GO FURTHER!

Explore Grassland Ecosystems

The Sevilleta National Wildlife Refuge (SNWR) is near Socorro, New Mexico. It is a semi-arid grassland in the Chihuahuan desert in New Mexico. Almost 98 percent of Gunnison's prairie dog (Cynomys gunnisoni) disappeared in the last century. Since 2010 biologists have tried to bring them back.

The unique behaviors of the prairie dog change the ecosystem. At SNWR, various grassland species may benefit from prairie dogs. Kangaroo rats and burrowing owls use their abandoned burrows for homes. Prairie dogs also change the vegetation and soil.

Because the prairie dog has played an important role in shaping grasslands, it is often called a keystone species. Ariel D. Elliott's study is designed to determine whether the reintroduction of the prairie dog increases the biodiversity of other small mammals in the refuge.

To understand the hypothesis and the research done at Sevilleta National Wildlife Refuge you must first think about the organisms that live there.
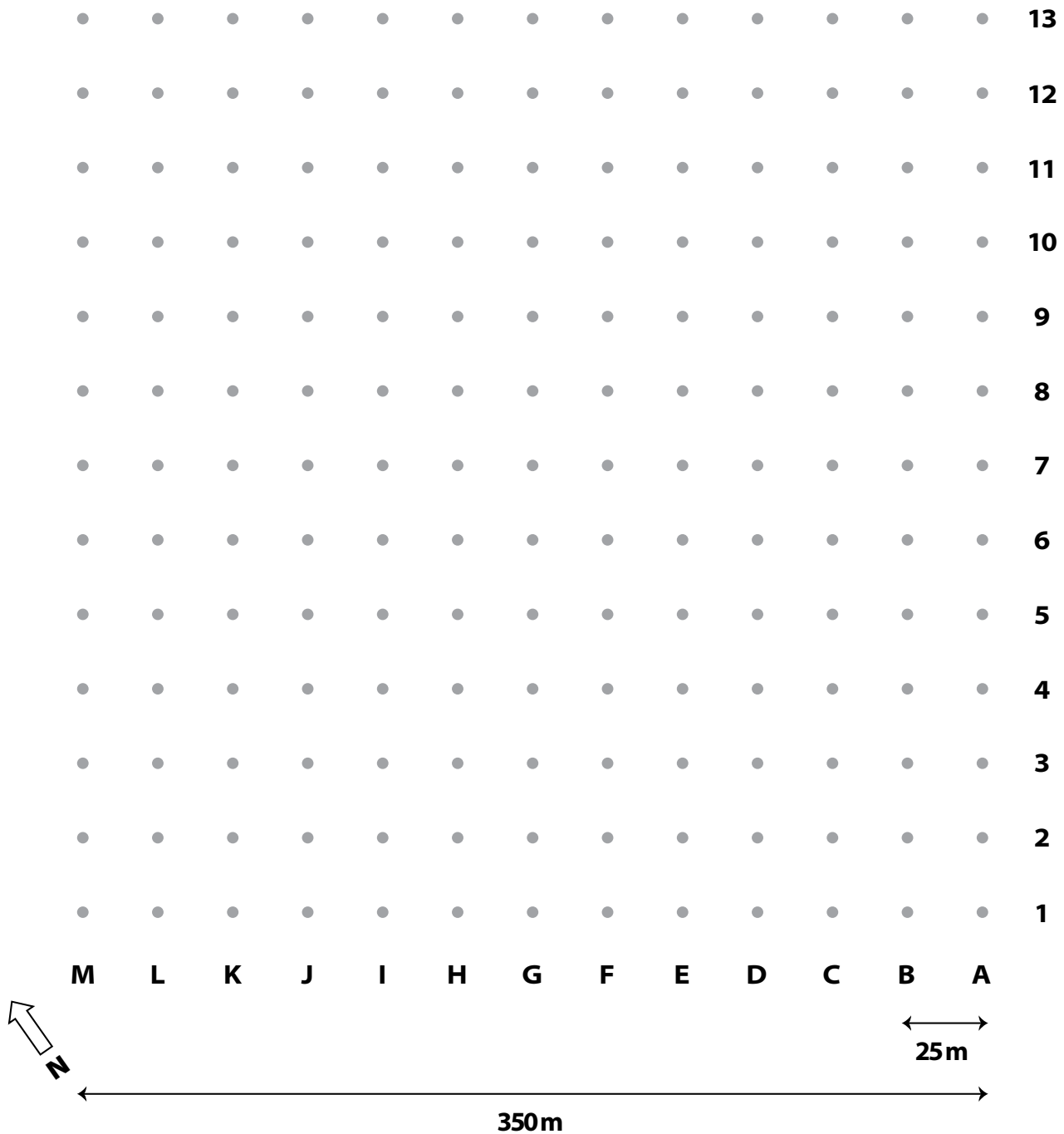
Make a list of every species of small mammal that you see or hear about in the video.

