological Station; Toussaint River Watershed Conservancy

Schedule: 2019 – 2023

Introduction: King rail population declines in Great Lakes region have likely been caused by habitat loss, though due to the secretive nature of king rails, our understanding of suitable habitat at both the micro (within home range) and macro (larger than home range) scales is lacking. Another challenge is that even when present king rails are difficult to detect and likely violate assumptions of many standard survey techniques. In order to use distance sampling methods to produce accurate estimates of king rail abundance, 'correction factors' should be incorporated into population models. These correction factors determine and account for the proportion of king rails that are not detected even when near to a sample point during a survey and can improve population estimates. To address these challenges, our project objectives include:

- 1.) Trap and equip 10-20 king rails across northwest Ohio and southeast Michigan with VHF radio transmitters to collect accurate and abundant fine-scale locational data. These data will be used in conjunction with habitat data to improve our understanding of fine-scale (microhabitat) needs of king rails. Further, if telemetry allows us to discover nests, we have the opportunity to collect some of the first ever habitat data on breeding king rails in the Upper Midwest.
- 2.) Conduct standardized secretive marsh bird surveys in near proximity to radio-marked king rails in order to determine call-response rates and non-response biases, thus complimenting on-going research to determine call-response rates of sora (*Porzana carolina*) and Virginia rails (*Rallus limicola*) in the region.



Figure 1. King rail trapping locations used in northwest Ohio and southeast Michigan in 2019-2021.

Summary: King rails were captured at Winous Point Marsh Conservancy (WPMC; OH), Pickerel Creek Wildlife Area (OH), Ottawa National Wildlife Refuge (OH), and Pt. Mouillee State Game Area (MI; Figure 1). Overall, we caught and radio-tagged 14 king rails (1 in 2019, 5 in 2020, and 8 in 2021). Of these birds, 9 were genetically sexed as males and 4 as females. We completed 245 habitat surveys at king rail homing locations (6 in 2019, 104 in 2020, 135 in 2021) and 485 habitat surveys at random points 75 m from the homing location and representing non-used habitat (7 in 2019, 208 in 2020, and 270 in 2021). We recorded enough independent locations for 10 birds to calculate home range size (mean 95% minimum convex polygon = 16.4 hectares, range = 0.9 to 58.3). We found nests on June 16, 2020 (Pickerel Creek Wildlife Area, OH) and on June 14, 2021 (Pt. Mouillee State Game Area, MI). Both nests were apparently successful (eggs hatched in early July) and habitat data were collected at both sites.

Overall, we completed 87 standardized playback experiments, 46 in 2020 and 41 in 2021. We found that individuals responded on 40 of 87 surveys. Interestingly, this response rate of 46% is nearly identical to the response rate calcuted for Virginia rails by WPMC staff during research conducted in 2017-2019. This suggests that current marsh bird survey techniques likely underestimate how many king rails are actually present on the landscape. In addition to collecting data that will allow us to determine the rate at which king rails respond to standardized

marsh bird surveys, we noted which call types king rails responded to and will determine if the location where audio tracks were recorded (in midwest or outside of midwest) affect response rates. Regarding audio playback, we also experimentalized trapping efforts in 2020 and 2021 to determine which call types most effectively attract king rails to traps.



Figure 2. King rail nest discovered at Point Mouillee State Game Area in Michigan in June, 2021 (left). WPMC research technician, Trey McClinton, releasing a radio-marked king rail captured at Winous Point Marsh in May of 2021 (right).



Figure 3. Central Michigan University research technician, Grant Ravary, setting up a king rail walk-in trap at Point Mouillee State Game Area (Monroe County, MI) in April of 2021.

Winous Point Marsh Conservancy is a co-lead investigator on the project with Dr. Thomas Gehring of Central Michigan University. The project is funded by Central Michigan University and grant funding from the Upper Mississippi River and Great Lakes Region Joint Venture. Toussaint River Watershed Conservancy provides additional trapping locations and logistical support.

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, Ecosystem Health Unit, The Ohio State University; and Dr. Mark Flint, Program Head of Zoo and Wildlife Conservation Medicine and Ecosystem Health, Veterinary Preventive Medicine Department at The Ohio State University College of Veterinary Medicine

Collaborators: Winous Point Marsh Conservancy, Ohio State University 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 safe 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 is no longer allowed by Ohio's government. Another option for the dumping of dredged material is disposal into in-water or upland Confined Disposal Facilities, which can include the creation of dredge spoil islands. Although islands created using dredged materials can provide valuable habitats for wildlife, there remain concerns about the release of industrial contaminants and other pollutants from this material that could have long-term health implications in wildlife species. This project uses a One Health approach to evaluate the impacts of dredge materials on wildlife health in southwestern Lake Erie.

