

Bison Management

Objective: To analyze / study a population of NWT Bison and its management

Introduction: The MacKenzie Bison Population was established to protect the genetics and health of Wood Bison as a species. This population started with a limited number of healthy individuals, grew exponentially and now is fluctuating. The purpose of this study is to create understanding about population change and species management in the NWT.

Curriculum Connections:

Unit D - 1.1 sts, 30 2.1k, 2.1sts, 2.1s, 3.1-3.3k, 3.1s, 3.3s

Supplies / Materials:

- Data from ENR – see below
- Student questions – see below

Hook: Wolf and bison video:

<https://www.youtube.com/watch?v=tCG1I-Ssgww>



SCIENCE FOCUS

Lesson Subject

Biology 30

Topic

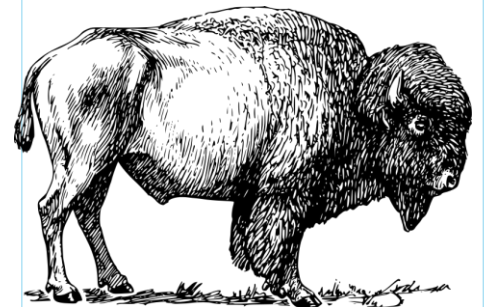
Population and Community Dynamics

Location

Classroom

Length

50 minutes for initial activity,
50-100 minutes for group
investigation



Intro Activity:

- 1) Let the students know they are going to investigate the MacKenzie Bison Population, which started with 16 human-introduced individuals in 1963 as an attempt to protect Wood Bison genetically - avoiding interbreeding with Plains Bison. A map of the range of this population can be found in **Resource 1**.
- 2) Have students look at population estimate chart and see what information they can glean from the data. Sample questions to help guide them can be found below.

Main Activity:

1. Have students work in a group to investigate Wood Bison further (**Resources 1 and 2**).
2. Ask students to either brainstorm ideas of how to manage this population, especially considering the limited genetics, and/or design experiments that could be done with this population. Some ideas are given below.

Independent Student Work: Have your students write a journal entry about what they have learned about bison populations and management.

Conclusion / Review: What responsibilities do we have in managing populations and what are some of the challenges of reintroducing species in an area?

Homework: Do some online research on Wood Bison and/or other managed species in the NWT (e.g. Whooping Cranes, Caribou, Wood Frog etc.) E-mail links to interesting news stories to your teacher.

Resources:

1. Wood buffalo management strategy:

http://www.enr.gov.nt.ca/sites/default/files/strategies/wood_bison_management_strategy.pdf

2. Wood Bison information: <http://www.nwt-species-at-risk.ca/species/wood-bison>

3. Sample Student Questions:

Review this data from ENR found at:

http://www.enr.gov.nt.ca/sites/default/files/strategies/wood_bison_management_strategy.pdf

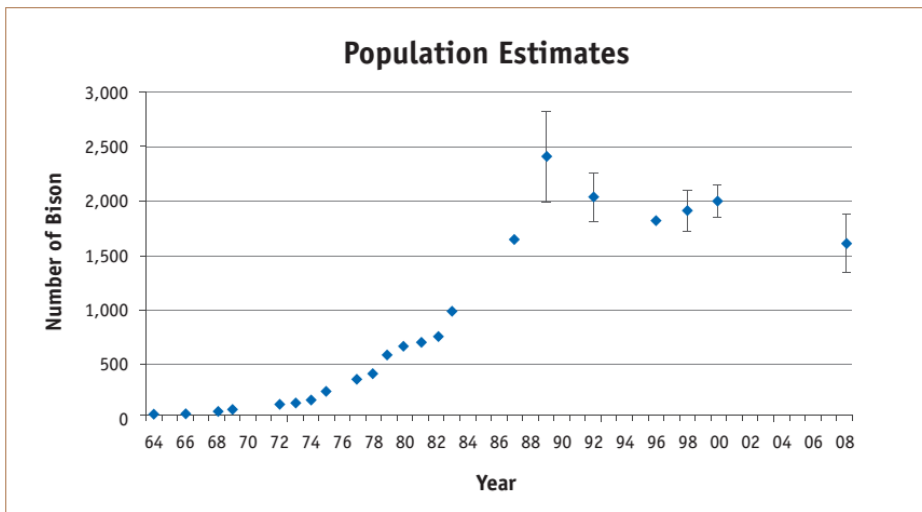


Figure 3: Mackenzie wood bison population size estimates, 1964 to 2008. Error bars are 95 percent Confidence Limits.

1. What is a population?
2. How do you think these estimates are made (especially larger numbers)?
3. What type of growth do we see between 1964 and 1989? (Linear vs Exponential)?
4. What factors might influence population growth? (Predators, hunting, habitat limitations, human control measures, disease).
5. Would you assume buffalo offspring are r- or k- type? Could this graph support your assumption? (may expect more variability in population numbers in an r-based population) What other data would help confirm your assumptions?
6. At what point in this graph do you think the Hardy-Weinberg principle might apply?
7. (when might the assumptions hold true).
8. Why might we want to keep Wood Bison genetics pure? What are potential genetic challenges for this population?

In the summer of 2012, the Mackenzie wood bison population experienced the worst anthrax outbreak known in northern Canada when at least 440 bison died over an 8 week period.

1. If anthrax resistance is hereditary as it is in humans¹ do we expect the remaining population to be more or less resistant? Why?
2. How would we expect the population of predators (wolves) to respond to this loss?
3. What control measures might be put in place to limit the spread of disease in populations?

¹ Anthrax susceptibility and heredity (in humans): http://www.upmc-cbn.org/report_archive/2012/cbnreport_02172012.html

Experimental Ideas:

1. Investigate intraspecific competition for mates / prime habitat
2. Investigate anthrax resistance by looking for resistant proteins

Pimental, RA; Christensen, KA; Krantz, BA; Collier, RJ (September 2004). "Anthrax toxin complexes: heptametrical protective antigen can bind lethal factor and edema factor simultaneously". *Biochemical and Biophysical Research Communications* 322 (1): 258–62. doi:10.1016/j.bbrc.2004.07.105. PMID 15313199.

3. Investigate the effect of human activities such as logging on distribution and population levels
4. Investigate predator/prey relationships
5. Predict population change over the next 10-20 years

Extension Ideas:

- 1) Use this lesson as a springboard into Frog Watch: <https://www.naturewatch.ca/frogwatch/>
Please note, Lesson Plan Biology 30-1 has more detail on NWT Frog Populations.
- 2) If possible, use this topic (managed species in the NWT) to be the focus for a student project. The projects can be part of a small group or large group focus depending on your goals as an educator.