BIOLOGY 20: Energy and Matter Exchange in Ecosystems

<u>Concept 2</u> - Populations are basic components of ecosystem structure. Woodland caribou are a threatened species in Alberta.

Introduction

Caribou in Alberta are of two ecotypes: the mountain caribou and the boreal caribou. Each group is distinct in terms of habitat, with the mountain caribou being more migratory. They range from high alpine meadows in summer to lower wooded altitudes during the winter. The boreal caribou are found year round in the moist forested bogs and fens.

The state of woodland caribou populations became a concern in the 1970's. To address these concerns wildlife management restricted land use in sensitive areas. A need for better and more complete information on caribou was realized and research was initiated by both government and resource developers. One such study group is the joint committee between government and industry call the Boreal Caribou Committee (BCC)

Researchers have radio collared more than 200 caribou to study range, habitat and movement patterns. Findings have shown that caribou require specialized habitat, are slow to reproduce and sensitive to predation, forest harvesting and resource development (within their ranges). Their primary food source is slow growing ground and tree lichen, a plant more suitable to old growth forest.

The population numbers are estimates at best because the nature of the caribou, their low densities and unpredictability in daily and seasonal patterns of movement make accurate counts difficult. Numbers are estimated to have decreased from 7000 in 1966 to under 2000 in 1986. (Edmonds, 1986) Roads serve as semi-permeable barriers to caribou movement and oil/gas wells and seismic lines within their range are avoided by caribou. This may have contributed to population declines. Research studies are continuing to address the effect of industrial activity within the species range.

Activity 1

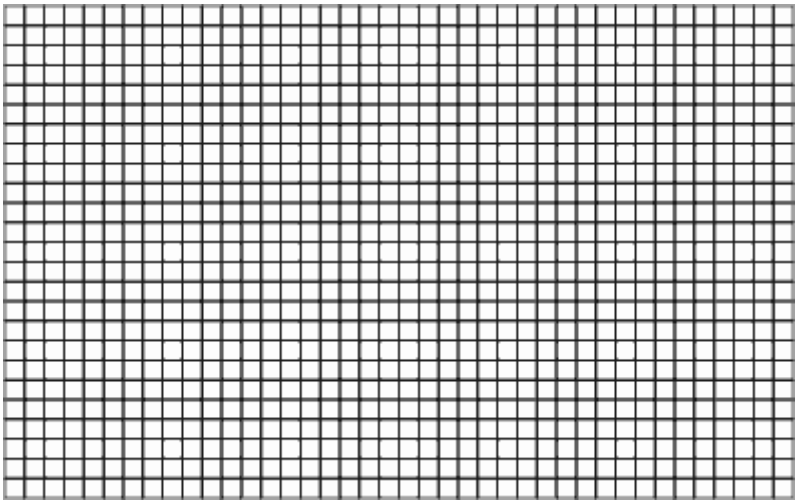
A series of studies by Jan Edmonds has estimated the Alberta caribou populations outlined below.

Provincial Caribou Population Estimates (Edmonds 1986)*

1966……7000	1979……3500
1973……5000	1980……4000
1975……4500	1985……2500
1977……4500	1986……1900

*<u>Hoofed Mammals of Alberta.</u> Edited by J. Brad Stelfox 1993

1. Graph the results outline by Edmonds. Ensure the graph has an appropriate set of scales on the X and the Y axis with the independent variable on the X-axis and the dependent (responding) variable on the Y-axis.



2. Population changes can be described as stable, increasing, decreasing or random, How would you describe the pattern of your graph? Explain your answer.

3. Suggest reasons for the population pattern displayed above. What might account for the change in pattern shown from 1979 – 1981?

4. Estimate what the population of caribou would be in 1990 by extrapolating on the graph.

5. Using your knowledge on ecological predator-prey relationships predict what would happen to the predator population as time passes.

6. What role can man (industry present in the caribou habitat) play in maintaining the caribou as a boreal wildlife species?

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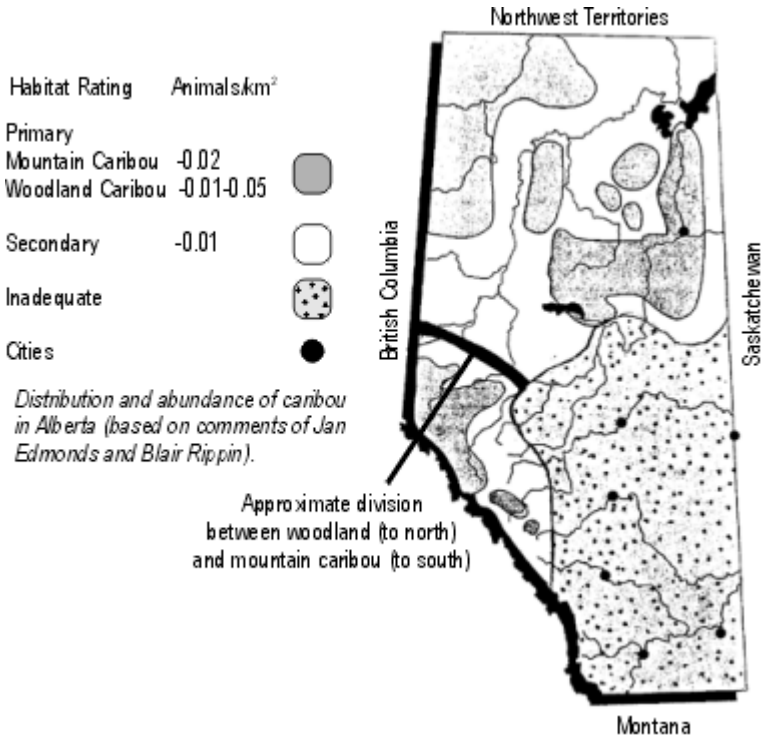
Activity 2

