

# Rocky Mountain Bird Observatory

## Field Protocol for Spatially Balanced Sampling of Landbird Populations

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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### **Cover Photos:**

Audubon's Warbler. By Jeff Jones. Used with permission.

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## I. PROJECT OVERVIEW

Rocky Mountain Bird Observatory (RMBO) in cooperation with the US Forest Service, US Bureau of Land Management, US National Park Service, and other agencies, developed a program to monitor bird populations utilizing point counts as the primary sampling technique. We designed this program to be statistically rigorous, biologically accurate, and to produce data for analyses of population trends for most breeding diurnal landbird species. This document provides details of the design and of the operation of our monitoring program. We intend this protocol to instruct our field technicians on how to conduct point counts and for others to follow when establishing monitoring projects of their own, so that the design and methods are comparable.

Survey points are arranged in a 4 x 4 grid of 16 points, with 250m spacing between points. Grids are selected using a spatially balanced sampling algorithm (Blakesley and Hanni 2009). Grids are generally selected without regard to habitat type, except for some grids placed within riparian corridors. In most instances, grids are stratified by land ownership (National Forests, National Grasslands, National Parks, BLM land, etc.).

## II. MATERIALS

Before heading out into the field, each technician should be sure to have the following equipment (RMBO will supply all materials unless otherwise indicated below):

- A. Timepiece** with a countdown timer and a chime;
- B. Binoculars** (you must provide these);
- C. Declination-adjustable compass** with sighting capability (e.g., a mirror);
- D. Clipboard** (with instruction sheets 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. 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**, attached to the clipboard.

## III. NAVIGATING TO THE SURVEY LOCATION

Navigating to randomly selected survey locations can be challenging. Fortunately, there are a number of resources that you can utilize to assist you in finding your way to the most convenient access point for each survey site. You can utilize RMBO's online transect maps website, view the Google Earth file provided to you by your crew leader, review a previously existing transect description sheet, and consult Delorme, BLM, or USFS maps.

### **RMBO online maps website**

RMBO's online maps website is available at the following link:

<http://rmbo.org/v2/dataentry/monitoring/transectLocationMaps.aspx>

You will be required to login using the username and password provided to you at training. Once logged into the site, please select the appropriate project (e.g. state or park network you are working in) and transect you wish to view from the drop down menus. Once the appropriate transect appears you can use the zoom and scroll features to follow existing roadways to the most convenient access point. You can also toggle between the terrain, satellite and maps options. The terrain feature shows topography, which is useful for navigating to the transect and between points. The maps feature only shows roads, but can be useful when figuring out directions to a particular site. The satellite feature will display actual satellite photo imagery. We recommend that you take a careful look at steep transects using the satellite feature found in the upper left portion of the map. This will give you a better idea of whether steep slopes are vegetated or not.

### **Google Earth files**

Prior to training you will receive a Google Earth file with transects that are expected to complete. To view this KML file you will need to download a free version of Google Earth from the internet. Once Google Earth is installed you can simply double click on the KML file sent to you it view the transect locations. This file will help you plan the order you would like to conduct your assigned surveys to minimize travel time and distance between survey locations. Additionally, you can zoom-in to get a better idea of existing roadways and the terrain at the survey locations.

### **Transect Description Sheet**

You will receive a printed transect description sheet (Figure 1) corresponding to each transect that has been assigned to you. If, for some reason, you are missing a transect description sheet you can print one by visiting RMBO's landowner website (<https://fc.rmbo.org/>), logging in with your landowner username and password (different from your data entry and transect description password), and entering the full transect name. If you would like to include the landowner information sheet (Figure 2) please check the box next to "show landowner information". Most transect description sheets will already have information recorded on them; however, it is possible that you will be assigned a transect that has not been completed before. Please take the time to record or verify the information on the transect description sheet. This is the best opportunity for information obtained "on the ground" to be passed onto crew leaders and future technicians. Be sure that each of the following fields is filled out before leaving the survey location:

#### **1. Observer Initials**

Record your first, middle, and last initials here.

#### **2. Date Conducted (MM/DD/YYYY)**

Record the date you sampled the transect.

#### **3. 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.

#### **4. DeLorme Page**

Don't forget to record the DeLorme page and section that the transect is on. This allows future field

technicians to quickly locate the transect on the road map.

**5. Access Point UTM**

The UTM and projection zone for the closest spot to the transect where a surveyor can park their vehicle.

**6. Access and Transect Difficulty**

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. It is helpful for surveyors to know if they will be pressed for time to complete all 16 points, so they can ensure that they move quickly between points, etc. Please record the access and transect difficulty using the rubric (Table 1) so future field technicians can plan accordingly.

**Table 1. Difficulty Rubric**

Rating Rubric	Transect Difficulty			
Access difficulty	1: Easy	2: Moderate	3: Difficult	4: Inaccessible Terrain
1: Easy	11	12	13	14
2: Moderate	21	22	23	24
3: Difficult	31	32	33	34
4: Inaccessible Terrain	4	4	4	4

**Explanation of codes**

**Access Difficulty:**

- 1: < 3 km and easy topography. Hike to transect requires less than 45 minutes.
- 2: 3 km - 6 km with relatively easy topography. Hike to transect requires less than 75 minutes.
- 3: > 6 km and/or difficult terrain. Transect likely requires backpacking into transect the day before.
- 4: Transect is inaccessible due to river, cliffs, or other dangerous terrain.

**Transect Difficulty:**

- 1: relatively flat transect. 16 points are easily surveyed in approximately 4 hours.
- 2: hilly terrain, areas with dense vegetation, a few stream crossings. Technician might not be able to complete all 16 points during the sampling period.
- 3: steep slopes, dense vegetation, or difficult stream crossings throughout the transect. Technician is unlikely to complete 12 or more points during the sampling period.
- 4: transect has cliffs, rivers, or other dangerous terrain that do not permit 6 points to be finished.

**7. Directions to Access Point (VERY IMPORTANT!)**

You will want to 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 location for these directions. When recording directions to the Access Point provide explicit directions from a nearby town, major intersection, or geographical feature readily found on a map to the Access Point. It is extremely helpful to provide mileages from intersections or other landmarks using your odometer. For all sites, take GPS readings and record **UTM coordinates** for each Access Point. It can be helpful to make the Access Point a recognizable feature on the landscape, like a cattle guard or sign post. You may encounter a situation where a road has been gated, washed out, etc. In these instances it is very important to record appropriate changes to the existing directions. Please don't inconvenience future surveyors by not making these changes.

If necessary, provide the distance and time to hike from the Access Point to the grid, or more specifically, to the first point if it becomes apparent that there is a logical order in which to survey the points. Record recommendations of a survey route through the grid for the subsequent year, if necessary. As some of these grids are miles from the nearest road, explicit details of a good route in will help future technicians greatly.

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

**DO NOT FORGET TO RECORD THE UTM'S OF THE ACCESS POINT ON THE TOP OF THE SHEET!**

### **8. Transect description**

In this section, please record the primary habitat types encountered on the transect. Please provide between-point accounts, when necessary, describing paths future technicians may want to follow to travel between points. You can also include useful information about terrain, barbed wire fences encountered, and any other information that would be helpful to know when surveying a transect.

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

Please provide directions and a description of camping options in the area in this section. Sometimes, camping is available right at the Access Point. If not, then record directions to where you camped and provide UTMs 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 (e.g., the transect is surrounded by private land) then record where you stayed. The nearest library or free internet access you used is often helpful information as well. Also, you can enter information relevant to the site, problems encountered during the transect, cool scenery, or other tidbits that either don't really fit in other places or that future surveyors might find interesting.

### **Delorme, BLM, and USFS Maps**

Delorme maps are a particularly useful tool for driving around whatever study area you are working in. Surveys on BLM lands or National Forests may be greatly aided by maps produced by those agencies. In particular, we recommend having a USFS map for backcountry surveys as these will display trail systems and parking areas and can greatly simplify you getting to the transect. In most cases, RMBO will provide you with these maps; however RMBO will reimburse technicians for necessary BLM or USFS maps, with your supervisor's approval, if they are not provided.

