SURVEY RECOMMENDATIONS FOR LOCATING A PINYON JAY BREEDING COLONY

COLORADO PARKS AND WILDLIFE

2026

Why Locate and Protect Pinyon Jay Colonies?

- Pinyon jays (*Gymnorhinus cyanocephalus*) show strong fidelity to breeding areas and may use colony sites for many years.
- Although wide-ranging overall, pinyon jays settle into breeding areas in early spring, spending 40–50% of their time in colonies during the breeding season, which increases detectability.
- Identifying and protecting breeding colonies during habitat treatment planning is an important step in conserving this rapidly declining species.

Partners in Flight Protocols:

There are recommendations for survey protocols developed by the Partners in Flight (PIF) Pinyon Jay Working Group https://partnersinflight.org/resources/pinyon-jay-working-group/. These guidelines advocate for using a plot-based approach using a 2.5 km x 2.5 km grid and area search to find pinyon jays.

CPW has produced a statewide grid layer and that can be used as a sampling frame for those who prefer a grid-based approach rather than treatment polygons.

Colorado Parks and Wildlife Pinyon Jay Protocol:

The CPW protocol presented here is complementary to the PIF protocols in terms of data standards but is targeted at finding pinyon jay colonies and applies specific best practices developed for Colorado. The protocol is intended to be adaptive and will incorporate updates through time.

STEP 1 – Deciding if Surveys are Needed

Colony Site-Suitability Model – Through a collaborative effort between CPW, Bureau of Land Management (BLM), and South Dakota State University, a statewide predictive model of colony-site suitability was developed based on colony locations identified across Colorado between 2019-2024 (Macklin, E.D., 2025). This model is available in both raster (named **PIJA CO Colony Suitability 2026**) and vector (named **PIJA CO Priority Areas 2026**) formats. The raster model predicts the probability of colony-site suitability on a 0-1 scale. In the raster layer, cells with a predicted suitability of ≥ 0.41 (41% probability of suitability) and cells adjacent to those with ≥ 0.41 values are classified as suitable habitat for pinyon jay colonies where surveys are recommended. In the vector layer, areas classified as High Priority Areas designate suitable colony-site habitat where surveys are recommended.

Proposed Treatment Area – Overlay your proposed treatment polygon on the provided Colony-site suitability model. If a proposed treatment polygon intersects or is adjacent to a cell with predicted suitability ≥ 0.41 in the raster layer or intersects a high priority area in the vector layer, pinyon jay surveys are strongly recommended. If the proposed area is not in a cell classified as suitable habitat, no survey is required.

Surveys for pinyon jay breeding colonies should be completed in the spring before a treatment is to be implemented. Pinyon jays do not reuse nests, so active nesting areas in a colony will move. Please refer to the "CPW Guidelines for Promoting Pinyon Jay Conservation in Pinyon-Juniper Woodlands" for treatment implementation recommendations near pinyon jay colonies.

Step 2 – Planning Surveys

Dates to Survey for Breeding Colonies – In Colorado, pinyon jays began breeding activities in mid-February with most of the nesting completed by the end of May. Normally from mid-February to mid-March, birds are performing courtship behaviors and building nests. From late March to late May most pairs are incubating or raising nestlings. At higher elevation (>8000 ft) sites in the state, for example in the San Luis Valley and around Gypsum, the initiation of courtship behavior begins in early March.

Point Counts – A point count should be completed every 1 km if surveying from roads or trails or every 833 m in a 2.5 km x 2.5 km grid or treatment polygon that is not accessed by roads or trails. It is okay to move a point to take advantage of good observation and listening points. Stops should be marked with a GPS waypoint for follow-up surveys and tracks should be recorded to assess the area surveyed. The point count duration is 6 minutes. At each stop, surveyors should visually scan the area with binoculars in addition to listening. Most pinyon jay detections are aural.

Area Searches – Area searches are an option to locate breeding colonies within a treatment polygon or grid. The area search approach gives the surveyor flexibility to choose a survey route that takes advantage of good observation points. Tracks of your survey effort should be recorded to assess coverage of a site. The goal of area searches is to survey the treatment footprint sufficiently so that no location in the polygon boundary is further than 500 m from a surveyor's track.

Weather appropriate for Conducting Surveys – Surveys should only be conducted when there is little to no rain or snow falling, and when winds are below 25 km (Beaufort Scale 4). Pinyon jay breeding activities are delayed or subdued during inclement weather or after heavy snowfall. We observed birds delaying breeding and abandoning nest building/egg laying after a snow event that was followed by colder temperatures. The birds normally return to breeding activity when the temperatures have warmed and weather moderates.

