

**Northern Colorado Plateau Network  
Point Transect Protocol  
2011**



## ROCKY MOUNTAIN BIRD OBSERVATORY

*Mission: To conserve birds and their habitats*

*Vision: Native bird populations are sustained in healthy ecosystems*

### **Core Values:**

1. **Science** provides the foundation for effective bird conservation.
2. **Education** is critical to the success of bird conservation.
3. **Stewardship** of birds and their habitats is a shared responsibility.

### **RMBO accomplishes its mission by:**

- **Monitoring** long-term bird population trends to provide a scientific foundation for conservation action.
- **Researching** bird ecology and population response to anthropogenic and natural processes to evaluate and adjust management and conservation strategies using the best available science.
- **Educating** people of all ages through active, experiential programs that create an awareness and appreciation for birds.
- **Fostering** good stewardship on private and public lands through voluntary, cooperative partnerships that create win-win situations for wildlife and people.
- **Partnering** with state and federal natural resource agencies, private citizens, schools, universities, and other non-governmental organizations to build synergy and consensus for bird conservation.
- **Sharing** the latest information on bird populations, land management and conservation practices to create informed publics.
- **Delivering** bird conservation at biologically relevant scales by working across political and jurisdictional boundaries in western North America.

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## I. PROJECT OVERVIEW

Rocky Mountain Bird Observatory (RMBO) in cooperation with the National Park Service has developed a program to monitor bird populations that utilizes point-counts along habitat-stratified transects (i.e., point transects) as the primary sampling technique. The goal of the Northern Colorado Plateau Network (NCPN) landbird monitoring effort is to contribute to the regional perspective of status and trends in landbird in three priority habitat types: sagebrush, pinyon-juniper woodlands, and riparian. The point transect portion of this program has been designed to be statistically rigorous and biologically sound, and should produce data for analyses of population trends for most diurnal, regular-breeding landbird species. This document delineates the design and operation of the NCPN landbird monitoring program, now in its 7<sup>th</sup> year. We intend this protocol to instruct our field workers on how to run point counts and for others to follow when establishing monitoring projects of their own, so that the design and methods are comparable.

## II. TRANSECT DESIGN AND OVERVIEW

The sampling design consists of 15 points spaced 250 m apart, connected by a transect line. Because points within a given transect are not independent of each other, the entire transect, rather than the individual point, is the sampling unit. Observers record all avian species detected at each point. In addition, observers also record certain species of concern along the line transect in between points. We estimate detection probability using Distance sampling (Buckland et al. 2001). We then use the detection probability to calculate density estimates for species with greater than 60 detections. We established fifteen 15-point transects within each habitat with two visits to each transect to increase sample size.

Methods for selecting sampling locations differed between the upland habitats and riparian areas. For upland habitats, a gridded sampling frame with an inter-point spacing of 100 m was generated for each of the 16 parks in the NCPN. Inaccessible areas were delineated and eliminated from consideration. For each habitat type, points falling within a habitat patch were pooled across all parks. Perennial streams in the NCPN are limited. Thus, the 15 riparian areas included in landbird monitoring were selected based on availability. To determine the starting locations of the transects, the accessible extent of a riparian corridor was ascertained and measured. For riparian strips longer than the 3.5 km transect, the starting location was randomly determined, but constrained to accommodate the full length of the transect (O'Dell et al. 2005).

We determined the access point for each transect randomly, but all fall on or near a road running through the habitat or within one mile of the habitat (see "IV. Setting up New Sites"). We placed each transect's first point between 0 and 400 m (determined randomly) away from the access point, in a randomly determined direction that leads the observer into the target habitat. From point 1, each transect continues along a pre-selected random bearing for all successive points.

## III. MATERIALS

Before heading out into the field, each technician should be sure s/he has the following (unless otherwise indicated below, RMBO will supply all materials):

- A. **Timepiece** with a countdown timer and a chime;
- B. **Binoculars** (*you must provide this*);

- C. **Declination-adjustable compass** with sighting capability (i.e., a mirror);
- D. **Clipboard** (with instruction sheets/lists attached);
- E. **Writing utensils** (pencil or indelible ink pen) (*3 pencils will be provided by RMBO at the start of the field season; if you lose these you must provide additional writing utensils*);
- F. **GPS unit** with grid locations loaded onto it;
- G. **Rangefinder**;
- H. **Extra batteries**;
- I. **Vegetation and bird data forms** sufficient for all the points planned that morning;
- J. **Plant ID guide**;
- K. **Maps and transect locations**
- L. **Master list of four-letter codes** and;
- M. **Master list of weather and habitat codes**, taped to the clipboard.

#### IV. CONDUCTING THE POINT TRANSECT SURVEYS

##### Seasonal Timing

Point count transects should be performed after all migratory species have returned to the area and as early in the season as possible, but beware of performing them too early and potentially counting a lot of transient migrants, or missing some of the breeders that have not yet arrived. Also, transects within a given habitat should all be surveyed in as short a period as possible--within three weeks; less time, if possible. Obviously, counts performed in sagebrush in late May are not comparable to counts performed in the same habitat in early-July, as most locally-breeding species have completed nesting and are much less vocal in July than they were in May. By limiting the period in which transects in given habitats are surveyed, we reduce the amount of seasonal variability in singing rates, and hence detections, that we capture in our data. Please see Appendix E for the list of dates that are optimal for surveying transects in each habitat. In addition to seasonal timing, each individual point-count transect must be surveyed during the time of day that songbirds are most detectable. Surveys should begin approximately ½ hour before sunrise (once there is enough light to ID birds by sight) and finished before 10am (it may be necessary to finish earlier if it is hot and bird activity decreases).

There are **two aspects** to the collection of bird data along point transects: the **5-minute point counts**, and the **continuous line-transect count of low-density target species** observed between the first and last points.

##### A. Point Counts

You will receive a GPS unit with all of the points for your transects pre-loaded onto it. Follow the GPS unit to each point count station (we will practice this during training). Upon reaching a point, fill out the GPS accuracy and habitat data on the field forms **first**. **DO NOT begin counting until after this is done** Upon reaching a point, record and label the waypoint in the GPS unit, and fill out the GPS accuracy and habitat data on the field forms **first** (including directions to point). **Do NOT begin counting until after you have done this** (however, do identify and make a mental note of the identification and locations of any birds flushed from around the count station upon your approach). Doing this first is important for two reasons: 1) it will ensure that you do not forget to write it down, and 2) it will allow the local birds to “settle down” somewhat after the disturbance you created when approaching the point. Please see “**Appendix A: Explanation of field forms and data codes**” for more instructions on how to record habitat and bird data.

## 1. Habitat Data

Pay particular attention to filling in the squares in the habitat blocks of the data form for each of the 15 points per transect **while at each point**. We will use the habitat data to relate bird use with vegetation features and habitat type, so please be as accurate as possible in providing these data.

## 2. Bird Data

After recording the general habitat data at the point count station activate your timepiece and begin counting and recording the birds you see and/or hear. **The count duration is 5 minutes**. Write the minute in the minute column of the bird datasheet (see Appendix I: Sample Bird Data Sheet). To do this, simply start the timer, and when you hear the first beep (at one minute), write a “2” in under the last bird recorded and keep recording new birds until you hear the second beep (at two minutes). Then, write a “3” under the last bird recorded and continue to write each successive minute under the last bird detected in each one-minute interval until the 5<sup>th</sup> beep when the count at this point is over. **DO NOT** record any other birds after the 5 minutes are over, even if it is an interesting bird (you could record this bird in the notes if you so desire). If you do not detect any birds during an interval, record **NOBI** (No Birds) in that interval. We are providing a time piece that beeps every minute and you must learn how to use it properly (we will go over this at training). Please make certain that the time piece’s beeper is on and is functioning as it is impossible to pay attention to the birds and to note how much time (by looking at your time piece) has passed at the same time. All birds detected during the 5-minute count period will be recorded using the **correct 4-letter codes** (See Appendix F for bird species codes; most are obvious, but please commit to memory those codes that are unusual and do not follow the general rules). You should also record birds flushed from the count station upon arrival (and measure their distance from the point), because we assume that these birds would have remained at their original locations were it not for the disturbance created by the observer.

For each independently detected bird, you should record:

- 1) the **species**, using the appropriate 4-letter code,
- 2) the **radial distance** in meters from you to the bird,
- 3) **how** the bird was detected (by song, call, drumming, other aural cues, or visually),
- 4) If the bird was seen at all during the minute,
- 5) the **sex** of the bird if known (if the bird is a juvenile, put in J for sex),
- 6) if it is a low-density target species (“99” birds, see Appendix B), the **bearing** from you to the bird, and
- 7) the **cluster size** and **cluster ID** code for any birds that observed as part of a cluster (i.e., non-independent detections).

While conducting counts, be sure to focus primarily on birds that are close to the point. While we do ask you to record all birds detected, distant birds have little effect on density estimates. However, missing close birds can have a significant effect on density estimates. Also, be sure to look and listen in all directions, including up. It is best to slowly rotate in place while you are counting; making three complete turns in the six minutes is probably adequate. **Don’t forget to look up!** It is very important to stay in one place while counting. It is acceptable to take a step or two away from the point in order to identify a bird that you have detected from a point, but cannot identify from the point, but **ALWAYS** return ASAP to the point. **DO NOT** chase birds during the count.

After the five minutes are up, you may chase down a bird that you couldn't identify on the point in order to get an identification for the point, but do not leave the point during the five minutes and do NOT record birds on the point count that were only found while chasing another bird. **Remember: Consistency of methods and coverage is the key to useful data!**

Be aware of what is going on around you and realize that you may hear or see individual birds on multiple points. It is okay to record the same bird on multiple points only if the bird has not moved from the location where you originally detected it. For example, if you see a Western Meadowlark on a powerline, and that same Western Meadowlark is visible from the next two points in the same location, you would record it on all three point counts. However, if you see a Red-tailed Hawk soaring above you, and still see the hawk soaring on another point, only record this bird once.