Field Protocol for Spatially Balanced Sampling of Landbird Populations: 2011 Field Season

**Transect: WY-BCR10-SR9**

Observer Initials:

Date Conducted:

Transect Name:

**Please verify all transect information. If the access point, county, map, or other information is inaccurate, please note the correct data!**

Transect is accessible to:  All Vehicles  High Clearance  4WD Only

**DeLorme Page:**  
49 B6

**County:**  
Fremont

**State:**  
WY

**Access Point UTM:**  
12 616008 4851224

**Management Unit:**  
Shoshone NF - wilderness

**Elevation:**  
2612

**Time Required:**  
4.5

**Access Point Directions:**

From Dubois take FR 285 (aka Horse Creek Rd) North to Double Cabin Trailhead and Campground. This is your access point. You must cross a rather wide, but fairly shallow creek immediately. Follow trail to East along creek to Zone 12 619893 4848769. From here leave main trail (just before it crosses the creek) and head up draw towards transect along what appears to be a cattle trail; however, this is truly an unmarked hiking/horseback riding trail complete with cutout fallen logs. This trail takes you to both the recommended camping site and to the transect.

**Notes:**

Camped in draw below transect (12 621143 4850943). You could also camp at access point; however, this would leave you with about a 2.5 - 3 hour hike to the transect (approx. 6km).

**Transect Description:**

Transect was primarily in LP, much of which suffered beetle kill. Points 13 - 16 were inaccessible due to terrain. Sandals are recommended for crossing the creek that runs through the middle of the transect.

**2011 Notes/Updates/Camping Information**

**Point: Zone: Easting: Northing: TRS:**

1	13	140524	4860727	T44N R105W 4
2	13	140274	4860727	T44N R105W 5
3	13	140024	4860727	T44N R105W 5
4	13	139774	4860727	T44N R105W 5
5	13	140524	4860477	T44N R105W 4
6	13	140274	4860477	T44N R105W 5
7	13	140024	4860477	T44N R105W 5
8	13	139774	4860477	T44N R105W 5
9	13	140524	4860227	T44N R105W 4
10	13	140274	4860227	T44N R105W 5
11	13	140024	4860227	T44N R105W 5
12	13	139774	4860227	T44N R105W 5
13	13	140524	4859977	T44N R105W 4
14	13	140274	4859977	T44N R105W 5
15	13	140024	4859977	T44N R105W 5
16	13	139774	4859977	T44N R105W 5

**Figure 1. Example Transect Description Sheet.**

#### IV. VERIFYING ACCESS PERMISSION

It is the goal of RMBO staff to obtain permission to access private or restricted property prior to the beginning of the field season. Under most circumstances permission to survey at least 4 of the 16 point count locations (the minimum required for a transect to be considered “complete” due to private land issues) on a transect will have already been obtained before the transect is assigned to you. On occasion, technicians may be asked to contact assessor offices, resource managers, and/or private landowners to obtain additional contact information and permission. **It is each technician’s responsibility to verify which points RMBO has permission to survey prior to navigating to the survey site.** Please go to: <http://fc.rmbo.org> and click on the link for the landowner database. Once you login using the username and password provided to you at training, you can navigate to the appropriate transect and review the access status for each point. Please make sure to circle each point where access has been “granted” and cross out any points where access has been “denied” on your landowner information sheet (Figure 2). Points where the access status is listed as “no contact” or “unknown” should not be marked. This will help you understand and remember which points are ready to survey, which points should be avoided, and which points could use some more information in the event that you encounter a landowner while near the transect or see a nearby house. Technicians are responsible for reviewing the notes associated with each landowner whose land they intend to survey to make certain there are no notes regarding driving on roads, disturbing cattle, etc. Please record these notes on your landowner information sheet as a reminder to yourself. Finally, **technicians are responsible for calling landowners that have granted RMBO access to their property two or three days prior to surveying the property.** It is extremely important that technicians do this because RMBO has promised landowners that they will receive notification prior to the survey, as a courtesy to them. When calling please tell the landowner your name, state that you are a surveyor for RMBO, provide an expected date that you will be on their property, and describe the vehicle that you will be driving. In the event that the landowner doesn’t answer the phone, a voicemail message will suffice. If the landowner doesn’t answer and you are unable to leave a message you should not survey the property until you establish some contact with the landowner. If you are unable to establish contact after repeated attempts please contact your crew leader.

<b>Name:</b> (Owner) <b>Address:</b> <b>Phone:</b>	5, 9 13,
<b>Name:</b> Jeff Birek (owner) <b>Business:</b> Birek Cattle Co. LLC <b>Address:</b> PO Box 247 Green River, WY 82935 <b>Phone:</b> (307) 331-4251 <b>Alternate Phone:</b> (307) 328-4455	1,
<b>Name:</b> Green Grass Country Club (Owner), Nick Van Lanen (Contact) <b>Business:</b> Green Grass Country Club <b>Address:</b> PO Box 21 Green River, WY 82935 <b>Phone:</b> Phone: (307) 882-1459 <b>Notes:</b> 2/2011: Contact Nick before entering.	10, 11 14
<b>Name:</b> Chris White (owner) <b>Address:</b> PO Box 844 Green River, WY 82935 <b>Physical Address:</b> 2716 Tulane Dr. <b>Phone:</b> (307) 452-9845	2, 4
<b>Name:</b> Jora Rehm-Lorber (owner) <b>Address:</b> 589 Comanche Cir Green River, WY 82935 <b>Phone:</b> (307) 362-3854	6, 7, 8
<b>Name:</b> Matthew & Cassidy McLaren (owner) <b>Address:</b> 1100 Mountain Vista St. Green River, WY 82935 <b>Phone:</b> (307) 462-8985	12, 15, 16
<b>Name:</b> David Hanni (owner) <b>Address:</b> PO Box 1441 Green River, WY 82935 <b>Phone:</b> (307) 433-9957	β,

Figure 2. Example Landowner Information Sheet.

## V. CONDUCTING POINT COUNT SURVEYS

### Seasonal Timing

Point counts should be performed after all migratory species have returned to their breeding areas and as early in the season as possible without performing them too early and potentially counting transient birds that are migrating through, or missing some of the local breeding birds that have not yet arrived. Counts performed in grasslands in late May are not comparable to counts performed in the same habitat in early July. Most local breeding birds complete nesting before July and are much less vocal than they are in May. We will provide you with optimal survey dates, based on primary habitat and elevation, for your study area at training. Below is an example of the optimal survey dates used in Colorado in 2008.

### Colorado Optimal Survey Dates:

<7,500ft (<2,286m) - 12 May - 15 June  
7,500ft - 9,300ft (2,286m - 2,835m) - 5 June - 30 June  
>9,300ft (>2,835m) - 25 June - 15 July

### Daily Timing

In addition to seasonal timing, observers should survey each individual point count grid during the time of day that songbirds are most detectable. Observers should start conducting point counts approximately ½ hour before sunrise (once there is enough light to ID birds by sight) and finish before 11am (preferably before 10am). In some cases, such as more southern locations, counts may need to be completed before 9am.

### Point Counts – Getting Started

You will receive a GPS unit with all of the point locations for your transects pre-loaded onto it. Follow the GPS unit to each point count station (we will practice this during training). Please see Appendix A for a description of how transects are labeled within the GPS unit. 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** (however, do identify and make a note in the margin of your datasheet of the locations of any birds flushed from around the count station upon your approach). Filling out the habitat data 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.

### Collecting Habitat Data

Fill in the habitat data for each of the 16 points **while at the point**. Unlike the bird data, which we record to an unlimited distance from each point, **we only record habitat data within a 50m radius of each point**. We use the habitat data to relate bird density to vegetation features and habitat types. This information will have real applications for managing habitats for birds, so please be as accurate as possible with these data. Because it is very important to finish the bird surveys we ask that you do not spend more than a couple minutes filling in habitat data at each point. Collect samples (place in a zip lock bag) of unknown plant species to identify after completing the survey. Below is a description of the fields found on the vegetation data sheet and brief instructions on filling in these fields. Please refer to Figure 3 at the end of this section for an example of a completed vegetation datasheet.



**Agricultural /Rural (AR):** vegetation has been planted by humans for food production or ornamental purposes in sparsely developed areas. Examples include a farmed field with wheat, corn, millet, etc., a fallow field, or a rural home site with planted non-native species. Please make note of crop spp., if fallow, etc.

**Aspen (AS):** overstory dominated by aspen although scattered ponderosa pine or Douglas-fir may be present. The overstory should make up  $\geq 20\%$  of 50m radius around point and consist of  $>50\%$  Aspen. Aspen stands often have an abundant and diverse shrub layer. Typical shrub species in aspen habitats include snowberry, willow, sagebrush, mountain mahogany and oak. On occasion there may be no shrub layer. Typically the ground under aspen stands is covered by grasses and forbs.

