

Bald Eagle Nest Monitoring Program

George Miksch Sutton Avian Research Center



Photo: Patty Clark-Smith

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INTRODUCTION TO BALD EAGLE NEST MONITORING

The decline of nesting bald eagles, peregrine falcons, and ospreys was an indication of environmental contamination. This documented decline in wildlife populations led to the banning of DDT and the awareness we have regarding the possible effects of chemicals on the environment, on wildlife, and on humans. Monitoring these environmental indicator species will help people concerned with the conservation of our natural resources make wise management decisions.

Bald eagle nests have been surveyed in Oklahoma since this species returned as nesters in 1991. Expanded statewide nest monitoring today will add to the data collected in the past, and volunteers are needed to help develop and maintain an accurate database. Bald eagle nest monitoring provides a way to record up to date information. Opportunities to involve volunteers as citizen scientists are both exciting and essential in order to accomplish the job.

In this training you will be given specific information on the protocol used to monitor nesting bald eagles. Participants can either be assigned or can find their own nest sites to monitor every year to assess territory/habitat changes and nest success (i.e., the number of young fledging from the nest). Topics covered will be: 1) general bald eagle and nest identification, 2) characterizing a nest's surrounding habitat, and pinpointing its location, 3) conducting a scientifically correct monitoring survey of a nest, and 4) submitting data to the Sutton Avian Research Center's bald eagle nest database. Your participation helps us gather important information to monitor the bald eagle population and to advise developers as to whether their projects may potentially be interfering with nesting eagles. At the end of the workshop you will be prepared to join the ranks of the BEST, the Bald Eagle Survey Team!

You will be provided with materials in this workshop to help you identify nests and to help you collect the appropriate data. There are a few things that you will need:

- 1) Time and patience: nests need to be visited 2-3 times each year during the eagles' breeding season, and you may need to spend 20 minutes or more observing the nest.
- 2) Binoculars: birds are good at keeping their nests from prying eyes. Binoculars are a must.
- 3) Spotting Scope: a scope is not required, but, as with the binoculars, it will make "spying" on the young in a nest much easier.
- 4) Good note taking and organization skills: good surveys result from good organized note taking!
- 5) A computer with internet access: This is important for quick communication and for accessing Google Earth to determine the correct coordinates.

Thanks for participating and volunteering your time for the sake of our national symbol!

GENERAL MONITORING INSTRUCTIONS

Know the Law!

First of all, it's important to know the law! All raptors are protected by state and federal laws. It is illegal to kill, capture, possess, harass, or harm any raptor. Special permits are required for salvage (use of mounts, feathers, or other parts), falconry (hunting game with a trained raptor), rehabilitation (treatment of injured raptors), or education (raptors used in live display or other education situations). Please keep these laws in mind as you survey raptor nests.

Keep a safe distance from the nest site. Some raptors are very sensitive to human disturbance early in their nesting cycle and may abandon their nest. Some species are VERY protective of their nest site and young and will not hesitate to chase human intruders from the area. Stay on the ground and use binoculars or a scope so you can watch the nest from a distance.

Bald eagle nest monitoring etiquette

For many bald eagle enthusiasts there is little 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. These once endangered birds have been successful enough at raising eaglets to be removed from the Endangered Species list. That being said, bald eagles remain protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. They are also, as a species, 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 to 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 that you are monitoring.

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, and 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 he/she is uncomfortable long before the point of flushing, and 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 he is doing as you approach, he is probably not bothered by you. If he does stop what he is doing but resumes his activity after giving you a once over, you are also probably not bothering him and so are safe to continue observing. If, however, the bird does not resume his 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 may begin vocalizing. As the bird's agitation increases it might start shifting in the nest/on its perch, raising its wings, leaning forward and 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 1000 meters. Anecdotal observation seems to indicate that the eagles that choose to nest in close proximity to humans or areas with lots of human use are generally more tolerant of human activity while those birds that choose remote territories are 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 adult disturbance depending on the habits of each nesting pair.

TABLE 1: Nesting Bald Eagle Sensitivity to Human Activities

Phase	Activity	Sensitivity to Human Activity	Comments
I	Courtship and Nest Building	Most sensitive period; likely to respond negatively	Most critical time period. Disturbance is manifested in nest abandonment. Bald eagles in newly established territories are more prone to abandon nest sites.
II	Egg laying	Very sensitive period	Human activity of even limited duration may cause nest desertion and abandonment of territory for the breeding season.
III	Incubation and early nestling period (up to 4 weeks)	Very sensitive period	Adults are less likely to abandon the nest near and after hatching. However, flushed adults leave eggs and young unattended; eggs are susceptible to cooling, loss of moisture, overheating, and predation; young are vulnerable to elements.
IV	Nestling period, 4 to 8 weeks	Moderately sensitive period	Likelihood of nest abandonment and vulnerability of the nestlings to elements somewhat decreases. However, nestlings may miss feedings, affecting their survival.
V	Nestlings 8 weeks through fledging	Very sensitive period	Gaining flight capability, nestlings 8 weeks and older may flush from the nest prematurely due to disruption and die.

