



Colorado Parks and Wildlife Raptor Monitoring Volunteer Program Handbook

Public Version

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American Kestrel mobbing a Red-Tailed Hawk – Photo by Larry Glass at Chatfield State Park

This handbook is for use by Colorado Parks & Wildlife Staff, Interpreters, and Volunteers.

This is the public version of the handbook. Once accepted as a volunteer in the raptor monitoring program, please contact the Resource Stewardship staff for additional information at DNR_CPWResourceStewardship@state.co.us.

For more information on any part of this document, or to obtain a copy, please contact:

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Please remit copies of all data sheets, completed field forms, and other data related information to the above address.

If there are any general questions or comments please contact the Seasonal Resource Stewardship Technician:

DNR_CPWResourceStewardship@State.CO.US

303-291-7282

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How to Use this Guide

This Handbook is intended to help State Parks in implementing a raptor monitoring citizen science program. The guide provides a brief description of the methods to be used, and then provides background information, species descriptions, and copies of blank data sheets and forms to be used in the surveys. As data is gathered, the Handbook will also become a reference for the monitoring program.

State Parks staff should keep the master copy of this handbook in the Park office. When new data is gathered by volunteers or staff, the volunteer or staff member should enter the data into the Resource Stewardship Program's electronic data format as soon as possible. Copies of the data sheets should then be filed or given to their Park's raptor monitoring coordinator or park office. The easiest way to file field data forms is to punch holes in them and include them in the back of this manual after the data is entered.

Important Handbook Pages

Raptor monitoring volunteers should read the entire handbook, as it provides critical information for proper monitoring in parks. However, there are some pages that are important and used frequently while monitoring that are highlighted below.

- Nest monitoring protocols – page 9
- Non-nesting monitoring protocols – page 10
- Nesting timetable by species – page 18
- Observation distances and recurrence of observations – page 19

Purpose and Process

The mission of the Resource Stewardship Program is to promote sustainable outdoor recreation settings while improving and sustaining the ecological, scenic, and scientific assets in and around State Park lands. The Resource Stewardship Program is devoted to assisting park staff by performing resource inventories, advising on planning processes, and providing appropriate tools to effectively conserve and manage the natural and cultural resources in and around State Parks.

Raptor monitoring gives useful tools to land managers to assist in stewardship and management decision making for public lands. Raptors are a *keystone predator* – a species that is a main consumer and population control of prey species within a system. Raptors are carnivores, and their food base is comprised of fish, mammals, reptiles, insects and other birds. A lack of or decline in raptor population is often a reflection of a lack or decline of prey species. Therefore, top-level carnivores provide insights into the health and functioning of small animal populations within a natural system.

Some raptors have specific breeding and nesting habitat needs and their use or lack of use of these habitats can lend information about the functioning of the larger system. We can learn about pieces of the ecosystem puzzle through observations of presence and success of these species in Parks. The absence of sensitive raptor species in traditionally used areas may be a reflection of that habitat experiencing an excess of disturbance.

As an example, Bald Eagles (along with many raptors) are a raptor that is a good *indicator species* – species whose population decline indicates poor ecosystem health. Bald Eagles need fish and small mammals for forage. If the populations of fish and small mammals are low or start to decline, the birds' population will decline as well due to lack of food *indicating* a change in the ecosystem.

Another important indicator species is Northern Harrier (formerly called a Marsh Hawk). Harriers build their nests on the ground in marshy areas, so their presence (especially nesting presence) indicates a healthy, robust marsh. A marsh, in turn, is a biological community type that is especially sensitive to pollution and disturbance (an *indicator community*). Marshes also provide water filtration and other essential functions to an ecosystem. So the presence of a Harrier nest suggests a healthy surrounding ecosystem. Harriers are ground-nesters and their nest presence indicates of a low level of disturbance in a Park (such as human-related impacts like invasive species or pets). The presence of Northern Harriers indicates good health in the components of the Park's marsh ecosystem.

The functioning of the Park ecosystems is dependent on raptors. By monitoring the presence of birds and nests, a clearer picture is drawn of the overall functioning and health of the system. Raptor monitoring data helps biologists make suggestions about how to promote healthy system functioning. Besides these invaluable benefits, raptors are charismatic creatures that are relatively easy to watch and a lot of fun to monitor! Raptor monitoring is a great way to learn about the ecosystems of a park and get volunteers involved in citizen science and public land stewardship in a meaningful way.

Starting a New Volunteer Monitor

The general process works like this:

1. Volunteers contact Park Resource Stewardship staff about a park that they are interested in monitoring DNR_CPWresourcestewardship@State.CO.US or call (303) 291-7282.
2. If the park the volunteer is interested in has a monitoring program, it is often possible for the new volunteer to join an existing volunteer raptor monitoring team.
3. If that park does not have an active program, Resource Stewardship staff will set up the monitoring program for the park, facilitate a meeting between the volunteer and the Park staff, and train the monitor on the ground on locations of known nests and winter monitoring points. The volunteer observes raptors over the winter and determines if the number and location of observation points are suitable for making good observations.
4. The volunteer determines parking and entry issues with the Park manager.
5. Volunteers determine potential nest and roost sites by considering nesting habitat needs of species, structures, topography, forests & trees, and raptor behavior. Volunteers then map observed nest locations on paper or with a GPS. Stewardship staff can assist with locating raptor nests.
6. The volunteer meets with Park Stewardship staff and Stewardship staff will amend or create GIS theme maps of the winter observation points and of all known nest and roost locations.

7. The Parks Stewardship staff distributes maps, protocols and survey datasheets to volunteers and Park staff.
8. The volunteer continues non-nesting monitoring, then transitions to nest monitoring in zones with nests as the raptors begin to nest (February to March) or as nests begin to be used or located. Nest monitoring requires using recommended buffers (p. 27), official survey datasheets, data entry into an electronic data form, and regular correspondence with Resource Stewardship staff. Generally correspondence involves data entry into electronic data forms every 2 weeks. Direct emails are always appreciated with news of unique, fun, or special observations. Nest monitoring continues into September or when nests and their occupants are no longer active.
9. At the end of the nest monitoring season, the volunteer reports overall nest success and any unsuccessful nests to the Park Stewardship staff. Stewardship staff updates the GIS nest coverage with any new nest locations.
10. As nesting activity ends, zones that no longer contain active nests are monitored from the set observation point following non-nesting monitoring protocols.

References to Use With This Guide

(listed in order of importance based on subjective determination and field use of the program manager)

For the Field:

Sibley, D.A., 2003. "The Sibley Field Guide to Birds of Western Birds of North America" Knopf (New York, NY) 545 pp.

Ligouri, J., 2005. "Hawks from Every Angle. How to Identify Raptors in Flight". Princeton University Press. 129 pp.

Crossley, R, J. Ligouri, and B. Sullivan, 2013. "The Crossley ID Guide: Raptors". Princeton University Press. 286 pp.

Supplements to Above Field Guides:

National Geographic Society, 2002. "National Geographic Field Guide to the Birds of North America, 4th Edition" (Washington, D.C.) 480 pp.

Peterson, Roger Tory, 1998. "A Field Guide to Western Birds: A Completely New Guide to Field Marks of All Species Found in North America West of the 100th Meridian and North of Mexico, Third Edition"

For Advanced Birding:

Dunne, P., Sibley, D.A., Sutton, C., 1988. "Hawks in Flight". Houghton Mifflin Company. 254 pp.

Wickersham, L.E., 2016. "The Second Colorado Breeding Bird Atlas" Colorado Bird Atlas Partnership (Denver, CO). 727 pp.

Alderfer, J. & Dunn, J., 2006. "National Geographic. Complete Birds of North America. Companion to the National Geographic Field Guide to the Birds of North America". National Geographic Society. 664 pp.

Dunn, P. & K. Karlson. 2016. "Birds of Prey: Hawks, Eagles, Falcons, and Vultures of North America." Houghton Mifflin Harcourt. 305 pp.

Protocols

A. Monitoring Tips

Raptor nest monitors contribute directly to the preservation of birds of prey in Colorado. By identifying nest sites, monitoring them for disturbance, and observing the behavior of nesting birds, nest monitors provide valuable information to land managers. However, nest monitoring can be tedious and sometimes frustrating. The tips, below, are meant to make the experience more constructive and less stressful both for you and for the nesting raptors you observe.

1. Birds are generally most active in the morning so make every attempt to perform monitoring activities as early as possible and conclude before noon. Raptors can also be more active as the day warms and when thermals form.
2. Locate observation points outside the recommended buffer area distances (Handbook p. 19). Use the same observation point each time; do not move around. This will enable the nesting raptors to habituate to your presence.
3. Keep a low profile by sitting or lying down while observing. Birds estimate distances and the degree of threat by assessing the height of human profiles. Avoid making any loud noises.
4. If the birds show signs of distress due to your presence, leave the area immediately. You may need to choose a new observation point or extend the buffer distance for that particular nest.
5. Always carry the following equipment: binoculars and/or a spotting scope, field data forms & pencil or phone with the database application, water, rain gear, matches, a first-aid kit, a topographic map, a notebook, a bird field guide, and a whistle or cell phone to call for help in an emergency.
6. Keep group sizes low, preferably to 5 people or less. Large groups will alert raptors to your presence and prevent them from behaving normally. If monitoring occurs along a busy road, you must limit groups to one carload for safety.
7. Write down everything of interest you observe, and **always submit a report form, even if you don't observe any raptors**. Sometimes the absence of a nest or of nesting behavior is just as important to know about as the presence of a nest.
8. Become familiar with the species you are assigned to observe by consulting some of the books on the list of references preceding this list of tips and by reading the species descriptions near the end of this field manual. All of the recommended books and articles should be available at any research library; or they can be ordered from any public library through interlibrary loan. There is a list of potential species for your park near the end of this handbook.

Enjoy the experience, and don't worry about missing things. Often the things we are searching for are the last things we see, and the things we see by accident are the most interesting.

SAFETY CONCERNS

1. Monitor with someone else and/or let someone else know of your monitoring plans so they may alert the relevant parties in case of an accident. Inform your park management of your monitoring schedule. Always notify Park Managers in advance if you will be going off trail.
2. Be aware of mountain lion and bear activity in areas of monitoring. Avoid encounters and, if these species are present, be aware of protocol on encounters. Do not run or turn your back. Talk calmly, but firmly while appearing as large as you can by raising your arms, opening your jacket, etc. Back away slowly and avoid eye contact with bear encounters. Maintain eye contact if you encounter a mountain lion. Fight back in the rare instance of an attack.

B. Monitoring Ethics

Volunteers must make all efforts to limit disturbance to nesting raptors and other wildlife. Monitor nests from outside of the buffer distances given on p. 28. Stay behind cover or low to the ground. Do not use recorded birds calls to attract birds, this causes distress. If the birds show signs of distress due to your presence, leave the area immediately. Signs of distress include vigorous tail pumping, long absences from nest, erratic flights, and distress calls. You may need to choose a new observation point or extend the buffer distance for that particular nest.

If you observe park visitors viewing or photographing a nest from within the buffer distance, you are welcome to politely inform the person of recommended buffer distances and/or provide them with a CPW Guidelines for Wildlife Viewing and Photography card (available from park or Resource Stewardship staff). Violations of park rules, such as dogs off leash or walking off trail, can be reported to park staff. Any concerns about general park use or park management should be communicated to Resource Stewardship staff, who will work with park management to address concerns.

Volunteers in the State Parks Raptor Monitoring Volunteer Program have knowledge of nesting locations for many sensitive and protected species. Nesting activity and locations are not to be shared with anyone outside CPW or the Monitoring Program. Sightings of raptors, especially of nesting raptors, may not be shared on websites, list serves, Ebird, social media (except on the CPW Raptor Monitoring Program Facebook group) or any other public format.

C. State Parks Monitoring Protocols

There are two main components to the State Parks Raptor Monitoring Volunteer Program. One is to identify and document raptor nests. The presence of nesting birds indicates a great deal about the healthy functioning of the Park ecosystem, and if nests are documented they can provide an excellent way to chart change over time by returning to the same place over a span of years. This information is critical to be able to evaluate the overall functioning of the local systems.

The second component is recording the raptors observed in the park. By documenting observations of non-nesting raptors, each Park can create a better overall picture of the raptors that use the area for nesting, forage and habitat, and add to the greater understanding of the Park's ecosystems.

Other components of the monitoring scheme is nocturnal owl monitoring. Owl species that can be observed during the day (like Burrowing Owl and Great-horned Owl) should be included in the general raptor surveys. Owls that can only be observed at night should only be monitored through consultation with the Resource Stewardship Program and where expertise and resources allow. Information is included on how to set up an owl monitoring program, and can be customized depending on Park needs and specific species. However, owl monitoring is not considered a main component of the State Parks Raptor Monitoring Program due to lack of resources, nighttime work, and a higher level of expertise needed to perform this type of monitoring.

