

The Ohio State University
Campus as a Living Laboratory

Improving Bird Watching at the Ohio State University Wetlands: Columbus, OH

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Executive Summary

The Ohio State University Wetland Research Park is well known for the research that is conducted there. However, the staff and administration of the wetlands have expressed their desire to be more involved with community outreach. Bird watching is an incredibly popular hobby throughout the nation that is actively enjoyed by many people. Currently the wetlands has a very standard bird viewing pavilion with a view that is blocked by vegetation. Our group believes that the wetlands can greatly improve upon their current bird watching facilities in order to attract birders and leave a memorable impression on visitors. We propose that 6 birdhouses be set up throughout the park designed to attract three species: bluebirds, black-capped chickadees, and wood ducks. Three of these birdhouses will be equipped with a Sony POV Action Cam that will wirelessly display a live video feed of the inside of the birdhouses to the screen within the wetlands lobby.

Furthermore, in order to attract new visitors and to spread the word about the live video feed feature there will also be a calendar of when the cameras will be operating. This calendar will be displayed on the School of Environment and Natural Resources website, and is intended to make people aware of the new features. Posters of the times and dates that the cameras will be used will also be displayed. Additionally, the live video feed will also be displayed during peak visitor occasions such as school tours and conferences. By limiting when the cameras are on the staff will avoid having to constantly monitor and change the camera batteries.

The projected cost of our project is centered predominantly on the purchase of the video cameras, but also includes components such as supplies that will be required to construct the birdhouse. Our group has recommended several grants that we believe this project could apply to. These grants should be able to entirely fund the proposed costs.

We believe that wildlife interactions leave a very memorable impression on people and are much more engaging for visitors than lectures. Our birdhouses and cameras, specifically the live video feed element, will attract both birdwatchers and the general public alike. The online calendar of events allows for the word to spread about these changes and garners interest in the wetlands. A unique and interesting bird watching experience will be able to bring visitors to the wetlands. Ideally, after exposure to the wetlands visitors will want to continue to be involved and interested in the research and activities going on there.

Introduction

The American public has had an interest in outdoor, wildlife-related recreational activities going back to the colonial period. Even today, with the increased popularity of video games and personal laptops, people still find time to get out and enjoy wildlife. In particular, the hobby of bird watching has really taken off. Currently 20% of Americans identify as bird watchers and spend collectively more than \$50 billion on the hobby each year (Carver, 2011). The Wetland Research Park has all of the elements to provide a high quality, enjoyable bird watching experience for both novice and avid bird enthusiasts. The Ohio State University's Wetland Research Park boasts a vast number of native wetland and terrestrial bird species and is also recognized with RAMSAR status as being a wetland of international importance. However, improvements should be made to the wetlands to make the bird viewing experience more satisfying to birders and to attract new visitors. Given the unique environment of the wetlands, the diverse species of birds that frequent it, and the popularity of bird watching, improving the bird viewing experience can be expected to result in more visitors to the wetlands and increased interest in the wetlands. One way of improving the birding experience is by installing six birdhouses, three of which will be equipped with video cameras. These new birdhouses will provide improved habitat for several bird species, and the video cameras will allow researchers to obtain better data about the birds' behaviors. The improved bird viewing areas will attract new visitors to the wetlands, and highlight the biodiversity of the wetlands to people just passing through by showcasing various bird species, while preventing interference and damage to the wetlands.

Background Information on The Wetland Research Park

The Olentangy River Wetland Research Park at Ohio State is a site of both research and educational opportunities. The park's final phase of development was finished in 2003, and the park consists of two kidney shaped experimental wetlands, a created oxbow, a stormwater wetland, a bioreserve pond, and a wetland research and education building. The park also contains a viewing pavilion and fragments of deciduous forest (Mitsch, 2005). The Olentangy River Wetland Research Park has four main goals that have been formulated throughout the park's development. The first goal is to research ecological processes in both created and naturally occurring wetlands, with a specific focus on improving water quality, mitigating flooding, and providing habitat. The second goal is to research the proper design criteria for wetlands and to measure wetland success. The third goal of the wetland park is to provide undergraduate and graduate education in areas related to the responsible management of river

and wetland resources. The final goal is to continue the education and demonstration on wetland subjects for the public, agencies and private consultants (Mitsch, 2005). Research is a key aspect of the Olentangy Wetland Research Park, and the establishment of birdhouses and bird viewing at the park can allow for greater public outreach and education opportunities without interfering with research goals. Improved bird viewing could also be used for future research and education opportunities with further development.

