WILDLIFE MANAGEMENT
Publication Series

Morning covey call counts for estimating autumn
quail (Northern Bobwhite) populations

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The following instructions outline the current techniques for using covey-call-counts to estimate quail population abundance. These methods should provide reasonably accurate estimates of autumn bobwhite population abundance and are relatively easy to implement and use. Of course, no estimator provides a completely true population measure. Here we provide suggestions and outline the methods to maximize precision of estimates without involving too much technical detail. Thus, if you follow this guide for using covey-call-counts, you should be able to derive reasonable estimates of quail population abundance on your management area.

There are three major aspects of successfully utilizing covey-call-counts: planning, field methods, and data analysis. Although the end goal is dependent on all three aspects, it is convenient to separate each part for presentation and instruction. We provide sample figures and examples to help demonstrate key points. We also provided an appendix of supplemental information that you may find useful in your quail management work.

PART I. PLANNING THE COVEY-CALL-COUNT

For a particular area of interest (we will refer to this as the study area), a farm for example, try to survey most of the available quail habitat (it is not practical to waste survey effort on habitats that quail do not use). We will introduce the two methods for conducting call-counts at this time. The grid design, developed at Tall Timbers Research Station, makes use of a square sampling area. Multiple observers locate calling coveys to determine which coveys are inside and outside of the grid area.

For a variety of wildlife call surveys, we often use a method called a point count survey. The point count is less accurate than the grid method, but is much more labor efficient. Point counts require only a single observer to estimate covey locations. With this method, we make some assumptions about the area in which an observer can effectively detect calling coveys. However, research has provided some reasonable estimated average detection areas for point counts. Later in the paper, we will explain these methods in more detail and show you examples.

After defining the study area, you need to consider how to survey it. Each grid is 1,600

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feet (about 500 meters) on each side and covers an area of about 60 acres (25 hectares). Point counts generally assume a radius of 1,600-1,900 feet (500-600 meters), and a reasonable estimate of the effective area surveyed is about 200 acres (80 hectares). Estimates that are more conservative may be warranted in hilly terrain, areas of very dense vegetation, or in the presence of interfering noise. As shown in Figures 1 and 2, distribute samples in a way that covers most of the study area.

In Figure 1, the grid survey will require 20 observers to do all grids at once, or 4 observers per morning to do each grid individually. For the same area depicted in Figure 2, point counts would only require four observers to do all counts at once, or one observer per morning to do each individually. It is important to minimize as much as possible the overlap in survey area. However, a small amount of overlap does not invalidate the count. Position each observer to make access to survey points more convenient (put points along or close to field roads for example. Avoid public roads.) In the example habitats shown in Figures 1 and 2, there is no need to add more observers to survey the dense pine plantation habitat (though the edges of such habitats could be incorporated if necessary), because these habitats are generally not ideal quail habitat.

Now that the counts are quantified relative to the study area, we next need to consider how to sample the area. Rather than sampling all suitable quail habitat in a given area, you may elect to sample a portion of the study area. In this case, randomly select a portion of survey points to conduct call-counts (use the same randomly selected points for follow-up samples). When surveying only a sample portion of the study area, it is important to survey as much of the total study area as possible. Also, it is better to measure the chosen sample of survey points on the same mornings (since coveys counted in one morning could move to areas surveyed in following mornings), but you will always be limited by how many observers you have available on a given morning.

For larger study areas, spatially separate your sample of survey points to minimize double counting coveys when surveying on different mornings, but you should try to keep your selection of survey points as random as possible. Table 1 shows the amount of observer effort needed to conduct call-count surveys at several scales. If the study area is 500 acres (1,600 hectares) or less, it is probably best to sample at least 50% of the area (we will refer to this as the sample fraction) if using grid surveys and 100% of the area if using point counts. If the study area is greater than 500 acres (1,600 hectares), sampling 50% of the study area regardless of method will probably be sufficient. However, by examining Table 1 it is clear that as the size of the study area increases the sample fraction will be reduced.
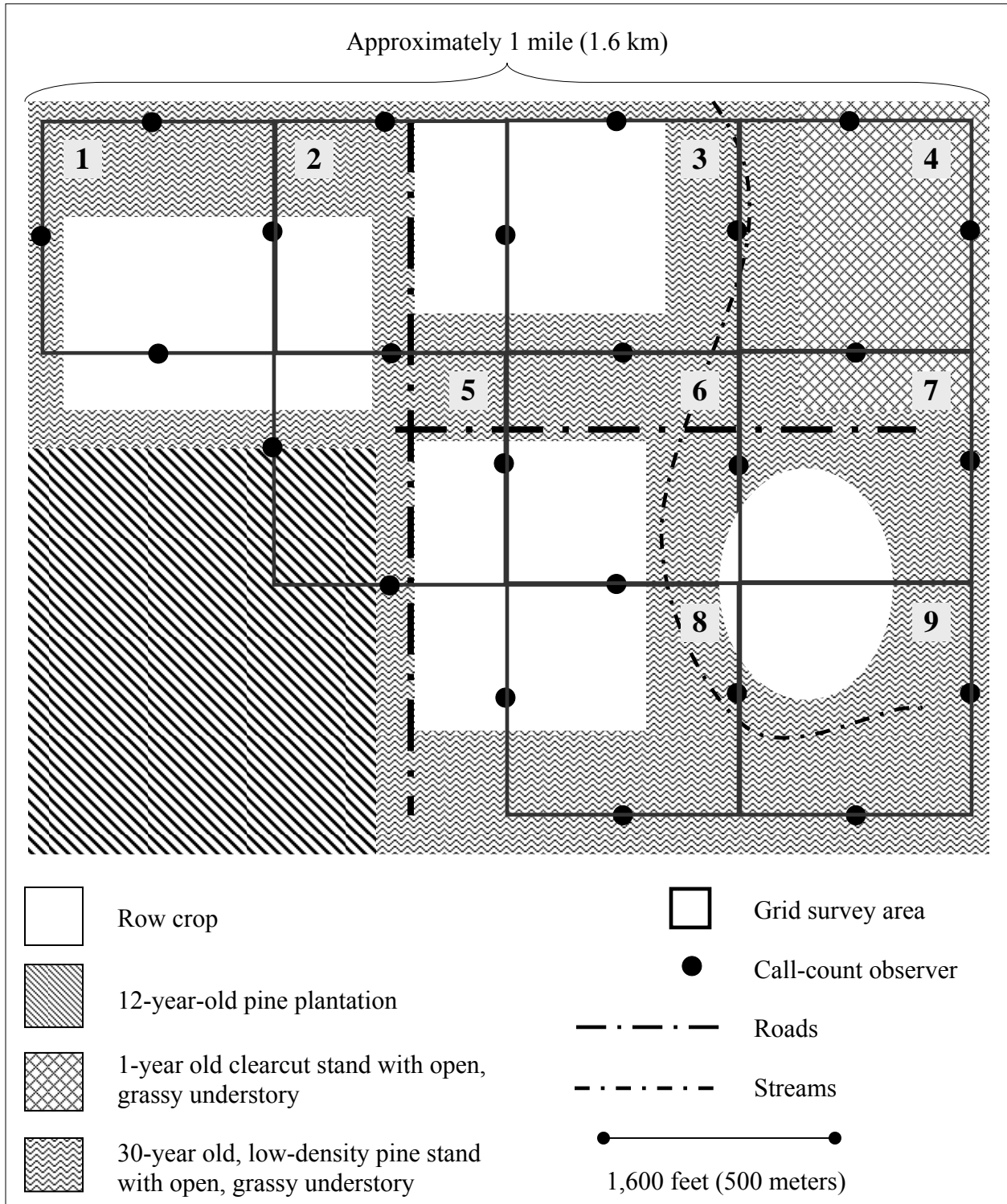
Figure 1. Sample grid method design to survey calling quail coveys.