I. Nest Monitoring

Refer to the nesting schedule of species (see p. 18) and the park's species lists to create a timeline strategy for identifying raptor nests. Coordinate several surveys based on the times of year that the bird should be nesting. Plan to step up the level of monitoring around the time when the most birds nest at one time (this time will normally be between late February and late August p. 30). Identify volunteers for monitoring, and try to assemble a volunteer crew before the season starts. Throughout the nesting season, plan to have people out monitoring active nests once every two weeks. Inactive nests should be monitored every two weeks until June 1; after June 1 monitoring of inactive nests should continue at least once a month to ensure that nesting activity and late-season nesters (ie: Swainson's hawk) are not missed.

Data for all nests, active and inactive, should be recorded into the Raptor Online Database. While monitoring nests, also document any non-nesting raptor behavior observed. When nests are found at the beginning of the season, document nest use and location carefully and plan a monitoring schedule for the rest of the species' nesting season. Time for nest observations for each species can be found in the **Observation Details** table (p. 19). DO NOT monitor for less than 30 minutes.

It is best to be as consistent as possible with monitoring; try to go out at the same time of day each week, and if possible, in similar weather conditions. Since this is not always possible, document the weather conditions and time of day of the observance on the field forms. The influence of human activity on nesting raptors is of interest to the Resource Stewardship staff. If volunteers have the ability to monitor on a weekend and weekday once every two weeks, make this clear to Stewardship staff so that we may manage the data appropriately. If more than one volunteer is monitoring at a park, please ensure that all volunteers are following the protocols outlined in this handbook.

The Monitoring Process for Volunteers or Staff

- ◆ Search for nests during winter months and into the nesting season. Return to monitor new nests and previous years' nests where they exist. Gather nest information from

volunteers as they return from monitoring trips. When new nests are found, communicate locations to other volunteers and the Resource Stewardship staff so that the new nest is consistently monitored.

- ◆ Record locations of nests with GPS units and report new nest locations to the Resource Stewardship staff so they can update nests. Print out updated maps for future reference and monitoring work. Determining exact locations of nests with GPS is not possible until after the use of the nest is completed. Until then, draw an approximate location on your park's nest map (or you can also find an approximate location using google maps, latlong.net and or by using the Avenza smart phone app). Send copies of the new nest location data to Resource Stewardship staff in Denver ASAP. Stewardship staff will create new nest monitoring maps based upon the latest information. For detailed information on how to collect GPS data and conform to current Parks standards, contact the Resource Stewardship email (see contact information on page 2).
- ◆ Fill out field data sheets entirely (see Section C). After monitoring, use a computer to enter the data into the Resource Stewardship electronic data entry format (see protocol for completing data entry, Section D). Alternatively, you can use the Zoho smart phone app to enter data directly into the database while in the field.
- ◆ Review the collected data (GPS and written) to evaluate what information was recorded and whether additional work is immediately needed at the site(s) visited. Enter data into the Zoho database.

II. Non-Nesting Monitoring (Observation Points)

Outside of nesting season, volunteers will monitor from set observation points, normally from late September to mid February. During nesting season, only those observation zones that do not contain known nests will be monitored from the non-nesting observation points. After nesting ends at your park, switch back to non-nesting protocol in zones with nests in August or September, when fledglings are no longer seen perched near the nest. Monitor from the zone observation points twice per month.

Creating Zone Observation Points: the Resource Stewardship team will create a draft of non-nesting season monitoring zones with observation points for each zone. These locations will be created to cover the most area of the park and consider ease of monitoring. Zones will be created in order to try to get a good range of habitat types in the routes. Visit each zone's observation point once every two weeks. It is a good idea to only count raptors within at most a ½ mile of each observation point or the distance that identification is easily confirmed. The Park Stewardship staff can help delineate these visual boundaries. Monitor each point for raptors for 5-10 minutes total. If the Observation Zones or the observation points within the zone do not accurately reflect what is able to be seen from each point or if there are better locations to view the zone from, contact the Resource Stewardship Program and discuss edits to the zone monitoring.

If the established observation points are difficult to reach in the winter due to icy road or trail conditions, new points can be established. Try to regularly visit certain observation points in the

park (you could use the nest sites from the summer). Name the observation points for quick reference and ease of note-taking in the field.

For example:

SITE CODE:	DATE:	SPECIES:	IMM	M	F	Unknown	BEHAVIOR:	SPECIFIC LOCATION:
BAR003	2/10/05	Red-tailed Hawk					2 Perched	Tree W of road

You can also edit observation points yourself. Record the locations of new observation points with a GPS receiver or locate them with Latlong.net. Send copies of the GPS coordinates to Resource Stewardship staff in Denver. The Stewardship staff will update these maps. For detailed information on how to collect GPS data and conform to current Parks standards, contact the Resource Stewardship staff (see contact information on page 2).

Once you have your zones and observation points and they are confirmed with Stewardship and Park staff, then stick to them! These are the locations you should use year after year to conduct monitoring. If you change a location for some reason, make sure there's a strong reason behind it and let the Parks Stewardship team know as soon as possible. Aim for trying to replicate the same observation conditions (place, time of day, time of year, etc.) over time.

Process for Volunteers or Staff

- ◆ Visit each zone and stop at the predetermined points (use landmarks, Avenza PDF Maps app, or refer to the points on the map). Observations may be made up to 50 ft. from the predetermined point. It may be helpful to move around a bit to avoid obstacles in the view shed. But, this is a sampling protocol based on point locations; please try not to go beyond 50 ft.!
- ◆ Scan the horizon and sky for *five* minutes (be consistent with this). If you see any raptors, watch them and record their behavior. Record on the field form the raptor species and behavior, where you saw it, and what it was doing. Pay special attention to raptors exhibiting breeding behavior – such as flying in a pair, carrying nesting material, or carrying food – as this will assist you in locating active nests. Record the length of time your observation on the data sheet.
- ◆ If you don't see any raptors right off, keep scanning for the full ten minutes and then press on. If you can't identify a bird, record as many details as you can about it and make a note to look it up back at the office. Note on the form that you monitored at the point, even if you didn't see any birds. Observations for non-raptor species can be entered in iNaturalist under the project State Parks NatureFinder or in EBird.
- ◆ If you see raptors outside of the 5-10 minute observation time or between monitoring points, information should still be entered on the field data sheets. These observations should be included as observations within the observation zone and distinguished from observation point observations by making a notation in the comments box.

Immediately enter data from field data sheets into the Resource Stewardship database on Zoho

III. Owl Monitoring (Nocturnal Species)

Tips for Finding Owls

- ◆ If recording locations of owl nests (great horned owl most of the time) during daylight hours, use the raptor protocol above.
- ◆ **If you want to do night-time surveys with hooting or playbacks, you must coordinate with the Resource Stewardship staff because you may need a permit from Colorado Parks & Wildlife.**
- ◆ Refer to your park's species list at the end of this handbook. In the Rocky Mountains, the number of breeding species varies from two in most high-altitude spruce-fir forests to five or six in most foothills mixed coniferous/deciduous forests.
- ◆ Learn the common territorial calls of local owls. Each species uses one or two characteristic vocalizations to advertise its nesting territory to potential mates and potential rivals.
- ◆ Unlike owls in the movies, real owls don't hoot incessantly once the sun goes down. Some small owls, including northern pygmy-owls and flammulated owls, call actively for only a few weeks as they establish their nesting territories. These bite-sized raptors can't afford to advertise perch locations to potential predators, including larger owls and hawks.
- ◆ Become familiar with other vocalizations. In addition to their distinctive territorial calls, the majority of owls possess a bewildering repertoire of hisses, squeals, whistles, rasps, and screams. These sounds tend to "overlap" from one species to another, confounding identification efforts. Several excellent recordings, including the *Peterson Field Guide to Western Bird Songs*, and the Cornell Laboratory's *Voices of New World Owls*, feature an assortment of owl calls.
- ◆ Go hiking at dawn or dusk. Most owls are active, and call most often, during the twilight (crepuscular) hours.
- ◆ Look and listen for songbirds "mobbing" owls. Jays and other songbirds often harass owls, hoping to drive them away. Jays make a loud rasping sound when mobbing an owl.
- ◆ Look for owl pellets and excrement at the base of potential nest and roost trees. All owls regurgitate oblong pellets of indigestible bones and fur. Once you've heard an owl calling at night, you can return to the area during daylight hours to search the ground for pellets.
- ◆ Camp out in late winter, early spring, or fall. If you camp out at low to middle elevations during the peak calling period for most owls (roughly January-May), you're likely to hear an owl or two during the night.
- ◆ Use recorded playbacks sparingly, if at all. Recordings should be used under the supervision of CPW staff only. Play recordings softly and never for more than a few minutes in one location. Even minor disturbances lessen the owls' chances of survival. Approaching a nest or playing a territorial call stimulates nesting owls to divert precious energy into repelling the perceived intruder.

IV. Bald Eagle Winter Night Roost Monitoring

At parks with wintering Bald Eagles CPW would like to monitor night winter roosts. Unlike most raptors, wintering bald eagles often congregate in secluded stands of trees to roost at night. Roosts can be found in a variety of tree types, but are characteristically protected from the prevailing winds and disturbance. Stands may include groups of trees in the bottoms of narrow drainages, on leeward slopes, in open country, and groups screened from the wind and other inclement weather.

Roosts generally are secluded from regular human activities. In Colorado, roosts are often associated with wetlands and riparian vegetation, but some roosts occur away from water bodies. Eagles will readily use both deciduous (particular cottonwood) and mature coniferous trees for roosting. Groves of roost trees usually consist of large trees with open branching structures that provide flight paths into the tree and large, horizontal branches for perching. Although perching locations may move within the grove due to changes in prevailing wind and other weather, usually those that have the largest diameter and are the tallest generally receive most of the use.

Roost groves size is highly variable, ranging from 1 to 30 acres. Frequently, several roosts may exist within a general eagle wintering area, with eagles shifting among roosts as dictated by weather or prey availability. During very mild winter weather, eagles may not use communal roosts and may stay at diurnal perches.

The number of roosting eagles may fluctuate throughout the winter depending on weather conditions, availability of prey in the vicinity (e.g. presence of open water, waterfowl concentrations, prairie dog colonies, or areas with carrion available), and other reasons. Generally, eagles arrive at the roost throughout the afternoon, with the majority arriving just before dark, with a substantial amount of displacement and movement occurring as dusk falls and the eagles arrange themselves for the night. Eagles will begin leaving the roost for foraging areas in the morning, frequently before sunrise. Foraging areas may be as far as 15 or more miles from the roost location, but are usually within 2-3 miles. Some individuals may remain at the roost throughout the day; others that have become satiated at nearby feeding areas may arrive back at the roost fairly early in the afternoon.

Wintering eagles generally begin using communal roosts in late November or early December, and begin leaving the state in early March. The highest number of birds generally occurs in February and early March as they prepare to return to their breeding areas.

Process for Volunteers or Staff

- ◆ Surveys should occur at regular intervals with a frequency of every 1 to 2 weeks with a minimum of 8 surveys during this period. At least half, but not all, of the surveys should be dusk observations. Observations should not be conducted during inclement weather, e.g., fog, snow, rain, or high wind.
- ◆ Observations can be conducted at dawn or dusk. Generally, dusk observations are more reliable as eagles are visible at the roost longer in better lighting, fog is less likely, and

better counts are possible. Also, dusk observations allow observers to judge weather patterns before departure and reschedule if necessary. Dawn observations should begin at least 30 minutes prior to sunrise, and continue until at 30 minutes after sunrise. Dusk observations should begin at least 30 minutes before sunset, and continue at least 30 minutes after sunset. Note that sunrise and sunset change drastically throughout the winter.

- ◆ Observations points should be located at least ¼ mile from any potential roost. If possible, stay within a vehicle, or use a blind, to lessen the possibility of disturbance to the roost. Spotting scopes are very helpful for roost observation. The point should be located to provide a good view of the flight paths to and from the potential roost area. Generally, the best counts are of birds arriving or departing a roost, not of birds actually perched at the roost as perched birds are often hidden by vegetation, and movement of birds within the roost can lead to confusion in counting the total number of individuals. The observation point should be located so that the rising or setting sun is not opposite the roost from the observation point, and, if possible, on the leeward side of the roost. Identification of new roosts can be done by following birds located on foraging grounds during the day back to their night roost. However, this method can be difficult depending on terrain and road coverage in the area.
- ◆ Data sheets will be provided by Resource Stewardship and at a minimum the following information should be collected during all roost surveys and observations:
 - +Date
 - +Observer
 - +Start and end time of observation
 - +Weather (temperature, wind speed, cloud cover)
 - +Maximum number of eagles observed
- ◆ The location of the observation point and roost should be indicated on a map, and a photo of the roost grove and prominent eagle use areas should be maintained. As the winter progresses, please take the time to mark the location of active prairie dog towns in the vicinity of your roost. There is a strong association between bald eagle occurrence and prairie dog towns. This information will help the park keep updated on active prairie dog sites. Also, if possible, photograph the observation site and the roost site.
- ◆ Other information that can be collected includes number of eagles seen in each age-class, direction of flight to or from the roost, and other raptor species observed (e.g. red-tailed hawk, rough-legged hawk, ferruginous hawk, golden eagle).
- ◆ Other Considerations
A decent pair of optics is necessary to help in identifying and aging any eagles observed. Spotting scopes may be useful, but often are difficult to use during the time of day that observations should occur. Keep in mind that although roosts normally only have bald eagles, occasionally golden eagles and other raptors may fly in or out of the roost during the observation. Know how to identify bald eagles from other raptors you may see, as well as be able to identify the different age-classes of bald eagles. You should, at minimum, learn to be able to delineate three age classes: juvenile, immature/sub-adult, and adult.