**Alpine Tundra (AT):** high-elevation, open landscapes that occur above tree line. These areas should have no overstory and often lack a significant shrub component. Ground cover consists of short grasses (generally  $<10\text{cm}$  in height), wild flowers, mosses, lichens and succulents.

**Cliff/Rock (CR):** area is dominated by rock and generally lacking vegetative cover (e.g., talus slopes, boulder fields, and rocky outcroppings). Areas described as Cliff/Rock should have  $<20\%$  shrub cover and vegetated ground cover.

**Desert/Semi desert Shrubland (DS):** dry landscape containing shrubs, but lacking a co-dominant grass component. Dominant shrubs may include sagebrush, greasewood, barberry and saltbush. Ground cover layer is typically dominated by bare ground and rock with limited forbs and grasses present. Grass and forbs make up  $\leq 20\%$  of ground cover.

**Grassland (GR):** landscape lacking an overstory and significant shrub component. Ground cover is dominated by grasses and perhaps some forbs. Shrub component must be  $\leq 30\%$ . Grasses must be  $\geq 50\%$

**Insect Infested (II):** forested habitat with  $\geq 20\%$  of the overstory dead or sickly - typically referring to pine bark beetle affecting lodgepole and ponderosa pine. Canopy cover must be  $\geq 30\%$ .

**Lodgepole Pine (LP):** habitat consisting of  $\geq 30\%$  canopy cover that is dominated by lodgepole pine. Canopy may have other conifer species or some aspen but lodgepole pine must be dominant. Shrub layer can be conspicuous or nearly absent.

**Mixed Conifer (MC):** forested habitat consisting of several species of conifers with ponderosa pine, lodgepole pine, or spruce/fir spp. not being dominant. Canopy cover should be  $\geq 30\%$ . Overstory may range from very dense to relatively open. Undergrowth is complex and is typically contains deciduous shrubs and/or conifer saplings. Stands with dense overstory may have little or no shrub and ground cover layers.

**Montane Meadow (MM):** areas with little to no overstory where the ground cover consists mostly of forbs, which are surrounded by forests. Elevations should be  $>7,000'$ .

Soils should be moist to wet with forbs or grass as the dominant species. Canopy cover should be  $\leq 10\%$ . Shrub layer should be  $\leq 10\%$ .

**Open Water (OW):** habitat consisting of  $>50\%$  open water, bank, and shoreline. Any other habitat type may be present, but must be  $<50\%$ .

**Pinyon-Juniper/Juniper (PJ):** vegetative communities largely influenced by pinyon-juniper or other juniper species. Overstory must be  $\geq 20\%$ . Semi-arid conditions often produce a relatively short overstory. Juniper tends to dominate at lower elevations while pinyon dominates at higher elevations. Typically, shrub layer includes sagebrush, rabbit brush, oak or mahogany. Ground cover is usually dominated by grasses with fewer forbs.

**Ponderosa Pine (PP):** areas with  $>20\%$  overstory cover that is made up primarily ( $>60\%$ ) by Ponderosa Pine. Often includes other tree types such as fir, pine and aspen. Shrub layer relatively open and often includes common juniper, oak, cliffrose and currents. Ground cover typically dominated by grass species.

**Riparian (RI):** stands or strips of trees or shrubs near a permanent or seasonal water source. Typical tree and shrub species include cottonwood, box elder, maple, aspen, alder and willows. Typically isolated areas surrounded by coniferous forest, grassland, shrubland or sagebrush habitat.

**Sage Shrubland (SA):** habitat where grasses and shrubs are co-dominant and the shrub layer cover is  $>30\%$ . Shrub species must consist of  $\geq 30\%$  sagebrush. Typical ground cover is dominated by grasses with limited forbs and bare ground. Bare ground must be  $<80\%$  ground cover.

**Spruce-Fir (SF):** mixed coniferous forest that is dominated by spruce and fir species (typically occurring at elevations  $>7000'$ ). Spruce and fir must be  $\geq 50\%$  of overstory cover. Variable understory typically includes shrubs and forbs with few grasses.

**Shrubland (SH):** landscape co-dominated by grasses and shrub species. Shrub species must be  $>30\%$ . Sagebrush must be  $<30\%$  of shrub layer. Typical shrub species include ceonothus, manzanita, sage, rabbitbrush, current, skunkbrush, serviceberry and plum. Ground cover dominated by grasses.

**Urban/Residential (UR):** areas highly impacted by human development in which  $>20\%$  of the ground is covered by impermeable surfaces. Typically describing relatively dense development including houses, lawns, sidewalks and streets.

**Wetland (WE):** habitat influenced by permanent or seasonal flooding resulting in tall reeds, grasses, and/or cattails with little to no overstory. This habitat is defined by the presence of some emergent vegetation that is adapted to wet soils or inundation. Typical species include cattails, sedges, rushes and sphagnum mosses. Overstories are limited to dryer areas around the wetland and must be  $<20\%$ .

### **Overstory Data (forested habitats only)**

- 1. Canopy Cover:** Estimate closure of the combined canopy trees to the nearest 10% within a

50m radius of the point-count.

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

**3. 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 50m 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 datasheet using the correct two-letter vegetation code (see Appendix B for plant species codes). Note that Insect Infested (II), 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).

### Miscellaneous Data (Y/N)

**1. 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 **50m** 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 that is higher than the surrounding vegetation.

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

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

**4. 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.

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

### Mid-story Data (forested habitats only)

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 B 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. Keep in mind that trees in the mid-story can potentially be the same species as overstory trees.

### Shrub Layer Data

Use this category to estimate the amount and species makeup of any woody shrub layer

(including seedling trees) present. Generally, shrubs are >0.5m high and <5.0m high. Anything taller than 5.0m should be considered part of the sub-canopy (e.g. very tall oaks or aspens that are of greater height); anything shorter than 0.5m 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 0.5m (sage transects) – in this case, record all shrubs species as a shrub layer and estimate cover as usual).

- 1. Shrub Cover:** Estimate the *total* percent coverage of all woody shrub species AND seedling trees present within 50m of the count station to the nearest 10%.
- 2. Mean height:** Estimate the average height to the nearest 0.5m of the shrub layer.
- 3. 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 50m 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 B for plant species codes).

Note: 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**.

### Ground Cover Data

We classify ground cover into five categories. For each of these categories, estimate the *total* percent of ground cover within 50m of the count station. In most 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 or snow pack is present at a point, make a note of it along with the percent cover at the bottom of the vegetation data sheet.

The five common types of ground cover are:

- 1) woody vegetation below 0.5m (roughly knee height) including cacti;
- 2) dead and down 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

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

Grass and herbaceous height: Estimate the average height of the grass and herbaceous plants in centimeters within the 50m 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.

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Observer (FI, MI, Last name)			Date (mm/dd/yy)			GPS Unit #:			Transect ID			Time	
N. J. Van Lanen			7 20 10			1245			WY-BCR10-SR9			5:05	9:30
Access Point UTM's			ZONE: 12			UTMs: 6195994980056						Temp	
5			1		3		45		60				

Point	Point info			Point	Overstory - all spp. total to 100%													Point	Other (Y/N)				
	Dist. to road (m)	Private property?	Accuracy		Primary Habitat	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 %	Human structures?	Cliff/rock?	P-dog town?	P-dogs present?
1	-	N	2	1	AT	1	0											1	N	Y	N	N	0
2	-	N	2	2	AT	1	0											2	N	N	N	N	0
3				3														3					
4	-	N	2	4	AT	1	0											4	N	N	N	N	0
5	-	N	4	5	MC	4	70	16	LP	40	ES	30	DC	20	DF	10		5	N	N	N	N	41
6	-	N	4	6	MC	4	50	13	ES	50	LP	30	DC	20				6	N	N	N	N	17
7	43	N	6	7	MC	4	60	17	LP	30	ES	30	DF	25	DC	15		7	Y	N	N	N	22
8	-	N	2	8	MC	4	40	15	DF	40	ES	30	LP	15	SU	10	DC	5	8	N	N	N	6
9				9														9					
10	-	N	5	10	MC	4	60	18	DF	50	LP	30	ES	15	DC	5		10	N	N	N	N	8
11	-	N	3	11	MC	4	40	16	DF	40	LP	30	ES	20	DC	10		11	N	N	N	N	19
12	-	N	4	12	LP	4	40	14	LP	90	DC	10						12	N	N	N	N	16
13	-	N	4	13	LP	4	50	13	LP	90	DC	10						13	N	N	N	N	14
14	-	N	2	14	II	4	60	14	LP	50	DC	50						14	N	N	N	N	56
15				15														15					
16				16														16					