Time to survey – The best time to survey for pinyon jays is starting at sunrise until noon. This is when they are most reliably active and have higher detection probabilities.

How many surveys are needed to determine jays are not active in an area – Conduct three surveys**,** spaced 7–10 days apart, between late February and early April (peak breeding activity window) to confidently determine that pinyon jays are inactive in an area.

If pinyon jays are detected during the first survey, no additional point counts or area-search surveys are required if determining jay presence is the primary objective. To determine where pinyon jays are breeding, follow survey methods below for colony identification.

STEP 3 – Locating Pinyon Jay Breeding Colonies

Follow Birds Detected During Point Counts or Area Searches – When pinyon jays are detected during a point count or area search, prioritize observations of pairs or small groups. Birds flying in pairs or small groups are more likely associated with breeding activity and should be followed when possible. If birds cannot be followed when initially located, establish a good vantage point and observe for at least one hour to determine whether they return.

Group Composition and Age Classes – Large flocks flying together are likely to be young birds not breeding and generally do not yield useful information for colony identification. Within a breeding colony both adults and sub-adults are present. Pinyon jays are cooperative breeders, and non-breeding sub-adults may assist with brood rearing. Most males do not breed until two years of age, while some females may breed at one year.

Sub-adult birds are typically duller gray, while adults appear brighter blue with a white or grayish bib. Age-related plumage differences are easiest to detect when birds are side-by-side in a group and may be difficult to distinguish on single birds.

Observation Effort and Follow-Up – Detecting breeding behavior may require extended observation. Plan to spend several hours observing and following birds identified during point counts or area searches. Follow-up visits may be necessary to confirm breeding activity and determine the precise location of a colony.

Using multiple observers during follow-up visits can improve detection of breeding behaviors. Each observer should position themselves at a distant vantage point to minimize disturbance to a colony. Follow-up surveys should begin prior to sunrise, when possible, to observe birds arriving at colony sites from roosting areas.

Interpreting Behavior Indicative of Breeding

Johnson, K. and R. P. Balda. 2020. Pinyon Jay *(GYMNORHINUS CYANOCEPHALUS), version 2.0. In Birds of the World (P. G. Rodewald and B. K. Keeney, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. (*https://doi.org/10.2173/bow.pinjay.02)

Pair Flying Together – If you observe a pair of birds separate from a flock and fly off together, you should try and follow them to observe courtship behavior or nest building.

Mobbing – If you are at the edge or in the colony and a group of birds surrounds you (or another potential predator) and starts to make raucous warning calls, this is called mobbing. You should try to move to a more distant location if this happens. Helpers can be very ready to mob a potential intruder early in the breeding season and when young are fledging.

Display Flights – You can observe a small group of individuals fly rapidly through and above trees. They look like they are chasing each other at rapid speeds.

Food Transfer – This involves one bird holding a piece of food, offering it to its mate and the mate accepting it. This is usually a silent exchange, and you generally observe a pair off by themselves doing this courtship behavior.

Silent Sitting – Pairs leave the foraging flock and fly to a perch, where they sit silently next to one another. While sitting near one another they may alternate raising their bill upwards displaying their white-throat bib.

Stick Manipulation – A male picks up a stick, a twig, or tuft of grass and if the female does not respond, he will drop the material. He can carry it for a short time before dropping it. As courtship proceeds, stick manipulation increases in frequency and becomes suggestive of nest-building. Sometimes the male will place twigs in a tree for a partial nest build. You can hear pairs in trees making soft vocalization as they begin to select a nest tree to initiate nest building.

Nest Building – Once a pair has selected a tree for nesting, they get to work. They both make numerous flights back and forth to collect sticks placing them in the nest tree. This is a great time to locate a nest from a distance because they make straight flights in and out of the nest tree.

Carrying Nest Lining– Females will collect fine, fluffy materials in their bill to line a nest. Try and follow the female to the nest and you can watch as she lines the nest. This indicates the nest is almost complete. It normally takes 5-7 days to complete a nest and for the female to start laying a clutch.

Courtship Begging – Females crouch before their males with their heads slightly extended, open bills pointed slightly upward, with wings flapping or fluttering. The begging calls can be very insistent and loud. Females can be seen flying after males as they continue to beg. Female begging sounds similar to nestling and fledgling begging, but in the early season you can assume it is most likely a female begging to her mate.