This table is reproduced from “The National Bald Eagle Management Guidelines”, U.S. Fish and Wildlife Service, May 2007.

The United States Fish and Wildlife Service (USFWS) recommend that active nest sites not be approached beyond a distance of 330 feet. In addition, 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, you as an observer need a clear view of the nest to gather accurate data about what the eagles are doing, 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 a pair was exposed to a human activity prior to moving in and still chose the site, they will be tolerant of that activity, and that

certainly applies to road traffic. In addition, birds in general seem to be less bothered by people in a car than people outside of one, 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 probably have found a great observation point. If you prefer to use a spotting scope over binoculars to watch the nest, window mounts are a fairly inexpensive and practical way to use your scope from inside your car. In some situations, you might be able to climb out of your car and stand with the car between you and the nest, which 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. As before, 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, keeping the USFWS buffer distance of 330 feet in mind and taking into account how the landscape changes when the trees have leaves. Again, take your cues from the eagles and adjust your viewing spot accordingly.

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 amongst individuals and across regions. Learn about the eagles in your region and adjust these guidelines accordingly.
- 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.
- 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 330 feet as a rough starting point. If the eagles in your region prefer a much larger physical distance from humans, learn what constitutes a comfortable distance for those birds. 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!

Definition

With "Bald Eagle Territory Monitoring" it is first important to understand what we mean by territory. For our purposes a bald eagle territory is: *A habitat area up to 1 mile in radius (though sometimes smaller in good habitat) that is defended by a pair of eagles and used for breeding. It meets the eagles' breeding habitat needs; appropriate trees (or very occasionally other structures) to build nests, and a nearby food source. A territory may hold more than 1 nest but may not house more than 1 pair of eagles within the same breeding season. The pair of eagles need not be the same pair across years.*

Main monitoring points

- 1) **Find a nest** using the tips and information about nesting habitat and habits.
- 2) **Map the nest** using the county map(s) provided and any other mapping tools such as an Atlas or online resources. Make sure to note close addresses of any landmarks that might help you. Use online tools to more precisely map the site. Preferentially report the location by putting a place mark in Google Earth that can be copied and e-mailed to the Sutton Center coordinator.
- 3) **Collect data** by visiting the nest 3 times during the nesting season and spend at least 20 minutes observing. Record the data collected on the Territory Monitoring Form. You may need to visit one or two more times to get a feel for the pair's specific nesting chronology, but only submit data for 3 official visits.
- 4) **Submit the data.**

The first and most important step of the survey is to locate the nesting site. You may be given a map and location description for some. However, the locations we provide for you may not be entirely precise or the nesting site may have moved since the last time we received information. You should go out as soon as feasible and scout your nesting location (preferentially while the trees are leafless). Since you may not always have an accurate location provided, several outings could be spent exploring natural (and semi-natural) areas. Google Earth is a good tool to find landmarks and to see the location before heading out in the field. If the nest is not at the coordinates, some sleuthing may be required (the gps and/or coordinates may be off). If you cannot initially find the nest or if a nest has fallen down:

- a) As thoroughly as possible investigate all potential eagle habitat within a 1-2 mile radius of the original nest site. *Tip: If you're not shy you may try asking local landowners—nesting eagles usually get noticed and local residents may know where the nest is located.*
- b) Once you have tracked the nest down to a new location, please determine the coordinates and e-mail the information with the status of the nest. We would also like to be updated if you've found a new nest.

Once the nest has been found, data collection can begin. Find the best vantage point for viewing the nest – one that is not too close but gives the best view. *If you'll be going on private property, you are responsible for getting permission from the landowner first.* The objective of monitoring is to collect three major pieces of information: 1) Is the nest occupied?, 2) Have young been produced and how many?, and finally 3) How many of the young fledge from the nest successfully? Therefore, nest monitors should make at least three visits to the nest that coincide with the best times to collect these pieces of information (see table 2 above for some guidance). On each of the three main visits, **20-30 minutes** should be spent quietly observing and collecting the data requested on the data sheet. Record the data collected on the Territory Monitoring Form. You may need to visit one or two more times to get a feel for the pair's specific nesting chronology but only submit data for 3 official visits. Once all of the data

has been collected the data sheets should be returned to the Sutton Center.

There are of course some important caveats. While there are some general guidelines for nesting chronology, each pair of birds is a little different. So, once you have located a nest, you will likely need to make some unofficial visits to gauge more precisely the timing of young in the nest to include fledging. On these occasions the monitor may enjoy keeping a journal noting dates and behaviors observed. However, it is also important to note that visits should be kept to a minimum in order to avoid any possibility of disturbing the nesting pair.

