Bald Eagle Nest Monitoring Program

Volunteer Instruction Manual

Welcome to the Bald Eagle Monitoring Program! Thank you for your interest in helping monitor Bald Eagle breeding populations in Maryland.

Your contributions will support the maintenance of a long-term dataset on Bald Eagles (*Haliaeetus Leucocephalus*) and their productivity. Maryland Department of Natural Resources (MD-DNR) monitored Bald Eagles until they were delisted as an endangered species in 2007. Their population rebound is an amazing success story, but continuing long-term monitoring of these majestic birds is critical. As top predators, Bald Eagles remain under threat from pollution, degradation of watersheds and fish population changes, increased frequency and intensity of storms, and coastal development. Long-term datasets enable scientists to predict and prevent threats by keeping track of population trends.

As a **Bald Eagle Nest Monitor**, you are entrusted with several responsibilities. The first is to prevent disturbance to breeding Bald Eagles as you monitor. Although data on these birds is valuable, eagles are sensitive to human activity, and too much disturbance can impact nest success. Eagles have been removed from the federal endangered species list, but are still protected by the *Bald and Golden Eagle Protection Act* and the *Migratory Bird Treaty Act*. A summary of these has been provided in chapter 2 of this manual. We have also included detailed instructions on precautions you can take to minimize the chance of nest disturbance during your monitoring activities.

Your second responsibility is to provide scientific data of good quality. Citizen science—data collected by the public or trained volunteers—has an amazing potential to provide data we would otherwise not be able to collect. However, incorrect data will be of equal or lesser value than the absence of data. This instruction manual is provided for your reference to help you collect quality data. If you have questions or doubt the credibility of the data you are collecting, please do not hesitate to reach out to our staff for clarifications.

The **Maryland Bird Conservation Partnership** (MBCP) is devoted to providing experiences that connect the public to our wildlife so we can ensure their conservation and protection. We are thrilled to provide you with an opportunity to contribute to conservation data. Please consider supporting our other programs, through your tax-deductible donations and your volunteer time.

Thank you!

Chris Eberly, MBCP Director

Photo by Frode Jacobsen

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Chapter 1: Bald Eagle Breeding Biology in Maryland

Territories

While not every bald eagle pair in every region of the country nests in exactly the same habitat, or with exactly the same timing (phenology), there are some general traits that are common to Bald Eagle territories and nest sites. Any animal, be it mammal, amphibian, reptile, insect, or bird, has four basic needs: food, water, shelter and a place to raise young (habitat). Within those general needs each animal has specific requirements that vary widely by species and even sometimes by individual. Like many other animals, eagles establish and defend a territory around their nests.

The territory is the space that each pair claims as their personal resource. Eagles will actively defend their territories from any perceived threat. While defense of the nest from direct predation is important, territory protection is more about food and foraging areas. Having a reliable and readily available food source is crucial to the success of a nest. The size and location of a territory is intimately tied to available food resources. Therefore, the pair will chase off other eagles, Osprey, Red-tailed Hawks, and other such competitors. An average territory is about 1 mile in diameter. In areas where food is harder to find, territories may be larger. In areas where food is especially abundant, such as along the Chesapeake Bay, territories may be much smaller.

Nest sites

Bald Eagles typically raise their young in large stick nests placed near the top of tall trees near (within about a mile of) a water source. Therefore, a typical Bald Eagle nesting landscape would be forested and include rivers or lakes that offer areas of shallow water suitable for foraging. In many cases, Bald Eagles also need some degree of insulation and buffer from human activity, though sensitivity to disturbance seems to vary widely.

Bald Eagles usually like to have a clear view in all directions around their nests. They tend to prefer nest sites that are on some sort of edge, be it water or forest opening, and that a variety of tree heights. Nest trees tend to be the tallest in the surrounding area, called super-canopy trees. Nests tend to be very large and rather heavy, so the best nest trees are tall, strong healthy trees. Pairs that are building a new nest usually choose a live tree. Dead trees, called snags, are usually close and serve as lookout posts.

Eagles reuse their nests year after year, especially if the parents successfully raise young from that nest. The birds will keep adding sticks to the nest every year. They make repairs, and long-standing nests can become enormous, up to 6-7 feet across and 12 feet high! Typical nests are much smaller, more like five to six feet across and three to four feet high, which is still a rather large nest! One well-known nest in Ohio was used for 34 years! The foundation of a new nest is usually a significant branch, often a forked branch, four meters or more from the top of the tree. The nest itself needs to be higher than the surrounding vegetation to provide both easy access and a clear view of possible threats to the nest. Trees that are tall and strong enough to satisfy eagle nesting needs tend to be old and sometimes may be nearing the end of their life. Occasionally the nest tree dies but stays strong for a time and the eagles will continue to use their nest, despite the death of the nest tree, often until the tree/nest falls down. To summarize: tree shape, size, and location are more important to an eagle looking to build a new nest than is the tree species. Some of the trees more likely to meet nesting needs in Maryland are pines, oaks, and hickories.

Often a territory includes multiple suitable nest sites, and a pair may build more than one nest within a territory. While a territory can only have one ACTIVE nest at a time, it can certainly have alternate, inactive nests. Research dating to the late 1980s found that the average number of nests per pair was greater than one (1.5), with up to five nests reported in some territories! Sometimes a pair will use one nest consistently year after year; sometimes they will alternate, using one nest one year and the other the next. There does seem to be some link between nest success or failure and the desire to move house; if a nest is successful there is a better chance that the pair will nest there again the next year than if it fails. If the nest fails, the pair may look to try a different location the next year, turning to an alternate nest within their territory. In some cases, the pair may give up on the territory all together and move on to a different place, leaving the nest or nests within that territory vacant until another pair decides to move in. Sometimes a nest or territory can be inactive for three or more years before hosting a nesting pair again. Eagles are very opportunistic and tend to take advantage of the resources available. Therefore, a useable nest probably will not stay vacant forever. This opportunistic behavior, coupled with the creation of alternate nests, means it is important not to forget about vacant nests, because they may become active again. Interestingly, inactive Bald Eagle nests sometimes host other bird species, such as Great Horned Owls which nest in winter.

Foraging locations

Most eagles feed primarily on fish and waterfowl, and easy access to a food source is key. In the Chesapeake Bay region, most of the prey adults feed to chicks will be fish. Raising young eagles is hard work: eaglets need a lot of food! Placing a nest near a food source means the parents do not have to waste valuable time and energy flying to a food source and looking for food. It is important to note that while eagles are good hunters, they would much rather scavenge or steal a meal than hunt one themselves (again, that energy conservation thing) and if the opportunity for a “free” meal exists they’ll take it. Because of this opportunistic behavior, you may observe eagles chasing an osprey or another eagle that has a fresh meal, in the attempt to get the other to drop the fish. During the winter time at the Conowingo Dam, hundreds of Bald Eagles take advantage of the high concentration of stunned fish when the dam releases water.