Point count detection area, based on an assumed 1600-foot (500-meter)

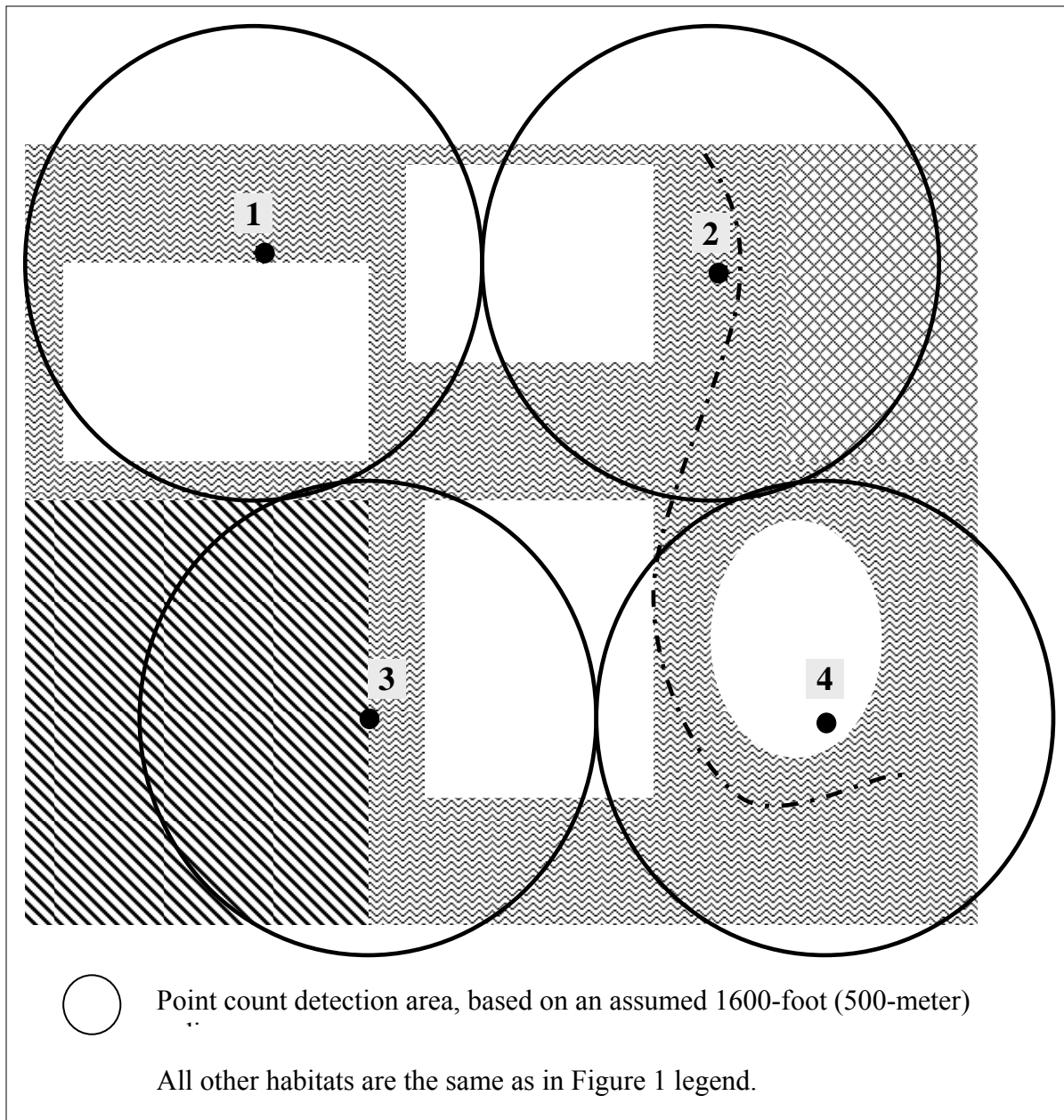All other habitats are the same as in Figure 1 legend.

