FILE

18-1607-EL-BGN

Date: August 24, 2020

From: Catharine Downing

To: Ohio Power Siting Board

Re: Supporting Documents

Enclosed with this memorandum are some of the sources I relied upon for my speech presented virtually to you at the Emerson Creek Wind Project public hearing August 20, 2020. Thank you for including them on the record.

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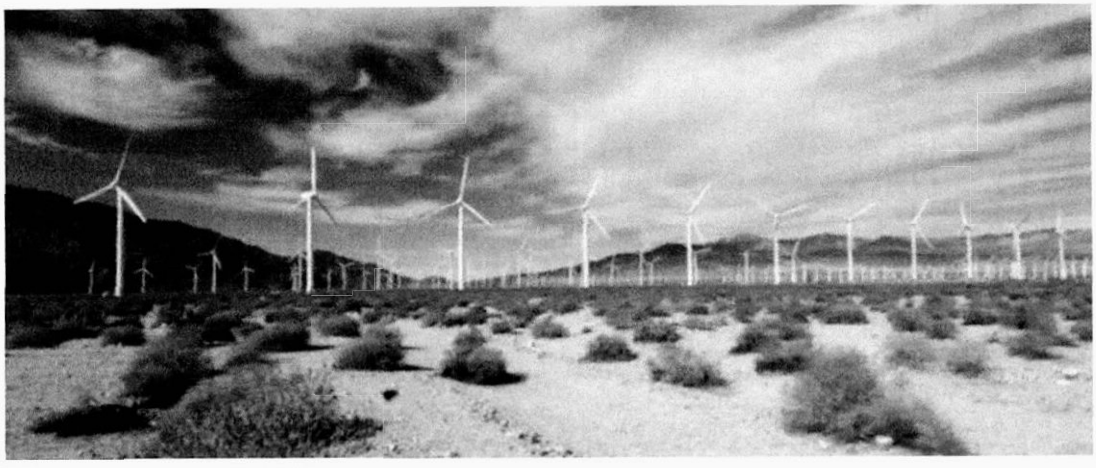
Conventional Wind Energy – A Design Deadly for Birds



Wind turbines present an ever-present danger to not only eagles and other birds of prey, but also to any migratory bird that passes through

with arms 116 feet long – that's an enormous area that is covered as the blades rotate.

"Wind turbines may now be among the fastest-growing human-caused threats to our nation's birds. Attempts to manage the wind industry with voluntary as opposed to mandatory permitting guidelines are clearly not working. Wind developers are siting turbines in areas of vital importance to birds and other wildlife, and this new data shows that the current voluntary system needs radical improvement", said Dr. Michael Hutchins (now deceased), former National Coordinator of American Bird Conservancy's Bird Smart Wind Energy Campaign.

The American Eagle Foundation joins American Bird Conservancy in supporting Bird Smart wind energy development, which involves careful risk assessment leading to appropriate siting; independent, standardized post-construction monitoring of bird fatalities; mitigation using effective, tested methods; and compensation if federally protected birds and bats are killed incidentally. The number of birds taken annually by wind energy facilities (not including associated power lines and towers) has been estimated to exceed 1.4 million birds by 2030 if there is no change in U.S. policy toward wind energy development.

Fish & Wildlife Service's Eagle Management Plan Presents Grave Risk

In December, 2016, a new eagle-management plan announced a final rule by the federal government that would give wind energy developers 30-year permits to "take" or incidentally kill protected Bald and Golden Eagles, without requiring the industry to share mortality

data with the public or take into consideration such critical factors as proper siting. The so-called Eagle Take Rule, finalized by the U.S. Fish & Wildlife Service, puts many thousands of the nation's protected Bald and Golden Eagles at unacceptable risk.

The American Bird Conservancy – as well as a host of other environmental agencies – have requested that the U.S. Department of the Interior develop a **National Programmatic Wind Environmental Impact Statement (EIS)** to identify appropriate areas for wind energy development as well as areas where development should be avoided completely to conserve federally protected birds and protect especially sensitive habitats.

ABC was subsequently told that the Department of the Interior and FWS did not have sufficient funds to undertake such a project.

Supporting the development of clean, renewable sources of energy such as wind and solar power to address climate change is admirable, but such development must be done responsibly, with minimal impact on our public trust resources, especially federally protected species such as Bald Eagles and Golden Eagles. If wind farms are to be created, we must make sure the farms are placed in areas where there will be the least negative impact to eagles and other birds.

> *"Alternative energy is not 'green' if it is killing hundreds or thousands or millions of birds annually," said Dr. Hutchins. "Our wildlife should not be collateral damage in our effort to combat climate change, nor does it have to be. Improved regulation and science leading to proper siting, effective*

mitigation, and compensation would go a long way to address this conflict."

Ten Worst Offenders

ABC has identified 10 of the worst-sited wind energy projects in the United States. The listed projects—five already built or approved and five proposed—are located throughout the United States, in California, Hawaii, Kansas, Massachusetts, Missouri, New York, North Dakota, Texas, West Virginia, and Wyoming. Some of these projects have a long history of causing bird deaths. All illustrate the risks of poor siting and the limitations of current mitigation strategies.

Are Some Designs Better Than Others? Look to Hawai'i's Approach!

In June 2016, an article by Dr. Hutchins entitled *To Protect Birds From Wind Turbines, Look to Hawai'i's Approach* stated, "To address the growing and recognized risk to threatened and endangered species, federal and state regulators have created protections that are currently unique to Hawai'i. While far from perfect, we believe these protocols should, at minimum, also be employed on the mainland. Doing so would go a long way toward helping protect threatened and endangered birds and bats."

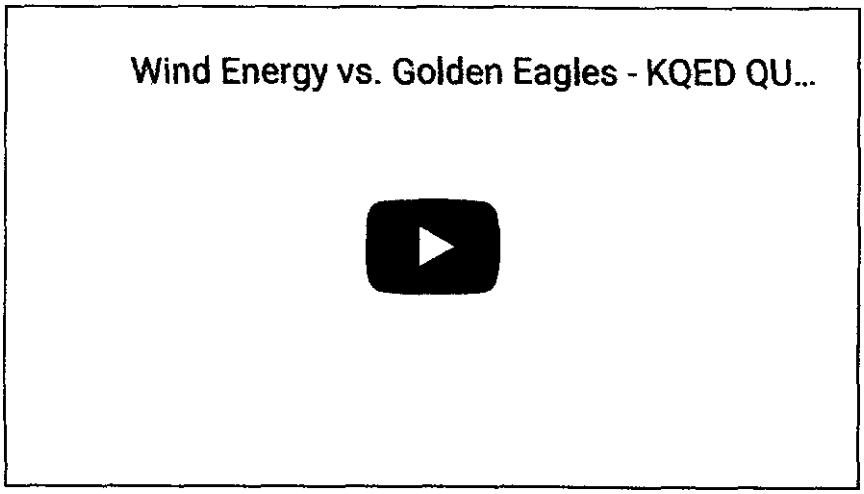
In Hawai'i some areas are completely off limits to wind development. State and federal officials have declared the island of Kaua'i totally restricted for any wind energy development due to the presence of many endangered species. This forethought and planning have been lacking on the mainland.

areas where wind turbine farms have been constructed.

A 2013 study published in ***The Wildlife Society Bulletin*** found that wind turbines killed an estimated 573,000 birds annually in the United States. And that figure was almost 7 years ago. According to U.S. Wind Energy State Facts (Oct. 2016), there are over 52,000 wind turbines installed across 40 U.S. States plus Puerto Rico & Guam.

Most people do not realize how little energy is actually derived from these wind turbines. For calendar year 2016, Wikipedia states that wind power in the United States **amounted to only 5.55% of generated electrical energy.** The goal is to have these turbines produce 20% of generated electrical energy in the U.S. by 2030—and one can only imagine how many more turbines would have to be built with an incalculable risk to birds.

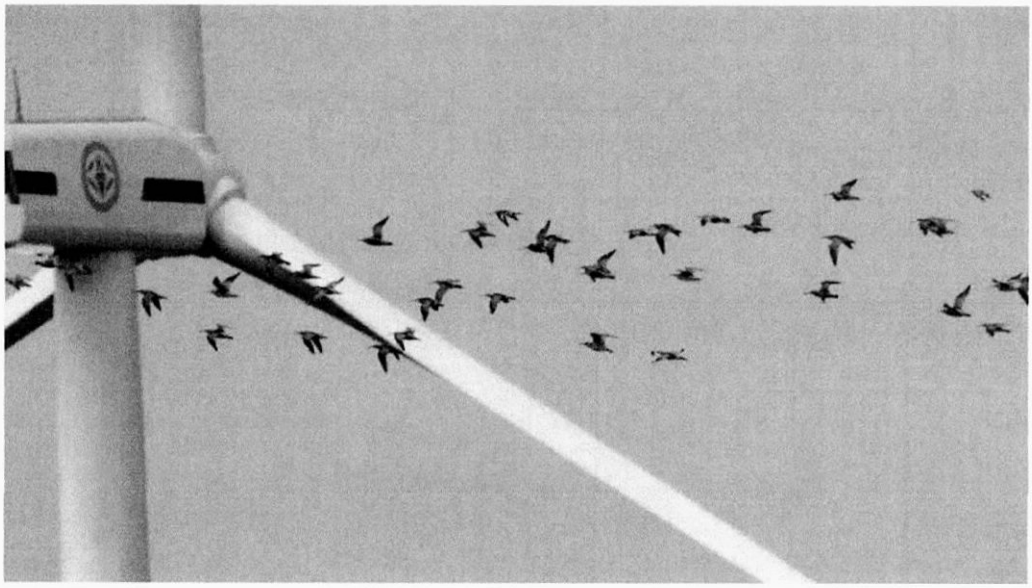
An even more alarming fact is that the data on the number of deaths is gathered by paid consultants to the wind industry. That's the fox guarding the chicken house. At the infamous Altamont Wind Resource Area alone, more than 2,000 Golden Eagles have been killed by the wind turbines there.



Since the diet of Bald Eagles is primarily fish, when wind turbine developers begin constructing wind farms on our coasts or near lakes or rivers, the mortality rate for Bald Eagles will skyrocket. We cannot let this happen.

The size of each traditionally designed industrial wind turbine is staggering. An average tower is 212 feet (but can go well over that), with arms 116 feet long – that's an enormous area that is covered as the blades rotate.

During construction of a wind turbine, roads often have to be widened or built from scratch; mountain tops are sometimes blasted away to create a level area of at least 3 acres, so that the platform can be stable enough to support the enormous weight of each turbine assembly.



The size of each traditionally designed industrial wind turbine is staggering. An average tower is 212 feet (but can go well over that),

Of Particular Concern

Again, Bald Eagles will be seriously impacted when wind turbines are placed around the Great Lakes or other major waterways, because fish is their main source of food.