You should measure all distances using the Rangefinder whenever possible. If you cannot get a direct line of sight to the location of a bird, use the Rangefinder to measure to a point close to that bird, and then add or subtract the additional estimated distance between that point and the bird to obtain the best possible distance estimate from the point to the bird. Distance-sampling relies upon the assumption that observers measure all distances accurately, so *always use your rangefinders as much as possible!*

**Always measure distances to where you first detected the bird, not to where you first identified it.** *For low-density target species observed at point counts, measure the radial distance to each bird (or estimate when necessary) **AND record the bearing from the point to the bird** (see Transect counts, below).* For birds that are vocalizing but not seen, try to pin-point their locations to a specific tree/bush, then measure the distance to that tree. If you are unable to pin-point its location to a specific tree/bush, then estimate the distance, but **do not round distances to the nearest 5- or 10-m interval**. Rounding distances causes heaping at popular values and makes analysis more problematic! If you see/hear a bird that is beyond the range of the Rangefinder, measure to the furthest object in the direction of the bird that the Rangefinder can measure to, and estimate the distance beyond that object to the bird. Add your estimate plus the measured distance and record the sum as the total distance.

**B. Transect Counts** (i.e. between points)--Conduct a continuous line transect count *between the first and last points* of the transect and record all observations of low-density target species (99 birds, see Appendix B) and other rare or unusual bird species. For each low-density target species detected, you should **measure (or estimate) radial distance and take a bearing from your position on the transect to the target bird**. Use your compass to sight in the direction of the bird and record the bearing in the appropriate space on the field form. Make sure that you are on the exact bearing from your previous point to your next point before measuring and recording this data. **You should record bearings for all low-density target species detected on transects, regardless of whether you record them on points or while in between points.** Do not forget to take a bearing for low-density targets detected during point counts, as the time spent at point counts is part of the *continuous* line transect. Fill in the "How" and "Sex" columns for each low-density target just as you would for any other bird. For all low-density target species observed between points, record "99" as the point number. **Record any species on the "99" list or that you think might be rare for the area you are surveying in.**

While walking between points, move at a constant speed and concentrate on listening and



looking for target species. Keep your eyes and ears open and spend as little time as possible looking down. However, do watch where you are going enough to follow the correct compass bearing and avoid hazards. If you detect target species as true flyovers (i.e., they are not using the habitat), enter the species code and “F” in the how detected column, but do not estimate distance to the bird(s) unless they land. If you already recorded an individual bird on a point, do NOT count it again. **However, if you record a target bird in between points, and then while conducting your next point count you hear/see that same individual bird again, remove it from the “99” category, add it to your point count, and treat it as though it was first detected during that point count.** The line transect begins after the first point is conducted and ends after the last point is conducted, so do not record any 99 birds observed outside of this time frame. You can add these birds to the notes section, but not the point count data.

When entering the point count data into the database, be sure to enter any 99 birds recorded between points with the point you came from, not the one you are going to. So, if you detect RNA while going from point two to point three, you would enter it in the database along with the birds you detected on point two. Also, be sure to check the box indicating this bird is a 99 bird and leave the space for time period blank, as it was not detected during the five-minute interval.

## V. POTENTIAL PROBLEMS WHEN CONDUCTING POINT COUNTS

### A. Window species

This is “listening through” (not detecting) a particular common species because you are habituated to it (Mourning Dove is a common window species).

### B. Look and Listen everywhere

Be sure to look up regularly, particularly in taller forest types and, particularly if you are wearing a hat. **Do not wear sunglasses or hats that can affect your hearing while counting birds!** This includes caps that pull down over your ears as well as full-brimmed hats that can deflect sound away from your ears. Be sure to look and listen in all directions (try to look and listen in all directions equally).

### C. Stand at Points

**Do not sit or kneel** as this can reduce the number of individuals recorded, by decreasing visibility, audibility and dexterity. If you are tired, take a short break after the point count. As long as you start early, you should have plenty of time to rest along the way.

### D. Recording Data

Unless specifically instructed, do not use a second person as a recorder; this can enable the observer to record more birds (or fewer, if the recorder detracts from the job at hand or creates more disturbances). We may occasionally assign someone to conduct point counts with you, and you will note this person’s presence on the datasheet.

### E. NO Pishing

Do not attract birds to you. Pishing is permissible after the count in order to attempt to identify an individual that was not identifiable on the count, but do not add other individuals after the count that were not first detected during the count period.

### F. Airplane (and other) Noise

If audibility of birds is reduced by mechanical noise, interrupt the count (i.e., stop your timer),

and restart when the noise abates so that the total time still equals a six-minute count.

### **G. Guessing**

Never guess on the identity of a bird. Instead, use an unknown code (e.g. unidentified sparrow - UNSP) for those individuals about which you're not sure. However, recording a lot of unidentified birds is an indication that you need to learn/practice more before performing point counts.

### **H. Know the Area**

The day before conducting a point count transect, check out your survey area and familiarize with it so you know what to expect. Plan out an access route during the daylight the day before, that way you will be able to find your way easier if you have to hike in the dark the next morning.

### **I. Practice**

Practice in the habitat before counting for real. Be familiar with the songs and calls of all species found in a habitat before conducting point counts in that habitat. Use habitat-specific bird data queried from the RMBO Avian Data Center website ([www.rmbo.org/public/monitoring/countseffort.aspx](http://www.rmbo.org/public/monitoring/countseffort.aspx)) along with audio recordings to practice before (and during) the field season.

### **J. Weather**

Weather can always be a factor when conducting point counts. Never conduct a point count when it is raining, as birds will not be very active and visibility may be poor. Also, do not conduct a point count if the wind is strong enough to hinder your ability to hear bird calls and songs, as this will affect the number of birds you are able to detect.

## VI. LITERATURE CITED

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## **APPENDIX A. EXPLANATION OF FIELD FORMS AND DATA CODES**

Please refer to Appendices G, H, and I to view example data sheets while reading the information below.

### **I. Transect Description Sheet**

#### **A. Observer Initials**

Record your first, middle, and last initials here.

#### **B. Date Conducted**

Record the date the transect was conducted

#### **C. Map Accurate**

If the topographic map does not accurately reflect the transect, check no here so that we can make changes to it for the following field season.

#### **D. Transect Accessible to**

Please record how accessible the transect is (all vehicles, high-clearance, or 4WD). It is important for us to know the accessibility of each transect so that we can assign them to field technicians according to the type of vehicle they drive.

#### **E. DeLorme Page**

Don't forget to record the DeLorme page and coordinates the transect is on. This allows future field technicians to quickly locate the transect on the road map.

#### **F. Access Point UTM's**

See "H. Directions to Access Point" below.

#### **G. Time Required to do the Transect**

It is helpful to have an idea of what to expect before conducting a transect. Some transects are located on easy terrain and can be conducted relatively quickly, while others are on very difficult terrain and take a long time. Please record the amount of time it took you to conduct this transect so future field technicians can plan accordingly. If the transect required an hour hike to access it, add this in the notes section.

#### **H. Directions to Access Point (VERY IMPORTANT!)**

We will provide you with a transect description sheet and topographic map for each transect assigned to you, as well as a road atlas for your study area. The transect description sheet will contain road-based directions on how to find each transect. If the directions are incomplete or inaccurate, please record updated directions on this sheet and enter these directions into the database later. Provide explicit directions from some nearby town, major intersection, or geographical feature readily found on a map to the access point in the space provided for directions on the transect description sheet. Provide mileages from intersections or other landmarks using your odometer. Try to locate the most logical and efficient location to access each transect. This location will become the Access Point. This point is the end goal for the directions you provide. For all sites, take GPS readings and record **UTM coordinates** for each access point. Also, **be explicit in your description about the exact location of the access point** (e.g. "the right post of the green metal gate" or "the NE corner of the cattle guard").

Be as clear and accurate as possible when recording directions. Remember, someone will use your directions next year to find these transects.

**Example:** CP-LR01 - Start measuring at the intersection of HWY 128 and HWY 191 in Moab. Drive north on HWY 191, and at mile 2.3, turn right into Arches National Park. Drive north on the main park road, and at mile 6.5, pass the Courthouse Towers Overlook. At mile 7.5, cross Courthouse Wash and park at a large pullout on the left side of the road. The access point is a brown NPS sign, "Courthouse Wash."

### **I. Transect description**

Provide the **distance** and **bearing from the access point to the first point** (do not provide bearing from first point back to the access point). Then, provide the bearing you follow to each of the remaining points along the transect. You should have bearings provided to you from previous years. If no bearings are given and you have GPS coordinates provided in your unit, please record the bearings as you go. To do this, use the "go to" function on the GPS to determine your bearing from the last point. It is important to understand that this bearing will be the inverse of the bearing you followed to reach the current point (e.g. if you traveled on a bearing of 264 degrees to reach the point, the GPS unit will tell you that the bearing to the point is 84 degrees). Try to adhere to the bearings as much as possible. In some situations, such as when you are conducting a transect in a linear habitat, it becomes more important to stay within the target habitat than it is to follow the bearings exactly. Use your best judgment in this situation, but try to follow the directions as much as possible. Always be sure to record your bearing from one point to the next, as this information is crucial to the transect aspect of the point-count transect. Feel free to provide *between-point accounts*, when necessary, describing the topography, habitat, landmarks and/or other features that you pass prior to arriving at the next count station. ***It is especially important that you record any turns, changes in bearings, or other deviations that you make from the original transect bearing.*** As this is a long-term monitoring program, the importance of providing detailed directions/descriptions for each transect cannot be overstated! GPS locations alone are not always sufficiently reliable as the accuracy of GPS locations can vary significantly.