Perch Sites

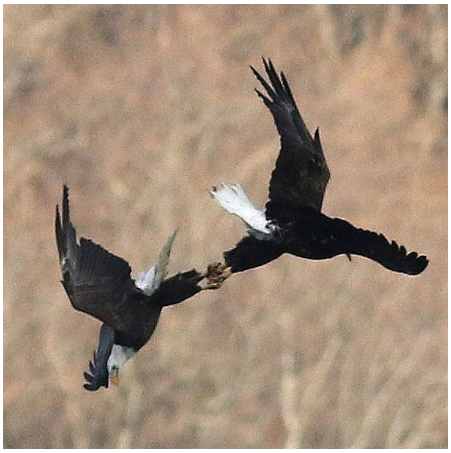
Recognizing potential favorite perch sites is important for our volunteers. During nest visits, volunteers should look for both adult birds. Nearby perch sites such as snags are a good place to look. Along with one or more appropriate nest sites, a bald eagle territory also needs several quality daytime perch sites. Perches are used for resting, for surveying their territories for threats (predators, other eagles, etc.), and for hunting. Several scientific studies on Bald Eagle perch use have determined favored perch trees have a larger diameter, are taller, and have longer trunks than non-perch trees. Perch trees also tend to be dead and dying and within 20 meters of shoreline, though the life status of the tree (dead, dying, or alive) appears to be of less importance than tree height and proximity to water.

Phenology: Timing from Nest to Incubation to Fledglings

The entire cycle, from egg laying to fledging, tends to take about 16 weeks (or 4 months). The time can vary a bit depending on how many eggs are laid and how many days pass until a clutch is complete. Eagles generally lay one egg, and often wait a day before laying a second egg. Nests most commonly

have two eggs, but sometimes have three. It can take up to six days to complete a three-egg clutch. At the other end of the process, some eaglets take longer than others to leave the nest. Fledging can happen anywhere from 11-14 weeks after hatching. **Most young fledge at 11-12 weeks.** A parent eagle's job doesn't end at fledging, however. When post-fledging care is included in the nesting cycle, the length of the nesting cycle is 5½ -6 months. Fledglings may continue to rely on their parents for food and other care for 4-6 weeks after fledging.

Nesting behavior in the Chesapeake Bay region can start as early as November with some light housekeeping around the nest: clearing out any unwanted debris, fixing any damaged areas of the nest and adding on to the nest. Some resident (non-migratory) pairs may stay in the vicinity of their territory all winter and can be seen poking around the nest year-round. The early season work is usually sporadic. More dedicated repairs start in December-January. This home improvement behavior serves two purposes: 1) it makes the nest ready to house the next generation of eagle young; and 2) it strengthens the bond between mates and is part of the courtship process. A pair that successfully raised young the previous year usually stays together and tries again the next year (if it's not broken, why fix it). These birds do not have to spend time actively searching out and courting a mate, although they may still engage in the elaborate courtship displays that "single" birds do.



Two eagles engage in a cartwheel display, Photo credit: Randy Loftus

Courtship displays can be spectacular to watch. The most visually stunning of these displays is the cartwheel display, where the potential mates fly together to a great height, lock talons and spin downwards like a propeller. Just when you think they are going to crash into the ground, the pair will break apart and fly back up into the air. In Maryland, copulation usually occurs in January and is followed soon after by egg-laying, somewhere in early to mid-February. Incubation begins after the first egg is laid, meaning that in a nest with more than one egg there will be an oldest sibling, a youngest sibling and occasionally a middle sibling. Both the male and the female incubate the eggs and both have brood patches, though the female tends to do the bulk of the incubating and has a much more developed brood patch. The brood patch is an area of bare skin on the bird's breast that is formed when the bird removes its own feathers. By removing the feathers the parent bird allows its body heat to better reach the eggs and keep them at the proper temperature. **Incubating eagles will sit on the nest almost continuously, so the continual presence of an adult on the nest is a good clue that the female has laid eggs**. Incubation lasts 35 days with very little deviation. The eaglets hatch from the eggs without any help from the parents. Pipping, as the hatching process is called, can take an entire day. The oldest egg hatches first and its younger sibling follows 1-4 days later. At first it may be difficult to tell when a nest status changes from eggs to chicks, since the female spends a lot of time brooding the tiny eaglets and this behavior looks very much like incubation. If you can stay and observe the nest for a while, however, you should see the male deliver food to the nest. The female will then stand and tear off small pieces, bending downwards to feed it to the eaglets. You may not be able to see the babies themselves, but it will be obvious that the food is disappearing somewhere and that the female is not eating it herself. As the babies grow you should have opportunities to see them poking their heads above the nest rim, especially by about **4-5 weeks** of age.

As the young birds grow and develop they literally stretch their wings, testing out their abilities by flapping across the nest and even hopping and jumping up onto limbs immediately adjacent to the nest. These behaviors become more frequent and more adventuresome as the young approach fledging. Parents can also provide clues that fledging is approaching. Instead of bringing food directly to the nest the adults may fly above the nest with the prey and call to the eaglets, seemingly bribing the youngsters with food to venture out of the nest. The young will leave the nest about 11 weeks after they hatch. First flights are often rather awkward and up to half of fledging attempts are less than successful. The parents typically continue to feed these grounded birds, but in some cases, fledglings fall into the understory where parents cannot reach the young.

Summary Chronology and Indicative Bald Eagle Behavior in Maryland:

Nov-December: Courting and Nest Maintenance
Adults investigate a nest, fix damaged areas sporadically, and may start to defend territory against intruders. You may also observe courtship behavior, such as the cartwheel display.

January-February: Nest Building/Maintenance
Copulation occurs and nest maintenance becomes more regular. Adults actively defend the territory from other eagles. They may or may not roost (spend the night) next to the nest. Most of their day is away from the nest, foraging, but they will regularly come back to the nest.

February-March: Egg-laying and Incubation
Most egg-laying happens somewhere in mid- to late February. Incubation begins immediately after the first egg is laid; incubating adults will sit on the nest almost continuously, so the continual presence of an adult on the nest is a good indication the female has laid eggs. Incubation will take an average of 35 days until chicks hatch.

mid-March-April: Hatching and Rearing Young
At first it may be difficult to determine when a nest status changes from eggs to young chicks, since the female spends a lot of time brooding small chicks and the behavior is similar to incubation. However, if you stay a while you will observe the male deliver food to the nest, and the female stand, tear off small pieces, and lean downward to feed it to the eaglets.

April-June: Rearing Young (continued)
As the eaglets grow you should be able to see their heads poke out of the nest rim, especially by about 4-5 weeks of age.

June-July: Fledging
Fledging (first flight out of the nest) can happen anywhere between 11-14 weeks after chicks hatch, and more typically around 11-12 weeks. As the young birds grow, they build flight muscles by flapping across the nest and even up onto limbs immediately adjacent to the nest. These behaviors become more frequent and more adventuresome as the young approach fledging. Fledglings may continue to rely on their parents for food 4-6 weeks after fledging.

