

Prairie Trophic Level Pyramid

Bison played an important role as prairie ecosystem engineers in the past – can they play that role again? In this activity students will construct a prairie ecosystem trophic pyramid describing the ecological relationships that bison as a keystone species can promote. Wild bison exist in a complex landscape, one that overlaps with human land uses. Your students can extend their learning by discussing how these human land uses could impact bison reintroductions intended to restore prairie ecosystems.

Objectives:

- To generate an ecological or trophic level pyramid reflecting the role of bison in prairie ecosystems.
- To define the societal challenges to restoring bison to their historic ecological role in nature.

Materials:

- [Prairie Ecosystem Worksheet](#)
- [Fire and Grazing in the Prairie](#)

Process:

- 1) In this project students will research species that compose the prairie ecosystem at various trophic levels, and generate a classroom model of the prairie ecosystem as a trophic pyramid. The model will be used to generate classroom discussion and an understanding of the bison's role as a keystone species in prairie ecosystems.
- 2) Prior to lesson delivery, teachers should make a classroom sized 4 level trophic pyramid outline, which includes producers, primary, secondary and tertiary consumers. Students will need to be able to interact with the trophic pyramid.
- 3) Teacher should distribute the Prairie Ecosystem Worksheet to their students, and review the Glossary and the Worksheet with their students.
- 4) Students can either be assigned or choose the species that they will use to complete the Prairie Ecosystem Worksheet. The teacher should insure that the following species are chosen by at least one student each: American bison, prairie grasses and forbs. Other suggested species include: gray wolf, elk, pronghorn, mule deer, black-tailed prairie dog, black-footed ferret, prairie vole, northern grasshopper mouse, burrowing owl, turkey vulture, purple martin, greater sage grouse, prairie rattlesnake, plains spadefoot toad. Note: these are just a few species you might select. Research other species by searching the internet for Montana prairie species.

- 5) After the research and Worksheet are completed, students will place the image of their focus species on the appropriate level of the classroom trophic pyramid, and should also draw connections between their species and species with a direct energy transfer relationship – demonstrating predator and prey relationships.
- 6) After all students have contributed their work to the classroom Prairie Ecosystem Trophic Pyramid, the teacher can lead a discussion of the impact that the removal of a particular species could have on other members of the prairie ecosystem, using the classroom model to help students make connections.
- 7) Teacher should conclude this discussion by asking, “What impacts could free ranging bison or predator species have on human land uses in the prairie ecosystem?”. Teacher should take and discuss responses.
- 8) After this initial discussion in Step 7, teacher should read or assign as reading the Fire and Grazing in the Prairie page linked above. Use this information and the species from trophic pyramid to engage students in a discussion of the complexities of using free ranging wild bison and fire ecology to maintain prairie ecosystems in landscapes with overlapping human land uses.

Supplemental Resources:

- a. [NPS Bison Bellows – Ecological Restoration of Wild Bison](#)
- b. [American Bison Society Working Papers](#)

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