INTRODUCTION

Whether you are studying the grassland ecosystems, humans and the environment, species decline or ornithology, *Going Underground* is a great resource. Burrowing owls are charming little birds that are sure to grab the attention of any student! This video is useful for a variety of abilities and is easily adapted to almost any age. The following study guide provides you with some suggestions for incorporating this video into your classroom.

The following resources are included in the study guide:

- Brief overview of the burrowing owl
- Lesson plan to accompany the video
- Focus questions for video
- Lesson plan focused on species decline and associated reasons
- Nest box building instructions
- List of burrowing owl resources on the web

Any comments or questions may be addressed to vfranke@sover.net or dan.rosenberg@cc.usu.edu

For additional copies of *Going Underground* go to http://www.cnr.usu.edu/faculty/drosenberg/video.html

STUDY GUIDE

Objective: Students will discover the many ways organisms depend on their environment.

Each student will choose a magazine picture of a natural scene that includes an organism and its surrounding. Students will paste the picture in the middle of a blank sheet of paper, leaving space around the picture. Next, students will identify all of the biotic and abiotic characteristics in the picture. Using colored pencils or markers, students should connect the biotic factors to the abiotic factors.
On the back of the page students should answer the following questions:

1. How do organisms in the picture depend on the abiotic factors?

2. Make a list of how humans might affect the abiotic factors in the picture. (ex. Humans mine rocks and minerals)

3. Students should hypothesize how humans may affect the organism by destroying or altering the abiotic factors in the photo.

4. What needs are met by an organism’s surroundings?
   *Food, water, shelter, and anything else that it needs to live, grow, and reproduce from its surroundings.*

Next students will watch “Going Underground”

While students watch the video they should begin to create a list of all of the abiotic factors in the grassland ecosystem. In addition, they should create a list of all of the organisms mentioned in the video.

When the video is finished students should answer and discuss the following questions:

1. How have humans affected the grasslands of California?

2. How have these changes affected the owls?

3. What burrowing owl needs are met by the grassland ecosystem?

4. What has caused some of the burrowing owl populations to decline?

5. What can humans do to help the burrowing owl?

At the end of the video allow time for the students to answer the questions and then discuss the answers.
Some suggested topics of discussion:

Why is it important to preserve large pieces of land?

With land prices in the Silicon Valley so high (1.5 million/acre), is it worth saving the land to protect the grassland species? Why or why not?

When humans manage land for the burrowing owls, how else do we help the environment?

Additional resources:

Below is a list of Burrowing Owl and grassland ecosystem web pages.

http://raysweb.net/specialplaces/pages/owl.html
   Canadian Page: explaining status, range, many links, risks factors and management

http://www.thewildones.org/Animals/burroOwl.html
   Appearance, threats to survival, Habits, resources available.

http://arnica.csustan.edu/esrpp/burowl.htm
   Life history, distribution, references and links

   Has range map and seasonal changes, plus other links.

http://www.imperial.cc.ca.us/birds/brw-owl.htm
   Endangered species links, Operation Burrowing Owl, photos and songs.

   Images, audio, distribution maps, and other useful information.

http://rbcm1.rbcm.gov.bc.ca/end_species/species/burowl.html
   Site explaining risk status, habitat, distribution, and why it is endangered.
The following activity is a good review of species decline and loss and the associated reasons. In some parts of North America, Burrowing Owl populations are in decline. In the following activity, students may wish to do research on the status of the owl and any legislation that affects the bird. Other students may wish to look at a group of grassland organisms that are declining in numbers.

Objectives:

1. Identify and describe some causes for extinction of animal species
2. Define threatened, rare, and endangered as applied to wildlife
3. Name threatened and endangered animals living in the local grassland ecosystem

Method:
Students will become familiar with classification of animals, conduct research, and make or obtain a master list of threatened and endangered animals locally and/or nationally, including factors affecting the animal's condition.

Background:

Pinpointing an exact number of species that become extinct each year is difficult. Many plants and animals are still unnamed and unknown. There is controversy over estimates of species extinction rates. Some scientists estimate that human activity is responsible for 100 extinctions each day. Other scientists offer lower figures, but few experts disagree with the belief that the rate of species extinction is being accelerated by human actions. In 1991, the U.S. Department of the Interior listed 457 plants and animals in the United States as being endangered, with an additional 153 listed as threatened. Many other species are under review for classification as threatened or endangered.

