



Wildlife Lesson/Activity

Mourning Dove: Population Estimation/Sampling

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| Content Area | Wildlife Population Estimation; Wildlife Management |
| Audience | High School Biology, Math, AP Environmental Science, FFA. Middle School Science |
| Setting | Outside on School Campus; area with combination of trees and shrubs |
| Duration | 1 Class period depending on how teacher sets up activity |
| NC Essential Standards | |
| Objective | Students follow field transect sampling method to collect marked/unmarked Dove data and use the Lincoln-Peterson math formula to estimate a dove population. |
| Key Terms | Population Estimation, Transect lines, Lincoln-Peterson formula, |
| Materials | 28-30 Dove Decoys (marked and unmarked); 50-100 ft rope; small whiteboard. Dove Decoys can be bought on-line or at Walmart stores during late summer. The Wildlife Resources Commission has a Dove Decoy loaner box – contact wrceducation@ncwildlife.org to request and learn check out/in details. More details found in lesson plan and in Dove Population Estimation - Background doc. |

Overview:

The most fundamental task in population ecology is to determine or estimate population size. The purpose of the Dove Population lesson/activity is to provide experience with wildlife population estimation in the field. Students engage in a hands-on simulation of a mark-recapture study using dove decoys. The activity occurs outside. Students perform the 'recapture' segment of the study to determine the dove population in an area. The instructor provides, or students investigate, background information on how and why mark/recapture studies are performed by field biologists. Students develop a list of questions they would want answered through field studies related to doves. Students do some background research on mourning doves to learn about their biology, habitat requirements, niche in the ecosystem and whether any of their questions have already been answered by field biologists studying doves. Instructor provides a scenario whereby someone (instructor, biologist, other students) has previously gone to study area and captured Mourning Doves, marked them with a yellow wing band, and then released all doves back into the study area. This activity involves the students going to the study area and walking a line transect and recording two pieces of information:

1. The number of *marked* doves observed as they walk the transect
2. The total number of doves (both *marked and unmarked*) observe as walk the transect.

The mark-recapture study is based on the principle that if a proportion of the population was marked in some way, returned to the original population and then, after complete mixing, a second sample was taken, the proportion of marked individuals in the second sample would be the same as was marked initially in the total population. Therefore, through a simple calculation, known as the Lincoln-Peterson equation, one can determine what the total population is based upon a ratio of observed marked to unmarked animals with a known number of marked animals. (see more detailed information in Dove Population-Background document.

Background: See Dove Population Estimation - Background document

Introduction:

Instructor will need to do some prep of the outside study area ahead of time. This lesson/activity requires at a minimum of 100 ft x 30 ft area on campus where there are trees and shrubs. Place a 50 ft or 100 ft length of rope laid on the ground in the study area. Randomly clip 28 -30 life-size dove decoys, both marked and unmarked, onto tree or shrub branches up to 15 ft from rope on both sides of rope and along the entire length of the rope. Dove decoys with clips can be purchased on-line for approximately \$20/6 decoys (see photo of decoys in Dove Decoy – Image document). Recommend 28-30 decoys for this activity. After purchasing the dove decoys mark at least 10 and not more than 15 with red or yellow paint on both sides of neck (see diagram in Dove Background document). The Wildlife Resources Commission has a Dove Decoy loaner box that can be checked out. Contact wrceducation@ncwildlife.org to request and learn the check SOP.

Prior to starting this activity provide or have students investigate how scientists estimate wildlife populations. What NC wildlife would students be interested in knowing more about their population numbers? Query students on they think this information can be used in wildlife management. Students research wildlife management decisions that are can be guided by knowing the population estimation of the wildlife in an area.

Lesson/Activity:

1. Study area is set up by teacher ahead of time.
2. Show students a marked and unmarked Dove Decoy so they know what to look for when walking the transect.
3. Each student needs a piece of paper and pencil. Write two headings at top of paper 'marked' and 'unmarked'.
4. Walk to study area.
5. Students walk, silently, in single file along transect line looking on either side and tallying marked, and unmarked doves seen.
6. After all students have completed walking the transect line collect all student data on whiteboard. Discuss differences noted in the number of marked and unmarked doves students observed. Would this same thing happen with field scientists? Why or Why not? What can be done to account for these differences?
7. Each student uses their own data to calculate the population estimate using the Lincoln-Peterson equation:

$$N = Mn/m$$

Where: N = estimated population

M = the total number of known marked doves in the population. This number is determined in the first 'mark' segment of the study done before the 'recapture' segment of the activity. Since the students do not do this part of the study the instructor decides the number of how many doves were found and marked during the first segment of the activity.

n = the total number of doves counted during the line transect

m = the number of marked doves observed during the line transect

Emphasize to students that the Lincoln-Peterson equation is a ratio where three numbers are known and used to solve for the unknown (fourth) number in the equation.

8. Discussion:
How accurate was the Lincoln-Petersen Population Estimate?
Did it calculate higher or lower than the true number of doves along the line transect? Why? (difficulty detecting birds, ability to see marks, inexperience of observers ...)
What could be done to make it more accurate? (incorporate detection probability, i.e. if you previously calculated that you know you only see 75% of the doves out there, then you could account for that in your population estimate)