Figure 1. Tory Gabriel of Ohio State University Stone Laboratory, Emily Vincent, Brittany Fischer, and veterinary students from The Ohio State University record fish lengths as part of their ecosystem health assessment.

Summary: Researchers from The Ohio State University will compare two sites with different levels of anthropogenic influences. The first site is the Winous Point Marsh Conservancy on Muddy Creek Bay in Ottawa County, OH. The second site is a Confined Disposal Facility dredge spoil island 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 will compare water quality and sediment parameters, biomarkers of wildlife health in sentinel species, and prevalence of infectious diseases at these two sites.

Fish species at both sites will be captured with fyke and seine nets to assess biodiversity, parasite burden, immune function, and overall health of fish populations. Painted turtles (*Chrysemys picta*) will be captured at each site for comprehensive physical exams and morphometric data. Oral-cloacal swabs from turtles will be used to test for infectious diseases (*Chlamydia*, herpesvirus, *Ranavirus*/FV3-like virus, *Mycoplasma*, and adenovirus). To evaluate systemic health, blood from painted turtles will be used for Complete Blood Counts, biochemistry profiles, and plasma protein electrophoresis testing. In addition, samples from mammal species including muskrats (*Ondatra zibethicus*), American beavers (*Castor candensis*), and American mink (*Neogale vison*) will be collected. Serum, lung tissue, and mucosal swabs from mammals will be analyzed for SARS-CoV-2 PCR and sequencing. Mammals will also be tested for *Chlamydia* with conjunctival and nasal/oral swabs.

Goals:

- 1) To compare ecosystem health parameters at two sites with different levels of anthropogenic influences in Lake Erie using a comprehensive, One Health-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 for SARS-CoV-2, which will add to the growing field of knowledge about this critically important virus in wildlife.

Timeline: This project commenced in fall 2021 with fish sampling at Winous Point Marsh Conservancy. Winous Point Marsh Conservancy supported Year 1 of this project by assisting in fish sampling, collecting mammals, providing housing, and providing supplies. Mammal sampling began in January 2022. Turtle sampling and additional fish sampling will occur in spring and early summer 2022.

Figure 2. Two fyke nets borrowed from Ohio State University Stone Laboratory were used to capture almost 2,500 fish in one night in November 2021 at Winous Point Marsh Conservancy.

Figure 3. Dr. Emily Vincent and Brittany Fischer examine cytology samples and prepare blood smears for fish health assessments in November 2021 at Winous Point Marsh Conservancy.

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

Investigators: Ben Luukkonen, Dr. Scott Winterstein, Dr. Dan Hayes, Michigan State University

Collaborators:

- Winous Point Marsh Conservancy
- Ducks Unlimited, Inc.
- Franklin College, Franklin, IN
- 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 project is a regional collaboration to learn more about factors limiting the Great Lakes mallard population. Since the early 2000's, abundance of mallards nesting in the Great Lakes region has been low relative to the remainder of the midcontinent mallard population. It is unclear what factors are limiting mallard abundance. Mallards are an ecologically important waterfowl species and mallard abundance is related to wetland quantity and quality. As a generalist species, mallards use a variety of wetland types during nesting and the non-breeding period and may serve as an indicator of wetland abundance and function relevant to other wetland wildlife species. Mallards also have social and cultural value for a variety of stakeholders. In the Great Lakes region and Mississippi Flyway, mallards are the most abundant and most harvested duck species. 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: Hen mallards will be marked with GPS-GSM transmitters 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 will be captured in urban and rural areas to assess potential differences in population 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 is a mixed individual with introgression of domestic mallard genes. Further, 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. Population parameters that are 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 (left). A GPS-marked hen mallard ready for release (right).

GPS transmitter deployments began in spring 2021, with 33 hen mallards marked with transmitters during April and May. An additional sample of 161 mallards were marked with transmitters during the summer pre-season banding period (July–September). Winous Point Marsh Conservancy personnel deployed 16 transmitters in Ohio. Nest success, survival, and cause of mortality were estimated using location and movement data collected by transmitters in combination with observations of marked individuals and investigation of mortalities.

