WILDLIFE CAMERAS

COMMUNITY SCIENCE OPPORTUNITIES

Urban Wild
Monitoring Program

BRANDYWINE ZOO
Go a little wild!

DELAWARE STATE PARKS

OUR PROJECTS

WILDLIFE RESEARCH IN DELAWARE

More than 10% of the Earth's surface is characterized as urban land cover, and the majority of humans live in urban areas, yet the wildlife in our cities are understudied and often misunderstood.

In 2018, the Brandywine Zoo began studying urban wildlife and how it is impacted by human development and urbanization, with a focus on New Castle County, Delaware.

PROJECT GOALS

1. Connect Delawareans and residents of the Delaware Valley to the wildlife living in our backyards.
2. Understand how wildlife behavior is changing as our cities continue to grow.
3. Investigate inter-specific relationships between carnivores and scavenging animals living in proximity to people.

In having a better understanding of urban ecosystems, we can help minimize human-wildlife conflict and maximize positive wildlife interactions.

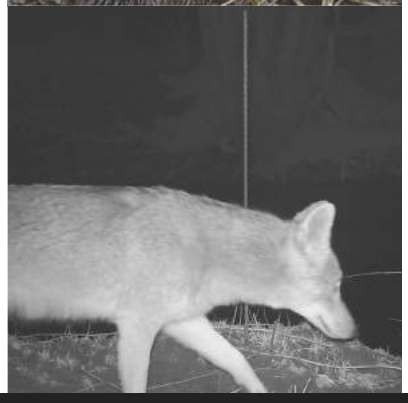
Currently, our projects studies urban wildlife, primarily mammals and scavenging birds, however non-target wildlife is often captured by our cameras including non-scavenging birds, reptiles, and even invertebrates.

Additionally, cameras will often take photos of domestic animals and people. While not the target of our study, these detections are still important data. Where pets and people are, we may not find as much diversity in the species detected, or may not see more shy species at these locations.

Installing a wildlife camera on your property will help us collect valuable data about animals in Delaware.

Urban Wild Monitoring Research Projects

OBJECTIVES AND STRATEGIES



URBAN WILDLIFE INFORMATION NETWORK

In partnership with the Lincoln Park Zoo, Chicago, this international network of more than 25 cities using the same protocols and share data in a collaborative research partnership unlike any other camera trapping project in the world.

- 40 KM transect across New Castle County with 28 survey locations
- Surveys for 4 weeks each season

This project answers: how are wildlife co-existing, or struggling, to adapt in an increasingly urban world?

CARNIVORE ECOLOGY

When the public receives information about urban carnivores, it unfortunately comes when the media focuses on conflicts, such as pet attacks. However, carnivores serve important roles in any ecosystem, even urban ones. This study focuses on two apex carnivores in Delaware with very different public personas, coyote and otters, and how their presence is understood, received by the public, and the biological impacts of their presence or absence on other species.

- Year-round camera surveys at select locations
- Presence surveys using coyote calling

This project answers: how common are coyote and otters in our urban areas, and how does their presence change the diversity of animal communities.

SMALL MAMMAL STUDIES

Small mammals serve important roles as food sources in their ecosystems. The goals of this project are to index small mammal species across sites along an urban to rural gradient. These surveys aim to simply determine which small mammal species are present at any given location, as small mammals are not as easily detected using camera traps.

- Co-located small mammal surveys in conjunction with cameras
- Surveys take place over three consecutive nights

This project answers: what small mammals are present at varying levels of urbanization?

SCAVENGER ECOLOGY

Scavengers provide vital carcass disposal services. Wildlife carcasses can harbor diseases, which, left unchecked, can spread to people, pets, and livestock. In researching scavenging succession in urban areas, this project will look at how the presence, or absence, of avian and mammalian scavengers affects the outcomes of carcass decomposition.

Additionally, many obligate and facultative scavengers make use of hunter gut piles (offal) in the fall. However, these scavengers are exposed to lead fragments, a major health threat, in consuming offal. Understanding scavenger ecology and succession in Delaware is the first step to educating the public and hunters about threats facing scavengers.

- Selectively survey carcasses using camera traps inside and outside of hunting seasons

This project answers: how well are urban scavengers doing their jobs and what level of lead exposure are they potentially facing.

HELP US WITH OUR RESEARCH

Become a community scientist for the Zoo

The purposes of this document is to guide citizen scientists interested in helping our camera research projects in Delaware and our neighboring states.

Looking for ways to get involved with wildlife research in Delaware?