Chapter 2: Observing Eagles and Ethics

Bald Eagle Nest Monitoring Etiquette

For many bald eagle enthusiasts, there is almost nothing more exciting than watching their favorite birds become parents and raise young. Seeing our national symbol go through the process of nesting is a thrilling and satisfying experience. Once DDT was banned from use in the U.S., these once-endangered birds have been successful enough at raising eaglets to be removed from the Endangered Species list. However, Bald Eagles remain protected by both the *Bald and Golden Eagle Protection Act* and the *Migratory Bird Treaty Act*. They are sensitive to human activity—too much disturbance to nesting eagles can have a negative impact on nest success. The last thing any bald eagle lover would want is to unintentionally cause a nest to fail or produce fewer young. Fortunately, there are precautions that you as a citizen scientist can take to limit the amount of stress you cause the birds while monitoring the nest.

Disturbance is defined as any activity that changes an eagle's behavior. For example, if an eagle stops preening to study you then you have disturbed the eagle. Disturbances fall on a spectrum from minor (such as in the example above) to major (flushing from the nest). The impact of disturbance on nest success can also vary from minor to major, up to causing a nest to fail. Frequent disturbance can cause a cumulative effect, meaning that frequent minor disruptions can be as problematic as infrequent major disturbances. Most of the time an eagle's behavior will tell you that it is uncomfortable long before the point of flushing. Learning these behavioral cues will help you know when your behavior is causing stress to the birds. The first sign of agitation to watch for is a simple change in eagle behavior, such as the example above. If a bird does not stop what it is doing as you approach, it is probably not bothered by you. If the bird does stop what it is doing and resumes its activity after giving you a once over, you are also probably not bothering it and are safe to continue observing. If, however, the bird does not resume its task or becomes more agitated you should back away until the eagle becomes comfortable again. An eagle that is alarmed by your presence will progress from simply watching you to sitting up in an alert posture, and it may begin vocalizing. As the bird's agitation increases it might start shifting in the nest/on its perch, raising its wings, leaning forward, preparing to fly, and otherwise looking anxious until it finally flushes from the nest.

Just like people, eagles have different comfort levels when it comes to disruption. Some birds seem unfazed by hikers walking within 100 feet of a nest, while others are bothered to the point of flushing by any human activity within 100 feet. Anecdotal observation seems to indicate eagles which choose to nest in close proximity to humans or areas with lots of human use are generally more tolerant of human activity. Birds that choose remote territories are generally more sensitive to disturbance. Nest stage also seems to affect how eagles respond to human activity. For example, eagles seem to have their lowest threshold for disturbance during courtship, pair formation and nest building. If we make the birds acutely uncomfortable during that critical period, they are much more likely to give up on their site than they would be if disturbed when the eaglets are a few weeks old. Given these variations in behavior, there are some general guidelines for reducing disturbance that you can adjust based on the habits of each nesting pair.

The United States Fish and Wildlife Service (USFWS) recommends that active nest sites not be approached from closer than 100 meters (330 feet). You should do your best to have some sort of screen or blind between you and the nest, as research shows that eagles are more likely to be bothered

by an activity when it happens in full view. Of course, as an observer you need a clear view of the nest to gather accurate data about eagle activity, so you'll need to work out a balance between seeing the nest and staying out of sight. Sometimes a road will offer an ideal vantage point for viewing a nest. In general, if human activity (including road traffic) was present prior to a pair moving in to a site, they will be tolerant of that activity. In general, birds seem to be bothered less by people in a car than people outside of one, and so cars make excellent bird blinds. If there is a place along a road that provides both a safe place for you to park and a view of the nest, you have probably found a great observation point. If you use a spotting scope to watch the nest, window mounts are an inexpensive and practical way to use your scope from inside your car. In some situations, you might be able to get out of your car and stand with the car between you and the nest. This still creates a sight buffer between you and the birds while giving you more range of motion and perhaps an easier view of the nest. However, be sure that you park in such a way as to provide no danger to yourself or any other motorists. If the nest is not visible from the road or is remote enough that no roads take you within viewing distance of the nest, you might want to consider scouting out a good place to view the nest prior to the nesting season. Keep in mind the USFWS buffer distance of 100 meters and take into account how the landscape will change when the trees have leaves. Again, take your cues from the eagles and adjust your viewing spot accordingly. Also be mindful of private property boundaries and no trespassing signs.

With prior planning, an understanding of eagle behavior, and attention to those behavioral cues, you can have a successful and enjoyable nest monitoring experience. Things to keep in mind are:

- Sensitivity to disturbance varies among individuals and across regions. Learn about the eagles in your region and adjust these guidelines accordingly.
- When monitoring, select times of the day where temperatures are above 55°F (including wind-chill) so that incubated eggs and chicks are less sensitive in case the adult flushes off the nest.
- As a rule, nesting eagles will be more sensitive to disturbance early in the nesting process—during nest building and incubation. Be especially careful to avoid disturbance during this time. \
- Eagles seem to be most alarmed by disturbances they can see. Provide a visual buffer between you and the birds. Cars make excellent blinds.
- Respect a distance buffer using 100 meters (330 feet) as a rough starting point. Learn what constitutes a comfortable distance for those birds, especially if they require a larger buffer. In all cases, use the birds' behavior as your guide and adjust your distance accordingly.
- Recognize the signs of agitation in Bald Eagles.
- Enjoy yourself!

An adult bald eagle fights of an immature eagle that attempts to steal his fish.
Photo Credit: Randy Loftus

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) was passed in 1918 as a treaty law between the U.S. and Canada to protect birds from people. This law was enacted in response to concerns about general bird population declines and threat to many avian species that at the time were hunted for sport or collected for their feathers.

Establishment of a Federal prohibition, unless permitted by regulations, to "**pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention . . . for the protection of migratory birds . . . or any part, nest, or egg of any such bird."** (16 U.S.C. 703)

Take is defined in regulations as: 'pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect.'

The Act does not discriminate between live or dead birds and includes bird parts, including feathers, eggs, and nest.

The Migratory Bird Treaty Act has been expanded to cover more species and geographic areas through treaties with Mexico (1936), Japan (1972), and Russia (1976). In 1962 it was updated to address how Native American tribes can collect feathers from protected birds for religious ceremonies (a practice otherwise banned by the MBTA). For a full history of how the MBTA has evolved over time, see our timeline. A total of 1,026 species are currently protected through this Act.

To read the full digest of this law, expectations, and associated penalties, please access:

https://www.fws.gov/laws/lawsdigest/MIGTREA.HTML

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c), enacted in 1940, and amended several times since then, prohibits anyone from "taking" Bald Eagles, including their parts, nests or eggs without a permit issued by the Secretary of the Interior.

The Eagle Act identifies criminal penalties for persons who "**take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any Bald Eagle ... [or any Golden Eagle], alive or dead, or any part, nest, or egg thereof.**" The Eagle Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb."

The National Bald Eagle Management Guidelines define "**disturb**" as: "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, injury to an eagle, a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

This definition also covers impacts that result from human-induced habitat alterations initiated around a previously used nest site during a time when eagles are not present, if upon the eagle's return, such

alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death or nest abandonment.