Necropsies were preformed to estimate cause of mortality when possible. Spring 2021 nest success was slightly greater for hens nesting in urban areas (33%) than in rural areas (27%), although our initial sample was small and additional individuals will be monitored in subsequent years. The leading cause of mortality was predation, followed by mortalities where cause could not be determined, hunter harvest, vehicle strikes, and poaching (Figure 2). Ohio-marked mallards typically remained within 30 km of the capture site until autumn migration (Figure 3), except for an individual that relocated to Wisconsin in mid-August (Figure 4). Autumn and winter migratory movement for hens marked across the Great Lakes region occurred primarily during November and December (Figure 5). Transmitters have already provided a substantial dataset and preliminary analyses are just beginning. Transmitter deployments planned during the next two years will provide a robust sample of marked mallards and valuable data to inform management decisions.

Figure 2. Number and cause of mortalities during April–December, 2021 for hen mallards marked with GPS-GSM transmitters in Illinois, Indiana, Michigan, Ohio, and Wisconsin.

Figure 3. August through December, 2021 movements of hen mallards marked with GPS-GSM transmitters in northwest Ohio during spring and summer 2021.

Figure 4. August through December movements of hen mallards marked with GPS-GSM transmitters in northwest Ohio during spring and summer 2021.

Figure 5. Autumn and winter migratory movement of GPS-marked hen mallards by month for mallards marked in Illinois, Indiana, Michigan, Ohio, and Wisconsin in 2021.

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

In the last 20 years 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*). 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 turtle 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 ninth consecutive year USDA Ohio Wildlife Services conducted trapping efforts as part of an integrated approach to managing meso-predator populations, mainly raccoons (*Procyon lotor*), in northwest Ohio. The focus of the project is on increasing the nesting success and enhancing the survival rate of Blanding's turtles 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.

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 PIT tag and a blood sample was collected for genetic analysis.

In 2019, we conducted visual and trap surveys, resulting in a total of 1560 trap-nights at the Winous Point Marsh Conservancy. This effort resulted in the capture of 12 Blanding's turtles

and visual observation of two more turtles. In addition, we captured 85 snapping turtles (*Chelydra serpentine*) and 386 painted turtles (*Chrysemys picta*). In 2021, we conducted visual and trap surveys, resulting in a total of 1998 trap-nights at Winous Point Marsh Conservancy. This effort resulted in the capture of 18 Blanding's turtles and visual observation of two more turtles. In addition, we captured 138 snapping turtles (*Chelydra serpentine*) and 442 painted turtles (*Chrysemys picta*). Three female Blanding's turtles captured in 2021 were equipped with radio telemetry units to track nesting and hibernacula locations. These efforts along with those of the Toledo Zoo, resulted in the collection of the largest data set on turtles, 2,752 Painted turtles, 827 snapping turtles, 9 Spotted turtles, 4 northern map turtles (*Graptemys geographica*), and 1 stinkpot turtle (*Sternotherus odoratus*). This data set will provide valuable information to ensure turtles continue to be part of the rich natural heritage of the Lake Erie Basin.

Figure 2. Blanding's turtle located at the Winous Point Marsh Conservancy with the help of volunteers, summer 2021.

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.

Additional Research Supported by WPMC in 2021

In addition to the projects detailed above, Winous Point Marsh Conservancy annually supports a variety of smaller projects or supplies field, housing and logistical support for larger projects not directly initiated by our staff. These projects are important components towards achieving program objectives.

Origins of Northern Pintails Harvested in the Atlantic and Mississippi Flyways

Pintails (Anas acuta) harvested in eastern North America come from 3 main breeding populations in the U.S. and Canadian prairies, Alaska, and eastern Canada. In the east, pintails primarily breed around Hudson and James Bays and northern Quebec. Apparent increases in the number of pintails observed in the east have researchers suspecting that the eastern pintail population may be increasing relative to pintail breeding populations elsewhere. Prior research on pintails marked with satellite telemetry units on Atlantic Coast wintering areas revealed that 80% of these females (n = 55) used an eastern migration corridor and all but 2 settled in the southern James Bay lowlands of Ontario or farther east. This is further corroborated by counts of ~35,000 pintails during peak migration in the Montezuma Wetlands Complex of central New York alone. On opening week of waterfowl season, harvest of pintail in the Montezuma Wetlands Complex and elsewhere in NY is comprised largely of juveniles, although this percentage does fluctuate annually, presumably because of differences in annual production. However, where these ducks are produced and breed is difficult to determine using traditional banding because few pintails are banded in their eastern breeding region. Pintails breeding in eastern North America may contribute substantially to harvest in the Atlantic flyway and may have different productivity than those in the mid-continent and Alaska. Stable isotope analysis of feathers grown on breeding grounds provides a unique opportunity to sample pintails in abundance to determine summer origin and regional productivity.