Installing and monitoring your own camera trap for the Zoo will help us cast a wider net in our data collection efforts. Through the help of community scientists like you, we will better understand what type of wildlife we live amongst and, ultimately, how to co-exist!

To get involved, you simply need landowner permission and your own wildlife camera(s).

HOW IT WORKS

INSTALL CAMERAS

Your trail camera will become one of many in our network of cameras across Delaware. We simply need the GPS coordinates to get started.

MONITOR WILDLIFE

In our projects, wildlife are studied at dozens of locations simultaneously. This helps create many opportunities for comparison. You'll also get to find out what wildlife you're missing out on seeing in person!

SUBMIT DATA

You will submit your photos to us (we'll provide you a link), and we'll then analyze your images and identify species seen at your site and compare to others.

Get in touch:

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Brandywine Zoo
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BrandywineZoo.org/urbanwild

Join our iNaturalist Project
Urban Wild

Our iNaturalist project is another great way to share your photos with wildlife-enthusiasts and other community science projects.

TRAIL CAMERAS

Urban Wild Monitoring Programs

WHAT IS A WILDLIFE CAMERA?

Wildlife lives all around us, some we see however most we do not. Animals have learned to avoid humans by shifting activity to dusk, dawn, or during the night.

A popular technology used to detect elusive wildlife with minimal disturbance is the use of motion-activated cameras, called "trail cameras," "game cameras," or "camera traps." Animals walking in front of trail cameras will trigger its shutter, taking its own picture. Wildlife cameras use a passive infrared detector that responds when something hotter or colder than the background moves in its detection zone to trigger the camera to take a photo or video.

WHY USE A CAMERA TRAP?

Most wildlife avoid humans - our presence often scares them off long before we have a chance to see them. Motion-activated, outdoor cameras are typically used by hunters and researchers to spot wildlife that would otherwise avoid detection. Trail cameras can be left in place for weeks or months, are very hardy, and are built to withstand long-term exposure to weather.

Wildlife biologists use camera traps because they're very time effective and are great at detecting elusive animals that are shy of people or species that are highly sensitive to people. Camera traps are considered passive monitoring, which means people do not have to physically interact with animals to study them, making this method of research a least-invasive opportunity that requires few man-hours.

Wildlife enthusiasts also enjoy using camera traps to photograph wildlife in their yards and neighborhoods. Camera traps are a great way for citizen scientists to help the Brandywine Zoo collect valuable wildlife data. To get the best photos, a trail camera photographer must think like a wildlife tracker and read signs left by animals and place the camera in a location most likely to "capture" an animal using that area.

TYPES OF CAMERAS

Game cameras take color photos and videos during the day, with the night time image type dependent on the type of camera selected. There are 3 main types of trail camera: Low Glow, No Glow, and White Flash.

- **Low Glow cameras** are called such because they give off a slight red glow when triggering. These cameras allow for brighter nighttime images and are typically cheaper than No Glow. We use Low Glow cameras for our studies. These cameras take monochrome night images and are the only one completely undetectable by people (a valuable option when theft is a problem).

- **No Glow cameras** do not give off any glow when triggering. These cameras won't spook animals that may be sensitive to the red glow given off by Low Glows, but they do result in darker nighttime photos and are usually more expensive. These cameras take monochrome night images. No glow draws more power than low glow and may limit the choice of batteries .

- **White Flash cameras** emit the type of flash that you typically think of when you think of a camera. While these allow for very bright, color nighttime images, the bright white light will scare animals within view of the light. Our research protocols do not require color nighttime photos, therefore we highly discourage this type of camera as it will significantly disturb animals as well as alert people to the presence of the camera.

PICKING A CAMERA

APPROVED CAMERAS

- Browning (Strike Force Elite HD, 2017 Strike Force HD Pro, DarkOps, or camera of equal or greater quality)
- Bushnell (Trophy Cam HD, Essential, Aggressor, Impulse, orcamera of equal or greater quality)
- Moultrie (M-999I, M-1100i, or camera of equal or greaterquality)
- Primos (Proof Cam 02, Proof Cam 03, or camera of equal orgreater quality)
- Reconyx (all models)
- Spypoint (Solar, Force 10, Force 11D, Force GM, Force Dark,Link-S, Link Dark, or camera of equal or greater quality)
- Stealth Cam (G45NP Pro, G42NG, or camera of equal or greaterquality)

MINIMUM SPECS

- **Photo quality** - 12 megapixel or greater quality
- **Night photos**- no glow infrared, or red glow (low glow) infrared only. No white flash cameras-this disturbs behavior and makes animals avoid camera sites.
- **Trigger Time**- the faster the better- this is the time it takes to wake the camera when an animal is first detected. In most cameras this is <0.5 sec, with some around 0.2, for still images. Video triggers are always slower than stills.
- **Recovery Time**- this is the time in between photos that it takes the camera to be ready again. Recovery times are usually longer than trigger times, 0.5–3.4 s for still images and 0.7–5 s for videos. Purchase a camera with minimum of 5 seconds, but the lower the better. 1-3 seconds is ideal with "burst mode" setting options.
- **Detection Zone**- the bigger the better

We use Bushnell Trophy Cam HD's for our monitoring projects, but any camera with a 5 sec or less delay and 12 megapixel or greater quality will work.