### **J. Notes, Updates, and Camping Information**

Provide directions and a description of camping options in the area. Sometimes, camping is available right at the Access Point. If not, then record directions to where you camped and provide UTM's for that location. It is important for future field technicians to know what their camping options are before arriving at the transect. If camping is unavailable (i.e. transect is surrounded by private land) then record where you stayed.

Enter information relevant to the site, problems encountered during the transect, interesting birds seen, cool scenery, or other tidbits that either don't really fit in other places or that future surveyors might find interesting.

## **II. Point Information Data Sheet**

### **A. Points not conducted**

If you are unable to survey a point on a transect, record the reason you were unable to survey on this data sheet. Common reasons for not surveying a point are:

- 1) Inaccessible due to terrain

- 2) Ran out of time
- 3) Weather (rain or wind)

These are just a few reasons; you may run into other unexpected issues in the field. Just be sure to take detailed notes on why points were not conducted. We need to report this information to the park service after the field season, so the more information you provide us, the less we will have to contact you with questions after the field season.

### III. Vegetation Data Sheet

### A. Site Data

1. **Observer:** Enter your first two initials *and your full last name*
2. **Date:** Enter the date in the format: MM-DD-YY
3. **GPS Unit #:** Enter the number from the RMBO silver property tag on the back of your GPS unit
4. **Program:** Enter the two-letter code identifying the program to which the point transect belongs (e.g. CP, Colorado Plateau)
5. **Transect ID:** Enter the 4-character code identifying the transect and number (e.g. PJ08)
6. **Access Point:** You should enter the access point in the same manner as the point UTM's, using 00 as the point number. Mark this point in your GPS unit as well.
7. **Time:** Enter start and stop times for entire transect (not individual points) using 24-hour clock
8. **Sky:** (start and end): Enter one-digit codes at beginning and end of transect (not at points)  
*0=0-15% cloud cover      1=16-50% cloud cover      2=51-75% cloud cover*  
*3=76-100% cloud cover      4=fog      6=drizzle*  
***You shouldn't survey in any other conditions!***
9. **Wind:** (start and end): Enter one-digit codes at beginning and end of transect  
*0=Less than 1 mph; smoke rises vertically*  
*1=1-3 mph; smoke drift shows wind direction*  
*2=4-7 mph; leaves rustle, wind is felt on face*  
*3=8-12 mph; leaves, small twigs in constant motion; light flag extended*  
*4=13-18 mph; raises dust, leaves, loose paper; small branches in motion*  
***YOU SHOULDN'T SURVEY IN ANY OTHER CONDITIONS!***
10. **Temperature:** (start and end): Use °F (if you do not have a thermometer estimate to nearest 5°)
11. **6-Character Point ID:** Enter the UTM Easting and Northing for each point location

**12. UTM Level of accuracy:** enter the level of accuracy that is displayed on your GPS screen (+/- X meters). You must do this in the field at each point, since this information cannot be stored in the unit along with the UTM.

## **B. Habitat Data**

Unlike the bird data, which we record to an unlimited distance from each point, we only record habitat data within a 50-m radius of each point.

### **1. Point Info**

**a. Distance to road:** Enter the distance in meters for **EACH** point based on your best knowledge of the site. **You should ignore roads beyond 100m.** *For our purposes, a “road” must be substantial enough so that it either causes a significant disruption of the understory vegetation OR a break in the canopy.* For example, a grassy 2-track running through an open meadow should not be considered a road, whereas a gravel or dirt road that forms a 3 to 4-m wide break in the grass cover would be considered a road. Similarly, an old, pine needle-covered logging track in an open forest situation is not a road, whereas a logging road that causes a clear and wide break in the woody understory vegetation or in the forest canopy is a road. We will cover this topic thoroughly during the training session.

**b. Private Property:** Enter “Y” for yes and “N” for no for **EACH** point.

**c. Bearing to Point:** Enter the bearing your compass shows to the point

### **2. Overstory (forested habitats only)**

**a. Structural stage:** At each point-count station, identify and record *the structural stage that best describes the overstory trees* within a 50-m radius of the point-count station. Please use the following scale (see Appendix C for detailed habitat specific information on structural stages):

- 1) grass-forb (i.e., no or very few overstory trees present);
- 2) shrub-seedling (i.e., generally trees below head height);
- 3) sapling-pole;
- 4) mature;
- 5) old-growth.

**b. Canopy Cover:** Estimate closure of the combined canopy trees to the nearest 10 percent within a 50-m radius of the point-count.

**c. Mean Canopy Height:** At each point-count station, estimate the *average height to the top of the canopy trees* (in meters) within a 50-m radius circle to the nearest meter. Use a rangefinder to help gauge estimates.

**d. Species Composition:** Identify the dominant tree species in the overstory and record the **relative abundance (%)** of the total overstory occupied by each species within a 50-m radius of each point-count station; you can list up to five species. Note that if only one tree species is present in the overstory, the relative percent should be 100%, regardless of how much of the circle the tree species occupies. Record tree

species on the data form using the correct 2-letter vegetation code (see Appendix D for plant species codes). Note that Snags (SN), dead trees (DC or DD), and dead burned trees (BU) should be considered here. Estimates in increments of 10% are adequate in most situations. However, if there are only a few individuals of a certain species, use smaller percentages to accurately reflect that while being sure that the total of all species sums to 100% (i.e. DF 98%, SN 2%).

### 3. Mid-story (forested habitats only)

**Sub-canopy species:** You should only fill out this section if, **and only if**, there is a *distinct* sub-canopy comprised of individual trees different from those making up the overstory. Enter up to three species' two-letter codes in the spaces provided (see Appendix D for plant species codes) in descending order of abundance. If there is no distinct sub-canopy, leave the provided spaces blank. This evaluation should not include foliage on mid-story branches from overstory trees, only those distinct trees that form a canopy (even if it is only one tree) below the overstory canopy.

### 4. Shrub layer

Use this category to estimate the amount and species makeup of any woody shrub layer (*including* seedling trees) present. Generally, shrubs are >0.5 meter high and <5.0 meters high. Anything taller than 5.0 meters should be considered part of the sub-canopy (e.g. very tall oaks or aspens that are of greater height); anything shorter than 0.5 meter should be considered in the ground cover category (except for the rare instances where there is a distinct shrub layer that are all less than 0.5 meter (sage transects) – in this case, record all shrubs species as a shrub layer and estimate cover as usual).

**a. Shrub Cover:** Estimate the *total* percent coverage of all woody shrub species AND seedling trees present within 50-m of the count station to the nearest 10%.

**b. Mean height:** Estimate the average height to the nearest 0.5 meter of the shrub layer.

**c. Species composition:** Identify the shrub species (including seedling trees) present and record the *relative* percent of the total shrub layer occupied by each species within a 50-m radius of each point-count station; you can list up to five species. Note that if only one shrub species is present, the relative percent should be 100%, regardless of how much of the circle the species occupies. Record shrub species on the data forms using the correct two-letter vegetation code (see Appendix D for plant species codes).

### 5. Ground Cover

**a. We classify ground cover into five categories:**

- 1) woody vegetation below 0.5 m (roughly knee height) including cacti;
- 2) dead and downed trees (also of a minimum of 6" dbh);
- 3) broad-leaved herbaceous plants and forbs;
- 4) bare ground (including rocks) and/or leaf litter; and



5) grass.

**b. Cover:** For each of these categories, estimate the *total* percent of ground cover within 50 meters of the count station that qualifies for each. In most all cases, the categories in this section will add up to 100%. The only time this won't happen is if you have some ground cover type that is not on the data sheet (i.e. water). If water is present at a point, make a note of it at the bottom of the vegetation data sheet

Note: Please put a "0" in the box for any ground cover category that is absent from the 50-m circle, rather than leaving it blank.

**c. Grass height:** Estimate in centimeters the average height of the grass within the 50-m radius. Learn where 10cm, 20cm, 30cm, etc. are on your leg as a guide. You can also use your data sheet. 8 ½ " x 11" = 21.5cm x 28cm.

## 6. Croplands

If the point you are surveying is in cropland, please specify whether it is **bare (plowed), fallow, or active (and indicate crop species if known)**. Write these data in across the applicable row for the point in the section **Shrub Layer**.

## 7. Other (Y/N)

**a. Human structures:** Record either Y or N to indicate the presence or absence of human-created structures (e.g. cabins, bridges, mine shafts, etc) within a **50-m** radius of the count station. This includes any human structure that would influence (positively or negatively) the detection or the behavior of birds in the area, such as something that a bird could use for perching or nesting (e.g. windmill, gas well, mine shaft, building, or power pole). For example, you would not need to record a stop sign in a forested area because there are already plenty of places for a bird to perch. However, you would record a stop sign in grassland, as it provides a perch for singing that is higher than the surrounding vegetation.

**b. Cliff/rock:** Record either Y or N to indicate the presence of cliffs or large rocky outcrops within a **50-m** radius of the count station.

**c. Prairie dog town:** Record either Y or N to indicate the presence of a prairie dog town. Abandoned towns will be marked as Y.

**d. Prairie dog presence:** Record either Y or N to indicate the presence of prairie dogs. If you have reason to believe a colony is active, but they are all inside (excessive heat or cold), mark Y. Look for fresh sign such as scat or diggings.

**e. # of Snags:** Count the numbers of snags (>3 meters high, >6 in. dbh) within a **50-m** radius of the count station.

**f. Tamarisk beetles:** Record either a Y or N to indicate the presence of tamarisk beetle within the 50m radius. Generally this will be in Lowland Riparian habitat. We will go over how to identify tamarisk beetles during training.

**g. Tamarisk defoliation:** Record either Y or N to indicate the presence of defoliated tamarisk vegetation, due to beetle foraging. We will go over what this looks like during training.