While you may not see them on the video, Ariel's cameras also occasionally found pronghorn antelope and lizards. After the reintroduction of the prairie dog, the cameras also caught some predators like coyotes and badgers.

Ariel did her study in two different 16 hectare plots that were very similar. On plot G, there were artificial burrows, old burrows from prairie dogs and kangaroo rat mounds, They called this the treatment plot. On plot H there were only kangaroo rat mounds. This was called the control.

Ariel set up 169 small mammal traps in each plot on a 13 x 13 grid that looked like this.

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•	•	•	•	•	•	•	•	•	•	•	•	•	**12**
•	•	•	•	•	•	•	•	•	•	•	•	•	**11**
•	•	•	•	•	•	•	•	•	•	•	•	•	**10**
•	•	•	•	•	•	•	•	•	•	•	•	•	**9**
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•	•	•	•	•	•	•	•	•	•	•	•	•	**3**
•	•	•	•	•	•	•	•	•	•	•	•	•	**2**
•	•	•	•	•	•	•	•	•	•	•	•	•	**1**
M	**L**	**K**	**J**	**I**	**H**	**G**	**F**	**E**	**D**	**C**	**B**	**A**	

N

25m

350m

RESULTS

Plot G

Species	What is it?	Number before Reintroduction	Number after Reintroduction
Perognathus flavus (PGFV)	Silky pocket mouse	243	448
Dipodomys ordii (DIOR)	Ord's Kangaroo Rat	10	11
Onychomys leucogaster (ONLE)	Northern grasshopper mouse	18	14
Onychomys arenicola (ONAR)	Mearn's grasshopper mouse	12	-
Onychomys(ONSP)	Grasshopper mouse	2	1
Dipodomys spectabilis (DISP)	Banner-tailed kangaroo rat	1	1
Perognathus flavescens (PGFL)	Plains pocket mouse	1	-
Peromyscus leucopus (PMLE)	White footed mouse	1	2
Peromyscus maniculatus (PMMA)	Deer mouse	-	-
Spermophilus spilosoma (SPSP)	Spotted ground squirrel	-	3
Neotoma micropus (NEMI)	Woodrat	-	-
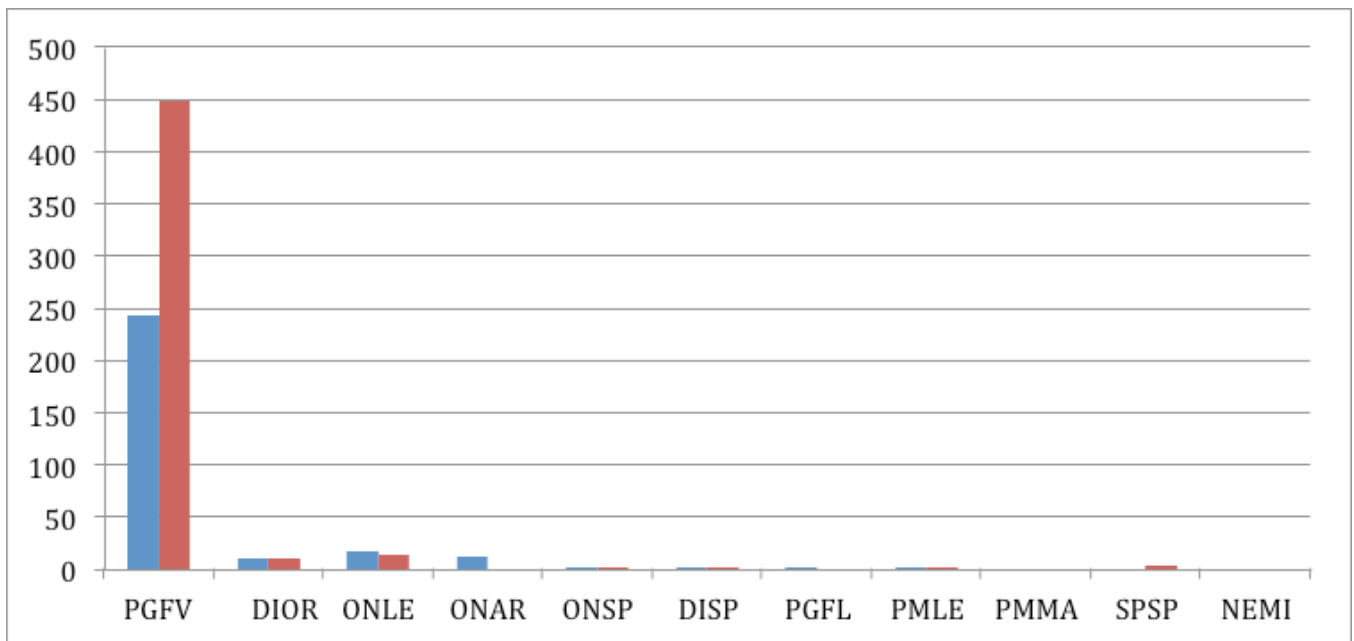
Blue = Before Reintroduction   Red= After Reintroduction