OTHER ITEMS

- **SD card** – the larger the memory card, the less frequently you'll need to check it. Check your camera specs for the maximum size memory card it can take before buying large capacity cards.
  - We recommend numbering your SD cards if you will be using more than one, especially if you are using more than one camera, to keep track of them.

- **Batteries** – we recommend rechargeable batteries and getting a battery recharging bank. Most game cameras take 6-8 batteries, but some may take even more than that.
  - We change batteries on our cameras every 2 weeks to ensure our cameras are never being left out without collecting data. Often times, batteries will last longer than this, but it is good to check battery percentage regularly, as factors such as age of the batteries and extreme temperatures can affect how long batteries will last before dying.

- **Rigging/Install equipment** – we use metal lock-boxes (sometimes called "bear boxes") attached to the mounting surface by the camera's strap and secured with a braided steel cable and padlock when we set our cameras to prevent theft. If you plan to set your camera in a secure location, you will only need the strap that comes with your camera to mount it.

  - If you would prefer to secure your camera to its mounting surface, be sure to check if your camera's model has a specific lock-box before purchasing, as cameras come in many sizes and shapes that won't all fit in the same type of box.
  - We purchase python cables and small master locks for our cameras. If you will be setting up multiple cameras, we recommend purchasing locks that are keyed alike.

SETTING A CAMERA

SETTING UP THE CAMERA

We focus on 7 setting options when prepping our cameras for deployment: date/time, timestamp, camera/video, capture photos, delay, and sensor sensitivity. Note that different brands may call these options by different names, so it is important to consult your camera's manual if you are unsure what a setting means. Practice with your camera set up at home before deploying in the field.

DATE/TIME

The most important step in setting up a camera trap is to ensure the date and time is accurate. If it is not, adjust it in the settings and be sure to double check that the camera saved your adjustments by checking the date and time on the home screen.

IMAGE SIZE/QUALITY

Set your image size to a minimum of 12 megapixels. If your camera trap allows a choice of image resolution, set it equal to or slightly higher than the pixel count of the image sensor.

DELAY

The delay setting determines how long the camera will wait between triggers before taking a photo again. We recommend setting the delay as fast as your camera allows. For our Bushnells, the fastest speed is a 3 second delay, but if you have a camera that will allow you to go lower, we recommend you do so. This will help minimize the possibility of missing fast-moving animals.

SENSOR SENSITIVITY

The sensitivity setting allows you to adjust how sensitive your camera's motion sensor is to an animal walking in front of it. We typically keep our sensors on "High" but if you see that your camera is having problems with false triggering (it can sometimes be thousands of empty photos), turning the sensitivity down can sometimes help alleviate this problem-though this should be a last resort. Try trimming vegetation or changing the angle of your camera first.

TIMESTAMP

Make sure that "Timestamp" is turned on. This will display a bar with date and time (millitary time) in the caption at the bottom of each photo.

Your camera will also record temperature, and some cameras with cellular capabilities will record GPS locations, too.

CAMERA/VIDEO

We use the photo mode for our monitoring but many cameras also include the option to record video. For our data collection purposes, we require still image settings, as video settings tend to have slower trigger speeds which results in missing image captures. You may choose to switch your camera to video occasionally, or set to dual video/image modes (if your camera has this setting) if you would like, though this should be an exception rather than default setting. Keep in mind that videos will take more memory on the SD card than photos. If you plan on recording videos, we suggest you either choose a large memory card (8 GB or greater) or check your camera often to make sure the camera hasn't run out of space to record.

CAPTURE PHOTOS (BURST)

This setting allows you to tell the camera how many photos to take each time it triggers. Our Bushnells allow us to take 1, 2, or 3 photos at a time. We prefer to set our number of photos to at the highest trigger/capture rate (for us, 3) to increase our chances of capturing an animal that may be moving very quickly and would otherwise be missed.

