BEACH MOUSE PARENTS?

Research Area: Conservation Genetics

Background: Beach mice are small mammals that live in the coastal dune systems of Alabama and Florida. Human occupation of coastal areas has dramatically reduced the amount of available natural habitat. As a result, beach mice are now found in only a few small, isolated areas. The situation has become so critical that four Gulf Coast subspecies are now listed as Endangered by the U.S. Fish and Wildlife Service and Congress. The Perdido Key Beach Mouse (*Peromyscus polionotus trissylepsis*) has been especially hard hit by habit loss. By 1985 less that 30 of these mice were known to be in the wild. To make matters worse, all of the remaining mice were found on a very small site on the extreme western edge of Perdido Key. This since had very little dune structure and is heavily impacted by storms. Taken together these conditions earned this mouse the unfortunate title of "The Most Endangered Small Mammal In North America". During the late 1980's, U.S. Fish and Wildlife scientists re-established a second population on the island. In 1999, an opportunity arose to move mice again to a third site (Perdido Key State Recreation Area) in the center of the island. To start this population, three pairs of Perdido Key Beach mice were released in fall 1999. By spring 2001, a population survey indicated that over 25 mice were present on the release site. The biologists in charge of the new population were excited that the re-establishment was successful but they wondered if all three pairs had reproduced. Some recent behavioral data had indicated that only about ½ of the pairs released on a site were actual able to survive and reproduce. The biologists were especially concerned about breeding in the new population because the small number of founders subjected the population to inbreeding. If one or more pairs failed to reproduce, the situation would be worse. In anticipation of this issue, the biologists had collected small tissue samples from the three original pairs and, during an annual trapping survey, were able to obtain additional samples from 6 members of the first generation of offspring.

Information and Data:

You have been contacted by the U.S. Fish and Wildlife Service to help estimate how many of the original pairs reproduced. Using DNA from the original pairs and from a sample of the offspring, it is hoped that you can answer this questions. When you receive the samples, you make an unfortunate discovery. Apparently, the technician in charge of original samples has misplaced two sets of parents so you will be working with only one known pair

- You are provided with 2 "known" DNA samples, one original male and female
  • Tissue samples from 6 young mice are also provided.
- Your laboratory has the capability to determine genotypes at six microsatellite loci. All of the loci exhibit co-dominant modes of inheritance. Some of the locus will be informative, some may not. You may use as many or as few loci as you feel are necessary.

Assigment:

1. Use the *ELS* program to collect genotype data from each of the 8 individuals. Be sure to carefully record the sample identification information on the **Electrophoresis Loading Sheets** and the genotypes on the **Genotyping Data Sheet.** Your data set is called *Beach Mouse Data.*

2. Before examining the data, propose a hypothesis for one possible outcome ofyour investigation. Based on this hypothesis, state a prediction and an alternative that will allow you to answer the investigator's question.

Hypothesis:

Prediction 1:

Alternative:

4. Examine the genotype data. Based on the genotypes of potential pair of original mice, what genotype patterns are possible for their offspring?

5. Examine the full data set. Do any of the patterns from the bones match the predicted pattern? Can you refute either your prediction or the alternative? Carefully consider the logic that you use. Remember that alleles that can exclude samples are more "powerful" than those that are shared.

6. How many of the original three pairs most likely contributed to this generation?

7. Using the word processor on your computer, write a report (see Report Format instructions) outlining your investigation, describing the results and providing your conclusions. Be sure to include careful statements about the logic that led you to your decision.

8. Turn in your report.