

## MARK-RECAPTURE SAMPLING

In this lab, we will be working with live snails of the genus *Littorina*. These snails were collected recently from a local tidal marsh where they graze on fungus growing on marsh grasses, largely of the genus *Spartina*.

- Each group will receive a black plastic tub, wetted down with a small amount of water and populated with 50 snails.
- For the purposes of this lab, imagine that the tub is an entire *Spartina* marsh and we are going to estimate the population of snails in that marsh using mark-recapture.

### A. Initial marking and recapture

- If there are snails climbing up the sides of the tub or even outside the tub, redistribute them evenly along the flat bottom of the tub.
- Have one person close their eyes and **randomly** select snails from the tub for **45 seconds** and place in tupperware container.
- Once you have collected your snails, take them outside (where it is well ventilated) to do the actual marking. Have several members of your group dry each snail's shell with paper towels. It also helps to blow on them. They do not need to be perfectly dry.
- Have one member of the group mark the right side of the dry snail shells with a dot of nail polish. The right side of a snail is defined as the snail's right when the snail has been orientated with the opening down and the apex (pointed end) towards you (you and the snail are now pointing in the same direction).
- Let the nail polish dry (blowing on it periodically) for a few minutes before going back inside to repopulate the tubs.
- Record the number of individuals captured and marked (**M<sub>1</sub>**) on the data sheet provided.
- Once the nail polish is dry, return the snails to their tubs by distributing them evenly around the bottom.

### B. Second capture-mark-release

- Now that the marked snails have been evenly distributed among the others, capture a second sample in the same manner as the first. Record the total number of snails captured (**n<sub>2</sub>**) and the number of marked snails from first capture that were recaptured (**M<sub>12</sub>**).
- Next, mark all the snails taken in this second sample with a dab of nail polish on the LEFT side of the snail's shell. In marking, ignore any marks on the right side of the shell (from the first sample) or marks from previous classes. Use the same marking techniques as outlined above.
- Once the nail polish is dry, return the snails to their tubs by distributing them evenly around the bottom.

### C. Third capture

- Your instructor will add or subtract 10 additional snails to your tub by distributing them evenly around the bottom. (Tubs 1, 2, 3, ADD 10; tubs 4, 5, 6 REMOVE 10).

- Capture snails as before (45 second period), recording the total number of snails in the third capture ( $n_3$ ) and the number of snails marked in the second census that were recaptured ( $M_{23}$ ; all snails with marks on the left side). Note that you are essentially doing the same thing you did before but this time you treat the individuals marked during the first census as unmarked.

#### ***D. Eco-Beaker Simulation***

\*Open pigeons.sit . Go to 'Setup' → 'Other...' → change the simulation speed in the appropriate field. I used a speed of 2 or 3 to figure out what was actually happening in the simulation.

\*Change the number of pigeons in the park to 50 and keep the sample size at 20 (to order to mimic what we do with the snails).

\* "Control panel": Click the "Go" button to begin the simulation of pigeons moving about in the park. When you want to, click the "Sample" button. (Do NOT hit stop!)

\*You will see four boxes (quadrats) laid out in the park. The program will count the number of pigeons caught in each of the quadrats and mark them red. (Select "yes" to mark when asked). Continue to sample until at least 20 pigeons are caught and marked red (note that you may end up capturing more than 20 pigeons).

\*You will then wait for 100 hours (shown in control panel). The program will then sample again automatically using the four quadrats until 20 pigeons are captured. You will see a summary of those that already had marks from the first sampling or were unmarked. You will use this information to estimate the population size. How close did you come? \*\*Remember, you know what the actual population size is!

\* Press the "reset" button to reset the simulation. Repeat the simulation varying the number of pigeons to capture/recapture (sample size). Each group will use a different number. Run through the simulation 3 times with that parameter value recording your values.