Conservation and the Genetics of Population

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Conservation can be viewed as an attempt to protect genetic diversity. But how do we Prioritize species for conservation?

- Phylogenetics
- Biogeographic
- Ecological
- Demographic
- Social
- Economic
- Cultural

Setting conservation priorities from population genetics perspective

Approaches of assessment

What kind of genetic diversity should we protect?

What kind of threats should we bear in mind?

Lonesome George is the last purebred individual of the Galapagos giant tortoise (June 24th, 2012)
The tuatara is a lizard-like reptile

Phylogenetic approach

Population-based approach

Phylogenetic relationships can be considered when setting conservation priorities

http://sciblogs.co.nz/tuataragene

- It is been estimated that the tuatara represents between 0.3 and 7% of the taxonomic distinctness, or perhaps we could say genetic information, among reptiles.

http://sciblogs.co.nz/tuataragene
Population-based approach
Individuals from different geographic locations are genotyped at a number of loci to determine the amounts of gene flow among populations.

- Allele frequencies at allozyme loci
- 1. Molecular markers
- 2. Metrics
- 3. Genetic distance matrix
- 4. Clustering algorithm
- Wright’s Fst
- Populations dendrogram

Based on allele frequencies at 23 allozyme loci, the North Brother tuatara population is highly distinct.

What should we protect?
- Particular pieces
- Evolutionary process

What kind of threats should we bear in mind?

a. Deterministic threats such
   1. Habitat destruction.
   2. Pollution.
   3. Overexploitation.
   4. Species translocation (invasive species).
   5. Global climate change.

b. Stochastic threats such
   1. Random changes in genetic
      a. Genetic drift
      b. an increase in inbreeding
   2. Demographic factors
      a. as a random variation in sex ratios
   3. Environmental factors
      a. as the occasional occurrence of several harsh winters in a row.

(Erwin, 1991)
The captive population of Arabian Leopards comparing males and females since 1985

The retention of gene diversity in the captive population of the Arabian Leopard after 100 years assuming

The population stays at its current size of 73
Maintaining the same size with rate of 3.3% per year, and 8 years generation length

The current gene diversity is 91%.
The retention of gene diversity in the captive population of the Arabian Leopard after 100 years assuming the population increases to 170 animals. The current gene diversity is 91%. (Budd and Leus, 2011)

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**References**


