Urban Wildlife Habitats

An Honors Thesis (Honors 499)

By

Erin Elizabeth Arnold

Thesis Advisor
Tim Carter

Ball State University
Muncie, Indiana

December 2010

Expected Date of Graduation
December 2010
Abstract

Living with the land as well as wildlife is something that is always changing because of habitat destruction and development. But there is something you can do. You can make your backyard a haven for wildlife. You can even attract what species you want, for the most part. By looking at numerous state and national websites I have come up with a brief list of suggestions on how to attract wildlife to your urban habitat.
Acknowledgements

I would like to thank Dr. Tim Carter for advising me throughout my entire project, as well as my entire Ball State career. He has always been there for me to talk to about any questions I had, or just there to bounce ideas off of. Not only is Dr. Carter a great professor but also a great advisor, mentor, and friend. My Ball State experience would not have been the same without you.

I would also like to thank Dr. Islam for letting me use one of his bird specimens in my case as well as being a great mentor over my time here at Ball State.

I would also like to thank my parents, Eric and Kathy Arnold, and grandparents, Charles and Marilyn Sater and Tom and Beverly Arnold, for encouraging me and bringing in a fresh perspective throughout this entire process. You are my support and I couldn’t ask for anything more from any of you.
Table of Contents

Abstract............................................................................................................ 2
Acknowledgements............................................................................................ 3
Introduction........................................................................................................ 4
Display Cases..................................................................................................... 5
Water Sources..................................................................................................... 6
Food Sources....................................................................................................... 7
Mammals............................................................................................................. 10
Bats..................................................................................................................... 11
Birds..................................................................................................................... 13
Reptiles and Amphibians..................................................................................... 15
Butterflies........................................................................................................... 17
Conclusion.......................................................................................................... 18
Literature Cited..................................................................................................... 19
Supplemental Materials....................................................................................... 23
Introduction:

For my Honors thesis project I wanted to do something creative that would help the department that helped me so much during my time here at Ball State University and a topic that is also very relevant to my Biology major. This is why I chose to redo one of the display cases in the department. I chose the topic of urban wildlife habitats because it applies to almost everyone.

Since the 1900s humans have had a devastating effect on wildlife and have contributed to the destruction of their habitat through the expansion in the human population and resulting encroachment on wildlife habitats (Chomel et al. 2007). Land development is at an all time high, leading to habitat loss and fragmentation (Terris 1999). Now wildlife in these areas are forced to adapt to urban areas if they are to survive. By creating or improving habitats in backyards it may be possible to help animals adapt to this ever-changing environment. My goal is to help people understand what they can do to improve or create new suitable habitats in their backyards in order to enjoy the wildlife species that coexist in their area.

This project required me to look at several different aspects of habitats and wildlife at both specific and general levels. In the display I include general information such as food and water resources as well as more specific information on bats, butterflies, mammals, birds, and herpetofauna (including both reptiles and amphibians). I chose these specific taxonomic groups because they include many animal types that people wish to attract, such as birds (Jensen and Guthrie 2005), as well as other species that are
important to an environment but that many people do not consider (e.g. bats; Bat Conservation International 2010 B).

**Display Case:**

Along with the informational facts I chose to include many three-dimensional and visual elements to bring the audience into the subject (Trapp et al. year?), as well as show them what a modified backyard might look like. Good display cases have both two and three dimensional elements and have facts associated with some sort of visual aid (Ham 1992). The background is also important in bringing all the concepts together, and so I took many pictures before finding the ones I wanted to use. In the end, I used photographs of the wooded edge of the forest in Christy Woods as well as a yard from a house directly across from Cooper Science Building. These pictures represent what could potentially be a typical back yard, with grass and some trees. These elements in the picture are also very helpful with my three dimensional elements because they allow me to place items such as the bird house on a tree, simulating how it would appear in an actual back yard.

