Lesson Plan: 6-8.2
Grade Levels: Grades 6, 7 & 8

California State Framework: Grade 6 Standard Set 5. Ecology
Grade 7 Standard Set 7. Investigation; Grade 8 Standard Set 9. Investigation

Giving a Boost to Endangered Species

Background

In situ (or in native habitat) preservation is a kind of preservation that involves preserving an endangered animal in the wild by preserving a portion of its habitat. This might be done by setting aside an area as a national park, for example. This preservation method has a number of advantages over attempting to preserve the organism through ex situ (or out of native habitat) measures, by removing it to an artificial, protected site such as a zoo, botanical garden or seed bank.

For example, with in situ preservation, interspecific interactions are preserved, including those that might not yet been uncovered by scientists. Animals can learn basic patterns such as hunting behaviors without direct intervention by humans. All the organisms in the site are preserved when the site itself is preserved, and this can be far more cost effective than saving one species at a time through ex situ measures. In addition, in situ preservation makes it possible to save many more individuals of each species, thus maintaining genetic diversity. This is far more difficult with zoos, for example, since space is so limited. Some other considerations in setting up site refuges are discussed later.

At the same time, we may need to remind ourselves of the invaluable service performed by zoos, botanical gardens and seed banks. First the educational value, including the opportunity to delight in organisms the vast majority of humans could never otherwise see, may, in fact, translate into political and economic support for saving species in the wild. In some cases, breeding programs in zoos represent a last-ditch effort to prevent extinction (i.e., California condor). In the broadest sense, our appreciation for other species may encourage us to perceive and respect the web of life and point us in the direction of living more sustainably, to the benefit of all.

To understand other concerns associated with setting up nature preserves, we need to look at island biogeography. National parks and other areas of preserved habitat tend to be increasingly isolated "islands" surrounded by compromised land. Thus, evolutionary biologist, Jared Diamond, began applying island biogeographical theory to the choices of shape, size and number in setting up preserved areas.

Diamond came up with the accompanying Designing Nature Preserves diagram, which can be used as a transparency master. It gives us basic rules of thumb to apply in choosing our preserve design. In essence, larger is better than smaller since it will probably preserve more species. The better designs will have lower rates of species extinction than the worse ones. In the case of B, several small preserves would be an inferior choice since they would be disproportionately impacted by the negative "edge effect," in which the species near the edge suffer from increased winds, more invasive species, increased predation, etc. In C, closer preserves would be more easily accessed by animals looking for mates, den sites, food, etc. In D, preserves in a triangular orientation would be more accessible. In E, corridors provide safe passage for animals (i.e., refer to riparian corridors as areas of safe passage when talking with students). And in F, again, the interior is more impacted by the edge effect in the elongated shape than in the circle. Of course, much more data would be needed about the sites and about the species involved to make an informed choice.

Goal

The goal of this lesson is to teach students that extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient for its survival.

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Endangered Species continued...

Before Your Visit

Students can be taken to the computer lab to research the tiger salamander. The Santa Rosa Press Democrat has at least 300 articles on this topic that can be accessed at www.pressdemocrat.com.

Questions to research:

- What is the tiger salamander?
- Is it a separate species?
- What is its range?
- What are its physical characteristics?
- What kind of habitat does it prefer?
- What are its mating habits?
- What environmental changes are threatening its survival?
- What solutions have been proposed to help it survive?
- Why should we care? What does the UN charter say about the survival of species?
- What is the Endangered Species Act? When was it written? Who was President of the U.S. then?
- How does the Endangered Species Act apply to the tiger salamander?

Students may present the answers to these questions in different ways. Here are two possibilities.

1) The Tiger Salamander Tribune
Working in groups, students choose which of the following roles to assume:
Wildlife Biologist, Bioethicist, Developer, Mayor, Biological Illustrator, Taxonomist

Each must write an article exploring his/her particular aspects of the problem. The mayor needs to summarize the different aspects of the conflict and propose solutions. The biological illustrator must draw the tiger salamander and may be called on by the others to provide specific additional illustrations. Follow-up visits to the computer lab can be used to compile the group's efforts into a newspaper/newsletter.

2) The Tiger Salamander Community Panel Discussion
To prepare for the discussion, the class divides into groups based on the roles listed above. On the day of the panel discussion, one person from each group acts as spokesperson. The biological illustrators have provided illustrations as requested by the other groups. The mayor's group/staff provides proposed solutions, and the mayor hosts the discussion and acts as moderator.

Assessment: The group assessment can be based on the performance of the group spokesperson as well as on the minutes from their planning sessions. For individual assessment, each student should write a summary of the problem and critique the selected solution(s).

Further activity: Before visiting Safari West, ask your students to prepare a list of questions about the Safari West site and the considerations involved in the long term maintenance of populations of various species at the site.

Materials to Bring

Have students bring their lists of questions (see above), notebooks and pencils.

At Safari West

When the opportunity arises, encourage students to ask the guides the questions they prepared in advance; ask the students to take notes to share in a later class discussion.

Back in the Classroom

Discuss the questions students prepared and the answers they received. Specifically, discuss requirements for maintenance of specific populations found at Safari West.

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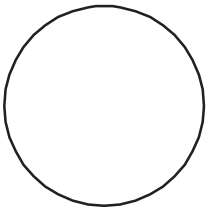
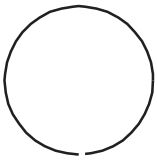
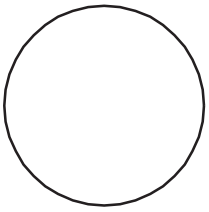
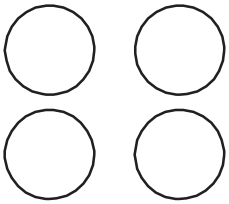
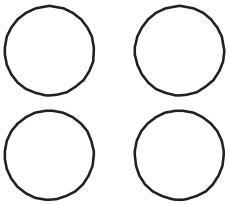
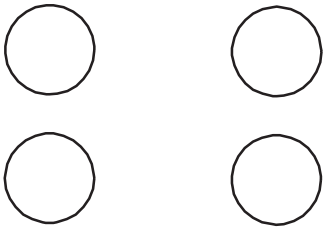
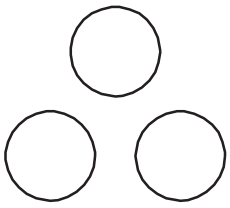
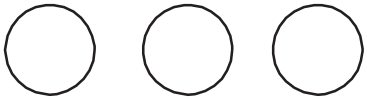
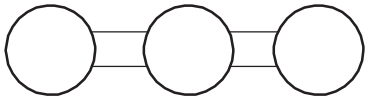
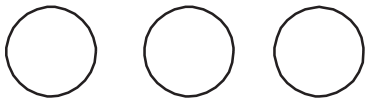
Diagram: Designing Nature Preserves

Evolutionary biologist, Jared Diamond, applied island biogeographical theory to the choices of shape, size and number in setting up nature preserves.

	Better	Worse
A		
B		
C		
D		
E		
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