This protocol was developed based on past protocols used by the former Division of Wildlife's Volunteer Roost Observation Program, personal experience, and guidelines recommended in literature which is listed at the end of this handbook.

Field Forms and Data Entry

C. Non-Nesting and Nest Monitoring Forms

Raptor Non-Nesting Monitoring Field Data Sheet

NON-NESTING OBSERVATION FIELD SHEET

Date: _____ Observer(s): _____

Temperature: _____ °F **Wind:** Calm Light Moderate High Winds (20mph+) Variable

Sky: Clear Pt. Cloudy Overcast Rain Snow Fog **Equipment:** Binoculars Scope Both Visual Observation

Observation Zone Code: _____ **Time Start:** _____ **Time End:** _____

Disturbance: None Low Moderate High **Source:** N/A Human Dog Wildlife Motorized Vehicle Non-motorized Vehicle Other **Disturbance Comments:** _____

Most Sig. Behavior: Calling Copulation Courting Disturbed/flushed Eating Feeding Young Flying
Hunting Nesting Activity On Ground On Ice Perched Territorial No Raptor Species Present

Species	#Imm	#M	#F	#Unknown	#Total	Behavior (Use Options Above)	Location

Comments: _____

Raptor Nest Monitoring Field Data Sheet

NEST MONITORING FIELD SHEET

Date: _____ Observer(s): _____

Temperature: _____ °F Wind: Calm Light Moderate High Winds (20mph+) Variable

Sky: Clear Pt. Cloudy Overcast Rain Snow Fog Equipment: Binoculars Scope Both Visual Observation

Raptor Species: _____

Is this a new nest? Yes or No Nest Code: _____ Time Start: _____ Time End: _____

Disturbance: None Low Moderate High Source: N/A Human Dog Wildlife Motorized Vehicle Non-motorized Vehicle Other Disturbance Comments: _____

Most Sig. Behavior: Calling Copulation Courting Disturbed/flushed Eating Feeding Young Flying Hunting Nesting Activity On Ground On Ice Perched Territorial No Raptor Species Present

Nest Status: Active Inactive Nest Substrate: Cliff Ground Man-made Structure Tree _____

Nest Activity (significance highest to lowest): 1) Fledglings 2) Observed 3) Presumed Fledged/Nesting Complete
 4) Nestlings Observed 5) Nestlings are Calling 6) Eating 7) Feeding Young 8) Food Exchange (Adults)
 9) Abandoned (Active This Year) 10) Incubation 11) Nest Building 12) Perched Pair 13) Territory Defense
 14) Destroyed 15) Substrate and Nest Destroyed 16) Unverified 17) No Nest Activity Observed

# Males	# Females	# Adult Unknown	# Nestlings	# Fledglings	Total # Observed

Comments: _____

Appendices

A. Nesting Schedule, Buffer Distances, and Observation Durations of Species

When to look for nests and nesting activity; there is no need to pursue nest monitoring if no nests are located within the first months of the nesting season, (unless you are visiting sites previously not visited). Bird species are listed by common name

Table 1. Breeding seasons for each species

X = Nesting activity occurs, known and former nests should be observed

C = Courtship occurs, make notes of behavior and follow pairs to locate nests

Species	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
American Kestrel			C	C	X	X	X					
Bald Eagle	C	C	X	X	X	X	X					
Boreal Owl		C	C	C	X	X	X					
Burrowing Owl			C	C	X	X	X	X	X			
Common Barn Owl			C	X	X	X	X	X	X			
Cooper's Hawk			C	C	X	X	X					
E. Screech Owl			C	X	X	X	X					
Ferruginous Hawk				X	X	X	X					
Flammulated Owl				C	X	X	X	X				
Golden Eagle	C	X	X	X	X	X	X					
Great Horned Owl	C	X	X	X	X	X	X					C
Long-eared Owl		C	X	X	X	X	X					
Mississippi Kite					X	X	X	X				
Northern Goshawk				C	X	X	X	X				
Northern Harrier				X	X	X	X	X				
N. Pygmy Owl				X	X	X	X	X				
N. Saw-whet Owl			C	C	X	X	X					
Osprey				X	X	X	X	X	X			
Peregrine Falcon				X	X	X	X					
Prairie Falcon				X	X	X	X					
Red-tailed Hawk			C	X	X	X	X					
Sharp-shinned Hawk			C	C	X	X	X					
Short-eared Owl		C	C	X	X	X	X					
Spotted Owl		C	X	X	X	X						
Swainson's Hawk				X	X	X	X	X				
Turkey Vulture			X	X	X	X						
W. Screech Owl			C	X	X	X	X					

Table 2. Site fidelity and nesting duration for each species. Note than many fledglings remain near the nest and depend on parents for 1-3 months.

Nest Fidelity:

H = high

M = medium

L = low

Species	Territory Fidelity	Nest Fidelity	Incubation Time (days)	Time to Fledge (days)
American Kestrel	Y	M	26-32	27-31
Bald Eagle	Y	H	34-38	70-84
Boreal Owl	Y	M	26-32	28-36
Burrowing Owl	Y	H	27-30	40-45
Common Barn Owl	Y	H	26-32	56-62
Cooper's Hawk	Y	L	30	27-30
E. Screech Owl	Y		27-34	28
Ferruginous Hawk	Y	M	30-34	38-50
Flammulated Owl	Y	H	21-24	
Golden Eagle	Y	M	41-45	72-84
Great Horned Owl	Y	L	32-35	45
Long-eared Owl		L	25-35	30-40
Mississippi Kite	Y	L	29-32	25-30
Northern Goshawk	Y	L	30-35	35-42
Northern Harrier	Y	L	29-31	30-40
N. Pygmy Owl			28	23
N. Saw-whet Owl		L	27-29	
Osprey	Y	H	34-40	50-60
Peregrine Falcon	Y	H	30	35-42
Prairie Falcon	Y	H	30	40
Red-tailed Hawk	Y	H	28-32	44-46
Sharp-shinned Hawk	Y	L	30	21-27
Short-eared Owl		L	24-29	27
Spotted Owl	Y		28-32	32-36
Swainson's Hawk	Y	H	33-36	38-46
Turkey Vulture	Y		28-40	70-80
W. Screech Owl		H	26-34	

Table 3. Recommended buffer distance and observation frequency by species.

Duration Notes: Observe nests until you can determine the nesting status for that visit (a minimum of 30 minutes). When the nest type, location, or surrounding foliage makes it difficult to view the contents of the nest it may be necessary to observe for an hour or more to confirm the status of the nest (through observations of: nest exchange, incubating adult changing position, chicks standing up in nest, or prey exchange, etc.). Leave the area if agitated behavior is observed.

Species	Code	Buffer (m)	Observation Recurrence	Observation Duration
American Kestrel	AMKE	50	2 weeks	30 min – 1 hr
Bald Eagle	BAEA	800	2 weeks	2-3 hrs
Boreal Owl	BOOW	400	1-2 weeks	30 min – 1 hr
Burrowing Owl	BUOW	50	2 weeks	30 min – 1 hr
Common Barn Owl	BANO	200	1-2 weeks	30 min – 1 hr
Cooper's Hawk	COHA	200	2-3 weeks	30 min – 1 hr
E. Screech-Owl	EASO	200	1-2 weeks	30 min – 1 hr
Ferruginous Hawk	FEHA	800	2 weeks	30 min – 1 hr
Flammulated Owl	FLOW	400	1-2 weeks	30 min – 1 hr
Golden Eagle	GOEA	800	2 weeks	2-3 hrs
Great Horned Owl	GHOW	100	2-3 weeks	30 min – 1 hr
Long-eared Owl	LEOW	200	1-2 weeks	30 min – 1 hr
Mississippi Kite	MIKI	400	2 weeks	30 min – 1 hr
Northern Goshawk	NOGO	800	2-3 weeks	30 min – 1 hr
Northern Harrier	NOHA	400	2 weeks	2-3 hrs
N. Pygmy Owl	NOPO	400	1-2 weeks	30 min – 1 hr
N. Saw-whet Owl	NSWO	400	1-2 weeks	30 min – 1 hr
Osprey	OSPR	400	2 weeks	1-2 hrs
Peregrine Falcon	PEFA	800	1 week	2-3 hrs
Prairie Falcon	PRFA	800	1 week	2-3 hrs
Red-tailed Hawk	RTHA	600	2 weeks	30 min – 1 hr
Sharp-shinned Hawk	SSHA	200	2-3 weeks	30 min – 1 hr
Short-eared Owl	SEOW	500	1-2 weeks	1-2 hrs
Spotted Owl	SPOW	800	1-2 weeks	30 min – 1 hr
Swainson's Hawk	SWHA	400	2 weeks	30 min – 1 hr
Turkey Vulture	TUVU	800	2 weeks	1-2 hrs
W. Screech-Owl	WESO	200	1-2 weeks	30 min – 1 hr

B. Breeding Bird Atlas Priority Blocks

The Breeding Bird Atlas priority blocks and the corresponding parks in the Quad's vicinity are listed below. Park staff should be aware of their priority, and consult the Atlas for more information.

***Most or all of park lies within a Colorado Breeding Bird Atlas priority block (southeastern one-sixth of topographic map).**

<u>Quad No.</u>	<u>Quad Name</u>	<u>State Park</u>
3610783/84	Bancos Mesa (NM)	Navajo
3710425	Trinidad West*	Trinidad Lake
3710457/67	Walsenburg S/N	Lathrop
3710566	Medano North	San Luis Lakes
3810467	Cheyenne Mountain	Cheyenne Mountain
3810783	Paonia Reservoir	Paonia
3810436/37	NW Pueblo/Swallows*	Pueblo Lake
3810584/85	Elevenmile/Spinney	Eleven Mile/Spinney Mt.
3810726/27	Dallas/Ridgeway	Ridgeway
3810765	Crawford	Crawford
3810861	Delta	Sweitzer
3910252	Bonny Reservoir South	Bonny Reservoir
3910437	Castle Rock South	Castlewood Canyon
3910467/68	Fitzsimons/Englewood	Cherry Creek
3910487	Brighton	Barr Lake
3910541	Kassler	Roxborough
3910551	Littleton	Chatfield
3910574	Black Hawk	Golden Gate Canyon
3910583	Eldorado Springs	Eldorado Canyon
3910646	Crooked Creek Pass	Sylvan Lake
3910727	Vega Reservoir	Vega
3910756	Silt	Harvey Gap
3910766	Rifle Falls	Rifle Falls
3910767	Horse Mountain*	Rifle Gap
3910814/23	Clifton/Cameo	Colorado River
3910837	Highline Lake	Highline Lake
4010373	North Sterling Reservoir*	North Sterling Reservoir
4010441	Sunken Lake	Jackson Reservoir
4010521	Longmont*	St. Vrain State Park
4010541	Loveland*	Boyd Lake
4010552	Horsetooth Reservoir	Lory
4010568	Rawah Lakes	Colorado State Forest
4010661/71	Johnny Moore Mt/Shipman	Colorado State Forest
4010638	Oak Creek	Stagecoach
4010678	Hahn's Peak	Steamboat

C. Selected Species Descriptions

The reference list follows the species descriptions.

Eagles:

Bald Eagle
Golden Eagle

Hawks and Falcons:

Cooper's Hawk
Ferruginous Hawk
Osprey
Northern Goshawk
Northern Harrier
Peregrine Falcon
Prairie Falcon
Red-tailed Hawk
Sharp-shinned Hawk
Swainson's Hawk

Owls:

Barn Owl
Burrowing Owl
Great Horned Owl
Long-eared Owl
Short-eared Owl
Spotted Owl

EAGLES:

Bald Eagle *Haliaeetus leucocephalus*

1. Identification

Perching: Adults always have white heads and white tails. Immatures (less than five years old) have dark heads with very long beaks and mottled white on breast or under wings.