Also, what if you are unable to collect all the necessary data? Don't worry! This is a very real possibility. Counting the number of young is particularly difficult as the young are very small, the nest very large, and usually, very high in the air. Even if you are unable to collect all the data, report everything you do have and then use your journal notes to "hatch" a plan to get the information the next year.

Materials Needed

1. Datasheet
2. Pencil
3. Binoculars
4. Spotting Scope (optional but extremely useful and in some cases essential!!)

Some clues for finding a nest site

Look for signs that raptors are using a particular area (e.g., feathers, pellets [the indigestible material raptors condense and spit out after a meal as a pellet or casting], mutes [fecal material]).

Many raptors become vocal when they set up territories. Watch for aerial displays (usually involving both the male and female) and listen for vocalizations.

The best time to locate nests is in the winter. Do visual searches of an area before leaf out in the spring. This allows you to see old stick nests. Nests may be reused or a new nest may be located near the old one.

Read up on habitat. This will help you to know where to look for nests. All raptors have habitat preferences. Most use trees and particularly nest near water so it's a good idea to keep your eyes peeled on the tree tops for large clumps of sticks that stick out.

Submitting Data

NOTE: Complete a separate Territory Monitoring Form for **EACH** nest site monitored. You need only 1 datasheet per year for each nest.

It is important to fill in all the fields on the data sheet or, if you can't, explain why in the comments.

STEP BY STEP INSTRUCTIONS

The overall goal of eagle nest monitoring is to collect important information, mainly:

- 1) Is the bald eagle territory active/occupied?**
- 2) How many young, if any, are produced?**
- 3) How many fledglings, if any, are produced?**

Additional information will also be useful for research. In order to gather the information, the territory monitor will need to make a minimum of 3 visits to the nest with binoculars and/or a scope, and spend 20 minutes or more watching the nest at each visit. The following steps should be followed:

1) Locate the nest

- Preferentially scout for nests early in the nesting season and note the best viewing locations.
- Any changes to the nest site location in a territory, including the nest's absence, should be recorded and reported to the nest monitoring program coordinators. Change the nest ID in alphabetical order with the first nest in the territory named A, the second B, and so on.
- Record the location in the format: degrees, minutes, and decimals of minutes (for example, the Sutton Center Administration building is located at 36° 41.17'N/ 95° 59.02'W).
- Record if you have landowner and their contact information as well as directions for accessibility to nest.
- If you are unable to find a nest, conduct a thorough search of the area within a 1-2 mile radius of the original nest site.
- Make sure to thoroughly fill out observer information so we know who to contact if there are questions.

2) Visit 1: Is the bald eagle territory active/occupied?

- Monitors should visit the nest site during the first month of the nesting season during daylight hours when visibility is good (no fog or rain). Record weather conditions as well as time spent observing.
- Spend at least 30 minutes observing the nest for any eagle activity on or within 50 yards of the nest site. If you find a good vantage point, it can be added under comments for future reference.
- If no activity is noted, a further visit may be needed during this initial time period and monitors should plan on making visit 2 as directed in order to confirm that the territory is inactive.
- In Oklahoma, there is a wide range of nest initiation dates from December through early March.

3) Visit 2: How many young are produced?

- The purpose of this visit is to count the number of young in the nest. A spotting scope will be an especially useful tool for this task. Adults' behavior can also confirm presence of young.
- Tips for seeing and counting young:

- Be patient and make multiple visits.
- Try different vantage points for viewing.
- Schedule visits to coincide when the young are 6-8 weeks of age, as they will be bigger and more active and therefore easier to see.

4) *Visit 3: How many fledglings are produced?*

- Monitors should visit the nest during the final part of the nesting season and record the number of chicks preparing to fledge.
- What counts as a fledgling? The eaglet has fully developed dark feathers (the head and tail do not turn white until bird matures at approximately four years of age), is adult sized and may be doing wing exercises or exploring the edges or outside of the nest. If they've already made some initial flights they may be perched in the vicinity (within 50 yards) of the nest.
- Interesting additional information includes variability in development of eaglets and activity, as well as behaviors. Below the eagle comment section is space to note information regarding the nest and surrounding habitat, including human activities such as development, traffic etc.

5) *Submit Data Sheets*

- By **June 15**: Sutton Avian Research Center, P.O. Box 2007, Bartlesville, OK 74005;
BEST@suttoncenter.org

Other Helpful Information

Etiquette!! Especially in the early part of the nesting season, eagles can be very sensitive to any kind of disturbance. It is important during this early part of the nesting season that you keep your distance and try to be as inconspicuous as possible. Once the young are a little older the parents are less likely to abandon the nest, and you can get closer, while still being respectful and trying to keep disturbance to a minimum.

Territory Refers to one bald eagle pair's breeding territory. This territory may have more than one nest (serves as an alternate nest or replaces destroyed nests) but will never have more than 1 breeding pair of eagles. The territory is what is being monitored, meaning that even if a nest is destroyed and a new nest is built in a different location, monitoring of that newly built nest continues. *How can you tell if two nests are in the same territory?* Excluding certain special situations, any two nests that are within 1 mile of one another and which have not both been recorded as active within the same breeding season are considered to be within the same territory. Any two nests that fall outside of either of these criteria will be considered separate territories unless evidence to the contrary is observed.