Figure 2. Sample point count method design to survey calling quail coveys.

Table 1. Maximum number of observers required per morning to conduct covey-call-count surveys with grid (based on a 60-acre grid with 4 observers/grid) and point count (based on a 200-acre point count) methods at several scales of study area.

Study area acres[a] (≈ hectares)	Observers needed for each sample fraction[c]					
	100%		50%		25%	
	Grids[b]	Point Count	Grids	Point Count	Grids	Point Count
200 (80)	12 (10)	1	8	1	--	--
500 (200)	32 (22)	2	16	1	8	1
600 (250)	40 (27)	3	20	1	12	1
800 (300)	52 (34)	4	26	2	12	1
1,000 (400)	64 (40)	5	32	3	16	1
1,500 (600)	100 (61)	7	50	4	24	2
2,500 (1,000)	160 (95)	11	80	6	40	3
5,000 (2,000)	320 (185)	25	160	12	80	6

[a] For study areas <500 acres, point counts will likely be the best method as the scale of measure is probably not sufficient to warrant labor intensive grid surveys. For study areas 500-1,000 acres, grid surveys could be used even at the 100% sample fraction over the course of several mornings. For study areas >1,000 acres, grid surveys quickly become labor intensive (though as the study area gets larger, smaller sample fractions are more acceptable).

[b] Numbers of observers for the 100% sample fraction assumes all grids are connected (as in Figure 1) and that an observer is positioned at every grid's survey point. However, when 1 or more grids are connected, some observers can be shared among grids (e.g. in Figure 1, a single observer can be used rather than 2 observers where the east observer from grid 1 and west observer from grid 2 overlaps). Numbers in parentheses indicate the number of observers required if a single observer surveys overlapping survey points. Numbers of observers for sample fractions <100% were calculated assuming all grids could be completely separated (these numbers could be reduced if randomly selected grids are connected and a single observer surveys the overlapping survey points).

[c] Represents the percentage of the study area to be surveyed relative to the entire study area.

Table 1 is simply a gauge to evaluate and estimate labor needs. Obviously, hardly anyone can acquire the labor necessary to conduct grid surveys on more than 500 acres in 1 morning, even at the 50% sample fraction. This is simply to indicate the trade off in estimator accuracy and labor required. Regarding footnote "b" of Table 1, if you use an observer for every grid survey point (even those that overlap), those observers can focus more intently on the calling coveys within their assigned grid. If you share observers among overlapping grid survey points, then those observers must focus their attention among multiple grids. When quail covey densities are high (e.g. consistently > 5 calling coveys heard per point), greater accuracy will likely be achieved by using an observer for every grid survey point.

Reduce sample fractions for large study areas more than on smaller study areas. In general, you can reduce the sample fraction of larger study areas at a greater level than smaller study areas without sacrificing too much precision (e.g. surveying 25% of a 5,000-acre site results in 1,250 acres surveyed, but surveying 25% of a 200-acre site only results in 50 acres surveyed). Scale is very important in the context of estimating bobwhite populations. So carefully consider if your measurement is being made relative to an area of sufficient size to be meaningful.

There is also some flexibility in designing your surveys. For study areas larger than 1,000 acres, we recommend that the area be divided into smaller blocks based on different habitats or where distinct divisions (e.g. roads) occur. This is called stratification and has an advantage in that you can distribute your sampling effort among the smaller blocks to obtain a more representative estimate for the entire area. If habitat is approximately the same throughout the entire study area, then your blocks can be distributed relatively evenly throughout the study area. If there are a number of distinctly different habitats (e.g. managed woodlands, agricultural fields, and grassland) throughout the study area, then it may be useful to stratify (create blocks) around these habitat patches. You can then distribute your sample points among habitat patches and survey a fraction of each block. Stratification helps reduce potential bias in your population estimate by sampling portions of the study area that could have different population levels. Taking samples from stratified blocks may also tell you that certain areas need more management or maintenance if population levels are less than desired.

II. FIELD METHODS FOR COLLECTING COVEY-CALL-COUNT DATA

During covey-call-counts, observers listen for the "koi-lee" covey-calls given by quail (almost always before sunrise) during autumn and count the unique number of calling coveys. Call-count surveys should be conducted mid-October to about the first week of November on clear mornings when barometric pressure is relatively high and wind is calm to slight. Observers should begin data collection 40-45 minutes before sunrise in order to standardize data collection (you may hear coveys call earlier than this, but they will usually call again after the survey officially begins). Go to http://www.srh.noaa.gov/ffc/html/srss.shtml to obtain sunrise times for Georgia. Observers should arrive at their survey points (minimizing disturbance when traveling to survey points) at least 10 minutes before the survey officially begins.

Each observer will record the compass bearing, estimated distance, and approximate location for each unique calling covey detected. Record this information on standardized data sheets (see example in this paper) and field maps. Once the first call is detected, calling coveys should only be recorded for a 10- to15-minute interval (choose either 10 or 15 minutes and use that interval consistently) in order to minimize duplicate observations (coveys usually begin to move soon after calling) and to standardize survey methods. If no calls are detected, surveys should end at the official sunrise.

For grid surveys, observers should compare their results to determine if a single or multiple observers recorded a covey. If more than one observe detects a covey, then use the intersection of compass bearings to the covey to plot the approximate location. For point counts and grid surveys when only one observer detects a particular covey, the approximate location is spot-mapped based on the observer's estimate of the covey location. When two or more observers are conducting point counts in the same vicinity, it is probably a good idea to compare notes to determine if more than one observer heard one or more of the same coveys. Plot each unique covey location on one final field map for record keeping.