Although I gathered a large amount of information about many of these topics, I chose to only put a few of the more important facts in the display. In doing this I hope that the viewer will be able to read a fact or two in the short moment that they are walking by, and hope it will spark interest or allow them to gather enough information to use in the future. Displays that work best have only four or five short facts for each main idea and do not overwhelm the reader with too much information (Ham 1992). By shortening the facts and providing a variety of visuals, I hope to encourage the viewer to actually stop and take a few moments to read the display, even though an average
reader’s attention span is typically 45 seconds (Ham 1992). In those few seconds they will be able to read as well as associate pictures and three dimensional objects with the information and will have a better understanding of what they can do to attract wildlife to their urban habitat.

Two of the most important resources a habitat can provide are water and food, which is why I chose to include these two categories in my display. I also chose to include many large taxonomic groups, such as mammals, birds, reptiles, and amphibians. I also chose a few specific groups such as bats and butterflies.

**Water Sources:**

Water is a resource that is important for all living things and can be a limited resource in urban environments. This is why it was important to include in my display. Many species need water not only for drinking, but also for other stages and activities in their life cycle. Birds use shallow water sources to clean their feathers to keep them in good condition (Schneck 1992). Most amphibians as well as reptiles use water as place to lay their eggs, which is where they hatch and undergo early stages of development (Cates 2002). The most ideal places for this are in wetlands which is why it is so important to protect them. According to the United States Environmental Protection Agency (2003), wetlands’ “shallow waters, nutrients, and primary productivity are ideal for organisms that form the base of the food web upon which many species of wildlife depend.”

However, since many people can not create a wetland in their back yard a more appropriate substitute is a bird bath or a shallow pond. A shallow pond tends to be the best choice because all species can use it, while bird baths tend to exclude reptiles and amphibians.
These are the facts I chose to include in my display about water:

- Needs to be clean
- Should be shallow enough for birds to stand in
- A water source with movement is best

I felt these were the best facts because they are simple, easy to remember, and very relevant. The aspect of shallow water allows use from many species if it is a pond, movement attracts reptiles and amphibians, and the water needs to be clean for any species to want to use it. By keeping the pond shallow this discourages fish populations which in turn could have a negative affect on the amphibian population, because of predation (Sexton 1986).

**Food Sources:**

As all animals require nourishment to survive and flourish, a quality food source is the one of the best ways to attract wildlife to your area. This is why I chose to include this information in my display. Different species require and prefer different types of food, and by providing a mixture of options you are more likely to attract a greater variety of species. There are often native plants or trees that will produce desired foods, and although the use of natives are not necessary, they tend to require little upkeep (National Wildlife Federation 1996). As long as you are not using invasive species, any variety of food producing plant should work as long as you can get it to grow and survive in your area. An invasive species is a species that is non-native to the ecosystem and upon introduction to that ecosystem can cause economic or environmental damage (United States Department of Agriculture; National Agricultural Library 2010). Introducing invasive plants may provide short term benefits to back yard habitats, but
their uncontrollable spread can have long term devastating consequences to natural environments.

It is also a good idea to have plants that will produce food in different seasons. By having multiple food sources, it is more likely that your backyard will naturally produce food all year round as opposed to for only one season. Seasonal food availability is something to take into account. During the spring, many bird species thrive on the newly hatching insects, while herbivorous mammals feed on the new grasses and shrubs (USGS 2006). The summer is when the berry and fruit producing plants normally mature, which are great for many bird and mammal species. Also, flowers will attract butterflies, insects, and possibly hummingbirds. Although flowers are beautiful it is important to have more than just spring and summer flowers in your yard to make sure there is a consistent source of food for species that them. The fall is one of the most important times for animals because this is when they build up their fat reserves prior to migration and/or the more difficult times of winter (USGS 2006). During this time it is best to have plants or trees that produce mast (hard seeds like acorns or hickory nuts). Also, if you want to supplement food for birds, suet is a preferred food that is high in fat (Schneck 1992). The winter is hard on almost all species, and wildlife depend heavily on the abundance of mast from trees to make it through this tough season. Wildlife also rely on plants or trees that have berries that persist into winter, such as hackberries (USGS 2006). Overall providing food year round is very important.

