

## Population worksheet

1. Does each of the following examples refer to a population or to the size of a population?

- |    |  |                   |
|----|--|-------------------|
| a) | hares in Gaspésie                          | <u>population</u> |
| b) | a private lake stocked with 240 trout      | <u>size</u>       |
| c) | snow geese migrating north                 | <u>population</u> |
| d) | 628 000 caribou counted in northern Québec | <u>size</u>       |
| e) | the frogs in a pond                        | <u>population</u> |

2. Based on the data below, describe the changes to the population size in a snow goose colony that has migrated north.

<b>Data</b>		
Initial number of geese: 150	$B+I$	$D+E$
Number of births: 70	$70+3$	$10$
Number of deaths:		
- attributed to predators: 5		$70-10 = 60$
- attributed to hunting: 3		
- attributed to exhaustion from the migration: 2		$150+63$
Number of geese that immigrated: 3		
Number of geese that emigrated: 0		$= 213 \text{ pop}$

3. A population of 55 snowshoe hares lives on an island with an area of 55 000 m<sup>2</sup>. What is the population density of hares on this island?

$$\frac{55}{55000} = 0.001/m^2$$

4. Every year, grey seals gather on pack ice or on Sable Island to give birth and nurse their young. Sable Island is located 300 km off the coast of Nova Scotia, and has an area of approximately 80 km<sup>2</sup>. The island is covered in grass and scrub. Your count last year put the grey seal population on Sable Island at 30 000 individuals. What was the population density at that time? Show your calculations.

$$30000/80 = 375/km^2$$

5. There are three packs of wolves in a national park, for a total population of 41 wolves. This year, 13 wolf cubs were born, and four of the older wolves died. Due to conflict in the packs, three wolves were chased off the territory. In addition, six two-year-olds left to form their own pack in a new territory. Finally, two new wolves arrived in the park and have been trying to gain acceptance into one of the packs. How did the size of the wolf population in the park vary this year? Show your calculations.

$B+I$	$D+E$	increase in 2
$13+2$	$4+3+6$	= 43 total
15	13	
	$15-13 = 2$	

6. Scientists wanted to monitor the population of tigers in the savannah over a 2 year period. Use the information on the table to determine whether there was an increase, decrease or stable population after the 2 years. Justify your answer.

	Births	Deaths	Emigration	Immigration
Year 1	6	4	5	6
Year 2	8	4	7	2

$$14 - 8 + 12 + 8 = 22 - 20 = 2 \text{ after 2 years}$$

7. You counted 23 tulips in an 800 m<sup>2</sup> area, what is the population density for a 1 m<sup>2</sup> area?

$$23/800 = 0.03/m^2$$

8. For each of the following examples, name the factor that makes the population size vary (births, deaths, immigration or emigration) and specify its effect.
- Every spring, Canada geese return to the shores of Lac Tranquille.
  - During a logging operation, the noise from the forestry vehicles scared away the white-tailed deer in the vicinity.
  - In the spring, a female bear nurses her three cubs in her den.
  - Fish farmers stock a river with salmon fry.
  - Cottage owners can eliminate voles by installing traps in the roof.

Write your answers in the table below.

Example	Factor	Effect on population size
a)	Immigration	↑
b)	Emigration	↓
c)	Birth	↑
d)	Immig	↑
e)	death	↓

9. What happens to a population when death and emigration rates are higher than birth and immigration rates?

POP ↓

10. Name the pattern of population distribution in each of the following examples.
- schools of herring along the coast \_\_\_\_\_ clumped
  - razorbill colonies on Île aux Grues \_\_\_\_\_ clumped
  - roaming packs of wolves \_\_\_\_\_ clumped
  - snow geese flying in a "V" formation \_\_\_\_\_ uniform
  - Pods of belugas in the St. Lawrence River \_\_\_\_\_ clumped

11. Is each of the following a biotic or an abiotic factor?

- Predation B
- Temperature A
- Air humidity A
- Soil pH A
- Disease B
- Competition B



12. In order to grow, a plant needs light, water and nutrients. Furthermore, some plants cannot survive if the nighttime temperature falls below 17°C.

a) What type of ecological factors are described in this statement? *Abiotic*

b) Name the limiting factor for plants that cannot survive below 17°C. *cold*

13. Sea urchins are invertebrate herbivores that live at the bottom of the ocean. Under favourable conditions, sea urchins can spread so much that they completely cover the ocean floor. Which pattern of distribution do they then illustrate? *uniform*

14. This year, the deer population has fallen considerably. First, the saplings that deer eat were ravaged by disease. Weakened by lack of food, the deer became easy prey for wolves. To make matters worse, heavy snowfall at the end of the year made finding food on the ground more difficult. Name the abiotic factor and the two biotic factors that led to a decline in the deer population.

*abiotic = snow*      *biotic = food, predation + disease*

15. Which pattern of distribution is illustrated by each of the following situations?

a) In a forest, the fir trees are scattered about at random. *random*

b) Fungi grow in colonies on the trunks of dead trees. *clumped*

c) Several clouds of mayflies hover over a lake. *clumped*

16. Do the studies described below relate to a biotic or an abiotic factor?

a) An ecologist studies the effect of hares' browsing on a population of fir trees.

*biotic*

b) Chemists test the acidity of a soil sample.

*abiotic*

17. Use the graph to answer the questions.

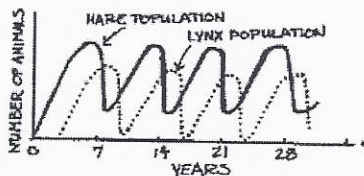
A- What causes the lynx population to increase? *↑ hare*

B- What causes the hare population to decrease? *↑ lynx*

C- What causes the lynx population to decrease? *↓ hare*

D- What causes the hare population to increase? *↓ lynx*

E- How long does this cycle last? *7 years*



18. Why does the size of the hare population in Québec decrease when the size of the lynx population increases?

*Being eaten by predator - lynx.*