#### IV. Bird Data

##### A. General Info

It is extremely important to fill in this data at the bottom of each and every bird form. If a bird form does not have this information and it becomes separated from the vegetation data sheet, then there is no way for us to know what transect the data came from. This data would become useless and an entire day's worth of data collection would be lost. Before starting your first point count, be sure to fill out this information:

- 1. Observer:** Fill in your first, middle and last initials on all pages of the bird form.
- 2. Project:** Fill in the 2-letter project code on all pages of the bird form (i.e. Colorado Plateau= CP).
- 3. Transect Name:** Fill in the 4-character transect ID code (habitat and number) on all pages of the bird form (i.e. SA10).

##### B. Point Data

- 1. Point #:** Enter the number of the point (1-15) on the transect. **NOTE:** for entries for low density species *between points* enter "99" (see below for more information on "99" birds).
- 2. Species:** All birds detected during the 5-minute count period should be recorded using the correct 4-letter codes (See Appendix F for bird species codes; most are obvious, but please commit to memory those codes that are unusual and do not follow the general rules). If you ever record a bird and are unsure of the four-letter code, make a note of it in the notes section at the bottom of the page to avoid confusion later.

Never record the same bird twice. If you already recorded a bird on an earlier point and detect it again at the next point, do not record the bird again. We do not want to double count any birds.

PLEASE, PLEASE use correct codes, as it makes data entry and analysis easier. Species that cause particular problems for observers include: **Northern Shoveler** (NSHO, not NOSH), Ring-necked Pheasant (RINP, not RNPH), **Western Wood-Pewee** (WEWP, not WWPE), **Gray Jay** (GRAJ, not GRJA), **Tree Swallow** (TRES, not TRSW), **Bank Swallow** (BANS, not BASW), **Barn Swallow** (BARS, not BASW), **MacGillivray's Warbler** (MGWA, not MAWA), **Yellow Warbler** (YWAR, not YEWA), **Yellow-rumped Warbler** (AUWA - for Audubon's Warbler, MYWA for Myrtle's Warbler, not YRWA), **Lark Bunting** (LARB, not LABU), **Savannah Sparrow** (SAVS, not SASP), **Lazuli Bunting** (LAZB, not LABU) and **Red-winged Blackbird** (RWBL, not RWBB).

If you detect a bird that you are unable to identify, use the code **UNBI**. Never guess on the identity of a bird, because this amounts to falsifying data. If you are unsure, we would prefer you to record UNBI rather than incorrectly identify a bird. However,

recording a lot of unidentified birds is an indication that you need to study up and practice more before performing more point counts. Following is a table of unidentified bird codes you should use:

Unknown Bird	Code
Unknown Accipiter	UNAC
Unknown Bird	UNBI
Unknown Blackbird	UNBL
Unknown Buteo	UNBU
Unknown Chickadee	UNCH
Unknown Duck	UNDU
Unknown Empidonax	UNEM
Unknown Falcon	UNFA
Unknown Finch	UNFI
Unknown Flycatcher	UNFL
Unknown Grouse	UNGR
Unknown Gull	UNGU
Unknown Hawk	UNHA
Unknown Hummingbird	UNHU
Unknown Jay	UNJA
Unknown Oriole	UNOR
Unknown Owl	UNOW
Unknown Raptor	UNRA
Unknown Sandpiper	UNSA
Unknown Sparrow	UNSP
Unknown Swallow	UNSW
Unknown Vireo	UNVI
Unknown Warbler	UNWA
Unknown Woodpecker	UNWO
Unknown Wren	UNWR

**3. Measuring Distances:** Using your Rangefinder, measure the distance from the point to each and every individual bird detected during the count and record the distance in meters on the data sheet under “Radial Distance”. If you detect a bird beyond one kilometer (1000m), fit number in the three spaces provided as best you can. **Please note that we record radial distance (horizontal distance), not actual distance.** If you detect a bird singing in a tree directly above you, the distance would be 0, not how far the bird is above you. We will review this during training.

You should measure all distances to birds using your Rangefinder whenever possible. If you cannot get a direct line of sight to the location of a bird, use the Rangefinder to measure to a point close to that bird, and then add or subtract the additional estimated distance between that point and the bird to obtain the best possible distance estimate from the point to the bird. Distance-sampling relies upon the assumption that you measure all distances accurately, so always use your rangefinders as much as possible!

Always measure distances to where you first detected the bird, not to where you first identified it. For birds that are vocalizing but not seen, try to pin-point their locations to a specific tree/bush, then measure the distance to that tree. If you are unable to pin-point its location to a specific tree/bush, then estimate the distance, but do not round distances to the nearest 5 or 10 meter interval. Rounding distances causes heaping at popular values and makes analysis more problematic! If you see or hear a bird that is beyond the range of the Rangefinder, measure to the furthest object in the direction of the bird that the Rangefinder can measure to, and estimate the distance beyond that object to the bird. Add your estimate plus the measured distance and record the sum as the total distance.

Every bird recorded on point counts must have a radial distance measurement associated with it! This is imperative! Because our monitoring programs rely on Distance-sampling techniques and analyses, birds recorded without associated distances are essentially useless data that we cannot use in analysis! We will further explain the premises behind Distance-sampling during the training session. But please, please, PLEASE do not forget to measure and record radial distances for EACH bird recorded on point counts.

**4. How:** In the “How” column, record **how each bird was detected**, i.e., whether the bird was detected by ear (V=visual, C=calling, S=singing, D=drumming, F=Flyover, or O=other aural, e.g. wing beats). Enter the code for how you **first** detected each individual. Remember that how you detect a bird is different from how you identify it.

When birds sing, this is important information for us to know, as it is a strong indicator that the species is holding a breeding territory (and thus a potentially breeding species in the study area). **If you first detect a bird by means other than it singing and that same individual later sings, neatly write an ‘S’ in the ‘How’ box next to the first code entered.**

**5. Sex:** In the “Sex” column, record the sex of the bird, if known (F=female, M=male, U=unknown). Change a U to an M or F if you later see or otherwise identify the same individual as male or female. Assume that singing birds are males only if: 1) you can see that the singing bird is a male, 2) it is a warbler, or 3) it is singing emphatically and repeatedly. Females of many species will vocalize, although generally their vocalizations are less emphatic and extensive. You should not record sex for birds giving only sex-unspecific calls.

#### **Example 1:**

On a point count, you detect six birds. You see a male RNSA, you hear a drumming RNSA, a calling WBNU, a singing WETA, and a singing CHSP, and you see a brown-plumaged CAFI. You should record the radial distances for all six individuals. In order, the “How” column should be filled in with V, D, C, S, S, and V. Fill in the “Sex” column: M, U, U, M, M, and U respectively (male CAFI require two years to achieve adult plumage, thus a brown-plumaged bird cannot be sexed in the field).

**6. Bearing:** When recording low-density target species on point counts and in between points, use your declination-adjusted compass to site in the direction of the bird and record the true bearing to the bird. If you detect a bird at a bearing of 0/360°, please record this bearing as 360° for consistency and to avoid confusion.

**7. Transect notes:** Enter information relevant to the site or individual points in the notes section at the bottom of the data sheet. It is very important to make notes about rare or unusual birds here. After the field season, RMBO staff review the data and look for any detections that seem odd or out of place. If you positively identify a species that you believe we may question later, it is helpful to write notes to affirm your detection.

This is also the location to record problems encountered during the survey, cool scenery, or other tidbits that either don't really fit in other places or that future surveyors might find interesting. If you are unable to complete a point, record the reason why here.

When entering data into the database, don't forget to look through the notes sections on your data sheets. Notes that are useful to someone surveying next year should be entered on the transect description page.

**8. Clusters:** "A cluster is a relatively tight aggregation of objects of interest..." (Buckland et al. 2001). In our point count sampling, clusters are actually our unit of observation, with most cluster sizes = 1. There are generally two cases in which cluster sizes are > 1: flocks, and paired birds. In either case, we define a cluster as birds of the same species that you observed TOGETHER (foraging, flying, perching, or obviously interacting with each other). Two males of the same species singing 20 meters apart do NOT constitute a cluster. Distances between members of a cluster should be very short.

How to record clusters:

**Flocks:** When individuals of the same species are obviously in a flock and cannot be readily sexed (e.g. Cliff Swallow or Pine Siskin), record the distance to the center of the flock and record the number of individuals in the "Cluster Size" column of your data form. You do not need to enter a Cluster Code. When you can determine sex, enter the number of males on one line, and the number of females on the next line, with the appropriate number of each sex in the corresponding "Cluster Size" boxes. Then enter the same letter on both lines for the "Cluster Code" (a, b, c ...).

**Pairs:** Often you may hear a bird singing or calling, look up, and see that it is a male bird with a female perched or foraging nearby. Or you may see one individual moving about, raise your binoculars to identify it, and observe that there are actually two individuals of the same species but opposite sex in that location. In these cases, enter the male and female on separate lines of your data form, with the appropriate codes for "HOW" detected. In the first scenario, the male "HOW" = S(inging) and the female "HOW" = V(usual). In the second scenario, "HOW" = V(usual) for both the male and female. In both cases enter the same letter for the "Cluster Code" of each member of the pair (a, b, c ...).

**Other aggregations:** For sexually monomorphic species, you may observe two birds together but not be able to determine their sexes. If they were detected by the same method (Visual, Singing, Calling, Drumming), they can be entered on the same line of your data form with no "Cluster Code". If you detect them by different methods, enter them on separate lines, with a common "Cluster Code".

Example:

After recording a Western Tanager (WETA) and an American Robin (AMRO) on a point count, the observer hears a Black-headed Grosbeak (BHGR) give its distinctive squeaky call note. The observer turns to see the bird and notes that the calling bird is a male BHGR 27 meters away AND also notes that there is a female BHGR in the same tree, but about 29 meters away. Next, the observer hears 5 Pine Siskins (PISI), looks up, and measures that they are 36-38 meters away. Finally, the observer hears a Mountain Chickadee (MOCH) calling, looks up and sees that MOCH as well as a second MOCH in the same tree, both at 17 meters away. The sex of both individuals is unknown, but the method of detection differs, so record them on separate lines with a common Cluster Code. See table below.

