

SURVEY RECOMMENDATIONS FOR LOCATING A PINYON JAY BREEDING COLONY

COLORADO PARKS AND WILDLIFE

Why Locate and Protect Pinyon Jay Colonies?

Pinyon jays have site fidelity to breeding areas and will use these breeding colony sites for many years. While pinyon jays are known to be wide ranging due to their unpredictable food resources, in early spring pinyon jays settle in at a location so that breeding adults can build nests, incubate eggs, and fledge young. Typically, near these breeding sites are also cache sites to support the colony through their breeding season. Therefore, identifying and protecting pinyon jay breeding colonies when planning habitat treatments may be one important step towards understanding and protecting a species in steep decline.

Colorado Parks and Wildlife (CPW) Survey Efforts:

Colorado Parks and Wildlife has intensively studied 23 colonies in the state. These efforts included mapping colony extent using over 1400 old nests and 281 active nests. Colony sizes of the 23 colonies mapped ranged in size from 37-1561 acres using all age classes of nests found. When using only active nest locations, colony sizes ranged from 0.24 - 484 acres. The number of active nests found in breeding areas varied from 1-29 nests being used within a colony site. In years when food resources are limited, jays are known to forego nesting or fewer pairs will nest. Active nests within a single season can be located as close as 4 m to each other or up to 2.5 km apart within a colony boundary. Colony boundaries are not static and colonies in Colorado have been documented to move a distance of up to 2.4 km.

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 provide a “how-to” guide for surveying for Pinyon jay presence. These survey guidelines advocate for using a plot-based approach using a 2.5 km x 2.5 km for area searches, and a 5 km x 5 km recommended for road-based point counts.

CPW has produced both grid sizes recommended in the PIF survey protocols to be used across the pinyon jay range in the state and recommends using them as a starting point to find jays. Grid cells will be provided when requested.

CPW 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.

The objectives of CPW's protocol include:

1. Provide information on how to find breeding colony areas while limiting disturbance to pinyon jays.
2. Help land managers identify breeding colonies when planning woodland treatments in pinyon-juniper woodlands to help protect nesting sites either through avoidance or timing restrictions. Pinyon jays have high site fidelity to breeding colonies and these areas should be protected.
3. Collect data in a similar manner so we can monitor colony occupancy through time to assess pinyon jay populations. Monitoring activity at colonies will be important in understanding population status and potential treatment impacts to breeding areas.

STEP 1 – Locating Pinyon Jays

Desktop Analysis - When assessing a potential survey or treatment area, begin with a Desktop Analysis to direct survey efforts using available habitat GIS layers (e.g. Landfire and SWReGap). Overlay the provided 2.5 km x 2.5 km or the 5.0 km x 5.0 km survey grids on the area of interest to help focus survey effort. Current knowledge from surveys conducted between 2019 and 2021 indicate that in Colorado, pinyon jay breeding is associated with pinyon-juniper woodland, juniper savannah and juniper shrublands. Known colony sites appear to be associated with interspersions within or connections to sagebrush shrublands and/or salt desert shrub communities. While breeding elevations vary across the state, in general, breeding elevations are near the lower end of that community in any given region. Digital aerial photos are also very useful to examine the survey area and assess the validity of the habitat models. During the desktop analysis, the surveyor should plan out the best possible method (see Point Counts and Area Searches below) for the survey based on access and to focus efforts in areas that appear to be the most likely pinyon jay breeding habitats.

Dates to Survey for Breeding Colonies - In Colorado, pinyon jays began breeding activities in mid-February with most birds completed with nesting by late May. Normally from mid-February to mid-March, birds are performing courtship behaviors and building nests. From late March to late May the majority of pairs are incubating or raising nestlings. At the higher elevation sites in the state, for example in the San Luis Valley and around Gypsum, the initiation of courtship behavior begins in early March. Breeding can be interrupted or delayed with snow events or a significant decrease in temperatures.

Point Counts - The desktop analysis determines where to start the point count route. Point counts can be conducted on roads or trails or while doing an area search in grids provided by CPW. A point count should be completed every 1 km on roads or trails or every 833 m in the smaller 2.5 km x 2.5 km grid that is not road based. It is okay to move a point up to 250 m 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. Continue point counts until you have surveyed the entire area identified in the desktop analysis or until pinyon jays are detected. A point count should last for 6 minutes. At each stop, surveyors should visually scan the area with binoculars in addition to listening.

Area Searches – Area searches are an option to locate breeding colonies within the 2.5 km x 2.5 km plots overlaid on proposed habitat treatment areas. Point counts can be spaced every 833 m across the plot to improve detection probability. The area search approach gives the surveyor flexibility to choose a survey route that takes advantage of good observation points. Including point counts as part of the areas search provides a more structured and repeatable way to cover a plot as opposed to relying on surveyor judgment. Tracks of your survey effort should be recorded to assess coverage of a site. The goal of area searches is to survey the plot sufficiently so that no location in the plot boundary is further than 500 m from a surveyor's track.

How many surveys need to be completed - Three surveys spaced 7-10 days apart should be conducted to adequately assess whether pinyon jays are in an area. If pinyon jays are detected in the first survey and breeding behaviors are noted, no additional point counts or area search surveys are needed if determining jay presence is your main objective (see below for more detailed surveys methods to identify colonies).

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 a heavy snowfall. We have observed birds delay breeding behaviors 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 about 2:00 pm as this is when they are most reliably active. Evening surveys may also be appropriate as activity increases in the evenings prior to sunset. Pinyon jays are thought to roost relatively nearby to known breeding sites. Conducting an evening survey may result in the identification of a pinyon jay roost site which may allow observers to follow pinyon jays to their breeding colony the next morning

STEP 2 – Locating Pinyon Jay Breeding Colonies

If during a point count survey or area search you detect birds flying in pairs or small groups, you should attempt to follow the birds and observe them to document breeding behaviors. You can follow birds outside your survey plot. Also, you may find a flock of birds at a cache site. Wait for the flock to leave the cache site so you can see where they go. If the birds leave the area and you cannot follow them, find a good vantage point to observe from and wait for at least an hour and a half to see if they return.

