Chapter 1 Test Bank Questions

Authored by Lee Kats and Gary Bucciarelli

**Multiple Choice**

1. Ecological phenomena can occur at a range of
   1. Biological scales.
   2. Spatial scales.
   3. Temporal scales
   4. All of the above

ANSWER: D

Difficulty: Easy

Bloom Code: Comprehension

Reference: Section 1.1

1. Which field of ecology studies trends and fluctuations in the number of individuals of a particular species at a particular time and place as a result of birth and death rates and interactions between predators and prey?
   1. Community ecology
   2. Systems ecology
   3. Ecosystem ecology
   4. Population ecology

ANSWER: D

Difficulty: Easy

Bloom Code: Knowledge

Reference: Section 1.1

1. One researcher studies plant cells and how these cells and plants respond to increased concentrations of carbon dioxide. Another researcher studies how multiple species interact and what affects their abundances and distributions. A different researcher studies a species’ DNA and what changes have occurred between populations as a result of evolution. What do these researchers all have in common?
   1. They all study community ecology since each researcher is interested in what happens within communities
   2. They are all interested predator-prey interactions
   3. They all study one of the many levels of biology with some application to ecology
   4. They all study organismal biology since each researcher only studies the response of single-celled organisms

ANSWER: C

Difficulty: Medium

Bloom Code: Synthesis

Reference: Section 1.2

1. An ecologist wants to study what plants colonize a site after a volcano has erupted. She plans to compare what plant species were once there with what plant species begin to grow in a matter of a few months. What term best describes the process she is interested in studying?
   1. Unnatural history experiment
   2. Ecological succession
   3. Organismal ecology
   4. All of the above

ANSWER: B

Difficulty: Medium

Bloom Code: Application

Reference: Section 1.2

1. Who defined ecology as “the comprehensive science of the relationship of the organism to the environment?”
   1. Ernst Haeckel
   2. Charles Darwin
   3. E.P. Odum
   4. G.E. Likens

ANSWER: A

Difficulty: Easy

Bloom Code: Knowledge

Reference: Section 1.1

1. Pure science is:
   1. The practical application of scientific data.
   2. The conceptual truth proven by science.
   3. An experimental, systematic approach to a scientific area of interest.
   4. Theoretical modeling to prove what will happen in an area of interest.

ANSWER: C

Difficulty: Medium

Bloom Code: Comprehension

Reference: Section 1.1

1. If ecologists study the distribution, abundance and productivity of mosquitoes so that they can develop pesticides or ways to effectively manage West Nile virus, they can be considered what type of ecologist?
   1. An ecologist that focuses on pure science
   2. An applied ecologist
   3. An ecosystems ecologist
   4. None of the above

ANSWER: B

Difficulty: Medium

Bloom Code: Comprehension

Reference: Section 1.1

1. A researcher is studying how individual single-celled organisms of the same species are affected by water temperature. This is an example of studying ecology at what level?
   1. Organismal
   2. Population
   3. Ecosystem
   4. Community

ANSWER: A

Difficulty: Hard

Bloom Code: Synthesis

Reference: 1.2

1. You conduct a study and do a statistical analysis on your data. You set your confidence level at 95%. If you ran your statistical test and the p-value was equal to 0.035, you would conclude what?
   1. There is no association and your results are not significant.
   2. You could conclude that there is an association, but your results are not significant.
   3. Your results are significant and that 95% of studies just like yours should generate similar results
   4. None of the above

ANSWER: C

Difficulty: Hard

Bloom Code: Evaluation

Reference: 1.2

1. You have collected data on the body temperature and bite force of more than 100 iguanas on a recent research trip to Costa Rica. This is triple the data that most researchers ever get! You use these data to test if iguanas with higher body temperatures can bite harder. You generate a mean and look at your data relative to that mean. Many data points are consistent and fall within 1 standard deviations of the mean. You might expect your standard error to be:
   1. Large because the data are within 1 standard deviation of the mean
   2. Large because the data are within 1 standard deviation of the mean and you do not have many data points
   3. Small because the data are within 1 standard deviation of the mean and there are many data points
   4. Small because there is a lot of variation in the data

ANSWER: C

Difficulty: Hard

Bloom Code: Evaluation

Reference: 1.2

1. A student wants to prove that their research is significant using statistics. What’s wrong with this approach?
   1. There’s nothing wrong with this approach; statistics can be used to prove anything
   2. The approach is wrong because statistics can only prove things once in a while, not all the time
   3. The student is confused and shouldn’t be using statistics; they should be using a model
   4. The approach is wrong because statistics cannot be used to prove something; it is used to disprove a null hypothesis.