In my display I chose to include four facts on the topic of food. These are the four food source facts I used:

- Everything needs to eat!!
- It is best to use non-invasive plants
- It is helpful to have something that produces food for each season
- Plants that produce nuts, pollen, nectar, sap, and berries are best

The ones I chose are very general but apply to a broad spectrum of wildlife. It also gives the viewer a starting place if they wish to research more about specific types of plants. The main thing I focused on was to stay away from using invasive plants. There are so many types of native plants that people can use that provide a good variety of food sources for wildlife. Non-native species or exotics can also be used. Exotics are non-native plants or animals introduced into a new habitat either accidentally or purposefully. Non-native plants are prone to become invasive if they have certain characteristics such as fast growth, and rapid reproduction (Environmental Literacy Council 2002). People need to be made aware which plants are invasive, or potentially be invasive and that they should try to avoid them.

I also chose to include some different types of food sources because many people think only of mast, or nuts as a main source of food.

Great Food Sources:

- Oaks, Walnuts, Hickories
- Dogwood, Hackberry
- Butterfly Bush
- Sunflowers
- Bird feeders and suet

There are many other things that animals can eat besides just nuts. Some examples include items from nectar and sap, to pollen and berries. Also, by having
different food sources you are more likely to keep these animals close year round. By having a variety of food you will most likely be able to produce food for the wildlife all year long. The examples of food sources that I have listed work well because there is a type of food source for every season. Also these food sources are common ones that most people may already have in their back yard. These food sources will also feed a variety of species which is why I chose to include them.

**Mammals:**

Mammals are one group that people often do not want in their backyard because they can be a nuisance, but there are ways to attract mammals without having the problems most people associate with them. The most important thing to remember when attracting mammals is to take precautions. It is best to put your trash in a container that can not be chewed through and that can be closed securely. Also, be sure to check around the house for loose or rotten boards. These will need to be fixed or replaced to prevent animals taking up residency (United States Department of Agriculture, Natural Resources and Conservation Services 2010).

It is also best to consider the animal’s safety before you decide to attract them. Many wildlife species can avoid roads, but most mammals must cross them and face the dangers of traffic. If attracting mammals will endanger them, you may try to avoid and even take measures to deter them (Schneck 1992). If high traffic roads are not an issue, you might be able to attract not only small mammals, but possibly larger ones such as deer.

Many types of mammals need trees for shelter. These mammals include but are not limited to opossums, raccoons, and squirrels. Most mammals will also readily eat bird
seed and suet, so if you are trying to keep the bird food separate you may have to invest in a critter/squirrel guard, or bring in excess food. Having vegetation and other forms of cover is also important, especially if you are trying to attract rabbits. Rabbits and chipmunks in particular will make use of small brush piles for shelter.

Deer, like any other animals, have preferred foods that they will choose to eat over others. If you are trying to attract deer in particular they will eat a variety of items but have been known to prefer white cedar, white pine, maples, yellow birch, sumacs, dogwoods and viburnums to name a few (Michigan Department of Natural Resources and Environment 2001 B). Deer need to be carefully managed, and if their population grows too large you may begin to see major tree and vegetation damage.

Facts about Mammals:

• Mammals can become a nuisance if precautions are not taken
• Trash needs to be disposed of properly in a sealed container that cannot be chewed through
• Check and seal off any holes around the base of your house
• Many mammals will be attracted to areas with trees, food, water, and shelter

In this section of my poster it was difficult reduce all the information to only a few short facts. The main concepts I want to convey are to protect yourself from the animals and to prevent the animals from getting into areas where they don’t belong, such as a house or trash can. If the animals stay in the backyards, and out of trash cans and houses, they tend to be more welcome.

**Bats:**
Bats tend to be one of those species that, in my experience, people either love or hate. I chose to include them to show people that they can be attracted to an area and be beneficial to the ecosystem. Suitable bats roosting places are often in short supply (Bat Conservation International 2010 B). These animals can be attracted to an area by putting up a bat box, or roosting box. These boxes will not be used for winter hibernation because the temperatures do not stay constant enough for hibernation to occur, but will be used during the summer months.

