ECOLOGY OF THE GREAT BASIN

COMMUNITIES

The pattern of basin and range after basin and range in this region results in incredible biological diversity. Across the high desert there are numerous sub-climates correlating to the varied elevations. Heading from the valley bottoms to the mountain peaks, one will encounter constantly changing combinations of plant and animal species making up some 200 distinct biological communities. These communities can be generally grouped into six general communities or "life zones".

In the lower valley bottoms, where mountain run off evaporates to create saline soils, is the *shadscale zone*. Plants in this community are adapted to living with very little precipitation, high heat, and saline conditions. The amount of water and the soil type in any one area will determine exactly which plants will live there. Certain areas of the valley floors may harbor no life. These parched areas that flood periodically are called playas. On the shores of the playas, shadscale is the dominant plant, but is kept company by spiny hopsage, winterfat, four-winged saltbrush, and green rabbitbrush. Trees are not found in this community. Big greasewood is the dominant shrub in more saline areas or where the water table is high. These shrubs and associated grasses typically produce abundant small seeds that are harvested by rodents and insects. Ranches and irrigated alfalfa fields form mesic habitats for some non-desert species.

Up from the valley bottoms on the lower mountain slopes and alluvial fans and bajadas, the annual precipitation increases and the shadscale community gives way to the *sagebrush community*. Areas in this community that have wetter and less saline soils are dominated by big sagebrush. Low sagebrush or black sagebrush dominate areas with steep rocky slopes and shallow soils. Bunchgrasses such as wheatgrass and blue grass usually co-dominate with sagebrush or play a secondary role. Bunchgrass seems to dominate over sagebrush in areas that receive more moisture. Other shrubs commonly found in the sagebrush zone are rabbitbrush, bitterbrush, snowberry and Mormon tea (ephedra).

Continuing up in elevation, you reach the *pinyon-juniper community*. The main plants in this community are singleleaf pinyon pine and Utah juniper, often with a sagebrush understory. The elevational range of this zone varies, but it is usually found between 6,000 and 8,000 feet, with lower limits determined by lack of moisture and the upper limits determined by temperature.

NOTES:

ECOLOGY OF THE GREAT BASIN

The pinyon-juniper community consists of short evergreen trees that rarely grow over 20 feet in height. The trees are widely spaced and have an understory of a mixture of shrubs and herbaceous plants, often with nearly bare ground. These characteristics have led this zone to be named the “pygmy forest” by many scientists. The lower end of this zone is dominated by juniper; the middle is a combination of both species, and the upper end is dominated by pinyon.

The taller ranges of the Great Basin have a montane community. Due to the great distances created by basins between these small forest habitats, various rock substrates, and local climates, montane forests are tremendously varied across the Great Basin. Isolated from one mountain range to the next, montane communities in the region have long individual histories, each one affected differently by chance factors of migration over vast expanses of desert. Smaller communities are also vulnerable to adverse affects of climate change and to genetic drift. White fir, Douglas fir, and ponderosa pines are found in the middle elevations of some mountain ranges, while limber pine, subalpine fir, Engelmann spruce, and Bristlecone pines occupy the higher elevations, continuing to the upper tree line. Mountain mahogany often dominates drier, warmer south-facing slopes.

The Bristlecone pine is an important species that is indicative of the Great Basin. Bristlecones live a long time, some for thousands of years. The harsh areas they occupy are often devoid of other plant life, so there is little competition and reduced risk of fire. The trees grow very slowly, producing very dense, disease-resistant wood. These factors contribute to the Bristlecone’s long life.

Some mountain ranges in the Great Basin are high enough to have an *alpine community*; a community of low growing plants above the treeline. Tree line is generally found above 10,000 feet in the Great Basin, moving downslope with higher latitudes. The plants that grow above treeline are separated from other such areas by miles of foothills and valleys. This “island” phenomenon produces many endemic species - species that have evolved while isolated on a particular mountain peak or range and are found only in that one place. Grasses, sedges, low perennial herbs, and wildflowers grow above tree line.

ECOLOGY OF THE GREAT BASIN

The *riparian communities* of the Great Basin cut across all elevations and life zones. In the Great Basin, water is rapidly lost either to the earth or the sky. However, areas around streams where plant life is abundant constitute a riparian area. Water loving plants like willow, narrowleaf cottonwood, choke cherry, wild rose, and aspen are found along these wet areas. The willow has a spreading root network that allows it to reach all around for water and it also helps streams by slowing erosion.

The hydrology and geology of the area have affected all of these different communities. Various plants responding to different soil and moisture levels survive by adapting to their environment. Evolution has filled every niche of the ecosystem with plants that will take advantage of the available resources. And where there are plants, animals will follow.

DESERT ADAPTATIONS

The term "desert" has several definitions. Some define desert as a region that receives a mean annual precipitation of less than 10 inches (25cm). High evaporation rates are also used to define deserts. Deserts are characterized by low plant productivity, scarce surface water and often, high summer temperatures. Deserts include polar deserts (such as Anarctica), cool deserts (such as the Great Basin) and warm deserts (such as the Mojave and Sonoran deserts). Cool deserts are thus named because they receive most of their moisture as snow and because of their low annual temperatures. There are about 20 major deserts in the world and they cover 15% of the earth's land area. (About the size of South America.)

