SI Environmental Science - Full Discipline Demo

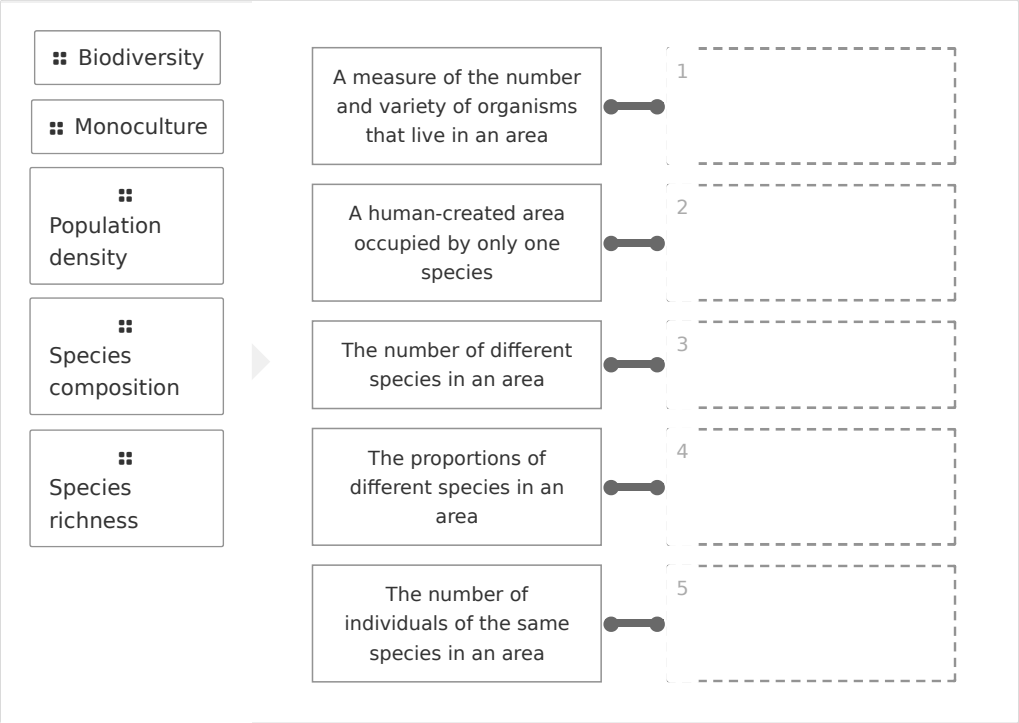
Environmental Plant Survey and Biodiversity

Final Report - Answer Guide

Institution	Science Interactive University
Session	SI Environmental Science - Full Discipline Demo
Course	SI Environmental Science - Full Discipline Demo
Instructor	Sales SI Demo

Test Your Knowledge

Match each term to the best description.

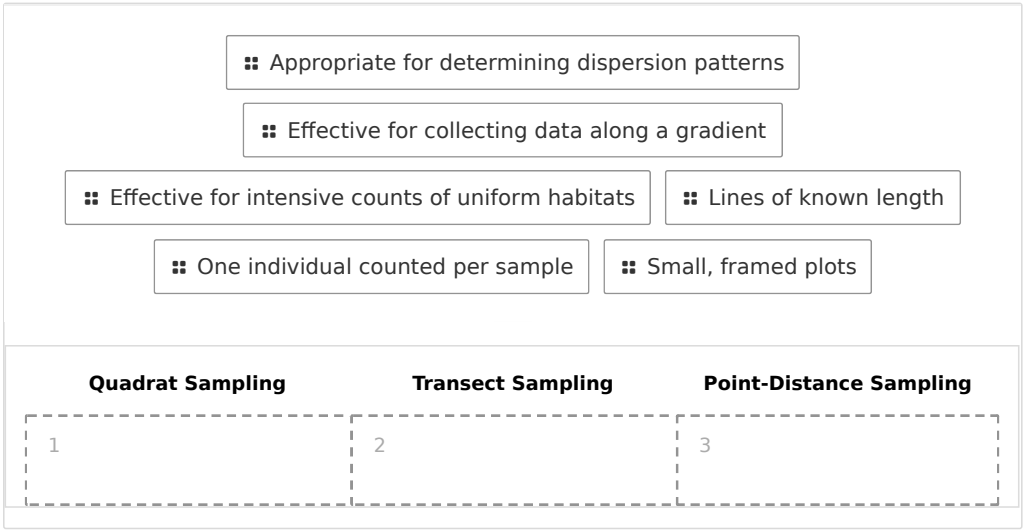


Correct answers:

1 Biodiversity 2 Monoculture 3 Species richness

4 Species composition 5 Population density

Place each phrase in the proper category.



Correct answers:

1 Small, framed plots Effective for intensive counts of uniform habitats

2 Lines of known length Effective for collecting data along a gradient

3 One individual counted per sample

Appropriate for determining dispersion patterns

Exploration

Diverse ecosystems contain a higher number of plant species than monocultures.

- True ✔
- False

Species composition is a measure of the _____ of different species in an area.

- dispersion
- proportions ✔
- number
- abundance

Plant surveys are a method of counting and measuring every plant in an ecosystem.

- True
- False ✔

Exercise 1

How did species richness compare between the four samples in Data Table 1 of the exercise? Which survey method produced the most consistent measures of species composition?

Species richness (4) was identical between all samples. Species composition percentages were consistent between the quadrat samples but were variable between the transect samples.

The transect samples in this exercise were used for species richness and composition calculations. How could they have been used to illustrate distribution patterns of the species?