I chose to include a bat box in my display because it is somewhat of a new concept and many people do not know what they are when they see one. In order to be effective, these boxes need to be placed on a pole 15 to 20 feet above the ground. This spot should receive direct sun during the summer months for at least 6 hours a day. It is recommended that in this area that the boxes be a dark to medium color so they conduct heat better (Bat Conservation International 2010 A). I chose to paint my bat house a dark reddish brown to illustrate this. The reason behind placing them on a pole is that if they are placed on a tree the leaves and limbs from the tree will block the sunlight. The houses also need to be checked during the winter to make sure that wasps have not formed nests inside. If they have, the nests need to be removed in order to attract bats the following year (Bat Conservation International 2010 A).

I also chose to include a big brown bat in my display because by placing it on the bat box I am hoping people will make the connection that it is indeed a bat house or box. Also, big brown bats are a native species of Indiana, and it is important for me to use local wildlife examples because that is my target audience. Many people who will see
this display will live in Indiana at least part of the year and so this is a species they could potentially see or provide habitat for.

Facts about your bat box:

- Hang 15-20 feet above the ground
- Needs to receive direct sunlight for 6 hours a day during the summer
- Do any maintenance during the winter

I did not include general facts about bats because by providing them with shelter is the main way of attracting them. I chose to include the most important facts about how their shelter should be put up, since this is not something many people are familiar with.

**Birds:**

Bird watching is one of the top recreational activities, and is steadily becoming more popular (Jensen and Guthrie 2005). You can attract many different types of birds by just providing them with a shelter or bird house. The most important thing about bird houses is the size of the hole in the bird house (Cates 2003). This will help determine what species will live there. This is because that any bird that is larger than the hole size cannot enter the bird house. Starlings, which are an invasive bird species, can not fit into a hole smaller than 1.5 inches in diameter (Cates 2003). Bird houses can be made for many different types of birds from owls and kestrels to song birds. Many of these houses should have a door on a hinged side so nest debris can be removed before the next nesting season (Cates 2003).

There are many steps to attract birds that do not involve buying copious amounts of bird food. By reducing or not using insecticides on lawns and around the yard, the bug population will increase and therefore attract insect eating birds. Also, by leaving grass
and small bush clippings birds will have easily accessible building materials for their nests. By providing a bird bath with clean water, you will encourage birds to visit the area to drink water and clean their feathers. The water in the bird bath should be shallow enough the bird is not swimming, but deep enough that its nares, or nostrils can be submerged. Keeping cats inside will also make the birds safer and therefore more attracted to the area (Washington Department of Fish and Wildlife: Living with Wildlife 2010). Although it may not be desirable to all homeowners a large population of song birds may attract a falcon or hawk to your property and possibly take one of the songbirds for its food (Roth 2000).

If you do choose to purchase bird food, such as seeds and nuts, the choices are endless. If you are trying to attract a specific type of bird you should study their diet as well as see if they even occur in the area. If you provide a variety of food sources, you can attract a variety of bird species. One of the best times to view birds is during the winter, but if you do choose to feed birds in the winter you must do so continually. Some birds will choose not to migrate if they feel they have an ample supply of food, but if you stop supplying them with food half way through the winter they may not be able to survive. Also, the caloric requirements of birds are much greater in the winter so it is important to provide foods high in fat such as suet to help meet their needs (Roth 2000).

Facts about birds:

- By providing a variety of food sources you can attract a variety of species of birds
- If you choose to feed birds over winter you must continue to feed them until the spring

Facts about your bird house:
• Hole size is very important for controlling what species occupy your bird house
• To find instructions on how to build a bird house for a specific type of bird you can look up bird house designs on the internet to get a variety of informational sources

The aspects that I chose to include in my display about birds are mainly about their shelter. Since many people do not understand the relationship of hole size to birds species, I felt like it was an important yet simple message to convey. I chose to include a bluebird house because it gives an example of an appropriate size of opening with the appropriate species. Hopefully with the bluebird specimen as a representation of the species, people will be able to understand the pairing of species and the appropriate opening size of a bird house. I felt like I didn’t need to include many facts about birds themselves because many people feel they know more about attracting birds than most other species. The one main fact that I did choose to include that most people do not think about is the fact that if you choose to feed birds over the winter you must continue to do so until the spring.