Species	What is it?	Number before Reintroduction	Number after Reintroduction
Perognathus flavus (PGFV)	Silky pocket mouse	242	271
Dipodomys ordii (DIOR)	Ord's Kangaroo Rat	18	13
Onychomys leucogaster (ONLE)	Northern grasshopper mouse	12	17
Onychomys arenicola (ONAR)	Mearn's grasshopper mouse	3	2
Onychomys (ONSP)	Grasshopper mouse	2	
Dipodomys spectabilis (DISP)	Banner-tailed kangaroo rat	12	3
Perognathus flavescens (PGFL)	Plains pocket mouse	-	-
Peromyscus leucopus (PMLE)	White footed mouse	-	-
Peromyscus maniculatus (PMMA)	Deer mouse	7	1
Spermophilus spilosoma (SPSP)	Spotted ground squirrel	1	1
Neotoma micropus (NEMI)	Woodrat	1	2
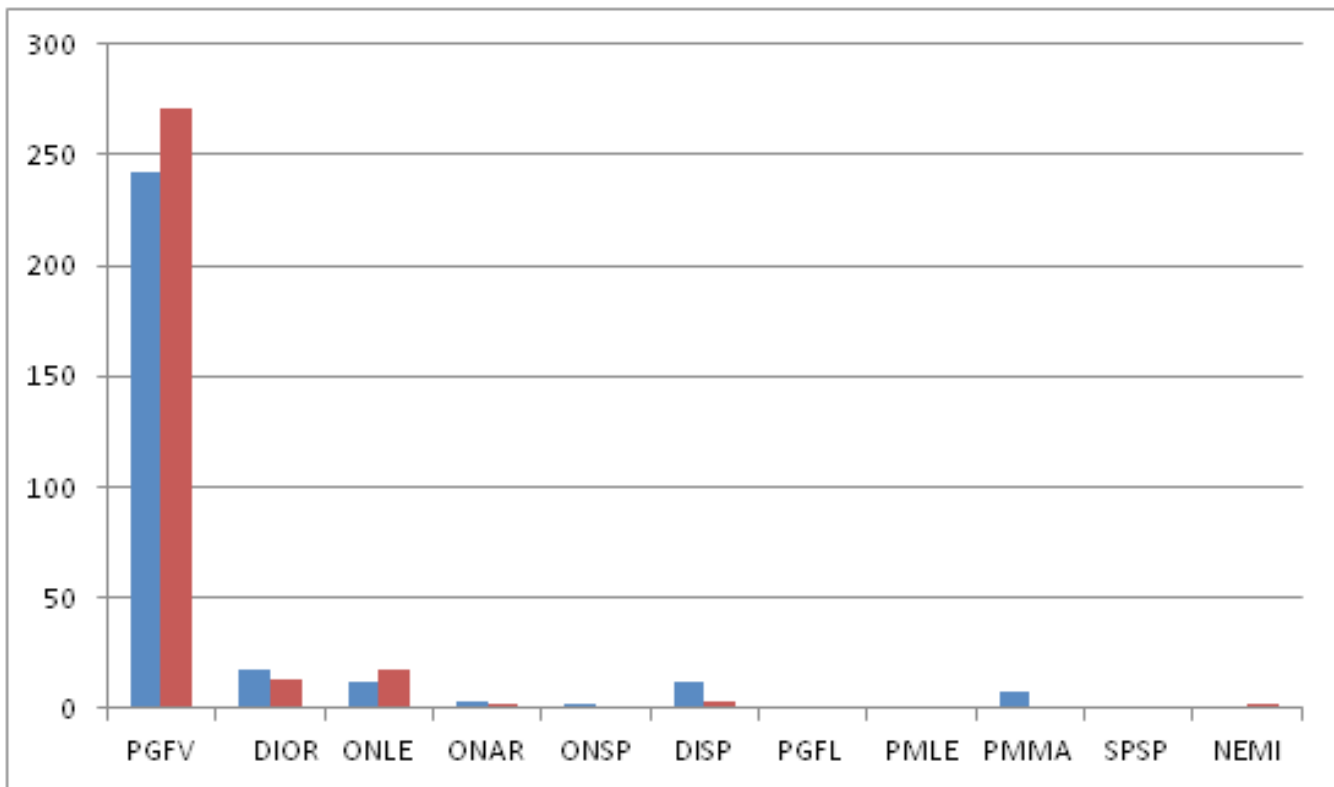
Blue = Before Reintroduction   Red= After Reintroduction