A violation of the Act can result in a fine of $100,000 ($200,000 for organizations) and imprisonment for one year for a first offense. Penalties increase substantially for additional offenses, and a second violation of this Act is a felony.

The preceding text was taken directly from the U.S. Fish and Wildlife Service "Bald & Golden Eagle Protection Act webpage. (https://www.fws.gov//birds/policies-and-regulations/laws-legislations/bald-and-golden-eagle-protection-act.php). Accessed on 2/14/2017.

Binocular and Spotting Scope Basics

A good pair of binoculars is a must for most for bird monitoring projects. Certainly, you can observe birds and other wildlife without the aid of binoculars, such as at a feeder, but with them you will see more detail. Binoculars don't have to cost you a lot of money, but should adequately magnify birds for identification. Many 7 x 35 or 8 x 42 power binoculars are affordable and good for bird watching. They should be easy to use and comfortable for you. You can buy binoculars through sporting goods stores, catalogs, and the Internet.

How to use binoculars

Binoculars are an extension of your eyes. First, use your naked eye to find the birds you are observing. Once you have detected movement and can see the wildlife, use binoculars to see details of a bird's "field marks." Everyone's eyes are different, so before you raise the binoculars, you must calibrate them for your eyes.

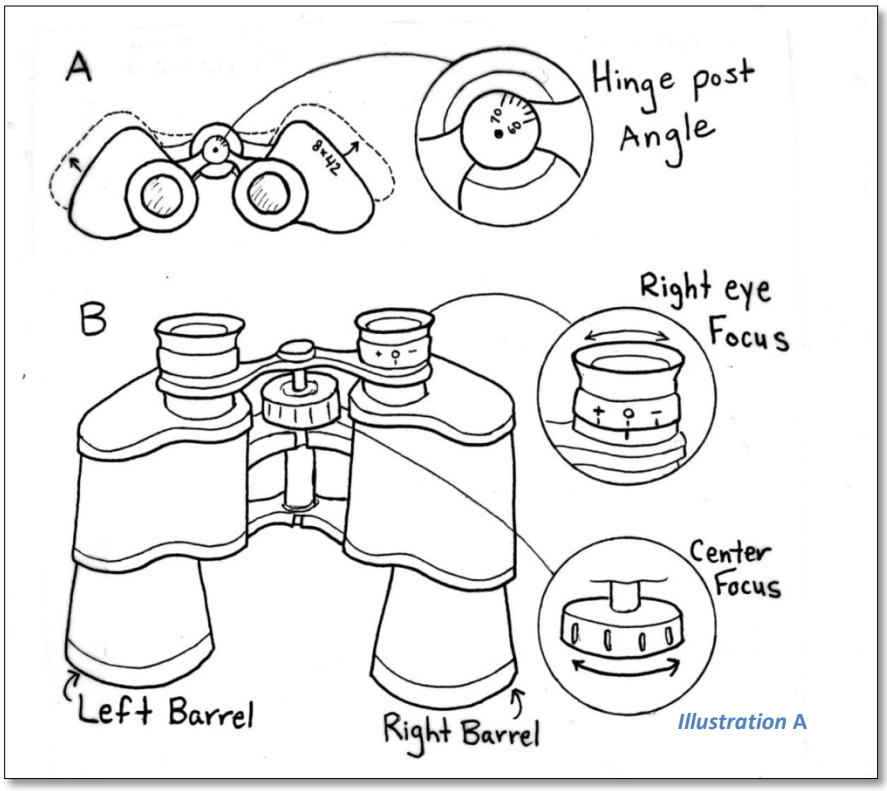


Illustration A

Use this diagram when referring to the calibration instructions.

Binocular Basics
Information taken from Classroom BirdWatch, Teacher's Guide, FeederWatch Module, Copyright, 2001, Cornell Lab of Ornithology; adapted from "*How to Calibrate Binoculars For Your Eyes*" by Steve W. Kress, National Audubon Society biologist. Binocular drawings by Jason O'Brien, 2002, Iowa NatureMapping.

Binoculars hinge at the center between the two large “barrels,” allowing the eyepieces to fit the width of your eyes (Illustration A). Pivot the hinged barrels so you see a single circle-shaped image, rather than a double-image when looking through them. If the barrels are as close together as they go and you still see two images, you may need to find another pair. The distance between the eyepieces is called the “interpupillary distance.” It is too large if you see two images. The number on the hinge post (angle) will always be the same for your eyes, no matter which binocular you use (A).

1) Each of your eyes has slightly different vision, so your binoculars must be calibrated to accommodate them (Illustration B). Calibrating binoculars brings both eyepieces into sharp focus. Most binoculars have a focusing wheel in the center. It adjusts the focus of both eyepieces (what you see with both eyes) at the same time. Most binoculars also have a separate “diopter” adjustment, which allows you to focus (turn) one eyepiece independently, to accommodate the differences in your eyes (B). Depending on the binoculars, this adjustment can be on the left or right eyepiece (usually the right). Marks similar to the following symbols (+ … O … -) are on the eyepiece. Note: the remainder of these instructions assumes you are using binoculars with a right-eye diopter adjustment. For binoculars with a left-eye adjustment, reverse the side of the binoculars indicated.

2) Turn the center focusing wheel to the right as far as it will go (if it is an external focus binocular, like illustration) (B). Turn the adjustable eyepiece (diopter adjustment) counterclockwise, moving it as far out from the body as possible (B). Both eyepieces should now be out of focus. Stand about 30 feet from a sign (street signs work well) with clear lettering. Cover the end of the right binocular barrel with your hand (B). With both eyes open, turn the center focusing wheel until the lettering comes into sharp focus. Turn the center focus wheel past sharpest focus and back again to ensure you have the sharpest image.

3) Next, cover the left barrel, keeping both eyes open, and turn the right eyepiece clockwise to bring the lettering into focus (B). Again, turn the eyepiece beyond the point of sharp focus and back to find the sharpest image. Remember to keep the center focus wheel in the exact position you left it in step 3. Uncover the left barrel. Your binoculars should be in perfect focus and calibrated to your eyes. Remember the position that the right eyepiece is set. This will not have to be changed unless your vision changes. You may want to place masking tape around the eyepiece so it can’t be turned. From now on, you will only need to use the center focus wheel to adjust both eyepieces.

Note: This exercise will greatly enhance the experience of watching wildlife, and taking the time to teach students this method is passing on an important skill. However, it may be preferable to keep the right eyepiece in the center (not adjusted) for younger students. Most young people have little or no need to adjust the eyepieces independently. This will reduce confusion for younger students, but the decision is up to you.

Spotting Scopes for Birding and Bird Monitoring

While binoculars are usually the most useful tool for general bird observation, spotting scopes are invaluable for long distance viewing, such as identifying shorebirds or monitoring an eagle nest. Here are some basic tips on selecting a scope to fit your needs.

