## Songbird Richness Along an Urban-Rural Gradient

This study introduces the point count method for songbird surveys. A single point counts consist of an observer standing at a location for a set time (8 - 10 minutes or more) and writing down all of the songbird species observed. Most species are observed aurally, that is, the observer can ID birds by call/song as well as by sight. Students will spend 2 days learning common bird species in class (see powerpoints). This will still probably not be enough time to learn all of the birds they will encounter. Depending on how much "good" data the instructor wants, he/she may need to consult a bird expert or spend substantial time training themselves. Members of local birdwatching groups could probably be persuaded to accompany the students on their trip. If possible, get someone who has experience with point counts specifically, as opposed to birdwatching alone. The standardization of effort and time at each point is necessary to ensure good data and having someone that is aware of the methodological requirements is helpful.

Point counts are performed at regular distances from outside a wooded park gradually into and through the park. See below:
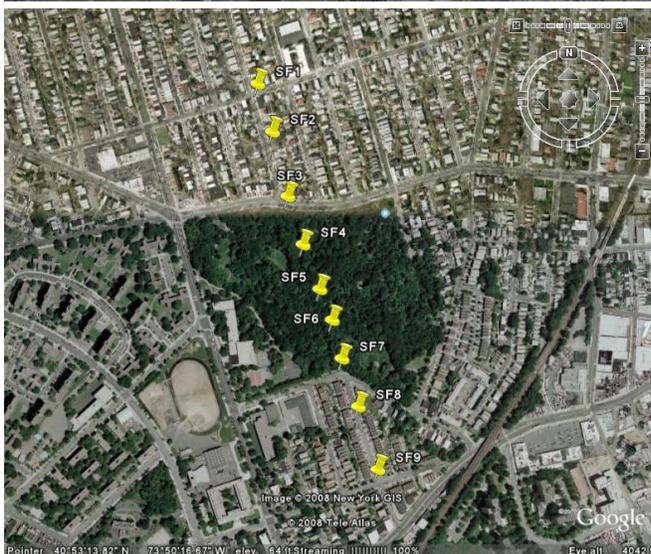
Top: Central Park; Bottom: Seton Falls

Field Set up
The teacher will need to scout out the points the class will use beforehand so they do not waste time looking for points during the lesson.

An easy way to arrange the points is to have points at every block intersection in the streets. Make sure you put points right on the edge of the park when you enter and exit. Within the park you may not be able to stick to the exact straight line (though, technically, this is what you should do by using a compass or pre-set GPS points). Try to keep the points within the park the equivalent of a street block apart. Setting up the points will require a GPS unit (or advanced orienteering skills and a good compass).

My method is to plot the points on a straight transect using Google Earth or a GIS program and then upload these points to my GPS. Then I go to the park and get as close to the "true" points as I can via the trail system (I try to get within 20m). This is usually pretty easy in NYC parks where there are trails everywhere. Then I replace the old point with the new on-the-ground point. By doing this I get a sense of the layout of the park and can write notes about how to get to each one. Beginners or folks with lousy senses of direction may need to practice their own route a few times before bringing a class.

Class Preparation
I usually like to put students in the field immediately, and then teach them the nuts and bolts. Unfortunately, this field trip requires background lessons first.

As stated above, there will be two whole classes devoted to teaching the students ~30 bird songs (see powerpoints). The teacher will need to be familiar with these 30 plus any others that might be encountered. If necessary, stay at the park during your point set up trip and birdwatch until you have a good idea of the look and calls of most of the birds you will encounter. I also suggest the Peterson's Audio Guide to Eastern Birds CDs.

Most birds will be identified by ear, so concentrate on that primarily.

