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.*

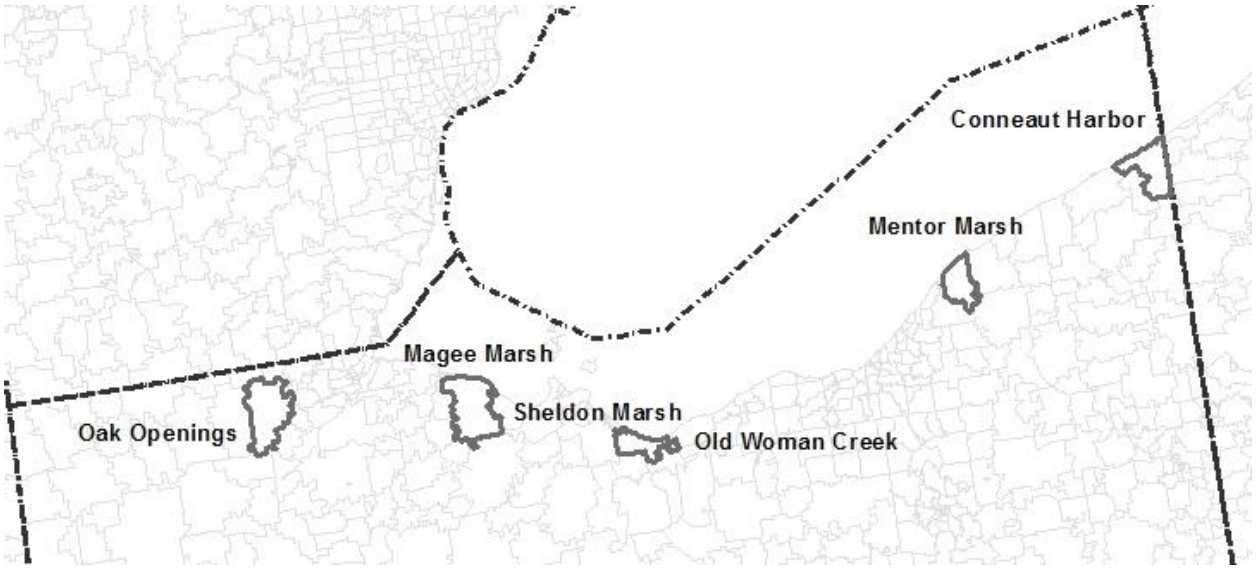
The study will provide reliable economic findings to help state agencies, NGOs, and community tourism planners understand the contributions of birdwatching expenditures along Lake Erie. A wider scope of analysis could encompass the cultural and environmental impacts of such birdwatchers. However, economic 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.

Findings

Socio-demographic Characteristics of Birders

The demographic variables of respondents are listed in Table 1. Of the total respondents, 49% were male and 51% female. The majority of respondents were over 55 (62%), and between 45 and 54 (22%). In terms of income, 34% of respondents earn over $100,000 in household income, 20% between $75,000 and $99,999, and 23% between $50,000 and $74,999. With respect to educational attainment, 47% of respondents claimed to have earned a graduate degree and 33% reported completing a Bachelor's degree.

Table 1: Profile of Sample Respondents (N=1,196)

	% of the Sample
Gender	
Male	49
Female	51
Age	
16-24	2
25-34	6
35-44	8
45-54	22
55 plus	62
Household Income	
Less than $20,000	4
$20,000 to $29,999	5
$30,000 to $49,999	14
$50,000 to $74,999	23
$75,000 to $99,999	20
$100,000 more	34
Education	
Less than high school	2
High school/GED	10
Associate degree	8
Bachelor's degree	33
Graduate degree	47

The socio-demographic results suggest that birders were disproportionately over 55 years of age (62%), graduates of college (80%), and from upper middle income households (34% reported annual household incomes over $100,000). The findings mirror the socio-demographic findings of birders at national level – they tend to be older, higher income, and highly educated.