Observers should practice for several days before conducting actual surveys. As a suggestion, all observers should listen to recorded covey-calls and then spend several mornings at the actual survey site practicing the technique. Appendix 1 contains a checklist of materials needed for covey-call-count surveys. Appendix 2 and 3 give an outline of the specific steps for conducting a grid survey and a point count survey, respectively. Copy these steps and give to each observer to use as a reference sheet before and during surveys.

III. ANALYZING COVEY-CALL-COUNT DATA

Once you have finished call-counts, you can derive an estimate of population size. If you have average covey sizes, you can estimate total number of birds in the area, number of birds per acre, total number of coveys, and/or number of coveys per acre. Use this equation to calculate these estimates:

$$\tilde{N} = \frac{(\text{Total Number of Coveys}) \times (\text{Average Covey Size})}{(\text{Call Rate}) \times (\text{Sampling Fraction})}$$

Total Number of Coveys: consists of the total number of all coveys that were detected inside of the grids or point counts (point counts assume every calling covey heard was inside of the survey area) that were surveyed. If each grid/point count is surveyed more than once, use the greatest value of the surveys or average the surveys, whichever you prefer.

Average Covey Size: sum of the number of birds per covey flushed divided by total number of coveys flushed. There are several ways to obtain average covey sizes. Ideally you should flush coveys after the morning survey is completed. If this is not possible, then obtain covey sizes from coveys observed during the survey period from the property.

Call Rate: average detection probability to account for calling variation. Recent research has suggested that if 3 or more coveys are heard at a survey point the call rate is likely around 0.7, and if less than three coveys are heard at a survey point then the call rate is likely 0.5 (refer to the article by Shane Wellendorf in the September-October 2001 issue of Quail Unlimited Magazine for more on call rate estimates and slightly different approaches to call-count surveys).

Sampling Fraction: number of surveys conducted divided by approximately the total number of surveys that could possibly be conducted over total acreage in suitable quail habitat. In Figure 1, there were nine grids. So, if all nine were surveyed the sampling fraction would be 1.00. If 5 out of 9 were surveyed, the sampling fraction would be about 0.60. In Figure 2, there were four point counts. So, if all four were surveyed the sampling fraction would be 1.00. If 3 out of 4 were surveyed, the fraction would be 0.75. On the other hand, you may divide total acreage surveyed by total acreage of suitable habitat to get the sampling fraction. Both methods should give about the same result.

If average covey sizes are not obtained, you can still estimate the number of coveys present with the same formula (omitting average covey size from the equation). The above formula gives total birds (coveys) present over the entire area. To estimate birds (coveys) per acre, simply divide total number of birds (coveys) by total acreage in suitable quail habitat. Following are some examples:

Here are some practice examples to help us get comfortable with how this process will work in your area.

Example 1.

Assume we surveyed all nine grids (Figure 3). The results were as follows:

Grid #	Total Number of Coveys Inside
1	0
2	3
3	2
4	1
5	0
6	4
7	0
8	0
9	3

> Assume 8 birds per covey on average, just as an example. You may use flush records (such as hunting flushes) to calculate a rough estimate of average covey sizes.

$$\tilde{N} = \frac{(\text{Total Number of Coveys}) \times (\text{Average Covey Size})}{(\text{Call Rate}) \times (\text{Sampling Fraction})},$$

$$\tilde{N} = \frac{(13 \text{ coveys}) \times (8 \text{ birds/covey})}{(0.50 \text{ call rate}) \times (1.00 \text{ sampling fraction})},$$

$\tilde{N}$ = 208 birds or 26 coveys (assuming suitable habitat covered 600 acres, which is about the area the 9 grids covered, then there would be 0.35 birds/acre or 0.04 coveys/acre).

Example 2.

If we only surveyed a sample of the entire area, for example grids 2, 3, 5, 8, and 9 (Figure 3), then we would have:

$$\tilde{N} = \frac{(8 \text{ coveys}) \times (8 \text{ birds/covey})}{(0.50 \text{ call rate}) \times (0.56 \text{ sampling fraction})},$$

$\tilde{N}$ = 229 birds or 29 coveys (assume amount of suitable habitat is the same as previous, then there would be 0.38 birds/acre or 0.04 coveys/acre).

