UNIVERSITY
OF SKÖVDE

School of Biological sciences

WRITTEN EXAMINATION

Course: Ecology, nutrient cycling and landscape processes G1F

Examination: Written exam

Course code: BV313G

Credits for written examination: 4 hp

Date: 2023-08-21

Examination time: 08:15 - 12:30

Examination responsible: Tomas Jonsson

Teachers concerned: Magnus Karlsson

Aid at the exam/appendices: Engelsk-Svensk / Svensk-Engelskt lexikon.

Other

Instructions

- ☐ Take a new sheet of paper for each teacher.
- ☐ Take a new sheet of paper when starting a new question.
- ☒ Write only on one side of the paper.
- ☒ Write your name and personal ID No. on all pages you hand in.
- ☒ Use page numbering.
- ☒ Don´t use a red pen.
- ☒ Mark answered questions with a cross on the cover sheet.

Grade points

Examination results should be made public within 18 working days

Good luck!

Total number of pages 6

Written Re-exam – Ecology, nutrient cycling and Landscape processes G1F (BV313G)

Welcome to the written re-exam on the course Ecology, nutrient cycling and Landscape processes G1F (BV313G). I suggest that you:

• Read every question carefully. If needed, read it more than once.

• Read through all the questions before you start writing. Note all your questions if you need to ask me something. This may spare you more than one call and saves time for everyone.

• Start with the questions you think are easy. This builds confidence and is smart time management.

• Write clear and precise answers that answers the actual question. Do not include irrelevant information in your answers. It may obscure what you actually know and lead to a deduction of points.

• If you draw figures or images to help with your explanation, make sure to explain the drawing with words! Figures or images without explanations will not be rewarded any points.

This exam covers the course objectives listed below. Each objective is tested by 4 questions. The total amount of points for each section is 16 points. There are four sections. Therefore, the total amount of points on the exam is 64 p. To pass the exam the student needs to accumulate at least 50 % of the total points in each section i.e. at least 7 points per section.

For higher grades the student must fulfill the requirements for grade E and then collect 60-90% of the total score of the exam according to the following: D= 38 p (60%), C= 45 p (70%), B= 51 p(80%) and A= 58 p (90%)

Good luck!

Goal 1: The student should be able to explain broadly how basic biotic and abiotic processes and factors, like biogeochemical circulation, soil formation, erosion, climate and species interactions determine and are determined by ecological systems such as species distribution and dispersal. (Max 16 p)

1. Soil is formed by processes that can be very slow. Five different factors affect the formation of soil. Name four (4) of these factors and explain in what way they influence the process of soil formation? (4 p)

2. Three different kinds of bacteria are crucial for the ecological circulation of nitrogen. Which are these three kinds of bacteria and where in the nitrogen cycle are they involved? (6 p)

    - Draw the nitrogen cycle
    - Name and place these three bacteria at their correct position in the cycle (3 p)
    - Briefly explain what the bacteria do (3 p)

    Note that some of these bacteria occur in more than one position in the cycle.

3. Living organisms interact in many different ways. These interactions may have effects on none, one or both species involved in the interaction. Name three different kinds of interactions and explain how each of the two species involved in the interaction are affected by it. (6 p)

Goal 2 The student should be able to recognize and describe some chosen Swedish habitat types connected to the species and habitat directive. (16 p)

4. Nature conservation species is an umbrella term for species that (for different reasons) are important to preserve because they are important for biodiversity. During this course we have studied six different kinds of such species. Name three such kinds of species and explain why they are important to conserve and/or why they are important for biodiversity. (6 p)

5. In the old cultivated landscape man constructed a number of structures that are important for biodiversity today. Most of them are the result of the agricultural methods that were used back then. Today, these structures are known as rest habitats. Name three kinds of rest habitats and explain why they are important for biodiversity today. (6 p)

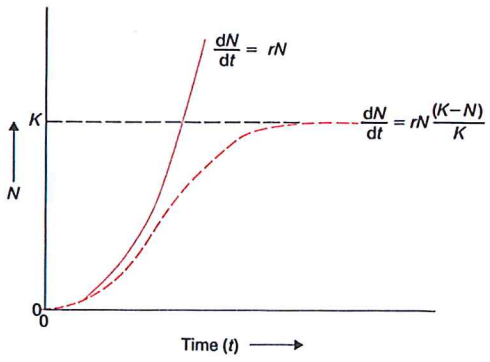
6. Describe how the cultivated landscape has changed in the last 70-80 years and how this has affected biodiversity. (4 p)

Goal 3 The student should be able to explain briefly and discuss simple ecological theories on individual, population, community and ecosystem level. (16 p)

7. Life histories can be under two distinct patterns of selection. They are either k- or r-selected. The kind of selection influences the ecology of a species in a fundamental way. (6 p)
   a. Explain the difference between K- and R-selection. (2 p)
   b. Which reproductive mode (semelparous or iteroparous) is typical for K- and R-selected species respectively? (1 p)
   c. At what age (early or late) do K- and R-selected species reproduce respectively? (1 p)
   d. What kind of organism, K- or R-selected species is most long lived? (1 p)
   e. What kind of organism, K- or R-selected has the strongest competitive ability? (1 p)

8. Lotka-Volterra models can be used to investigate how predator and prey interactions influences the density and population growth rates of both the predator and the prey. This is also called predator-prey dynamics. Draw a Lotka Volterra Predator and prey diagram with the zero isoclines of both species and explain the outcome of competitions for all four situations. Make sure to denote the zero isoclines very clearly. (4 p)