Although extinction is a natural process, excessive and intensive human activities in the environment have caused a dramatic increase in its rate. Loss of habitat as a result of human activity is considered to be the most pervasive cause of species extermination. Other major causes of species are personal use, disruption of migration routes and breeding behaviors, contamination by pollutants, human disturbance, predator control, competition or predation from introduced species and natural causes.

Generally accepted definitions of the terms to be used in this activity are:

- **Endangered**-Species in immediate danger of extinction
- **Critically Endangered**-Species will not survive without direct human intervention
- **Threatened**-Species present in its range, but threatened because of a decline in numbers
- **Rare**-Species not presently in danger, but of concern because of low numbers (this could be caused naturally by position in the food chain or habitat preference).
- **Extinct**-Complete disappearance of a species
- **Peripheral**-Scarce in area because it is fringe or marginal habitat

Listing of animals currently in these categories may be obtained from state or province wildlife agencies.
A list of the U.S. "Endangered Species" is available from:
1) Director, Office of Endangered Species
   U.S. Fish and Wildlife Service
   U.S. Department of the Interior
   Washington D.C. 20204
2) On the Internet; http://endangered.fws.gov/
3) Use a search engine to access the Department of Natural Resources in your state or for "endangered species list"
4) Contact your nearest regional or district Natural Resource office.

State and federal listings of endangered, threatened and rare species may vary because areas encompass different habitat conditions within their boundaries. An animal or plant may have been lost within one state's boundaries, but may be abundant in another, and therefore not considered threatened. It would be wise to get the "endangered species" list for the U.S. and for your state. The U.S. Endangered Species Act of 1973 gives authority to the U.S. Secretaries of the Departments of Interior and Commerce to protect endangered species, with responsibilities further delegated to the U.S. Fish and Wildlife Service and the National Marine Fisheries Services respectively.

The major purpose of this activity is to provide students with a working knowledge of the terminology and factors affecting potential elimination of wildlife species.

Materials:
Information from state and federal agencies about threatened and endangered animals
Poster-making materials
Writing materials
Access to the Internet.

Procedure:
1. Contact your state wildlife agency. This is good practice for students to make phone calls or write letters. Ask for a list of animals in your state which are classified endangered, critically endangered, threatened, rare, extinct, and peripheral. Ask, too, for information regarding the reasons for these classifications. For those students wanting more depth: Write the U.S. Department of Interior regarding any comparable information available at the national level. Also, contact local chapters of conservation organizations (e.g., National Wildlife Federation, National Audubon Society, Defenders of Wildlife) for additional information they might have about species and habitats for which there are concerns in your area.

2. Review and discuss with the students the definitions of threatened, endangered, rare, extinct and peripheral as used in wildlife conservation, as well as in a dictionary. Understand that words defined in a standard dictionary may have additional legal connotations.

3. Divide the class into even teams where one team will select all mammals, another will pick birds, and so on resulting in the major categories of animals have being covered. Each student
will then choose an individual species that is either endangered or threatened to study in more depth. They should decide the status of their species and what seems to be the most prevalent factors affecting the animals.

4. Each team will report on their animals (orally or written) and decide which one is in need of human interaction the most so that it will survive. Some students may choose to do a public service announcement or create a brochure or poster advocating for their species.

Note: The U.S. Department of Interior listed the following numbers of endangered and threatened species in the U.S. in 1991;

Endangered
Mammals-54
Birds-75
Reptiles-13
Amphibians-6
Fish-53
Snails-4
Clams-39
Crustaceans-8
Insects-16
Plants-189

Threatened
Mammals-6
Birds-9
Reptiles-19
Amphibians-5
Fish-33
Snails-6
Clams-2
Crustaceans-2
Insects-9
Plants-62

Total=457 Total=153

Evaluation:
1. Arrange the following terms in a list so that they progress from the least to greatest amount of danger to a species to the greatest amount: endangered, rare, threatened, extinct, and critically endangered.
2. Describe two reasons for possible concern when animal species become extinct.
3. Who decides what species are endangered or threatened and how do they decide?
4. Describe principal causes of extinction.
5. Evaluate from a set list, which species are in most need of human assistance.

Additional suggestions:

• Look up legislation affecting species preservation. Students may wish to contact local and federal legislators by writing letters about their opinions surrounding these issues.
• Create a food web that illustrates the interdependence of species. Label those species in the web that are threatened or endangered. Students should suggest hypothesis about what might happen if a particular species becomes extinct and is no longer a part of the web.
• Contact local agencies for wildlife and plant management plans. Students can create their own plans based on research or evaluate the implementation of plans already in existence.