Nesting timeline The nesting timeline for each pair of eagles will be slightly different, and it is for this reason that it may be useful to make some unofficial trips to the territory in order to determine when the various nesting stages begin. This will help you time your official visits within the survey periods so that you have the greatest likelihood of seeing young and counting fledglings etc.

Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Nest Repair and Building												
Egg Laying and Incubation												
Hatching and Tending Young												
Fledging												

* The darker shading represents the most usual time for the associated nesting activities.

Inactive

territories

If the territory is inactive one year, and you have done a thorough search within 1 mile of the nest site and have seen no eagle activity, do not assume the territory will remain inactive in future years. Continue to visit the territory for 2 more years after the initial year of inactivity since a territory will often be re-occupied. Information on territory inactivity is just as important as information on an occupied territory!!

BALD EAGLE NESTING ECOLOGY AND PHENOLOGY

(adapted from Iowa Dept. of Natural Resources)

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 typical 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. 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.

This 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 defense is more about food than it is about safety. Having a reliable and readily available food source is crucial to the success of a nest and the size and location of a territory is intimately tied to food resources available. 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 though in areas where food is harder to find territories may be larger and in areas where food is especially abundant, such as below dams along the Arkansas River, territories may be much smaller.

Nest sites

Bald eagles typically raise their young in giant stick nests placed near the top of tall (super canopy) 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 isolation from human activity, though sensitivity to disturbance seems to vary widely (see *Nest etiquette*). A good example of typical bald eagle habitat is the forested banks of large rivers; another is the forested peninsulas and areas near large bodies of water such as Grand/Hudson lakes and Sequoyah National Wildlife Refuge. These landscapes provide for all four basic needs through the water body (water to drink and fish to eat) and the forest (the trees provide shelter

and a place to raise young as well as perches for hunting and resting). As a note, in areas where trees are few and far between, eagles can nest on the ground or on the tops of cliffs!

Bald eagles usually like to have a clear view in all directions around their nests and so tend to prefer nest sites that are on some sort of edge, be it water or forest opening, and that have 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 living tree as the base for their nest though there are often some dead trees, called snags, nearby that 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 to the nest every year, cleaning out debris from the previous year, making repairs, and expanding so that very old nests can become enormous, up to nine feet across and 12 feet high! Typical nests are much smaller, more like five or six feet across and three or 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. The 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. As a summary, tree shape, size and location are more important to an eagle looking to build a new nest than is the tree species, but some of the trees more likely to meet nesting needs are pines, spruces, firs, oaks, hickories and cottonwoods. In Oklahoma, many eagle nests are placed in cottonwood trees, as these trees tend to grow to an ideal size and shape and are associated with lowland areas near water sources.

Sometimes 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'll alternate, using one nest one year and the other the next. In other cases, the eagles may use one nest for several years and then use the other for a while before returning to the first nest. 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 decide to move in. Sometimes a nest or territory can be inactive for 3 or more years before hosting nesting eagles again. Eagles are very opportunistic creatures 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 you never know

when they will become active again. Interestingly, inactive bald eagle nests sometimes host other bird species, such as great-horned owls or even Canada geese!

Foraging locations

Most eagles feed primarily on fish and waterfowl, so easy access to a food source is key. Raising young eagles is hard work: the little guys 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 eagles are not bound to nest near a water source (though most do). For example, in recent years bald eagles have begun to nest near livestock operations, a long distance from any significant water source, where livestock waste provides a ready food supply.

Perch Sites

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 monitoring their territories for threats (predators, other eagles, etc.) and for hunting. Several scientific studies on bald eagle perch use have determined favored perch trees are larger (DBH) and taller with 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. Also of note is an apparent tendency to select coniferous trees for perching during times when deciduous trees are in leaf and a preference for deciduous perches before leaf out and after leaf drop.

Phenology

The entire cycle, from egg laying to fledging, tends to take about 18 weeks (or 4.5 months) though it 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 per day and often wait a day before laying a second egg. Nests most commonly have two eggs, but sometimes have three and it can take up to 6 days to complete a three-egg clutch. Clutches of four eggs are rare, although recently observed at Sooner Lake, Oklahoma.

At the other end of the process, some eaglets take longer than others to leave the nest and fledging can happen anywhere from 8 to 14 weeks after hatching. Most young fledge between 11 and 12 weeks of age. A parent eagle’s job doesn’t end at fledging, however, and if the post-fledging care is included in the nesting cycle the length becomes closer to 5.5 or 6 months. Fledglings may continue to rely on their parents for food and other care for 4-6 weeks post fledging.