There are five different deserts in the United States: the Mojave, the Sonoran, the Colorado (a subdivision of the Sonoran), the Chihuahuan, and the Great Basin. The Great Basin desert is a result of the rain shadow cast by the Sierra Nevada (see Unit 4 for details).

All plants and animals have adaptations that help them to survive in their chosen environments. Adaptations can be structural, physiological, or behavioral. For example, an animal could be adapted to the heat in any or all of these three ways: being small (structural) gives more surface area to volume, making it easier to give off heat; sweating (physiological) lets the animal take advantage of evaporation; and staying in the shade (behavioral) reduces the animal's exposure to the hot sun.

ECOLOGY OF THE GREAT BASIN

PLANTS

TRANSPIRATION

In order to photosynthesize, plants must "breathe", taking in carbon dioxide and releasing oxygen through tiny pores (stomata) in their leaves and stems. Unfortunately for desert plants, water is also released to the atmosphere during this process; this is known as transpiration. Desert plants have evolved several adaptations that reduce water loss through transpiration. Many desert plants have smaller and fewer stomata than other plants. This prevents a large amount of water from being released through those holes. High daytime temperatures cause water to evaporate quickly when stomata are open. By opening their stomata at night, cacti (such as the prickly pear cactus) reduce the loss of water through transpiration. They carry out photosynthesis during the day, but transpire only at night after the sun goes down and the temperature falls. The carbon dioxide needed for photosynthesis is absorbed during nighttime transpiration and is stored for the following day.

Many desert plants have small leaves; others have no leaves at all. This limits the surface area exposed to sun and wind, both major drying factors. Small leaves, such as those on broom snakeweed, and needles, such as those on the pinyon pine, are more resistant to water loss because of their small size. Cacti spines (which are actually modified leaves) both reduce water loss and deter animals from eating the cactus plants. Some plants, such as Mormon tea, have leaves reduced to scales and have green stems that have been modified to photosynthesize. Many desert plants, such as green leaf manzanita, have waxy stems and leaves, further preventing water loss.

GETTING WATER

Where water is scarce, plants have adapted to find it or go without. This is certainly the case in the Great Basin. Some plants, such as mesquite, grow very deep taproots (as long as a hundred feet) that reach down to the water table. Others, such as Indian rice grass and bluebunch wheatgrass, survive only on the water from rare, short-lived rains, soaking up the moisture through shallow root systems spreading out in all directions.

Some plants survive the desert heat but avoid the dryness by growing only where water is continuously available. Cottonwood trees grow near perennial streams and springs or where their roots can easily reach groundwater.

Some plants die to the ground during the hottest part of the year, storing water in their underground tubers, roots, and bulbs to sustain them through the dry periods.

Fine hairs, such as those found on sagebrush leaves, serve to shade and cool the leaf surface. These hairs also reduce moisture loss by breaking the wind, which would otherwise increase evaporation rates.

Four winged saltbush is specially adapted to use salty water that would kill most other plants. It secretes the excess salt through its leaves, producing a salty film over each leaf.

SPECIAL SEEDS

During a drought, some deserts plants do not grow at all. They are present in the desert soil only as seeds for months, years, or for as long as the dry spell lasts. When the right amount of rain falls and soaks into the soil, the seeds sprout and bloom. Plants that use such a strategy do not live very long. Except for their ideal seed adaptation, they are not equipped to cope with the desert environment and they die quickly after producing another batch of seeds.

Numerous plants, called annuals, avoid the extreme heat of the summer by growing only in the early spring when water is relatively abundant and temperatures are mild. By the time summer comes, they will have completed their life cycles, produced seeds, and died. Annuals found in the Great Basin include wallflower and pepperweed.

ANIMALS

ADAPTING TO DRYNESS

The wildlife of the desert is well adapted to the dry environment. Many, such as the packrat and pronghorn, feed on cacti and other juicy vegetation. In this way they get all the moisture they need without needing to find and drink pure water. Other desert inhabitants, such as the coyote, are very mobile, traveling long distances to find water. They rely on a large area to satisfy their needs.

Two desert creatures, the kangaroo rat and the Great Basin spadefoot toad, are particularly well adapted to the lack of water in the Great Basin. The kangaroo rat possesses an incredibly efficient kidney that squeezes every last drop of water out of everything the animal ingests, excreting completely dry feces. This animal also adds moisture to its dry food supply of seeds by collecting them and storing them underground where they absorb moisture from the cool soil surrounding them. The kangaroo rat can go its entire life without drinking water.

The spadefoot toad buries itself in the soil, remaining dormant during dry periods. Vibrations produced by raindrops hitting the ground trigger the toad to dig to the surface. Within the first hour of a rainstorm the toad will be out of its burrow, active, and even mating. Once the rain has stopped and the puddles and pools start to dry up, the spadefoot toad heads back underground, back end first and using its “spades” at the back of its feet to burrow. Like all amphibians, the spadefoot must keep its skin moist or it will die; its adaptation allows it to survive even in this dry desert climate.