Note that the estimate is about the same as if the entire sample of grids had been surveyed.
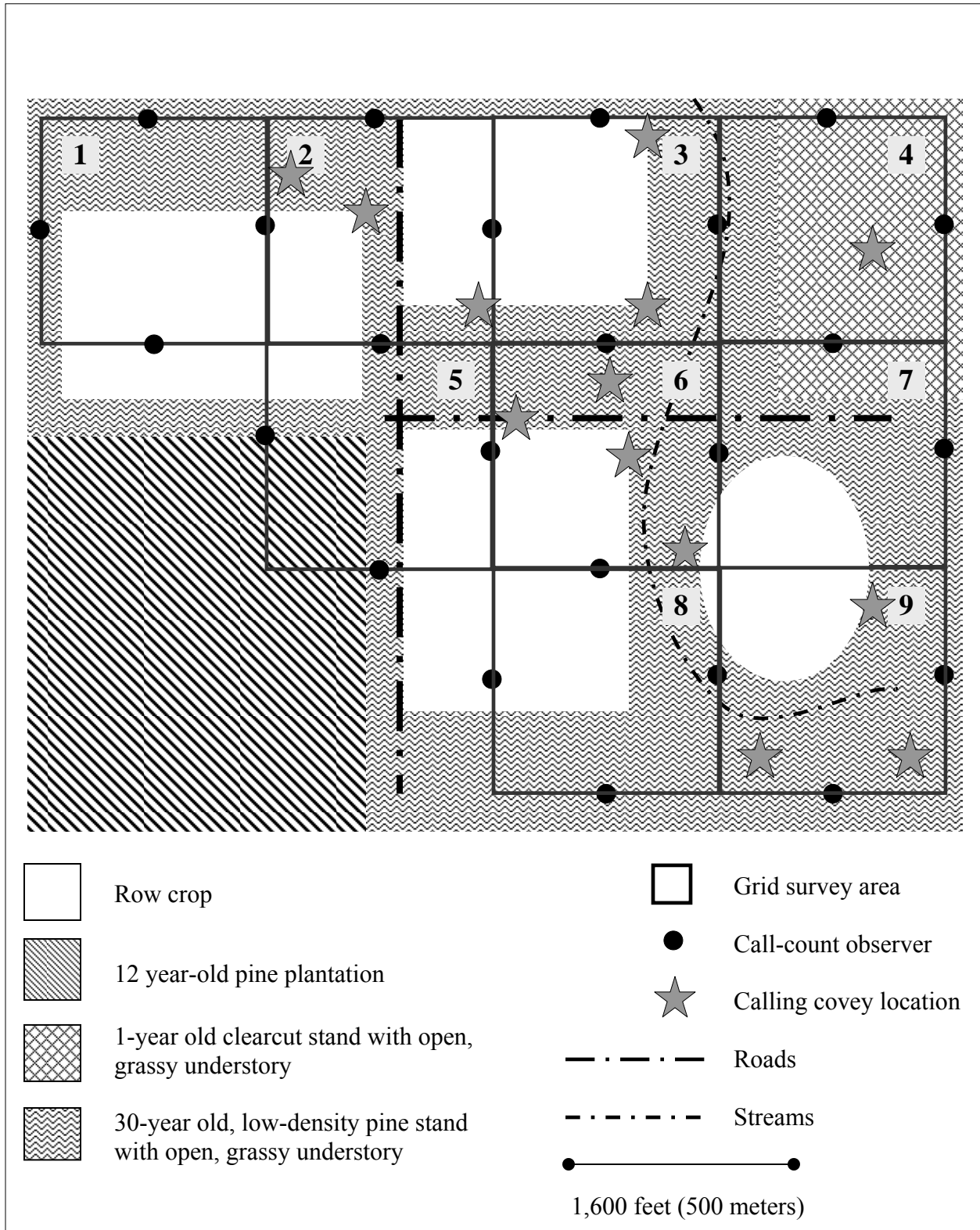
Figure 3. Sample grid design and theoretical locations of calling quail coveys.

The legend for the figure contains:

- Row crop
- 12 year-old pine plantation
- 1-year old clearcut stand with open, grassy understory
- 30-year old, low-density pine stand with open, grassy understory
- Grid survey area
- Call-count observer
- Calling covey location
- Roads
- Streams
- 1,600 feet (500 meters)

Example 3.

Now assume we surveyed all 4 point counts (Figure 4). The results were as follows:

Point #   Total Number of Coveys Inside
1   2
2   4
3   0
4   4

> Assume 8 birds per covey on average, just as an example. You may use flush records (such as hunting flushes) to calculate a rough estimate of average

$$\tilde{N} = \frac{(\text{Total Number of Coveys}) \times (\text{Average Covey Size})}{(\text{Call Rate}) \times (\text{Sampling Fraction}),}$$

$$\tilde{N} = \frac{(10 \text{ coveys}) \times (8 \text{ birds/covey})}{(0.50 \text{ call rate}) \times (1.00 \text{ sampling fraction}),}$$

$\tilde{N} = 160$ birds or 20 coveys (assuming suitable habitat surveyed was 600 acres, then there would be 0.27 birds/acre or 0.03 coveys/acre).

Note that these estimates differ slightly from the 0.35 birds/acre or 0.04 coveys/acre estimated by the grid survey. However, this is assuming that point count observers would not hear calling coveys outside of the circles in Figure 4. Had observers heard all of the coveys, then the estimates would have been the same. If points 1 and 3 had been chosen for samples, then there would have been 24 coveys detected or 192 birds divided by 0.25 (0.50 call rate x 0.50 sample fraction) resulting in 0.32 birds/acre or 0.04 coveys/acre. Also note that if points 1 and 3 had been randomly chosen, the results would have been quite underestimated. Again, this is based on assumptions that observers would not detect coveys outside of the circles in Figure 4. However, this demonstrates an important point, that estimates may be poor if based on only a few counts.