In July 2016, a radar study was released by the U.S. Fish & Wildlife Service that confirms wind turbines on the Great Lakes pose an unacceptably high risk to migratory birds and other wildlife. Proposed projects in New York, including the Lighthouse Wind facility, raises a red flag of alarm, as reported in a press release by American Bird Conservancy, *Wind Turbines On The Great Lakes Threaten Migratory Birds.*

This concern is echoed by the Rochester Birding Association in New York, stating that "due to its siting within 5 miles of the lakefront, [this project] will cause significant risk to migrating birds. **Up to 71 turbines are planned along the south shore of Lake Ontario, and these turbines are 570 to 620 feet tall.** That is twice the normal height!

Vast numbers of songbirds and raptors concentrate within six miles of the shoreline during spring and fall of each year. This area also has pockets of key habitat for sensitive grassland birds, which could be displaced by the wind turbines. Federally protected Bald Eagles from a nearby wildlife refuge are also at risk. USFWS has expressed serious concern about this project, warning the developer that this is an area of extremely high avian use. However, the developer appears to be going ahead with its plans, conducting its own studies, disputing

previous work done by other researchers, and ignoring the concerns of local residents."

The Fish & Wildlife Service currently recommends that wind turbines should not be placed any closer than 3 miles of the Great Lakes shorelines; the American Bird Conservancy recommends 5 miles. However, the recent FWS radar study indicates that the minimum should be extended to perhaps 10 miles from the shoreline.

This study monitored four sites using radar along the shore of Lake Ontario, scanning 24 hours a day in vertical and horizontal planes to capture movement. At all sites, the radar recorded high levels of bird and bat activity in or near the "rotor-swept zone" that wind turbines would occupy if built along the lakeshore. Activity was especially high at night. Hutchins stated, "It confirms what we have long known: In the absence of proven methods to reduce bird collisions with turbines, wind-energy development must be sited in areas where there are fewer birds and bats to minimize harm to these ecologically important animals."

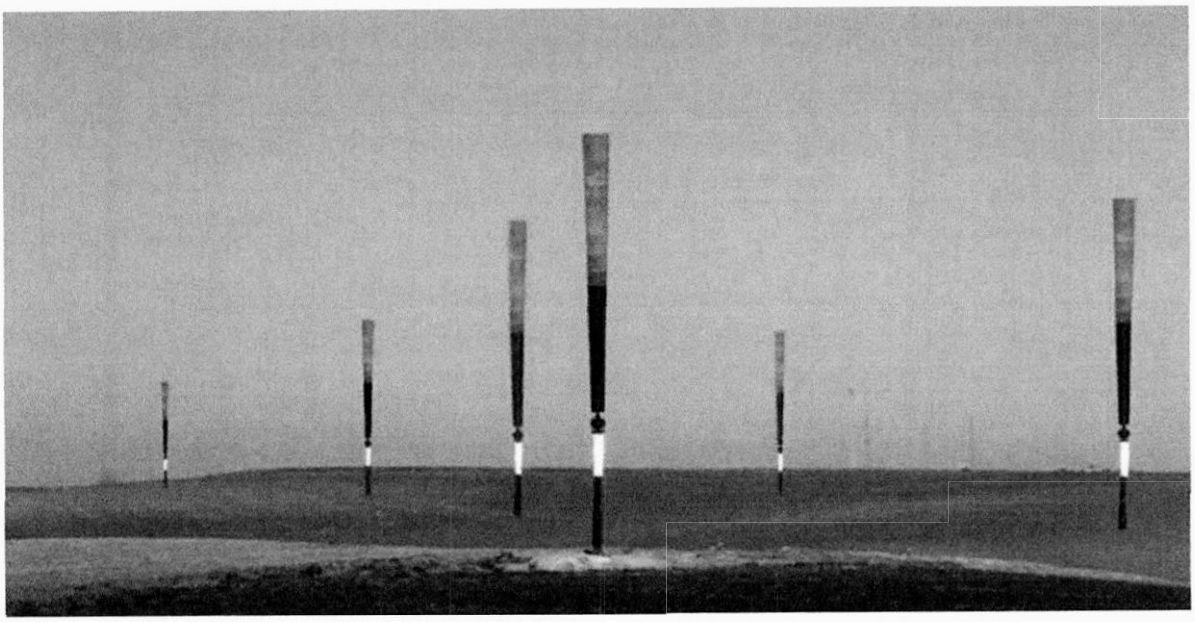
Into the Future

Can wind energy ever be bird safe? Libby Sander of the American Bird Conservancy, in an article dated Jan. 5, 2017 discusses this topic. New designs advertise they are "safe for wildlife." The technology comes in all sizes, shapes, and appearances. They all say they can harness the power of wind and create energy without killing birds. In one, giant sails funnel wind through a central turbine; in another design, wind is funneled into a tube, increasing speed. There is a definite need for

innovation, but rigorous scientific empirical evidence over the long haul is needed to authenticate the claims of any new design.

A startup in Spain called Vortex, however, has recently come up with a new design for the turbines. More Information.

The bladeless turbines are massive poles jutting out of the ground. Because they're thinner than a regular wind turbine and have no blades, more of them can fit into a space, meaning more electricity can be generated while taking up less real estate.



Bladeless Wind Turbines

This video (from 2015) is in both Spanish and English - first there is a Spanish section, then English...

Vortex Bladeless aerogenerador, Energías ...

Al Cecere, former President & Founder of the American Eagle Foundation states:

We cannot allow the progress we have made in restoring the Bald Eagle to the skies of America to be undone by the inappropriate siting of wind turbines in areas where Bald Eagles congregate in large numbers, such as the Great Lakes." He continues, "It's heart-breaking to think that we've spent more than 20 years releasing a total of 150 juvenile eaglets from our Hack Tower on Douglas Lake, many of which migrate to the the most heavily populated eagle areas in the US, and that all of our repopulation efforts could be undone in less than a year, without penalty. If one could see how much love, devotion, passion, and funds go into each and every bird that we hatch, raise, and release at our facility, they'd understand how devastating it is to us when even one of these beautiful creatures is killed by a poorly sited, poorly designed wind-turbine, with the owners of that turbine not even batting an eye. We have to do something.

Take Action!

- If you are aware of a future wind turbine development, garner support from your community, region, and state. Wind turbines affect birds of prey, but they also implicate other non-environmental issues, such as interfering with cellular connection and becoming an eyesore in otherwise beautiful landscapes. There are many reasons for a group of people to want to prevent a wind project in or around a community.

Groups you can support where Wind Turbines are being considered: **Rochester Birding Association** (remember, AEF eagles that are released from our Hack Towers migrate right into this area!) Find out from them what you can do to help, particularly if you live in the Lake Ontario area.

Wind farms are being proposed in these areas and have been identified by ABC as among the **Worst Offenders**, with explanations why each has been listed. If you live in any of these areas, get involved!

- LIGHTHOUSE: Location: Niagara County, New York near the town of Somerset (Apex Clean Energy)
- MERRICOURT: Location: McIntosh and Dickey Counties, North Dakota (EDF Renewable Energy)
- NINNESCAH: Location: Pratt County, Kansas (NextEra Energy Resources, LLC)
- ROCK CREEK: Location: Atchison County, Missouri (TradeWind Energy)

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FAQ — Impact on Wildlife

Do birds nest on wind turbines?

Modern turbines have solid instead of latticed towers, so birds can't rest or nest on them. They can, however, still perch on the nacelle (the bus-sized generator housing at the top of the tower).

Is the lower rpm of modern wind turbines safer for birds and bats?

Modern utility-scale wind turbines turn at a much lower rpm than older models. Because the blades are so long and are moving 150 to 200 mph at the tips, depending on the model, the impact on birds and bats remains substantial.

What studies have been done on the impact of wind turbines on birds and bats?

Few studies have been done to determine the true effect of industrial wind turbines on birds and bats, and fewer studies still that have been done independently of the wind companies' control. The evidence is clear, though, that wind turbines present yet another threat to the lives of birds and bats. The risk appears to be much greater in some areas than in others.

The first-year study of the "Maple Ridge" facility on the Tug Hill plateau of New York estimated that 2,000 to 4,000 birds and bats were killed by 120 turbines during the 5-month study period in 2006 (click here for the report; click here for May 1, 2007, testimony to the U.S. House Natural Resources subcommittee on Fisheries, Wildlife and Oceans).

What does the US Fish & Wildlife Service think about wind power?

The US Fish & Wildlife Service is concerned about the danger to birds. They have issued siting guidelines which recommend that wind turbines should not be installed near wetlands, on mountain ridges, near shorelines, or in other locations known as concentration areas for wildlife or at sites subject to frequent fog or low-lying clouds during spring and fall migrations.

How do wind turbines affect birds?

Mountain ridges and coastal areas, where industrial turbines are often installed, are features of the landscape that concentrate many birds. Songbirds mostly migrate at night and low enough to collide with the blades of large wind turbines. The presence of large wind turbines may cause birds to avoid the site, thus losing a foraging resource and requiring extra energy

to fly around it. The cumulative effect of multiple facilities could have a serious toll on bird populations. The activities of prairie birds, including mating and nesting, are easily disturbed — even at a great distance — by the construction and continuing operation of an industrial wind power facility, which can spread over hundreds, often thousands, of acres.

Are raptors threatened by industrial wind turbines?

Wind power is a unique threat to raptors (hawks, eagles, falcons, owls, and vultures) — many of them already endangered — and other large birds, such as ducks, geese, swans, and cranes. The risk of collision not only threatens individual birds but also augments existing threats to their populations. The cumulative effect of multiple facilities may threaten the viable breeding of several species already in decline.

Do wind turbines kill more birds and bats than other human activities?

Promoters of industrial wind power often try to divert our attention to the carnage wrought by office tower windows, cars, and housecats, as if a greater wrong excuses the lesser. Even using the scant data inconsistently compiled by consultants hired by the wind power developers, it is clear that industrial wind turbines kill many more birds and bats per unit than these other causes, particularly raptors (such as eagles and hawks) and migrating bats and songbirds.

Is the impact to birds and bats justified?

Promoters of industrial wind power try to justify the threats to birds and bats with the claim that they are actually saving even more birds by cleaning the air and reversing global warming. They are wrong in that rationalization, because wind power does not replace other sources of electricity to such a meaningful degree (see the "Output" FAQ).

Do wind turbines kill bats?

The threat to bats has turned out to be a problem the industry can't deny. FPL Energy ended access to its facilities after independent research documented that thousands of bats were killed in just a couple of months at one location and that this pattern of mortality was being seen at other sites as well. To divert attention from this outrage and their lack of action to remedy it, FPL Energy announced in January 2006 that it would fund some bat conservation projects. That effort will not, however, mitigate the harm they are causing, let alone justify or reduce it.

A revealing story comes from Carleton College in Northfield, Minnesota, which constructed a 1.65-megawatt wind turbine in September 2004 out in the middle of a corn field two miles from campus. In October 2005, the Winona Daily News described a tour led by project director Rob Lampa. Lampa told the group that they had seen no sign of a single bird or bat death since the turbine was switched on. But as they were leaving, one of the group from Winona pointed out something on the ground to one of the county commissioners with her.

It was a dead bat. Nearby was another. As one of NWW's correspondents commented, Lampa will have to make sure the clean-up crew does a better job before the next tour!

Do wind turbines affect other animals besides birds and bats?