The observer's data looks like this (with a dash indicating no entry):

Point #	Species	Radial Distance	How	Sex	Cluster	
					Size	Code
03	WETA	46	S	M	1	-
-	AMRO	103	S	M	1	-
-	BHGR	27	C	M	1	a
-	BHGR	29	V	F	1	a
-	PISI	37	V	U	5	-
-	MOCH	17	C	U	1	b
-	MOCH	17	V	U	1	b

**9. Flyovers:** Flyovers are birds that are not using the habitat in the vicinity of the point count and are only observed traveling high above the area, and not landing within sight. For true flyovers that are not using the surrounding habitat, enter the species code, enter an “F” in the “How” column, and draw a short line through the distance column – i.e. you do not need to estimate distance for flyovers. However, individuals of species that habitually hunt on the wing (e.g. raptors, swallows, swifts) and that appear to be foraging or hunting in the vicinity around the point, should NOT be treated as flyovers, and instead should be recorded as any other bird recorded on the point count. Additionally, individuals that you first detect in flight that are simply flying from perch to perch within the habitat should NOT be recorded as flyovers. Provide distance estimates to these flying individuals where you first detected them and record the best how-detected variable.

**10. “99” Birds:** While walking between points, record all low-density birds species on the list of “99” birds (see Appendix B). Record the same data you would during a point count (species, distance, how, sex, cluster). Also record the **bearing** to the bird from the line transect. **It is very important to make sure you are on the bearing between points when you record this information.** If you need to leave the bearing in order to avoid an obstacle and detect a 99 bird, note where you detected the bird, return to the between point bearing, and then collect your data.

**Don't forget to record the bearing to 99 birds even when you detect them during a point count!**

**12. VERY IMPORTANT: Check over your point-count data before leaving each count station** to make sure you recorded all the required information (e.g. distances,

how/sex info, etc.). Skip a line between entries for individual points. On the data sheet, you should group together all birds recorded on a particular point; then leave a blank line before starting entries for the next point.

## **V. OTHER IMPORTANT REMINDERS**

**Once you finish your transect and before leaving your sites, don't forget to:**

- 1) Check to make sure you entered your observer initials, transect#, and sheet #'s at the bottom of EACH page!**
- 2) Record the end of transect data (time, temp, sky, wind, transect notes) IMMEDIATELY UPON COMPLETING THE TRANSECT!**
- 3) Go through your data sheets carefully to make sure you have not forgotten to record any data. You are not done working until you've reviewed your data from the morning!**
- 4) Provide clear and explicit directions to the access point, if you have not already done so!**

## **APPENDIX B: LOW-DENSITY TARGET SPECIES (“99” BIRDS)**

### **Northern Colorado Plateau Network**

Record radial distance **and bearing** for these species whenever they are encountered anywhere along a transect in ALL HABITATS:

- ALL galliforms
- Turkey Vulture
- ALL raptors
- ALL owls
- Common Nighthawk
- Common Poorwill
- ALL woodpeckers (except NOFL)
- Black Phoebe
- American Crow
- Black-capped Chickadee
- Mountain Chickadee
- Red-breasted Nuthatch
- White-breasted Nuthatch
- Western Bluebird
- Townsend’s Solitaire
- Northern Mockingbird
- Lucy’s Warbler
- Yellow-rumped Warbler
- Common Yellowthroat
- Blue Grosbeak
- American Goldfinch



## **APPENDIX C. GUIDELINES FOR CLASSIFYING STRUCTURAL STAGE BY HABITAT**

The following characteristics can generally define the various structural stages of a habitat. Use this information as a guide to help you better understand what we mean by “structural stage”. Expect variability among sites depending on geographic location, elevation, aspect, slope, soil quality and other site characteristics. Therefore, you must use your head when judging structural stage. The important thing is to roughly assess the size (structural stage) and density (canopy coverage) of the trees at each point.

You should record all data regarding habitat on page one of the field form *prior to beginning each point count*.

### **Pinyon-Juniper**

- 1: Grass-Forb stage: Grasses and forbs dominate; saplings and small trees are absent.
- 2: Shrub-Seedling stage: Juniper and/or woody shrubs are present; pinyon seedlings are generally absent or sparse.
- 3: Sapling-Pole stage: Junipers average ~2 m in height; pinyons 2-5 m in height. Few if any snags are present.
- 4: Mature stage: Wide range of tree sizes may be present; pinyons are generally between 6-18 inches dbh and 3-10 m in height; junipers are typically 6-12 inches dbh and average 6 m in height. Snags 6-20 inches dbh are typically present.
- 5: Old-Growth stage: Virtually indistinguishable from Mature stage, but incidence of snags, litter and downed material is generally higher.

**APPENDIX D. KEY OF TWO-LETTER CODES FOR SHRUBS AND TREES**

<b>Code</b>	<b>Shrubs/Small Trees</b>
AL	Alder sp. ( <i>Alnus spp.</i> )
AB	Alder-leaved buckthorn ( <i>Rhamnus alnifolia</i> )
AP	American plum ( <i>Prunus americana</i> )
AC	Arizona Cypress ( <i>Cupressus arizonica</i> )
BE	Beaked hazelnut
BG	Beargrass ( <i>Nolina spp.</i> )
BI	Birch spp. ( <i>Betula spp.</i> )
BB	Blackberry/Raspberry ( <i>Rubus spp.</i> )
BL	Blackbrush ( <i>Coleogyne ramosissima</i> )
BF	Buffaloberry ( <i>Shepherdia canadensis</i> )
BH	Bush honeysuckle ( <i>Lonicera spp.</i> )
CC	Choke cherry ( <i>Prunus virginiana</i> )
CH	Cholla ( <i>Opuntia spp.</i> )
CR	Cliffrose or bitterbrush ( <i>Purshia spp.</i> )
CJ	Common juniper ( <i>Juniperus communis</i> ) – low growing shrub in high elev. (NOT the tree)
CB	Corkbark Fir
DH	Desert Holly ( <i>Berberis fremontii</i> )
DO	Desert Olive ( <i>Forestiera neomexicana</i> )
EB	Elderberry ( <i>Sambucus spp.</i> )
FB	Fendlerbush ( <i>Fendlera rupicola</i> )
GO	Gambel oak ( <i>Quercus gambelii</i> )
GB	Gooseberry/Currant ( <i>Ribes spp.</i> )
GW	Greasewood ( <i>Sarcobatus spp.</i> )
HA	Hawthorn ( <i>Crataegus spp.</i> )
HB	Huckleberry ( <i>Vaccinium spp.</i> )
IB	Indigo bush or Leadplant ( <i>Amorpha spp.</i> )
JU	Juniper (bush-size) – all <i>Juniperus</i> species (Utah, Rocky Mountain, and One-seed)
MZ	Manzanita ( <i>Artocostaphalis spp.</i> )
MT	Mormon Tea ( <i>Ephedra spp.</i> )
MO	Mountain ash ( <i>Sorbus scopulina</i> )
MM	Mountain mahogany ( <i>Cercocarpus spp.</i> )
MS	Mountain/Ocean spray
LC	New Mexico Locust ( <i>Robinia neomexicana</i> )
NB	Ninebark ( <i>Physocarpus spp.</i> )
OB	Oak bush – not Gambel oak
OG	Oregon grape ( <i>Berberis aquifolium</i> )
OT	Other shrub – unknown species or not on list
RA	Rabbitbrush ( <i>Chrysothamnus spp.</i> )
RD	Red-osier dogwood ( <i>Cornus sericea</i> )
RB	River (water) birch ( <i>Betula occidentalis</i> )

<b>Code</b>	<b>Shrubs/Small Trees</b>
MA	Rocky mountain maple ( <i>Acer spp.</i> )
RO	Russian olive ( <i>Elaeagnus angustifolia</i> )
SA	Sage spp. ( <i>Artemisia spp.</i> )
SL	Saltbush ( <i>Atriplex spp.</i> )
SB	Serviceberry ( <i>Amelanchier spp.</i> )
LO	Shrub Live Oak ( <i>Quercus turbinella</i> )
SC	Shrubby cinquefoil ( <i>Pentaphylloides floribunda</i> )
SE	Single-leaf Ash ( <i>Fraxinus anoala</i> )
SK	Skunkbrush ( <i>Rhus trilobata</i> )
SW	Snakeweed ( <i>Gutierrezia sarothrae</i> )
SY	Snowberry ( <i>Symphoricarpos spp.</i> )
TA	Tamarisk/Saltcedar ( <i>Tamarix pentandra</i> )
TB	Thimbleberry ( <i>Rubus spp.</i> )
VI	Viburnum ( <i>Viburnum spp.</i> )
WR	Wild rose ( <i>Rosa spp.</i> )
WI	Willow spp. ( <i>Salix spp.</i> - primarily for all shrubby willows)
WO	Wolfberry ( <i>Lycium pallidum</i> )
YU	Yucca ( <i>Yucca spp.</i> )