Deficiencies in Bird Viewing Infrastructure at the OSU Wetlands

Currently, there is viable habitat for birds at the wetlands, but the bird viewing conditions provide limited opportunity for public connection and engagement. See Figure 1 on page 9 for a map of the wetland areas. The main structure available for the public to view birds is the wooden observation deck near the river. However, a small, relatively young timber stand obscures the view of the wetland area that one would have while standing on the observation deck.

The vegetation obscures the view of the wetlands, which presents a problem if the objective is to allow bird-watchers to view from the observation deck the wetlands and the birds that frequent them. Continuing along the bicycle path from the observation deck away from the nearest location where the path crosses the river, one would notice that there is not a place for people to sit near a spot where birds will be likely to congregate for viewing purposes.

Benefits to The Wetland Research Park

The improvement of bird watching conditions at the wetlands will bring a number of benefits to the Wetland Research Park. When managing an urban wetland for multiple uses, the type of recreation that is the most valuable for engaging the public with minimal environmental impacts is passive recreation (Zedler & Leach, 1998). Bird watching is one example of passive recreation that is able to attract visitors while maintaining a low impact on the wetland ecosystems (Zedler & Leach, 1998). As previously mentioned, around 20% of Americans identify as bird watchers (Carver, 2011). Furthermore, in 2006, 26% of Ohio residents participated in birding related activities (U.S. Fish & Wildlife Service, 2006). With this large number of people participating in bird watching, the Wetland Research Park could attract a greater number of visitors through the improvement of bird viewing within the park. Bird watching is a great, low-impact hobby that can attract a wide range of participants while having limited environmental impacts.

Encouraging bird watching at the wetlands could lead to greater public interest in the wetlands and the research being conducted there, as more people with environmental interests come to the wetlands

and are able to walk around the park. There are also many benefits that bird watching has on both human and avian communities. Bird watching promotes the valuation of local natural history knowledge as well as the environmental education of individuals and contribution to ornithological knowledge (Sekercioglu, 2002). Bird watching also creates a source of funds for bird conservation and the protection of unprotected areas that contain desirable bird species (Sekercioglu, 2002). Successful bird watching at the wetlands can help promote environmental conservation and protection and generate greater environmental interest for park visitors.

The addition of birdhouses and a live video feed in the lobby of the research building will allow for passive recreation within the wetlands, which does not have a major impact on the ecological well being of the wetlands or the research being conducted. Enhanced bird viewing can create the opportunity for greater public engagement with the wetlands, as well as a greater interest in environmental education and history.

Case Studies

Two successful bird viewing locations were used to help determine a possible plan of action for establishing a better bird presence at the wetlands. The two successes that were researched were Blendon Woods Metro Park and Scioto Audubon Metro Park. Both parks are located in the Columbus area and are popular for bird viewing.

Blendon Woods Metro Park is a 653-acre park located in Westerville, Ohio. Blendon Woods features multiple bird viewing stations, which include two covered observation decks looking out at Thoreau Lake, the park's main body of water. The park also has a nature center, which allows for bird viewing through its various windows (Columbus Metro Parks, 2009a). Blendon Woods Metro Park has a mixture of both bird feeders and birdhouses. These fixtures are placed throughout the forested areas of the park as well as the surrounding edges of the lake, offering for some great bird viewing (Platt, 2013). The nature center also uses speakers that are connected to microphones in the birdhouses and feeders to play birdcalls for visitors (Kennett, 2009). The methods of attracting and viewing birds were the biggest focal points when evaluating this metro park. Our group looked at the placement of birdhouses and methods of visitor engagement used within the metro park to help create our plan for enhancing bird viewing at the wetlands.