As with birds and bats, there are no reliable studies of the effect of industrial wind turbine facilities on other animals. The installation of such large structures in wild areas, along with supporting roads and transmission infrastructure and the clearing of trees on mountain ridges, inevitably has a negative effect, if only because of the loss, degradation, and fragmentation of habitat, especially ecologically vital interior forest. The turbines also move (producing noise and vibration) and are lit by strobes day and night, adding to the distressing impact they likely have.

Until good studies are done, we have anecdotal evidence such as the following about the effect of a wind facility on Backbone Mountain, West Virginia: "I looked around me, to a place where months before had been prime country for deer, wild turkey, and yes, black bear, to see positively no sign of any of the animals about at all. This alarmed me, so I scouted in the woods that afternoon. All afternoon, I found no sign, sight, or peek of any animal about."

The Economics of Bird Watching in Ohio

By Jen Dennison, ODNR Division of Wildlife

Bird-watching is big business in the state of Ohio! If you've never been to Magee Marsh Wildlife Area the Saturday before Mother's Day, below is a typical shot of the enthusiasts that pack the mile-long boardwalk that is nestled in the marshes along the south shore of Lake Erie.

Annual visitation to the region exceeds 100,000 each year, with much of it being concentrated on the Magee Marsh/Ottawa National Wildlife Refuge complex in Lucas and Ottawa Counties. This is a fairly recent discovery on the part of birders. While the boardwalk will be celebrating its 25th year this coming spring, it was a relative secret until about 10 years ago. Word was spreading slowly about this little gem along Lake Erie. It is a stop-over or resting spot for migrating birds before they cross the Lake to Canada. And thanks to some great promotion and lots of word-of-mouth, the secret is now out!

Bowling Green State University professor Dr. Philip Xie, in cooperation with Ohio Sea Grant, recently completed a study that shows how bird watching just along Ohio's Lake Erie coastline injects more than $26 million annually into the state's economy and is responsible for approximately 300 jobs. The survey asked questions of approximately 1,100 birders as they visited some of the most popular birding sites in the region, including Magee Marsh, which has recently been voted as one of the top birding destinations in North America by a number of birding organizations.

The U.S. Fish and Wildlife Service also conducts a survey every five years that looks at trends in hunting, fishing and wildlife watching across the country. The most recent study was concluded in 2011 and shows an increase in participation in wildlife watching in Ohio as well. Birdwatchers are included in the category of wildlife watchers, but that category also includes those that feed and photograph wildlife. Some interesting facts from that study that are specific to Ohio include the following:

4 million hunters, anglers and wildlife watchers in Ohio (35% of the state's population)

- 1.6 million hunters and anglers (14% of the population)
- 3.2 million wildlife watchers (28% of the population)

$3.6 billion spent on wildlife-related recreation

- $1.8 billion spent on fishing
- $753 million spent on hunting
- $738 million spent on wildlife watching

Days spent in Ohio on each activity:

- Fishing: average 13 days
- Hunting: average 21 days
- Wildlife Watching: average 7 days of participation AWAY from home (does not include activities done while at home)

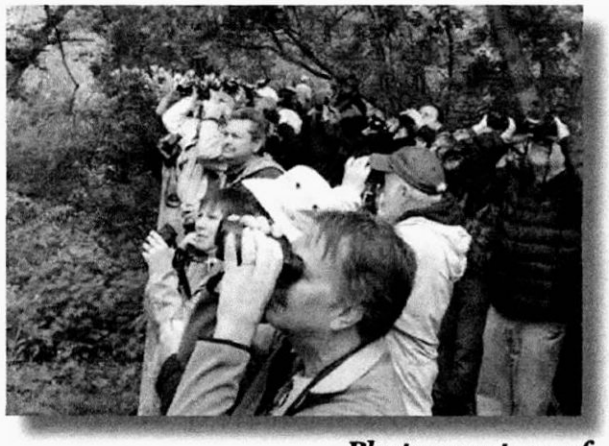

Photo courtesy of Kolibri Expeditions website.

Trip-related expenditures (food, lodging, gas, etc)

- Fishing: $91 million
- Hunting: $20 million
- Wildlife Watching: $95 million

This kind of information has fueled increased marketing and partnerships among conservation organization with businesses and facilities that birders utilize on their trips. An example is the new Lake Erie Birding Trail. The website is www.lakeerieohiobirding.info This is the newest of these kinds of "trails" in Ohio that are designed to drive traffic not only to hot birding spots along the Lake, but also to help birders find restaurants and accommodations that are convenient and that cater to birders and their needs.

Travel and tourism bureaus, city and county planning groups, and private industries are beginning to recognize the economics of birding and are waiting to cash in. And all of this is good for not only the local economies along the Lake, but it also drives awareness and appreciation for Ohio's natural resources.

Birders who care about conservation can find a multitude of additional ways to help monetarily prop up funding towards conservation of these areas, whether it's through the purchase of the Ohio Division of Wildlife's Ohio Wildlife Legacy Stamp, tax-check off, or Cardinal License Plates ($933,000 in 2012).

Continued on next page

Economics of Birding Continued...

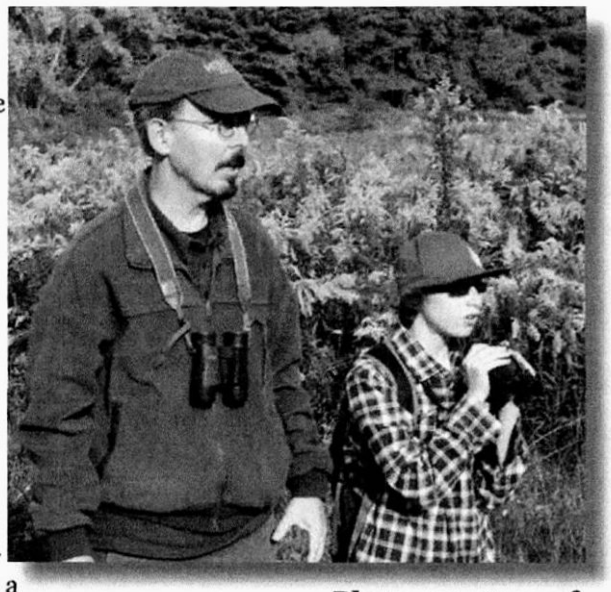

Photo courtesy of ODNR-Division of Wildlife

Birders can even make direct donations to the myriad of Friends groups, management agencies and organizations that provide the habitat for these beautiful birds. The Lake Erie Birding Trail website also has a "business card" that birders can print off and leave at local businesses to thank them for supporting the birding community in their area. This technique was first used by the Black Swamp Bird Observatory (BSBO), which is a research, educational, and advocacy organization for birding and bird habitat along western Lake Erie. This organization also partners with Magee Marsh Wildlife Area and Ottawa National Wildlife Refuge to host the Biggest Week in American Birding, which is the 10 days surrounding Mother's Day weekend. This is the prime migration time for over 30 species of warblers to come through on their way to Canada. Through the use of these cards, the influence of birding and birdwatchers has steadily increased in the area by highlighting the economics of birding. That economic influence could help not only drive the tourism industry in the area, but could also drive policies and decision-making related to the habitat that brings the birds, and therefore the birders. Birders are becoming a powerful voice along the Lake Erie shoreline and there's no telling where or how far that influence could migrate in the coming years.

You can find more information about the economics of birding in Ohio from the following sources:

- Lake Erie Ohio Birding Trail www.lakeerieohiobirding.info
- ODNR-Division of Wildlife www.wildohio.com
- Black Swamp Bird Observatory www.bsbobird.org
- The U.S. Fish & Wildlife Service-2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation www.census.gov/prod/2013pubs/fhw11-ga.pdf
- Socio-economic Impacts of Birdwatching along Lake Erie: A Coastal Ohio Analysis by Philip F. Xie, Ph.D. http://ohioseagrant.osu.edu/research/economic/?ID=R/ME-033

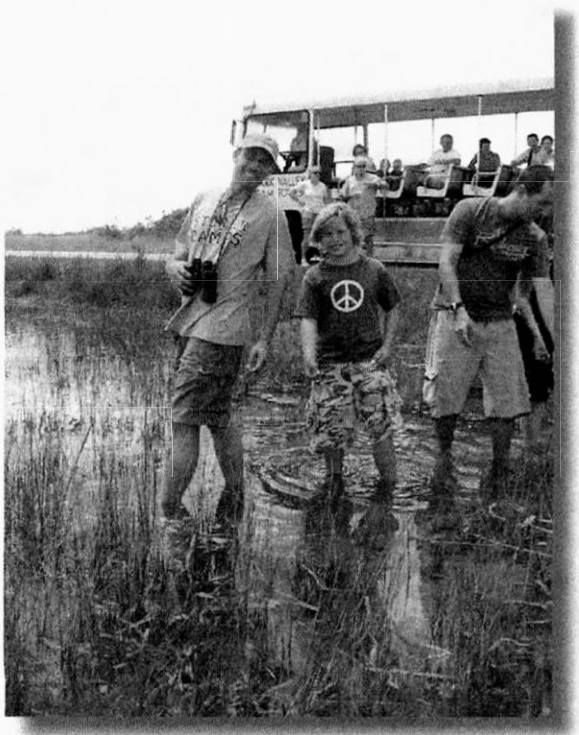

Image courtesy of Denise Natoli-Brooks

EcoTourism: Great Articles & References

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THE BLADE
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Biggest Week in American Birding brings influx of tourism dollars

5/6/2018
BY JAY SKEBBA
BLADE STAFF WRITER

Customer and birder Lisa Young, center, buys plants at Bench Farms on Jerusalem Road in Curtice.

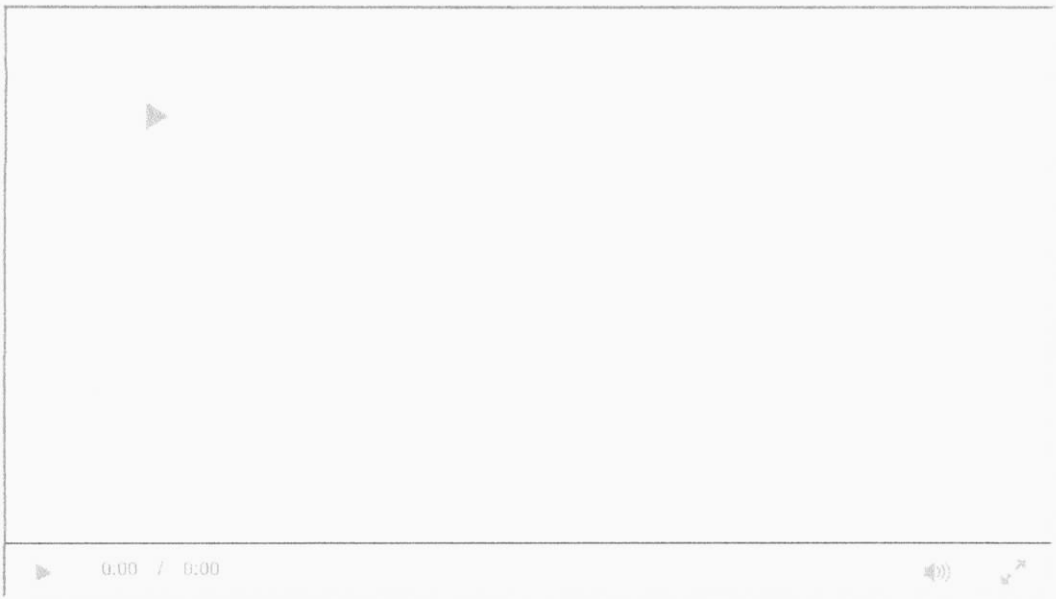
The Blade/Lori King
Buy This Image

As tens of thousands of birders flock to northwest Ohio for the Biggest Week in American Birding, the local economy will benefit from millions of dollars poured into it.

