**Unit 2 Biology: Area of Study 2 SAC “Dynamic Ecosystems”**

In this SAC, we will be focusing on various aspects of our chosen ecosystem, “The Frog Bog”. During the SAC we will be looking at the following features:

* Creating a plan and profile sketch
* Measure abiotic factors of the environment
* Measure biotic factors

Your task is to write a written report on your findings. You will be given some class time to complete these tasks, however it will be up to you to research anything you do not complete within your own time.

You will be given **three 75 minute periods** to research and begin your SAC.

**What you need to look at before hand?**

This task covers topics from chapter 19-23 of your text book and it would be advisable to become familiar with the content. It may be a good idea to familiarise yourselves with the practicals 10, 11 and 12 from your work book as the techniques from these could be applicable to the SAC. Also if you have completed any of the worksheets from no.38-48, these may be of use as well.

**Assessment:** You will be assessed using the following rubric.

**Materials:** Refer to page 176 in your work book for the list of materials.

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| --- | --- | --- | --- | --- | --- | --- |
| Assessment  Descriptors | Marks Allocation | | | | | |
| 5 | 4 | 3 | 2 | 1 | 0 |
| Understanding of aims and methods utilised | Comprehensive understanding of aims and method utilised in field study | Thorough understanding of Aims and methods utilised in field study | Satisfactory understanding of the aims and methods utilised in the field study | Limited understanding of the aims and methods utilised in the field design | Minimal degree of understanding of aims and methods utilised in field study | N.A |
| Skills in use of Equipment and Gathering of Relevant Data | High Degree of skills in using equipment and gathering of relevant data. | Thorough skills in using equipment and gathering relevant data. | Satisfactory level of skills in using equipment and gathering relevant data. | Limited skill in using equipment and gathering relevant data. | Demonstrates minimal degree of skill in using equipment and gathering relevant data. | N.A |
| Collection and presentation of relevant data | Detailed and Accurate collection and presentation of relevant data (including tables ect) | Detailed and mostly accurate collection and presentation of relevant data (including tables ect) | Satisfactory collection and presentation of relevant data (including tables ect) | Collection and presentation of relevant data lacking in detail and/or clarity (including tables ect) | Collection and presentation of relevant data lacking in detail and clarity (including tables ect) | N.A |
| Visual representation such as plan and profile sketching | Detailed and Accurate visual representations such as plan and profile sketching. | Detailed and mostly accurate visual representations such as plan and profile sketches | Satisfactory visual representation such as plan and profile sketching | Visual representation such as plan and profile sketching lacking in detail and/or clarity | Visual representation such as plan and profile sketching lacking in detail and clarity | N.A |
| Knowledge and understanding of the interrelationships between biotic factors and the ecosystem | Comprehensive knowledge and understanding of the interrelationships between biotic factors in the ecosystem including food chains, list of organism in the ecosystem ect | Thorough knowledge and understanding of the interrelationship between biotic factors in an ecosystem including food chains, list of organism in the ecosystem ect | Satisfactory knowledge and understanding of the interrelationships between biotic factors in the ecosystem including food chains, list of organism in the ecosystem ect | Limited knowledge and understanding of the interrelationships between biotic factors in the environment including food chains, list of organism in the ecosystem ect | Demonstrates minimal degree of knowledge and understanding of the interrelationships between biotic factors in an ecosystem including food chains, list of organism in the ecosystem ect | N.A |
| Knowledge and understanding of the interrelationships between biotic and abiotic factors. | Comprehensive knowledge and understanding of the interrelationships between biotic and abiotic factors including explanations of placement of different organisms | Thorough knowledge and understanding of the interrelationship between biotic and abiotic factors including explanations of placement of different organisms | Satisfactory knowledge and understanding of the interrelationships between biotic and abiotic factors including explanations of placement of different organisms | Limited knowledge and understanding of the interrelationships between biotic and abiotic factors including explanations of placement of different organisms | Demonstrates minimal degree of knowledge and understanding of the interrelationships between biotic and abiotic factors. including explanations of placement of different organisms | N.A |
| Interpretation and analysis of data gathered during field study | Detailed and accurate interpretation and analysis of data gathered during field study | Detailed and mostly accurate interpretation and analysis of data gathered during field study | Satisfactory interpretation and analysis of data gathered during field study | Interpretation and analysis of data gathered during field study lacking detail and/or clarity | Interpretation and analysis of data gathered during field study lacking detail and clarity | N.A |
| Interpretation and analysis of distribution and abundance of organisms | Detailed and accurate interpretation and analysis of distribution and abundance of organisms (including predicted changes in population.) | Detailed and mostly accurate interpretation and analysis of distribution and abundance of organisms(including predicted changes in population.) | Satisfactory interpretation and analysis of distribution and abundance of organisms(including predicted changes in population.) | Interpretation and analysis of distribution and abundance of organisms lacking detail and/or clarity. (including predicted changes in population.) | Interpretation and analysis of distribution and abundance of organisms lacking detail and clarity. (including predicted changes in population.) |  |
| Knowledge and application of terms, concepts and relationships related to ecosystems. | Comprehensive knowledge and application of terms, concepts and relationships related to ecosystem (how does the frog bog work?) | Thorough knowledge and application of terms, concepts and relationships related to ecosystem (how does the frog bog work?) | Satisfactory knowledge and application of terms, concepts and relationships related to ecosystems. (how does the frog bog work?) | Limited knowledge and applications of terms, concepts and relationships related to ecosystems. (how does the frog bog work?) | Demonstrates minimal degree of knowledge and applications of terms, concepts and relationships related to ecosystems. (how does the frog bog work?) | N.A |
| Knowledge and application of terms, concepts and relationships to their biotic and abiotic factors. | Comprehensive knowledge and application of terms, concepts and relationships related to their biotic and abiotic factors. (showing understanding of the biotic and abiotic features) | Thorough knowledge and application of terms, concepts and relationships related to their biotic and abiotic factors. (showing understanding of the biotic and abiotic features) | Satisfactory knowledge and application of terms, concepts and relationships related to their biotic and abiotic factors. (showing understanding of the biotic and abiotic features) | Limited knowledge and applications of terms, concepts and relationships related to their biotic and abiotic factors.(showing understanding of the biotic and abiotic features) | Demonstrates minimal degree of knowledge and applications of terms, concepts and relationships related to biotic and abiotic factors. (showing understanding of the biotic and abiotic features) | N.A |