Actually observing the birds exhibiting breeding behaviors can take time and requires patience. Plan to spend several hours observing and following the birds you located during point counts or area searches. Follow up visits may be required to determine the presence of breeding birds. Pairs and small groups flying together are likely near or in a colony if you observe them landing

low in trees, doing warning calls, begging calls, rattle calls, and mobbing behavior (*See key vocalizations below*). These vocalizations all signify breeding in the area, and you should definitely set up to watch the flock from a good vantage point and see if you can document nest building or other courtship behaviors (*See key behaviors and timing below*).

Small groups of jays in a breeding colony can be a mix of adults and sub-adults. Pinyon jays nest cooperatively with immature, non-breeding jays sometimes helping to raise broods. Most males do not breed until they are two years old, but one-year-old females can breed. Sub-adult birds are normally grayer whereas adults are brilliant blue with a white/grayish bib. When birds are side by side in a flock, the plumage colors indicating the age of birds can be more easily distinguishable, but the difference can be difficult to see on single birds.

If pinyon jays are located and you see them in pairs and small groups, but do not observe breeding behaviors, the site should be revisited several more times (unless inclement weather like a heavy snowfall happens) to confirm breeding behaviors and pinpoint a colony. Having several observers return to watch the birds located during point counts or area searches can be very helpful. Keep in mind that pinyon jays are very alert to intruders around a breeding site, so observers should endeavor to be slow and quiet so as to observe birds without being detected or causing disturbance. Each observer should be situated at a good vantage point to observe birds from a distance. Follow-up surveys should start prior to sunrise as you may be able to observe birds arriving at a colony from a roost site.

CPW recommends surveying once in the early breeding season and once in the late breeding season to confirm breeding at an identified colony site. The two visits will allow observers to document breeding behaviors/nest building in the early season and ascertain nesting by observing females being fed by males, and/or nestlings and fledglings being fed in the late season.

Nest searching at colonies should not be completed during the active nesting season.

Searching to find active or old nests greatly increases the chances of nest abandonment or the potential to attract unwanted nest predators and thus should be avoided. If finding more nests within the colony is necessary to map colony extent or age the colony, we recommend conducting nest searching activity starting mid-June until January.

Early Season Breeding (February 14 – mid-March)

This is a key time to locate birds exhibiting courtship behaviors and building nests. If you identify breeding behaviors listed below you can be confident you are in a breeding colony. During this early season it is imperative that observers are very quiet and limit movement when working in and around the colony. When birds are beginning nest construction or egg laying, 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 (*see below*) 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.

Pinyon jay behaviors indicative of breeding colony location:

Record on datasheets using associated codes.

Pair Flying Together (PF) – 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 (MB) – 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 vacate 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 (DF). A small group of individuals fly rapidly through and above trees, emitting loud *Krawks* as they perform steep dives and sharp turns. These flights contain yearlings and adult jays and always seem to contain one or more leaders and a group of followers. Upon landing, individuals continue to chase each other up and down through the tree branches in sharp spiral patterns before initiating another flight.

Food Transfer (FT). 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 (SS). 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. The pair may allopreen.

Stick Manipulation (SM). A male picks up a stick, a twig, or tuft of grass and if the female does not respond, he drops the material. As courtship proceeds, stick manipulation increases in frequency and becomes suggestive of nest-building. You can hear pairs in trees making soft vocalization as they begin to select a nest tree to initiate nest building.

Nest Building (NB). 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 (CNL) – Birds will collect fine, fluffy materials in their bill to line a 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 (BG). 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 will sound the same as nestling and fledgling begging, but in the early season you can assume it is most likely a female begging to her mate.

Copulation (CP). Rarely seen. The birds stay low in the tree, and you could hear a variety of low vocalizations prior to copulation.

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 (R). 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 (N). 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 (B) - 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 (K). 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 (FB). 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 a number of females are incubating, as a flock of males return to feed the sitting females, a cacophony of begging calls may be heard at the nesting colony. 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 by young (YB). Begging call 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 about 2 days after fledging.

Rattle, and Piping Rattle (RT). These calls are given by females. Agitated females will give Rattle calls. This Rattle call has a rather harsh tonal quality. Females Rattle when predators are near nests, when their males sidle too close, or when a non-mate approaches too close. The piping rattle is less harsh and higher pitched than the rattle call.

Late Season Surveys (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 a majority 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), the majority of 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 a large number of helpers and pairs make this an extremely noisy and confusing time for an observer. Feeding bouts may occur as often as once an hour, with the colony site being very noisy for 10 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 first fledged, 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 will have 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:

Ravens 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 or drop 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 spook pinyon jays out of them. Sentinel birds 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 jays nests in are 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 varies 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 located 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 definitively 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 actually 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.

Classifications:

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 does not maintain its structure.

Class 3 - An old (>5 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 which species' nest it is:

Similar Species: Woodhouse's scrub jay and Clark's nutcracker 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 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. Clark's nutcrackers are dark gray overall with black wings and white undertail coverts. Nutcrackers are jay size and have a long dagger like bill.

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 located 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 in a flock and start walking on the ground probing in the soil. They are very vocal and you can hear many rattle, Kaw, and Racka calls. If you locate birds caching in February, searching around the cache for a colony is a good idea. Birds will reuse cache sites, so they are important to identify and record their locations.