Midstory										
Distinct SUBCANOPY - If Present										
Species #1 #2 #3			Species #1 #2 #3			Species #1 #2 #3			Point	
										7
										8
										9
										10
										11
										12
										13
										14
										15
										16

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

Shrub layer - all spp. total to 100%											Ground Cover - usually totals to 100%							
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	Woody %	Dead and Down %	Herbaceous %	Bare / litter %	Grass %	Grass & Herb. Height (cm)
0												1	0	10	40	40	10	10
0												2	0	0	30	30	40	15
												3						
0												4	5	10	40	30	15	10
30	1.0	ES	45	CJ	30	DF	15	SU	10			5	10	10	10	60	10	20
20	3.0	LP	40	ES	40	DF	20					6	5	10	10	70	5	15
30	1.8	DF	100									7	5	5	10	70	10	20
20	2.5	LP	60	SU	40							8	5	5	15	55	10	25
												9						
10	1.5	ES	60	DF	40							10	10	10	5	70	5	20
20	1.2	DF	50	ES	30	CJ	20					11	5	10	5	75	5	18
20	0.8	LP	90	CJ	10							12	10	5	5	70	10	15
10	1.0	LP	100									13	10	5	5	60	20	25
20	0.6	LP	60	CJ	40							14	10	10	5	55	20	20
												15						
												16						

16% H<sub>2</sub>O

Figure 3. Example of a completed Vegetation Datasheet.

**Point Information Data Sheet**

**Landowner Information**

There is a simple datasheet on the back of the vegetation datasheet with 16 lines on it; one line for each point on the survey (Figure 4). You will use this form to record any additional landowner information you may collect in the field. If you find that the landowner information we provided is different from what you encounter in the field (such as landowner names, phone numbers, addresses, etc.) or if you obtain new landowner information please record that information on the appropriate line. Also, if a point is listed as private, and you discover it is actually public (or vice versa), you will record that information here as well.

**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 (Figure 4). Reasons points were not conducted:

P:	Private Property - Denied <u>P</u> ermission
N:	Private Property - <u>N</u> o contact with landowner
U:	Terrain <u>U</u> nsafe (could not safely approach to within 25 m of point)
R:	Can't cross <u>R</u> iver
S:	<u>S</u> now pack impassible
H:	Running water near point - unable to <u>H</u> ear
W:	<u>W</u> eather (rain or wind)
G:	No <u>G</u> PS reception, cannot find point
T:	Ran out of <u>T</u> ime (Past 11am or noticeably decreased bird activity)
O:	<u>O</u> ther - explain

These are just a few reasons; you may run into other unexpected issues in the field. Be sure to take detailed notes on why points were not conducted. We need to report this information to our funders 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.

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Point	Landowner Info/Reasons points were not conducted
1	
2	
3	O: Pt. on public property, but denied access by USFWS b/c of active wolf den.
4	
5	
6	
7	
8	
9	U Scree Slope (steep)
10	
11	
12	
13	
14	
15	P Mr. Johnson denied access
16	P " " " "

Observer Initials (all three)

N	V	L
---	---	---

Year

2	0	1	0
---	---	---	---

State

WY
----

BCR

10
----

Transect Name (e.g. RM99)

SR09
------

Order of Importance	Please record the reasons why you did not survey certain points within the grid (if applicable). If more than one of the codes below apply, please record ONLY the code of highest importance.
<div style="text-align: center;">  <p>Most</p> <p>Least</p> </div>	<p>P: Private Property - Denied <u>P</u>ermission</p> <p>N: Private Property - <u>N</u>o contact with landowner</p> <p>U: Terrain <u>U</u>nsafe (could not safely approach to within 25 m of point)</p> <p>R: Can't cross <u>R</u>iver</p> <p>S: <u>S</u>now pack impassible</p> <p>H: Running water near point - unable to <u>H</u>ear</p> <p>W: <u>W</u>eather (rain or wind)</p> <p>G: No <u>G</u>PS reception, cannot find point</p> <p>T: Ran out of <u>T</u>ime (Past 11am or noticeably decreased bird activity)</p> <p>O: <u>O</u>ther - explain</p>

Figure 4. Example of a completed Point Information Datasheet.

## Collecting Bird Data

### General Info

**It is extremely important to fill in the blanks at the bottom of both sides 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. Also, we scan copies of all of our data, so the general info needs to be on both sides of the datasheet. **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=CO).
3. **BCR:** Fill in the number of the BCR you are working in.
4. **Transect Name:** Fill in the 4-character grid ID code (strata and number) on all pages of the bird form.

### Point Data

Enter the number of the point (01-16) on the transect you are about to survey. **NOTE:** for entries of low density species *between points* enter "88" as the point number (see below for more information on "88" birds). After recording the general habitat data at the point count station and denoting the point you are at on the bird datasheet, activate your timepiece and begin recording the birds you see and hear. **The count duration is 6 minutes. It is extremely important to document the minute of the count that an individual bird was first detected.** To do this, simply write the number of the minute under the "minutes" column each time the beeper goes off. DO NOT record any other birds after the 6 minutes are over, even if it is an interesting bird (you could record this bird in the notes if you so desire). However, if the species is an "88" bird, then you can record it as such on the data sheet after the point data. If you do not detect any birds during a minute 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 correctly as it is impossible to pay attention to the birds and to note how much time (by looking at your time piece) has passed simultaneously. If, during your 6 minute survey, you detect a bird that was flushed from the survey point upon your arrival (which you should have noted while collecting vegetation data), record the bird's original distance from the survey point, because we assume that these birds would have remained at their original locations were it not for the disturbance created by the observer.

While conducting counts, be sure to focus primarily on birds that are close to the point. Although 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 the point but **ALWAYS** return ASAP to the point. Do NOT chase birds before or during the count. After the six 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 six minutes and do NOT record birds that were only found while chasing another bird after the count. **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. Additionally, you should mentally track birds that may move around you during a point so as not to double count them during a single 6-minute count.

For each independently detected bird, you will record:

- 1) the **species**,
- 2) the **radial distance** (in meters),
- 3) **how** the bird was detected,
- 4) if the bird was **visually** observed,
- 5) the **sex** of the bird, if known,
- 6) the **cluster size** and **cluster ID** code.

Please refer to Figure 5 at the end of this section for an example of a completed bird datasheet.

**A. Species:** All birds detected during the 6-minute count period will be recorded using the correct four-letter codes (See Appendix C 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.

PLEASE, PLEASE use correct codes, as it makes data entry and analyses easier. Species that cause particular problems for observers include: **Cackling Goose** (CACG not CAGO), **Canada Goose** (CANG not CAGO), **Northern Shoveler** (NSHO, not NOSH), Ring-necked Pheasant (RINP, not RNPH), **Barn Owl** (BNOW not BAOW), **Barred Owl** (BDOW not BAOW), **Broad-tailed Hummingbird** (BTLH not BTHU), **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), **Cactus Wren** (CACW not CAWR), **Canyon Wren** (CANW not CAWR), **Cedar Waxwing** (CEDW not CEWA), **Black-throated Gray Warbler** (BTYW not BTGW), **MacGillivray's Warbler** (MGWA, not MAWA), **Yellow Warbler** (YWAR, not YEWA), , **Canyon Towhee** (CANT not CATO), **Lark Bunting** (LARB, not LABU), **Sage Sparrow** (SAGS not SASP), **Savannah Sparrow** (SAVS, not SASP), **Lazuli Bunting** (LAZB, not LABU) and **Red-winged Blackbird** (RWBL, not RWBB).

