

# 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

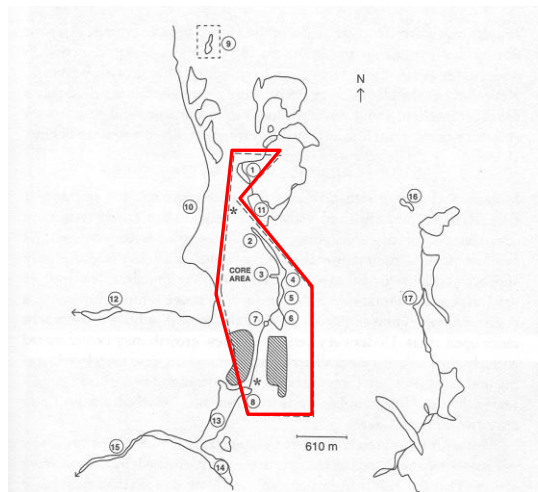
- “a group of organisms where breeding is random” (Emlen 1984:202)
- “a panmictic population” (Ehrlich and Holm 1963)

# 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 (Oriens study area)

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

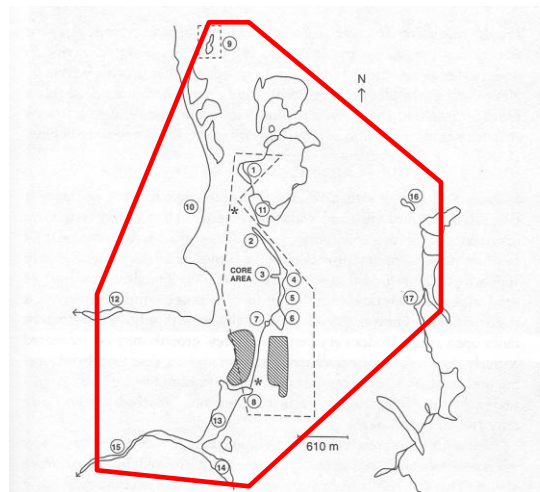


## Population

- 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

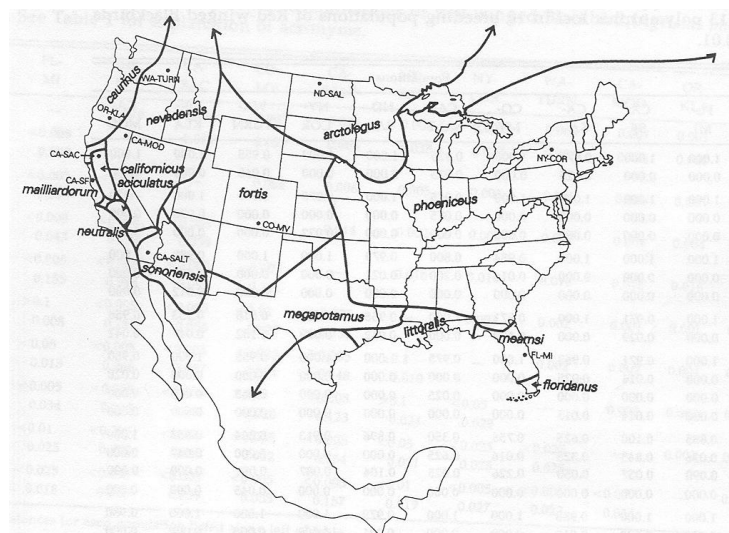
## Red-winged Blackbird Metapopulation

- 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