Name: _____

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Ecosystems

**LIMITING FACTORS, CARRYING
CAPACITIES AND ADAPTATIONS**

What is it that decides what type of
wildlife can be found in an ecosystem?

Why is it that there aren't giraffes in
Alberta or blue whales in Lake Athabasca but there are cougars in the Rockies?

The answer is, because of Limiting Factors, Carrying Capacities and Adaptaions.

Together these three things control the types of wildlife species and the numbers of individuals of
those species that will be found in an ecosystem.

Limiting Factors
Limiting Factors are the amount and type of food, water, minerals and shelter found in area.

Wildlife species generally require very specific amounts and types of these four things (food, water,
minerals and shelter). If any one of these things is outside their acceptable range in an area a wildlife
species cannot establish itself in that area.

The limiting factors of The Kazan Uplands are things like:
•   Shortage of water (due to limited precipitation)
•   Lack of sunshine hours (due to latitude)
•   Lack of food in winter (due to latitude)
•   Poor soil quality (due to type of bedrock)
•   Lack of topsoil (due to all of the above)

   1. What is an ecosystem?

2. What is an abiotic factor?

3. In your own words, what is a limiting factor?

4. Name three limiting factors that you might expect in a desert.

Carrying Capacity
<u>Carrying Capacity is the number of individuals of a species that can live and reproduce in a specific area.</u>

If an area has the right type of food, water, minerals and shelter for a wildlife species to establish itself then the Carrying Capacity of that area is set by the quantity of these things.

For example, if a hawk needs to eat 10 ground squirrels a summer and an ecosystem is producing 50 ground squirrels a summer then the carrying capacity for the ecosystem is 5 hawks.

- the carrying capacity of an ecosystem is different for every species but in general:
- the larger a species is the fewer individuals of a species there will be e.g. there are fewer giant redwood trees than ants
- there will be fewer predators than prey e.g. there are fewer ladybugs than aphids
- there will be fewer carnivores than herbivores e.g. there are fewer grey wolves than elk

For example in an area of $1km^2$ the carrying capacity might be:

1 000 000 000 E. coli (bacteria)
    1 000 000   Lichens
        1 000   Aspen trees

Or

    1 000 000   Ants
          1 000   Robins
    10   Foxes
    1   Black Bear

1. Describe "carrying capacity" in your own words

2. Based on your understanding of the general principles of carrying capacity in ecosystems rank these wildlife species from most (7) to least (1) individuals:

Broad Winged Hawk   ____

Aphid   ____

Black Bear   ____

Ladybug   ____

Read Breasted Nut-hatch (small bird)   ____

Richardson's ground squirrel   ____

Coyote   ____

3. Complete this sentence: Carrying capacity is controlled by _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
   which are controlled by _ _ _ _ _ _ _ _ _ _ _ _ _ _ .

Adaptations
Adaptations are special characteristics a wildlife species has that make it possible for them to live in an ecosystem certain.

Lichen is an example of a wildlife species that lives on exposed granite in the Kazan uplands. It has adapted to an acidic environment with huge variations in temperature and a limited water supply.

Moose also live in the Kazan Uplands and they have adapted to moving through the extremely cold snowy ecosystems by having thick fur and long legs that let them step high through snow instead of dragging their legs.

1. What is an ecosystem?

2. In your own words what is an adaptation?

3. What are three adaptations a snow-shoe hare has for living in Alberta?

4. What adaptations would a person need if they were going to live underwater without machines?