ANSWER: D

Difficulty: Medium

Bloom Code: Application

Reference: 1.2

1. In your experiment, you manipulate temperature to test if it has an effect on the abundance of an insect species. If your null hypothesis stated that temperature has no effect on insect abundance, and your p-value was equal to 0.80, then you would conclude what?
   1. That there is an association between insect abundance and temperature
   2. Your data show evidence to support the null hypothesis, and conclude that temperature has no effect on this insect species abundance.
   3. That there is a relationship between temperature and insect abundance
   4. That temperature has an effect but species abundance does not*.*

ANSWER: B

Difficulty: Hard

Bloom Code: Evaluation

Reference: 1.2

1. You design an experiment to test how ultraviolet radiation effects the development of a species of frog tadpoles. You set up your experiment so that there are 50 replicates, instead of only 10. Why is it a good idea to have so many replicates?
   1. A greater number of replicates makes no difference. The 40 additional replicates are a waste of time and money
   2. A greater number of replicates will create pseudo replication.
   3. The more replicates you have the greater the likelihood of obtaining significant results.
   4. All of the above*.*

ANSWER: C

Difficulty: Hard

Bloom Code: Synthesis

Reference: 1.2

1. An annual plant:
   1. Completes its life cycle over many years
   2. Completes a whole generation in a single year
   3. Is a persistent plant that may not produce in its early years
   4. Completes half a generation its first year

ANSWER: B

Difficulty: Easy

Bloom Code: Knowledge

Reference: 1.3

1. There is a 100 square meter rectangular meadow that has a rare plant growing throughout it. This plant species is used by a butterfly species as food and land managers are worried that the population of this plant may be too low to sustain the butterfly. Since there are no data about the abundance or density of this plant, you need to sample this field to determine its density and abundance. To best sample it, you should:
   1. Chose one specific patch of the meadow and sample what is in it and assume the rest of the meadow is the same
   2. Section the meadow into smaller units and chose to sample only the units on one side of the meadow
   3. Section the meadow into small units and use a random number generator to sample some of those units
   4. Cut down part of the meadow and let it grow back, the record the density and abundance of the plant

ANSWER: C

Difficulty: Hard

Bloom Code: Evaluation

Reference: 1.3

1. Introduced brown trout (*Salmo trutta*) in New Zealand negatively affected lake systems by:
   1. Disturbing mayfly behavior, which resulted in fewer invertebrates feeding on algae
   2. Introduced brown trout did not affect lake systems; rainbow trout that they coexisted with caused the negative effect
   3. Brown trout were never introduced to New Zealand
   4. Macroinvertebrates feeding on algae over grazed, and as a result lakes became eutrophic and brown trout died

ANSWER: A

Difficulty: Medium

Bloom Code: Analysis

Reference: 1.3

1. You conduct an experiment to test if water temperature affects developmental time of dragonfly nymphs. You only had time to set up three replicates for each of three temperature treatments: 10, 13, and 15 degrees Celsius. Each replicate is one individual nymph. Therefore, you have data on the developmental rate of three nymphs at each temperature treatment. The data show some variation within each treatment. You conduct your statistical test and your resulting p-value is 0.85. These results indicate the result was not significant. However, you can interpret this result another way, which is:
   1. There really may be no effect of ecological importance, or there may not be enough data, which may be because the effect is weak and you need more extensive data
   2. There is nothing more to conclude. The experiment is over, temperature has no effect, and increasing the number of replicates will make no difference
   3. The result actually is significant because the p-value is so high
   4. There is an ecological effect, it is just small and that is why the p-value is great.