Flying: Long straight wings with exceptionally long "fingers" (outer primaries). Slow, fluid wing beats. Uniformly dark or mottled dark-and-white underwings.

2. Nesting Habitat

Large, mature cottonwoods or pines, usually in riparian areas along rivers or around large lakes or reservoirs. Most nest sites are well removed from human activity areas. Large stick nest is placed near the top of the tree. Inexperienced breeding pairs often build "winter nests" (unused for breeding) on wintering grounds prior to heading north to summer breeding areas.

3. Nesting Dates

Courtship: January to March

Incubation: late February to late May

Dependent nestlings: late April to July

Incubation period is 34-38 days. Young fledge 70-84 days after hatching and remain dependent on adults for several months after fledging.

4. Statewide Distribution and Population

More than 140 pairs currently nest in Colorado, up from fewer than 10 pairs in 1960. Highest nesting densities occur along the Yampa River, in the San Juan River basin, and in the South Platte River valley.

5. State and Federal Status

Federal – Delisted/protected under Bald and Golden Eagle Protection Act; state species of concern; Colorado State Wildlife Action Plan Tier 2 species.

6. Search and Nest Monitoring Protocol

Beginning in January, check historic and potential nest sites for activity. Visit nest sites every two weeks for 2-3 hours, supplementing on weekends to monitor nests for disturbance.

Observation points should be at least 800 m from active nests and perches/roosts.

7. Recommended Nest Buffer Area

CPW recommends a year-round closure to surface occupancy (beyond that which historically occurred in the area) within 400 m radius of nest and no human encroachment from 15 November through 31 July within 800 m of the nest.

8. References Bald Eagle

Bent, A. C. 1937; Johnsgard, P. A. 1990; Kingery, H. E., ed. 1998; Snow, C. 1973. Bald eagle; Stalmaster, K. 1987; Wickersham, L.E. 2016.

Golden Eagle

Aquila chrysaetos

1. Identification

Perching: Large, dark raptor with large beak and golden neck feathers. Immatures (less than 5 years old) have a prominent white stripe at base of tail.

Flying: Dark brown underneath. Dark tail unbanded to faintly banded. Long straight wings with long "fingers" (primaries); "lazy" soaring flight. Immatures show white tail stripe and white underwing spots at the wrists.

2. Nesting Habitat

Cliffs or trees, generally in open country. Nesting cliffs are usually sheer and often several hundred feet high. Cliffs often contain several stick nests, 3-10' wide; a single pair will move from one nest to another on the same cliff face from year to year. Active nests usually show some greenery (Douglas-fir or pine boughs). Pairs defend nesting territories of several square miles.

3. Nesting Dates

Courtship: January to May

Incubation: late February to June

Dependent nestlings: early April to mid-July

Incubation period is 41-45 days. Young fledge 72-84 days after hatching but remain dependent on parents for several months after fledging.

4. Statewide Distribution and Population

There are probably 200-500 breeding pairs in Colorado. The statewide population appears to have changed little during the past 100 years. Golden eagles nest in virtually every part of the state, with highest densities in the northern Front Range foothills and western plateaus. Nesting pairs are widely scattered across the eastern plains.

5. State and Federal Status

Federally protected under Bald and Golden Eagle Protection Act. Colorado State Wildlife Action Plan Tier 1 species.

6. Search and Nest Monitoring Protocol

Begin to search for active nests, looking for fresh greenery, in late February. Visit active nest sites for 2-3 hours every 2 weeks (supplementing on weekends to monitor nests for disturbance) until young have fledged. Observation points should be at least 800 m from nests.

7. Recommended Nest Buffer Area

CPW recommends no surface occupancy (beyond that which historically occurred in the area) within a 400 m radius of the nest site and associated alternate nests, and no human encroachment within 800 m of the nest and any alternate nests from 1 February to 15 July.

8. References Golden Eagle

Bent, A. C. 1937; Craighead, J. J., and F. C. Craighead. 1956; Johnsgard, P. A. 1990; Jollie, M. T. 1945; Kingery, H. E., ed. 1998; Snow, C. 1973. Golden eagle; True, D. 1980; Wickersham, L.E. 2016.

HAWKS AND FALCONS:

Cooper's Hawk *Accipiter cooperii*

1. Identification

Perching: Medium-sized hawk with a small head, rufous- or brown-streaked/checkered breast, and long, banded tail.

Flying: Short, rounded wings and long, banded tail (compared to Buteos). Tail is rounded off at the end (compared to more square tail of sharp-shinned), and head projects far beyond wrists when gliding.

2. Nesting Habitat

Primarily coniferous forests in the mountains between 1500 and 3200 m. They typically nest in dense conifers such as Douglas fir, but they also nest in dense stands of juniper and scrub oak, and occasionally in aspen groves and riparian woodlands.

3. Nesting Dates

Courtship: March to May

Incubation: early May to early July

Dependent nestlings: late May to late July

Incubation period for 2-6 eggs is about 30 days. An average of 2-3 young fledge 27-30 days after hatching.

4. Statewide Distribution and Population

Scattered throughout the mountains and western plateaus, possibly also plains. Highest nesting densities may occur in western valleys and Front Range foothills. The Second Colorado Breeding Bird Atlas shows an apparent eastward expansion and an increase in presence in urban areas. They are probably more common than some studies indicate, but they are secretive around the nest, which is often placed in dense foliage, where it is difficult to see.

5. Federal and State Status

Not listed.

6. Search and Nest Monitoring Protocol

Beginning in early May, search areas where individuals have been sighted. Care should be taken on identification as it is easy to confuse with Sharp-shinned hawks. Look for butcher blocks (stumps where prey has been taken apart) and pellets in areas of dense conifer growth. Once a nest has been located, visit every 2-3 weeks for no more than 20 minutes per visit. Do not approach within 200 m of active nests.

7. Recommended Nest Buffer Area

No foot traffic or recreational activity within 200 m of active nests.

8. References Cooper's Hawk

Bent, A. C. 1937; Call, M. 1978; Johnsgard, P. A. 1990; Kingery, H. E., ed. 1998; Reynolds, R. T., and H. M. Wright. 1982; Wickersham, L.E. 2016.

Ferruginous Hawk *Buteo regalis*

1. Identification

Perching: Large hawk with white breast and white or dirty orange, unbanded tail. White feathers on chin and neck, long yellow beak (gape) extending back below eye, mottled rusty, white, and brown feathers on back.

Flying: White breast and white underwings in light morph bird. Almost all birds have white or dirty orange, unbanded tails. Upper wings show prominent white "windows" at base of primaries. Rusty leggings form a prominent "V" against whitish underparts of light morph adults in flight. Tends to fly in a straight line from perch to perch. Wings are long, broad, and pointed.

2. Nesting Habitat

Prairies and shrublands, eastern plains and northwestern plateaus. They build a stick nest in a tree, on a cliff face, or on the ground. In the Pawnee National Grassland, one nest was placed in a 30-foot high cottonwood near a paved highway, while another was located 4 feet off the ground on a small chalk cliff. They prey on rabbits and large rodents, including prairie dogs and ground squirrels.

3. Nesting Dates

Courtship: April to June

Incubation: mid-April to mid-July

Dependent nestlings: mid-May to late July

Incubation period is 30-34 days. Usually 2-4 young fledge 38-50 days after hatching.

4. Statewide Distribution and Population

Highest nesting densities occur on the southeastern and northeastern plains, with small numbers nesting from the Grand Valley northward to Wyoming. Only a few thousand pairs nest in the world, primarily on the high plains and in the Great Basin. Urban development and conversion of grassland to farmland threaten populations in many areas.

5. Federal and State Status

State special concern; Colorado State Wildlife Action Plan Tier 2 species.

6. Search and Nest Monitoring Protocol

Beginning in mid-April drive a set route, stopping every 500 m to scan all potential nest trees, cliffs, and ground sites (usually hilltops or rocky areas) with binoculars. Repeat every two weeks throughout the nesting season. Monitor active nests at two-week intervals from a fixed observation point located at least 800 m from the nest.

7. Recommended Nest Buffer Area

No foot traffic or recreational activity within 800 m of active nests or perches.

8. References Ferruginous Hawk

Bent, A. C. 1937; Houston, C. S., and M. J. Bechard. 1984; Johnsgard, P. A. 1990; Kingery, H. E., ed. 1998; Olendorff, R. R. 1972; Wickersham, L.E. 2016.

Osprey

Pandion haliaetus

1. Identification

Perching: Large raptor with dark brown back, white breast, white head with prominent dark eye stripe, long beak.

Flying: Mostly white underneath with dark wing tips and dark patches at the wrists. Narrow wings with distinctive crook at the wrists give this raptor a gull-like appearance in flight. Wings are slightly arched when soaring.

2. Nesting Habitat

Near lakes on the plains or beside rivers, lakes, or beaver ponds in the mountains. They build a large stick nest in a tall tree, in a broken-topped snag, on a power pole, or on an artificial nest platform. In the mountains they frequently nest in flooded groves of trees on islands. They take readily to artificial nest platforms. Young breeding pairs have a high rate of nest failure.

3. Nesting Dates

Courtship: March to May

Incubation: early May to mid-July

Dependent nestlings: early June to late July

Incubation period is 34-40 days. Young fledge 50-60 days after hatching. Fledged young remain dependent on parents for about three months.

4. Statewide Distribution and Population

Osprey nest primarily in mountain parks and western valleys, but pairs have begun to breed on artificial platforms around prairie reservoirs along the Front Range especially between Denver and Fort Collins. The statewide population has increased from about 10 pairs in 1965 to around 100 pairs in 2000. DDT and other pesticide use in Mexico continue to affect North American nesting osprey populations.

5. State and Federal Status

Not listed. Formerly federal sensitive.

6. Search and Nest Monitoring Protocol

Beginning in mid-April, visit potential nest sites (lakes, reservoirs, and mountain marshes) every two weeks for 1-2 hours. Continue monitoring until young have fledged. Observation points should be located at least 400 m from active nests and perches.

7. Recommended Nest Buffer Area

CPW recommends no surface occupancy (beyond that which historically occurred in the area) within 400 m of the nest site and no human encroachment within 400 m of the nest site between 1 April and 31 August.

8. References Osprey

Bent, A. C. 1937; Johnsgard, P. A. 1990; Kingery, H. E., ed. 1998; Peck, G. K., and R.D. James. 1983; Swenson, J. E. 1981; Wickersham, L.E. 2016.

Northern Goshawk

Accipiter gentilis

1. Identification

Perching: Much larger than other accipiters. Adults have dark crowns, white "eyebrow" behind red eye, blue-gray backs, and white underparts with dense gray barring.

Flying: Wings are proportionately longer and tail proportionally shorter than Cooper's and sharp-shinned. But goshawks do show densely barred breast and long, banded tail typical of accipiters.

2. Nesting Habitat

Open conifer stands with large trees (often old-growth ponderosa pine), dense stands of spruce or fir, or mature aspen stands, usually between 2000 and 3200 m. No one is sure what constitutes optimal goshawk nesting habitat. In the Boulder Mountain Park they nest in 80-foot high ponderosa pines in remote north-facing canyons. In Rocky Mountain National Park pairs often nest in aspen groves near meadows. Adults are vocal and sometimes aggressive around the nest.

3. Nesting Dates

Courtship: April to May

Incubation: early May to mid-July

Dependent nestlings: early June to early August

Incubation of 2-5 eggs requires around 30-35 days, and young fledge 35-42 days after hatching.

4. Statewide Distribution and Population

They nest throughout the mountains and western plateaus, with highest nesting densities apparently occurring in the north-central mountains. They may be threatened in some areas by forest fragmentation, as they seem more sensitive than other accipiters to human disturbance.

5. Federal and State Status

Colorado State Wildlife Action Plan Tier 2 species; U.S. Forest Service and Colorado Natural Heritage Program species of concern.

6. Search and Nest Monitoring Protocol

Drive a set route beginning in mid-May, stopping every 500 m to look and listen for 10 minutes. After locating a territory, search suitable trees for nests. Visit nest sites every 2-3 weeks, observing for no more than 20 minutes at a time from a distance of at least 800 m.

7. Recommended Nest Buffer Area

No human encroachment within 800 m of active nests whenever possible.

8. References Northern Goshawk

Bent, A. C. 1937; Braun, C. E., J. H. Enderson, M. R. Fuller, Y. B. Linhart, and C. D. Marti. 1996; Call, M. 1978; Johnsgard, P. A. 1990; Kingery, H. E., ed. 1998; Reynolds, R. T., and H. M. Wright. 1982; Wickersham, L.E. 2016.

Northern Harrier (Marsh Hawk) *Circus cyaneus*

1. Identification

Perching: Slender silhouette, long, banded tail, small head with owl-like facial disk. Males gray above and white below; females brown above with heavy brown streaking on breast. Juveniles chocolate brown underneath. Perches on the ground or on low fence post in wetland or grassland.