CHOOSING A LOCATION

We try to set cameras facing habitat features that animals are likely to use, or features that will act as a "funnel" to guide animals in front of the camera (such as fence rows). Animals will take the path of least resistance when possible!

- Habitat features may include game trails, fallen logs (on land or over water-acting as a crossing), obvious stream/water entry/exit points, brush piles, streams, fence lines, and human-made paths.
- Look for game trails, the easier they are to detect, the more they are used.
- Check for other signs of wildlife, such as tracks, scat (feces), or evidence of rubbing or scratching on logs/trees.

Record the GPS coordinates of your location in latitude and longitude.

LOCATIONS

it is best to choose an open location with no/minimal moving vegetation in front of the camera that would cause false triggers (taking a picture without the presence of an animal). Grass and other tall vegetation can be trimmed down to minimize this.

It is also important to consider location risks for your camera - while many cameras are water resistant, most are not 100% water tight. Install higher than usual in flood-prone areas.

There is also the possibility of theft, especially in areas with high human traffic, where cameras may be vandalized or stolen. To avoid this, use a steel lock box custom sized for your camera, a steel cable cable and pad lock to fasten the camera to its mounting surface (see bottom left photo).

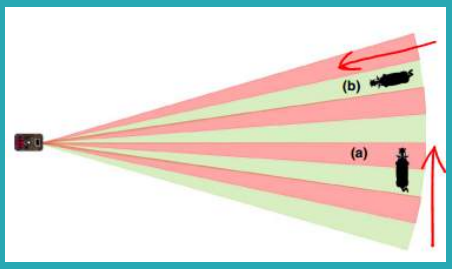
Additionally, you may choose to set the camera higher from the ground. If you opt to set a camera high off the ground, make sure that you sufficiently angle the camera down to the ground to capture any animals that may pass underneath it, but not to the extent you compromise detection zones. (Discussed more in **Deployment**).

.If you have the option, put the camera trap where it will be in afternoon shade to protect the infrared sensors from heat.

DETECTION ZONE

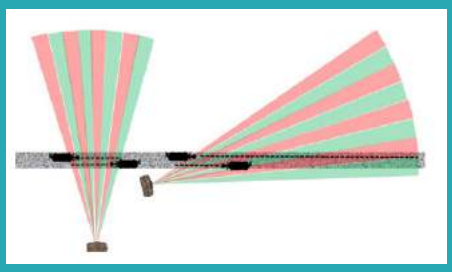
Detection zones are the areas with the highest likelihood of photographing an animal due to the angle of a camera.

Cameras need to be set up so that animals move **across** the camera's detection zone (below, "a") rather than **towards** or away from the camera ("b"). It is best to place a camera perpendicular to the habitat feature you have selected.



Position the camera at a distance from a trail or habitat feature so as to detect as much wildlife as possible, keeping in mind that smaller targets are more difficult to detect because they radiate less heat, and more distant targets are more difficult to detect because less of the heat they radiate reaches the detector.

Cameras should be set back from the line of travel (i.e. trails) by enough distance to capture full body images when animals are centered in front of the camera. Detection zones are increased by angling the camera diagonally across a path (below right) rather than straight across (below left).



Consider setting two cameras aimed at right angles to each other across a trail for maximum detection. This setup reduces the cameras "dazzling" one-another with their lights/sensors.

HIGH TRAFFIC LOCATIONS

Choose a locations where habitats or barriers meet and look for signs of wildlife use such as gaps in or under fences, trailheads for game trails, stream crossings at fallen logs, and heavy use people/game trails - the wider the trail appears to you, the more it is likely used.

Above Images from *How Camera Traps Work and How to Work Them*

DEPLOYMENT

DEPLOYMENT

To participate in our study, your camera should be deployed (set up at a site) for a minimum of 28 days, four times per year (winter/spring/summer/fall). Our typical deployment schedule is January, April, July, and October. You can also leave in place longer than this, which we recommend.

ATTACHMENT SURFACE

Attach camera to a tree, stump, fence or other sturdy surface. Cameras should be secured tightly so that they will not move, causing false triggers. Where there are no suitable trees in the right places, camera traps can be fixed to fallen trees/branches, wedged between rocks, or mounted on poles or stands.

Cameras are less conspicuous on natural objects than on poles out in the open, which makes them less likely to be interfered with by people or noticed by animals.

LURES

For the purposes of our study, do not use a scented lure or carcass without expressly clearing this with research personnel at the Zoo, as this deviates from the protocols of the rest of our cameras and may make your data invalid. .