ANSWER: A

Difficulty: Hard

Bloom Code: Evaluation

Reference: 1.2

1. One reason to randomly sample is because:
   1. It helps to create consistent data
   2. It ensures significant p-values
   3. It helps to prevent bias
   4. It generates the most data

ANSWER: C

Difficulty: Medium

Bloom Code: Comprehension

Reference: 1.2

1. Say you go and measure the diameter of trees in old growth forests throughout 30 plots of land in Argentina. You want to know if tree size differs between sites. This is an example of what type of study?
   1. Manipulative field study
   2. Comparative laboratory study
   3. Comparative field observation study
   4. None of the above

ANSWER: C

Difficulty: Medium

Bloom Code: Comprehension

Reference: 1.3

1. You have gathered historical data on the prevalence of a pathogen throughout a population of bats. You have also learned the dynamics of transmission and the rate of infection. You want to know how this pathogen may spread to other colonies of bats adjacent to the population you are studying. What might be a good way to do this?
   1. Inoculate the adjacent colonies and watch to see how the pathogen spreads on its own
   2. Bring all the bats into captivity and expose them to the pathogen then measure how the bats from each colony respond
   3. Set up a field experiment where the prey spread the pathogen naturally
   4. Use historical data, the knowledge of its infection rate, and population dynamics to create a model and predict how it might spread.

ANSWER: D

Difficulty: Hard

Bloom Code: Synthesis

Reference: 1.3

1. An experiment you have been conducting uses a large pond to observe how the input from fertilizer runoff affects the native pond community. You find that many amphibians are not able to survive in this pond when the nitrogen levels are high. What could you do next to best test if nitrogen concentrations affect amphibians?
   1. Do a field experiment to exclude amphibians from the pond and see if they survive elsewhere
   2. Experimentally raise frogs in a controlled laboratory experiment where some are exposed to water from the pond at certain periods of time and others only raised in filtered water for the duration of the experiment.
   3. Find other ponds and input runoff to see if amphibians there cannot survive too
   4. Increase the runoff input at your pond and see if amphibian survivorship decreases

ANSWER: B

Difficulty: Hard

Bloom Code: Synthesis

Reference: 1.3

1. Generally, most studies will evaluate a hypothesis based on whether the p-value is:
   1. p=0.01
   2. p>0.05
   3. p>0.5
   4. p<0.05

ANSWER: D

Difficulty: Easy

Bloom Code: Knowledge

Reference: 1.2

1. A proximate explanation explains:
   1. What has happened to a species through evolutionary time
   2. What is predicted to happen to a species
   3. What is happening here and now to a species
   4. None of the above

ANSWER: C

Difficulty: Easy

Bloom Code: Knowledge

Reference: 1.1

1. An ultimate explanation explains:
   1. What has happened to a species through evolutionary time
   2. What is predicted to happen to a species
   3. What is happening here and now to a species
   4. None of the above

ANSWER: A

Difficulty: Easy

Bloom Code: Knowledge

Reference: 1.1

1. You work on a research project to test what happens to a species of fish as dissolved oxygen levels decrease. You find that the fish becomes lethargic because cells are deprived of the necessary oxygen levels they need. This is an example of what kind of scientific explanation?
   1. Ultimate
   2. Predictive
   3. Proximate
   4. None of the above

ANSWER: C

Difficulty: Easy

Bloom Code: Knowledge

Reference: 1.1

1. You are interested in finding out why crayfish can eat many toxic or noxious amphibian species. You find through a research project of the primary literature that the species of crayfish you are interested in studying has evolved from a lineage of ancestors that appear to have had resistance. This is a i) proximate explanation or ii) ultimate explanation?
   1. i
   2. ii
   3. i and ii
   4. None of the above

ANSWER: B

Difficulty: Hard

Bloom Code: Evaluation

Reference: 1.1

1. You want to understand the birth rate of a salamander population. To understand the mechanistic reason associated with this salamander species birth rate, you would need to:
   1. Study the entire population and then the community
   2. Only study the community
   3. Look at reproduction in the individual salamanders
   4. Test how predators affect population numbers

ANSWER: C

Difficulty: Medium

Bloom Code: Analysis

Reference: 1.2

1. A manipulative field experiment was conducted to test the hypothesis that nitrogen pollution affects biodiversity. In this study, a field was treated for 4 years by adding nitrogen to it regularly. A potential limitation to this study is:
2. It was conducted on only one soil type
3. It was run for too long so you cannot trust the results
4. Confounding variables were not held constant
5. Biodiversity is not a reliable indicator for this research question