Nesting behavior in Oklahoma can start as early as October 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 and not terribly serious. More dedicated repairs start in December. This

home improvement behavior serves two purposes: 1) it makes the nest ready to house the next generation of eagle young; 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 don't have to spend time actively searching out and courting a mate though they may still engage in the elaborate courtship displays that "single" birds do.

Courtship displays can be pretty 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 tumble end-over-end together. 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 Oklahoma, copulation usually occurs in December/January and is followed soon after by egg-laying, usually somewhere in mid to late January. 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 his/her 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 moves from eggs to babies, 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 tear off small pieces and 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 5-6 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 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 and eventually they do fly again.

In other regions of the country the timing of the nesting cycle varies also. For example, in Florida nest building/maintenance activities may start in late September or early October and incubation can begin in October. The Florida nesting season tends to be prolonged, meaning

that while some birds do start incubating in October, others may wait until April. In Saskatchewan, almost all the nesting pairs lay their eggs in mid-April while in Mexico many pairs are already incubating in January.

TABLE 3: Eagle Nesting Phenology in the United States.

This table is reproduced from “The National Bald Eagle Management Guidelines”, U.S. Fish and Wildlife Service, May 2007.

Chronology of typical reproductive activities of bald eagles in the United States.

Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.
SOUTHEASTERN U.S. (FL, GA, SC, NC, AL, MS, LA, TN, KY, AR, eastern 2 of TX)											
Nest Building											
Egg Laying/Incubation											
Hatching/Rearing Young											
					Fledging Young						
CHESAPEAKE BAY REGION (NC, VA, MD, DE, southern 2 of NJ, eastern 2 of PA, panhandle of WV)											
				Nest Building							
					Egg Laying/Incubation						
						Hatching/Rearing Young					
								Fledging Young			
NORTHERN U.S. (ME, NH, MA, RI, CT, NY, northern 2 of NJ, western 2 of PA, OH, WV exc. panhandle, IN, IL, MI, WI, MN, IA, MO, ND, SD, NB, KS, CO, UT)											
				Nest Building							
					Egg Laying/Incubation						
							Hatching/Rearing Young				
								Fledging Young			
PACIFIC REGION (WA, OR, CA, ID, MT, WY, NV)											
				Nest Building							
					Egg Laying/Incubation						
						Hatching/Rearing Young					
								Fledging Young			
SOUTHWESTERN U.S. (AZ, NM, OK panhandle, western 2 of TX)											
				Nest Building							
					Egg Laying/Incubation						
						Hatching/Rearing Young					
							Fledging Young				
ALASKA											
					Nest Building						
							Egg Laying/Incubation				
								Hatching/Rearing Young			
Ing Young											Fledg-
Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.

THE 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, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Act provides 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 Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb."

"Disturb" means: "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, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."



In addition to immediate impacts, this definition also covers impacts that result from human-induced 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), imprisonment for one year, or both, for a first offense. Penalties increase substantially for additional offenses, and a second violation of this Act is a felony.

MIGRATORY BIRD TREATY ACT OF 1918

The MBTA (16 U.S.C. 703-712), prohibits the taking of any migratory bird or any part, nest, or egg, except as permitted by regulation. The MBTA was enacted in 1918; a 1972 agreement supplementing one of the bilateral treaties underlying the MBTA had the effect of expanding the scope of the Act to cover bald eagles and other raptors. Implementing regulations define “take” under the MBTA as “pursue, hunt, shoot, wound, kill, trap, capture, possess, or collect.”

Copies of the Eagle Act and the MBTA are available at: <http://www.fws.gov/permits/ltr/ltr.html>.

Additional information regarding U.S. Fish and Wildlife Service’s eagle management is available @ <https://www.fws.gov/birds/management/managed-species/eagle-management.php> (accessed 2019-11-18)

FIELD BY FIELD EXPLANATION OF DATA COLLECTION SHEET

Territory/nest name: If this is a new nest, preferentially give the nest a name that makes it easier to find on a map, for example, name of nearby body of water, wildlife area, or town.

Nest ID: Record the nest id alphabetically in chronological order. If it is a new territory you are reporting for the first time, the nest ID will be "A".

Season: Write the year that the potential young will hatch and fledge.

Latitude/Longitude: Please report the GPS coordinates for the nest as this is the most precise location methods. You can determine the coordinates by using a web-based point and click method on Google maps, by using a GPS unit, or on our website where bald eagle nests can be reported (<https://www.suttoncenter.org/conservation/saving-species/bald-eagles/report-an-oklahoma-bald-eagle-nest/>).

County: Write what county the nest is located in.

Nearest body of water: If the nest is located to a larger body of water with a name, note the name. Otherwise describe whether it is a creek or pond.

Distance: Estimate the distance to the nearest body of water.

Property information: If the land is owned by a public entity, please note whether it is city, county, state, etc. Note name of property owner if known. Make sure that private property owners' rights are respected. Always request permission to be on someone's land to monitor a nest. Landowners will be contacted *only for voluntary assistance*. If landowners have questions about the monitoring program, they can contact the Sutton Avian Research Center.