Size/power: Spotting scopes come in three sizes and a range of powers, with zoom lenses the most popular. Compact and mid-sized scopes fall in the 12-45 power range, while full-sized are in the 20-60 power range. For beginning or average birders, compact or mid-sized scopes are suggested, because they are lighter weight, easier to use and less costly. However, optical quality is *sometimes* not as good in the smaller scopes, to some degree reflected by price. If you can afford it, *any* scope you consider will be excellent if it has "ED" or "HD" lenses, which reduce blurriness or chromatic aberration (colors) around the edge of your viewing field. Most birders seldom use the 60x end of even their large, expensive scopes, because of the narrow range of vision at this high end of the magnification range and the effects of heat waves, viewing through precipitation, or the shaky picture resulting from even a slight wind. Scopes are also measured by the size of their *objective lens* (the lens at the opposite end from the eyepiece). This is a measurement of lens diameter in millimeters (50mm, 60mm, 80mm, etc.) and the larger this number the brighter your view through the scope. Thus, an 80mm objective lens is brighter than a 72mm (on the same power scope), a 60 mm is brighter than a 50mm, etc.

Eye Relief and Retractable Eyepieces: All scopes and binoculars are given an "eye relief" rating, and the higher this number, the easier it is to see through the optics. Anyone with glasses should consider a scope with the highest eye relief number (usually above 15 or 16) possible, to offer the widest field of view. Retractable eyecups are most often extended by people who do *not* wear glasses, to keep their eye at an optimal distance from the lens.

Lens Hood or Shade: A retractable lens hood on the objective (far end) lens of a scope helps reduce lens glare on sunny days. It should be retracted in low-light conditions.

Tripods and Window Mounts: Because scope viewing is always at higher magnification than binoculars, a solid base is essential. Purchase a strong, heavy tripod to reduce scope vibrations when viewing. A good tripod will cost $100+. A window mount is much less expensive ($25-$45) and is a great tool when viewing birds from your car (cars make *great* blinds for bird observation).

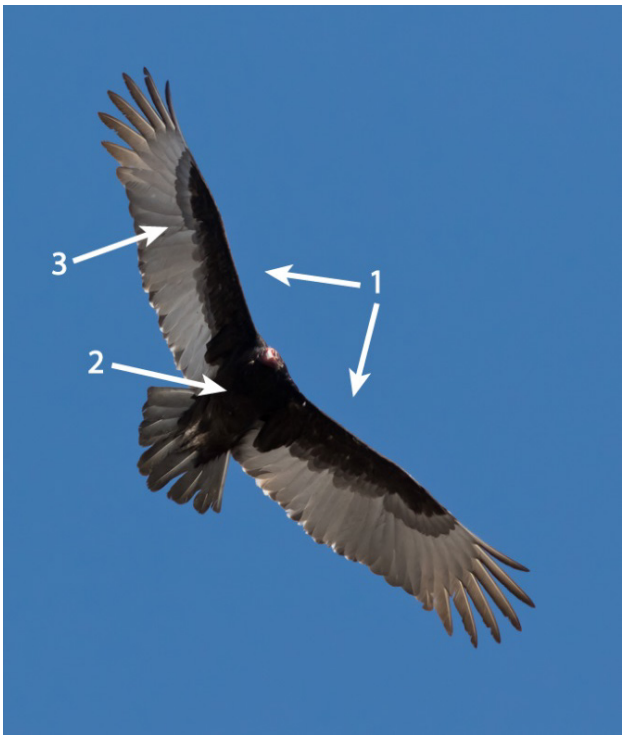
Identifying and Aging Bald Eagles

To ensure the collection of good data, it is critical our volunteers are familiar with Bald Eagle breeding biology and behavior, as well as physical identification of this bird. Bald Eagles take an average of 5 years to reach sexual maturity, and before they transition to a full adult plumage, their successive molt can make them easy to misidentify. We've put together some keys to help you age Bald Eagles and differentiate them from other large raptors. All of this information is also available on our project webpage, at https://marylandbirds.org/bald-eagle-nest-monitoring.

BALD EAGLES VS. VULTURES

Bald Eagles are most frequently confused with two other large raptors commonly found throughout most of Maryland, Turkey Vulture and Black Vulture (depicted below). These huge predominantly black birds, often referred to as "buzzards", spend much time soaring on rising thermals while scanning the ground for dead animals or food scraps, and can easily be mistaken for an eagle. The fact that eagles, especially immature birds, often accompany groups of Vultures in search of food complicates matters even further!

Take a look at the distinguishing characteristics of both of our native vultures to familiarize yourself with differentiating vultures from Eagles. *All photos by Frode Jacobsen*.



Turkey Vulture

Characteristics:

1. Dihedral wing shape (forming a V-shape angle)
2. Solid black body
3. Contrasting silver underside of wings.

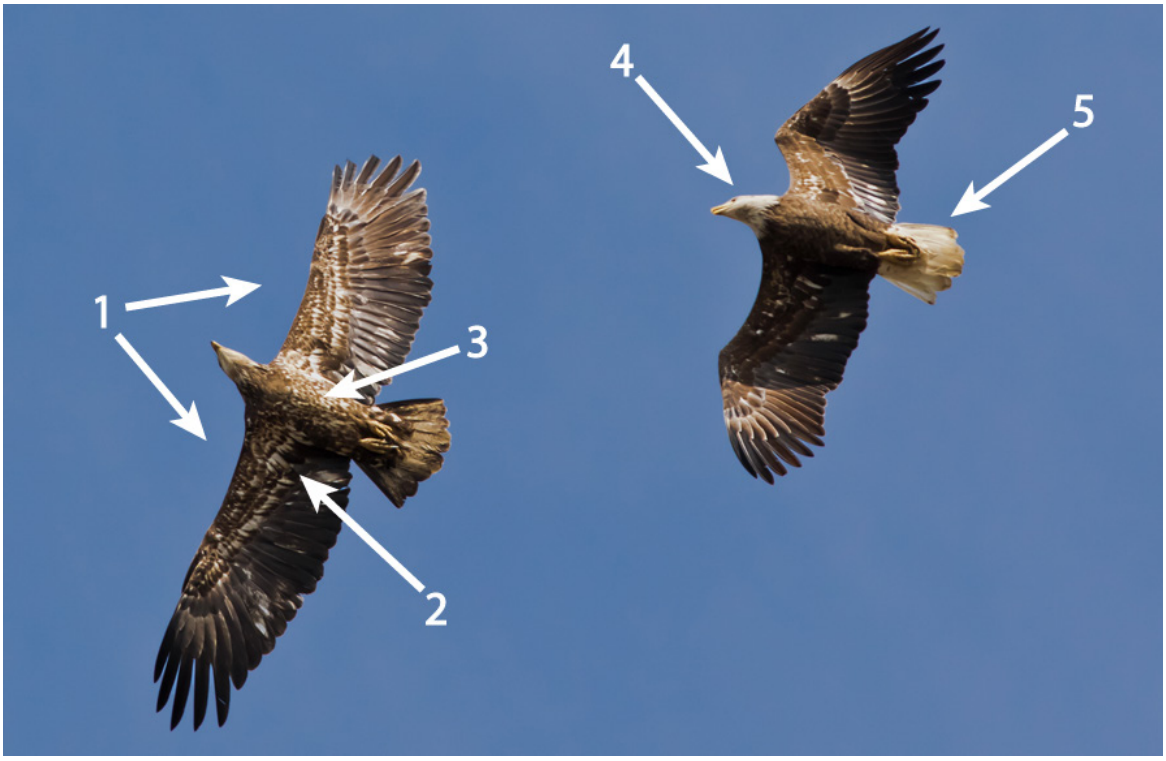
- Head is small compared to wing span and tail
- Flies in a series of slow flaps, usually 3 flaps then glide.
- Will often titter back and forth slightly when soaring
- Appear very buoyant and erratic in flight, almost like a kite