The second park that was used as a model for determining potential bird viewing options at the wetlands was Scioto Audubon Metro Park. The Scioto Audubon Metro Park is an exceptional demonstration of using a riparian ecosystem as a natural attractor of birds. Migrating birds and native birds flock to this small, green space next to the Scioto River, without relying on large numbers of

birdhouses and feeders. Visitors are able to observe these birds with the help of numerous observation decks placed along the bank of the river and in the forested areas of the park (Columbus Metro Parks, 2009b). A point of interest from this case study was the numerous activities and programs that are offered at the park. Because the Grange Insurance Audubon Center is located within the park, nature programs of all types are offered for all age groups (Columbus Metro Parks, 2009b). Many bird related activities offered at the metro park, such as youth bird counts, could serve as potential models for future education and outreach programs at the wetlands.

Species Targeted for Birdhouses

In our project, we have three target bird species that we want to attract to the houses within the wetlands: eastern bluebirds, black-capped chickadees and wood ducks. We chose these species because they are native to Ohio wetlands and they are all cavity-nesters, which inhabit different niches. They are a perfect match for the wetlands ecosystem. Our group will work with the wetlands staff on constructing two new birdhouses for each of these species. One birdhouse for each species will be equipped with a video camera to aid in documenting the birds' behavior patterns. We will stream videos from the three birdhouses that are closest to the wetland visitor center. In the construction of the birdhouses, we will follow specific guidelines aimed at keeping the birds safe.

Placement of Birdhouses

As previously mentioned, we plan on installing six birdhouses at the wetlands. Two birdhouses will be devoted to each of our three main target species: wood ducks, chickadees and bluebirds. Figure 1 below shows the general areas in which we plan to put our birdhouses.

The two circles located on the bank of the bioreserve pond and oxbow in Figure 1 represent the placement locations for the two wood duck boxes. Wood ducks prefer to nest in woody areas around shallow banks of bodies of water including lakes, ponds and wetlands. The presence of flooded vegetation and boxes placed near the water's edge or directly in the water are also characteristics that promote wood duck nesting. It should also be noted that wood duck nesting is not severely affected by human presence (Oklahoma Department of Wildlife Conservation, 2011). We have chosen to place one of the wood duck boxes at the bioreserve pond to ensure that it will be close enough to the visitor center to be used with the wireless camera. The second wood duck box will be placed on the bank of the oxbow so that it is

viewable from the walking path that passes through the wetland park. We will place the wood duck birdhouses in secluded areas along the shoreline at least 600 ft. apart (“Nestwatch”, 2014).

The four remaining circles represent the location of the chickadee and bluebird houses. Two houses will be dedicated to each bird, and one of each house type will be placed near each other. In Figure 1 below, the two circles located at the northern portion of the wetland park represent one bluebird box and one chickadee box. Similarly, the two circles in the forested areas near the visitor center in Figure 1 also represent the location of one bluebird box and one chickadee box. The birdhouses will be placed near trees and shrubs to provide shelter, protection from predators and snowstorms, and as places to build nests for their young (“Attracting Birds”, 2014). We have focused on spacing out the birdhouses to decrease the threat of disease transmission between the birds caused by overcrowding. The entrance holes will face north or east to prevent overheating in the summers (“Migratory Bird Program”, 2014). Because bluebirds are territorial, we will place the birdhouses at least 100 yd. apart. The chickadee houses will be placed at least 20 to 30 ft. apart (“Nestwatch”, 2014). The two northernmost circles in Figure 1 have been placed in areas where one bluebird box and one chickadee box will both be viewable from the bike path that runs through the wetland park. The other two bird boxes, indicated by the middle pair of circles shown in Figure 1, have been placed in woody areas near the visitor center so that the cameras installed in each box will be able to pick up the wireless internet coming from the building. Both of these boxes will also be able to be viewed from the walking path that goes through the wetland park.



Figure 1. shows the proposed locations of the six birdhouses (original map (Mitsch, 2005))

Keeping Away Predators

We will install metal predator guards on the birdhouse poles below the birdhouses. These metal guards are designed to protect all three species from predators like snakes, raccoons, chipmunks, opossums, and squirrels (“Nestwatch”, 2014). We will install the birdhouses on metal poles, because they are less accessible to predators than houses placed in trees. We will grease the poles with petroleum jelly or hot red pepper to deter predators even further (“Migratory Bird Program”, 2014). Wetlands staff should apply the grease or jelly every few weeks during the warmer months of the year. To prevent insects like gypsy moths, blow flies, wasps, ants, gnats and bees from laying their eggs in the birdhouses, we will work with the

wetlands' staff on conducting regular inspections of the birdhouses. We will coat the inside of the roofs with bar soap to keep away bees and wasps. Using pyrethrin and rotenone insecticides to kill fly larvae, bird lice, and mites after the birdnesting season will also be considered ("Migratory Bird Program", 2014).