Copulation – Rarely seen. Normally proceeded by soft trills.

Vocalizations – Pinyon jays have sophisticated vocal communications and paying close attention to vocalizations will help inform you about activities happening in the colony.

Multiple Rack – This is a loud series of racks given when jays perceive danger by either a human intruder or predators. Pinyon Jays typically give this call while perched on the top of a tree. They may proceed to mob the intruder.

Near – Each individual jay has a distinctive “near” call and pairs recognize each other using it. It is a softer syllable call.

Soft trills and buzzing – When pairs are forming bonds and selecting nest trees you can hear them doing soft calls and trills low in a tree. They are very vocal with one another during nest construction, copulation, and egg-laying. This communication can go on for extended periods of time and is very fun to listen to.

Kaw – This is the typical contact call for pinyon jays. Kaw calls can take on a variety of variations as individual birds communicate. A loud Kaw call is usually given by the last member in a moving flock.

Begging call by Female – This rather harsh, prolonged series of notes is given by a female when she is being fed by her mate. The loudness and directional qualities of this call can be used to locate nests.

Once multiple females are incubating, groups of males return to the colony to feed them, creating a cacophony of begging calls throughout the nesting area. The female will generally leave her nest momentarily to be fed by the male so keep your eyes on her as she flies back to her nest tree and settles in on her nest.

Begging young – Begging calls are used by nestlings and fledglings when approached by their parents for feeding. Normally, only older nestlings will beg audibly. Be aware that older fledglings can beg insistently but may not be indicative of a colony site as broods normally leave the colony site a day or 2 after fledging.

Rattle, and Piping Rattle– These calls are given by females. Agitated females will give Rattle calls. This Rattle call has a rather harsh tonal quality. Harsh rattle are heard when predators are near nests, when males get too close, or when a non-mate approaches. The piping rattle is less harsh and higher pitched than the rattle call. This is more related to courtship.

Seasonal Survey Recommendations

CPW recommends conducting surveys twice at confirmed colony sites to better evaluate colony location and extent:

- **Early breeding season**: to document courtship behaviors and nest building
- **Late breeding season**: to confirm nesting by observing females being fed by males and/or nestlings being provisioned

Early Season Breeding *(February 14 – mid-March)*

During this early season it is imperative that observers are very quiet and limit movement when working in and around the colony. When birds begin nest construction or egg laying, nest abandonment during this sensitive time is a real possibility.

It is best to set up at an observation point above the area where pairs and small flocks are seen flying in the trees (e.g., ridgeline) or at an observation point where birds can be observed, but where you will cause them little to no disturbance. Walking or moving in areas where birds appear to be most active should be limited and you should move quietly and slowly to reduce disturbance to the birds. Sentinel birds can become very agitated when you get near a nest. Most of the effort during these early surveys is spent watching and recording the behavior of birds. Observers should not disturb the colony by looking for nests during this time.

All breeding behaviors and vocalizations should be recorded with a UTM coordinate projected to the central areas of noted behaviors/vocalizations. The number of pairs counted may be a good index to potential nesting attempts in a colony.

The early breeding season is the best time to see pairs starting to build a nest. This allows you to find nest trees from a distance as you can watch the birds (both the male and female work to build a nest) busily building a nest by bringing nesting materials back and forth to the nest tree. Watch quietly from a distance and you can pinpoint the nest tree for later confirmation of breeding.

Late Season Breeding (late March – late-May)

Confirming breeding through behaviors can be more difficult during the mid- to late-season surveys because the colonies tend to be quieter as most of the females are incubating. Surveys during this

period should focus on listening for begging from incubating females or begging from nestlings or fledglings.

Although there is variation when birds initiate nesting within a colony (e.g. failed breeders may attempt a second brood), most females in a colony generally begin incubating within a week or two of each other. When females are incubating, feeding bouts by males to females on the nest can allow observers to locate nests and determine the number of pairs nesting. Males commonly return to feed females at the same time. The female leaves the nest, perches in a nearby tree, and begs at the male to feed her. After being fed, the female will return to her nest. Colonies that contain many helpers and pairs make this an extremely noisy and confusing time for an observer. Feeding may occur as often as once an hour, with the colony site being very noisy for 5 minutes or less and then falling silent until the next feeding.

Nestlings – Female pinyon jays incubate eggs almost continually for 17 days and brood nestlings, depending on brood size and weather, for 8–10 days. If a female is incubating, you may be able to see her head or tail above the nest from an observation point away from the nest tree. When brooding, the female sits a bit higher on the nest.