## Field Protocol for Spatially Balanced Sampling of Landbird Populations: 2011 Field Season

Some individuals can be identified to subspecies. If you can identify one of the below subspecies, please use the four-letter codes below:

Subspecies	Code	Subspecies	Code
Northern Flicker (Red-shafted)	RSFL	Dark-eyed Junco (Pink-sided)	PSJU
Northern Flicker (Yellow-shafted)	YSFL	Dark-eyed Junco (Red-backed)	RBJU
Northern Flicker (Intergrade)	FLIN	Dark-eyed Junco (Slate-colored)	SCJU
Yellow-rumped Warbler (Audubon's)	AUWA	Dark-eyed Junco (White-winged)	WWJU
Yellow-rumped Warbler (Myrtle's)	MYWA	White-crowned Sparrow (Gambel's)	GWCS
Dark-eyed Junco (Gray-headed)	GHJU	White-crowned Sparrow (Mountain)	MWCS
Dark-eyed Junco (Oregon)	ORJU		

If you detect a bird that you are unable to identify, use the appropriate unknown bird code. Never guess on the identity of a bird. This is 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. Below is a table of unidentified bird codes you can use:

Unknown Bird	Code	Unknown Bird	Code
Unknown Accipiter	UNAC	Unknown Jay	UNJA
Unknown Bird	UNBI	Unknown Nuthatch	UNNU
Unknown Blackbird	UNBL	Unknown Oriole	UNOR
Unknown Buteo	UNBU	Unknown Owl	UNOW
Unknown Chickadee	UNCH	Unknown Pipit	UNPI
Unknown Corvid	UNCO	Unknown Raptor	UNRA
Unknown Dove	UNDO	Unknown Sparrow	UNSP
Unknown Duck	UNDU	Unknown Swallow	UNSW
Unknown Empidonax	UNEM	Unknown Swift	UNSI
Unknown Falcon	UNFA	Unknown Tanager	UNTA
Unknown Finch	UNFI	Unknown Thrush	UNTH
Unknown Flycatcher	UNFL	Unknown Thrasher	UNTR
Unknown Gnatcatcher	UNGN	Unknown Vireo	UNVI
Unknown Grouse	UNGR	Unknown Warbler	UNWA
Unknown Gull	UNGU	Unknown Woodpecker	UNWO
Unknown Hawk	UNHA	Unknown Wren	UNWR
Unknown Hummingbird	UNHU		

**Distance:** 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 datasheet under "Radial Distance". If you detect a bird beyond one kilometer (1000m), enter the distance as "999". **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. If you cannot get a direct line of sight to the location of a bird, estimate the distance that bird is from a visible point and use

the Rangefinder to measure to that point. 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. **Please estimate the distance from the visible point to the bird BEFORE using the Rangefinder to get the distance from you to that point.** Distance-sampling relies upon the assumption that you measure all distances accurately, so 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 10m interval. Rounding distances causes heaping at popular values and makes analyses more problematic! If you see or hear a bird that is beyond the range of the Rangefinder, estimate the distance the bird is past a point-within-range and add that distance to what the Rangefinder displays. **Once again, estimate the distance between the bird and point-within-range BEFORE using the Rangefinder to get the distance from you to that point.** 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, bird data recorded without associated distances CANNOT be used in analyses! 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.

**How:** In the “How” column, record **how each bird was detected** (i.e., 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 may be 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 after the first code entered.**

Flyovers: Some birds observed flying over a point without showing any signs of landing or using the surrounding habitat should be recorded as a “flyover”. However, individuals of species that habitually hunt on the wing (e.g. raptors, swallows, swifts) or appear to be foraging (e.g. crossbills, goldfinches, waxwings) or hunting in the vicinity around the point, should NOT be treated as flyovers. You should record these as if they were a perched bird. Additionally, individuals that you first detect in flight that are simply flying from perch to perch nearby 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. For true flyovers, 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.

**Visual:** In the visual column enter a checkmark if you were able to visually identify the individual at any time during the survey. Check this box even if you recorded “V” for the

detection type. This column is meant to further assure us of proper identification and recorded distances.

**Sex:** In the “Sex” column, record the sex of the bird, if known (F=female, M=male, U=unknown). Change U to a M or F if you later identify the same individual as male or female. Assume that singing birds are males only if: 1) you can visually identify the singing bird as a male, 2) it is a warbler or sparrow, 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 unless you can visually identify it.

*Example:* On a point count, you detect six birds. You see a male RNSA, you hear a drumming RNSA, a calling WBNU, a singing AUWA, 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).

**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: single species flocks and paired birds. In either case, we define a cluster as birds of the same species that are observed TOGETHER (foraging, flying, perching, or obviously interacting with each other). Distances between members of a cluster should be very short (within 20 meters). Two males of the same species singing 20m apart do NOT constitute a cluster. Please record the two types of clusters as follows.

**Flocks:** When two or more 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 ...). The Cluster Code is only used to link clusters that take up multiple lines on the datasheet.

**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 datasheet, with the appropriate codes for “HOW” detected and “Sex”. In the first scenario, the male “HOW” = S(inging) and the female “HOW” = V(isual). In the second scenario, “HOW” = V(isual) 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 ...).

*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 27m away AND also notes that there is a female BHGR in the same tree, but about 29m away. Next, the

observer hears 5 Pine Siskins (PISI), looks up, and measures that they are 36-38m 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 17ms 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. The observer’s data looks like this:

Point #	Minute	Species	Radial Distance	How	Visual?	Sex	Cluster	
							Size	Code
03	1	WETA	46	S		M	1	
		AMRO	103	S		M	1	
	2	BHGR	27	C	x	M	1	A
		BHGR	29	V	x	F	1	A
	3	PISI	37	C	x	U	5	
	4	NOBI						
	5	MOCH	17	C	x	U	1	B
		MOCH	17	V	x	U	1	B
	6	NOBI						

**Squirrels:** Yes, squirrels. In an effort to incorporate other information into our bird monitoring programs, we are also collecting data on red squirrels (RESQ) and Abert’s squirrels (ABSQ) during point counts. *Treat both squirrels as you would a bird on point counts (fill in the radial distance, how and sex boxes) and treat Abert’s squirrels as an “88” species as well.* Please do not forget to record these squirrels **and** their associated data at all point counts, as the utility of these data depend on everyone collecting them throughout the study areas.

**“88” Birds:** While walking between points, record all low-density birds species on the list of “88” birds. You do not need to record distance *but do record HOW and CLUSTER SIZE.* **Also record any birds you think might be rare for the area in which you are surveying.** (See Appendix D for a list of 88 bird species.)

**Transect notes:** Enter information relevant to the site or individual points in the notes section at the bottom of the datasheet. 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, or anything that may have affected your point counts (loud noises, cows, etc.)

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

**VERY IMPORTANT: Check over your point-count data before leaving each count station** to make sure you have recorded all the required information (e.g. distances, how/sex info). Skip a line between entries for individual points. All individual birds on a particular point should be bunched together on the form; then you should leave a blank line before starting entries for the next point.

How: V=visual; S=singing; C=calling; D=drumming; O=other aural detection. Sex: M=male; F=female; U=unknown  
 Rocky Mountain Bird Observatory, PO Box 1232, Brighton, CO 80601

Rocky Mountain Bird Observatory Point Transect Bird Form

Point #	Minute	Species	Radial Distance	HOW	Visual?	SEX	Cluster		Point #	Minute	Species	Radial Distance	HOW	Visual?	SEX	Cluster	
							Size	Code								Size	Code
01	1	HOLA	071	S		M			14	1	HETH	083	C		U		
		LISP	122	S		M					DEJU	064	S		U		
	2	STJA	186	C	✓	U				2	YRWA	051	S		M		
	3	AMPI	046	C		U				3	NOBI						
	4	NOBI								4	DEJU	089	S		M		
	5	CORA	177	V		U					HAWO	028	O	✓	M		
	6	HOLA	108	S		M				5	DUFL	065	C		U		
										6	NOBI						
05	1	DEJU	040	S		M	1	A	10	1	DEJU	054	S		U		
		DEJU	041	V	✓	U	1	A			DUFL	041	S		M		
		RCKI	083	S		U					MOCH	127	C		U		
	2	TOSO	042	S		M				2	MOCH	126	C		U		
		DEJU	064	S		M				3	YRWA	072	S		M		
	3	MOCH	034	C		U	2			4	YRWA	085	S		M		
	4	NOBI								5	NOBI						
	5	HETH	113	S		U				6	AMRO	136	F	✓	U	3	
	6	NOBI															
88		BRCR				S		U	06	1	NOBI						
										2	CLNU	113	C		U		
13	1	NOBI									MOCH	111	C		U		
	2	YRWA	033	S	✓	M					CLNU	013	V	✓	U		
	3	MOCH	041	C		U				3	ATTW	034	C		U		
	4	DEJU	120	S		M				4	NOBI						
	5	NOBI								5	NOBI						
	6	NOBI								6	NOBI						

Notes:

Observer 1 Initials-all three

N V L

Year

2011

Visit #

1

Park Code - Transect/Group Name

WY-BCR10-SR9

Figure 5. Example of completed Bird Datasheet.

## VI. OTHER IMPORTANT INFORMATION

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

- 1) Check to make sure you entered your observer initials, point count grid #, 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. Your work is not done 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!