We will also give special attention to discouraging invasive bird species such as house sparrows and starlings from infesting the wetlands' birdhouses. These aggressive species were introduced to the U.S. from Europe, and they are prevalent year-round ("Migratory Bird Program", 2014). They are known for taking over birdhouses used by woodpeckers, bluebirds, and chickadees ("Sparrows and Starlings", 2014). To deter these species from entering the new birdhouses, we will:

- Block the entrances and remove the nesting materials of the starlings and sparrows until native species arrive.
- Hang suet, instead of posting it, to keep starlings from eating it, while making it available to native birds ("Sparrows and Starlings", 2014).

Construction and Projected Costs of the Birdhouses

We will use untreated, unpainted, weather-resistant cedar and galvanized, rust-resistant wood screws for the construction of the six birdhouses to ensure a good seal. For the bluebird and chickadee houses, we estimate that the dimensions for the floor will be about 5 in. by 5 in., the distance from the bottom of the entrance hole to the floor will be around 6 in., and the distance from the top of the hole to the underside of the roof will be about 1 1/2 in. The roof will be at least 10 in. long and wider than the box, which will be 8 to 9 in. For the wood duck houses, the total height of the box will be approximately 24 in. The height of hole above the floor will be about 18 in. The inside floor dimension will be about 12 in. by 12 in. To make the birdhouses, we will need the materials listed above, as well as wood sealer, wood glue, galvanized sheet metal for four of the cone-shaped predator guards, and metal poles ("Nestwatch", 2014). These materials can be found in most hardware stores. The projected cost is approximately \$15.00 to \$20.00 per each birdhouse. The list of materials and corresponding cost estimates obtained from Lowe's Home Improvement are listed below:

Materials List:

- 2 Sony POV Action Cams - \$299.99
- 1 Sony POV Action Cam Bundle (includes camera) - \$339.97
- (2) Kiln-dried cedar boards (1 in. by 4 in. by 8 ft.) - \$6.48 each
- (2) 3 ft. by 8 ft. sheets of 26-gauge galvanized metal - \$9.34 each
- About 120 galvanized nails - \$4.27/one pound box
- About 20 galvanized wood screws - \$33.30/box of 100
- (6) Metal poles – no cost (donated by community service agencies)
- Gallon of wood sealer - \$18.47
- Bottle of wood glue – \$4.00/8 oz. (“Nestwatch”, 2014).

As mentioned earlier, the specifications for building each birdhouse will be tailored to meet the needs of each species. The eastern bluebird is a cavity-nester, which does not have the ability to create its own nesting cavity. It relies on the abandoned cavities of woodpeckers or other natural cavities at the tops of rotten stumps or fence posts (“About Birdhouses”, 2014). The new bluebird houses will simulate tree cavities to cater to this species. The entrance hole for the bluebirds will be 1.5 in. in diameter. For bluebird hatchlings, ladder-style cuts will be included in some of the birdhouses (“Nestwatch”, 2014). The predator guards will be placed on the poles, 6 to 12 in. below the bottom of the box. The black-capped chickadee also prefers abandoned woodpecker cavities, but it can excavate its own cavities. It prefers to use wood shavings or sawdust rather than empty boxes. The entrance hole for the chickadees will be about 2 1/2 in. wide and about 5 in. deep. To help chickadee fledglings leave the nest, we will focus on making the interior walls below the entrance holes rough (“Nestwatch”, 2014).

Pre-made wood duck boxes are available for purchase at a wide range of prices. We have found pre-made wood duck boxes online for \$30 each plus shipping (TEL Woodworking, 2011). These boxes come with an opening side door for maintenance, drainage holes, bedding material and three galvanized bolts. For an additional \$5, the boxes will be covered in a protective water sealer. Predator guards can also be purchased from TEL Woodworking for \$22 each plus shipping (TEL Woodworking, 2011). To purchase two pre-made, water sealed wood duck boxes and two predator guards, the total cost will add up to around \$114 plus shipping.