The position of each plant relative to others could have been recorded along the transect, or only given distances of the transect line recorded to provide distribution pattern data in relation to elevation.

Predict both the level of biodiversity (number of species) and species density (number of individuals) in your proposed study area from Part 2 of this exercise. Explain why species density may not be a positive indicator of ecosystem health.

Student answers will vary for the level of biodiversity of their proposed sample site but should correlate to Photo 1. Species density is not always positively related to ecosystem health since individuals are in close proximity and more susceptible to disease and resource limitations.

Data Table 1: Quadrat and Transect Calculations

(SAMPLE ANSWER BELOW)

Measure	Quadrat 1	Quadrat 2	Transect 1	Transect 2
Species Richness	4	4	4	4
Crocus Composition (%)	9.4	14.7	14.3	25.0
Fern Composition (%)	25.0	23.5	42.9	12.5
Sapling Composition (%)	34.4	38.2	14.3	37.5
Shrub Composition (%)	31.3	23.5	28.6	25.0

Photo 1: Plant Survey Site

(SAMPLE ANSWER BELOW)

Student photos will vary but should display the variety of plants in the site. Sites should be one of the following: lawn, urban park, open space, or natural area.

Data Table 2: Local Survey Design

(SAMPLE ANSWER BELOW)

Proposed Sampling Method	Student answers will vary but should correlate with Photo 1.
Proposed Sample Size	Smaller quadrats will be required for areas with smaller plants. Longer transects will be required for highly variable terrain. Sufficient points should be sampled in forests with multiple tree and understory species.
Explanation	Areas with small plants should be sampled with the quadrat method, areas with variable terrain with the transect method, and areas with large trees with the point-distance method.

Competency Review

A _____ is an example of a diverse ecosystem.

- crop field
- manicured lawn
- tropical rainforest ✔
- monoculture

Monocultures are areas occupied by _____ plant species.

- one ✔
- two
- three
- over five

3. Population density is usually higher in a diverse ecosystem than in a monoculture.

- True
- False ✔

The _____ survey method is conducted using multiple, random samples within the ecosystem.

- point-distance
- quadrat
- transect
- All of the above ✔

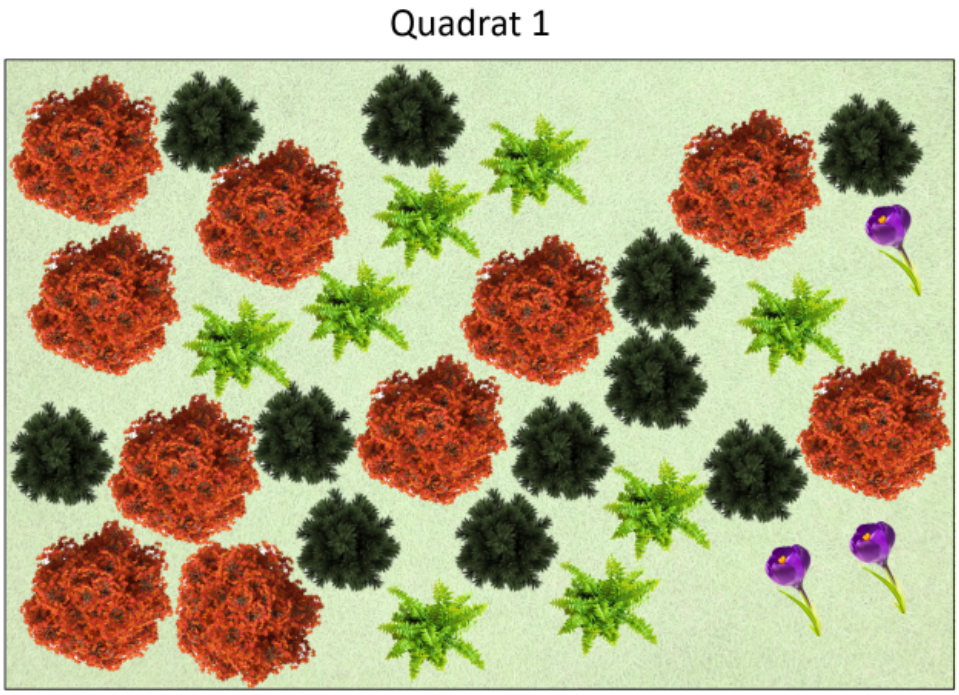
The point-distance method is most appropriate for sampling _____.

- forests with large trees ✔
- grasses and herbs
- vegetation along a gradient
- arctic tundra

Ten individuals of species A were counted in a quadrat that contained 50 plants in total. The species A composition of the sample is _____.

- 10%
- 20% ✔
- 25%
- 50%

The quadrat illustrated in the diagram has a species richness of _____.



- 4 ✔
- 9
- 10
- 25

_____ sampling is the most appropriate method for surveying plant biodiversity in the pictured ecosystem.

- ○ Point-distance
- ○ Quadrat ✔
- ○ Transect
- ○ Cath and release

Extension Questions

A new orchid species has been discovered growing beside a mountain stream located in steep forested terrain. Describe how you would survey the area to determine the density and distribution of this small, flowering plant. (SAMPLE ANSWER BELOW)

More than one survey method should be used to properly assess the density and distribution of the orchid. To determine the distribution in relation to elevation, transect lines could be positioned parallel to the stream. To determine the distribution in relation to the stream, transect lines could be placed from the stream bank into the surrounding forest. To determine the density of orchid in the ecosystem, quadrats should be positioned along transect sections where the orchids were counted.