Black Vulture

Characteristics:

1. Slight Dihedral wing shape
2. Solid black body and inner wings
3. Contrasting silver underside of outer wing tips

- Head is larger in comparison to body
- Tail is short and round, can blend into wings if seen from afar
- Black Vultures have a rapid burst of strenuous-looking wingbeats interrupted by short glides



Above: Two immature Bald Eagles by Frode Jacobsen

Above: Two Bald Eagles, one on the left retains mostly juvenile plumage with some molting, the sub-adult on the right has a more advanced molt, with some younger-aged plumage left over (note the white feathers) with the adult white head and feathers.

Even at a distance, Bald Eagles can be distinguished from vultures based on shape, flight patterns, and plumage:

1. Bald Eagles soar with their wings held flat/horizontally, unlike Turkey Vultures and Black Vulture (to a lesser degree) that soar with their wings raised in a V-shape (dihedral). Bald Eagles have a more direct and powerful flight than Vultures. Wing beats will be slower, more consistent than vultures, which tend to flap in short burst then glide.

2. & 3. Juvenile and immature Eagles always have (albeit to varying degree) whitish markings on the belly and underwing (see image above). Vultures always have solid black bodies and mostly black wings and tails, except for silvery panels on the underside of their wings (see images above).

4. & 5. In the adult Bald Eagle plumage, the white head and tail is visible from a great distance.

BALD EAGLES VS. HAWKS

Above: Osprey by Frode Jacobsen

The next most common source of confusion is the Osprey, which like the Bald Eagle is also closely tied to estuaries and lakes and therefore often found nesting side by side with Bald Eagles. Ospreys are exclusively fish-eaters and often fall victims to kleptoparasitism by Bald Eagles, an action-filled drama that plays out by one or more Eagles falling in hot pursuit of an Osprey after securing a fresh catch, harassing the smaller Osprey until it releases its prey for the Eagle(s) to relent and instead dive for the stolen food.

Although superficially similar, Ospreys are in most instances readily distinguished from Bald Eagles by their bright white underside (except tail and flight feathers) and all-dark upper-side. They also have a distinct black eye mask on an otherwise white head, which helps reduce sun glare while hunting over open water. The Osprey also typically soars and glides on slightly drooping, angled wings. They also frequently hover while fishing, allowing them to remain stationary with their eyes fixed on a particular prey item, upon which they will pounce through a steep dive with their feet and talons extended to grab the intended target.

Other common hawks that can be mistaken for an eagle are Red-tailed Hawk and Red-shouldered Hawk, medium-sized woodland hawks that can appear larger than their actual size when seen soaring over the forest canopy or farm fields.

Above: Adult Red-Tailed Hawk by Frode Jacobsen

Above: Adult Red-shouldered Hawk by Frode Jacobsen

AGING BALD EAGLES

Above: Two young eagles that are near fledging age. Although they are as large as their parents, eaglets have a dark beak and are covered in all brown dark feathers. Photo credit UFWS.

It takes 4-5 years for juvenile Bald Eagles to attain their diagnostic adult plumage. This transition occurs in stages through replacement of juvenile and immature feathers during annual molt(s). Some groups of birds, like waterfowl, shed all their flight feathers at once and become completely flightless for a period of time following their breeding season. This molt strategy works well for birds feeding under water, but not so well for birds that depend on flight to feed or to escape predators. Birds of prey, such as eagles, are especially reliant on maintaining their agility and speed to catch prey year-round and therefore shed 1-3 flight feathers at a time, in a very predictable manner as they age. Experts can therefore easily determine the exact age of a Bald Eagle and any other raptor just by examining which feather tracts are fresh, which are currently under molt, and which feathers are worn (retained from early age), until they reach adulthood upon which the growing feathers look identical to the ones they replaced. In Bald Eagles, there are four age classes that can readily be distinguished based on plumage features by the trained eye:

First-year bird. Note the dark belly, head and beak.

Second-year bird. Note the lighter belly, dark throat and breast

Third-year bird. Note the lighter beak, head and tail, darker body and flight feathers

Mature bird. Note the white head and tail, dark wings and body.

Aging Eaglets

Being a nest monitor takes patience; you must learn and watch behavioral clues to infer activity at the nest. Nests are located in tall trees, and unless you are fortunate to find an advantageous elevated viewpoint, your ability to observe eggs or chicks inside the nest will be limited. However, the actions of adults around the nests are great indicators of what is happening in the nest. An adult (usually the female) that sits in the nest continuously, and occasionally leaves only to be rapidly replaced by her mate is most likely incubating. Although you may not be able to have visual confirmation of the eggs, sustained behavior observations are enough to confirm the incubation process has begun. Once incubation has begun, monitors can estimate when they will hatch (average of 35 days of incubation). Again, your ability to observe chicks until they are older and larger will be limited. But you can infer the presence of chicks if the male is observed bringing prey back to the nest, especially if the female takes it from him and shreds it, and then appears to feed it to chicks below her. If you are patient, you may spot a small white head popping up from the nest and into your view for a few seconds.

As a monitor, you are not required to age chicks you observe, but being able to estimate age can help monitors estimate when eaglets will fledge from the nest. Below are pictures documenting the growth of eaglets. Our partners at the *Iowa Department of Natural Resources* put together these pictures; they run a similar monitoring program that that we used as our model for the Maryland program.

3 days.

10 days.

2 weeks. Off-white first down.

3 weeks. Medium-gray second down. Head with off-white down contrasting with darker body, creating a "mohawk" appearance.

4-5 weeks. Early contour growth. Medium-gray down with emerging dark brown feathers that cover 5-50% of the body.

Note: There may be noticeable variability in feather growth among nestlings. Within broods this is related to asynchronous hatching of young, nutrition, and sibling competition. The main point is that at this stage feathering comprises a minority of body cover, whereas down makes up the majority.

5-6 weeks. Late contour growth. Medium-gray down with emerging dark brown feathers that cover 51-95% of the body.

Photo documentation of aging Eaglets provided by Iowa Department of Natural Resources.

Chapter 3: Collecting and Submitting Data

Program Summary

The **Maryland Bird Conservation Partnership** created the *Bald Eagle Monitoring Program* so we can continue to add to our state's long-term dataset previously managed by the Maryland Department of Natural Resources (MD-DNR). Getting trained volunteers to monitor Bald Eagle nests will help us get data on Bald Eagle productivity in our state. From the data you collect, we will continue to learn about: distribution, abundance, and density of eagle nests; range expansion; average nest and fledging success; and also nesting season changes over time (phenology).