Flying: Long slender wings held in slight dihedral; tilts from side to side while gliding low near the ground. Prominent white rump patch (when viewed from above) on both sexes.

2. Nesting Habitat

Wetlands, grasslands, and shrublands, usually below 3000 m. Nest is a platform of grass, reeds, and cattails placed on the ground and concealed by thick vegetation. One male may nest with two or more females. When not nesting, harriers roost communally on the ground. Avoid walking through areas of dense grass or cattails.

3. Nesting Dates

Courtship: late April to late June

Incubation: early May to early July

Dependent nestlings: early June to mid-July

Clutch sizes range from 3-7 eggs. Incubation period is 29-31 days. Individual young hatch over a period of 1-10 days. Young fledge 30-40 days after hatching.

4. Statewide Distribution and Population

Nests throughout eastern plains, western valleys, and mountain parks. Colorado Breeding Bird Atlas efforts indicate a scattered distribution. Populations appear to be declining in areas where habitat has been fragmented by farming and urban expansion.

5. State and Federal Status

Colorado State Wildlife Action Plan Tier 2 species.

6. Search and Nest Monitoring Protocol

Beginning mid-April, observe potential nesting habitat for 2-3 hours every two weeks (early morning or early evening optimal) from one or more fixed observation points. Note behavior of males and females. Both engage in prominent courtship flights, and males perform "food drops" over active nests. *Do not search for nests or approach within 400 m of suspected nest sites.* If nest site is active, continue observations until mid-August or until all young have fledged.

7. Recommended Nest Buffer Area

No surface occupancy, foot traffic, or recreational activity within 400 m of suspected nest sites. Permanent trails should be located at least 400 m from recent nest or roost sites.

8. References Northern Harrier

Bent, A. C. 1937; Craighead, J. J., and F. C. Craighead. 1956; Johnsgard, P. A. 1990; Kingery, H. E., ed. 1998; Rice, W. R. 1982

Peregrine Falcon

Falco peregrinus

1. Identification

Perching: Medium-sized raptor with short beak, cream to brown-colored breast and abdomen with light to heavy streaking, dark back. Head has distinctive black "helmet" and wide, dark mustache mark.

Flying: Narrow, pointed wings, rapid wing beats; no dark axillaries ("armpits") on underwings, which usually exhibit a checkered pattern of black on white.

2. Nesting Habitat

Ledges of high cliffs, usually remote areas in foothills and mountains, sometimes near wetlands. They advertise their nesting territory with a sky dance and high circling display. They vocalize frequently, making a loud screaming sound audible 1-2 km away. Nesting cliffs usually show extensive patches of whitewash. Their nest sites are not distinguishable from those of prairie falcons.

3. Nesting Dates

Courtship: late March to late May

Incubation: late April to late June

Dependent nestlings: early May to late July

Incubation of 3-4 eggs requires around 30 days. Young fledge 35-42 days after hatching.

4. Statewide Distribution and Population

Nests in western two-thirds of state, mostly in foothills and mountain valleys. Current state population is over 140 nesting pairs, up from a low of 4 nesting pairs in 1977. Highest concentrations nest in Western Slope river valleys and canyons.

5. State and Federal Status

State special concern.

6. Search and Nest Monitoring Protocol

Prior to searching, check with CPW and Bird Conservancy of the Rockies to ascertain whether there are any recent nesting reports from the target area. Beginning early April, search potential nesting habitat (cliffs) for whitewash, then observe potential nesting and perching sites for 2-3 hours every week from a fixed observation point *located at least 800 m away*. Once nesting is confirmed, monitor nests on weekends to enforce climbing and recreational closures. Continue monitoring until late July or until all young have fledged.

7. Recommended Nest Buffer Areas

CPW recommends no surface occupancy (beyond that which historically occurred in the area) or other human activity or encroachment within 800 m of the nest cliffs from 15 March to 31 July.

8. References Peregrine Falcon

Bent, A. C. 1937; Craig, G. R. 1991-94; Glinski, R. L., and S. Ambrose. 1990; Houle, Marcy Cottrell. 1991; Johnsgard, P. A. 1990; Kingery, H. E., ed. 1998; Enderson 2011; Wickersham, L.E. 2016.

Prairie Falcon
Falco mexicanus

1. Identification

Perching: Medium-sized raptor with short beak, pale brown back, white breast streaked with brown, and prominent brown "teardrop" below eye. Sexes similar in plumage.

Flying: Pointed wings, rapid wing beats, long banded tail, distinctive dark axillaries ("armpits") and dark bar on wing lining (front part of underwing).

2. Nesting Habitat

Cliffs in open country such as grasslands, deserts, and shrublands, usually below 3000 m. They lay their eggs directly onto the rock of a ledge, pothole, or crevice, or occasionally in a used hawk or eagle nest. Nest sites are prominently marked by excrement ("whitewash"), and screaming of adults is audible from 1-2 km. In the Flatirons near Boulder they typically nest in south-facing potholes; in the Pawnee Buttes, they nest on cliff ledges. Adults compete with peregrine falcons for nest sites, although these two species can nest successfully in close proximity.

3. Nesting Dates

Courtship: mid-April to early June

Incubation: late April to mid-July

Dependent nestlings: late May to late July

Clutch sizes range from 2-6 eggs. Incubation period is about 30 days; young fledge about 40 days after hatching.

4. Statewide Distribution and Population

Only about 5000 pairs nest in all of North America. About 300-500 pairs probably nest throughout Colorado, with highest nesting densities in the Front Range foothills and the north central mountains. Nesting populations have declined near urban areas, particularly in the area between Denver and Colorado Springs and from Pueblo south to New Mexico.

5. State and Federal Status

Colorado State Wildlife Action Plan Tier 2 species.

6. Search and Nest Monitoring Protocol

Beginning early April, search potential nesting habitat (cliffs) for whitewash, then observe potential nesting and perching sites for 2-3 hours every week from a fixed observation point *located at least 800 m away*. Once nesting is confirmed, monitor nests on weekends to enforce climbing and recreational closures. Continue monitoring until late July or until all young have fledged.

7. Recommended Nest Buffer Areas

CPW recommends no surface occupancy (beyond that which historically occurred in the area) within 800 m of the nest site and no human encroachment or disturbance within 800 m of the nest site from 15 March through 15 July.

8. References Prairie Falcon

Bent, A. C. 1937; Craighead, J. J., and F. C. Craighead. 1956; Enderson, J. H. 1964; Johnsgard, P. A. 1990; Kingery, H. E., ed. 1998

American Kestrel *Falco sparverius*

1. Identification

Perching: Both sexes have gray head caps, rufous backs with noticeable barring, and two black vertical lines (malar) on a white face. Males have blue-gray wings whereas females have rufous wings. They will flick their tail up and down immediately after landing.

Flying: Pointed swept-back wings. They use rapid, shallow wing-beats alternating with short long glides. They will hover with rapid wing beats and dive to catch prey.

2. Nesting Habitat

Nests in tree cavities, cliff faces, or wooden nest boxes. Nest cavities are most often found on the east side of a nest tree and most often located on east-facing slopes. Highest nesting densities probably occur in and around urban areas, where these small falcons hunt insects and small rodents. They can also be found in forests, wooded backyards, parks, cliffs, fields, and along roads. They are very vocal (high screams) around the nest.

3. Nesting Dates

Courtship: March to April

Incubation: April to May

Dependent nestlings: Late May to late July

Incubation period is 26-32 days, and the young fledge 27-31 days after hatching. Parents continue to feed fledglings for up to 12 days.

4. Statewide Distribution and Population

Common throughout Colorado, and breeding throughout most of Colorado except the high mountains and some of the plains, especially those sections devoted mainly to crops. Kestrels maintain a healthy population in Colorado.

5. State and Federal Status

Not listed.

6. Search and Nest Monitoring Protocol

Look for pairs in courtship during March and April and try to track down their potential nesting cavities. Listen for “chitter” calls for interactions between the males and females (courtship feeding, copulation, and the feeding of nestlings).

7. Recommended Nest Buffer Area

No foot traffic or recreational activity within 50 m of active nests from March 1st to August 15th.

8. References American Kestrel

Raphael, M.G. 1985; Johnsgard, P. A. 1990; Kingery, H. E., ed. 1998; Tekiela, S. 2011; Wickersham, L.E. 2016.

Red-tailed Hawk

Buteo jamaicensis

1. Identification

Perching: Extremely variable. Most light morph adult birds have red tails, white breasts with broken belly bands, and dark, square heads. Juveniles have gray, narrowly banded tails. In the adults and juveniles, folded wings usually make an indistinct "V" against brown or black back. Upright, "blocky" appearance when perched.

Flying: Dark patagial marks on the leading edge of wings, on either side of the head, are only certain identification mark (but some red-tails don't have them). Look also for red or narrowly banded tail and broken belly band. Some birds may be almost entirely white underneath, others almost entirely black.

2. Nesting Habitat

All Colorado ecosystems from the plains to the high mountains, including urban areas. They prefer open country and mosaics of wetlands, grasslands, and woods. They occasionally nest on cliffs but usually place a bulky stick nest in a tall tree or, occasionally, on a utility pole. They will use the same nest for several years in a row. Their nests are later used by great horned owls, which sometimes prey on red-tailed hawk young.

3. Nesting Dates

Courtship: March to May

Incubation: late March to late June

Dependent nestlings: late April to late July

Incubation period is 28-32 days, and the young fledge 44-46 days after hatching.

4. Statewide Distribution and Population

Common throughout Colorado. Populations are increasing near urban areas where this habitat generalist outcompetes other hawks and they appear to be expanding into the eastern plains. Highest nesting densities occur in western valleys and along Front Range urban corridor.

5. State and Federal Status

Not listed.

6. Search and Nest Monitoring Protocol

Beginning in mid-April drive a set route, stopping every 500 m to scan all potential nest trees with binoculars. Repeat every two weeks throughout the nesting season. Monitor active nests at two week intervals from a fixed observation point located at least 600 m from the nest.

7. Recommended Nest Buffer Area

No foot traffic or recreational activity within 600 m of active nests. These hawks will abandon nests if they are disturbed.

8. References Red-tailed Hawk

Bent, A. C. 1937; Houston, C. S., and M. J. Bechard. 1983; Johnsgard, P. A. 1990; Kingery, H. E., ed. 1998; Olendorff, R. R. 1972; Wickersham, L.E. 2016.

Sharp-shinned Hawk *Accipiter striatus*

1. Identification

Perching: Small hawk with a small head, streaked breast (brown or red-streaked), and long, banded tail.

Flying: Short, rounded wings and long, banded tail (compared to Buteos). Tail is squared off at the end (compared to more rounded tail of Cooper's).

2. Nesting Habitat

Primarily coniferous forests in the mountains between 1500 and 3200 m. They typically nest in dense conifers such as Douglas-fir, but they also nest in dense stands of juniper and scrub oak, and occasionally in aspen groves.

3. Nesting Dates

Courtship: March to May

Incubation: early May to early July

Dependent nestlings: early June to late July

Incubation period for 2-6 eggs is about 30 days. An average of 2-3 young fledge 21-27 days after hatching.

4. Statewide Distribution and Population

Scattered throughout the mountains and western plateaus. They are probably more common than sighting records indicate, but they are secretive around the nest, and nests are usually placed in dense foliage where they are difficult to see. Nesting populations are probably fairly stable. Howard Weinberg (unpublished study) found 8 nest sites within 6 km of Boulder, all in dense stands of Douglas-fir on north-facing slopes in the foothills.

5. Federal and State Status

Not listed.

6. Search and Nest Monitoring Protocol

Beginning in early May, search areas where individuals have been sighted. Care should be taken on identification as it is easy to confuse with Cooper's hawks. Look for butcher blocks (stumps where prey have been taken apart) and pellets in areas of dense conifer growth. Once a nest has been located, visit every 2-3 weeks for no more than 20 minutes per visit. Do not approach within 200 m of active nests.

7. Recommended Nest Buffer Area

No foot traffic or recreational activity within 400 m of active nests.

8. References Sharp-shinned Hawk

Bent, A. C. 1937; Call, M. 1978; Johnsgard, P. A. 1990; Joy, S. M., R. T. Reynolds, R. L. Knight, and R. W. Hofmann. 1989; Kingery, H. E., ed. 1998; Platt, J. 1973; Wickersham, L.E. 2016.

Swainson's Hawk *Buteo swainsonii*

1. Identification

Perching: White or mottled abdomen, chocolate-colored bib, white chin, narrowly banded tail, and white spot ("flashlight") above beak. Back is uniformly dark.

Flying: Our only hawk with dark flight feathers (trailing part of wings) and light wing linings (front part of wings). Wings are narrow and pointed, held in a slight dihedral when soaring. Tail has several dark, narrow bands.