THINK!

After you have watched the video and read
the text and charts, think about these questions:

1. What was the difference between Plot G and Plot H? _____

_____

2. Why might prairie dogs help other small mammals that eat the same kinds of food? _____

_____

3. Which organism showed the greatest difference? _____

_____

4. Imagine you are talking to a friend. The friend doesn't like prairie dogs because she believes that they make dangerous
   holes in the prairie that could harm horses. Use the data to argue that prairie dogs can be good for grasslands.

_____

_____

Graph on Your Own

Imagine Area G in 5 years. How many small mammals do you think will be there?
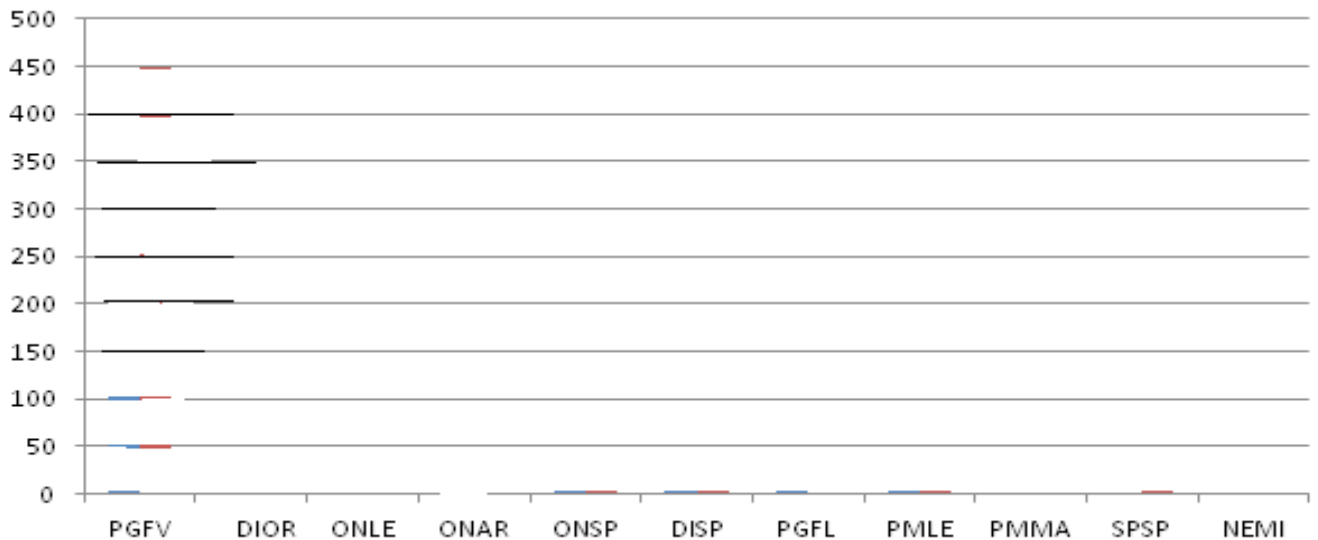
Why did you make your guess? _____