Dariusz Wojtaszek is the graduate student leading this project while completing his MSc at Western University, London, Ontario, Canada. SUNY ESF lab is providing financial, technical, and logistical support in collaboration with the Hobson Isotope Lab at Western University. Funding is provided by the Long Point Waterfowl and Wetlands Research Program of Birds Canada and Waterfowl Research Foundation. Technical assistance provided by the USFWS Parts Collection Survey and Winous Point Marsh Conservancy.

Nutrient Cycling by Invertebrates in Wetland Sediments

Figure 1. Technicians collect samples from enclosures at the Winous Point Marsh Conservancy, Summer 2021.

This experiment uses fish/waterfowl exclosures to experimentally manipulate benthic invertebrate densities in order to get a better understanding of how invertebrates can influence nutrient cycling in wetland sediments. We measured invertebrate densities, redox conditions, porewater concentrations of nutrients, and nutrient flux rates within our control exclosures and elevated invertebrate density exclosures. We are still working through samples but our previous lab-based studies have indicated that burrowing benthic invertebrates, or bioturbators, increase oxygen penetration into sediments, and thereby enhance phosphate retention in the sediment and increase the release of nitrate and ammonium to surface water. However, we expect that bioturbators also enhance paired nitrification and denitrification, potentially leading to a net removal of nitrogen from surface water. We hope to see the same trends in this study, although potentially not as pronounced due to more environmentally realistic conditions than in our prior lab studies.

Taylor Michael is a Ph.D. Candidate at Kent State University in Kent, Ohio. Winous Point Marsh Conservancy provides one study area and logistical support for exclosures and sampling.

Origins and Genomics of Mallards Harvested in Northwestern Ohio

In collaboration with John Simpson and Brendan Shirkey of Winous Point Marsh Conservancy and Dr. Philip Lavretsky of the University of Texas – El Paso, The Waterfowl and Wetlands Research Lab at SUNY ESF developed a concentrated, single season case study to investigate the origins and genomics of mallards harvested in Sandusky and Ottawa counties of northwestern Ohio. The region is a confluence of mallards from the Mississippi and Atlantic flyways and enabled us to investigate the extent of game-farm genes farther west than the Atlantic Coast. We sampled 296 hatch-year mallards from October to December 2019 to determine their origins by stable isotope analysis and applied genetic techniques to determine proportions of pure wild mallards, pure game-farm mallards, and filial categories (e.g. wild mallard × game-farm mallard = F1; F1 × wild mallard = F2; and so on).

Nowadays, ~92% of Atlantic Coast mallards have substantial game-farm gene input ($\geq 10\%$ assignment probabilities). In contrast, Dr. Lavretsky and colleagues previously detected that ~40% of sampled Mississippi and 3% of more western North American mallards possessed substantial game-farm mallard ancestry. Interestingly, these previous efforts working with mallards randomly sampled across Mississippi flyway states a decade ago was nearly identical to what we detected, with 40% of mallards harvested in northwestern Ohio marshes possessing substantial game-farm mallard ancestry. Furthermore, most mallards at this location were categorized as hybrid swarm (82%) and only 10.5% were pure wild mallards. F1 to F5 hybrids were 9% of our sample, 3 of which were F1 hybrids (pure game-farm \times pure wild cross), indicating there is ongoing reinforcement of game-farm genes into the hybrid swarm of our sample. We also detected that wild mallards originated from farther north than hybrid mallards. These results suggest that game-farm introgression into the wild mallard population is not isolated to the eastern population of mallards in North America but may be more widespread than previously detected. The stable percentage of game-farm genes for a decade also highlights potential for a barrier to game-farm introgression into mid-continent mallards. Considering that game-farm mallard introgression into the eastern mallard population has been presented as a viable hypothesis for eastern mallard decline, understanding movement of game-farm genes out of the Atlantic flyway into the core of the North American mallard breeding region is important.