SECURITY

Metal housings are available for most standard camera models and are typically used to protect camera traps from large predators (such as bears). In our study area, they are used to secure cameras and protect from vandalism and theft. They are not required but are recommended if your camera is publically visible.

CAMERA HEIGHT & DIRECTION

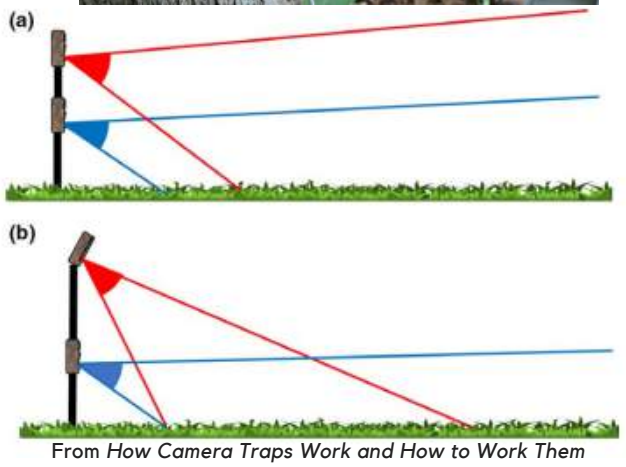
Camera performance is sensitive to the height and angle of mounting; maximum detections come from cameras just below the target's shoulder height, aimed horizontally. For our study, this is typically 18-24" (45-60 cm) from the ground.

If the ground is sloped where the camera is placed, angle the bottom of the camera to be parallel with the ground.

Refrain from aiming cameras too directly east or westward (within 30°) at an unobsucred horizon to avoid sunrise/sunset flares.

AIMING YOUR CAMERA

Aiming cameras is a series of compromises if you cannot put the camera at at the recommended height. Mount and aim cameras so that animals are detected as soon as possible after they enter the field of view. They should be installed so that the detection zone is parallel with the slope of the ground. Adjusting the aim of camera may need some ingenuity to level your camera's sensors. Use sticks, rocks, or a pad of flexible foam plastic, along with the tension of your straps, to adjust the angle of your camera. Just make sure it will not move when you leave.



From *How Camera Traps Work and How to Work Them*

Avoid "dead zones" (above-"a") in front of the camera by angling higher cameras down. However, in angling down a camera, the maximum detection range is reduced (b). Best placement occurs at "shoulder height" of the target species, but some locations may require higher placements due to vegetation, flooding or theft risks, or other factors.

Confirm a camera trap's aim by taking an image and viewing it (take a point and shoot camera with a view screen with you if your camera does not have one) and adjust if necessary.

FINAL CONSIDERATIONS

Batteries, SD Cards, & Other Supplies

We change batteries and SD cards every two weeks while our cameras are in the field. This gives us an opportunity to check up on the camera to ensure it is still working properly and to clean off sensors with an eyeglass cleaning cloth.

Cleaning should be done as carefully as cleaning an ordinary camera's lens; blow off the dust, then squirt the surface with water that contains a couple of drops of detergent, then wipe very gently while it is still wet. Having some alcohol wipes or eyeglass cleaning spray in your "check kit" will help to remove any dirt that has splattered on the camera.

We recommend bringing a fresh set of charged batteries and a (numbered) SD card to swap out every time you go to check your camera.

Trigger Your Set Camera

Do a "walk test" when deploying your camera to make sure it is functioning properly. Refer to your user manual to find this setting in your camera.

Remember to "wave" at your camera once you've set it up and turned it on for final deployment. This will take a photo of you and ensure your camera is working when you see the system lights, but also will give you decisive "start" and "end" points for each deployment when reviewing your photos.

Check Camera Images Often

It is considered good practice to check your camera images as soon as possible, ideally on site, to ensure your camera is still working properly. This can be done by bringing a simple point-and-shoot camera with a review window that takes SD cards with you when checking your trail camera.

Resources

For more, read:
How Camera Traps Work and How to Work Them

Trail Camera Reviews and Tests: **TrailCamPro**

Camera Trap Recommendations from: **eMammal**

Urban Wildlife Information Network

Zooniverse: database of camera trapping projects from around the globe with a citizen science opportunity for ID. A great place to practice your ID skills!

Identifying wildlife in camera trap photos:
Delaware species you're likely to see

Fawn ID Guide: From NC Candid Critters, deer aging guide

Ready to Get Started?

1-Purchase a camera
2-Find a location
3-**Tell us about your project and location**
4-Submit your photos to us (we'll give you a link)
5-Log sightings on **iNaturalist** (**Urban Wild** project)

Contact Us
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