More than 90,000 people from all corners of the world visit the region's Lake Erie shore between late April and mid-May to track their favorite songbirds as they migrate. Perhaps the only people more excited for the annual festival than the birders are business owners in Oregon, Oak Harbor, Port Clinton, and surrounding areas.

A 2013 study conducted by the Black Swamp Bird Observatory — located at the entrance to Magee Marsh in Oak Harbor — determined 77,000 people pumped $37 million into the economy. This year the economic impact is expected to surpass $40 million.

"We asked them lots of questions about the festival, but most importantly, we asked them how much money they spent in the region on gas, lodging, and shopping," said Kimberly Kaufman, executive director of the observatory. "We've had birders register from every state, 52 countries, and six continents. It's truly a global reach."



WATCH: Kendra Buchanan talks about impact of birding week

RELATED CONTENT: Habitat the foundation behind birding phenomenon ■ Birding's biggest week a tourist draw for NW Ohio ■ Magee Marsh boardwalk a magnet for birds, birders

About 30,000 people will visit the observatory during the Biggest Week. Ms. Kaufman said sales at the gift shop increase, with 100 percent of the proceeds going back to programs and research.

Customer and birder Lisa Young, center, buys plants at Bench Farms on Jerusalem Road in Curtice.

The observatory is an independent nonprofit organization and receives no funding from state or wildlife agencies. They serve as one of the hosts of the 10-day festival and handle marketing.

The Biggest Week now fills a gap in the tourism schedule. Ms. Kaufman said the festival has extended the summer tourism season by six weeks.

"We've essentially created an industry where nothing existed before," Ms. Kaufman said. "That's putting people back to work earlier in the season. All the 'ma-and-pa' shops along the lakeshore that wouldn't open until June are now opening in mid-April because there are so many birders coming to the region."

In Oregon, the Maumee Bay State Park Lodge and Conference Center is headquarters for the Biggest Week. Sales manager Kendra Buchanan said rooms start to fill up far in advance, and birders account for about 90 percent of the hotel's occupancy.

"Once guests are leaving this year, they're already starting to make their reservations for next year," Ms. Buchanan said. "Chances are good we'll sell out. You might fine one night here and there, but any consecutive duration is going to be pretty tough."

Cindy Bench owns and operates Bench Farms on Jerusalem Road in Curtice, selling plants and produce. Birders have been in and out for a couple weeks.

"We are a retail greenhouse in the middle of nowhere," Mrs. Bench said. "The birders bring us that traffic volume without having to chase them down."

Many familiar faces return each year looking for bird-friendly plants. The farm also raises plants for the Ottawa National Wildlife Refuge.

There's a good chance a portion of Mrs. Bench's customers will grab a bite to eat at Tonia Tice's Barnside Creamery just outside the Marsh in Oak Harbor. The stone parking lot at the popular lunch spot surrounded by farmland fills up daily during the Biggest Week.

Hungry customers can cool off with ice cream and take advantage of daily lunch specials.

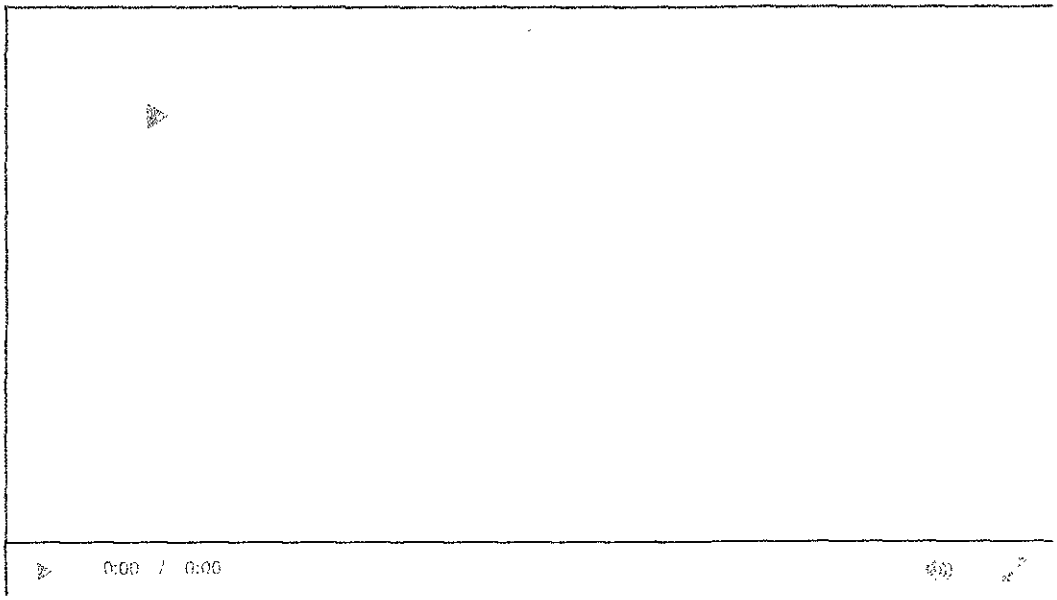
"A lot of friendly faces come back year after year," Ms. Tice said. "I'd say it has a huge impact on our business here. We open our season just in time for the birders because we know they're coming. They're a great kickoff to our season."

Ms. Tice said her establishment receives so many customers, they typically measure by the number of bags of ice cream sold.

As the 10-day festival grows in popularity, birders are forced to stay as far away as Ottawa County or Monroe County in Michigan. Hotels in Port Clinton are routinely packed with birders.

Holiday Inn general manager Kim Bartish said the hotel is close to selling out.

"I get people all the way from the United Kingdom and Australia just to come here and look at birds," Ms. Bartish said. "I get people who have been coming here for 15 years. It's nice; you become like family."



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About 60 percent of the hotel's rooms are occupied by birders. Ms. Bartish said the uptick in sales benefits not just her hotel, but the surrounding restaurants, museums, and shops.

"People don't realize how big it is," Ms. Bartish said. "It's fun because I'll be sitting here and in the morning these people leave in droves. They always say, 'Happy birding, happy birding.' That's what they say to each other every morning as they leave the hotel."

The Island House Hotel is also filling up with birders. General Manager Lisa Young often recommends places to eat or play around town.

"It definitely brings business, and we're happy to have it," Ms. Young said. "We're very grateful they keep coming back.

"It fills the gap; we love that. Otherwise, it would be very quiet."

The Blade is owned by Block Communications Inc., which is a sponsor of this year's Biggest Week in American Birding.

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Socio-economic Impacts of Birdwatching along Lake Erie: A Coastal Ohio Analysis

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Abstract

The objectives of this study focus upon economic impact of birdwatching as it relates to substantial economic expenditures; tourism patterns of birdwatching along Lake Erie; and strategic partnership among the communities and industries to promote the local economy and to market birdwatching. The findings show that birdwatching at six Ohio natural areas along Lake Erie generated $26,438,398 in 2011, created 283 jobs for those living and working in these coastal communities, generated $8.9 million in personal income, and contributed $1.9 million tax revenues directed to local and state coffers. Birders visiting Lake Erie provide significant revenue infusions to the regions year around.

Keywords: birdwatching, birders, economic impact, Lake Erie, Ohio

Introduction

Birdwatching is the act of observing and identifying birds in their native habitats. Birdwatchers (also identified as birders) are people who view, photograph, study, identify, or otherwise take interest in wild birds in the outdoors (Cordell et al, 2007). Individuals who participated in birdwatching are one of the best sources of ecotourism income since they form the largest single group of ecotourists (Ceballos-Lascuráin, 1996; Sekercioglu, 2002). Because of the zeal of many birdwatchers and their willingness to invest in this activity, birdwatching is becoming the most rapidly growing and most environmentally conscious segment of local tourism economic development and provides significant revenue for communities (Lee et al, 2009). Birdwatching has the potential to increase revenues for local businesses, state and local tax coffers, parks and preserves; to educate locals about the value of biodiversity; and to create local and state incentives for successful protection and preservation of natural areas. The activities of birdwatching play a particularly important role because they can create jobs in rural areas that historically have benefited less from economic development programs than more populous areas. Birdwatching also provides for market diversification to enhance existing tourism economies.

In 2006, the *US Fish and Wildlife Service National Survey of Fishing, Hunting, and Wildlife-Associated Recreation* documented that 47.8 million US residents observed birds around their homes and 19.8 million US residents traveled away from home to view birds. Financially, more than 71 million Americans spent nearly $45 billion (in retail sales) on observing, feeding, or watching wildlife in 2006 alone. In addition, the State of Ohio released its portion of the *National Survey on Fishing, Hunting and Wildlife-Associated Recreation* in 2006. It showed that state residents and nonresidents spent $3.2 billion on wildlife recreation in Ohio (Source: http://www.census.gov/prod/2008pubs/fhw06-oh.pdf). The survey found that 4.2 million Ohio residents and nonresidents participated in wildlife-associated recreation in 2006, about 83% of them, or 3.5 million, participated in wildlife-watching activities. The Ohio survey clearly indicates that birdwatching has become a very important economic segment for state recreation plans. Birders spend more

money than other visitors to natural sites. Birdwatching is also a more sustainable use of wild areas and may be preferred to land clearing or consumptive activities, such as hunting.

Despite the significance of birdwatching, its net economic value along Lake Erie and the assessment of economic impact of birdwatchers have not been undertaken in recent years. The Lake Erie marshes are home to some of the best birding spots in the nation. The areas between Maumee Bay and Sandusky Bay have the highest concentration of breeding bald eagles in the State. Furthermore, the warbler migration along Lake Erie has attracted tens of thousands of birdwatchers every spring. Nonetheless, research on birdwatching is a relatively uncharted area of academic study in Ohio both in terms of demand and supply.

The potential benefits associated with birdwatching in protected areas are extremely tangible. For example, birdwatchers spend money on lodging, food, and other goods and services, thereby providing employment for local and non-local residents. These positive economic impacts can lead to increased support for the protected areas where birds are located. There is a pressing need for data on these financial contributions and economic impacts of birdwatchers. It is essential to help the local and state governments, companies, and individuals interested in birdwatching understand the scope and magnitude of economic benefits, as well as find ways to promote this recreational activity. Credible economic benefit data is essential if policy makers and resource planners are to fully discharge their responsibilities to sustain avian resources for future generations. Not only will this study have important information for conservation efforts, it will also be integral to the long-term success of birdwatching along Lake Erie and will create a more sustainable tourism economy. The findings will be useful for government officials, wildlife resource managers, tourism industry professionals, media, and others interested and active in natural resource management and economic development. The information from the project will be helpful to formulate strategic plans and programs that will produce optimum economic returns from birdwatching resources. The findings will also give insights on the importance of birdwatching to the birdwatchers who participate in this activity.