ANIMALS

BEATING THE HEAT

The wildlife of the Great Basin has several ways of keeping cool, even in the heat of the desert summer. Lizards will stand high off the ground as they sprint across the hot, sunny areas, seeking shelter in the shade of the rocks. Antelope ground squirrels scamper through hot sunlight using their large tails as umbrellas. Kit foxes and rattlesnakes find abandoned badger holes to wait out the heat. The oversized ears of jackrabbits allow blood to circulate close to the skin surface, giving off heat.

Some animals, including people, perspire; evaporation of the perspiration cools the skin. Other animals pant, allowing water to evaporate from the mouth and lungs. Evaporation removes heat from the body because it takes heat (energy) to transform water from liquid to gas. When water on the skin goes from liquid to gas (water vapor), it takes heat with it. Although evaporation is an effective way to cool the body, it also removes water from the body, which can be dangerous in the dry desert environment. The snowy plover is one animal that uses evaporative cooling without sweating or panting - it simply splashes water on itself usually undrinkable salt water and lets this water evaporate. Using the undrinkable salt water available to it for cooling allows this bird to survive on the salt flats where fresh water is scarce.

Many animals beat the heat with timing. Nocturnal animals are active at night, laying low during the hot days. Crepuscular animals take advantage of cool mornings and evenings. Packrats stay in their nest in cool rock crevices during the day. Kit foxes and rattlesnakes find abandoned ground squirrel or badger holes to wait out the heat.

The hottest place to be in the desert is on the ground in the sun. Soaring birds, such as the red-tailed hawk and golden eagle, soar high above the earth where temperatures are much cooler than on the ground below.

People living in the Great Basin must also find ways of dealing with the heat and aridity. More often than not, we change our environment rather than adapting to it. Some of our actions, such as planting shade trees, can provide shelter for animals as well. Other actions, such as using air conditioners for cooling or damming rivers for reservoirs, may have detrimental affects on the ecosystem.

ECOLOGY OF THE GREAT BASIN

ENDANGERED SPECIES

Scientists estimate, based on fossil records, that 99% of all the species that ever existed on earth are now extinct. Many of these species evolved into new species as they adapted to their environment over generations, while many others lost the evolutionary battle, not able to adapt to changing environments or out-competed by better adapted species. Extinction, as it has occurred since life began on earth, is a natural process. So why are we so worried about it now?

The difference between past extinctions and those we are witnessing now is a difference in extinction rate. Species are going extinct much faster than they ever have before. Whole families of species and orders of species are threatened with extinction rather than just individual species within a family or order. Species are going extinct faster than evolution can replace them. And with each extinction, there is a ripple effect - dozens of other species, each linked through the intricate web of life, will follow. Should we care?

It is easy to pass off extinction as natural - after all it has been going on since life itself existed on earth. But the increased rate of extinction has scientists around the world concerned - is this increased rate the proverbial canary in the mine shaft? The human being has a greater capacity to alter its environment than any species has in the history of the earth. It is possible that our tinkering has reached a level so high that we have affected the health of the planet as a whole. And as “modern” and “high-tech” as we may be, humans are dependent on the earth and its ecosystems for survival. We depend on the world’s forests to replenish oxygen; we need the water cycle to give us fresh water; many of our medicines are derived from obscure plants; and while hydroponics is feasible, healthy soil is still the best place to grow food. Some may argue that we can do all these things with machines, but would we want to?

Endangered species - those that are threatened with extinction in all or a significant portion of their range - are indicators of ecosystems in trouble. Human activities have led to habitat loss (the most significant cause of extinction), non-native invasive species, water and air pollution, increased solar radiation (due to loss of ozone in the upper atmosphere), and warming climate.

It can be difficult to teach about the intrinsic value of each species on earth. On the surface, many species hold no value for humans. But if we traced the connections that each species has to the next, we would probably find that all species on earth have value to people. A diversity of species ensures the health of ecosystems, provides a larger gene pool from which adaptations can come (such as resistance to disease and plagues), and preserves secrets yet to be discovered. And if there is a species that you can still find no value for, what about the mere fact that it has evolved over time and has survived for tens of thousands of years or more?

The topography of the Great Basin (“island” mountain tops separated from one another by vast expanses of desert valleys) renders it vulnerable to extinctions. Populations that occupy the high peaks are isolated from one another; therefore, they cannot interbreed. Small populations are more vulnerable to the forces of extinction - generally small populations have less genetic diversity and therefore a lesser ability to adapt to changing conditions. Groundwater pumping, road and home construction, grazing, and mining are all activities that alter habitat; as more habitat is affected, the threat of extinction increases. The Great Basin is home to many threatened and endangered species; the following page lists some of these.