**Reptiles and Amphibians:**

Reptiles and amphibians are another category that people do not normally think of attracting to their area, or backyard, but they need relatively more resources to be provided to them to attract them to an area. One main thing that amphibians need throughout their life stages is a clean source of water. Reptiles and amphibians are ectotherms, which means their body temperature is influenced and controlled by the surrounding environment and its’ temperature (Cates 2002). Rock piles in the sun and shade are also very useful for reptiles, as they will use this rock pile to warm or cool their
body temperatures (United States Department of Agriculture, Natural Resources and Conservation Services 2010). The rock pile can also be used as a place of shelter, and can be as large or small as the home owner has room for. These rock piles should have some gaps in them. This can serve as protection, as well as a safe place to lay eggs (Cates 2002). One thing to remember is that a landowner should try to avoid mowing around rock piles or along water sources. The long grass provides a habitat to reptiles and amphibians as well as protection from predators (Cates 2002).

Another technique is to erect what is called a toad light. This is a small light that is less that three feet tall that is established between two habitats. This can be anything from grass to woods, or grass to gravel. Once the toad light is erected it should be turned on at night, which will in turn attract insects (Michigan Department of Natural Resources and Environment 2001 A). These insects over time will attract frogs and toads to the area because of the abundance of food. It is estimated that an American toad can eat up to 200 insects in one night (Schneck 1992). Besides getting rid of unwanted insects this is also a fun way to be able to see frogs and toads up close at night.

Facts about Reptiles and Amphibians:

- Set up a light less than 3 feet off the ground to attract insects which in turn will attract frogs and toads
- Create a rock pile that receives direct sunlight
- Provide them with a clean source of water

I chose to include these facts because they are some of the simpler ways that people can attract reptiles and amphibians. Also, they are very easy to remember because each one involves a basic need such as food, water, and a shelter.
**Butterflies:**

Butterflies are another taxonomic group that many people enjoy viewing and will go to great lengths to attract to their yard. Butterfly gardens can be as big or as small as the homeowner desires, but the best butterfly gardens are in sunny areas that are protected from wind. The best plants to use are full sun, nectar producing plants (Washington Department of Fish and Wildlife: Conservation 2010). There are many types of plants that will attract butterflies ranging from evergreens to wild flowers. It is best to pick a variety of plants that will cater to both the larval and adult forms of butterflies. Plants that are best for larvae are weedy and somewhat unattractive but have lots of foliage which allow them to grow rapidly, while the adults prefer more energy rich nectar producing flowers (Ball 2001). Just a few species of these plants are Asters, zinnias, golden rod, butterfly weed, chokecherry, butterfly bush, and rhododendrons (Washington Department of Fish and Wildlife: Conservation 2010). The best thing to do when picking out plants is to look at what plants occur naturally in your area. Although it is not necessary to use native plants to attract butterflies, you do not want to introduce invasive species to your yard.

The use of butterfly boxes to attract butterflies is debated among biologists. Some say that butterflies use these small boxes as a place to hide from predators and to take shelter from elements. It is even thought that some butterflies use these boxes for hibernation purposes. Those who do not believe that they use them say it is because they have natural places to hide and take shelter (Dole 1997). I chose to include a butterfly box in my display because it is something that is becoming more commonly used to attract these insects. Even though there is a debate about whether or not butterflies
actually use it, I feel that it is worth a try and even if the box doesn't attract butterflies, it will not have a negative impact on the surrounding habitat.