## VII. POTENTIAL ISSUES WHEN CONDUCTING POINT COUNTS

### 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).

### 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 or visual field 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 (equally). Avoid red and other bright colors that may attract species to you (hummingbirds, etc.).

### 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.

### 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. **Never pish or attract birds toward you when you are near a point that has not been completed!**

### 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.

### 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. If you are unsure of the correct unknown code, make a note in the comments section so you can write the correct code in later.

### **Know the Area**

The day before you survey a transect, check out your survey area and familiarize yourself with the habitats found within the grid so you know what to expect. Plan out an access route the day before. You will be able to find your way easier in the dark if you have already done the hike during daylight hours.

### **Practice**

Practice identifying birds in a habitat or elevation range before counting in that area. Be familiar with the songs and calls of all species found in an area before conducting point counts there. Birding on-site the evening before is often helpful when camping at or near the transect. Use BCR- or 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.

### **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 (light mist or drizzle is fine as long as it is not impacting the bird activity). 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.

## **VIII. LITERATURE CITED**

- Blakesley, J.A. and D. J. Hanni. 2009. Monitoring Colorado's Birds, 2008. Tech. Rep. M-MCB08-01. Rocky Mountain Bird Observatory, Brighton, CO. 39 pp.
- Buckland, S. T., D. R. Anderson, K. P. Burnham, J. L. Laake, D. L. Borchers, and L. Thomas. 2001. Introduction to distance sampling. Oxford University Press, London, UK.

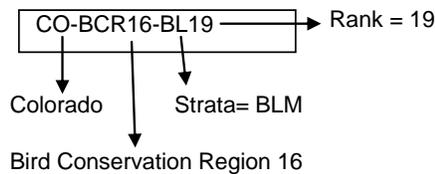
## APPENDIX A. GPS NAMING SYSTEM

At the beginning of the field season, you will receive a GPS unit containing waypoints for each point on each transect assigned to you. The following is an example of how transects and points will be labeled in your GPS unit:

# Monitoring Colorado Birds Grid Label & Point Label Explanation

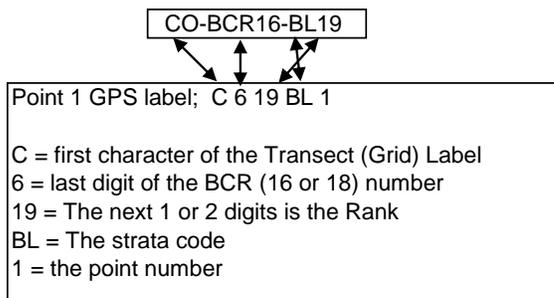
The Grid (Transect) labels are based on the State, Bird Conservation Region (BCR), Strata Code (ie. BLM = BL) and the Rank (This number corresponds with the order of the sample)

Grid Label Example



Point Label Example (16 points per Grid)

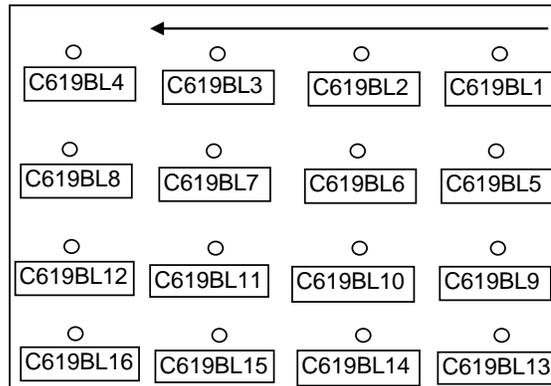
The point GPS label is related to the Transect (Grid) label by the following:



Grid with GPS labels

Number order is from upper right to left

Point Number	GPS label
1	C619BL1
2	C619BL2
3	C619BL3
4	C619BL4
5	C619BL5
6	C619BL6
7	C619BL7
8	C619BL8
9	C619BL9
10	C619BL10
11	C619BL11
12	C619BL12
13	C619BL13
14	C619BL14
15	C619BL15
16	C619BL16



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

<b>Code</b>	<b>Shrubs/Small Trees</b>
AA	Acacia spp.
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>Cylindropuntia 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
CT	Creosote ( <i>Larrea tridentata</i> )
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>Arctostaphalis 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> )
OP	Prickly Pear ( <i>Opuntia spp.</i> )
OT	Other shrub – unknown species or not on list
RA	Rabbitbrush ( <i>Chrysothamnus spp.</i> )

Field Protocol for Spatially Balanced Sampling of Landbird Populations: 2011 Field Season

Code	Shrubs/Small Trees
RD	Red-osier dogwood ( <i>Cornus sericea</i> )
RB	River (water) birch ( <i>Betula occidentalis</i> )
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> )

Code	Large trees
HH	American hophornbeam ( <i>Ostrya Virginian</i> )
AE	American Elm
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> )

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<b>Code</b>	<b>Large trees</b>
LP	Lodgepole pine ( <i>Pinus contorta</i> )
NC	Narrow-leaf cottonwood ( <i>Populus angustifolia</i> )
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 C. FOUR-LETTER BIRD CODES

<b>Common Name</b>	<b>Code</b>	<b>Common Name</b>	<b>Code</b>	<b>Common Name</b>	<b>Code</b>
Abert's Towhee	ABTO	Barrow's Goldeneye	BAGO	Bobolink	BOBO
Acorn Woodpecker	ACWO	Bell's Vireo	BEVI	Bohemian Waxwing	BOWA
Alder Flycatcher	ALFL	Belted Kingfisher	BEKI	Boreal Chickadee	BOCH
Am. Three-toed Woodpecker	ATTW	Bewick's Wren	BEWR	Boreal Owl	BOOW
American Avocet	AMAV	Black Phoebe	BLPH	Brewer's Blackbird	BRBL
American Bittern	AMBI	Black Rail	BLRA	Brewer's Sparrow	BRSP
American Coot	AMCO	Black Rosy-Finch	BLRF	Bridled Titmouse	BRTI
American Crow	AMCR	Black Swift	BLSW	Broad-tailed Hummingbird	BTLH
American Dipper	AMDI	Black Tern	BLTE	Broad-winged Hawk	BWHA
American Goldfinch	AMGO	Black Vulture	BLVU	Brown Creeper	BRCR
American Kestrel	AMKE	Black-and-white Warbler	BAWW	Brown Thrasher	BRTH
American Pipit	AMPI	Black-backed Woodpecker	BBWO	Brown-capped Rosy-Finch	BCRF
American Redstart	AMRE	Black-billed Cuckoo	BBCU	Brown-crested Flycatcher	BCFL
American Robin	AMRO	Black-billed Magpie	BBMA	Brown-headed Cowbird	BHCO
American Tree Sparrow	ATSP	Black-capped Chickadee	BCCH	Bufflehead	BUFF
American White Pelican	AWPE	Black-capped Vireo	BCVI	Bullock's Oriole	BUOR
American Wigeon	AMWI	Black-chinned Hummingbird	BCHU	Burrowing Owl	BUOW
Anna's Hummingbird	ANHU	Black-chinned Sparrow	BCSP	Bushtit	BUSH
Ash-throated Flycatcher	ATFL	Black-crowned Night-Heron	BCNH	Cackling Goose	CACG
Baird's Sandpiper	BASA	Black-headed Grosbeak	BHGR	Cactus Wren	CACW
Baird's Sparrow	BAIS	Black-necked Stilt	BNST	California Gull	CAGU
Bald Eagle	BAEA	Black-tailed Gnatcatcher	BTGN	California Quail	CAQU
Baltimore Oriole	BAOR	Black-throated Gray Warbler	BTYW	Calliope Hummingbird	CAHU
Band-tailed Pigeon	BTPI	Black-throated Sparrow	BTSP	Canada Goose	CANG
Bank Swallow	BANS	Blue Grosbeak	BLGR	Canvasback	CANV
Barn Owl	BNOW	Blue Jay	BLJA	Canyon Towhee	CANT
Barn Swallow	BARS	Blue-gray Gnatcatcher	BGGN	Canyon Wren	CANW
Barred Owl	BDOW	Blue-winged Teal	BWTE	Cassin's Finch	CAFI

Field Protocol for Spatially Balanced Sampling of Landbird Populations: 2011 Field Season