SOME THREATENED AND ENDANGERED SPECIES IN THE GREAT BASIN

COMMON NAME:	SCIENTIFIC NAME:
FISH:	
Ash Meadows Amargosa Pupfish	*Cyprinodon nevadensis mionectes*
Pahrump Kilifish	*Emperrichthys latos*
Desert Dace	*Eremichthys acros*
Lahontan Cutthroat Trout	*Oncorhynchus clarki henshawi*
BIRDS:	
Least Tern	*Sterna anyillarum*
White faced Ibis	*Plegadis chichi*
Northern Goshawk	*Accipter gentilis*
MAMMALS:	
Ash Meadows Montane Vole	*Microtus montanus nevadensis*
Sierra Nevada Red Fox	*Vulpes vulpes necator*
Pygmy Rabbit	*Brachylagus idahoesis*
Spotted Bat	*Euderma maculatum*
PLANTS:	
Sodaville Milkvetch	*Astragalas lentiginosus var. sesquimetralis*
Ash Meadows Blazing Star	*Mentzelia leucophylla*
Amargosa Niterwort	*Nitrophila mohavensis*
Ute Lady's Tresses	*Spiranthes diluvialis*

NOTES:

WHO LIVES HERE?

ACTIVITY 1

SUBJECTS:
Art, language arts, music, science, math

LOCATION:
Classroom

DURATION:
45 minutes

OBJECTIVES:
Name two things that happen to a community of plants and animals when habitat is destroyed. List some of the human activities which change the Great Basin. Discuss what happens to the plants and animals that live in a habitat when it has been disturbed.

BACKGROUND:
One of the greatest threats to plants and animals today is habitat depletion. What happens to these plants and animals when their habitats are disturbed?

KEY VOCABULARY:
Habitat, animals

MATERIALS:
Chairs, crayons, drawing paper, tape or CD player, recordings of music

METHOD:
1) Have each student draw a picture of a Great Basin plant or animal and label it. Have them also draw a picture of its habitat.
2) Tape a picture of a plant or an animal on each student. Tape a picture of a habitat on each chair.
3) Place the chairs in a row, alternately facing left and right. Have the students stand in a circle around the chairs. (There should be one less chair than there are students.) When the music starts, indicate the direction the students are to start walking. When the music stops they are to find a seat. Remove a chair after each round. Explain that this habitat has been removed because of human impact, such as bull dozing for a housing site or the collection of native species of plants, etc. Play until just one species is left - the survivor.
4) Play several rounds of the game, varying each set introducing additional factors, such as imaginary roads or fences species can cross. Include natural disasters which eliminate additional habitat. Have children come up with additional ideas!
5) Summarize this activity with a discussion. How many different desert plants or animals did we begin with? How many different habitats? What happened to the habitats? What are some reasons for human activities which are changing the Great Basin (need for more homes, roads, recreation, the introduction of exotic species, etc.)? What happens to the animals and plants when an area is disturbed?

EXTENSION:
Have the students research descriptions, accounts, and photographs of their local areas as early pioneers and explorers saw the area. Compare and contrast the area today with the past. Are there more or fewer native species of plants and animals? What are the native plants and animals which have become threatened, endangered, or extinct? What exotic plants and animals now live in the area? Locate natural springs and other natural water sources. Are these water sources still accessible to wildlife? What actions can students take to protect Great Basin plants and animals near their homes?

HABITAT WANT ADS

ACTIVITY 2

SUBJECTS:
Science, language, art

LOCATION:
Classroom

DURATION:
45 minutes

KEY VOCABULARY:
Habitat, animals

MATERIALS:
Writing and drawing utensils, paper, newspaper with want ads.

OBJECTIVES:
Students will learn the concepts of what is required by an animal to survive in the Great Basin through a science-based writing exercise.

BACKGROUND:
Every living thing requires a specific habitat in order to survive. There are several elements that comprise habitat: soil, water, air, shelter, and sun.

METHOD:

1) Discuss with your students why each of the essentials of habitats is necessary for the survival of animals.

2) Read a want ad for a house or apartment to the students and discuss how this habitat meets a person's requirements. Examples: water running from a tap, shelter such as a roof, heat from heating sources, etc.

3) Talk about the animals that can be found in the Great Basin. (You'll find a list of some of these animals on the following page.) List some of them on the chalkboard. Discuss how each animal's habitat requirements differ. An example could be "How do a kangaroo rat's requirements for habitat differ from that of the yellow-bellied marmot's?" List some of those examples.

4) Have each student pick an animal that lives in the Great Basin and have them do research on their animal's habitat requirements. A variation might be to write the animals' names on cards and have the students draw the cards randomly.

5) Have each student write a habitat want ad for his or her animal and decorate it. Instruct the students to omit the name of their animals as they write their want ads and requirements for habitat. For an example of how someone might write a want ad for a mule deer, please turn to the next page.

HABITAT WANT ADS

ACTIVITY 2

WANTED:
ROOM TO ROAM WITH LOTS OF GRASS AND SAGEBRUSH. HAVE SMALL KIDS ON THE WAY; NEED AN AREA WHERE THERE IS A LOT OF BRUSH COVER TO HIDE THEM AND COMPLIMENT THEIR SPOTS. ALSO NEED PLACES WHERE ANTLERS CAN BE DROPPED WITHOUT ANY NEED TO PICK THEM UP.