Funding was provided by the Long Point Waterfowl and Wetlands Research Program of Birds Canada and Waterfowl Research Foundation.

Natal Origins and Breeding Habitat Associations of the Eastern Mallard Population

The number of eastern mallards has been declining for 20 years but few studies have helped inform management actions to recover this population. Sam Kucia of the Waterfowl and Wetlands Research Lab at SUNY ESF is the first of several students to address this information deficit. Sam used stable isotope analysis to determine where juvenile mallards harvested in the Atlantic flyway were produced and investigated land cover associations of breeding mallards in the region of mallard decline.

From a sample of 1,254 wings feathers from the 2018-19 and 2019-20 hunting seasons, Sam determined that 64% of the sample had isotope signatures consistent with origins in Canada. Sam also detected that all states harvested mallards that had origins from the United States and Canada throughout their entire hunting season. Results contrast long-term breeding population estimates which suggest the majority of breeding pairs of eastern mallards occur in the U.S. He recommends further investigation into reasons for spatial disparities in eastern mallard production. These results are also informative for ongoing population modeling activities by the US Fish and Wildlife Service and Atlantic Flyway Technical Section.

Sam also used mallard breeding pair abundance from 1,322 1-km² plots surveyed in the Atlantic Flyway Breeding Waterfowl Plot Survey and detected that mallards were strongly associated with areas of human development, and also woody and emergent wetlands. Fewer mallard breeding pairs were found in areas with cultivated crops. Research is needed to investigate how human development is affecting breeding mallard survival and productivity.

Immediate land protection and conservation recommendations include restoring historical wetlands from agricultural lands to emergent and woody wetland which were positively associated with mallard breeding pairs.

Sam Kucia led this project while completing his Master's degree in Fish and Wildlife Biology and Management at SUNY ESF in December 2021 and is now a Ph.D. candidate at South Dakota State University. Financial support was provided by Delta Waterfowl, Ducks Unlimited, Waterfowl Research Foundation, Long Island Wildfowl Heritage Group, Robins Island Foundation, and additional philanthropy. Technical assistance was provided by the Hobson Isotope Lab at Western University and Winous Point Marsh Conservancy.

Highlighting Former Interns, Technicians, and Graduate Students

The Winous Point Research Committee started the summer internship and training program in 1983. This program was then adopted into the Winous Point Marsh Conservancy (WPMC) at incorporation in 1999. Originally started as a training program for young professionals, that model has continued over time as the program evolved from 2 seasonal positions to as many as 4 at times plus the addition of a Research Technician position in 2015. To date, 85 individuals have worked within the internship and technician programs and are now employed in Natural Resources occupations within government, academic, and non-governmental organizations across the country.

Jessica Schmit, Research Technician 2019 - 2020: After leaving WPMC, Jess utilized her skills working with marshbirds as the crew lead of a clapper rail demographics project in Delaware. Just recently, she is excited to pursue her Master's Degree at the University of Arkansas-Fayetteville. Jess's project will focus on king rail breeding and migration ecology, distribution, and abundance in Arkansas and is funded through the Arkansas Game and Fish Commission, Cooperative Wildlife Unit, and the Illinois Natural History Survey.

Owen Segaard, Intern 2016, 2017, and 2018: After working for WPMC, Owen obtained a volunteer internship for Friends of Ottawa National Wildlife Refuge and decided to pursue a career in wildlife resources. He graduated from Hocking College in 2020 and accepted a "Pathways Maintenance and Mechanic" position with the U.S. Fish and Wildlife Service (USFWS). He then continued his education at West Virginia University where he will graduate this spring. Last summer, he worked for the USFWS in Fergus Falls, Minnesota and hopes to accept a full-time position with the USFWS post-graduation.

Rachael Bealer, Intern 2021: After leaving WPMC in September, 2021 Rachael was hired as a waterfowl technician working on the Tennessee Mallard Project through Tennessee Technological University. There she assisted with the deployment of ~160 GPS Transmitters on wintering mallards at Reelfoot Lake, TN. More recently, Rachael accepted a full-time position with Pennsylvania Game Commission. In this position she will be responsible for overseeing wild turkey GPS and radio transmitter research.