2. Nesting Habitat

Open country, usually grassland, on plains and in mountain valleys and parks. Large stick nest is usually placed in an isolated tree or shrub. They will nest in small trees in the medians of I-76 and I-70. One nest in the Pawnee National Grassland was only seven feet off the ground in a small cottonwood. These hawks are often seen circling behind farm machinery as they search for grasshoppers and other insects. They form kettles of several hundred birds in the fall, when they migrate to Argentina.

3. Nesting Dates

Courtship: early April to late June

Incubation: early April to late July

Dependent nestlings: early May to August

Incubation period is 33-36 days. The young fledge 38-46 days after hatching. Young remain with the adults until the whole family migrates south in September.

4. Statewide Distribution and Population

Nests virtually statewide below approximately 3000 m. Highest densities are on the northeastern plains, where these grassland specialists outnumber red-tailed hawks. Numbers appear to be declining in many areas, and insecticides have poisoned many thousands of birds on wintering grounds in Argentina.

5. State and Federal Status

Not listed.

6. Search and Nest Monitoring Protocol

Beginning in mid-April drive a set route, stopping every 500 m to scan all potential nest trees with binoculars. Repeat every two weeks throughout the nesting season. Monitor active nests at two-week intervals from a fixed observation point located at least 400 m from the nest.

7. Recommended Buffer Area

No foot traffic or recreational activity within 400 m of active nests or perches. These hawks will abandon nests if they are disturbed.

8. References Swainson's Hawk

Bent, A. C. 1937; Fitzner, R. E. 1978; Johnsgard, P. A. 1990; Kingery, H. E., ed. 1998; Olendorff, R. R. 1972; Wickersham, L.E. 2016.

OWLS:

Barn Owl

Tyto alba

1. Identification

Visual: Medium-sized owl with a white or cinnamon breast, pale golden wings and back, heart-shaped face, and dark eyes. The heart-shaped face and long, spindly legs separate this owl from all other North American owls.

Vocal: Territorial calls include a hiss-scream (like a steam locomotive venting steam) and a ghostly rattle.

2. Nesting Habitat

Cliffs, ravines, unoccupied human structures--plains and western valleys, mostly below 2000 m. They typically lay their eggs on an internal building ledge, in a cave or pothole, or in a rodent or mammal burrow in a ravine.

3. Nesting Dates

Courtship: March to July

Incubation: late March to early August

Dependent nestlings: April to October

They may raise two clutches or re-nest if the first clutch fails. Incubation of 2-11 eggs requires a variable amount of time, since the eggs are laid at 2-3 day intervals. The young fledge 56-62 days after hatching.

4. Statewide Distribution and Population

This cosmopolitan owl nests at low elevations throughout the state. Little is known about population trends in Colorado.

5. Federal and State Status

Not listed.

6. Search and Nest Monitoring Protocol

Beginning in April, search cliffs and abandoned buildings for nests; or drive a set route after sundown, stopping every 400 m to listen for calls. Do not approach within 200 m of active nests.

7. Recommended Nest Buffer Areas

Avoid human encroachment within 200 m of active nests.

8. References Common Barn-Owl

Craighead, J. J., and F. C. Craighead, Jr. 1956; Johnsgard, P. A. 1988; Kingery, H. E. 1998
Marti, C. D. 1992; Vroos, K. 1988; Wickersham, L.E. 2016.

Burrowing Owl *Athene cunicularia*

1. Identification

Perching: About 10" tall with long spindly legs. Perches on prairie dog mounds, fence posts, and on the ground. Brown to buff colored.

Flying: Flies low to the ground, usually in a straight line. Sometimes hovers into the wind. Stout body and wide, rounded wings distinguish it from meadowlarks and other songbirds.

2. Nesting Habitat

Rodent colonies in grasslands, shrublands, and deserts, mostly below 2000 m. Highest nesting densities occur in prairie dog colonies on the eastern plains. Burrowing owls avoid areas where mid- to tall grass obscures their view of terrestrial predators. Occupied nest burrows usually have whitewash on the burrow mound, and bits of bone and fir of prey items are often scattered around the burrow entrance.

3. Nesting Dates

Courtship: mid-April to mid-May

Incubation: early May to mid-July

Dependent nestlings: mid-May to early August

Incubation of 6-11 eggs requires 27-30 days. Young appear above ground after about two weeks and fledge (moving to separate burrows) about 40-45 days after hatching.

Number of young appearing above ground averages 3-5.

4. Statewide Distribution and Population

Nests throughout eastern plains, in some western valleys (primarily the Grand Valley area), northwestern Colorado, and in scattered mountain parks. Negative influences on populations to loss of nesting habitat (primarily active prairie dog colonies on the high plains), fragmentation of nesting habitat leading to increased predation by urban-edge predators, automobile collisions, and poisoning of insect prey in Mexico.

5. State and Federal Status

State threatened; Colorado State Wildlife Action Plan Tier 1 species.

6. Search and Nest Monitoring Protocol

For rodent colonies of 50 acres or less: Beginning in mid-May, observe each colony for a minimum of 30 minutes from a stationary observation point, scanning the colony every 5 minutes with binoculars or a spotting scope. Repeat at two-week intervals until 1 August or until all young have dispersed from the nest burrow.

For rodent colonies larger than 50 acres: Same as above, but locate multiple observation points as necessary to provide a clear view of all areas of the colony.

7. Recommended Nest Buffer Areas

No foot traffic or recreational activity within 50 m of active nest burrows, 1 April-15 August.

8. References Burrowing Owl

Johnsgard, P. A. 1988; Kingery, H. E. 1998; Pezolesi, L. S. 1994; Plumpton, D. L., and R. S. Lutz. 1993; Vroos, K. 1988; Walker, L. W. 1974; Wickersham, L.E. 2016.

Great Horned Owl *Bubo virginianus*

1. Identification

Visual: Very large owl with prominent "ear tufts" and oblong facial disk. Coloring varies from almost white to dark brown. Bulky shape, white throat, and wide spacing between ear tufts separate this species from smaller long-eared owl.

Vocal: Territorial call is a series of 4-8 deep, resonant hoots: *who-who*; *who-who-who*. They also give single hoots, along with squawks and squeals around the nest. Young hiss when begging for food and also give a kazoo-like contact call in early summer.

2. Nesting Habitat

All Colorado ecosystems from the plains and western valleys to treeline. They usually lay their eggs in a hawk, crow, or magpie nest; but they also use stumps, large tree cavities, cliff ledges, and building ledges. Extremely adaptable, they thrive in human-disturbed habitats, driving away or preying upon other owls, including barn owls, long-eared owls, and burrowing owls.

3. Nesting Dates

Courtship: December through March

Incubation: late January through May

Dependent nestlings: March through July

Incubation of 2-4 eggs requires about 32-35 days. The young fledge about 45 days after hatching but remain dependent on their parents for several months. Parents chase young away when adults begin courtship again in late fall.

4. Statewide Distribution and Population

Nests statewide. Populations are increasing in urban and suburban areas. Highest nesting densities occur on the eastern plains, particularly along the Front Range urban corridor, where they have displaced the formerly common and now rare long-eared owl.

5. Federal and State Status

Not listed.

6. Search and Nest Monitoring Protocol

Beginning in February on the plains, March in the mountains, drive a set route, stopping every 500 m to scan all visible trees for nests. Nests are usually fairly large and flat-topped.

Incubating adults are visible from several hundred meters away. Average population density is one nesting pair for every 3-5 square km (1-2 square miles). Visit nest sites briefly every 2-3 weeks. Do not approach within 100 m of active nests.

7. Recommended Nest Buffer Area

Nest observers should stay at least 100 m from active nests.

8. References Great Horned Owl

Craighead, J. J., and F. C. Craighead, Jr. 1956; Johnsgard, P. A. 1988; Kingery, H. E. 1998; Vroos, K. 1988; Wickersham, L.E. 2016.

Long-eared Owl

Asio otus

1. Identification

Visual: Slender owl with long, close-set "ear tufts." Their wings are more than two and a half times longer than their bodies. Squarish, rusty facial disk, streaked breast and abdomen.

Vocal: Extremely difficult, since almost all of their calls overlap with those of the more common great horned owl. Territorial call is a single hoot, given at 2-5 second intervals. They also give a variety of barks, wails, screams, and kazoo-like squeals around the nest. Courting pairs sing a captivating duet, with the male's deep *hoos* accompanied by the female's higher-pitched, descending *whooo*.

2. Nesting Habitat

Variable, but often in dense thickets of coniferous or deciduous growth with nearby open areas for hunting small rodents. A nest in the Boulder Mountain Park was located in a crow's nest in a dense stand of ponderosa pine and Douglas-fir adjacent to a mountain meadow. A nest in Rocky Mountain National Park was located in spruce-fir forest at nearly 11,000 feet. These medium-sized owls breed from the plains to the subalpine forest. Once common along foothills streams of northeastern Colorado, they have been displaced by more cosmopolitan (adaptive to human disturbance) Great horned owls.

3. Nesting Dates

Courtship: February to April

Incubation: late March to early June

Dependent nestlings: early April to early July

Incubation of 3-7 eggs requires 25-35 days, with the eggs hatching over a period of a week or more. The young fledge 30-40 days after hatching.

4. Statewide Distribution and Population

They nest statewide from the eastern plains and western valleys to near treeline. Potential increases in distribution were noted in the northwest part of the state in the Second Colorado Breeding Bird Atlas. Once common in the Front Range, populations have declined near urban areas.

5. Federal and State Status

Not listed. Colorado Natural Heritage Program special concern.

6. Search and Nest Monitoring Protocol

Beginning in March, drive or walk a set route at 1-2 week intervals, stopping every 400-800 m to listen for territorial calls. Once a territory has been located, search the ground for pellets, and search the trees for stick nests. Avoid approaching within 200 m of active nests.

7. Recommended Nest Buffer Area

Avoid human encroachment within 200 m of active nests.

8. References Long-eared Owl

Johnsgard, P. A. 1988; Kingery, H. E. 1998; Marks, J. S., D. L. Evans, and D.W. Holt. 1994; Vroos, K. 1988; Walker, L. W. 1974; Wickersham, L.E. 2016.

Short-eared Owl

Asio flammeus

1. Identification

Visual: Medium-sized, tawny colored owl with bold black streaks on breast, round facial disk, and tiny, barely visible "ear tufts." Courses low over the ground, like a northern harrier, skimming over wetlands and grasslands, often during the day. Long, tapered wings have a distinctive black comma underneath at the wrists.

Vocal: Territorial calls include a raspy, high bark and a series of low-pitched *boo* notes reminiscent of a distant steam engine.

2. Nesting habitat

Open country, particularly wetlands and grasslands. They nest and roost on the ground amid concealing vegetation. However, in winter they occasionally flock to tree roosts.

3. Nesting Dates

Courtship: probably February to April

Incubation: probably April to June

Dependent nestlings: probably May to July

Incubation of as many as 13 eggs (5-7 average) requires about 24-29 days. The young walk away from the nest 14-18 days after hatching, but they require a week or two more to achieve stable flight.

4. Colorado Distribution and Population

Known to nest only in a dozen or so scattered locations on the eastern plains and in mountain parks and valleys, including the South Platte River basin, Alamosa and Monte Vista National Wildlife Refuges in the San Luis Valley, and Arapahoe National Wildlife Refuge in North Park. They occasionally winter in wetlands in the Front Range urban corridor, but nesting has not been confirmed in these areas. Loss of habitat due to agriculture and urbanization may have caused a decline in statewide nesting populations.

5. Federal and State Status

Not listed. Colorado Natural Heritage Program fully tracked.

6. Nest Search and Monitoring Protocol

Beginning in April, observe potential nesting habitat for 1-2 hours from a fixed observation point around dawn or dusk. Repeat observations every 1-2 weeks. *Do not search for nests.* If you keep a low profile and stay at least 500 m away from nest sites, males will eventually deliver food to incubating females. Male performs hovering courtship flight, sometimes clapping his wings or vocalizing while hanging in the wind.

7. Recommended Nest Buffer Area

No foot traffic or recreational activity within 400 m of suspected nest sites. Permanent trails should be located at least 400 m from recent nest or roost sites.

8. References Short-eared Owl

Johnsgard, P. A. 1988; Kingery, H. E. 1998; Holt, D.W., and S. M. Leasure. 1993; Vroos, K. 1988; Walker, L. W. 1974; Wickersham, L.E. 2016.

Spotted Owl

Strix occidentalis

1. Identification

Visual: Large owl with rounded head, dark eyes, and white spotting on head, back, and underparts. Strictly nocturnal.

Vocal: Territorial call is three or four low-pitched, cadenced hoots, lasting nearly 2 seconds: *who; who-whoo; whooo*. This call sounds a little like the *who-cooks-for-you* of barred owls. Contact call is a hollow, upslurred whistle.