(Notice that the words “mule deer” are never used in the ad.) After the students have written and decorated their ads, hang the ads up and allow the students to look at each of them and write down what they think the animal is who placed the ad.

6) Gather the students together and have each one name their animal and talk about why they wrote the ad the way they did. Ask the students if they were able to figure out what each animal was by looking at the clues in the ads.

SOME GREAT BASIN ANIMAL SPECIES:

BIGHORN SHEEP
BADGER
BIG-EARED BAT
MARMOT
RINGTAIL
MOUNTAIN LION
KANGAROO RAT
DESERT COTTONTAIL
BUSHY-TAILED WOODRAT
GOLDEN EAGLE
GARTER SNAKE
WESTERN RATTLESNAKE
HORNED LIZARD
GREAT BASIN SKUNK
PRONGHORN ANTELOPE
MUSKRAT
GREAT HORNED OWL
CUTTHROAT TROUT
TURKEY VULTURE
WHITE PELICAN
AMERICAN DIPPER (WATER OUZEL)

INVENT-A-PLANT

ACTIVITY 3

SUBJECTS:
Art and science

LOCATION:
Classroom

DURATION:
30 minutes

OBJECTIVES:
Name and identify Great Basin plants

KEY VOCABULARY:
Plants, vegetation, adaptation

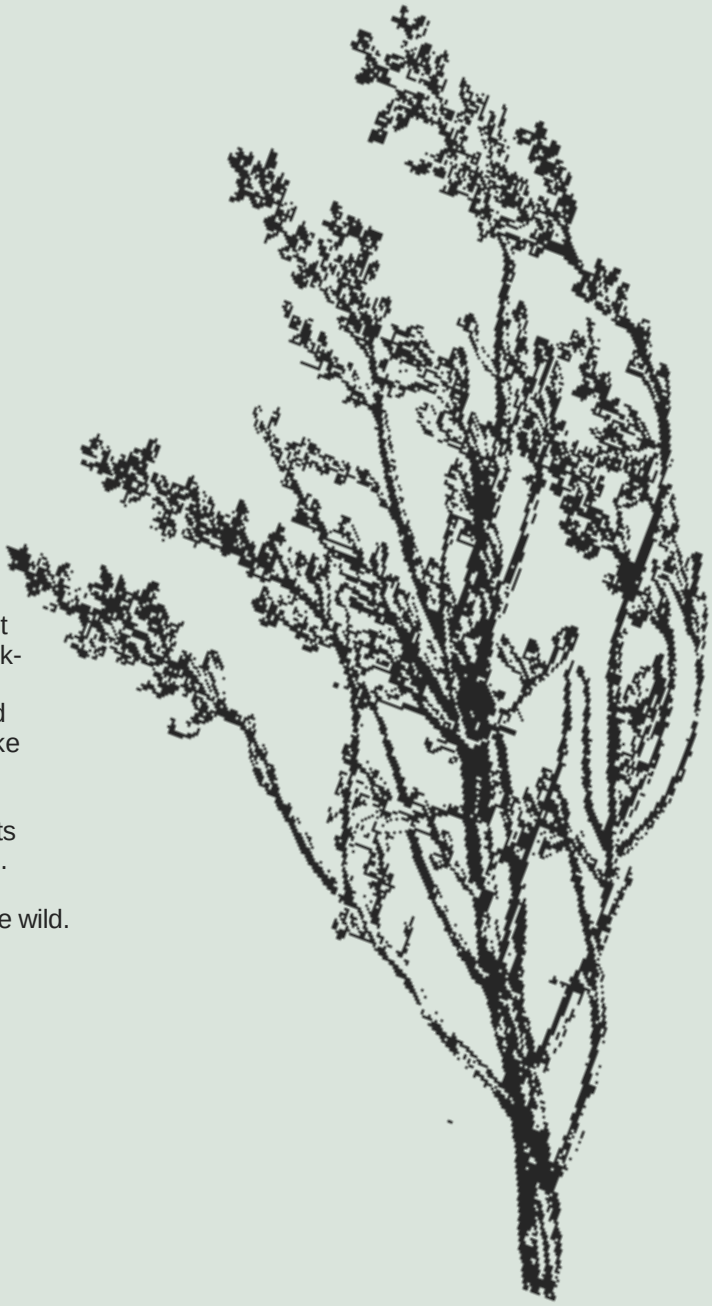
MATERIALS:
List of Great Basin plants (below), drawing utensils, paper, and a guide to Great Basin plants with photos.

METHOD:

1) Make copies of the Great Basin plants with unusual names and hand them out to students or write the list on the blackboard.

2) Have students choose a few plants and draw what they think the plant looks like (from the sound of its name).

3) Show the students what the plants really look like. Discuss why the students think the plants are named as they are. Discussing characteristics of the plants can help them to identify the plants in the wild.