ANSWER: A

Difficulty: Medium

Bloom Code: Comprehension

Reference: 1.2

1. You compile a model to test how dissolved carbon dioxide levels are affecting calcium deposition in the Pacific Ocean as a result of climate change. Your model indicates that many species relying on carbonate for shell deposition will not be able to survive due to the projected future changes in dissolved carbon dioxide levels as a result of climate change. What is the likely conclusion to draw from this result?
   1. All species are doomed and there is nothing that can be done
   2. Your model is only a prediction and can be applied cautiously to help land managers and other researchers
   3. The result should not be generalized and you should not be cautious; the models right
   4. The model is a perfect description of what will happen and you should let land managers know exactly what is going to happen as a result of climate change

ANSWER: B

Difficulty: Medium

Bloom Code: Application

Reference: 1.3

**Multiple Select**

1. In the case of the Hubbard Brook Experimental Forest, hydrogen ion concentration in precipitation was measured over a period of more than 40 years. Why was it important to track the concentration of hydrogen ions in precipitation over such a period of time? Why not use just a few years?
   1. Tracking these data over more than 40 years was important because there was so little variation between years
   2. The period of time was necessary to capture beginning and final concentrations only. The researchers were not interested in data in between these points
   3. Measuring these data over more than a few years allowed researchers to track the trend in hydrogen concentration through time
   4. Collecting data for a few years would have been misleading because of the year by year variation

ANSWER: C, D

Difficulty: Hard

Bloom Code: Synthesis

Reference: 1.3

1. Variation in your data affects the standard error. Your standard error will be smaller if:
2. The effect is more consistent or stronger
3. The sample size is smaller
4. The effect is weak
5. The sample size is larger

ANSWER: A, D

Difficulty: Medium

Bloom Code: Application

Reference: 1.2

1. When one evaluates case studies in ecology, it is important to keep in mind:
2. Phenomenon occur at a variety of scales
3. Data and evidence can come from a variety of sources
4. Scientific evidence is necessary and statistics should be relied upon
5. None of the above

ANSWER: A, B, C,

Difficulty: Medium

Bloom Code: Comprehension

Reference: 1.2

1. It is important to remember when collecting data to:
2. Estimate accurately and without bias
3. Be as precise as possible
4. Fabricate data if necessary
5. Effectively use the time, money and human effort that has been invested

ANSWER: A, B, D

Difficulty: Easy

Bloom Code: Knowledge

Reference: 1.2

1. You complete a rigorous scientific study of salinity levels and its affect on the speed of a species of fish inhabiting brackish water. You plot salinity level on the x axis and fish speed on the y axis and see that as salinity increases so does fish speed. Much of your data fall very close to the trend line and your p-value is 0.01 after carrying out a statistical test. This would mean that:
2. There is an association between salinity level and fish speed
3. There is a lot of variation in the effect of salinity upon fish speed
4. The data will be more than two standard deviations away from the mean
5. Enough data have been collected to conclude with confidence that there is a relationship between salinity and fish speed

ANSWER: A, D

Difficulty: Medium

Bloom Code: Application

Reference: 1.2

1. There are important factors that influence the p-value. These may include:
2. Variability of the effect
3. Sample size
4. The null hypothesis
5. None of the above

ANSWER: A, B

Difficulty: Medium

Bloom Code: Comprehension

Reference: 1.2

1. Ecologists may use which of these approaches to answer research questions?
2. Mathematical models
3. Controlled laboratory experiments
4. Manipulative field experiments
5. Observational data

ANSWER: A, B, C, D

Difficulty: Easy

Bloom Code: Knowledge

Reference: 1.1

1. There are two different classes of explanation in biology. They are:
2. Ultimate
3. Predictive
4. Proximate
5. Successive

ANSWER: A, C

Difficulty: Easy

Bloom Code: Knowledge

Reference: 1.1

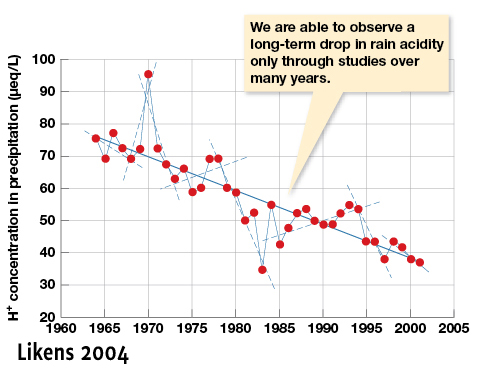
1. If an ecologist studies interbreeding between populations and how that affects which organisms live in a community, they would be working on scales that include:
2. The population level
3. The biosphere level
4. The community level
5. The molecular level