Marks: /50

Out of /25

1. Take a look at the ‘Frog Bog’. Write a description of the habitat, including abiotic and biotic features. The abiotic features include; the geographical characteristics of the pond as well as the weather conditions at the time of observations. For the biotic features, comment on the variations and density of vegetation.

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1. Make 2 diagrams to represent the area. Complete a plan sketch of the frog bog, as well as profile sketch of the area. Remember to either use a key or label the diagrams so you can tell what is what.

ABIOTIC FEATURES

1. Measure as many abiotic factors as possible for the frog bog.

|  |  |
| --- | --- |
| Abiotic Factor | Measurement |
| Air Temperature  -At ground level  -At 1 m above ground level |  |
| Soil Temperature |  |
| Water Temperature |  |
| Light Intensity |  |
| Wind Speed |  |
| Soil pH |  |
| Water pH |  |
| Water Turbidity |  |
| Dissolved oxygen content of water |  |
| Flow rate of water(place object in water and measure distance covered over a given time e.g metres per minute. |  |

1. Identify any other abiotic factor you find in the frog bog.

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Biotic Factors

1. Write a list of the different kinds of plants in the frog bog e.g trees, grasses, herbs, ferns, mosses, lichens. Also include algae and fungi that may be present. Provide specific names of plants that you are able to identify.

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1. Stand quietly for 5 minutes. Determine the kinds of animals that could be living in the frog bog (you could listen for sounds as well). Now list the animals that you could hear and see.

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1. Use the knowledge you have gained about the interaction between organisms within an ecosystem, draw four different food chains for the ecosystem.
2. Prepare a food web for this ecosystem that includes at least two different plants and at least four different animal species.

**Population abundance and distribution**

1. Mark a 10 m long transect line through a section of the frog bog. Make sure your transect line runs through an area that varies over the distance selected. Draw a profile sketch of the ecosystem represented by the transect line.
2. Complete the Table, entering the different plant and animal species you observe along the transect line.

|  |  |
| --- | --- |
| Plant Species | Animal Species |
|  |  |
|  |  |
|  |  |
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1. Select one plant species from your list. Set up a 1m x 1m quadrat at one end of the transect line. Count the individual plants of the species within the quadrat. Record the data in the table below.

|  |  |
| --- | --- |
| Quadrat Number | Number of Plants. |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

Repeat this for 4 more quadrats.

Discuss with other members how to estimate the ‘abundance of this plant species in the area of the ecosystem you are studying. Decide where to locate another 5 quadrats in order to achieve meaningful results.

1. A. Describe the distribution of the plant species along the transect.

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B. Account for any differences in the distribution you have observed.

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1. Use the data in the quadrat table, calculate the average size of the plant population per quadrat

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1. Estimate the abundance of the plant species in the area

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1. Comment on the variability of the measurements made in different quadrats

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1. Pick a small animal from the list you made in question 10 (eg an insect). Estimate the abundance of the animal species in the area. Indicate how you arrived at the estimation. Record the date and time you made the estimate, along with a description of particular circumstances that might affect the abundance of the animals at the time.

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1. Describe the distribution pattern of the animal species in the area. (Look at the features of the ecosystem that provide the optimum conditions for the species.)

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**Human Impact**

1. Look carefully around the ecosystem for the signs of human impact . Describe the effects humans have made on the frog bog. This may include deliberate change or indirect effects resulting from human activity outside the ecosystem. Examples could include pollution, clearing of land, building ect.

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**Summary**

1. Suggest how the abiotic factors in this ecosystem are likely to change over a 24 hour period.

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1. Describe how such changes in the abiotic factors are likely to affect the plant and animal life in the frog bog.

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1. Describe an example of each of the following kinds of relationships evident in the frog bog.
2. Predator-prey:
3. Parasite-host:
4. Mutual benefit:
5. Use the food chains and food web you constructed earlier in this activity to explain how energy moves through ecosystems.

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1. Outline some factors that might account for the distribution and abundance of organism in the frog bog.

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1. Prepare a concept map summarising the relationships between organisms within the ecosystem and between the organisms and their non-living surroundings. Include inputs and outputs relevant to the ecosystem.
2. Considering the human impact on this ecosystem discussed earlier in this activity, suggest strategies that might lead to an improvement in the quality of the frog bog.

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