The Alberta map below shows the distribution areas for caribou in Alberta. The map shows primary, secondary and inadequate regions for caribou in the province.



Distribution and abundance of caribou in Alberta (based on comments of Jan Edmonds and Blair Rippin).

Questions

1. The lower south-east portion of the province contains no caribou. Explain why.
2. What type of habitat is common in the areas deemed as primary when compared to areas deemed as secondary habitat?
3. The population for Woodland Caribou in 1980 was estimated to be 4000 animals. Knowing that maximum caribou densities are 0.05 animals/km^2 calculate the total area of their range. (formula for density = number/area)

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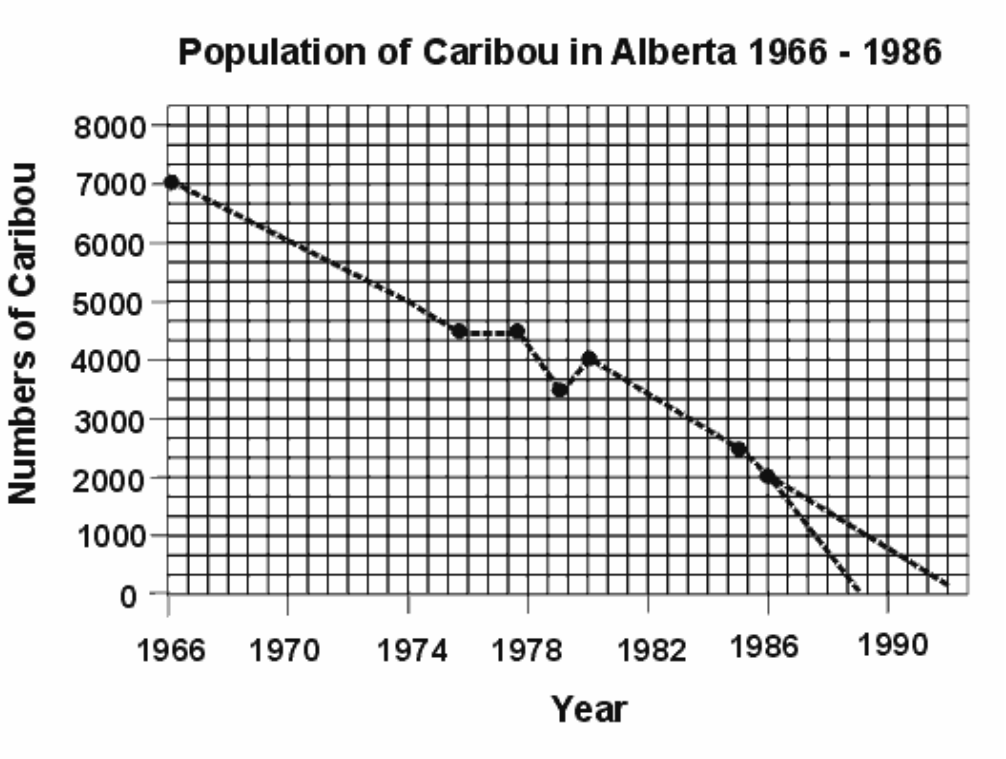
Answers

Activity 1

1. Graphing



2. The population demonstrates an overall decrease in the number of caribou. It drops from 7000 in 1966 to 1900 in 1986.
3. The decrease can be attributed to an increase in predator numbers. It can also be the result of change in habitat because of resource development, (oil exploration and extraction, forest harvest, access roads).
4. The population would drop below 1000 animals.
5. Predator numbers would also decrease because of a reduced food supply.
6. Restriction of resource development in sensitive areas, protected areas with no human footprint, narrower cutlines, limiting access during critical times of the year (calving), long term road planning, predator control, integrated landscape management – coordination of activity within and between different industry sectors and may help in stemming the decrease.

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Activity 2

1. The area termed inadequate does not contain the specialized habitat required by caribou. There is no low-lying conifer-type bog and black spruce that fosters lichen growth.

2. The primary region would have a greater amount of low-lying bog and fens which provide a more concentrated food supply.

3. The density at maximum is 0.05, the number is 4000.

D = N/S
0.05 = 4000/S
S = 4000/0.05
S = 80000 km^2