ANSWER: A, C, D

Difficulty: Medium

Bloom Code: Comprehension

Reference: 1.2

1. Using Figure 1.4, which of the following statements are accurate? 
2. The overall trend shows a negative effect of time on hydrogen ion concentration in precipitation
3. From 1965 to 1975 the trend is flat
4. From 1965 to 1975 the trend is a decline in hydrogen ion concentration
5. The data need to be looked at year by year and not over this long a period

ANSWER: A, C

Difficulty: Hard

Bloom Code: Evaluation

Reference: 1.2

1. Ecological phenomena occur at a variety of scales. These scales may include which of the following?
2. Spatial
3. Temporal
4. Mathematical
5. Logistical

ANSWER: A, B,

Difficulty: Easy

Bloom Code: Knowledge

Reference: 1.1

**Fill in the Blank**

1. \_\_\_\_\_\_ are functioning groups of individual organisms of the same species in a defined location.
   1. Populations
   2. Communities
   3. Ecosystems
   4. None of the above

ANSWER: A

Difficulty: Easy

Bloom Code: Knowledge

Reference: Section 1.1

1. The biological control of pests, conservation of rare and threatened plants, and wildlife management are all examples of \_\_\_\_\_\_ .
2. Pure ecology
3. Applied ecology
4. Pure and applied ecology
5. None of the above

ANSWER: B

Difficulty: Easy

Bloom Code: Comprehension

Reference: 1.1

1. The principal sources and approaches used to gather ecological evidence include \_\_\_\_\_\_.
2. Observations, experiments, and mathematical models
3. Observations and experiments
4. Experiments
5. Mathematical models

ANSWER: A

Difficulty: Easy

Bloom Code: Knowledge

Reference: 1.2

1. You are working on a project in a desert that has never been explored and you want to determine what species of insects interact with one another. You need to first learn what species are found in the ecosystem you will study. Therefore, you start by going to your site and making \_\_\_\_\_\_\_.
2. Field experiments to test species interactions
3. Observations to learn species distributions and abundances
4. Applied scientific results
5. A mathematical model to calculate the number of species that you will encounter

ANSWER: B

Difficulty: Medium

Bloom Code: Analysis

Reference: 1.2

1. To conduct a statistical test, you first need a \_\_\_\_\_\_.
2. P-value
3. A probability
4. A model
5. Null hypothesis

ANSWER: D

Difficulty: Easy

Bloom Code: Knowledge

Reference: 1.2

1. The \_\_\_\_\_\_ is comprised of the community together with the physical environment.
2. Habitat
3. Population
4. Ecosystem
5. Biota

ANSWER: C

Difficulty: Easy

Bloom Code: Knowledge

Reference: 1.2

1. \_\_\_\_\_\_ are use to express variability around the mean and to estimate the true mean value.
2. P-values
3. Standard errors
4. Null hypotheses
5. P-values and null hypotheses

ANSWER: B

Difficulty: Medium

Bloom Code: Comprehension

Reference: 1.2

1. The process of \_\_\_\_\_\_ is due to an excess of nutrient input.
2. Succession
3. Evolution
4. Eutrophication
5. None of the above

ANSWER: C

Difficulty: Easy

Bloom Code: Knowledge

Reference: 1.3

1. Statistics assigns \_\_\_\_\_\_ to an event as a way to predict if an event is expected to occur.
2. Data
3. Scales
4. Probabilities
5. None of the above*.*

ANSWER: C

Difficulty: Medium

Bloom Code: Comprehension

Reference: 1.2

1. At the level of the \_\_\_\_\_\_, ecology deals primarily with how individuals are affected by their environment and the physiological and behavioral responses to the environment.
2. Population
3. Community
4. Organism
5. Ecosystem

ANSWER: C

Difficulty: Medium

Bloom Code: Comprehension

Reference: 1.2