2. Nesting Habitat

Deep, rocky canyons containing old-growth coniferous forest or scattered conifers. These reclusive owls may require the shade of these canyons to help them regulate body heat. They lay their eggs in crevices of cliffs and in stumps or on limbs of tall conifers. They may use nests of other raptors, clumps of mistletoe or debris, or lay their eggs directly onto a stump or rock ledge.

3. Nesting Dates

Courtship: probably February through early March

Incubation: probably March through May

Dependent nestlings: probably May through August

Incubation of 2-4 eggs requires 28-32 days. The young fledge about 32-36 days after hatching.

4. Statewide Distribution and Population

Charles Johnson (1997) found 12 occupied territories in deep canyons south and west of Colorado Springs. Smaller populations inhabit slickrock canyons of Mesa Verde National Park in southwestern Colorado and remote river canyons in Dinosaur National Monument.

5. Federal and State Status

Federal threatened and state threatened (Mexican spotted owl--our subspecies). Colorado State Wildlife Action Plan Tier 1 species.

6. Search and Nest Monitoring Protocol

Walk through appropriate habitat shortly after sunset or before sunrise, February-June. Listen for territorial calls. If you find an active territory, immediately notify State Parks or Colorado Division of Wildlife personnel.

7. Recommended Nest Buffer Area

To be determined on a case-by-case basis by Colorado Division of Parks and Wildlife personnel.

8. References Spotted Owl

Ganey, J. L., and R. P. Balda. 1994; Johnsgard, P. A. 1988; Johnson, C. L. 1997; Kingery, H. E. 1998; Vroos, K. 1988; Walker, L. W. 1974; Wickersham, L.E. 2016.

Additional Species

Turkey Vulture: Nest statewide in caves of remote cliffs, May-August. They will not enter their nesting cave if humans are nearby. Most nests have been discovered by accident by rock climbers.

Mississippi Kite: Southeastern Colorado only, nesting colonially in cottonwood groves and urban parks, May-August. Largest colonies are in Pueblo and Lamar, but these acrobatic kites also nest in several canyons in Comanche National Grassland. They are conspicuous as they soar and dive over nesting areas.

Eastern Screech-Owl: Tree cavities, cottonwood-willow creekbottoms, and urban parks north of Palmer Divide and east of Continental Divide, March-June. Fairly common along South Platte River and tributaries. Listen for two territorial calls (a soft, horse-like whinny; and a rapid series of "hoo" notes, like a bouncing ping-pong ball), December-March, and again June-July. They respond to recorded playbacks of their territorial calls.

Western Screech-Owl: Tree cavities and sometimes cliff cavities, cottonwood-willow creekbottoms, and pinon-juniper woodlands, west of Continental Divide and south of Palmer Divide, March-June. Listen for their territorial call (a rapid series of soft hoots), January-June. Call is distinct from those of eastern screech-owl, but these two species are difficult to distinguish visually.

Northern Pygmy-Owl: Tree cavity (ponderosa pine, pinon pine, lodgepole pine, or aspen), foothills, western plateaus, and mountains, March-July. They vocalize (a series of high, hollow, breathy whistles--1-2 per second) from early March to late April and make a creeper-like twitter around the nest. They are active in the daytime, when they perch on dead branches and are sometimes mobbed by flocks of songbirds.

Flammulated Owl: Tree cavity, usually in ponderosa pine, pinon pine, or aspen, 2000-2800 m, May-July. They begin vocalizing (short, resonant hoots) shortly after arriving from the south in early May. These fist-sized owls hunt moths and other insects in remote foothills canyons. Once you have located a territory by listening for the hooting males, search tree cavities at dusk or listen for the loud hissing sound that fledglings make when begging for food.

Northern Saw-Whet Owl: Tree cavity (often ponderosa pine, lodgepole pine, or aspen), foothills, plateaus, and mountains, April-July. They vocalize (a series of high, hollow, persistent whistles) March-May and respond readily to take playbacks. Since they are entirely nocturnal and cryptically colored, most nests are discovered by accident.

Boreal Owl: Tree cavity (spruce or fir), subalpine life zone (usually above 3000 m), May-August. Their eerie territorial call (a rapid series of "hoo" notes very similar to the sound made by a winnowing snipe) are heard in the high country February-April. Ski or snowshoe into potential habitat before dawn or after sunrise. Sometimes they respond to recorded playbacks. Adults make a variety of high-pitched wails and laser-like screams around the nest. They hunt voles and other small rodents in meadows and open forests.

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D. Acknowledgements

This Handbook was compiled with the help and technical expertise of many individuals including the following CPW staff, contractors, and technicians: Rob Billerbeck, Heather Brown, Aimee Caires, Robert Fenwick, Elizabeth Gillespie, Steve Jones, Brian Kurzel, Jeff Thompson, Melissa Greulich, Sarah Lamagna, Naomi Yoder, Amberly Moon, Tanya Buxton Torres, Dylan Lewan, Samantha Holm, Melissa Daniels, Ben McClellan, and Elisha Rubin. The species descriptions were written by Steve Jones, and most of the content is from his guide that was a precursor to this Handbook. Robert Fenwick designed and piloted the field work from which this manual's protocols are based. Raptor biologist Jerry Craig was consulted on the formation of this project.

E. Non-raptor 4-letter codes

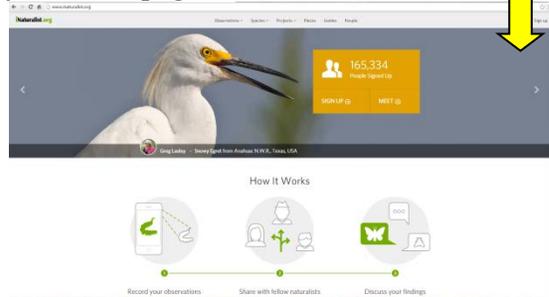
See the The Institute for Bird Populations website for 4-letter codes to use in the field data sheets and spreadsheets.

<http://www.birdpop.org/AlphaCodes.htm>

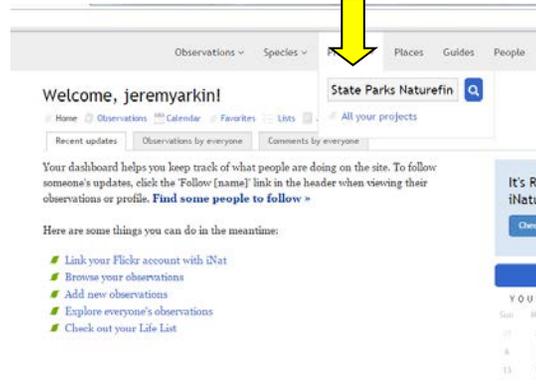
F. iNaturalist Instructions for entering other biological sightings

See the following pages.

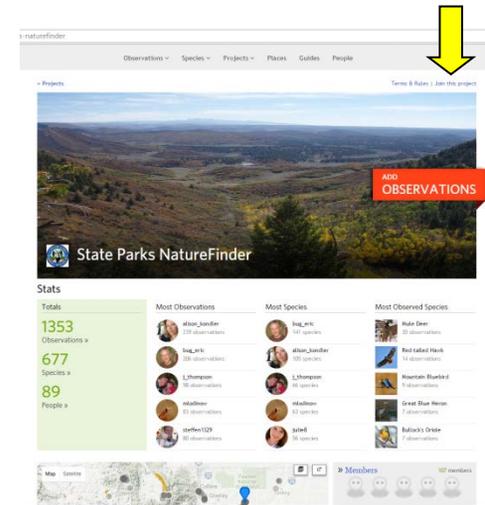
Step 1: Go to inaturalist.org and select “Sign up” in the top right corner. Fill out your information on the following page and click sign up before being redirected to your homepage.



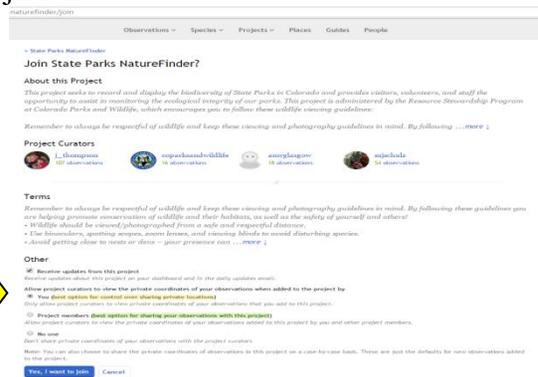
Step 2: To join the State Parks project, hover your mouse over the projects drop down menu to access the search bar. Then search for “State Parks NatureFinder”.



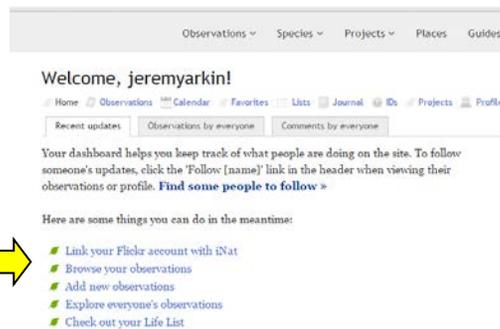
Step 3: Join the project by clicking the blue link in the top right corner that says “Join this project”.



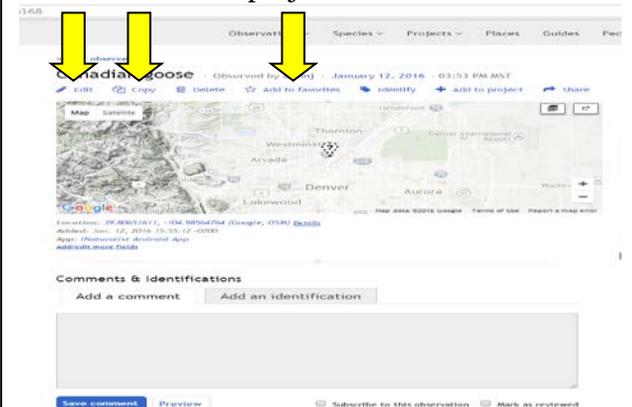
Step 4: Accept the terms on the following page, making sure to select the option to allow project curators to view the private coordinates of your observations. Then click the blue box that says “Yes, I want to join”



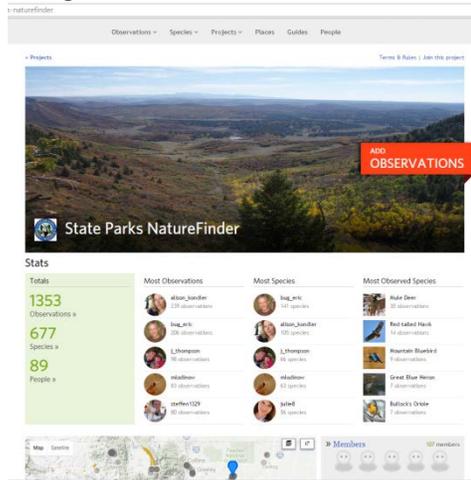
Step 5: To view/edit your observations navigate back to your homepage by clicking inaturalist.org (top left corner) and click the second link down “Browse your observations”, which will redirect you to a page that shows all of your observations.



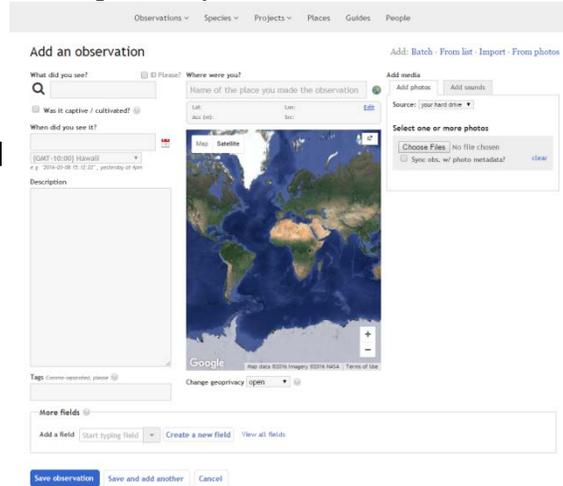
Step 6: After selecting a particular observation you will be redirected to a page where you can perform a variety of tasks, including: edit, delete, and add to project.



Step 7: You can add a new observation directly to State Parks NatureFinder by navigating to the project page and selecting “Add observations”.



Step 8: From this page you can add information about what you saw, where you saw it, and even what time you saw it! If you have a picture, you can add this as well.