Facts about the butterfly box:

- Hang 2-3 feet above the ground
- Place in sunny spot out of the wind

Although I did not include specific facts about butterflies, the information applying to general food applies to them. If someone succeeds in creating a diversity of foods in their yard they most likely will attract butterflies as well. I did, however, choose to include instructions for successful placement of the butterfly box. Since this is a relatively new idea, someone may buy one not knowing what the suggested hanging recommendations are.

**Conclusion:**

Although this is just an overview, it shows how much information is available to make urban habitats more wildlife friendly. As more and more areas are developed, finding a way to live with nature becomes more important. This way of living is not difficult, but is something people often don't really look into or think about. As people begin to develop more areas more wildlife habitats are lost (Terris 1999). If people make their yards more wildlife friendly it will offset some of the negative impacts that development causes. Granted it will not fix the problem but it will allow for the wildlife that was in the area before to hopefully be able to stay there. By creating a display I hope to bring just the idea of living with the local wildlife to the front of people's minds just for a few minutes. The idea of urban wildlife habitats is explained well by the National Wildlife Federation and they even allow people to certify their back yards as wildlife
habitats. I hope I can bring their message along with my own ideas of urban wildlife habitats to others and to create a spark and inspire others to make their homes or yards more wildlife friendly.

**Literature Cited**


Supplemental Materials:

The following materials show the progression of my display as I was working to put it together. First there is my sketch of the layout. Then there are the print outs of my finalized poster. Finally there are pictures of putting the display together and the finished product.
Food source fast facts
• Everything needs to eat!!
• It is best to use non-invasive plants
• It is helpful to have something that produces food for each season
• Plants that produce nuts, pollen, nectar, sap, and berries are best

Reptiles and Amphibians
• Set up a light less than 3 feet off the ground to attract insects which in turn will attract frogs and toads
• Create a rock pile that receives direct sunlight
• Provide them with a clean source of water

Mammals
• Mammals can become a nuisance if precautions are not taken
• Trash needs to be disposed of properly in a sealed container that cannot be chewed through
• Check and seal off any holes around the base of your house
• Many mammals will be attracted to areas with trees, food, water, and shelter

Great food sources
• Oaks, Walnuts, Hickories
• Dogwood, Hackberry
• Butterfly Bush
• Sunflowers
• Bird feeders and suet

About your bat box
• Hang 15-20 feet above the ground
• Needs to receive direct sunlight for 6 hours a day during the summer
• Do any maintenance during the winter

Urban Wildlife Habitats
By providing a variety of food sources you can attract a variety of species of birds. If you choose to feed birds over winter you must continue to feed them until the spring.

**About your bird house**
- Hole size is very important for controlling what species occupy your bird house.
- To find instructions on how to build a bird house for a specific type of bird, you can look up bird house designs on the internet to get a variety of informational sources.

**Water sources fast facts**
- Needs to be clean
- Should be shallow enough for birds to stand in
- A water source with movement is best

**About your butterfly box**
- Hang 2-3 feet above the ground
- Place in sunny spot out of the wind
About your butterfly box
- Hang 2-3 feet above the ground
- Place in sunny spot out of the wind

Water sources fast facts
- Needs to be clean
- Should be shallow enough for birds to stand in
- A water source with movement is best

Reptiles and amphibians
- Set up a light less than 3 ft. from the ground to attract insects. Insects will attract frogs and toads
- Create a rock pile that receives sunlight
- Provide them with a clear source of water

Great food sources
- Oats, Walnuts, Hickories
- Dogwood, Hackberry
- Butterfly Bush
- Sunflowers

Mammals
- Mammals can become a nuisance if precautions are not taken
- Store food and waste in a sealed container that cannot be chewed through
- Check and remove any holes around the base of your house
- Many mammals will be attracted to areas with trees, food, water, and shelter

About your bird house
- Hole size is very important for controlling what species occupy your bird house
- To find instructions on how to build a bird house for a specific type of bird, you can look up bird house designs on the internet to get a variety of informational sources

Food source fast facts
- Everything needs to eat
- A tree is an inclusive plant
- A bee is known to have something that produces food
- For each species
- Plants that produce nuts, pollen, nectar, sap, or berries are best