Your objectives and constraints will decide which call-count method is most feasible for you. It is recommended that counts for estimating population size for the entire survey area be repeated 2-3 times (this will provide some idea of variation in estimates; for those interested in formal variance estimation, see Smith 2001). In Example 2 for instance, you should conduct counts at grids 2, 3, 5, 8, and 9, then when finished sampling all five grids, repeat the procedure again 1 or more times.
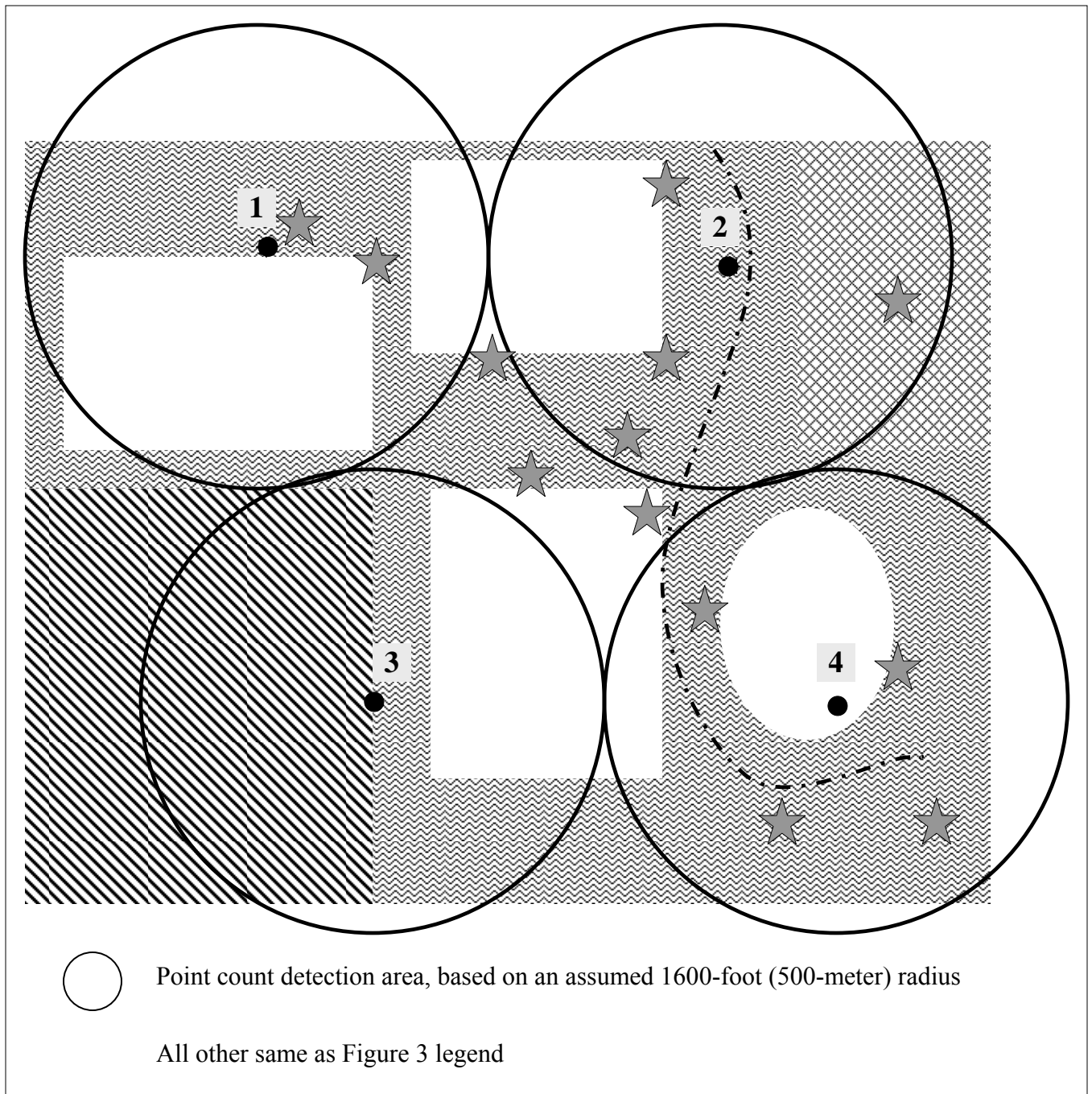
Figure 4. Sample point count design and theoretical locations of calling quail coveys.

Often, some experimentation is necessary in the initial phases of population monitoring in order to make the process work most efficiently. Managers can modify the methods presented here, but long-term monitoring strategies must be as consistent as possible over the survey area and time. We have provided sample data sheets for user convenience. For the harvest data sheets (again provided for user convenience), it is suggested that the pocket cards be used to record in-field observations, and then transcribe the information with more detail on the daily record sheet. This way, a volume of the daily record sheets can be neatly kept as permanent records. Feel free to make copies of any of this material. Sample materials can be modified as necessary. This material is intended to assist those interested in quail population management and monitoring. Every effort has been made to present accurate information based on quality research. However, no guarantees are made about the application of any this information or material.

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References:

Hamrick, R. G. 2002. Evaluation of northern bobwhite (*Colinus virginianus*) population monitoring methods and population trends in agricultural systems in the Upper Coastal Plain of Georgia. Thesis, University of Georgia, Athens, Georgia, USA.

Smith, M. D. 2001. Response of northern bobwhite to intensive habitat development on a prairie site in Mississippi. Thesis, Mississippi State University, Mississippi State, Mississippi, USA.

Wellendorf, S. D. 2000. Factors influencing early morning covey calling in northern bobwhites. Thesis, North Carolina State University, Raleigh, North Carolina, USA.

APPENDIX 1. CHECKLIST FOR COVEY-CALL-COUNT SURVEYS

Equipment:
1. Compass
2. Pencils/Pens
3. Flashlight
4. Clipboard or other writing surface
5. Data sheet and map
6. Watch (should be closely synchronized with other observers)
7. Proper clothes for field work (boots, jacket, etc.)
8. Table of sunrise times (hunting regulations are often a quick source)

Reminders:
1. Don't wear hats, etc. that obstruct your hearing (at least during survey period)
2. Try to minimize disturbance as much as possible when traveling to survey points
3. Make sure you can find your survey point in the dark
4. Make sure you know how to use/read your compass and field map
5. Make sure you know the bobwhite covey-call (there are some other birds that make some calls that can sometimes sound similar to the covey-call, so be sure to make a few practice counts)
6. Make a note of excessive noise around you (traffic, machinery, etc.), especially if you think it hinders your ability to detect calling coveys at a reasonable distance (such points may need to be moved or excluded if there is excessive noise)

APPENIDIX 2. INSTRUCTIONS FOR COVEY-CALL-COUNTS: GRID SURVEY

1. Obtain aerial photos (or some type of habitat cover map) to make field maps of the property to be surveyed.

2. Draw in the location of the grid on a field map (make sure the scale of the map is known and drawings are correct with the map scale). Give a unique number or other code to each grid and keep a record for easy distinction in the future (also record the grid identity on the survey data sheet/map). Draw in point locations and specifically label each point where observers will be positioned (make sure observers have a copy of the map and can orient themselves with it; observers should record their location on the survey data sheet/map).

