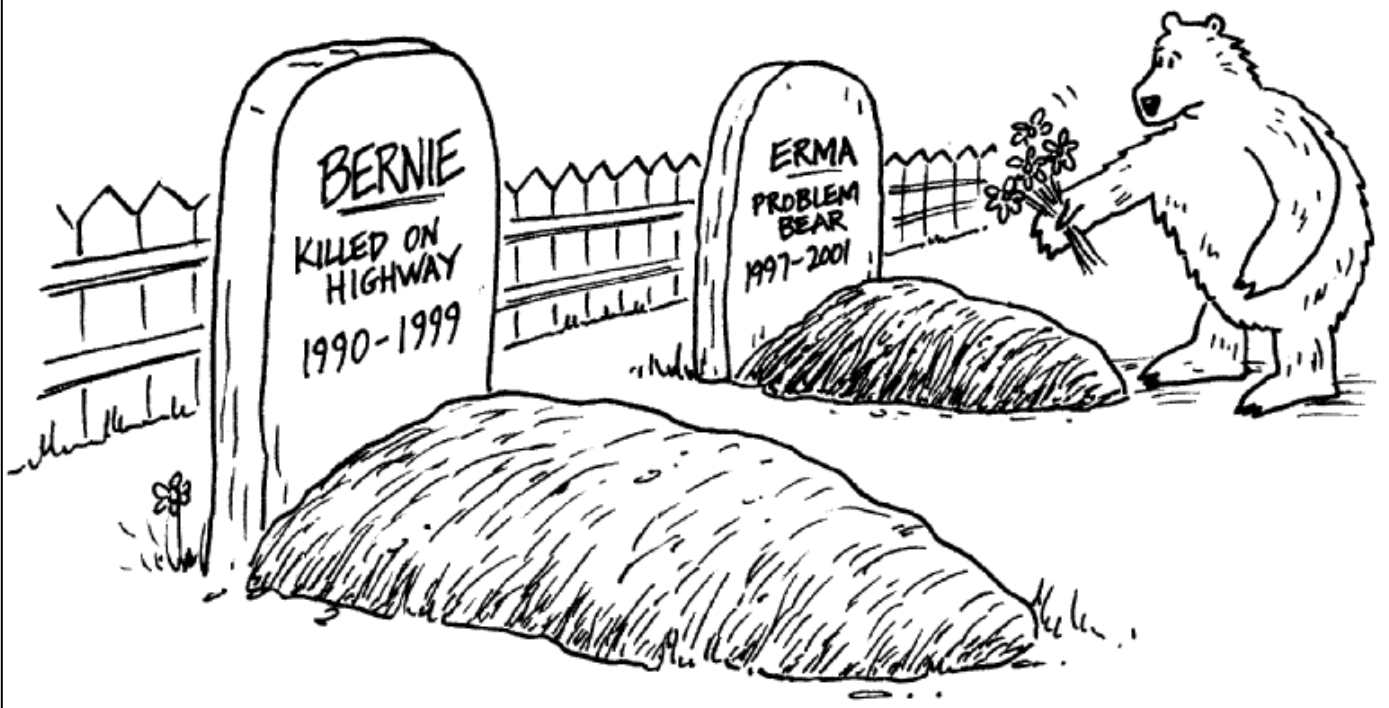


5 Main Causes of Grizzly Bear Mortality in Banff

1. Habituation
2. Highway Kills
3. Unknown
4. Railroad Kills
5. Natural Causes



Student Worksheet: Grizzly Bear Births and Deaths
Natality (birth rate) and Mortality (death rate)