Go Further!

Investigate the food web on this grassland. Put as many organisms (plants, animals and others) in your web as you
can. Then think about at least three possible explanations of why there is a difference between area G and area H.

_____

_____

_____

_____

Teacher Page

The activities which center around Ariel's work can help students achieve expectations and standards in mathematics, science and language arts. The charts below show sample standards for grade 5.

Students can read the graphs provided to answer the questions and create their arguments or use the blank framework in the worksheet to do their own graph. Students might also be asked to imagine (as Ariel does) what one of the plots might look like in a few years using that blank graph framework.

Possible Answers:

1. What was the difference between Plot G and Plot H? Increase in silky pocket mouse greater where burrows were introduced.

2. Why might prairie dogs help other small mammals that eat the same kinds of food? Homes in burrows

3. Which organism showed the greatest difference? Pocket mice

4. Imagine you are talking to a friend. The friend doesn't like prairie dogs because she believes that they make dangerous holes in the prairie that could harm horses. Use the data to argue that prairie dogs can be good for grasslands (Answers will vary)

For the "Going Further" section, remind students that good investigations often lead to even more questions. Their ideas should be logical (that is, related to some big of evidence they've collected) but there is not right answer—not even for the researchers. Here are two ideas that have been suggested by the team:

■ Prairie dogs eat grass and clip down grass, but don't eat too much seeds or grains. So, it is possible that as prairie dogs were clipping down grass, they were making seeds and grains more available for the silky pocket mouse.

■ Predators could have an effect. Prairie dogs and silky pocket mice probably don't have the same predators, but there could be something more complex happening. For instance, the predators that would focus on prairie dogs (badgers) could be more active on the prairie dog site and disturb and "chase away" predators of the pocket mice (owls, other night predators) from the site.

Students can learn more about grasslands by reading the NSTA/CBC Outstanding Trade Book by Catherine Sill. Grasslands, (2011). Peachtree Publishers. ISBN 1978561455591

Here's what the reviewers at the National Science Teachers Association say about it:

"Many textbooks lump all grassland biomes into one category, describing the ability of the climax community to withstand long, dry periods and the role of fires on grass. This NSTA/CBC Outstanding Trade Book goes farther, differentiating among the world's tall grass prairies, short grass prairies, and savannas.

"The author describes how various species of animals and plants have adapted to life in these habitats. Exquisite plates with detailed annotations further add to the information the text provides. An afterword section provides more detailed information about grasslands for the teacher or student who wants to investigate further, while a glossary supports informational reading skills.

"This book, along with the others in the series, will be valuable assets in a classroom where biomes, habitats, and/or adaptations are on the curriculum. The richness of the illustrations expands its useful range from elementary through middle school."

Common Core Mathematics

5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

Next Generation Science Standards

Core Idea: LS2.A: Interdependent Relationships in Ecosystems

A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1)

Practice: Engaging in Argument from Evidence

Support an argument with evidence, data, or a model. (5-LS1-1)

Crosscutting Concept: Systems and System Models

A system can be described in terms of its components and their interactions. (5-LS2-1)

Common Core Language Arts

CRI.5.8 Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s).