9. The two equations and their corresponding graphs in the figure below illustrates something important in ecology. Explain what ecological situations the equations and the graphs are describing and why that results in graphs with different shapes. Use the equations and their different parts by relating them to the ecological implications they have. (4 p)



10. Give two examples of what life tables can be used for. (2 p)

Goal 4 The student should be able to discuss ecological aspects on some actual Swedish environmental problems and the use of natural resources like fisheries, agriculture and forest. (16 p)

11. Biodiversity is declining at an alarming rate all over the world. Ecologists have been trying to raise the awareness of this issue for a long time but a lot of work still remains. (6 p)

    a. Explain how and why fragmentation is a threat to biodiversity? (2 p)

    b. What are the consequences of edge effects i.e. how do they affect the remaining habitat? (3 p)

    c. How does human activities cause acidification? (1 p)

12. There are a number of different indexes of biodiversity. All of them aim to evaluate and quantify biodiversity in a way that is practical and useful. What is the difference between species richness and relative abundance indexes? (2 p)

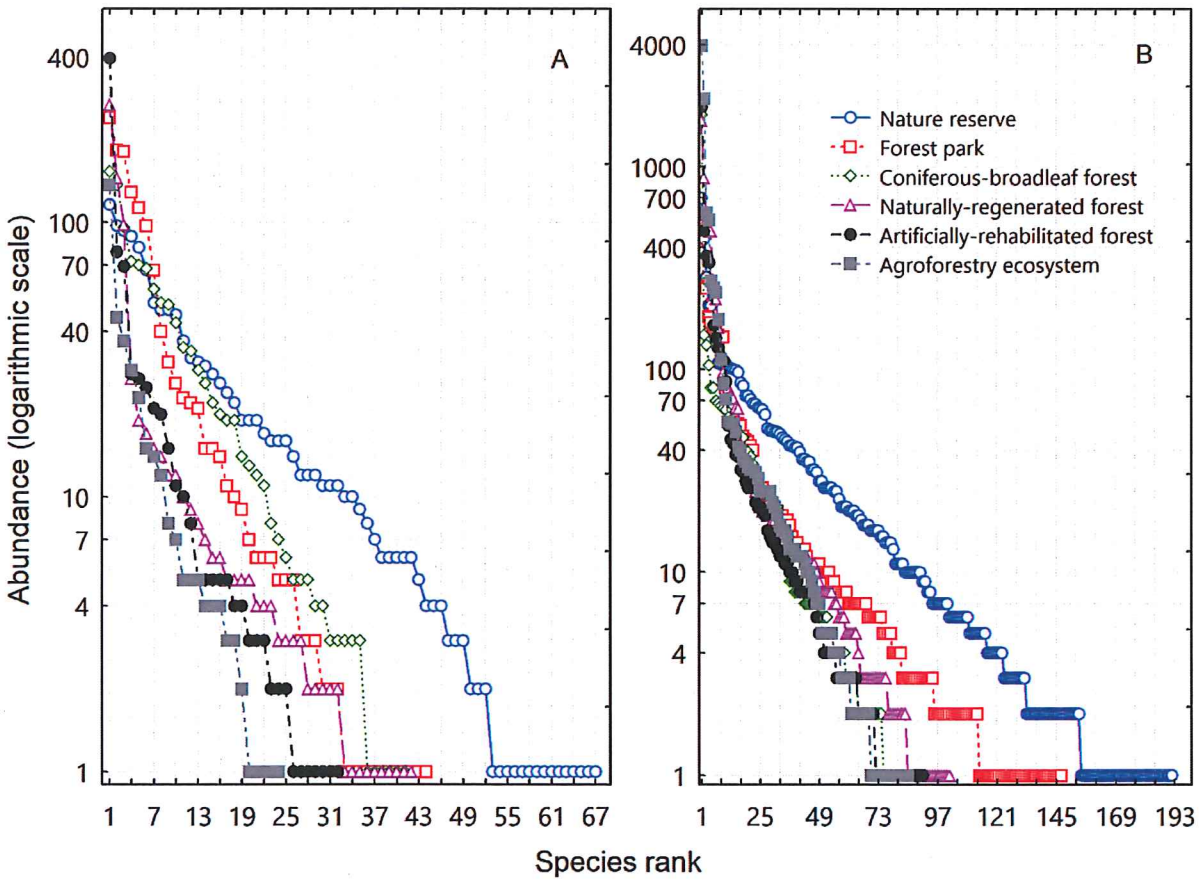
Don't miss the last two questions on the next page!

13. The image below is a rank abundance diagram. (5 p)

    a. According to the left panel (i.e. A): What kind of forest has the lowest and the highest species diversity respectively? For practical reasons (since it is hard to read) you have to exclude the coniferous broadleaf forest curve (i.e. the green graph). (2 p)

    b. Explain how to read and interpret a rank abundance diagram like the one below. (2 p)

    c. Why are rank abundance diagrams useful? (1 p)



14. Inbreeding may lead to a state called inbreeding depression. This state is a threat to the affected population and may pose a general threat to biodiversity. Its effects are well documented through the breeding of captive animals but also from studies of wild populations. (3 p)

    a. What is inbreeding? (1 p)

    b. Explain one negative effect of inbreeding depression. (1 p)

    c. Give one specific example of how human activities is causing inbreeding to become increasingly common in natural systems? (1 p)