Additional landowner/contact information: Phone numbers or e-mail addresses to landowner or other contacts, such as neighbors that are interested in providing information on the eagles' progress. Also record information regarding access to the land. Describe in detail directions to the nest, nearby landmarks, access comments (is it on private ground and permission needed, can it only be seen from the water), as well as the best vantage point for viewing the nest.

Observer information: Write your name(s), contact phone number(s), e-mail address(es), and whether there were additional volunteers assisting with the observations.

ALL VISITS

Date: record the date of your observations.

Start time: What time did you start observing the nest?

Minutes spent observing: How many minutes did you spend watching the nest during this particular visit?

Temperature: Record temperature in Fahrenheit.

% Cloud cover: Look at the sky and estimate the percentage of the sky covered by clouds.

Wind (MPH): Estimate the average wind speed during your observation visit.

Rain: Is it raining during any part of your observation visit? Rain impairs visibility so it is not recommended to survey during rain.

Fog: Is it foggy during any part of your observation visit? Same as with rain, it is not recommended to survey during fog.

Eagle activity at the nest: Is there any bald eagle activity, from adults and/or young, at the nest?

Number of adults seen: How many adults were present during your observation visit?

Describe Activity: What are the adults doing during your observation visit? Check all that apply.

Comments: Any caveats or additional information we should have about this visit to the nest?

VISIT 2

Number of young seen: Please choose one answer that best describes your observations during this visit. The goal of visit 2 is determine the number of young.

Certain this is all the young in the nest?: If you are not 100% certain of what you reported under *Number of young seen* check 'No'.

Comments: It would be unusual but not impossible to see some birds close to fledging during the second visit. If you do see young that you believe ready to fledge, record that and the number seen. A fledgling is any young that is adult-sized, fully feathered and which is branching out from the nest, wing-flapping etc.

VISIT 3

Number of fledglings seen: Choose one of the options that best describes what you observe at the nest. Try to report as accurate a count as possible.

Certain this is all the young in (from) this nest?: If you are not 100% certain of what you reported under *Number of fledglings seen* check 'No'.

Comments: Record your observations such as branching, differences in sibling size, health concerns...

Additional nest information: What is the condition of the nest, circle well-repaired, moderate condition, or dilapidated.

Nest Tree Species – If the nest is in a tree, please identify the tree species if possible.

Alive/Dead (circle one) – Is the tree the nest is located in alive or dead?

Nest height (ft) - Estimate, from the ground, the height (in feet) of nest from the ground.

Surrounding Habitat: In your own words give a short description of the habitat surrounding the nest site ex. Is it agricultural, suburban, forested? Please describe additional features such as human development, closeness to well trafficked roads, and other potential activities or disturbances.

Remember to submit the data by June 15!

BINOCULAR AND SPOTTING SCOPE BASICS

A good pair of binoculars is a must for most bird monitoring projects. Certainly, you can observe birds and other wildlife without the aid of binoculars but with them you will see more detail. Binoculars don't have to cost you a lot of money, but any pair you buy needs to 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

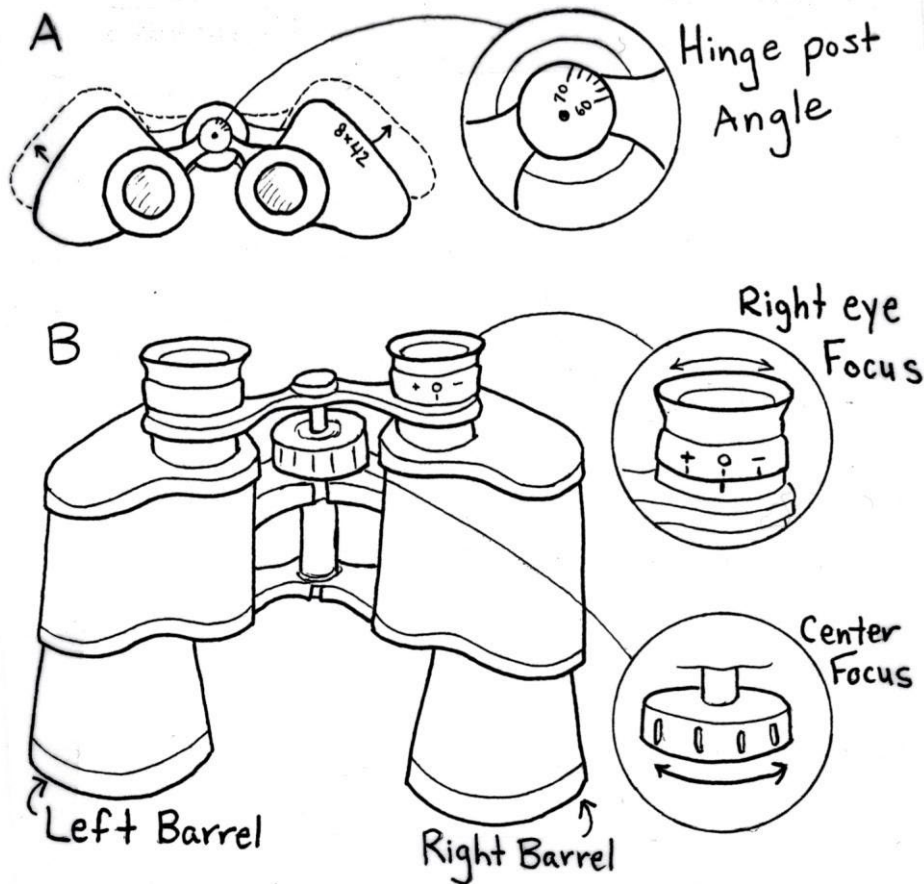
Binoculars are an extension of your eyes. First, use your naked eye to find the birds you are observing. Once you have detected movement and can see the wildlife, use binoculars to see details of a bird's "field marks." Everyone's eyes are different, so before you raise the binoculars, you must calibrate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