3. Set up grids and mark point locations in the field before the day of the survey (make sure observers can find the points in the dark). It is probably best to go ahead and fill out sunrise time and begin time on the data sheets the day before call-counts are conducted.

4. Arrive and get set up at observation points at least 45 minutes (one hour is better) before sunrise on the morning of the call-count. Have observers positioned at 4 point locations on the 25-ha (60-acre) grid.

Example:
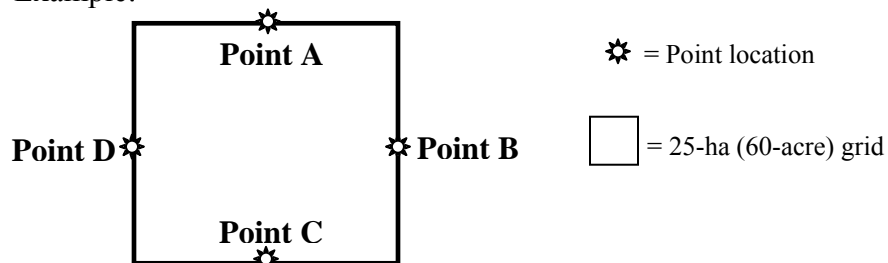
5. Fill out OBSERVERS, DATE, SITE, SURVEY NUMBER, etc. on the survey data sheet/map.

6. **Begin time is 40 minutes before sunrise** on the particular date and **end time is 10 minutes AFTER THE FIRST CALLING EVENT**.

7. Once coveys begin calling (~20-30 minutes before sunrise): **record time** the covey began calling, **record the compass bearing** from the direction coveys are calling (record each calling covey only once as sometimes a single covey may sound like more than one calling covey, so use your best judgment to distinguish number of separate coveys heard in a similar direction), and **record your estimated distance** to the calling covey on the survey data sheet/map.

8. Right after end of survey period, meet with other members of crew and draw bearing lines on field maps. This will tell approximate location of coveys and whether they are in or out of the sample plot; use a best estimate of location if only one observer heard a covey.

Example:

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9. Using approximate location of coveys, walk in and try to flush as many coveys as possible (this is usually unsuccessful, unfortunately, and is optional) to obtain an estimated covey size (if available, bird dogs can be used to aid in finding coveys, or if quail are hunted on the property, keep records of coveys flushed and number of birds in each and develop average covey sizes from this data).

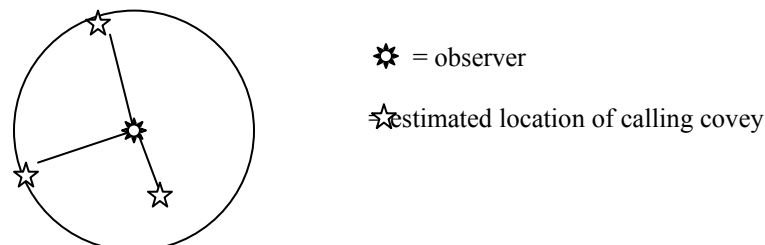APPENIDIX 3. INSTRUCTIONS FOR COVEY-CALL-COUNTS: POINT COUNT SURVEY

1. Obtain aerial photos (or some type of habitat cover map) to make field maps of the property to be surveyed.
2. Identify point locations in the survey area and draw in the location of the point counts on a field map (make sure the scale of the map is known and drawings are correct with the map scale). Make sure observers have a copy of the map and can orient themselves with it; it is probably best to go ahead and fill out sunrise time and begin time on the data sheets the day before call-counts are conducted. Use some type of system to uniquely identify each point count location and keep a record for easy distinction in the future (identify these points on survey data sheets also).
3. Mark point locations in the field before the day of the survey (make sure observers can find the points in the dark). As many point counts as necessary can be implemented, just remember this method will cover about a 500-m (1,600-ft) radius (see example). 500-600 m (1,600-1,900 ft) is considered an average maximum hearing distance for observers. So, you would want to distribute points far enough apart to minimize overlap of the circles, while covering enough of the landscape to get a good idea of how many coveys are in the area.

Example:
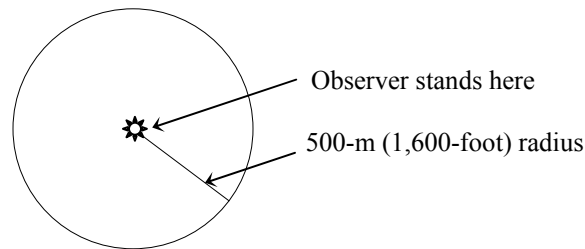
4. Arrive and get set up at observation points at least 45 minutes (one hour is better) before sunrise on the morning of the call-count.
5. Fill out OBSERVER, DATE, SITE, SURVEY NUMBER, etc. on the survey data sheet/map.
6. **Begin time is 40 minutes before sunrise** on the particular date and **end time is 10 minutes AFTER THE FIRST CALLING EVENT**.
7. Once coveys begin calling (~20-30 minutes before sunrise): **record time** the covey began calling, **record the compass bearing** from the direction coveys are calling (record each calling covey only once as sometimes a single covey may sound like more than one calling covey, so use your best judgment to distinguish number of separate coveys heard in a similar direction), and **record your estimated distance** to the calling covey on the survey data sheet/map.
8. Right after end of survey period, meet with other members of crew and draw bearing lines on field maps. This will tell approximate location of coveys and whether they are in or out of the sample plot; use a best estimate of location if only one observer heard a covey.

Example:

9. Using approximate location of coveys, walk in and try to flush as many coveys as possible (this is usually unsuccessful and is optional), to obtain an estimated covey size (if available, bird dogs can be used to aid in finding coveys, or if quail are hunted on the property, keep records of coveys flushed and number of birds in each and develop average covey sizes from this data).