Below is a list of the minimum birds the teacher/expert should know by ear and sight:

HOSP	house sparrow	BLJA	blue jay	RBWO	red-bellied woodpecker
EUST	European starling	SOSP	song sparrow	YSFL	yellow-shafted flicker
RODO	rock dove	SCTA	scarlet tanager	BAWW	black-and-white warbler
AMRO	American robin	COGR	common grackle	WOTH	wood thrush
RWBL	red-winged blackbird	AMRE	American robin	RBWO	red-bellied woodpecker
GRCA	gray catbird	NOMO	northern mockingbird	YSFL	yellow-shafted flicker
NOCA	northern cardinal	DOWO	downy woodpecker	BAWW	black-and-white warbler
AMCR	American crow	BTBW	black-throated blue warbler	WOTH	wood thrush
BAOR	Baltimore oriole	HAWO	hairy woodpecker	YWAR	yellow warbler
RTHA	Red-tailed hawk	HEGU	Herring gull	CAGO	Canada goose

The first class should be performed in the computer lab or have laptops for the students. Included is a powerpoint that will help get your class started with 7 species and a quick intro to the project.

The other 23 species can be assigned to students for class/homework to learn e.g., 2 songs each. These students can then be the "experts" on these species. The students should fill out the species worksheet for their species. For homework they should choose another species. They must find a image and sound file online of their species. All sound files and worksheets can be submitted to the teacher electronically. The Cornell site "All About Birds" is a good place for both.

The second class should be a review of all the species for the whole class. The sound and picture files can be printed bound into a class field guide (it is up to the teacher if they want to print a copy for every student; every student should at least receive a field guide electronically).

Field Techniques
Equipment: Class Field Guides, binoculars, an eastern bird field guide (for unknown species), data sheets

The simplest point counts are done by listing all the species heard and seen within the time limit at each point. This is a decent measurement of richness. If the teacher wishes, more detail may be employed to get estimates of abundance or density for each species (abundance per unit area).

The simplest way to get an estimate of abundance per point is to use the number of observations of each species as an analogue to abundance. You must do your best to not double count the same bird calling twice in the 10 minutes you are there (this can be tricky). With 20 or so students with you, however, you may be able to assign single students to keep track of individual birds.

If the above method is used, the teacher should make sure the students understand the difference between relative abundance and absolute abundance. (Or relative anything vs. absolute anything.)

A second way to look at density/abundance is by also recording the distance from you to each bird you hear. This distance is not literally measured; most people estimate the distance in 10's or 20's of meters (e.g., <10m, 10-20m, 20-30, >30). From this measurement, one can calculate a density function (simply a plot of the number of birds – of a given species – heard at each distance category fitted to a line). This function alters the abundance measurements at each distance category (the lower the probability of detection, the more birds are probably there *that you did not find*). There is free software (Distance http://www.ruwpa.st-and.ac.uk/distance/) to calculate these parameters and an online book detailing the method (same site). It is quite simple with a little reading and if the teacher gains a good understanding of these methods, the students can learn a lot about sampling in a complex environment.

If there is not time to do this, the first "counts = relative abundance" method is fine. Included are data sheets set up for the relative abundance counts (one sheet per day) and distance sampling method (one sheet per point). They may need to be adjusted according to your study and/or site.

In my experience, the teacher should keep a master data sheet from which the subsequent analysis will be done. The students often miss observations. It also helps to be able to go to the field multiple times – the students definitely get better with practice.

Analysis

If possible, the students can enter the data themselves and make graphs in excel. If not, included is a sample worksheet for a richness and relative abundance study. Note the data on the sheet will obviously be different for your study; this may also change what species you focus on the last page.

At the least, students should graph richness vs. point (i.e., changes in richness as you go from urban to park) and make some conclusions regarding the habitat "preferences" of their species. Did your observations of your species agree with what your researched online? Did richness change according to the habitat type (urban, edge, park)? Why do you think this is?

The class can also look at species-specific abundances/densities and how they relate to habitat.

If you would like to assign an entire paper, there are hundreds of papers on point counts. The online article archive SORA (searchable ornithological research archive) offers decades of free ornithological journals.