

BIOL 366 Laboratory 2



Sampling Sedentary Organisms

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Review Describing a Population

Results of Describing a Population

- See comments on papers
- Mean score was 8.88 (± 0.56 S.D.)
- Common Issues
 - X and Y axes need to be clearly labeled, including units
 - Many of you did not calculate the 95% confidence interval correctly. Please review this.
 - If data has non-normal distribution, use non-parametric statistics
 - Experimental design for **fitness** and **heritability**
 - Write in complete sentences with complete ideas
 - **Be Specific, Be concise** (new mantra)

Populations

What is a Population?

Biological

a group of individuals of the same species living in the same place and time

Statistical (more general)

all of the members of a any group (e.g., people, organisms, leaves, things) under investigation

Properties of Biological Populations

Abundance (# individuals)

Density (# individuals/ area)

Dispersion

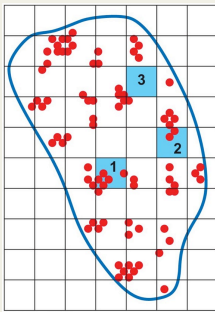
Age structure

Sex ratio

Questions to Consider for Population Properties

- (1) How do we empirically measure or estimate the value of the property?
 - Is there a pattern?
- (2) What ecological factors (physical, chemical, biological) influence or determine the property?
 - What causes the pattern?
- (3) What are the ecological consequences of specific property values?
 - How does the pattern matter?

Abundance & Density



Abundance = # of individuals
Density = # of individuals per area

2 Questions

- (1) What is an individual?
- (2) How do we empirically estimate population density?

Figure 9.6, Smith and Smith 2009

Unitary vs. Modular Organisms

Unitary
distinct individuals, a genetic unit

Modular
the organism grows into genetically identical modules that may or may not be physically connected

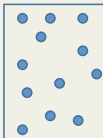
Distinguish between

Genet = individual arising from sexual reproduction, and

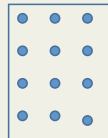
Ramet = modules produced asexually

Dispersion Patterns


Random






Even
(regular, uniform)



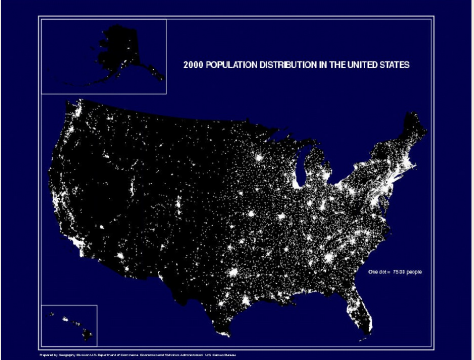
Clumped



Why might populations exhibit these dispersion patterns?

What kind of distribution is shown?

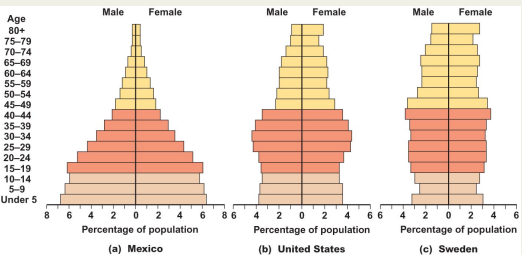


2006 POPULATION DISTRIBUTION IN THE UNITED STATES

One dot = 10,000 people

Copyright © 2008 Pearson Education, Inc. http://www.cengage.com/geo/imagery/imagery2k_night.jpg

Age & Sex Structure



(a) Mexico (b) United States (c) Sweden

Copyright © 2008 Pearson Education, Inc. Fig. 9.13, Smith and Smith 2009

Data from 1989

How do we select sampling locations?

- Random
 - Grid design
 - Use random number generator to find points (lat/longs)
 - GPS to find coordinates in field
- Stratified Random Sampling
 - Identify mutually exclusive and exhaustive strata (subgroups) to sample
 - May be more representative
- Haphazard
 - Frisbee method

Accuracy vs. Precision

Which one of these targets represents a precise result? An accurate result?

Precision
repeatability of a measurement.

Accuracy
how close the experimental value is to the true value.

How does population dispersion affect a density estimate?

| Random | Even (regular, uniform) | Clumped |
|--------|----------------------------|---------|
| | | |
| | | |

Population features may interact and affect sampling effectiveness (design)

Plot Sampling

A. What size should the plot be?

B. What shape should the plot be?

C. How many plots should be sampled?

D. How does the underlying population dispersion effect the results?

Assignment

- Complete activity as described in lab manual
 - EcoBeaker
- Analyze Data
 - Use starter spreadsheet to get you going
- Team Report
 - “Short Laboratory Report Format”
 - Please check appendices and grading rubric (online)
 - Due: by email before next lab.