<b>Code</b>	<b>Large trees</b>
HH	American hophornbeam ( <i>Ostrya virginiana</i> )
AH	Ash ( <i>Fraxinus spp.</i> )
BP	Balsam poplar ( <i>Populus balsamifera</i> )
BS	Blue spruce ( <i>Picea pungens</i> )
BX	Box elder ( <i>Acer negundo</i> )
BR	Bristlecone pine ( <i>Pinus aristata</i> )
BO	Bur oak ( <i>Quercus macrocarpa</i> )
BC	<b>Burned</b> conifer
BD	<b>Burned</b> deciduous
CW	Crack willow ( <i>Salix fragilis</i> )
DC	<b>Dead</b> coniferous - recently dead (still has bark)
DD	<b>Dead</b> deciduous - recently dead (still has bark)
DJ	<b>Dead</b> Juniper – recently dead (still has bark)
DY	<b>Dead</b> pinyon pine – recently dead (still has bark)
DF	Douglas fir ( <i>Psuedotsuga menziesii</i> )
ES	Engelmann spruce ( <i>Picea engelmannii</i> )
FC	Fremont cottonwood ( <i>Populus fremontii</i> )
JU	Juniper spp. ( <i>Juniperus spp.</i> )
LM	Limber pine ( <i>Pinus flexilis</i> )
LP	Lodgepole pine ( <i>Pinus contorta</i> )
NC	Narrow-leaf cottonwood ( <i>Populus angustifolia</i> )

<b>Code</b>	<b>Large trees</b>
PB	Paper birch ( <i>Betula papyrifera</i> )
PW	Peachleaf willow ( <i>Salix amigdaloides</i> )
PY	Pinyon pine ( <i>Pinus edulis</i> )
PC	Plains cottonwood ( <i>Populus deltoides</i> )
PP	Ponderosa pine ( <i>Pinus ponderosa</i> )
AS	Quaking aspen ( <i>Populus tremuloides</i> )
RO	Russian olive ( <i>Elaeagnus angustifolia</i> )
SU	Subalpine fir ( <i>Abies lasiocarpa</i> )
SN	Unidentifiable snag – no bark
UC	Unknown coniferous tree or not on list
UD	Unknown deciduous tree or not on list
WF	White fir ( <i>Abies concolor</i> )
WS	White spruce ( <i>Picea glauca</i> )
WP	Whitebark pine ( <i>Pinus albicaulis</i> )
WI	Willow species ( <i>Salix</i> spp.)

## **APPENDIX E. OPTIMAL DATES FOR CONDUCTING TRANSECTS**

### **Northern Colorado Plateau Network**

Low-elevation Riparian (LR) – 15 May through 20 June

Pinyon Juniper (PJ) – 15 May through 4 June

Sagebrush Steppe (SA) – 15 May through 15 June

**APPENDIX F. FOUR LETTER BIRD CODES FOR ALL PROGRAMS**

<b>Species</b>	<b>Code</b>	<b>Species</b>	<b>Code</b>
Abert's Towhee	ABTO	Black Rosy-Finch	BLRF
Acadian Flycatcher	ACFL	Black Scoter	BLSC
Acorn Woodpecker	ACWO	Black Skimmer	BLSK
Alder Flycatcher	ALFL	Black Swift	BLSW
Allen's Hummingbird	ALHU	Black Tern	BLTE
American Avocet	AMAV	Black Turnstone	BLTU
American Bittern	AMBI	Black Vulture	BLVU
American Black Duck	ABDU	Black-and-white Warbler	BAWW
American Black Duck	ABDU	Black-backed Woodpecker	BBWO
American Coot	AMCO	Black-bellied Plover	BBPL
American Crow	AMCR	Black-billed Cuckoo	BBCU
American Dipper	AMDI	Black-billed Magpie	BBMA
American Flamingo	AMFL	Blackburnian Warbler	BLBW
American Golden-Plover	AMGP	Black-capped Chickadee	BCCH
American Goldfinch	AMGO	Black-capped Gnatcatcher	BCGN
American Green-winged Teal	AGWT	Black-capped Vireo	BCVI
American Kestrel	AMKE	Black-chinned Hummingbird	BCHU
American Oystercatcher	AMOY	Black-chinned Sparrow	BCSP
American Pipit	AMPI	Black-crested Titmouse	BCTI
American Redstart	AMRE	Black-headed Grosbeak	BHGR
American Robin	AMRO	Black-headed Gull	BHGU
American Three-toed Woodpecker	ATTW	Black-legged Kittiwake	BLKI
American Tree Sparrow	ATSP	Black-necked Stilt	BNST
American White Pelican	AWPE	Blackpoll Warbler	BLPW
American Wigeon	AMWI	Black-tailed Gnatcatcher	BTGN
Anna's Hummingbird	ANHU	Black-throated Blue Warbler	BTBW
Arizona Woodpecker	ARWO	Black-throated Gray Warbler	BTYW
Ash-throated Flycatcher	ATFL	Black-throated Green Warbler	BTNW
Audubon's Warbler	AUWA	Black-throated Sparrow	BTSP

ROCKY MOUNTAIN BIRD OBSERVATORY

*Conserving birds and their habitats*

<b>Species</b>	<b>Code</b>
Bachman's Sparrow	BACS
Baird's Sparrow	BAIS
Bald Eagle	BAEA
Baltimore Oriole	BAOR
Band-tailed Pigeon	BTPI
Bank Swallow	BANS
Barn Owl	BANO
Barn Swallow	BARS
Barred Owl	BADO
Barrow's Goldeneye	BAGO
Bell's Vireo	BEVI
Belted Kingfisher	BEKI
Bendire's Thrasher	BETH
Bewick's Wren	BEWR
Black Oystercatcher	BLOY
Black Phoebe	BLPH
Black Rail	BLRA
Species	Code
Brown Thrasher	BRTH
Brown-capped Rosy-Finch	BCRF
Brown-crested Flycatcher	BCFL
Brown-headed Cowbird	BHCO
Buff-breasted Sandpiper	BBSA
Bufflehead	BUFF
Bullock's Oriole	BUOR
Burrowing Owl	BUOW
Bushtit	BUSH
Cackling Goose	CACG
Cactus Wren	CACW
California Condor	CACO

ROCKY MOUNTAIN BIRD OBSERVATORY

*Conserving birds and their habitats*

<b>Species</b>	<b>Code</b>
Blue Grosbeak	BLGR
Blue Jay	BLJA
Blue-gray Gnatcatcher	BGGN
Blue-winged Teal	BWTE
Bobolink	BOBO
Bohemian Waxwing	BOWA
Bonaparte's Gull	BOGU
Boreal Chickadee	BOCH
Boreal Owl	BOOW
Botteri's Sparrow	BOSP
Brandt's Cormorant	BRAC
Brewer's Blackbird	BRBL
Brewer's Sparrow	BRSP
Bridled Titmouse	BRTI
Broad-tailed Hummingbird	BTAH
Broad-winged Hawk	BWHA
Brown Creeper	BRCR
Species	Code
Common Goldeneye	COGO
Common Grackle	COGR
Common Ground-Dove	COGD
Common Loon	COLO
Common Merganser	COME
Common Moorhen	COMO
Common Murre	COMU
Common Nighthawk	CONI
Common Poorwill	COPO
Common Raven	CORA
Common Yellowthroat	COYE
Connecticut Warbler	CONW

<b>Species</b>	<b>Code</b>
California Gull	CAGU
California Quail	CAQU
California Thrasher	CATH
Calliope Hummingbird	CAHU
Canada Goose	CANG
Canada Warbler	CAWA
Canvasback	CANV
Canyon Towhee	CANT
Canyon Wren	CANW
Cape May Warbler	CMWA
Caspian Tern	CATE
Cassin's Finch	CAFI
Cassin's Kingbird	CAKI
Cassin's Sparrow	CASP
Cassin's Vireo	CAVI
Cattle Egret	CAEG
Cave Swallow	CASW
Cedar Waxwing	CEDW
Cerulean Warbler	CERW
Chestnut-backed Chickadee	CBCH
Chestnut-collared Longspur	CCLO
Chestnut-sided Warbler	CSWA
Chihuahuan Raven	CHRA
Chimney Swift	CHSW
Chipping Sparrow	CHSP
Chukar	CHUK
Cinnamon Teal	CITE
Clapper Rail	CLRA
Clark's Grebe	CLGR
Clark's Nutcracker	CLNU

ROCKY MOUNTAIN BIRD OBSERVATORY

*Conserving birds and their habitats*

<b>Species</b>	<b>Code</b>
Cooper's Hawk	COHA
Cordilleran Flycatcher	COFL
Costa's Hummingbird	COHU
Crissal Thrasher	CRTN
Curve-billed Thrasher	CBTH
Dark-eyed Junco	DEJU
Dickcissel	DICK
Double-crested Cormorant	DCCO
Downy Woodpecker	DOWO
Dunlin	DUNL
Dusky Flycatcher	DUFL
Dusky Grouse	DUGR
Eared Grebe	EAGR
Eastern Kingbird	EAKI
Eastern Meadowlark	EAME
Eastern Phoebe	EAPH
Eastern Screech-Owl	EASO
Elf Owl	ELOW
Eurasian Collared-Dove	EUCD
Eurasian Wigeon	EUWI
European Starling	EUST
Evening Grosbeak	EVGR
Ferruginous Hawk	FEHA
Field Sparrow	FISP
Five-striped Sparrow	FSSP
Flammulated Owl	FLOW
Forster's Tern	FOTE
Fox Sparrow	FOSP
Franklin's Gull	FRGU
Gadwall	GADW



<b>Species</b>	<b>Code</b>
Clay-colored Sparrow	CCSP
Cliff Swallow	CLSW
Colima Warbler	COLW
Common Black-Hawk	COBH
Species	Code
Glaucous-winged Gull	GWGU
Glossy Ibis	GLIB
Golden Eagle	GOEA
Golden-cheeked Warbler	GCWA
Golden-crowned Kinglet	GCKI
Golden-crowned Sparrow	GCSP
Golden-crowned Warbler	GCRW
Golden-winged Warbler	GWWA
Grace's Warbler	GRWA
Grasshopper Sparrow	GRSP
Gray Catbird	GRCA
Gray Flycatcher	GRFL
Gray Hawk	GRHA
Gray Jay	GRAJ
Gray Vireo	GRVI
Gray-crowned Rosy-Finch	GCRF
Gray-headed Junco	GHJU
Great Black-backed Gull	GBBG
Great Blue Heron	GBHE
Great Crested Flycatcher	GCFL
Great Egret	GREG
Great Gray Owl	GGOW
Great Horned Owl	GHOW
Greater Pewee	GRPE
Greater Prairie-Chicken	GRPC