How to Calibrate Binoculars

1. 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 the binoculars. If the barrels are as close together as they go and you still see two images, you may need to choose a different 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).
2. 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.
3. 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.
4. 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 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 people. Most young people have little or no need to adjust the eyepieces independently.



Information taken from "Classroom BirdWatch, Teacher's Guide, FeederWatch", 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.

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. Scopes are ideal for 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 eye cups 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).

GENERAL INFORMATION

WIND SPEED INDICATORS

	Wind Speed (mph)
Smoke rises vertically	< 1
Wind direction shown by smoke drift	1-3
Wind felt on face; leaves rustle	4-7
Leaves, small twigs in constant motion; light flag extended	8-12
Raises dust and loose paper; small branches are moved	13-18
Small trees in leaf sway; crested wave lets on inland waters	19-24

FEATHERS

Contour feathers: the outermost feathers

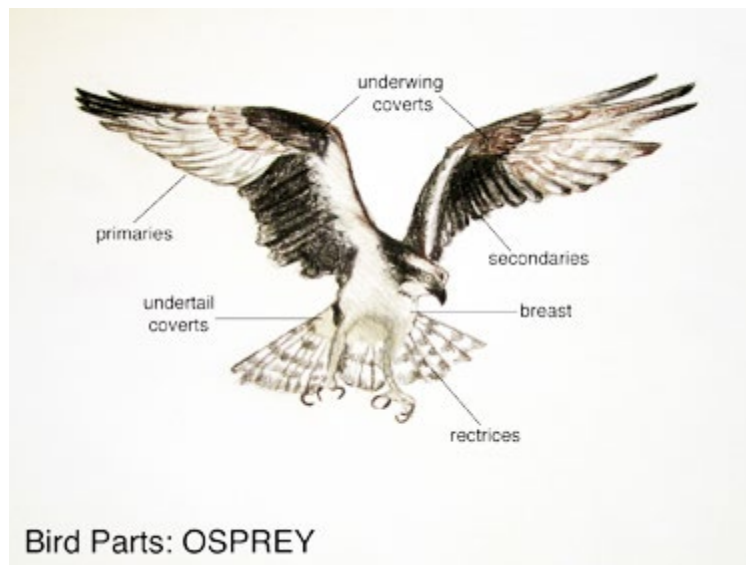
remiges: flight feathers, these largest contour feathers are responsible for supporting the bird in flight

retrices: tail feathers, the quill feathers of a bird's tail that are important in controlling flight direction