The project also includes outreach to the communities which rely on wildlife resources. Outreach and education components of this project include consultation with the Ohio Sea Grant Tourism Program Director prior to distribution of research findings in order to develop additional materials to assist in interpreting and efficiently using research findings. This project coincides with an Ohio Sea Grant and ODNR Division of Wildlife project to enhance birding along the lake, and research results will be integrated into training opportunities for local businesses and resource managers. Working with Ohio Sea Grant's Tourism Program Director, research findings will also be integrated into the new Ohio Tourism Toolbox, an online educational resource for the industry.

Objectives

The objectives of this study will focus upon three major areas:

(1) *Economic impact of birdwatching as it relates to substantial economic expenditures.*

Birdwatching can yield considerable returns on investments and be a positive force in remedying economic problems along Lake Erie. Economic impact studies are popular vehicles for illustrating the benefits of birdwatching. There are numerous and important uses for economic impact studies. For example, the results may inform legislation to implement economic development and conservation policies to stimulate local resource-based economies. Various groups can also use the information, such as community planners who respond to developmental prospects; public and private travel marketers who set the level and direction of their promotional efforts and expenditures; economic developers who capitalize upon and sustain birdwatching market; and planners and marketing strategists who forecast birdwatching tourism demands. The priority of this study aims to explore the estimation of the total contribution to local and regional economies attributable to birdwatcher spending. It is proposed to use the Geographical Information System (GIS) for the spatial analysis and Impact Analysis for Planning (IMPLAN) to assess the economic impact of birdwatching along Lake Erie. Quantifying total employment, income, value added, taxes, and total sales will allow natural resource and tourism agencies, land use planners, and policy makers to estimate benefits accrued from various land management options related to birdwatching.

(2) *Tourism patterns of birdwatching along Lake Erie.*

Although birdwatching is one of the fastest growing wildlife recreational activities in Ohio, the types of birdwatching along Lake Erie remain unknown at present. Many local efforts to attract birders have been guided by a monolithic image of birders. The stereotypical image of birders is characterized by "pilgrims with binoculars around their necks and cash in their pockets" (Miller, 1995). However, recent research (Reynolds and Braithwaite, 2001; Curtin and Wilkes, 2005) in the US showed that a wide variety of birdwatchers exist with different needs and satisfaction levels ranging from the goal specificity of advanced birdwatchers to dabblers who want to learn about nature. Birdwatching is receiving much publicity as an economic development strategy for rural communities. This publicity, often mistakenly, portrays all birdwatchers as a group of highly committed enthusiasts who are eager to add birds to their life lists. The market differentiation for birdwatchers of varying commitments to the activity will make it possible to identify particular segment that are still in growth and tailor products to improve birdwatchers' levels of satisfaction. It is proposed that the on-site survey will yield data on the types of birdwatchers and market segmentation along Lake Erie.

(3) *Strategic partnership among the communities and industries to promote the local economy and to preserve the social value of birdwatching.*

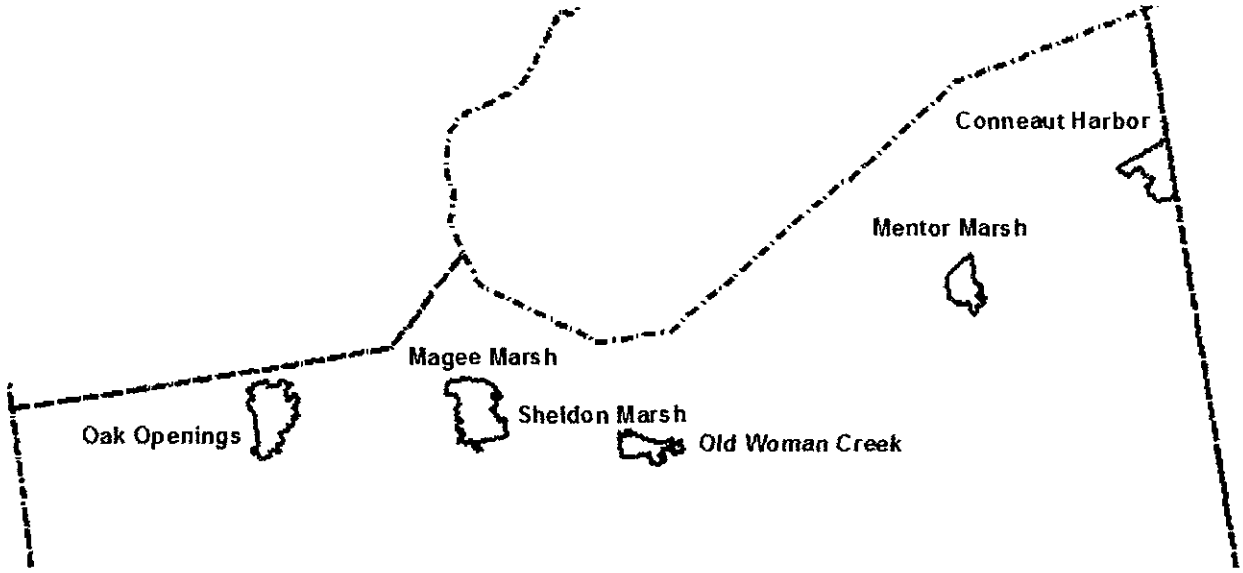
The study will provide reliable economic findings to help state agencies, NGOs, and community tourism planners understand the contributions of birdwatching expenditures along Lake Erie. A wider scope of analysis could encompass the cultural and environmental impacts of such birdwatchers. However, economic contributions are of interest to both public and private agencies and communities located in areas that birdwatchers visit.

Informed decision making and public policy require that executives, officials, employees and their dependents understand the contribution that birdwatchers make to the local economy, both through those businesses directly serving birdwatchers and their suppliers. The project will facilitate the accessibility of the communities along the Lake Erie to enjoy the birdwatching activities, promote travel and tourism in the region and stimulate the economy. It will do outreach in order to connect birdwatching destinations with the community involved in nature-based tourism. One of the objectives is to have a better idea of how much these birdwatchers spend which allow a promotion organization to more efficiently plan marketing efforts. This project will enable rural land planners and policy makers to estimate the benefits gained from various land management options on areas related to birdwatching. On the basis of this research, funding for nature-based tourism, species sustainability and tourism promotion can be justified from both the biological and economic standpoints. Eventually, it could result in increased conservation efforts and additional funding for the natural areas that attract the birds and birders.

Research Settings

Lake Erie provides one of the best birdwatching destinations nationwide. Stretching 312 miles from Toledo to Conneaut, Lake Erie birdwatching includes more than 30 different counties, cities and organizations. Six locations along Lake Erie were chosen for the on-site surveys (see Figure 1). These sites represent a wide range of birdwatching destinations in Ohio and are well known among birdwatchers. They represent a variety of habitats and subsequently a variety of birds and avidity levels of birdwatchers.

Figure 1: Six Birdwatching Location along Lake Erie



(1) Toledo Metroparks' Oak Openings Preserve and Side Cut have both been named an "Important Bird Area" (IBA) by the Audubon Society. The majority of the Oak Openings Region is located in Lucas County with the remainder falling within portions of Fulton and Henry counties. Oak Openings, Ohio's most unique natural area, is considered among the best birdwatching spots in the entire state. Metroparks properties along the Maumee River are also excellent places to view migrating songbirds, raptors, and water birds, while Pearson, Swan Creek, and Wildwood Preserve are excellent urban birding locations.

The Oak Openings region has a tremendous variety of birds because of the location near the Lake Erie coastline and its base of sandy soils. This area is known to be a migrating location in the spring for many birds. This region is dedicated to birding with groups that protect the birding population. Slightly less than 4,000 acres, the Oak Openings Region is a premier birding destination in Northwest Ohio, and its gateway is Oak Openings Preserve. The habitat in the winter, spring, summer, and fall has specific birds that can be seen due to migration. The late spring and early summer include Blue Grosbeak, Lake Sparrow, and Summer Tanager.

(2) Magee Marsh Wildlife Area is located north of Oak Harbor in Ottawa County. This location is one of the top ten birdwatching sites in North America, attracting more than 100,000 visitors a year. An estimated 2,000 acres of world-famous spring warbler migrant habitat provides wetlands and shoreline settings. In the southern Great Lakes region, this is one of the most recognized and iconic birding hotspot. Spring and fall migrations have more than 300 species of birds recorded for the area. Magee Marsh is a haven for bald eagles, great blue herons, egrets, and other species. A forested beach ridge located on Magee provides a critical feeding and resting habitat for more than 150 species of migrating songbirds, including 36 species of warblers, as they rest and refuel before continuing their journey. An accessible boardwalk that meanders through this beach ridge provides some of the best birdwatching opportunities in North America.

In addition to the spring and fall warbler migrations, bald eagles, shorebirds and raptors provide additional treats for bird watchers. Bird sightings are posted at the Sportsman's Migratory Bird Center at Magee Marsh Wildlife Area and the Ottawa National Wildlife Refuge Visitors Center. Birders flock to Magee Marsh from places as far away as New Zealand, Australia, Kenya, Guam, and Ecuador, as well as nearly all 50 states.

(3) Sheldon Marsh State Nature Preserve is located west of Huron. The preserve has a 465-acre coastal marsh surrounded by swamp forests and a barrier beach. Sheldon Marsh has been designated as an "Important Bird Area" (IBA) by the Audubon Society. Birding is best during the spring migration with almost 300 bird species recorded on the preserve.

(4) Old Woman Creek is a State Nature Preserve and National Estuarine Reserve located just east of Huron. It is one of the last remaining natural estuaries in the state, and the only Great Lakes freshwater estuary in the National Estuarine Research Reserve System. An estuary is the transition zone where freshwater from an inland river is combined, or mixed with water from a Great Lake or ocean water. Old Woman Creek State nature Preserve and

National Estuarine Research Reserve is 574 acres and an excellent location for viewing American water lotus beds, spring and fall migrants, and breeding bald eagles.

The Old Woman Creek also helps facilitate scientific learning of Great Lakes ecosystems, including the complex understanding of the ecology of freshwater. A visitor center has recently been renovated and research is ongoing.

(5) Mentor Marsh State Nature Preserve is located in Mentor. This locale was also recently ranked as one of the best places in Ohio for birdwatching during the spring migration. More than 250 species have been recorded in Mentor Marsh. In addition, more than 125 species are regularly seen here at the height of the spring migration and 100 species have been recorded on just one trail in Mentor Marsh.