ROCKY MOUNTAIN BIRD OBSERVATORY

*Conserving birds and their habitats*

<b>Species</b>	<b>Code</b>
Gambel's Quail	GAQU
Gila Woodpecker	GIWO
Gilded Flicker	GIFL
Glaucous Gull	GLGU
Species	Code
Hermit Warbler	HEWA
Herring Gull	HERG
Hooded Merganser	HOME
Hooded Oriole	HOOR
Hooded Warbler	HOWA
Horned Grebe	HOGH
Horned Lark	HOLA
House Finch	HOFI
House Sparrow	HOSP
House Wren	HOWR
Hutton's Vireo	HUVI
Inca Dove	INDO
Juniper Titmouse	JUTI
Kentucky Warbler	KEWA
Killdeer	KILL
Ladder-backed Woodpecker	LBWO
Lapland Longspur	LALO
Lark Bunting	LARB
Lark Sparrow	LASP
Laughing Gull	LAGU
Lazuli Bunting	LAZB
Le Conte's Sparrow	LCSP
Le Conte's Thrasher	LCTH
Least Bittern	LEBI
Least Flycatcher	LEFL

<b>Species</b>	<b>Code</b>
Greater Roadrunner	GRRO
Greater Sage-Grouse	GRSG
Greater Scaup	GRSC
Greater White-fronted Goose	GWFG
Greater Yellowlegs	GRYE
Great-tailed Grackle	GTGR
Green Heron	GRHE
Green-tailed Towhee	GTTO
Green-winged Teal	GWTE
Gunnison Sage-Grouse	GUSG
Gyr Falcon	GYRF
Hairy Woodpecker	HAWO
Hammond's Flycatcher	HAFL
Harlan's Hawk	HALH
Harlequin Duck	HADU
Harris's Hawk	HASH
Harris's Sparrow	HASP
Heermann's Gull	HEEG
Henslow's Sparrow	HESP
Hepatic Tanager	HETA
Hermit Thrush	HETH
Species	Code
McCown's Longspur	MCLO
Merlin	MERL
Mew Gull	MEGU
Montezuma Quail	MONQ
Mountain Bluebird	MOBL
Mountain Chickadee	MOCH
Mountain Plover	MOPL
Mountain Quail	MOUQ

ROCKY MOUNTAIN BIRD OBSERVATORY

*Conserving birds and their habitats*

<b>Species</b>	<b>Code</b>
Least Grebe	LEGR
Least Sandpiper	LESA
Least Tern	LETE
Lesser Black-backed Gull	LBBG
Lesser Goldfinch	LEGO
Lesser Prairie-Chicken	LEPC
Lesser Scaup	LESC
Lesser Yellowlegs	LEYE
Lewis's Woodpecker	LEWO
Lincoln's Sparrow	LISP
Loggerhead Shrike	LOSH
Long-billed Curlew	LBCU
Long-billed Dowitcher	LBDO
Long-eared Owl	LEOW
Long-tailed Duck	LTDU
Lucy's Warbler	LUWA
MacGillivray's Warbler	MGWA
Magnolia Warbler	MAWA
Mallard	MALL
Marbled Godwit	MAGO
Marsh Wren	MAWR
Species	Code
Pine Grosbeak	PIGR
Pine Siskin	PISI
Pinyon Jay	PIJA
Piping Plover	PIPL
Plumbeous Vireo	PLVI
Prairie Falcon	PRFA
Prothonotary Warbler	PROW
Purple Finch	PUFI

<b>Species</b>	<b>Code</b>
Mountain White-crowned Sparrow	MWCS
Mourning Dove	MODO
Mourning Warbler	MOWA
Mute Swan	MUSW
Myrtle Warbler	MYWA
Nashville Warbler	NAWA
Northern Bobwhite	NOBO
Northern Cardinal	NOCA
Northern Flicker	NOFL
Northern Goshawk	NOGO
Northern Harrier	NOHA
Northern Hawk Owl	NHOW
Northern Mockingbird	NOMO
Northern Parula	NOPA
Northern Pintail	NOPI
Northern Pygmy-Owl	NOPO
Northern Rough-winged Swallow	NRWS
Northern Saw-whet Owl	NSWO
Northern Shoveler	NSHO
Northern Shrike	NSHR
Northern Waterthrush	NOWA
Nuttall's White-crowned Sparrow	NWCS
Olive Warbler	OLWA
Orange-crowned Warbler	OCWA
Oregon Junco	ORJU
Osprey	OSPR
Ovenbird	OVEN
Pacific Golden-Plover	PAGP
Pacific Loon	PALO
Pacific-slope Flycatcher	PSFL

ROCKY MOUNTAIN BIRD OBSERVATORY

*Conserving birds and their habitats*

<b>Species</b>	<b>Code</b>
Purple Martin	PUMA
Pygmy Nuthatch	PYNU
Pyrrhuloxia	PYRR
Red Crossbill	RECR
Red-bellied Woodpecker	RBWO
Red-breasted Merganser	RBME
Red-breasted Nuthatch	RBNU
Red-breasted Sapsucker	RBSA
Red-eyed Vireo	REVI
Red-faced Warbler	RFWA
Redhead	REDH
Red-headed Woodpecker	RHOW
Red-naped Sapsucker	RNSA
Red-necked Grebe	RNGR
Red-necked Phalarope	RNPH
Red-shafted Flicker	RSFL
Red-shouldered Hawk	RSHA
Red-tailed Hawk	RTHA
Red-throated Loon	RTLO
Red-winged Blackbird	RWBL
Ring-billed Gull	RBGU
Ring-necked Duck	RNDU
Ring-necked Pheasant	RNEP
Rock Pigeon	ROPI
Rock Wren	ROWR
Rough-legged Hawk	RLHA
Ruby-crowned Kinglet	RCKI
Ruby-throated Hummingbird	RTHU
Ruddy Ground-Dove	RUGD
Ruffed Grouse	RUGR

<b>Species</b>	<b>Code</b>
Painted Bunting	PABU
Painted Redstart	PARE
Palm Warbler	PAWA
Pectoral Sandpiper	PESA
Peregrine Falcon	PEFA
Phainopepla	PHAI
Pied-billed Grebe	PBGR
Pileated Woodpecker	PIWO
Species	Code
Scaled Quail	SCQU
Scarlet Tanager	SCTA
Scissor-tailed Flycatcher	STFL
Scott's Oriole	SCOR
Sedge Wren	SEWR
Semipalmated Plover	SEPL
Semipalmated Sandpiper	SESA
Sharp-shinned Hawk	SSHA
Sharp-tailed Grouse	STGR
Short-billed Dowitcher	SBDO
Short-eared Owl	SEOW
Smith's Longspur	SMLO
Snow Bunting	SNBU
Snow Goose	SNGO
Snowy Egret	SNEG
Snowy Owl	SNOW
Snowy Plover	SNPL
Song Sparrow	SOSP
Sooty Grouse	SOGR
Sora	SORA
Spotted Sandpiper	SPSA

ROCKY MOUNTAIN BIRD OBSERVATORY

*Conserving birds and their habitats*

<b>Species</b>	<b>Code</b>
Rufous Hummingbird	RUHU
Rufous-crowned Sparrow	RCSP
Sage Sparrow	SAGS
Sage Thrasher	SATH
Sanderling	SAND
Sandhill Crane	SACR
Savannah Sparrow	SAVS
Say's Phoebe	SAPH
Species	Code
Unidentified Sparrow	UNSP
Unidentified Swallow	UNSW
Unidentified Thrush	UNTH
Unidentified Warbler	UNWA
Unidentified Woodpecker	UNWO
Unidentified Wren	UNWR
Upland Sandpiper	UPSA
Varied Bunting	VABU
Varied Thrush	VATH
Vaux's Swift	VASW
Veery	VEER
Verdin	VERD
Vermilion Flycatcher	VEFL
Vesper Sparrow	VESP
Virginia Rail	VIRA
Virginia's Warbler	VIWA
Warbling Vireo	WAVI
Western Bluebird	WEBL
Western Flycatcher	WEFL
Western Grebe	WEGR
Western Gull	WEGU

<b>Species</b>	<b>Code</b>
Spotted Towhee	SPTO
Sprague's Pipit	SPPI
Spruce Grouse	SPGR
Steller's Jay	STJA
Summer Tanager	SUTA
Surf Scoter	SUSC
Swainson's Hawk	SWHA
Swainson's Thrush	SWTH
Tennessee Warbler	TEWA
Thayer's Gull	THGU
Townsend's Solitaire	TOSO
Townsend's Warbler	TOWA
Trail's Flycatcher	TRFL
Tree Swallow	TRES
Tufted Titmouse	TUTI
Tundra Swan	TUSW
Turkey Vulture	TUVU
Wilson's Phalarope	WIPH
Wilson's Snipe	WISN
Wilson's Warbler	WIWA
Winter Wren	WIWR
Wood Duck	WODU
Yellow Rail	YERA
Yellow Warbler	YWAR
Yellow-bellied Sapsucker	YBSA
Yellow-billed Cuckoo	YBCU
Yellow-breasted Chat	YBCH
Yellow-headed Blackbird	YHBL
Yellow-rumped Warbler	YRWA
Yellow-shafted Flicker	YSFL

ROCKY MOUNTAIN BIRD OBSERVATORY

*Conserving birds and their habitats*

<b>Species</b>	<b>Code</b>
Western Kingbird	WEKI
Western Meadowlark	WEME
Western Sandpiper	WESA
Western Screech-Owl	WESO
Western Scrub-Jay	WESJ
Western Tanager	WETA
Western Wood-Pewee	WEWP
Whimbrel	WHIM
Whip-poor-will	WPWI
White-breasted Nuthatch	WBNU
White-crowned Sparrow	WCSP
White-faced Ibis	WFIB
White-headed Woodpecker	WHWO
White-tailed Ptarmigan	WTPT
White-throated Sparrow	WTSP
White-throated Swift	WTSW
White-winged Crossbill	WWCR
White-winged Dove	WWDO
White-winged Junco	WWJU
White-winged Scoter	WWSC
Whooping Crane	WHCR
Wild Turkey	WITU
Willet	WILL
Williamson's Sapsucker	WISA
Willow Flycatcher	WIFL
Zone-tailed Hawk	ZTHA

## APPENDIX G. SAMPLE TRANSECT DESCRIPTION SHEET

Transect: CP-PJ07-01 "  
 Transect Name: Colorado N. M. #2

Observer Initials:

Date Conducted: \_\_\_\_\_

Please verify all Transect Information. If AP, County, Map, etc. is  
 inaccurate please note the correct data!

