Protocol Draft

Questions

Are there any effects on herbivorous arthropod populations, such as butterflies, when there are no birds?

a. Is there an increased abundance of butterflies on Guam, which has no insectivorous forest birds, compared to Saipan and Rota, which do have insectivorous forest birds?

b. Are rates of herbivorous arthropod predation higher on Saipan and Rota than on Guam?

Hypothesis

Birds exert top-down control of herbivorous arthropods.

Prediction

If birds exert top-down control of herbivorous arthropods, then a higher abundance of butterflies will occur on Guam than on Saipan and Rota, and predation rates of caterpillars will be lower on Guam than on Saipan and Rota.

Butterfly Survey

Materials

1. Field notebook
2. Pencil
3. Flagging tape
4. GPS
5. At least 2 people

Protocol

1. Find possible limestone forest sites
2. Using a GPS device, measure a 500 m distance.
3. Mark off the 500m mark with flagging tape
4. With a partner walk the 500m distance in one direction.
   1. One partner will watch and search for butterflies. Note\*: Pace should be fairly slow (insert exact speed here)
   2. The other partner will keep a tally in a field notebook of all butterflies spotted, and species of the butterflies seen.
   3. Weather should be uniform throughout all surveys. Temperature should be between 75 and 85 degrees. Clear skies.
   4. Wind speeds should not be excessive.
5. Analysis

Clay Caterpillar Experiment

Materials

1. Non-hardening, non-toxic - green clay
2. Super Glue or Rubber Cement
3. Flagging Tape
4. GPS
5. Field notebook
6. Plastic Container
7. Cloth
8. Wax paper

Protocol

1. Make clay caterpillars
   1. Roll by hand 25 clay caterpillars. They should be smooth and 3cm in length: modeled after the *Eurema Blanda* caterpillar found in the Micronesian Butterfly Guide.
   2. Place the 25 clay caterpillars in a plastic container. Preferably line the container with wax paper so the caterpillars do not merge together or move.
2. Walking along a 500m limestone trail and use the GPS to mark every 100m with flagging tape. Label the flagging tape with #1, #2, etc.
3. Select a tree
   1. The tree used for the experiment should be within a 10m radius of this marking
   2. Mark the branch used with flagging tape.
   3. In field notebook, record the species of tree and relative location of the tree
4. Add caterpillars
   1. Using the cloth, wipe off any leaves that may be wet due to rain.
   2. Apply rubber cement to leaf. Wait 15 seconds to allow it to partially dry.
   3. Apply caterpillar to leaf or stem.
      1. Note\* If the caterpillar is applied to a leaf, it should be applied in the center.
      2. Note\* Both the leaf and stem should be unobstructed from other foliage.
5. Record in field notebook the species of the tree, the site name of the trail, the height of each leaf or stem, the time the caterpillar was placed out, the date the caterpillar was placed out, the marker # on the trail, and any other notes regarding the location of the caterpillar.
6. Continue this process for 1 tree at every 100m mark on the trail.
7. Leave the clay caterpillars out for 48 hours.
8. Collect caterpillars
   1. Go back to trail 48 hours later
   2. Look for caterpillars. At each caterpillar, record in the field notebook the number and whether it has been predated or not.
   3. Take a picture of any caterpillars that have suspected predation for further analysis and record image # in field notebook.
   4. Remove caterpillars and label the ones that have suspected predation- leave them in separate Tupperware.
9. Repeat at \_\_\_ trails on each island.
10. Analysis
    1. General linear mixed effects model