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

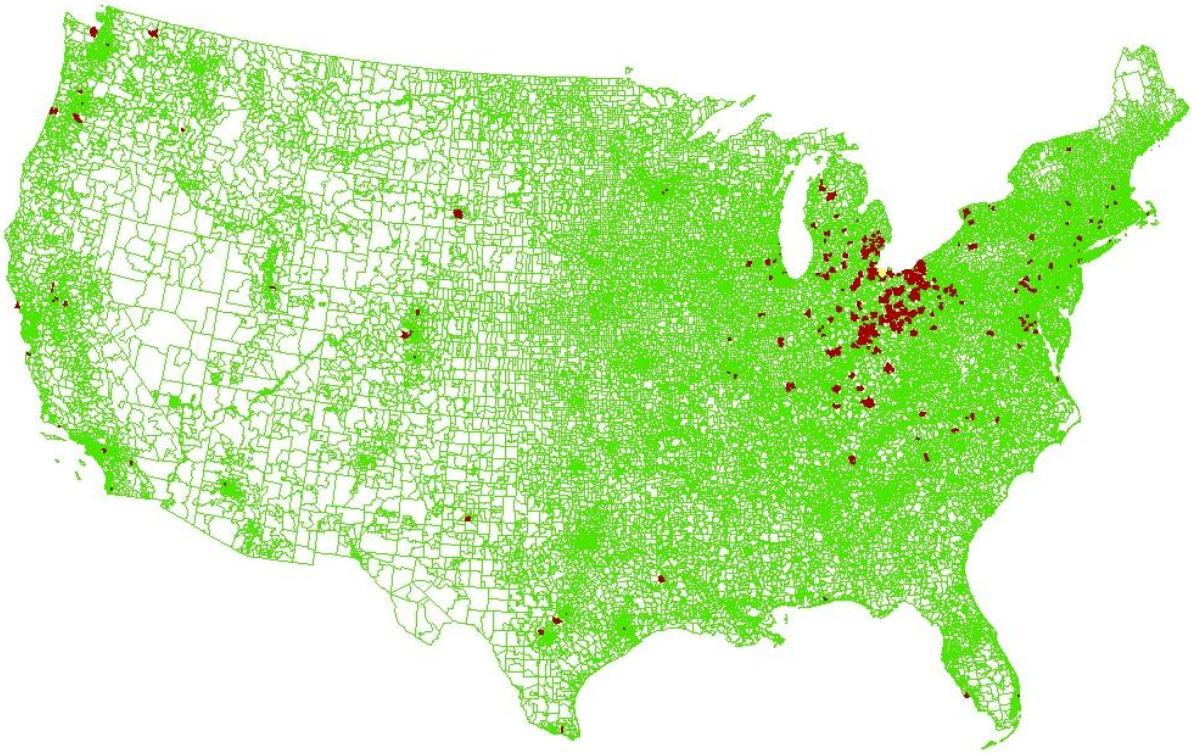


Figure 2: The Distribution of Birdwatchers Statewide

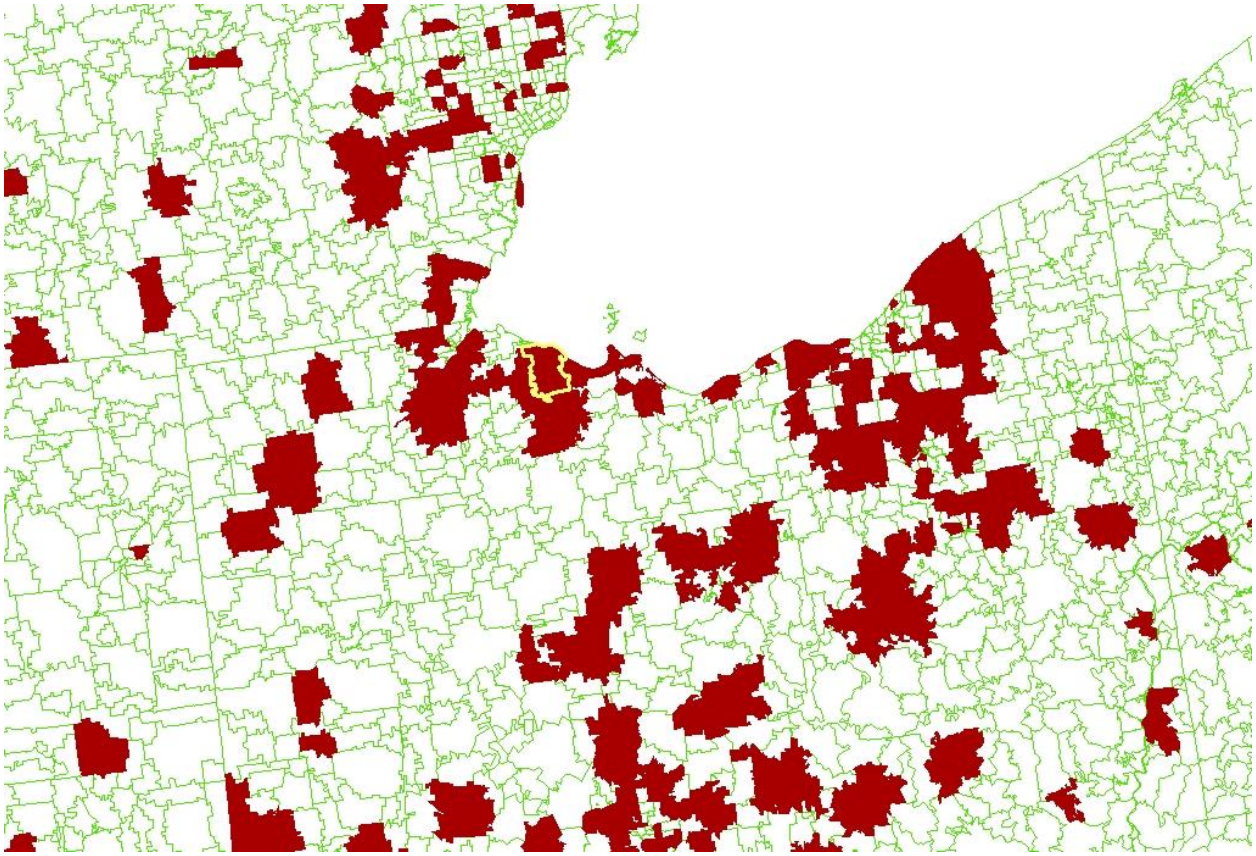