Nicole Hengst, Technician and Graduate Student 2017-2020: After graduating from Ohio State University, Nicole began working as a wildlife biologist at Chesapeake Marshlands National Wildlife Refuge Complex on the Eastern Shore of Maryland. Nicole administers a multiyear mark-recapture study of spotted turtles at Blackwater National Wildlife Refuge to estimate abundance and also a winter bat inventory project. Additionally, she helps with other biological surveys, the invasive species program, timber stand improvement projects, the regional wildland fire program, and public outreach for the refuge complex.

Trey McClinton, Intern 2017 and Research Technician 2021: Trey's affiliation with WPMC began with a summer internship in 2017. Following that internship, he earned his Master's degree at Michigan State University, before he returned to WPMC in the spring of 2021 to work as the Research Technician. This past December, Trey accepted a job in his home state with Texas Parks and Wildlife as the lead biologist at the Justin Hurst Wildlife Management Area. Trey is responsible for habitat management, a public hunting program, and coordinating special use access with industry and grazing lease holders.

2021 WPMC Activities and Presentations

January	Great Lakes Mallard Project Partners Coordination meeting						
January	Attended Great Lakes Coastal Assembly meeting						
January	Attended Lake Erie Marsh Association meeting						
January	Sandusky Bay Restoration Initiative update meeting						
February	Upper Mississippi River and Great Lakes Region Joint Venture Water						
	Committee meeting						
February	Lake Erie Cooperative Weed Management Area meeting						
February	Upper Mississippi River and Great Lakes Region Joint Venture Waterfowl						
	Committee meeting						
February	Attended Wild Rice Restoration webinar						
March	Attended European Frogbit Invasive Plant Workshop webinar						
March	Long Point Waterfowl Scientific Advisory Committee meeting						
March	Great Lakes Mallard Project Partners meeting						
March	Ohio Bird Conservation Plan meeting						
April	Attended Master's defense seminar, "Waterfowl Use and Hunter Success on						
	Managed Waterfowl Areas in Michigan"						
April	Attended Master's defense seminar, "Movements and Habitat Relationships of						
	Virginia Rails and Soras Within Impounded Coastal Wetlands of Northwest						
	Ohio"						
April	Presented at the "Friends of Ottawa National Wildlife Refuge" research talk series						
April	Hosted Ducks Unlimited documentary film crew						
May	Winous Point Marsh Conservancy annual meeting						
July	Hosted Ohio Division of Wildlife "Fish Ohio" tour						
July	Hosted Women in Conservation event						
July	Judged Ottawa County 4H "Conservation" projects						
July	Hosted Day on the Wild Side youth education event						
August	Ohio Bird Conservation Initiative Plan meeting						
August	Hosted Green Creek Wildlife Society volunteer appreciation day						
August	Hosted H2Ohio tour						
September	Attended Flowering Rush Control and Management webinar						
September	Guest speaker at Ohio University ornithology class						
October	Attended the Ohio Biodiversity Conservation meeting, Columbus, Ohio						
December	Ohio Bird Conservation Initiative Plan meeting						
December	Great Lakes Mallards Project partner meeting						

2021 WPMC Publications

Published:

Movement Patterns and Microhabitat Selection of Virginia Rails and Soras within Coastal Impounded Wetlands of Northwest Ohio. Master's Thesis. Hengst, N.M. Ohio State University. 2021.

In Review:

Evaluating Closure Assumptions to Improve Existing Marsh Bird Survey Methodology. Wildlife Society Bulletin. Fournier, Auriel; Bradshaw, Therin; Hagy, Heath; Shirkey, Brendan.

Harvest Mortality of Mallards Banded at Lake St. Clair, Canada and Western Lake Erie, USA. Journal of Great Lakes Research. Palumbo, M.D. and B.T. Shirkey.

Scale-Dependent Occupancy and Relative Habitat Suitability of Kings Rails in the Midwestern United States. Journal of Field Ornithology. Michelle E. Kane, Thomas M. Gehring, Brendan T. Shirkey, Kevin L. Pangle, Donald G. Uzarski, Michael A. Picciuto, and John W. Simpson.

In Preparation:

Origins and Genomics of Mallards Harvested in Northwestern Ohio. Michael L. Schummer, John Simpson, Brendan Shirkey, Sam Kucia, Phillip Lavretsky.

Estimating Occupancy and Abundance of Virginia Rails and Soras in Northwest Ohio. Brendan T. Shirkey, Robert J. Gates, James M. Hansen, Nicole M. Hengst, John W. Simpson.