To make sure we get the most accurate data, we are invested in training you as citizen-scientists. As a monitor, you need to be able to:

- Identify and roughly age Bald Eagles
- Recognize breeding behaviors
- Observe the nest without disturbance
- Collect accurate data to the best of your ability
- Submit data in the required format to our organization.

Nest ID

The first step for our program is to maintain an updated database of eagle nests across our state. Many of the known nests in our database are from the MD-DNR dataset. Volunteers can report other nests through our website. Before we can assign a nest to a volunteer, we must add it to our database. We then assign the nest a new **Nest ID**. This is a unique identifier that begins with the first two initials of the county it is in, followed by three numbers. The NestID enables us to keep track of exactly which nest we assign to monitors. You will receive the Nest-ID of any nest we assign to you. When you report information through our data portal, you will be required to have this NestID.

Nest Location & Physical Description

Each nest record in our database has detailed information about the location of the nest. Aside from geographic coordinates, we have information about the type of tree (deciduous vs. coniferous) the nest is built on and whether the tree is alive or dead. We keep information on the type of property (public vs. private), name of the property (park name or owner name) and a description of the physical location of the nest and how to find it. When you are assigned a nest to monitor, you will be given this information. When you visit the nest for the first time during the season, it is your job to **make sure all this information is correct.** You may need to report some changes. For example, the tree may be listed as alive in our database, but it may have since died. Or, the nesting pair of eagles may have abandoned the nest we assigned and relocated to a nearby tree. If this occurs, please email our project coordinator at mdeaglenests@gmail.com so we can update this information.

Nest Observation Requirements

By now, you should be familiar with how to avoid disturbance to the nest (Ch.2). The next requirement for our program is for data collection. As a nest monitor, you must submit at least three observations through our data portal that summarize nest activity for the season. Ideally, we'd like to have one observation when incubation begins, one observation when chicks are young and still dependent, and one observation when the chicks will shortly or have recently fledged. This provides us with important information on: when incubation starts, how many chicks hatch, and how many chicks successfully fledge (leave the nest). Depending on food availability and weather patterns, some chicks may not make it. A nest may also blow down with chicks in it (if this happens, refer to our injured eagle appendix). **All** of this is valuable information for our program.

Most likely, you will need to make more than the required three visits to the nest in order to get the information we ask for. The more you participate in our program, the more familiar you will be with eagle breeding biology and the less time you will have to invest to make accurate observations. If you visit the nest more than three times, you are welcome to report more than three observations through our data portal (the data portal does not limit the number of observations you can submit). However, we are mainly interested in getting observation reports when there is a *status change*. For example, you may visit a nest in May and observe two chicks. If you go back to visit the nest again a week or two later, but only observe one chick, you should report it. The second chick may have perished, or you may simply not be able to see it. If this happens, visit the nest again to confirm this observation. Once the chicks are well-grown in June, you may find that you now see two chicks again, or you may only see one again, which would confirm that one of the chicks did not survive.

In general, you should always keep your own written observations about your nest visits. You may only report three of the many more observations you make, but having a written record will help you plan for your next nest visits. The most important data to report is when there is a status change.

Timing is crucial for nest observations. You must time your observations to capture the full development and fledging of eaglets. At a minimum, we ask our volunteers to visit the nest three times: one during the early season **(late February to March)**, a second time in **late April** to count the number of chicks in the nest, and a third observation in **mid-June to mid-July** to count fledged young. Please take into consideration the breeding calendar for a Bald Eagle: **35 days of incubation** for the eggs to hatch, and **11-14 weeks** until grown Bald Eagle chicks fledge. **Refer to the nesting chronology on page 5 if you need to.**

*** * * BE AWARE OF PRIVATE PROPERTY BOUNDARIES! * * ***

Some nests are located on private property, but can be observed at a distance- from roads or adjacent public properties. If you are unable to observe from a public space, you can reach out to the private landowner to ask for permission to access the property. If you are unable to observe the nest assigned to you do to property restrictions, please let us know.

Monitor Datasheet Explained

Below is a breakdown of each data field you are responsible to report on as a nest monitor. A paper copy has been provided in Appendix 1 for your referral/field notes, but we prefer you submit data electronically. In order, the fields are:

1) Date:
   - This is the date of your nest observation, NOT the date of your data submission.
2) Visit #
   - The sequential number of your visits to the nest. For example, #1 for your first visit of the season, #2 for your second, etc.
3) Number of Adults
   - Report the number of adults you observed at or near the nest during this observation.
4) Number of Young
   - Report the number of eaglets you are able to observe. If you do not see chicks but know they are present due to adult behavior, please leave the field blank but add a comment in the notes that adult behaviors indicated chicks were present in the nest.
5) Number of Fledglings
   - This is the number of young eaglets that you have observed fledging (leaving the nest). Even if you are not present when chicks fledge, eaglets will remain near the nest period for a few weeks.
6) Summary of the Nest Status and explanations.
   - The summary status is your conclusion about the nest activity for this observation date. Choose one of the following statuses that best represents the activity at the time of your observation.
     A) **Unknown**
        - This should be only be chosen if you have visited the nest and are unable to make observations. An acceptable reason would be if leaf cover stops you from having any visibility to the nest. Another reason is if you feel untrained to make an accurate conclusion (for example, unable to tell adults from young). If that is the case, please follow up with us as soon as possible to get trained. Please use comment field to explain.
     B) **Destroyed**
        - This status is for nests that are no longer in existence, either because the nest tree fell down, or because the nest fell apart/blew down. No birds can use the nest at the time of observation. Please use comment field to explain.
     C) **Failed**
        - The nest failed to produce fledged young, choose this status for a nest that had breeding activity (Female at least started to incubate) but failed due to weather, predators, or the nest falling apart. You may also chose this option if no chicks survive and fledge from the nest. If one chick fledges but the others perish, it is not a failed nest. Please use comment field to explain.

D) **Inactive**

- Inactive nests are those with no breeding activity for the season. You may see some adults courting in the area, but the nest has not been added to or repaired and an adult was never observed on the nest in an incubating position.

E) **Nest Building**

- One or two adults are seen courting around the nest and you observe an adult maintaining the nest by bringing new branches and rearrange those in the nest.

F) **Incubating**

- Female is observed brooding (sitting on the nest for an extended period of time). If a female is incubating she will not leave the nest except for a very short period of time. You may observe the male bringing her food in the nest, or they may alternate the incubation duties.

G) **Young in Nest**

- Chose this status if you observe young chicks or perceive the female to be feeding young chicks (even if you do not see them)

H) **Young Fledged**

- Chose this status if you have observed young eagles at a mature age (11+ weeks) and no longer see them. Once chicks are mature enough to leave the nest, you may infer that they have fledged if you do not see them. You may also be able to confirm they have fledged by finding the parents in the nearby area- they will continue to bring prey to their fledglings for an additional 4 or so weeks.

