RMANWR High School Science Field Trip Name:_____

Background: Welcome to the Rocky Mountain Arsenal National Wildlife Refuge! Rocky Mountain Arsenal National Wildlife Refuge was established in 2004, in part, to protect our national symbol, the bald eagle. The land has a unique story - it has survived the test of time and transitioned from farmland, to war-time manufacturing site, to wildlife sanctuary. It may be one of the finest conservation success stories and a place where wildlife thrives!

Purpose: The purpose of this field trip is to explore the different types of wildlife on the refuge and apply your observations to design a food chain, food web & energy pyramid. In addition, you will explore some of the human impacts that have taken place on the refuge that have affected the shortgrass prairie ecosystem.

Part I: Field Observations - First, drive around the RMANWR wildlife drive (~45 min) with your class and listen to the audio guide podcast. As you drive (or if you stop at one of the many wildlife viewing areas) observe the landscape for the plants and animal species listed below. Second, explore the visitor center, surrounding habitat and pollinator garden. Check off the boxes below for any of the common species you observed. If you are not sure what species you saw, talk to your teacher, a visitor center educator or park ranger to identify the species.

Animals (Check off all that apply):

- ☐ **White-tail deer**
- ☐ **Mule deer**
- ☐ **Grasshopper**
- ☐ **Bees**
- ☐ **Ants**
- ☐ **Butterfly**
- ☐ **American beaver**
- ☐ **American bison**
- ☐ **Waterfowl (Duck, etc,)**
- ☐ **Bullfrog**
- ☐ **Black-footed ferret**
- ☐ **Black-tailed prairie dog**
- ☐ **Coyote**
- ☐ **Fox**
- ☐ **Black-Tailed Jack Rabbit**
- ☐ **Cottontail Rabbit**
- ☐ **Bullsnake (Brown w/ dark blotches)**

Birds:

- ☐ **Bald eagle**
- ☐ **Burrowing Owl**
- ☐ **Lark Bunting (black & white)**
- ☐ **Western Meadowlark (yellow throat)**
- ☐ **Black-billed Magpie (black & white)**
- ☐ **Great Blue Heron (large; blue/gray)**
- ☐ **Snowy Egret (all white)**
- ☐ **Horned Lark**
- ☐ **Ferruginous hawk**
- ☐ **Swainson's Hawk**

Animals not Listed (write in):

- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

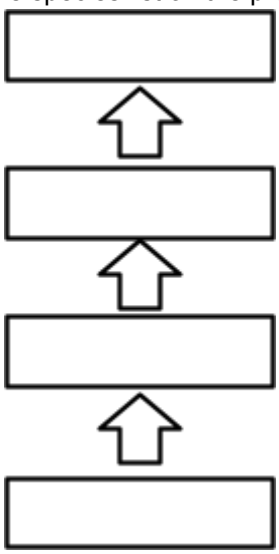
Plants (Check off all that apply):

- ☐ **Blue Grama Grass**
- ☐ **Buffalo Grass**
- ☐ **Big/Little Bluestem Grass**
- ☐ **Prickly Pear (cactus)**
- ☐ **Yucca Plant (spikey)**
- ☐ **Indian Ricegrass**
- ☐ **Cowpen Daisy**
- ☐ **Blanket Flower**
- ☐ **Sunflower**
- ☐ **Rocky Mountain Bee Plant**
- ☐ **Unknown Wildflower**
- ☐ **Unknown Grass**
- ☐ **Unknown Shrub**

Plants not Listed (write in):

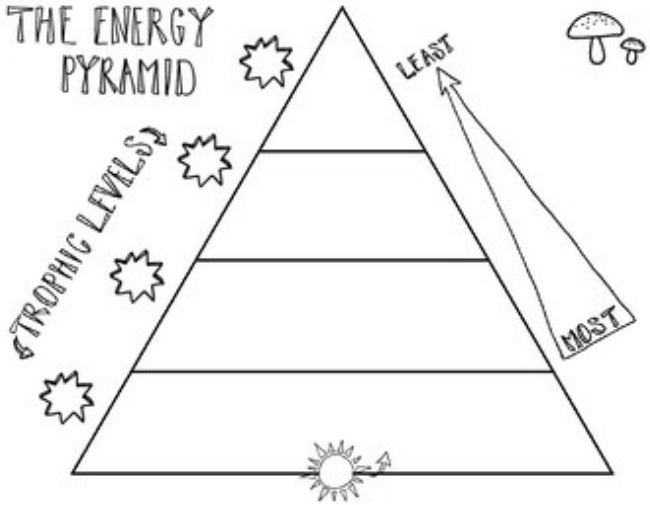
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

<u>Part II: Create a Food Chain</u> - Food chains show the trophic, or feeding relationships, between organisms in an ecosystem. An arrow shows the direction of **energy flow** from the organism to the one that eats it. Create a simple four step food chain below that includes a **producer**, **primary consumer**, **secondary consumer** and **tertiary consumer** from the species list on the previous page**.**



<u>Part III: Create a Refuge Food Web</u> - A **food web** shows more complex **trophic relationships** between many organisms in an ecosystem. Using the organisms you observed on the wildlife drive, around the Visitors Center and in the pollinator garden, build a food web showing the trophic interactions of many different organisms on the refuge. You must have a minimum of FOUR **producers**, FOUR **primary consumers**, THREE **secondary consumers** & TWO **tertiary consumers** (**apex predators**). Remember to show the flow of energy using arrows from one organism to another. It should look like a spider web!

<u>Part IV: Create an Energy Pyramid</u> - Remember the **Rule of 10%.** On average, only 10% of the energy from each trophic level is passed on, and **90% is lost** to the environment. Label the energy pyramid below with the amount of energy available at each trophic level. Start with **100%** at the first trophic level for **producers**. Label and identify the percentage of energy available at each trophic level for **primary consumers, secondary consumers** and **tertiary consumers**.



<u>Part V: Impacts on the Shortgrass Prairie Ecosystem</u> - As you walk through the exhibits in the visitor center, read about some of the human activities on the refuge from World War II, the Cold War and afterwards**.**

(A) Identify & describe TWO ways humans have negatively impacted the environment on the Refuge. Explain how these human activities could have impacted wildlife on the refuge:

(B) In the 1980s and 1990s the US Army, Shell and U.S. Fish and Wildlife began an environmental cleanup of the refuge. Describe TWO cleanup or restoration activities on the Refuge. How did these activities help to restore a healthy environment and ecosystem for wildlife on the Refuge?