(6) Conneaut Harbor is located in Conneaut, the most northeastern community in Ohio near the Pennsylvania border. The harbor has nearly 40acres of habitat consisting of sand, mudflats, scrub-shrub and wetlands. Known as a shorebird Mecca, it has a renowned reputation for its premier steel head fishing, perch fishing, and birdwatching. Conneaut has massive mudflats that attract both shorebirds and those who seek them. Ruddy turnstones, Baird's sandpipers, American avocets, and willets are some reported visitors in recent years. The mudflats at Conneaut Harbor are affected by Lake Erie's water level, but in recent years, they have attracted many birds from July to September.

Methodology

A previous study (Veal, 2006) in outdoor recreation showed that an on-site survey may result in a higher response rates, as compared with other methods. Furthermore, expenditures in outdoor recreation are more accurately reflected in on-site surveys. Therefore, on-site surveys were conducted with a selected sample of birdwatchers visiting six sites (Oak Openings Preserve, Magee Marsh, Sheldon Marsh, Old Woman Creek, Mentor Marsh and Conneaut Harbor). A research team collected a total of 1,196 valid questionnaires from May 2010 to November 2011. There were 502 questionnaires collected at Magee Marsh, 155 at Oak Opening, 186 at Sheldon Marsh, 121 at Old Woman Creek, 118 at Mentor Marsh, and 114 at Conneaut. Data collection was undertaken during two periods of time: mid and late spring and early and mid fall. Both periods are peak birding seasons along Lake Erie. In addition, different locations have various timeframes for bird species and their migrations, such as shorebirds appear in Conneaut Harbor in July and August. Therefore, the research team traveled extensively year around. The purpose of collecting data year around was to ensure a balanced and reliable database.

The survey was comprised of five components (see Appendix I): (1) profiles of birdwatchers along Lake Erie including travel distance, factors influencing their birdwatching participation, the importance of travel decision making, accommodation used for birdwatching; (2) equipment purchasing for birdwatching; (3) expenditures for travel in different categories; (4) socio-demographics; and (5) open-ended comments to improve birdwatching experiences. Participants were asked to provide their on-site, trip-related,

and equipment expenditures and the percentage of expenditure within a 15-mile radius. They were asked for the current 24 hours to minimize recall error. In situations where participants were on day trips, they were asked to estimate their trip expenses for the remainder of the day. Equipment expenditures included durable items related to participation at the site and acquired during the past year. Expenses were recorded by specific expenditure category to align them with the corresponding industrial sector in the modeled economy. The open-ended comments include data on potential purchases by birdwatchers, their attitudes towards the preserves, their opinions of local facilities and services, and their ideas on how birding experiences could be improved. In addition to primary surveys, governmental data and published documents will be used to gauge the overall economic impacts of birdwatching.

In terms of data analysis, recent research has advanced the application of economic assessment tools in birdwatching. There are two related, but distinct, economic concepts in birdwatching: economic value and economic impact. Two research models will be implemented to gauge the socio-economic benefits of birdwatching along Lake Erie: (1) Geographical Information System (GIS) for spatial analysis of birdwatching; and (2) Impact Analysis for Planning (IMPLAN) for measuring economic impact for bird watchers' travel and equipment expenditures.

With respect to spatial analysis of birdwatching, Geographical Information Systems (GIS) have great potential to understand the origins of birders, travel patterns, and birdwatching infrastructure along Lake Erie. GIS can describe and identify transportation network elements geometrically, thematically, and topologically. In addition, GIS is described as hardware, software, and procedures collectively supporting the collection, input, storage, retrieval, transformation, analysis, and presentation of geo-referenced object and field data. Since GIS technology couples common data, it is considered a decision support system involving spatially referenced data in a problem-solving environment. The application of GIS for a birdwatching study is especially important. In the past, the GIS used for nature-based tourism has been diverse, including the systematic inventory and audit of natural resources and conditions; simulating and modeling spatial outcomes of proposed developments through visibility analysis; and simulation modeling to facilitate monitoring and management of visitor flows. In this study, GIS was used to map the origins of birdwatchers visiting Lake Erie, the population density of the birders; and the projection of the birdwatching flow.

Expenditures represent dollars spent in an economy of interest; however, economic impacts measure dollars that remain in that economy. Economists have traditionally used input-output (IO) analysis to examine the impacts of tourism on the economy of the regions (Frechtling and Horvath, 1999). The IO analysis is especially useful in describing current and potential economic contributions of natural-based recreational activities, e.g., birdwatching, to the overall economy (Johnson and Moore, 1993). IMPLAN is an alternative model for regional analysis and can be used to measure the economic impacts of expenditures for travel and equipment associated with birdwatching. It is particularly useful for multiplier estimates since birdwatching involves purchasing the necessary equipment, such as binoculars and cameras. IMPLAN is a computerized database and

modeling system for constructing regional economic accounts and regional input-output tables. IMPLAN software and database can be purchased online through MIG, Inc.

Economic impacts of birdwatching can be grouped into three categories: direct, indirect, and induced. The IMPLAN model was built to identify direct and secondary impacts resulting from birdwatcher expenditures. Direct impacts represented that portion of expenditures retained by an economic entity in the operation of its business, such as sales, salaries, and jobs created by initial purchases of participants. Secondary impacts included indirect effects of inter-industry trade within the region and the induced effects of household consumption originating from employment tied to the direct and indirect activities. Six economic categories are identified to estimate these direct, indirect, and induced impacts: (1) total economic effect to understand industry output associated with birdwatching activities; (2) birdwatchers' incomes; (3) employment: the total number of jobs related to birdwatching including both full-time and part-time workers; (4) employee compensation: the description of the total payroll costs including benefits of birdwatching industry; (5) proprietary income: the spin-off income received by private business owners and self-employed individuals; and (6) indirect business taxes: the excise and sales taxes paid by individuals to businesses.

The steps for estimating economic impacts of birdwatching expenditures by using IMPLAN in the six selected destinations are as follows:

1. Obtain birdwatching expenditures in the economy from the six economic categories listed above.
2. Match the expenditure, earnings, and /or employment categories with the IMPLAN industries.
3. For retail trade industries, transform birdwatching expenditures into birdwatcher output through estimates of margins; for service industries, birdwatcher expenditures equal birdwatcher output.
4. Obtain the appropriate IMPLAN output, earnings, and employment multipliers for these industries from the Bureau of Economic Analysis.
5. Multiply the birdwatcher output for each industry by the appropriate final-demand multipliers to obtain total output, earnings, and employment produced in the economy by the birdwatching expenditures and evaluate.
6. If final-demand multipliers for earnings and/or employment seem unreasonable, multiply earnings and /or employment directly generated by these expenditures by the appropriate direct-effect multipliers to obtain total earnings and employment produced by birdwatching expenditures. Evaluate these multipliers.
7. Attempt to validate these estimates by comparing them with similar estimates obtained from other acceptable sources.

In addition, a large proportion of respondents traveled with one to two adults for birdwatching (68%) and 8% of the birders traveled with three adults. On average, birders spent 1.37 nights in the destination. It is noted that overnight stays vary from different locations along Lake Erie. For example, there was virtually no overnight stays associated with birders visiting Mentor Marsh since the majority of birders were from Metro Cleveland area. Similarly, Conneaut Harbor attracts many birders from Erie, Pennsylvania as it is located on the border between Ohio and Pennsylvania. However, overnight stays remain extremely low (5%) as compared with Magee Marsh where 21% of respondents chose to stay two nights.

The Distribution of Birdwatchers

As important as birdwatching expenditures are, it is paramount to understand the residence and demographics of birdwatchers. This is of great value when determining advertising and marketing strategies. In addition, understanding the demographics of birdwatchers will allow for improving economic impacts, developing effective communication and educational programs, and implementing effective marketing campaigns for birdwatchers.

Figures 1 and 2 provide a snapshot of the national and statewide distribution of birdwatchers from the Lake Erie study sites. The distribution modeling was aided by GIS through analyzing the origins of cities and towns of birdwatchers. The distribution model presents a distinctive pattern for birdwatchers along Lake Erie, as the majority of birdwatchers in Ohio prefer to enjoy birdwatching within the state. The Cleveland area has the largest concentration of birdwatchers. The reasons can be attributed to the proximity and familiarity of the birdwatching sites. Many birdwatchers from Cleveland areas frequently visit the sites along Lake Erie, and some have a close tie with regional birding clubs, such as Kirtland Birding Club. There is also a concentration of birders from southern Ohio, mainly the Columbus and Cincinnati areas. The influence of birding clubs and the use of birding listserves in these metropolitan areas show a surge of birdwatchers visiting Lake Erie. The comments from birders, such as "If I stopped birding, I would probably lose touch with a lot of my friends", "I attach great importance to birding", "Going birding is a group event that can't miss", reflect a strong sense of identity.

Scholarly research paints a different picture of the birdwatching market than the popular press. Elite birders probably comprise a very small fraction of all people who enjoy watching birds. Kellert and Brown (1985) estimated that "committed" birders (individuals who could identify more than 40 birds without a field guide) comprised only 3% of the birdwatching population. McFarlane (1994) estimated that serious or advanced birders comprised about 7% of birders in Alberta, Canada. Scott and Thigpen (2003) concluded that birders are a heterogeneous group of recreationists, exhibiting a diversity of skills and

interests. This survey has classified three types of birdwatchers: advanced, serious and casual based on amount of time spent and number of species identified. The survey revealed that a majority of birders perceived themselves as "serious" (51%), while 25% of respondents think "advanced" and 24% think "casual." Although these are self-described levels of avidity and may not truly reflect reality. However, the findings suggest that birdwatching along Lake Erie tends to be advanced-active and advanced-experienced birders. The knowledge of birdwatching is far better than the national average. It is also supported by the fact that about 72% of respondents are willing to purchase binoculars valued at more than $300, and 48% are willing to purchase a camera costing more than $500. In addition, 60% of birders spent more than $100 per year to purchase books and field guides.

Table 2 reports the factors that influenced birders visiting the Lake Erie study sites. Among the listed factors, diversity of bird species (82%), reputation of the site (62%), and good experiences during past visits (57%) were ranked as the most influential factors for visiting. It appears that birders along Lake Erie pay close attention to the number of species and the quality of the sites. Birdwatching is a repeat business, so the quality and experience are deemed extremely important for decision making.

Table 2: Influential Factors for Birdwatching

Factors	**Percentages**
Diversity of Bird Species	82%
Reputation of the Site	62%
Good Experiences During a Past Visit	57%
Presence of Specific Birds	54%
Convenience of Location	43%
Birding Festival	23%
Availability of Birding Programs	10%

Willingness to Travel and Pay

Willingness to travel and pay has become increasingly important to understand when considering participation in recreational activities. It is useful to understand willingness when considering birdwatching since birders follow the presence of specific birds and traveling is an integral part of the activity. The traditional models, such as distance decay, play a key role in determining the origin of birders. The findings suggest that the majority

of birders (64%) were willing to make long trip, e.g., 100 miles plus and about 31% was willing to make short trips, e.g., less than 100 miles. Close to 6% of respondents reported incidental travels, meaning travel much less than 100 miles. At a deeper level, Figure 3 shows a spatial travel pattern from birders. The driving distance was classified into three categories: less than 120 miles, 120 to 240 miles and more than 240 miles. As shown in the figure, about 45% of birders traveled within 2-hour driving distance (120 miles) and about 31% birders originated beyond a 4-hour driving distance (240 miles). For those who traveled more than 240 miles, an overnight stay is necessary which provides important economic contribution for local hotels and motels, restaurants, and other businesses. The figure indicates that the frequency of travels occurred within Ohio. For example, it takes approximately 3.5 hours to drive from Cincinnati to Magee Marsh, which typically requires an overnight stay. There were quite a few birders from neighboring states, such as Michigan and Indiana.