G. Instructions for loading observations into State Parks NatureFinder with a smartphone

Questions? Please contact:

Resource Stewardship Program Assistant

DNR_CPWresourcestewardship@State.co.us

303-291-7282

Geotagging Photos

Geotagging (capturing GPS coordinates with your picture) must be activated on your Smartphone camera as well as the iNaturalist application (for iOS), so that iNaturalist can use the location of where the observation occurred. Note: you can turn geotagging on or off whenever you like. For those that can't figure this out or choose not to use geotagging, the location can be manually set when you upload the photo and make the observation in iNaturalist.

iPhone:

1. *Camera:* Settings > Privacy > Location Services > Camera > While Using the App
2. *iNaturalist:* Setting > Privacy > Location Services > iNaturalist > While Using the App

Android:

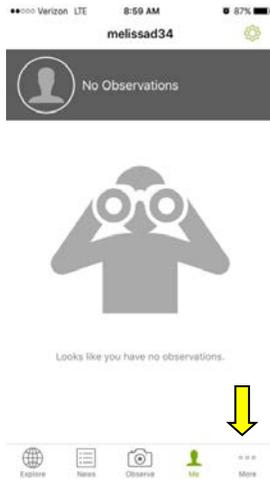
1. Open the Camera app > select settings wheel > select "Location Tag" to turn on

Getting Started with the App

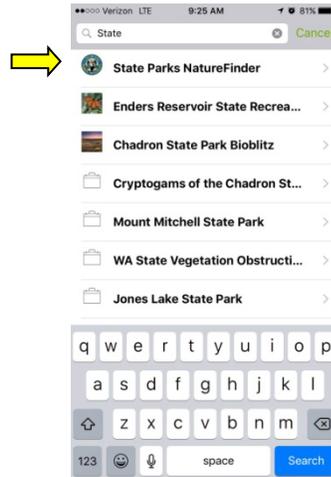
Download the iNaturalist app from the App Store. When you open the app, you will be prompted to log in or sign up. If you already have an account that you use for the iNaturalist website, you can use that.

iPhone instructions for recording an observation:

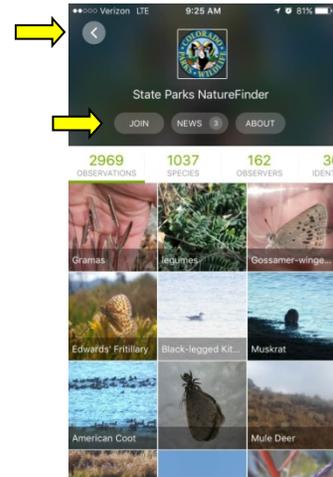
1. Before entering any observations, you will need to select our project. Tap the 'More' icon in the bottom toolbar.



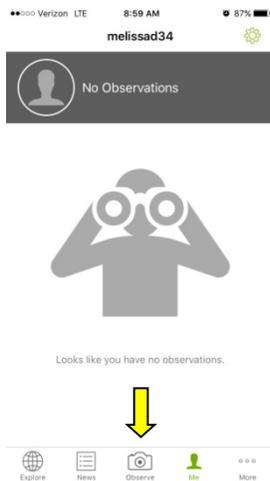
2. Select 'Projects', type in 'State Parks', and then select 'State Parks NatureFinder'.



3. Tap 'Join' and then the back arrow at the top left corner of the screen to navigate back to the main screen.



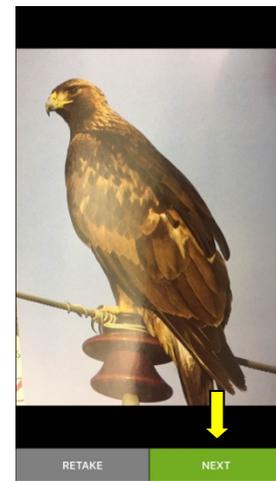
4. Press "Observe" at the bottom of the screen to make an observation.



5. Take a photo by pressing the big green button. You can also add a photo that you have already taken by pressing the photo icon next to the green button. If you are not able to take a photo, you can also continue by selecting NO PHOTO.



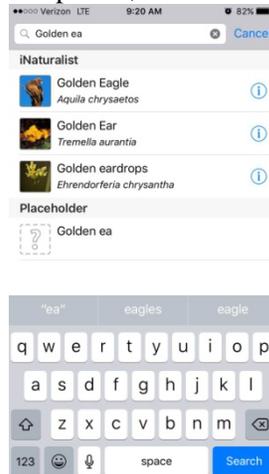
6. Once you have taken the photo, select NEXT.



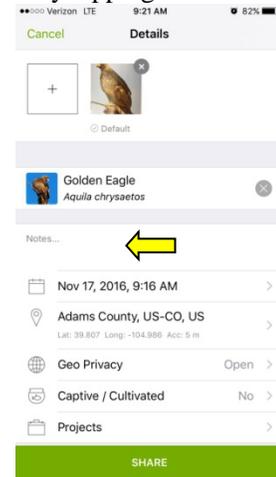
7. Add the species name by pressing 'Look up species'.



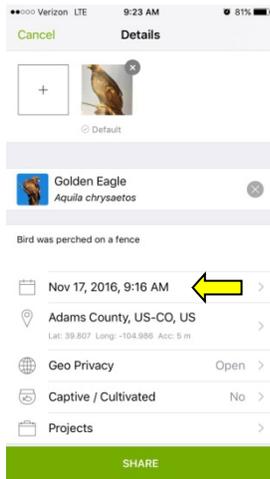
8. Tap the text box at the top to search the species, and then select it.



9. Add notes by tapping the 'Notes...' box. When you are done, minimize the keyboard by tapping the main screen.



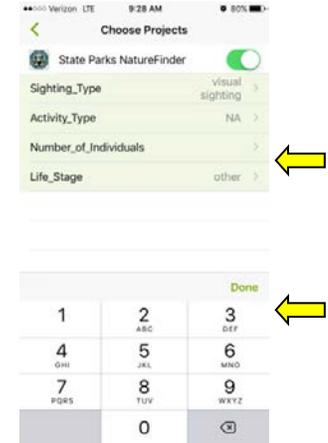
10. Make sure the date and time are correct. If not, change it by tapping on the date.



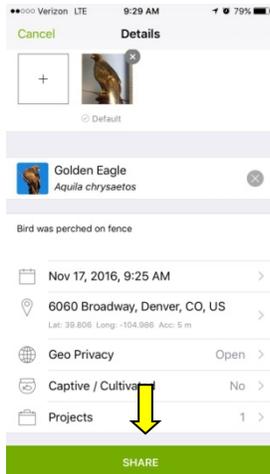
11. Tap Projects. Tap the white circle to turn this project on. To enter Sighting_Type, Activity_Type, and Life_Stage, tap them and make selection.



12. To add the number of individuals, tap that area, input the number, and then select done. Tap the arrow at the top left of the screen to return to the observation.



13. If you have service, you can click SHARE to complete observation and share it with us. If you do not have service, you can save the observation to be shared later by clicking the SHARE button.



14. You can view all observations to be shared for later by tapping the Me icon in the bottom toolbar. When you have service, you can share all saved observations by tapping the big green button at the top of the screen, or you can share them one at a time by tapping the cloud and arrow icon next to the observation. You can also view and edit the observations by tapping on them.

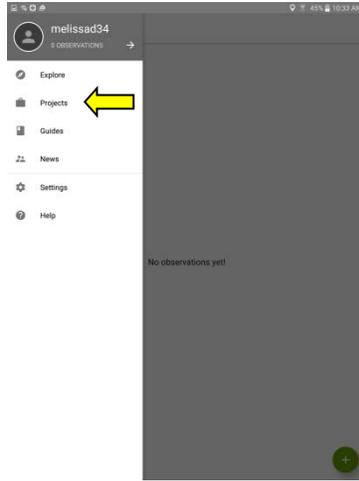


Android Instructions for recording an observation:

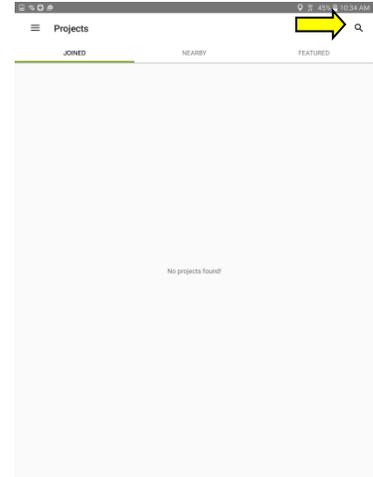
1. Before entering any observations, you will need to select our project. Open the menu by tapping the 3-line icon at the top left of the screen.



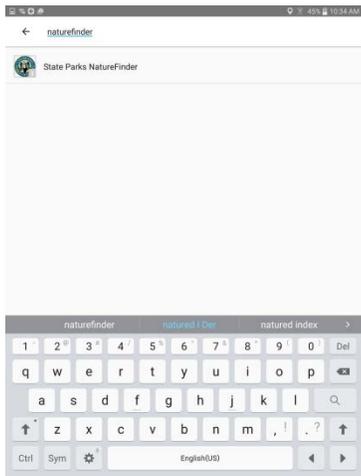
2. Select 'Projects' from the menu.



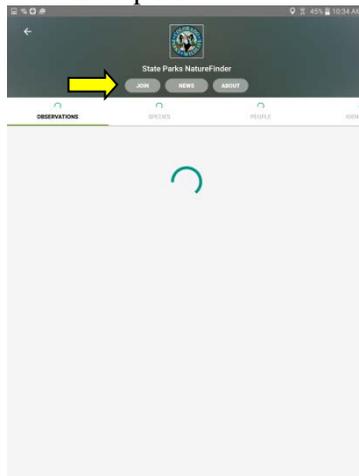
3. Tap the magnifying glass icon to search.



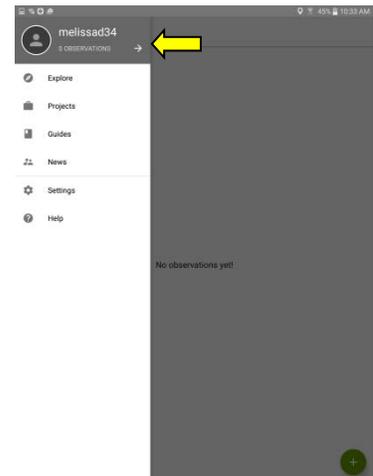
4. Type in NatureFinder to find our project, and then select it.



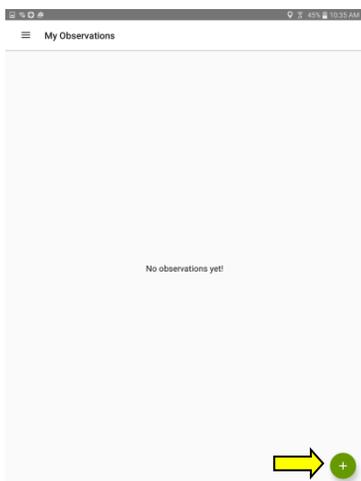
5. Tap 'Join' and then navigate back to the main screen using the back arrow at the top left.



6. Open the menu and tap on the gray box at the top.



7. Tap the green button to make an observation.



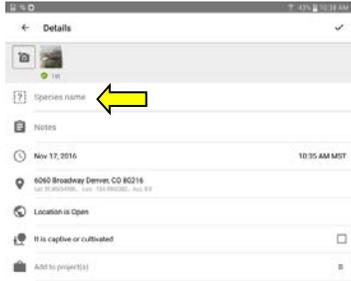
8. Select 'Take Photo'. You may also select an image you've already taken or make an entry with no photo.



9. Take the photo using the camera button and then accept it by tapping 'OK'.



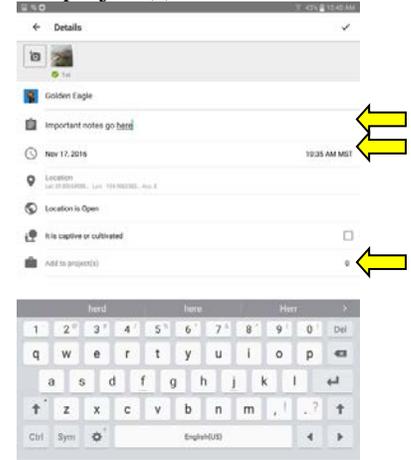
10. Add the species by tapping the 'Species Name' box.



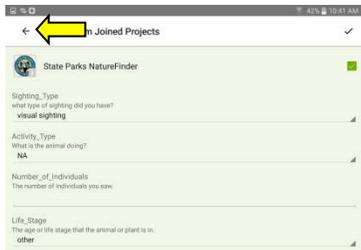
11. Type in the species and select it. If you are unsure, you can also type in the family (eg. Eagles) and select that.



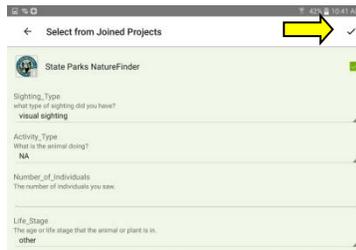
12. Add notes by tapping in the notes box. Check that the date and time are correct. Change them by tapping them. Add our project by tapping 'Add to project(s)'



13. Tap the project to select it, and then fill out all of the relevant information. Navigate back by clicking the back arrow.



14. Click the check mark button at the top left to finish your observation.



15. Tap 'Upload' to upload your observation. If you don't have service, you can upload all of your observations at the same time once you have service.