7) Observation Notes
   - Use this field to report any observation comments, such as speculations, explanations, etc.

8) Final Status
   - Use this field to report this observation as your summary observation for the season. You should use this field if you are no longer planning to visit the nest because A) All the chicks have all fledged B) The nest has failed c) The nest is destroyed

9) Location Update Needed
   - Check this field to let us know if something from the Nest Description you were given needs to change. This could because:
     A) Coordinates/description of location are wrong
     B) The tree type or status is wrong

   Note: Either of these may indicate that the nest we have on file was destroyed, and a new nest was built nearby. We may ask you to investigate the location of the old nest during your nest observation in case you can find the remains of the old nest. If you do not, we will update our information. If you discover a new nest, we will assign you a new Nest-ID.

Reporting Data

We ask our volunteers to report their observations through our online data portal. This data portal is on our project webpage, at: www.marylandbirds.org/bald-eagle-nest-monitoring

You may also access it from our main website: wwww.marylandbirds.org. Click on "**Initiatives"** from the Menu then select "**Bald Eagle Nest Monitoring"**.

Once on the project page, scroll down to find the "**Data Entry**" link. This page will be password protected. The password was sent to you by email with this document and nest assignments. If you do not remember it, please contact our project coordinator. **The password** should be "Eagledata" followed by the current year, with no spaces.

Each registered nest monitor is also assigned a **username**. To assist us in quickly identifying who submitted a particular observation record, we recommend the username be your first initial, followed by your last name, no spaces. You will need your username to submit your observations.

You may submit your observations individually or all together at the end of the season. We prefer you submit them shortly after you have made an observation. If you submit them all together, you have to refresh the data portal after submitting to submit each observation one after the other.

You may also submit observations from your smart phone / tablet at the same time as you visit the nest. Our data portal is compatible with mobile and tablet platforms. **The QR code at right takes you to the data portal sign-in page.**

We have put together a paper datasheet for your convenience. We much prefer you submit your data online, but we are willing to take scanned copies of your datasheet if you are unable to submit online.

QR code to data portal

Reporting a New Nest Location

If you observe a Bald Eagle nest other than the one we assigned, please report it through our project webpage. We are interested in keeping a record of eagle nests across our state, and there is a chance we do not currently have it in our database!

To report a nest, go to: https://marylandbirds.org/report-bald-eagle-nest and follow the provided instructions. You will need to collect geographic coordinates to share the nest location with us. You will also need observations such as tree type (deciduous vs. coniferous), tree status (dead or alive), and property type (public or private land) and additional descriptive information which would help a nest monitor find and identify the nest properly.

There are three ways to collect the coordinates of a nest:

1) **A hand-held GPS Unit:** most people do not have a GPS unit, but your nearby nature center may have one to lend you. Please note: A GPS Unit takes some skill to operate, and requires you to be at the foot of the nest to take coordinates. This may not be the best option for most people.

2) **Using a mobile map at the location**: Most smart phones and tablets nowadays are equipped with a built-in GPS. To access this feature, download Google Maps or use the default map application on your device. Without disturbing the birds (this cannot be done during the breeding season), walk to the base

of the tree and open a map application. Use the “Track My location” feature (usually you are the blue dot on the map) and click or press down on your location to mark the point. Then, scroll down to find the coordinates, or share the location to your email address so that you can find the coordinates on your computer.

If you have found a nest during the breeding season, you can still collect information on its location at a safe distance from the nest. Use the same process as above, but pull up “Satellite Imagery” on the map application you are using. This will enable you to see visual imagery on the map. Using visual clues, such as the tree line and bodies of water, drop a pin by clicking on your best estimate of the nest location. Use your own location as the point of reference to cross check your estimated nest location. Share this point with your email address or jot down the coordinates.

3) **Using Google Maps or Bing Maps on a computer:** If you find a nest but do not have a GPS-enabled device, take detailed field notes of the location description. Find the nearest street intersection, and write down a description in relationship to direction, estimated distance, tree line and bodies of water.

When you return home, go to Google Maps or Bing Maps and find your nearest point of reference by county, town, and street intersection. Turn on satellite imagery to see aerial photography of the location. Use your best judgment and your notes to right-click on the location of the nest. From the pop-up options, click “What’s here” or look for the coordinates. Copy the coordinates and use them to report the nest location through our website.

On our website, go to “Report Bald Eagle Nest” and fill out all the information. Click submit. Once we receive your report, we will check with our database to look into whether this is a new nest. If it is, we will add it to our database and if possible, assign volunteers to monitor the nest. If you are interested in monitoring this nest, send us an email with this request. Thank you for helping us build our database of nest records!

Bald Eagle Nest Monitoring Field Reporting Sheet

OBSERVER INFORMATION

(Primary if more than one per household)

Username: _____

E-Mail: _____

☐ If any **nest tree information has changed** since last season, or this season, check box and record updated info when you enter your data.

NEST LOCATION INFORMATION

Nest ID: _____

County: _____

GPS coordinates of nest tree (5 decimal places):

Lat: _____**Long**: _____

Property Type:

☐ Private ☐ Public

Property Name: _____

Nest Tree description :

Tree Species:

☐ Deciduous
☐ Coniferous
☐ Unknown

Is the Tree:

☐ Alive
☐ Dead

Nest location description:

OBSERVATIONS

VISIT #	DATE	TIME SPENT (min) [1]	# ADULTS (ON or BY THE NEST)	# YOUNG	# FLEDGED	STATUS CODE [2]
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

[1] **TIME SPENT** - we will use this only to calculate the total number of volunteer hours given to this project.

THANK YOU for your time and passion for monitoring eagles nest!

[2] **STATUS CODES:**

NB Nest building/repair
IN Incubating
CH Chicks observed
FL Fledged
NA Nest Not Active
FA Failed
ND Nest Destroyed
UN Unknown

GENERAL COMMENTS OR NOTES:

MBCP

Additional Bald Eagle Resources

- Center for Conservation Biology: Facts about Eagles

- Answers to commonly asked questions such as lifespan, size, behavioral habits, brood size and more on Bald Eagles.

http://www.ccbbirds.org/what-we-do/research/species-of-concern/virginia-eagles/facts-about-eagles/

- U.S. Fish & Wildlife Service: Bald Eagles Fact Sheet

- The history of the decline and recovery of Bald Eagles in the U.S. and more behavior facts.

https://www.fws.gov/migratorybirds/pdf/management/bald-eagle-fact-sheet.pdf

- Live Washington DC Bald Eagle Cam

- Since 2014, a pair of mated Bald Eagles has been nesting at the U.S. National Arboretum. Watching the behavior of this pair may give our volunteers helpful clues when making their own observations, not to mention an intimate inside look inside the nest!

- Inside a Bald Eagles Nest, by Teena Gorrow and Craig Koppie

- This book is a photographic journey of American Bald Eagles during the nesting season. Through 160 breathtaking images captured in eagles' natural habitats, this factual account offers a rare glimpse into the behaviors and activities of America's national symbol as it prepares a nest, mates, lays eggs, and raises its young.