With respect to willingness to pay for viewing birds, the questionnaire asked "When making a decision to travel for birdwatching, how important a consideration is the cost of the trip?" on a Likert scale ranging from "very important" to "not important at all". T-test was conducted to compare the income groups with their consideration for the cost of the trip. Among the six income groups, the t-test ($t>0.03$) reveals that there was significant difference between two income groups in terms of willingness to travel and the cost of the trip: annual income between $75,000 and $99,999 and those between $30,000 and $49,999. Birders with annual income between $75,000 and $99,999 are more willing to travel farther than those with annual household incomes between $30,000 and $49,999.

T test also indicate that both *advanced* birdwatchers and *serious* birdwatchers travel statistically significantly further than *casual* birdwatchers. But *advanced* birdwatchers and *serious* birdwatchers do not have significant difference in the travel distance. On average, travel distance for *advanced* birdwatchers is 146 miles, 134 miles for *serious* birdwatchers, and 102 miles for *casual* birdwatchers.

Economic impact of Birdwatching

The economic return for birdwatching can be measured by the creation of jobs and the injection of vitality into traditionally weakened economics. Birdwatching along Lake Erie plays a critical role in promoting destination images and increasing the demand for nature-based tourism. Birders are often from outside communities and bring economic benefits to local shops, restaurants, craft producers, and entertainers. Some businesses rely heavily on the number of birders, who have significant economic impacts on the locals.

The annual economic impact of birdwatching is defined broadly into seven categories: (1) travel (rental car, airfare, etc.); (2) food and beverage (restaurant, groceries, etc.); (3) lodging (hotel, motel, campground, etc.); (4) admission and fees at the site; (5) general shopping (clothing, souvenirs, etc.); (6) automobile (gas, repairs, parking, etc.); and (7) entertainment or recreation. The respondents were asked to estimate the spending on that day in these categories including all spending, not just spending at the birdwatching site. In addition, the respondents were asked to estimate the percentage of this spending that

occurred within 15 miles of the birdwatching destination. The average of the birders' responses were estimated and then applied to the total number of birders in each site (including those who did not take the survey). This effort yields a fairly comprehensive, yet relatively conservative, set of estimates of direct economic spending stimulus produced in the local economy. The direct spending economic stimulus is then entered into the IMPLAN economic impact assessment model which translates this direct spending into indirect and induced economic stimulus. Summing the respective effects provides an estimate of the overall economic impact to the area economy.

Table 3: Summary of Birdwatching Expenditures (2010-2011)

Sites	Travel	Food & Beverage	Lodging	Admission	Shopping	Auto	Ent & Rec
Magee Marsh	$3,217,025	$3,894,210	$6,965,957	$351,040	$1,541,741	$2,824,241	$495,360
Oak Openings	$429,004	$291,379	$188,518	$64,512	$112,214	$221,849	$85,299
Old Women Creek	$262,360	$371,000	$518,560	$47,880	$85,680	$384,720	$65,240
Conneaut	$52,176	$409,777	$155,257	$45,813	$55,994	$272,336	$45,813
Sheldon Marsh	$579,278	$466,065	$575,374	$96,396	$169,098	$381,381	$123,723
Mentor Marsh	$54,906	$163,643	$58,136	$53,830	$85,051	$118,426	$58,136
Total	$4,594,749	$5,596,074	$8,461,802	$659,471	$2,049,778	$4,202,953	$873,571

Table 3 presents the summary of direct total expenditures from each location from 2010 to 2011. Birders directly spent a total of $26,438,398 during visits to the six selected birding locations. Among these expenditures, $4,594,749 was spent in travel by birders from 2010 to 2011. Among the birdwatching sites, birders spent $3,217,025 in travels to Magee Marsh while $52,176 in Conneaut. Comparatively, birders spent approximately $3,894,210 a year in food and beverage in Magee Marsh while $58,136 was spent in Mentor Marsh. The discrepancy was influenced by a number of factors: (1) the number of birders who visited the sites. Magee Marsh is ranked as one of top ten birdwatching destinations in the US; therefore, it attracts more than100,000 birders annually; comparatively, other

destinations, such as Oak Openings and Mentor Marsh, tend to having birding markets that are currently more regional and local. The number of birders were much smaller compared with Magee Marsh; (2) duration of birdwatching. Birders spend more money if they stay overnight, e.g., shopping and entertainment. As shown on Table 3, Oak Openings, Conneaut and Mentor Marsh have the lowest numbers for lodging as these destinations attract the majority of birders from nearby metropolitan areas, such as Toledo, Erie, and Cleveland. Birdwatching in these locations appear to be day trips; and (3) Using a 15-mile radius of the destination to gauge the economic impacts, Magee Marsh and Sheldon Marsh have the highest percentage of expenditure while Mentor Marsh and Conneaut have the lowest. The infrastructure support seems important for birders' intention to stay overnight.

In addition to this direct spending, there is also a "multiplier" effect on businesses throughout Lake Erie, specifically in each county. The multiplier effect occurs as the initial spending on birdwatching circulates further within the regional economy, creating additional sales and employment opportunities in other businesses. For example, there is a multiplier effect when a birder's hotel purchase causes the hotel to purchase goods and services from suppiers, such as accounting services and farms. There is also a multiplier effect when park employees spend their paychecks throughout the local economy on typical household expenditures such as food, insurance, housing, and entertainment. Thus, the multiplier effect captures how businesses throughout the regional economy gain from the money attracted to the area by birdwatching sites. Economic multipliers show the dollars of total impact for each dollar of direct impact.

The IMPLAN Pro model was utilized to ascertain economic impact analysis for birdwatching. Input-Output accounts for local economies were based on detailed economic data for counties to produce a local Social Accounting Matrix. For example, Magee Marsh is located in Ottawa County while Conneaut is in Ashtabula County. The 2010 county data was used for this study.

Economic multipliers were calculated using the IMPLAN Pro model. The multipliers calculated for expenditures vary in six locations; where Magee Marsh is 1.43, Sheldon Marsh is 1.46, Oak Opening is 1.70, Old Woman Creek is 1.45, Mentor Marsh is 1.49, and Conneaut is 1.36. On average, economic multiplier for birdwatching along Lake Erie is 1.48.

Tables 4 to 6 illustrate substantial economic impacts were realized in terms of employment, labor income, and state and local tax revenues. By documenting the direct, indirect, and induced impacts of birdwatching in six selected locations, the findings show that birdwatching contributed about 283 full-time and/or part-time jobs to the local communities and $8.9 million in personal income. State and local tax revenues are comprised of four categories: (1) employee compensation including payroll tax; (2) indirect

businesses including property tax and sales; (3) households including tax revenue through employment; and (4) corporation tax. Birdwatching contributed about $1.9 million tax revenues at both state and local levels.

In terms of job generation, the expenditures were coded based upon the IMPLAN industry codes, which have 440 classifications ranging from farming (code 1-11) to retail stores (code 320-330). The findings suggest that the majority of job creation comes from four industries: (1) hospitality industry, such as hotels and motels; (2) food services and drinking places; (3) infrastructure services, such as transportation and support activities for transportation; and (4) retail stores. For example, in Magee Marsh area, 78 jobs were created in hotel and motel industry to accommodate birders; about 17 jobs were generated in food services; 41 jobs in transportation; and 23 in retail stores including gas stations, sporting goods, and general merchandise. It appears that these jobs were mainly created in service industry which caters to a birder's demand for food, travel, and lodging accommodations.

Table 4: Employment and Job Creation

Employment	**Magee Marsh**	**Sheldon Marsh**	**Oak Opening**	**Old Woman Creek**	**Mentor Marsh**	**Conneaut**
Direct Effect	148	22	14	15	5	8
Indirect Effect	21	3	3	2	1	1
Induced Effect	26	5	3	3	1	1
Total	195	31	20	20	7	10

Table 5: Labor Income

Labor Income	**Magee Marsh**	**Sheldon Marsh**	**Oak Opening**	**Old Woman Creek**	**Mentor Marsh**	**Conneaut**
Direct Effect	$4,589,275.6	$710,045.3	$422,881.5	$443,974.5	$130,356.7	$190,853.9
Indirect Effect	$879,043.6	$98,629.3	$105,578.8	$68,553.8	$21,818.3	$23,201.1
Induced Effect	$801,802.4	$156,601.2	$121,613.9	$99,102.5	$30,581.3	$34,893.4
Total	$6,270,121.6	$965,275.8	$650,074.2	$611,630.7	$182,756.3	$248,948.5

Table 6: State and Local Tax Revenues

Tax Revenues	Magee Marsh	Sheldon Marsh	Oak Opening	Old Woman Creek	Mentor Marsh	Conneaut
Employee Contribution	$23,075	$4,076	$2,653	$2,617	$587	$1,070
Indirect Business	$1,100,580	$157,617	$95,861	$109,900	$33,733	$54,536
Households	$166,184	$23,711	$14,434	$14,999	$5,058	$5,604
Corporations	$96,284	$11,479	$7,413	$8,616	$2,913	$3,755
Total	$1,386,123	$196,883	$120,361	$136,132	$42,291	$64,965

Research Implications

Birders visiting Lake Erie provide significant revenue infusions to the region year round. All the reported spending flows directly to local stores, hotels and motels, restaurants and retail outlets. The annual spending in six selected sites was $26,438,398 which created 283 jobs to the local communities, generated $8.9 million in personal income, and $1.9 million tax revenues directed to local coffers. In some locations, such as Magee Marsh that attracts more than 20,000 visitors each May for bird migration, birdwatching is seen as an engine of local economic development and growth. It is estimated that birdwatching generates approximately $30 million dollars worth of spending along Lake Erie in Ohio.

There are several points of interest that stem from this analysis that should be useful to local businesses, elected officials, and appointed policy makers:

The first is to encourage out-of-state, in-state, and locals to visit the area for longer periods of time. The average stay for birders along Lake Erie is about 1.37 nights. By extending the average birder's length of stay, the local area could add significantly to the revenues generated. More importantly, the surrounding communities would benefit from the birder's length of stay as they would spend longer times exploring the community, and spend more money locally as opposed to traveling to expend resources elsewhere.

Secondly, a carefully designed marketing strategy would greatly enhance the prospects of expanding birdwatching growth along Lake Erie. There was a low awareness from the local community that birdwatching has a huge potential to revive local economies and generate revenue. Therefore, a greater focus is needed by the tourism community on the

birding opportunities in the region, and connectivity of birding sites to visitor amenities is needed to both meet the needs of travelers and encourage additional spending. For example, Ohio Sea Grant has partnered with the ODNR to create a new website: lakeerieohiobirding.info, which offers a list of birding sites along Lake Erie. It also creates itinerary for birders to stretch their day trips into overnight stays, and it provides links to visitors bureaus which can provide visitor and travel information.

