INTRODUCTION TO POPULATIONS

Definitions

• What is a population?
  – Ecological*
  – Statistical
Ecological Population

• “a group of organisms of the same species occupying a particular space at a particular time” (Krebs 2001:116)

…same species…

• Populations are composed of interbreeding individuals

• There is genetic proximity
…particular space…

• Populations occupy a delimited geographic area

• There is *spatial* proximity

Genetic, Geography and…

• Demographics
  – Reproductive rates
  – Survival
  – Composition (sex ratio, age structure, etc.)

• These things should be similar within populations
Hierarchical Aggregations of Populations

• According to this definition, populations can be grouped at many different levels of aggregation (Garton 2002)
  – Deme
  – Population
  – Metapopulation
  – Subspecies
  – Species

Deme

• “a group of organisms where breeding is random” (Emlen 1984:202)

• “a panmictic population” (Ehrlich and Holm 1963)
Deme

- Genetics
  - This smallest grouping of individuals should emphasize genetic objective of random breeding within the group
  - In reality, random breeding is constrained by the social system
- Geography
  - Continuous distribution of individuals in one patch of habitat
- Demographics
  - Smallest group where it is reasonable to estimate birth, death, immigration and emigration rates

Red-winged Blackbird Deme
(Orians study area)

- A patch of emergent vegetation adjacent to or within ponds, streams or lakes
Population

- A collection of demes with strong connections between adjacent demes
- Genetics
  - Relatively high rates of dispersal among demes
- Geography
  - A collection of patches without great expanses of non-habitat intervening
- Demographics
  - High correlations in demographic rates between adjacent demes

Red-winged Blackbird Population

- Patches of emergent vegetation adjacent to or within ponds, streams or lakes in Columbia River National Wildlife Refuge
Metapopulation

- A collection of populations with weak connections between adjacent populations
- Genetics
  - Relatively low rates of dispersal among populations produces genetic differentiation
- Geography
  - Separated by expanses of non-habitat
- Demographics
  - Low correlations in demographic rates between adjacent populations

Red-winged Blackbird Metapopulation

- Populations along Columbia River and adjacent populations
Subspecies

- A collection of metapopulations in a region
- Genetics
  - Rare dispersals maintain genetic similarity
- Geography
  - Separated by expanses of non-habitat or other semi-permeable barriers to dispersal
- Demographics
  - Nearly complete independence

Red-winged Blackbird Subspecies
Species

• A collection of subspecies encompassing the entire distribution of the species
• May encompass substantial differences in phenotypes (habitat, physiology, behavior) and genotypes
• Genetics
  – Very rare dispersals maintain genetic similarity (at least for a while)
• Geography
  – The entire distribution
• Demographics
  – N/A

Red-winged Blackbird Species

Down through Central America