Lesson Overview

- Island Biogeography
- Metapopulations

Island Biogeography

- Historically islands used to study evolution.
  - Darwin and Galapagos.
  - How does this inform research on terrestrial landscapes?
  - Patches similar to islands.

Theory of Island Biogeography

- MacArthur and Wilson
  - Species on island represent a dynamic equilibrium between the immigration of new colonizing species and the extinction of previously established ones.
Island Size
- Larger areas have greater range of microhabitats.
- Larger areas more likely to support rare species that live at low densities.
- Small islands support smaller populations more likely to go extinct.

Island Isolation
- Near islands more likely to be colonized.
- Near islands are more often re-colonized reducing extinction rates.

Island Biogeography
Species Area Curves

- Number of species on an island or patch increases as area increases.
  \[ S = cA^z \]

  where, 
  \( S \) = number of species 
  \( A \) = area, and \( c \) and \( z \) are constants

How to study patchiness

- Island approach
  - Island Biogeography
  - Patch surrounded by “hostile” matrix
  - Focus on patch size and distance from source

- Patch dynamic approach
  - Patches within a homogenous matrix.
  - Focus on how patches function.
How to study patchiness

- Population perspective
  - Metapopulations
  - Interaction between members of patches
- Recall difference between population and metapopulation

Metapopulations

- What makes a local population a source?
  - Consistently producing excess individuals that disperse and serve as colonizers for other local populations.
- What makes a local population a sink?
  - Does not produce excess individuals and persists.

Similarities Between Patches and Islands.
- Separated from similar barriers.
  - Water or different habitat.
- Similar relationships between patch size and bird species diversity have been documented.
Differences Between Patches and Islands
- How much of a barrier does the intervening land represent?
- Isolated from what?
- Where is the ‘source’ population?
- Time: how long has the patch been isolated?

Fragmentation Creates Metapopulations
- Partially isolated populations due to fragmentation.
  - Each subpopulation has its own birthrate, death rate, and probability of extinction.

End of Lesson
- Island Biogeography
- Metapopulations