SOME GREAT BASIN PLANTS

RUBBER RABBITBRUSH
SNAKEWEED
BLACKBRUSH
GOOSEBERRY
SPINY HOPSAGE
BRISTLECONE PINE
FOUR-WINGED SALTBUSH
QUAKING ASPEN
GREASEWOOD
SKUNKBUSH
SNOWBERRY
PRICKLY PEAR
LITTLE LEAF HORSEBRUSH

ADOPT-A-TREE

SUBJECTS:
Science, writing, art

LOCATION:
Classroom, outside of school or home

DURATION:
Ongoing for weeks or months

OBJECTIVES:
Observe a specific tree. Gain an appreciation for quiet time outdoors. Practice observation and data gathering skills. Discuss how a tree might change over time and how various species of trees are different.

KEY VOCABULARY:
Trees

MATERIALS:
Spiral notebooks (one per student), clear contact paper, drawing paper, pencil/pen, glue, and crayons

METHOD:
By "adopting" a tree, students will take a close-up look at the different characteristics of trees. Take your students outside and have them each pick a tree to keep track of for several weeks or months. Divide the students into groups if there are not enough trees for each student to have their own. Try to avoid having the students pick exotic species of trees. For variation, have each student pick a tree in their backyard.

Give each student a spiral notebook and have them visit their trees once a week for a month or once a month for the whole school year (or whatever schedule you decide on). Each time they visit their tree have them write their observations in their notebooks, glue down samples of the trees leaves, write poems about their trees, draw pictures, etc. The following examples will provide some ideas for the types of activities the students can do and the kinds of questions they can answer in their notebooks.

1) Why did you pick this tree? How tall do you think it is? Was this tree planted by humans or did it grow here naturally?
2) Draw a picture of your tree and write a paragraph describing what it looks like and where it is located. Draw a map of its location in relationship to other trees, water, buildings, etc. Using a field guide, have the students identify what kind of tree they have adopted.
3) Keep track of any animals using the tree (don't forget insects!) or signs of animals that have used the tree (i.e. nests, galls, tracks, scat, etc.). What kinds of animals used the tree and what were they doing?
4) Are there any fruits or seeds on the tree? If so, draw a picture of them. If not when was there fruit or seeds on the tree? How do you suppose the seeds of this tree were dispersed (i.e. water, wind, animals)?
5) Collect one leaf or a bundle of needles from the tree. Lay them on a piece of construction paper and cover with clear contact paper. Glue or staple mounted leaves or needles into your notebook. Describe in writing what the leaves look like.
6) Write about changes you notice in the tree. What might cause these changes?
7) If the leaves change color in the fall, collect and mount some of those leaves and put them in your notebook.

ADOPT-A-TREE

8) Examine the bark closely and write a paragraph describing it. Put a piece of paper over an area of bark and make a rubbing by coloring the paper with a crayon. Glue the rubbing into your notebook. In writing, describe what bark looks and feels like. Describe the smell of the tree.
9) Describe what you think roots are like and why you think they are the way you describe
10) Draw a picture of the tree in winter.
11) Write a poem or song about a tree.
12) Have someone take a picture of you next to your tree and glue or staple the photo in your notebook.
13) What grows or lives next to your tree? Flowers? Grass? Draw a picture of your tree's "neighbors".
14) Draw a picture of your tree's buds in winter and again in early spring.
15) Write a few lines about if and why this tree is special to you.

Make sure students are careful with their trees. Do not make marks on the trees and do not break stems or branches.

EXTENSION:
Have the students display their notebooks or have them give a presentation about what they have learned about their tree.

Adapted from the "Ranger Rick" series.

NOTES:

CREATE-A-COMMUNITY

ACTIVITY 5

SUBJECTS:
Science, English, Art

LOCATION:
Classroom

DURATION:
3-5 class periods

OBJECTIVES:
The student will:
a) Describe the components of the food chain/food web
b) Explain how plants and animals in the community depend on each other
c) Name the communities found in the Great Basin. This activity helps students to distinguish between producers, consumers, and decomposers.

BACKGROUND:
Plants ultimately support all forms of life, including humans, either directly or indirectly. Plants are thought of as "producers". This means they make their own food through a process called photosynthesis. Only green plants are producers. Most humans are omnivores, which means that they eat both plants and animals in some form. Herbivores eat only plants, while carnivores eat other animals. Omnivores, herbivores and carnivores are all called "consumers". Consumers provide carbon dioxide, which plants need to produce food. "Decomposers" are necessary in a community because they cause decay and return nutrients and minerals to the earth. For more background information, see the enclosed text on the Great Basin communities.

KEY VOCABULARY:
Community, producer, consumer, and decomposer

MATERIALS:
Reference materials on Great Basin communities, paper, art supplies (crayons, paints, scissors, glue, etc.)

METHOD:
1) Introduce students to the definition of a natural, ecological community. Describe how producers, consumers, and decomposers function in a community. It may be helpful to show a movie or video about ecological communities.
2) Split the students into groups and assign a Great Basin community (shadscale, sagebrush, pinyon-juniper, alpine, riparian, or montane) to each group. If you end up with groups that are too large, feel free to break them into smaller groups and let more than one group cover the same community.