Nestlings at 8-14 days old emit low squeaks when begging for food. When they reach > 15 days they will start emitting loud begging calls. This begging can help you estimate the number of nestlings in a nest and pinpoint active nests from a distance. Again, colonies can get loud at feeding time. Both males and females feed the nestlings.

Fledglings – Birds normally fledge at 21-24 days. When they first fledge, the young birds sulk in the nest tree low in the branches or in nearby trees. They are very difficult to see, and many times there will be sub-adult birds guarding them. These sentinel birds guard around the nest tree and will make warning calls when intruders come close to young fledglings. This is your first indication nestlings have fledged. You should not approach the nest tree if you are detected by sentinel pinyon jays. Move away from the nest tree, remain still, and listen from a distance.

Fledglings only stay in the colony area for a day or two. So, locating fledglings is not generally the best indicator to define a colony area unless you have knowledge of the location of the nest from which the young fledged.

Additional Recommendations

Caution with Nest Predators – Common ravens (*Corvus corax*) are the most common nest predators for pinyon jays. During two years of assessing nest and fledging success at colonies in Colorado, preliminary results show 83% of nest failures were caused by ravens. Ravens actively hunt within colonies and take their biggest toll on nestlings. While surveying for pinyon jays, always be listening and have your eyes to the sky to be aware of raven presence. If a raven is spotted, and you are in a colony, hide yourself by dropping to the ground under a tree. Wait until the ravens leave the area before moving around again. You do not want to excite the jays and inform ravens of their presence, so staying still and quiet is best. If you are at the edge of a colony not near any birds, quickly vacate the area. Ravens that actively hunt colonies will circle above the colony and then fly into and above trees beating their wings trying to elicit a response from pinyon jays. Sentinel pinyon jays will mob them, but it seems to do little to deter ravens. And unfortunately, once one nest is found, nests in close proximity often follow a similar fate of predation. Other known predators of pinyon jays are golden eagle, great horned owl, squirrels, and other corvid species.

Mapping Colony Extent – Locating nests to map colony extent is extremely time consuming and takes methodical searching. Nests are not easy to locate, and they can be in a variety of tree shapes and sizes. Look for dense cover and tight twig density provided by the tree. Many nests are very well concealed within the tree branches, and you cannot see them until you poke your head into the tree. The only species of trees we have detected pinyon jay nests are in Rocky Mountain juniper (*Juniperus scopulorum*), one-seed juniper (*J. monosperma*), Utah juniper (*J. osteosperma*), and pinyon pine (*Pinus edulis*). The heights of trees containing nests vary from 5 ft. to 32 ft. tall with an average height around 13 ft. Nest heights also vary, with some nests being placed as low as 2 ft. or as high as 23 ft., with the average height being 6.7 ft. At all pinyon jay nests found, observers should record the tree species the nest was in, the nest and tree height, and distance of the nest from the trunk of the tree.

Searching for nests has the potential to disturb nesting jays or bring in potential nest predators, which is why it is much better to locate nests after the breeding season. Assuming pinyon jay breeding activity has been confirmed, efforts to find nests in a colony to assess habitat or to delineate the extent of the breeding colony can be important to inform woodland treatment project planning, but nest searching should be conducted after the conclusion of the breeding season (i.e., summer or fall). When searching for nests, try to classify nests according to this protocol to evaluate age and extent of the colony site.

Nest Classification

Active nest – An active nest includes those where a female is incubating, or if eggs or nestlings are present in a nest. Some active nests can be located by watching birds build a nest, when a female begs for food from her mate and she returns to her nest, or when you hear nestlings begging. These three methods of determining active nesting do not require you to see the nest, but you can pinpoint a nest tree from a distance to examine later when it is no longer active to record a GPS location.

Old Nest (classes 1-4*)* – An old nest has a gray tinge to twigs and the interior looks weathered. The cup is not as clearly shaped, and many times when you peer into the nest, there will be a collection of debris. The bottom of the nest may look like it is starting to fall apart.

- *Class 1* – Recently active nest (1-2 years) that has a clearly defined cup, large stick volume, and little debris in the nest.
- *Class 2* – An older nest (3-5 years) that still has a large stick volume and vertical structure, but nest cup full of debris and is not clearly defined.
- *Class 3* - An old (>6 years), dilapidated nest that lacks cup structure, sticks are falling out of the tree, and nest lining absent.
- *Class 4* – An incomplete nest building attempt.
- *Unknown Nest* – unsure of the bird species that constructed the nest.