Additional Materials:

PLOTTING COMPASS BEARINGS ON A MAP

Once you have taken compass bearings to calling coveys, you can plot their location on a map. Turn the compass dial to the bearing that was taken (in this example, the bearing to the calling covey was 45 degrees). From the point on the map where the bearing was taken, align the north-pointing arrow (not the magnetic needle) on the compass dial where it is oriented with "north" on the map. You then have a bearing, which can be drawn out a measured distance or which can be intersected with other bearings to plot a covey location. Remember that some things around you (such as cars, power lines, etc.) can affect the accuracy of the compass bearing.

**45 degree
bearing**

N

45

MAP
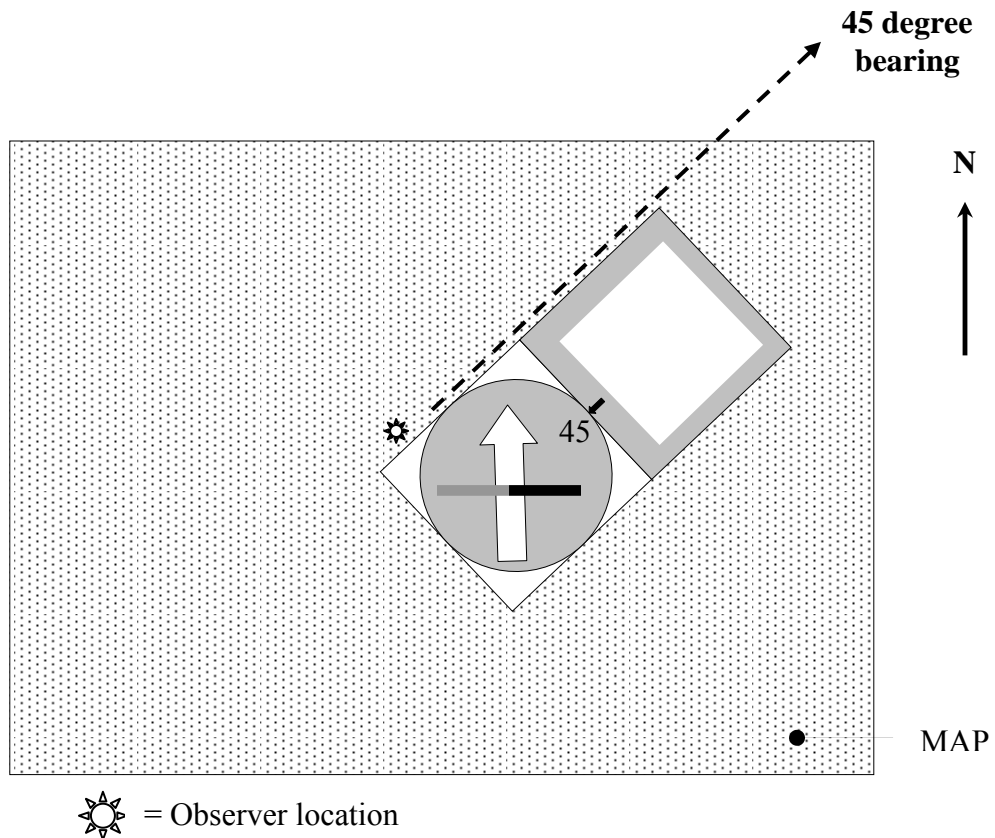
= Observer location

MORNING COVEY-CALL SURVEY DATA SHEET

Observer: _____ **Participants**: _____
Date: _____/_____/_____

Site: _____ **Location**: _____ **Survey #**:____
Sunrise: _____

Begin Time: _____ **End Time**: _____ **Wind**
Code[1]:___**Comments/Other**:_____

Initial Call Time	Compass Bearing	Estimated Distance	Initial Call Time	Compass Bearing	Estimated Distance

[1] Wind: 0=Smoke rises vertically   **1**=Wind direction shown by smoke drift
2=Wind felt on face; leaves rustle   **3**=Leaves, small twigs in constant motion
4=Raises dust and loose paper; small branches move   **5**=Small trees with leaves sway; crests on inland water

Paste/Copy In A Field Map Here If Desired

Daily Quail Hunting Record

Names of Hunters: _____
Total # of Hunters: _____

Location/Course/Farm Hunted: _____
Hunt Date: _____

Hours Hunted: _____   **Begin Time:** _____   **End Time:** _____

Temperature: _____   **Humidity:**_____   **Barometric Pressure:**_____

Recent Rainfall Conditions:
_____

Wind/Scenting Conditions:
_____

Coveys Found: _____   **Number of Quail Killed (Retrieved):** _____
                                           Number of Quail Crippled (Not Retrieved): _____

Dogs and Performance:

_____

_____

_____

_____

_____

Notes/Comments (**You may want to record information about numbers of birds per covey found, ages of harvested birds, other game encountered/taken, etc.**)**:**

_____

_____

_____

_____

_____

_____

_____

Quail Hunter Pocket Card (For Field Recording)	Quail Hunter Pocket Card (For Field Recording)	Quail Hunter Pocket Card (For Field Recording)

Quail Hunter Pocket Card
(For Field Recording)

Location:

Date:

Begin Time: End Time:

Weather:

Covey   # Birds   # Killed   # Crippled
 1.
 2.
 3.
 4.
 5.
 6.
 7.
 8.
 9.
10.
11.
12.
13.
14.
15.

Notes:

Quail Hunter Pocket Card
(For Field Recording)

Location:

Date:

Begin Time: End Time:

Weather:

Covey   # Birds   # Killed   # Crippled
 1.
 2.
 3.
 4.
 5.
 6.
 7.
 8.
 9.
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11.
12.
13.
14.
15.

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EDITOR

Michael T. Mengak, Associate Professor – Wildlife Specialist