CREATE-A-COMMUNITY

3) Ask the students to research the community they are assigned. Each student should research plants and animals specific to that community. Use a sign-up sheet to ensure that both plants and animals (producer, consumers, and decomposers) are represented and that some are not over represented. The aim should be to have a diverse and accurate representation of a community.
4) Assist the students in researching assigned plants and animals of the community. Have the students locate information describing what those organisms look like and how they function in the community.
5) Following their research, ask students to "picture" their organisms. Students may draw an outline (the shape) of the species they choose on a sheet of paper.
6) Instruct students to then attach another piece of paper behind the first and cut out the shape. When the shape is cut out, they will have two identical figures. Save the extra paper.
7) Instruct students to detail their drawings on both sides (front of the organism on the front side of one cutout and the backside of the organism in the backside of the second cut out). Attach the two pieces with glue along three-fourths of the edges of the two figures. (Make sure the drawing side of the front and back are on the outside.) When the glue has dried, stuff the organism with crumpled paper. For stuffing, the students can use the discarded paper they cut out in step 6. Glue the remaining edge together.
8) To populate the room, use string to suspend the organisms from the ceiling or along the wall. Hang them at appropriate heights, grouped by community. Background scenery may also be used.
9) Have the groups present their findings about their researched communities to the entire class.

SUMMARY:
Summarize the project by asking the students the following types of questions:
Can you show me some examples of producers? Consumers? Decomposers? What would be the effect of removing a particular organism from the community? What would happen if the entire population of these organisms was removed? What could cause the decline of organisms in a community? How might the decline of an organism affect our lives? What are some of the ways this community is important?

Some examples might include that the community or part of it helps keep soil in place, conserves water, and prevents flooding. It also provides homes for plants and animals, biological diversity, supplies medicines, provides food, beauty, etc.

What are some of the endangered species in these communities? How are they endangered? What are some of the things that are being done about the problems? How might we help? List some examples of food chains in this community. Can these food chains be connected to other food chains?

NOTES:

HABITAT CARDS

SUBJECTS:
Science, spelling

LOCATION:
Classroom/outdoors

DURATION:
1.5 hours

OBJECTIVES:
Upon completion of this activity, the students will be able to: a) compare and contrast 4 habitats found in the Great Basin, b) distinguish the flora and fauna that live in those habitats, and c) correctly spell or pronounce 17 vocabulary words.

BACKGROUND:
This activity covers some of the habitats found in the Great Basin. Many of the plants and animals have specific needs that are met in varying degrees within each habitat. Refer to text on adaptation for more information.

KEY VOCABULARY:
Habitats, flora and fauna

MATERIALS:
Colored poster board, cut into 34 pieces (2" by 2" each), black marking pens

METHOD:
1) Discuss the various habitats found in the Great Basin, and the plant and animal life found in each.
2) Have students research each habitat. Ask them to list characteristics specific to the habitat, as well as flora and fauna common to each.
3) While the students work, the instructor should choose 17 vocabulary words. Make sure to use at least 4 habitat words such as riparian, montane, sagebrush, alpine, pinyon-juniper, etc. The remaining words should be plants and animals found in these selected habitats. Write 1/2 of each word on different pieces of colored poster board. For example, if you choose the bird PINYON JAY, write PINYON on a green piece of poster board and JAY on a blue piece of poster board. When the green and blue pieces are placed correctly, side by side, they spell the animal's name, "pinyon jay".
4) Shuffle the completed cards. Pass out one card, face down, to each student.
5) Ask the students to show their cards and try to find their mate in three minutes or less.
6) When the time is up, review the vocabulary cards with your students.
7) Ask the pairs of students who are displaying the four habitats to spread out across the room. Ask the remaining pairs to locate and stand behind the "habitat" that is common to their vocabulary word.
8) Create a discussion to see if the students agree with the selection made by each pair. Are there any other possibilities? What happens if the sagebrush habitat becomes polluted? What happens when the riparian habitat is removed for more development? What natural factors cause destruction in natural habitats?
9) Ask the student to review their earlier research on habitats and communities. Ask them to compare animals that are dependent on more than one habitat.

EXTENSION:
Design a mural depicting one or all of the habitats and their inhabitants.

LOVELY LITTER

SUBJECTS:
Science, social studies (social responsibility)

LOCATION:
Outside classroom

DURATION:
45 minutes to an hour

OBJECTIVE:
Students will be able to explain how litter is damaging to wildlife and propose ways to eliminate these dangers.

BACKGROUND:
Litter is not only unsightly, it can cause injury, illness, and even death to wildlife. Fishing line can become tangled around a bird's beak and prevent it from eating. Tangled around an animal's legs, fishing line can prevent it from running. Plastic 6-pack rings can get caught around fish and other wildlife. As the animal grows, the non-expand-able rings cause a slow squeezing death. Cans and bottles can bring death to small animals like mice, by trapping them inside. Cigarette butts, cellophane wrappers, styrofoam cups, and other trash can be eaten by deer, and other animals, causing internal problems and poisoning.