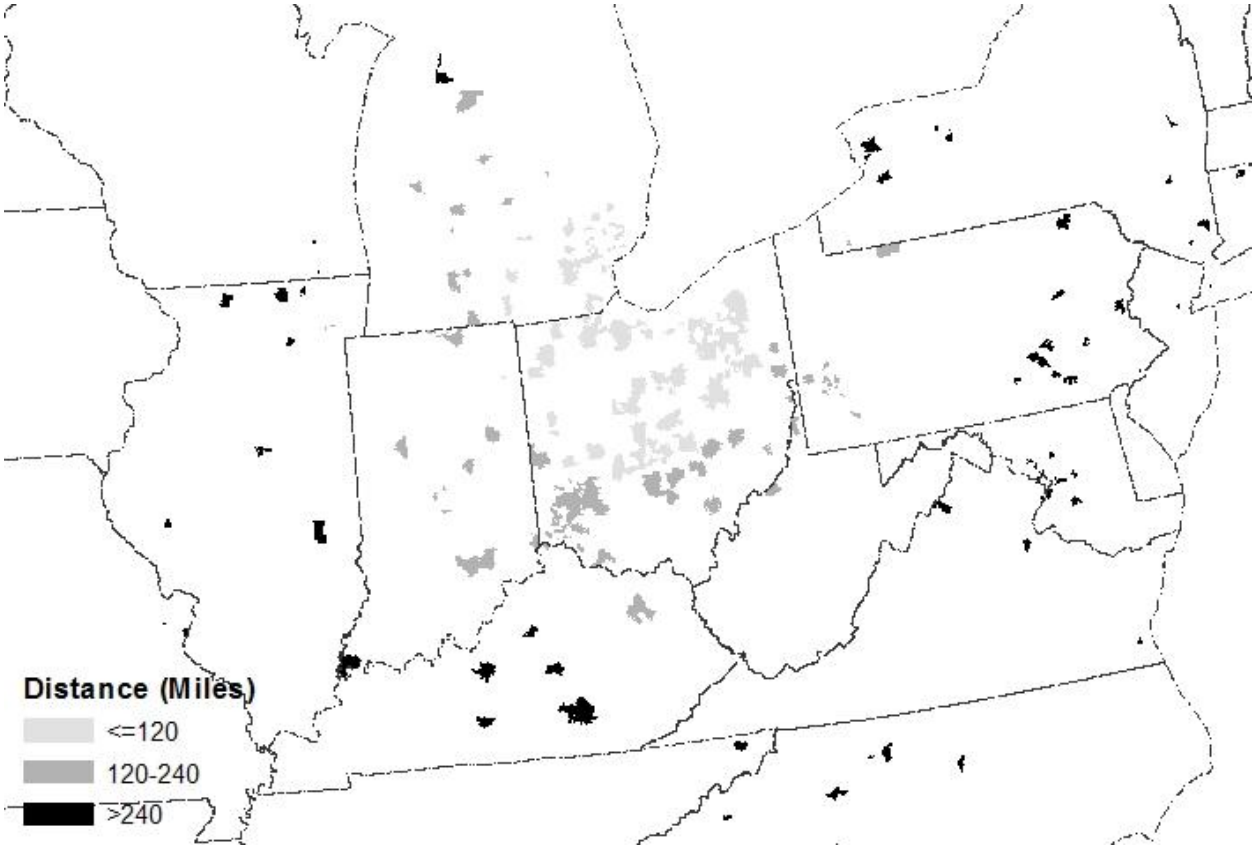


Figure 3: The Spatial Travel Pattern from Birders



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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