Map Accurate?

Yes: ☐  
 No: ☐

If no, please describe at bottom of page

Transect is accessible to:

☐ All Vehicle  
☐ High Clearance  
☐ 4WD only

Roads of Colorado Page:  
 (if applicable)

DeLorme Page: CO Atlas, Pa

County: Mesa

State: CO

Access Point UTM: 12 698290 4323365

Management Unit: Colorado Nat'l Monument

Elevation:

Time required to do the transect:

## Transect Descriptions

## Directions to Access Point:

Exit Interstate 70 on Horizon Drive in Grand Junction, CO. Turn west onto Horizon Drive and take it to its end at 7th street. Turn left onto 7th Street and drive to Grand Avenue. Turn right onto Grand Avenue and reach the intersection of 1st Street and Grand Avenue. Measure from this point. Drive west on Grand Avenue. At mile 0.9, reach Monument Road and turn left. Take Monument Road to the Colorado National Monument fee station. At this point, Monument Road becomes Rim Rock Drive. Continue on Rim Rock Drive to the upper Ute Canyon trailhead. The trailhead is a small pullout on the right side of the road. The access point is the NPS Upper Ute Canyon trailhead sign. See the list of UTM's for the exact location of the access point.

## Transect Description:

From the trailhead, hike down the steep Upper Ute Canyon Trail to the bottom of Ute Canyon. At the bottom of the canyon, turn left and hike upstream in the streambed to reach point 1. To reach points 2-15, turn around and follow the Ute Canyon streambed downstream. See the list of UTM's for the exact locations of points 1-15.

## Notes:

2008: PEFA Eyrie near Pt. 3

\* Please remember to record bearings for all low density species!

## 2008 Notes or Updates and camping information

Camping (full on weekends) Showers + laundry available @ Jones M. Robb State Park in Fruita, CO. Pass costs 6.00 in 2010.

UTMs: zone easting northing

0701:	12	698069	4324051 ✓
0702:	12	698247	4323877 ✓
3:	12	698422	4323699 ✓
4:	12	698641	4323579 ✓
5:	12	698801	4323386
6:	12	698942	4323180
7:	12	699130	4323016
8:	12	699287	4323211
9:	12	699413	4323427
10:	12	699460	4323672
11:	12	699690	4323769
12:	12	699758	4324009
13:	12	699934	4324185
14:	12	700087	4324382
15:	12	700175	4324615
16:			

## APPENDIX H. SAMPLE VEGETATION DATA SHEET

**Note:** The back side of this datasheet will contain the same form for points 9-15.

Observer (F.I. M.I. Last name)	Date (mm/dd/yy)	GPS Unit #	Program	Transect ID	start
CAINGWELL	5 14 18	000209	NCPN	LROS	Time 0542
Access Point UTM	ZONE:	UTMs:			Sky 3
		6 0 7 9 2 3 4 2 2 3 5 8 8			Wind 0
					Temp 41

6-char Pt-ID	Easting	Northing	Accuracy	6-char Pt-ID	Easting	Northing	Acc.
01	607812	422346	3	05	607147	427276	5
02	607617	422330	8	06	606936	422642	5
03	607531	422307	6	07	606705	422548	4
04	607377	422287	6	08	606678	422230	4

Point Info			Overstory - all spp. total to 100%															
Point	Dist. to road (m)	Private property?	Bearing to Point	Point	Struct stage (1-5)	Canopy Cover %	Mean Canopy Height	Species #1	Sp 1 abund %	Species #2	Sp 2 abund %	Species #3	Sp 3 abund %	Species #4	Sp 4 abund %	Species #5	Sp 5 abund %	Point
1	36	N	1	1	2	5	5	F C	99	J U	1							1
2	32	N	1	2	4	10	8	F C	100									2
3	1	N	1	3														3
4	1	N	1	4	3	15	6	F C	99	J U	1							4
5	042	N	1	5	4	20	8	F C	100									5
6	1	N	1	6	4	30	8	F C	99	J U	1							6
7				7	4	25	6	F C	97	J U	1	P Y	1	D Y	1			7
8				8	4	30	9	F C	98	J U	2							8

Midstory				Shrub layer - all spp. total to 100%													
Point	Distinct SUBCANOPY - If Present			Point	Percent Cover	Mean height (m)	Species #1	Sp 1 abund %	Species #2	Sp 2 abund %	Species #3	Sp 3 abund %	Species #4	Sp 4 abund %	Species #5	Sp 5 abund %	Point
	#1	#2	#3														
1				1	45	1	S A	85	B A	10	F C	5					1
2				2	30	1	S A	90	S L	5	R A	5					2
3				3	15	1.5	R A	70	S A	30							3
4				4	15	1	S A	98	R A	3	F C	2					4
5				5	25	1	S A	40	W J	30	R A	20	F C	8	S U	2	5
6				6	40	1	S A	65	R A	25	J U	9	S B	1			6
7				7	20	7	S A	60	F C	10	J U	10	P Y	10	6	7	10
8				8	20	2	J U	25	P Y	25	S A	25	R A	15	0	7	10

Ground Cover - usually totals to 100%						Other (Y/N)						
Point	Woody %	Dead and Down %	Herbaceous %	Bare / litter %	Grass %	Grass & Herb. Height (cm)	Human structure?	Cliffrock?	P-dog town?	P-dogs present?	# of Shags	Point
1	10	5	10	50	25	15	N	N	N	N	0	1
2	30	5	10	45	10	30	N	N	N	N	0	2
3	5	3	10	57	25	35	N	N	N	N	0	3
4	5	5	10	45	35	25	N	N	N	N	0	4
5	10	5	10	40	35	50	N	N	N	N	0	5
6	5	5	10	40	40	30	N	N	N	N	0	6
7	10	5	25	15	45	50	N	Y	N	N	1	7
8	10	5	20	10	55	60	N	Y	N	N	0	8

If found, please mail to:  
Rocky Mountain Bird Observatory (www.rmbo.org)  
PO Box 1232, Brighton, CO 80601

## APPENDIX I. SAMPLE BIRD DATA SHEET

How: V=visual; S=singing; C=calling; D=drumming; O=other aural detection. Sex: M=male; F=female; U=unknown.  
Between points, point # = 00

Point #	Minute	Species	Radial Distance	HOW	Visual?	SEX	Bearing	Cluster		Point #	Minute	Species	Radial Distance	HOW	Visual?	SEX	Bearing	Cluster		
								Size	Code									Size	Code	
06	1	BTHU	015	O		U					4	NORT								
	1	UFWA	038	S		M					5	MODO	071	C		U				
	1	HOFI	197	S		M					5	WTSW	237	C		U				
	1	HOFI	073	S		M					6	NORT								
	2	HOFI	112	S		M														
	3	CHSP	041	S		M					09	CORA	190	C		V				
	4	CANW	209	S		M					1	VIWA	031	S		M				
	5	GRFL	097	C		U					1	VIWA	041	S		M				
	5	SPTO	059	S		M					1	GRVI	046	S		M				
	6	CORA	291	C		U					1	BTYW	033	S		M				
	6	BCHU	631	S		U					2	PEFA	370	C		U				
67	1	CORHA	138	V		V	108				3	HOFI	160	S		M				
	1	GRFL	014	S		M					3	GRVI	061	S		M				
	1	HOFI	109	S		M					4	SPTO	044	S		M				
	2	CORHA	376	C		U					4	BTYW	034	S		U				
	2	WTSW	371	V		V		5	A		5	NORT								
	3	NORT									6	VNBI	031	C		U				
	4	VNBI	015	C		U					6	RCKI	021	C		U				
	5	ATFL	088	C		V					10	TUVV	436	V			3	58	Z	A
	6	RCKI	043	S		M					10	1	HOFI	088	S		M			
	6	VIWA	018	C		V						1	HOFI	041	S		M			
08	1	CORHA	236	C		V						1	BTYW	041	S		M			
	1	HOFI	134	S		M						2	BTYW	044	S		M			
	1	GRVI	039	S		M						2	GRVI	132	S		M			
	1	CHSP	022	S		M						3	VIWA	061	S		M			
	1	BGGN	200	C		U						3	CORHA	303	C		U			
	1	SPTO	038	C		U						4	BTYW	066	S		M			
	1	BTYW	019	S		M						4	SOSP	179	S		M			
	1	PEFA	192	C		U	298					5	BCHU	013	O		U			
	1	VIWA	115	S		M						5	ATFL	178	C		U			
	2	GRFL	035	C		V						6	GRFL	082	C		U			
	3	CHSP	042	S		M						6	CORHA	468	C		U			
	3	BTYW	027	S		M						6	VNBI	622	C		U			

Notes: Presumed VTM 0699281 Bearing Called ♀ whitewash  
PEFA Nest 4323224 near where bird called

Observer initials-all three Year Program (BH, AZ, etc.) Transect number, i.e., AS04

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