Wood ducks also like to nest in abandoned tree cavities, but they like to be in close

proximity to rivers, wetlands or other water sources. They are secretive in choosing nest sites to minimize predators and competition from other wood ducks. The entrance hole for the wood duck houses will be 4 in. in diameter and about 24 in. deep (“Nestwatch”, 2014).

For the bluebirds and chickadees, we will mount the birdhouses on poles about 6 ft. above ground. For the wood ducks, we will mount the birdhouses on poles about 10 ft. above ground. The birdhouses for all three species will have sloped roofs with overhangs to keep out the rain and to discourage predators. Each house will also have a recessed floor at least 1/4 in. up from the bottom and four 1/2 in. drainage holes in the floor to keep the nests dry. To regulate temperature and ventilation, the birdhouses will have thick walls at least 3/4 in. thick and two 5/8 in. diameter holes on each of the sidewalls near the top (“Nestwatch”, 2014).

We will work with the Stark and Perry County Boards of Developmental Disabilities (DD) to build the birdhouses economically. Participants with the Stark County Board of DD built birdhouses, picnic tables, and Adirondack chairs and sold them in their local community (“Youth Build”, 2014). Members from the Perry County Board of DD built items such as birdhouses, flower boxes, and candles that are sold at the Perco Market on State Route 13 (Hayes, 2013).

Live Video Feed in the Lobby

The main outreach component that will help bring in new visitors to the wetland consists of using video recording equipment in order to provide live video of the birds to the visitors inside wetlands building. People have a natural curiosity and interest in viewing wildlife activities. There have been many previous successes involving live video feeds of animals in both natural conditions and in captivity by organizations such as *National Geographic* and the Smithsonian National Zoo. A live video feed allows viewers to gain an insight into wildlife that they would not normally experience from a traditional viewing platform. In addition, this video setup requires less effort on the viewer’s part and prevents the interference and destruction of natural habitat amongst the wetlands.

The video camera that is best suited to the task of recording nesting activities inside a birdhouse and also providing a live video feed to the lobby is the Sony POV Action Cam (Prospero, 2014). This camera is intended for outdoor use so it is very durable and will be able to withstand the conditions at the wetlands. Furthermore, it is small enough to be mounted within a

birdhouse and has a long battery life (Sony, 2014). However, what makes this camera ideal for this proposal is the WiFi connection and live video feed that it can send to the wetlands lobby. The camera uses a WiFi connection to connect to mobile devices. These mobile devices (smartphone, tablet, etc.) may then be plugged into the television within the wetlands lobby through an HDMI cord. Alternatively, the mobile devices can connect wirelessly to a computer and provide a live stream via U-Stream, a website that streams live videos (B&H, 2014). The computer would then be plugged into the television via an HDMI cord, as opposed to the mobile device being plugged in. Regardless, the camera will be able to connect to a mobile device. The mobile devices can then use either the online streaming service or the direct connection to display onto the wetlands television. The newest model of the Sony POV Action Cam can be purchased individually for \$299.99 (Sony, 2014), and older models can be purchased for \$248.99 (Prospero, 2013). In addition, the bundle package is priced at \$339.97 and includes a live action remote that can control up to five individual Sony POV Action Cam's. This would allow the wetlands staff to alternate which camera is being displayed on the television remotely. This camera is well priced, can withstand the outdoors, and provides the wetlands lobby with a live video feed inside the birdhouses.