Third, continued support of the local government and businesses can ensure the healthy development of birdwatching. Investment is necessary to improve infrastructures at the sites to improve the birding experience for travelers, as well as to protect the resources that attract the birds they seek. For example, the addition of a boardwalk in Conneaut Harbor attracts birders and provides them with good views for shorebirds while protecting the vegetation and the natural flow of species at the site. Proper support of these efforts will produce long term dividends for the local economy and environment.

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Figure 1: The Distribution of Birdwatchers Nationwide

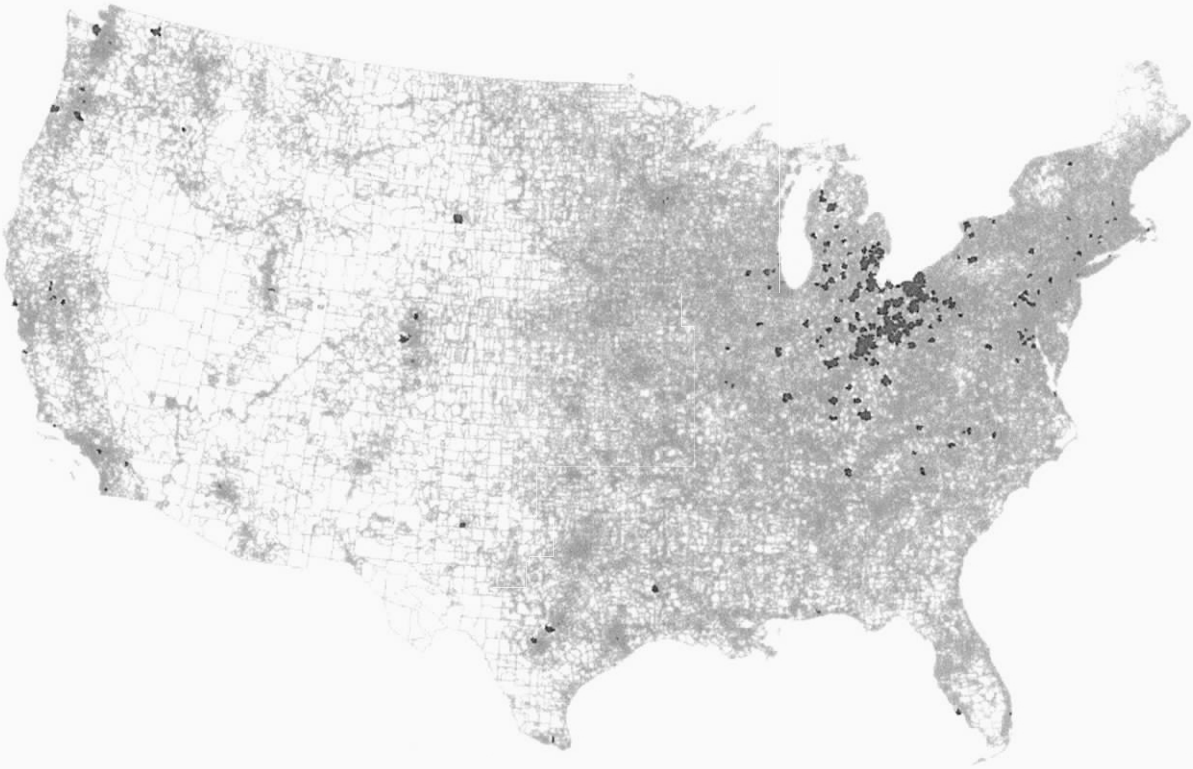
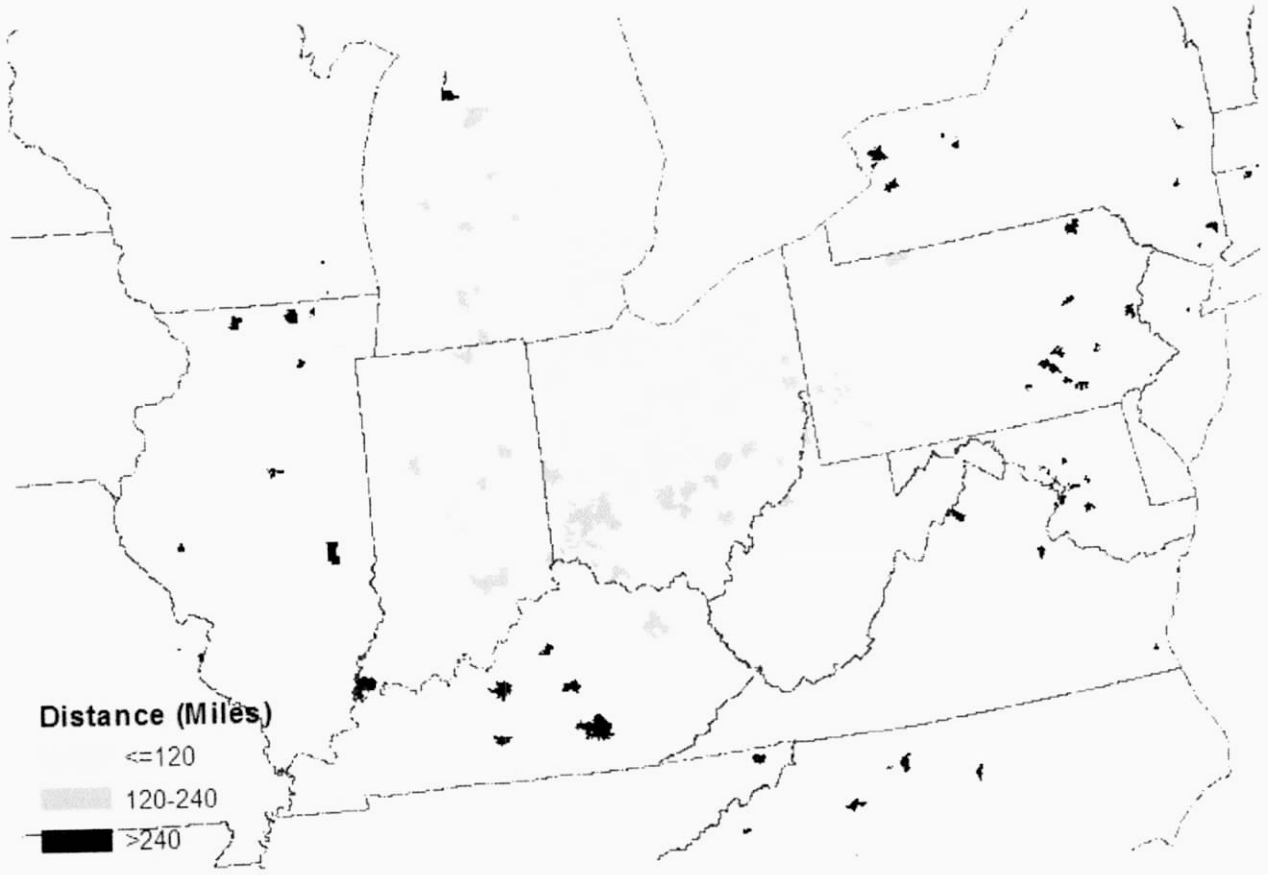


Figure 2: The Distribution of Birdwatchers Statewide

Figure 3: The Spatial Travel Pattern from Birders



Appendix I: The Survey Questionnaires

Survey of Birdwatchers Site _____ Time_____

Bowling Green State University is undertaking a survey on the economic impacts of birdwatching along Lake Erie under auspices of Ohio Sea Grant College Program. Your response will contribute to a better understanding of the significance of birdwatching in this area. Also, it will provide valuable feedback for improving quality of your birding experience at this location. Thank you for your time.

1. Where are you from?
   City/Town_____ State____ Zip_____
2. How did you hear about this birdwatching location?
   ☐ Magazine/Newspaper ☐ Internet/websites ☐ Friends/relatives
   ☐ Birding Organizations (*e.g.*, Audubon) ☐ Brochures ☐ Special event (*e.g.*, birding festival)
   ☐ Other, please specify_____
3. Please check the following that best describes your involvement in birdwatching:
   ☐ An *advanced* birdwatcher based on amount of time spent and number of species identified
   ☐ A *serious* birdwatcher based on amount of time spent and number of species identified
   ☐ A *casual* birdwatcher based on amount of time spent and number of species identified
4. Thinking about the birdwatching equipment you currently own, if you had to replace all the equipment you use for birdwatching with similar equipment, what would be the cost of replacement?
   Binocular(s) $_____
   Camera(s) and Lense(s) $_____
   Books and Field Guides $_____
   Others, please specify $_____
5. Please check the factors that influenced you coming to this site:
   ☐ Diversity of bird species ☐ Presence of specific birds ☐ Availability of birding programs
   ☐ Convenience of location ☐ Reputation of the site ☐ Good experiences during past visit
   ☐ Birding festival ☐ Others, please specify_____
6. How far are you willing to travel for birdwatching?
   ☐ Willing to make long trips (100 miles plus) ☐ Willing to make short trips (less than 100 miles)
   ☐ Only birdwatch incidental to travel for other purposes
7. When making a decision to travel for birdwatching, how important a consideration is the cost of the trip?
   ☐ Very important ☐ Important ☐ Somewhat Important ☐ Not Important ☐ Not Important At All
8. What type of accommodation did you use on this trip?
   ☐ Hotel/Motel ☐ Bed and Breakfast ☐ Campground
   ☐ Stayed with friends or family ☐ Others, please specify_____

9. Please estimate your spending TODAY in the following categories. Please include all spending, not just that at the birdwatching site; for example, include dining and shopping at area restaurants and stores

Travel (rental car, airfare, etc.)	$_____
Food & beverage (restaurants, groceries, etc.)	$_____
Lodging (hotel, motel, campground, etc.)	$_____
Admission and fees at the site	$_____
General shopping (clothing, souvenirs, etc.)	$_____
Automobile (gas, repairs, parking, etc.)	$_____
Entertainment or recreation	$_____

Others, please specify_____ $_____

10. What estimated percentage of this spending occurred within 15 miles of this birdwatching destination? ____%
11. How many adults are traveling with you today and included in the above spending?_____
12. How many overnight stays will you require during your visit? _____ days
13. Your gender ☐ Male ☐ Female
14. Your age

☐ 16 to 24 ☐ 25-34 ☐ 35-44 ☐ 45 to 54 ☐ 55 plus

15. Annual Household Income

☐ Less than $20,000 ☐ $20,000 - $29,999 ☐ $30,000 - $49,999
☐ $50,000 - $74,999 ☐ $75,000 - $99,999 ☐ $100,000 or more

16. Education

☐ Less than high school ☐ High school or GED ☐ Associate degree
☐ Bachelor's degree ☐ Graduate degree

17. What did you like best about your visit to this birding site?

_____
_____

18. Suggestions about how your experience at this birdwatching site could be improved?

_____
_____

Please return to Dr. Philip Xie, 235 Eppler Center, Bowling Green State University, Bowling Green, OH 43403

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