<b>Common Name</b>	<b>Code</b>	<b>Common Name</b>	<b>Code</b>	<b>Common Name</b>	<b>Code</b>
Cassin's Kingbird	CAKI	Cordilleran Flycatcher	COFL	Golden-winged Warbler	GWWA
Cassin's Sparrow	CASP	Crissal Thrasher	CRTH	Grace's Warbler	GRWA
Cassin's Vireo	CAVI	Curve-billed Thrasher	CBTH	Grasshopper Sparrow	GRSP
Cattle Egret	CAEG	Dark-eyed Junco	DEJU	Gray Catbird	GRCA
Cave Swallow	CASW	Dickcissel	DICK	Gray Flycatcher	GRFL
Cedar Waxwing	CEDW	Double-crested Cormorant	DCCO	Gray Jay	GRAJ
Chestnut-backed Chickadee	CBCH	Downy Woodpecker	DOWO	Gray Partridge	GRPA
Chestnut-collared Longspur	CCLO	Dusky Flycatcher	DUFL	Gray Vireo	GRVI
Chestnut-sided Warbler	CSWA	Dusky Grouse	DUGR	Gray-crowned Rosy-Finch	GCRF
Chihuahuan Raven	CHRA	Eared Grebe	EAGR	Great Blue Heron	GBHE
Chimney Swift	CHSW	Eastern Bluebird	EABL	Great Crested Flycatcher	GCFL
Chipping Sparrow	CHSP	Eastern Kingbird	EAKI	Great Egret	GREG
Chukar	CHUK	Eastern Meadowlark	EAME	Great Gray Owl	GGOW
Cinnamon Teal	CITE	Eastern Phoebe	EAPH	Great Horned Owl	GHOW
Clark's Grebe	CLGR	Eastern Screech-Owl	EASO	Greater Pewee	GRPE
Clark's Nutcracker	CLNU	Eastern Wood-Pewee	EAWP	Greater Prairie-Chicken	GRPC
Clay-colored Sparrow	CCSP	Eurasian Collared-Dove	EUCD	Greater Roadrunner	GRRO
Cliff Swallow	CLSW	European Starling	EUST	Greater Sage-Grouse	GRSG
Colima Warbler	COLW	Evening Grosbeak	EVGR	Greater Scaup	GRSC
Common Black-Hawk	CBHA	Ferruginous Hawk	FEHA	Greater Yellowlegs	GRYE
Common Goldeneye	COGO	Field Sparrow	FISP	Great-tailed Grackle	GTGR
Common Grackle	COGR	Flammulated Owl	FLOW	Green Heron	GRHE
Common Loon	COLO	Forster's Tern	FOTE	Green-tailed Towhee	GTTO
Common Merganser	COME	Fox Sparrow	FOSP	Green-winged Teal	AGWT
Common Moorhen	COMO	Franklin's Gull	FRGU	Gunnison Sage-Grouse	GUSG
Common Nighthawk	CONI	Gadwall	GADW	Hairy Woodpecker	HAWO
Common Poorwill	COPO	Gambel's Quail	GAQU	Hammond's Flycatcher	HAFL
Common Raven	CORA	Golden Eagle	GOEA	Harris's Hawk	HRSH
Common Yellowthroat	COYE	Golden-cheeked Warbler	GCWA	Henslow's Sparrow	HESP
Cooper's Hawk	COHA	Golden-crowned Kinglet	GCKI	Hepatic Tanager	HETA

Field Protocol for Spatially Balanced Sampling of Landbird Populations: 2011 Field Season

<b>Common Name</b>	<b>Code</b>	<b>Common Name</b>	<b>Code</b>	<b>Common Name</b>	<b>Code</b>
Hermit Thrush	HETH	Long-eared Owl	LEOW	Olive Warbler	OLWA
Hooded Merganser	HOME	Lucy's Warbler	LUWA	Olive-sided Flycatcher	OSFL
Hooded Oriole	HOOR	MacGillivray's Warbler	MGWA	Orange-crowned Warbler	OCWA
Hooded Warbler	HOWA	Mallard	MALL	Orchard Oriole	OROR
Horned Grebe	HOGR	Marbled Godwit	MAGO	Osprey	OSPR
Horned Lark	HOLA	Marsh Wren	MAWR	Ovenbird	OVEN
House Finch	HOFI	McCown's Longspur	MCLO	Painted Bunting	PABU
House Sparrow	HOSP	Merlin	MERL	Painted Redstart	PARE
House Wren	HOWR	Mississippi Kite	MIKI	Pectoral Sandpiper	PESA
Hutton's Vireo	HUVI	Montezuma Quail	MONQ	Peregrine Falcon	PEFA
Indigo Bunting	INBU	Mountain Bluebird	MOBL	Phainopepla	PHAI
Juniper Titmouse	JUTI	Mountain Chickadee	MOCH	Pied-billed Grebe	PBGR
Killdeer	KILL	Mountain Plover	MOUP	Pileated Woodpecker	PIWO
Ladder-backed Woodpecker	LBWO	Mountain Quail	MOUQ	Pine Grosbeak	PIGR
Lapland Longspur	LALO	Mourning Dove	MODO	Pine Siskin	PISI
Lark Bunting	LARB	N. Rough-winged Swallow	NRWS	Pinyon Jay	PIJA
Lark Sparrow	LASP	Nashville Warbler	NAWA	Piping Plover	PIPL
Lazuli Bunting	LAZB	Northern Bobwhite	NOBO	Plumbeous Vireo	PLVI
Le Conte's Sparrow	LCSP	Northern Cardinal	NOCA	Prairie Falcon	PRFA
Least Flycatcher	LEFL	Northern Flicker	NOFL	Purple Finch	PUFI
Lesser Goldfinch	LEGO	Northern Goshawk	NOGO	Purple Martin	PUMA
Lesser Nighthawk	LENI	Northern Harrier	NOHA	Pygmy Nuthatch	PYNU
Lesser Prairie-Chicken	LEPC	Northern Mockingbird	NOMO	Pyrrhuloxia	PYRR
Lesser Scaup	LESC	Northern Parula	NOPA	Red Crossbill	RECR
Lesser Yellowlegs	LEYE	Northern Pintail	NOPI	Red-bellied Woodpecker	RBWO
Lewis's Woodpecker	LEWO	Northern Pygmy-Owl	NOPO	Red-breasted Nuthatch	RBNU
Lincoln's Sparrow	LISP	Northern Saw-whet Owl	NSWO	Red-eyed Vireo	REVI
Loggerhead Shrike	LOSH	Northern Shoveler	NSHO	Red-faced Warbler	RFWA
Long-billed Curlew	LBCU	Northern Shrike	NSHR	Redhead	REDH
Long-billed Dowitcher	LBDO	Northern Waterthrush	NOWA	Red-headed Woodpecker	RHOW

Field Protocol for Spatially Balanced Sampling of Landbird Populations: 2011 Field Season

<b>Common Name</b>	<b>Code</b>	<b>Common Name</b>	<b>Code</b>	<b>Common Name</b>	<b>Code</b>
Red-naped Sapsucker	RNSA	Snow Bunting	SNBU	Vermilion Flycatcher	VEFL
Red-necked Grebe	RNGR	Snow Goose	SNGO	Vesper Sparrow	VESP
Red-tailed Hawk	RTHA	Snowy Egret	SNEG	Violet-green Swallow	VGSW
Red-winged Blackbird	RWBL	Snowy Plover	SNPL	Virginia Rail	VIRA
Ring-billed Gull	RBGU	Solitary Sandpiper	SOSA	Virginia's Warbler	VIWA
Ring-necked Duck	RNDU	Song Sparrow	SOSP	Warbling Vireo	WAVI
Ring-necked Pheasant	RINP	Sora	SORA	Western Bluebird	WEBL
Rock Pigeon	ROPI	Spotted Owl	SPOW	Western Grebe	WEGR
Rock Wren	ROWR	Spotted Sandpiper	SPSA	Western Kingbird	WEKI
Rose-breasted Grosbeak	RBGR	Spotted Towhee	SPTO	Western Meadowlark	WEME
Rough-legged Hawk	RLHA	Sprague's Pipit	SPPI	Western Screech-Owl	WESO
Ruby-crowned Kinglet	RCKI	Spruce Grouse	SPGR	Western Scrub-Jay	WESJ
Ruddy Duck	RUDU	Steller's Jay	STJA	Western Tanager	WETA
Ruffed Grouse	RUGR	Stilt Sandpiper	STSA	Western Wood-Pewee	WEWP
Rufous Hummingbird	RUHU	Summer Tanager	SUTA	White-breasted Nuthatch	WBNU
Rufous-crowned Sparrow	RCSP	Swainson's Hawk	SWHA	White-crowned Sparrow	WCSP
Rusty Blackbird	RUBL	Swainson's Thrush	SWTH	White-eyed Vireo	WEVI
Sage Sparrow	SAGS	Tennessee Warbler	TEWA	White-faced Ibis	WFIB
Sage Thrasher	SATH	Townsend's Solitaire	TOSO	White-tailed Ptarmigan	WTPT
Sandhill Crane	SACR	Townsend's Warbler	TOWA	White-throated Sparrow	WTSP
Savannah Sparrow	SAVS	Tree Swallow	TRES	White-throated Swift	WTSW
Say's Phoebe	SAPH	Trumpeter Swan	TRUS	White-winged Crossbill	WWCR
Scaled Quail	SCQU	Tundra Swan	TUSW	White-winged Dove	WWDO
Scissor-tailed Flycatcher	STFL	Turkey Vulture	TUVU	Whooping Crane	WHCR
Scott's Oriole	SCOR	Upland Sandpiper	UPSA	Wild Turkey	WITU
Sedge Wren	SEWR	Varied Bunting	VABU	Willet	WILL
Sharp-shinned Hawk	SSHA	Varied Thrush	VATH	Williamson's Sapsucker	WISA
Sharp-tailed Grouse	STGR	Vaux's Swift	VASW	Willow Flycatcher	WIFL
Short-eared Owl	SEOW	Veery	VEER	Wilson's Phalarope	WIPH
Smith's Longspur	SMLO	Verdin	VERD	Wilson's Plover	WIPL