Name: _____

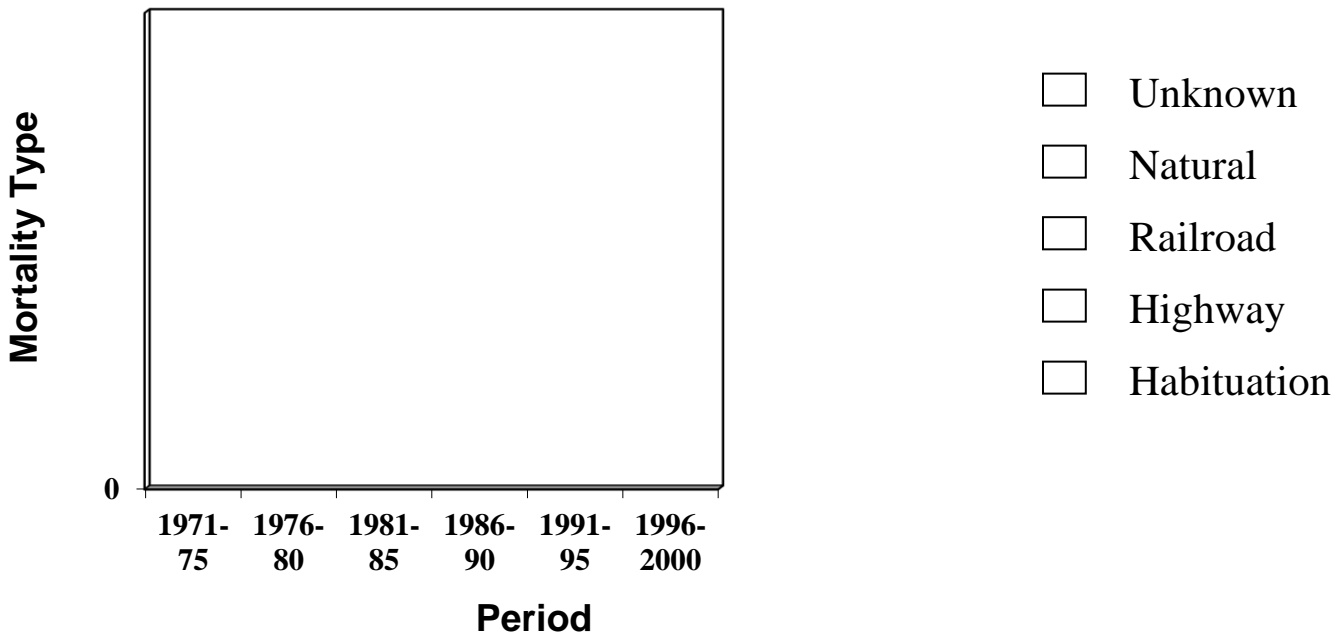
1) Fill in the blanks on the following table:

Type of Grizzly Bear Mortalities in Banff National Park, in 5-year periods 1971-2000

Period	Mortality Type					Totals	Average # of Mortalities/year
	Habituation	Highway	Railroad	Natural	Unknown		
1971-75	6	0	1	0	1		
1976-80	17	8	2	2	0		
1981-85	14	0	0	0	4		
1986-90	10	1	0	0	1		
1991-95	5	1	0	0	0		
1996-00	0	0	1	3	0		
Totals							

2) Using the numbers from the table above, create a histogram with coloured pencils in the provided space below plotting the number of deaths per year versus each five-year period.

Type of Grizzly Bear Mortalities in Banff National Park (BNP)



3) Based on the data, what is the greatest cause of grizzly bear mortalities?

4) What reasons might have contributed to the peak in mortalities in the late 1970's?

5) What factors may have caused the decrease in mortalities in the late 1980's and early 1990's?

6) Within Banff National Park the grizzly bear death rate for the most recent period we have data for (1996-2000) is 0.8 deaths/year. In your opinion, is this mortality rate too high for a bear population to remain in Banff Park for the years to come? What else do you have to know in order to answer such a question?

Use the following data to answer questions # 7, 8 and 9.

Between 1994 and 1999, 17 female bears in Banff National Park had the following cubs:

Bear #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
# of cubs	3	4	2	1	3	4	5	5	1	2	1	0	2	0	0	0	0

7) What is the average number of cubs born per **year** during this period?

8) What is the average number of cubs born per **bear** per year?

9) Many cubs will not survive to adolescence. Only about 70% will survive to adulthood. Take the total number of cubs per year from question 7 and multiply it by .70 to get the number of cubs who survive to become adults. This is the *natality rate*.

Comparing Mortality (death) and Natality (birth) Rates

10) Based on the mortality and natality rates in BNP, should the bear population increase or decrease over time? ($m > n = \downarrow \text{pop}$; $m < n = \uparrow \text{pop}$)

11) Biologists feel that the grizzly population in BNP is decreasing, not increasing. This is because the mortality rate (2.56 bears/year) does not represent the *actual* number of mortalities. Many deaths are undocumented or occur outside the park boundaries. Based on an increased mortality rate of 5.0 bears/year and a natality rate of 4.6 bears/year, what will happen to the grizzly bear population over time?

12) Biologists estimate that within Banff National Park, the current population of grizzly bears is 70. Use the numbers in the question above to find out how many bears there will be 25 years from now.

13) You have just done an extrapolation, where you take a certain rate and project it forward in time in order to make a prediction. Can you think of any problems in making such a prediction?

Population Dynamics

14) Compare the following two species. Identify which is an r-selected species and which is a k-selected species.

Grizzly Bears:

Age of sexual maturity – 5
litters – 1 every 3 years
young per litter – 2
population density – 1 bear/ 60 km²

Snowshoe Hares:

Age of sexual maturity – 1
litters – 2 to 3 per year
young per litter – 1 to 7
population density – 14 hares/ km²

15) How do you think human alterations/interventions affect the populations of r- and k-selected species?

16) Do you think that r-selected or k-selected species are more likely to be endangered? Discuss your reasons.