Make sure you know what species' nest it is – Similar Species: Woodhouse's scrub jay (*Aphelocoma woodhouseii)* and Clark's nutcracker (*Nucifraga Columbiana*) are two species that will nest near pinyon jay colonies and make similar looking nests. Both species overlap with the pinyon jay nesting period. Scrub jay nests have a shallower cup, are not as insulated, and generally have only grass lining – they are not lined with juniper bark. Clark's nutcracker nests are larger and often more visible as they are placed on the outer branches of trees. They can be lined with juniper bark. If a bird is spotted on a nest, look to make sure it is a pinyon jay and not a Woodhouse's scrub jay or a Clark's nutcracker. Scrub jays will have

a smaller bill, white eyebrows and are grayer on the back. Nutcrackers are jay size and have a long dagger like bill. Clark's nutcrackers are dark gray overall with black wings and white undertail coverts.

Cache Sites – Pinyon jays collect and store pinyon pine nuts for later use and will locate seed cache sites near colonies. Often, these sites are in areas where snow melts off quickly such as south facing exposed slopes or open areas. Birds can be seen caching seeds at these sites in winter. The birds land at the site as noisy flocks and start walking on the ground probing in the soil. They are very vocal, and you can hear many rattle, Kaw, and Racka calls. The birds remain at the site for a short period and then leave together as a flock. Birds will reuse cache sites, so they are important to identify and record their locations.

STEP 4 – Data Entry and Resources

CPW provides the following rasters, shapefiles and online surveys on Github

Colony-Site Suitability Model
Raster Layer: PIJA CO Colony Suitability 2026
Vector Layer: PIJA CO Priority Areas 2026

CPW Shapefiles
Nest Shapefile: PIJA CO Nests 2026
Colony Shapefile: PIJA CO Colony 2026
Grid Shapefile: PIJA CO 2_5 Grids
Point Count Shapefile: PIJA CO Grid Points

Online Surveys
Point Count Surveys: PIJA CO Point Counts
Colony Surveys: PIJA CO Colony Survey
Incidentals: PIJA CO Incidentals
Nest Surveys: PIJA CO Nests

Pinyon Jay Survey Decision Flowchart

1. Define Project Area

- Identify proposed survey or habitat treatment polygon.

Overlay treatment polygon on: - PIJA CO Colony Suitability 2026 raster layer or PIJA CO Priority Areas 2026 vector layer.

2. Does the Treatment Area Meet Either Condition?

- Intersects or is adjacent to raster cell with predicted suitability ≥ **0.41**
- Intersects a **high-priority area** in vector layer

YES → Surveys Required → Go to Step 3
NO → **No pre-treatment surveys required** → END

SURVEY REQUIREMENTS

3. Conduct Presence Surveys

Method: - Point counts or area searches within treatment polygon

Point Counts: - Duration: **6 minutes** - Placement: ~1 km apart along roads/trails, **or** - Strategically placed to cover treatment area

Survey Timing & Conditions

- **Three surveys**, spaced **7–10 days apart**
- **Late February–early April** (peak breeding window)
- Time of day: **Sunrise–noon**

Do NOT survey if: - Heavy precipitation or immediately following snow event - Wind speeds **> 25 km/hr.**

Are Pinyon Jays Detected During First Survey?

YES → **Presence confirmed** - Proceed to colony identification step 4
NO → Continue surveys (up to three total)

- After 3 completed surveys and No detections → Area may be considered **inactive**

4. COLONY IDENTIFICATION

Early Breeding Season (Mid-February–Mid-March)

Most effective period: disturbance risk is highest

Record: - Breeding behaviors and vocalizations - UTM coordinate of activity center - Pair counts (index of nesting attempts)

Nest Location (Distance Only): - Watch for straight-line flights with sticks or nest lining - Visually confirm nest trees from a distance - **Do not approach nests**

Mid–Late Season (Late March–Late May)

- Colonies quieter during incubation/nestling stages
- Focus on:
    - Female begging calls
    - Male feeding visits
    - Nestling or fledgling begging

DISTURBANCE & PREDATORS

- Common ravens are primary nest predators
- If ravens are present:
    - Remain still and quiet **or** move away from active birds

POST-BREEDING ACTIONS

- **Do not** search for nests during breeding season
- Conduct nest searches and colony mapping **after breeding** (summer/fall)

DATA COLLECTION

- Use Survey 123 and Field Maps provided by CPW available on Github