Online Viewing Calendar

The camera we have selected relies on a rechargeable battery, which is a slight drawback. However, this device is still a much better alternative than a camera that would require a hundred feet of wire to be plugged in. The rechargeable battery will have to continually be recharged by the wetlands staff. Thus, in order to limit the time devoted to charging this battery, we propose that the wetlands make a calendar of events for when the live video feed will be displayed. The SENR website already uses an online calendar and has an events list on the homepage. The wetlands would just have to add the times that the live video feed is displayed (we recommend twice a week during the nesting season) in order to alert the public to when they can view the live video feed. This would limit the amount of time devoted to charging the battery and would also create public excitement for the viewing sessions. In addition, the camera will also be on during peak visitor hours such as tours and conferences. Doing this allows the wetlands to showcase their bird viewing technology to people that likely have never experienced the

wetlands before. Hopefully, the experience leaves an impression on them and they return either for a viewing session of the birds or for some other activity. The wetlands will likely also want to promote these viewing sessions in more ways than just posting them on the SENR calendar. Posting flyers at the entrances of Kottman and at the Ag. Campus bus stop will help attract students and SENR visitors to these events and spread the word.

Funding

In order for this proposal to succeed there must be potential sources of funding to cover the anticipated costs of this project. The lists of our expected costs and the materials that will have to be purchased have already been outlined. One potential source of funding, though not one that we can entirely rely upon, is donations by wetland visitors. The wetlands staff has the ability to really spread the word about the proposed project and generate excitement by posting posters and announcements on the SENR website. The hope is that the additional interest in birdwatching may lead to more donations and increased funding for the wetlands. Donation boxes will be placed in the Heffner Building, pending board approval (“Ohio State Parks”, 2008). In addition to setting up donation boxes, Ohio has quite a few good funding sources for environmental conservation programs that we would like to approach. Based on feedback from the wetlands’ staff, our group will request funding from American Electric Power, the Catalog of Federal Funding Sources for Watershed Protection, the Clean Ohio Fund, NatureWorks and Land and Water Conservation Fund, and the Ohio EPA319 Grant Program. These sources focus on providing contributions in the areas of education, the environment, and human services regarding the conservation of open spaces, sensitive ecological areas, and stream corridors (“Funding Sources For Environmental Restoration”, 2014). We expect that this project will be completely funded with no costs to the wetland through the use of donation boxes and funding by the grants and organizations mentioned previously.

Critiques

Economic costs seem to be the most substantial and noteworthy at first glance, but an argument can be made that there are social costs and environmental costs associated with this

project. The primary environmental cost that has yet to be addressed is the issue of how to remove the cameras from the birdhouses without disturbing the nests. The cameras will have to be removed semi-regularly in order to recharge the battery. However, during the nesting season the birdhouses will likely be providing shelter for eggs and young chicks. The wetlands staff does not want to harm or interfere with the offspring inside these houses. The best solution is to monitor the battery life of each camera, which can be done remotely with the live video streaming. The wetlands staff can observe when the battery is getting low on their mobile devices and television screen in the lobby. They can also use the live video feed to determine when the mother and chicks are present inside the birdhouse. The staff can change out the batteries for these cameras without disturbing the birds by monitoring both the battery life and when the birds are present in the houses. Doing this will eliminate any potential problematic interaction that may arise between the staff and the birds.

Additionally, the issue of vandalism and camera safety is also a possible concern. The cameras that we are proposing are not overly expensive, but are also not cheap. The issue of individuals realizing that there are expensive cameras within the birdhouses and then stealing them is a legitimate problem. The best solution would be to add some sort of lock to the tops of the birdhouses that would require a key open. This would prevent individuals from stealing the cameras. This is not a foolproof solution. Certainly if someone is ambitious enough they will find a way to get a hold of the camera. However, generally speaking a lock should stop and/or deter most people that would consider stealing the cameras.

Conclusion

In summary, the wetlands at the Ohio State University could benefit from changes that would improve its bird watching experience. These changes would likely increase interest and the number of visitors to the wetlands. This could serve as an outlet for outreach to the public, which is one of the goals of the staff at the wetlands. People passing by on the bicycle path that goes by the wetlands could be attracted away from the path to observe wetland birds at the birdhouses and possibly use it as an educational experience. Also, by announcing the times that the live video will be on via the online calendar and flyers, the wetlands should generate enough interest to turn those weekly viewings into learning events. The arguments presented represent

several potential critiques that this proposal may experience in the future. However, as has been explained, none of the critiques are damaging enough to derail the entire project. Our proposal would provide a valuable resource for the Ohio State University and for the neighboring community and will promote wetland conservation by increasing the awareness of the public about birds, wetlands, and related conservation issues.

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