Field Protocol for Spatially Balanced Sampling of Landbird Populations: 2011 Field Season

<b>Common Name</b>	<b>Code</b>	<b>Common Name</b>	<b>Code</b>	<b>Common Name</b>	<b>Code</b>
Wilson's Snipe	WISN	Yellow Warbler	YWAR	Yellow-headed Blackbird	YHBL
Wilson's Warbler	WIWA	Yellow-bellied Sapsucker	YBSA	Yellow-rumped Warbler	YRWA
Winter Wren	WIWR	Yellow-billed Cuckoo	YBCU	Yellow-throated Vireo	YTVI
Wood Duck	WODU	Yellow-breasted Chat	YBCH	Zone-tailed Hawk	ZTHA

## APPENDIX D. LOW-DENSITY TARGET SPECIES (“88” BIRDS)

Record these species as 88 birds when you encounter them between points. You do not need to record distances, but please do record How, Sex, and Cluster information.

### I. Colorado

Abert’s Squirrel	Evening Grosbeak
All cuckoos	Field Sparrow
All galliforms	Fox Sparrow
All nightjars	Gray Catbird
All owls	Gray Vireo
All phoebes	Great Crested Flycatcher
All raptors	Great-tailed Grackle
All swifts	Hepatic Tanager
All woodpeckers (incl. sapsuckers but not NOFL)	Indigo Bunting
American Dipper	Lesser Goldfinch
American Redstart	Loggerhead Shrike
Baltimore Oriole	Long-billed Curlew
Band-tailed Pigeon	McCown's Longspur
Bank Swallow	Mountain Plover
Bell’s Vireo	Northern Cardinal
Black-throated Sparrow	Northern Waterthrush
Blue Grosbeak	Olive-sided Flycatcher
Bobolink	Ovenbird
Brown-capped Rosy-finch	Purple Martin
Canyon Towhee	Red-eyed Vireo
Canyon Wren	Rufous-crowned Sparrow
Cassin’s Finch	Scissor-tailed Flycatcher
Cassin’s Kingbird	Scott's Oriole
Cedar Waxwing	Upland Sandpiper
Chestnut-collared Longspur	Veery
Chihuahuan Raven	White-winged Crossbill
Curve-billed Thrasher	Willow Flycatcher

Also record color phase information for Ferruginous Hawks in the Notes section of the datasheet (light or dark only).

### II. Wyoming

All cuckoos	Golden-crowned Kinglet
All diurnal raptors	Gray Catbird
All galliforms	Gray Jay
All nightjars	Gray Vireo
All owls	Juniper Titmouse
All phoebes	Lazuli Bunting
All rosy-finches	Least Flycatcher
All swifts	Lesser Goldfinch

## Field Protocol for Spatially Balanced Sampling of Landbird Populations: 2011 Field Season

All woodpeckers (incl. sapsuckers but not NOFL)	Loggerhead Shrike
American Dipper	Long-billed Curlew
American Goldfinch	Mountain Plover
Ash-throated Flycatcher	Northern Rough-winged Swallow
Baltimore Oriole	Northern Cardinal
Bank Swallow	Northern Waterthrush
Black-and-white Warbler	Olive-sided Flycatcher
Black-chinned Hummingbird	Pine Grosbeak
Black-throated Sparrow	Pinyon Jay
Blue Grosbeak	Purple Martin
Brown Creeper	Pygmy Nuthatch
Bushtit	Red-eyed Vireo
Calliope Hummingbird	Rufous Hummingbird
Canyon Wren	Scott's Oriole
Cassin's Finch	Turkey Vulture
Cassin's Kingbird	Upland Sandpiper
Cassin's Sparrow	Veery
Cedar Waxwing	White-throated Swift
Chestnut-collared Longspur	White-winged Crossbill
Common Yellowthroat	Willow Flycatcher
Dickcissel	Wilson's Snipe
Evening Grosbeak	Yellow-breasted Chat
Fox Sparrow	

### III. Black Hills National Forest

All cuckoos (including GRRO)	Dickcissel
All diurnal raptors	Evening Grosbeak
All galliforms	Golden-crowned Kinglet
All nightjars	Gray Catbird
All owls	Hammond's Flycatcher
All phoebes	Indigo Bunting
All rosy-finches	Lark Bunting
All swifts	Lazuli Bunting
All woodpeckers (except NOFL and HAWO)	Least Flycatcher
American Dipper	Lesser Goldfinch
Baltimore Oriole	Loggerhead Shrike
Bank Swallow	Long-billed Curlew
Black-and-white Warbler	N. Rough-winged Swallow
Black-billed Magpie	Pinyon Jay
Blue Grosbeak	Pygmy Nuthatch
Bobolink	Red-eyed Vireo
Brown Creeper	Say's Phoebe
Canyon Wren	Turkey Vulture
Cassin's Finch	Upland Sandpiper
Cassin's Kingbird	Veery
Cedar Waxwing	White-throated Swift
Chestnut-collared Longspur	White-winged Crossbill

Clark's Nutcracker  
Common Yellowthroat

Wilson's Snipe  
Yellow-breasted Chat

**Report sightings of the following rare Black Hills species ASAP** (within 3-5 days maximum) to: Kerry Burns [kburns@fs.fed.us], USFS project manager for bird monitoring. Make sure to include the date and location information:

**Sharp-shinned Hawk**  
**Cooper's Hawk**  
**Northern Goshawk**  
**Broad-winged Hawk**  
**Flammulated Owl**  
**Yellow-billed Cuckoo**  
**Black-billed Cuckoo**  
**American Dipper** (outside of the Spearfish Creek watershed only)  
**Pygmy Nuthatch**

Identifying the locations of rare species is a benefit of this program that the Forest Service values very much and it can aid in the protection of these species. In your report, please provide UTM coordinates and a description of the location, with general directions to the site. On your GPS unit, log the sightings using the four-letter code of the species.

#### **IV. Northern Arizona (Coconino and Kaibab National Forests)**

All Cuckoos (including GRRO)	Crissal Thrasher
All diurnal raptors	Eastern Meadowlark
All grouse	Elegant Trogon
All nightjars	Gambel's Quail
All owls	Gray Hawk
All phoebes	Great-tailed Grackle
All rosy-finches	Hooded Oriole
All swifts	Lincoln's Sparrow
All woodpeckers	Loggerhead Shrike
Abert's Towhee	Lucy's Warbler
Band-tailed Pigeon	Magnificent Hummingbird
Bell's Vireo	Olive Warbler
Bendire's Thrasher	Olive-sided Flycatcher
Black-capped Gnatcatcher	Painted Redstart
Blue-throated Hummingbird	Red-faced Warbler
Bridled Titmouse	Rufous-winged Sparrow
Broad-billed Hummingbird	Scaled Quail
Canyon Towhee	Virginia's Warbler
Canyon Wren	Western Bluebird
Cassin's Kingbird	Wild Turkey
Cassin's Sparrow	Yellow-breasted Chat
Cordilleran Flycatcher	Yellow-eyed Junco
Costa's Hummingbird	