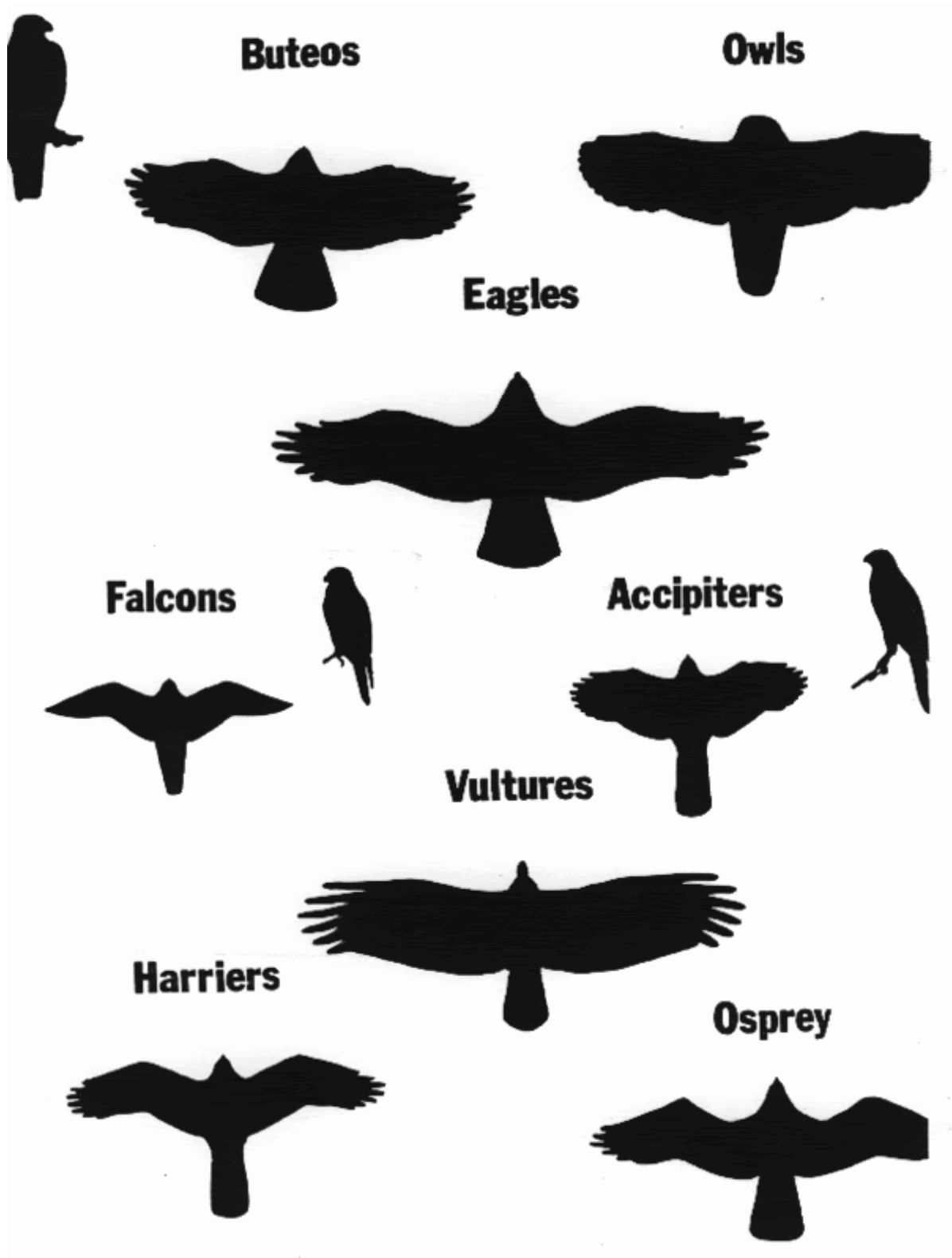
coverts: borders and overlays the edges of the remiges and the rectrices on both the lower side and upper side of the body

upperpart: on the mantle, scapular and surface of the wing

underparts: feathers on the throat, breast, belly, flanks, vent and under tail



TYPICAL RAPTOR SILHOUETTES



COMPARATIVE SIZES OF HAWKS AND EAGLES

Species	Length (inches)	Wingspan (inches)
Bald eagle	31-37"	70 – 90"
Turkey vulture	27"	69"
Osprey	22 – 25"	58 – 72"
Red-tailed hawk	22"	50"
Swainson's hawk	21"	52"
Red-shouldered hawk	15 – 19"	37 – 42"
Northern harrier	16 – 20"	38 – 48"
Broad-winged hawk	16"	34"
Peregrine falcon	16 – 20"	36 – 44"
Sharp-shinned Hawk	10 – 14"	20 – 28"
Cooper's hawk	14 – 20"	36 – 44"
American kestrel	10.5"	23"

HANDY HABITAT TERMS

Forest:	An ecosystem made up of trees and other woody vegetation. Tree canopies are dense and cover 60 – 100% of the sky.
Shelterbelt forest:	A belt of trees used to shelter a structure or area from wind, snow drift, and other environmental elements.
Coniferous:	Cone-bearing trees otherwise known as "evergreens."
Deciduous:	Trees which seasonally lose their leaves.
Upland:	Drier land at a higher elevation.
Lowland:	Low-lying land, usually holds more water than upland areas.
Woodland:	An open, wooded area where tree canopies cover 25 – 60% of the sky.
Shrubland:	An area in which shrubs are the dominant vegetation.
Shrub marsh:	A wetland-type area dominated by shrubs.
Herbaceous:	A plant having little to no woody tissue; leafy in nature.
Savanna:	An ecosystem with few, widely spaced trees.
Prairie:	An area of rolling grassland and few trees.
Sedge meadow:	A wet area dominated by low grasses.
Wetland:	An area saturated with water for most of the year and dominated by water- adapted plants.

- Fen wetland: A wetland dominated by sedge, shrub, or forest and has some peat accumulation. Peat is made up of decomposing mosses and other plants.
- Woody fencerow: The land around a fence which is inhabited by trees and woody shrubs.
- Grass fencerow: The land around a fence which is inhabited by herbaceous plants.

COMMON EAGLE NESTING TREES



American sycamore



Eastern cottonwood