KEY VOCABULARY:
Litter

MATERIALS:
Each student should have the following items: plastic or leather gloves to protect hands, large plastic trash bags for collecting litter. Each team should have:poster board, glue, and different types of litter.

METHOD:
1) Divide the class into teams of 3 or 4 students. Distribute plastic or leather gloves or small plastic bags to each student for hand protection. Hand out plastic trash bags for collecting litter. Have each team bring litter they find on the school grounds, parks, and other areas to school in their trash bag.
2) Using the litter. Have the teams each make a collage by gluing the litter to a poster board. Have the students evaluate the litter and decide which is most harmful to wildlife. Ask students to propose ways people can eliminate litter pollution. What are some of the alternative ways to package 6-packs of canned goods? How can individuals be told about the dangers of litter? What can students do personally to reduce litter?

EXTENSION:
Contact the state Fish and Game, Pollution Control Department in your area for more information about problems generated by litter. Perhaps you can arrange for a representative from the agency to come and speak to your class.

A WORD OF CAUTION...
Do not allow students to pick up broken glass, syringe needles, or sharp metal.

CAMOUFLAGE

ACTIVITY 7

SUBJECTS:
Science, math, physical education

LOCATION:
Outside classroom or gym

DURATION:
30-45 minutes

OBJECTIVES:
The students will be able to:
a) Simulate how predators use their eyes to find their food, and
b) Describe ways animals use camouflage to survive.

BACKGROUND:
Many animals camouflage themselves in their surroundings for survival. A rabbit with its brown fur can blend in well with the brown grass. Lizards sometimes have gray bodies with darker gray patches to blend in with rocks. Prey animals use their colors to disguise themselves from predators. Predators also use camouflage to hide from prey so that they can get closer to them.

KEY VOCABULARY:
Camouflage, predator, prey

MATERIALS:
Poster board and 15 pieces of each of the following colors of yarn: gray, green, red, yellow, purple, and any color that closely matches the surface you will be playing on. Each piece of yarn should measure about two inches long.

METHOD:
1) Before the students arrive, scatter the pieces of yarn around the playing field.
2) Explain to the class what camouflage is. Ask students if they can think of any animals that use camouflage.
3) Divide the group into 2 to 4 equal teams. Tell them that they will be birds and they will have to hunt for worms (yarn pieces) to survive. Describe what the worms will look like.
4) Arrange the groups at the starting line. Tell them that when you say “go” they must run out onto the playing field and find a worm. When they do, they must run back and sit with their group. The first group to have each bird find a worm and return wins.
5) After the first round, record on the poster board what color of worms were found. What color was most common? What color was least common? Why?
6) Have the teams line up and repeat the game. Record the results. Was it harder to find the worms this time? Why?
7) Repeat the game until all the “easy” colors have been found. Once most of the worms have been found, discuss the results. Don’t forget to collect all your worms!

ANIMAL OLYMPICS

SUBJECTS:
Science, physical education, math

LOCATION:
Outdoors or in a gymnasium

DURATION:
45 minutes

OBJECTIVES:
The students will: a) compare and contrast differences between animals and themselves; b) define the concept of variation, a level or biological diversity; c) develop a classification system to group the animals (i.e. runners, swimmers, fliers, etc.).

BACKGROUND:
Animals have certain characteristics that make them unique. By comparing ourselves to other species, we see how truly remarkable those species are. Even individuals within the same species have different physical abilities. For example, one frog may be able to jump higher than another one. One eagle may see further than another. These differences within a species are referred to as variation.

KEY VOCABULARY:
Biological diversity, adaptation, and variation

MATERIALS:
Measuring tape, several stop watches (or second hands on a watch), activity page

METHOD:
1) Find a large open area, either outside or in the gym.
2) Place students in groups of five.
3) Inform the students that they will be competing in the Animal Olympics and distribute one activity sheet to each student. Have them make measurements for each student and each activity.
4) Following the Olympics, reassemble as a large group and discuss various differences between humans and animals and among animals of the same species. Pick two animals from the list and have the students describe one likeness and one difference between the two animals. Similarities and differences should be based on food gathering, movement, birth of young, coloration and camouflage, or bright colors.

ANIMAL OLYMPICS

Name _____ **DATE:**_____

1) **A beaver can hold its breath for up to 15 minutes (900 seconds).**

   I can hold my breath for _____ seconds.

2) **A bald eagle may have a wingspan of 7 to 8 feet.**

   I have a wingspan of _____ feet _____inches.

3) **A mountain lion can jump 20 feet in one leap.**

   I can jump _____ feet in one leap.

4) **A sleeping heron can stand on one leg for over an hour.**

   Blindfolded, I can stand on one leg for ___seconds

   or _____minutes.

5) **A snake can crawl along a branch without falling off.**

   I can walk a straight line _____ feet.

6) **A pronghorn antelope can run 70 miles per hour (about 6,160 feet in 60 seconds).**

   I can run 40 feet in _____seconds.

7) **Frogs can leap 120 times consecutively without stopping.**

   I can leap _____ times without stopping.

8) **Owls have the ability to stare without blinking for hours.**

   I can stare down my partner without blinking for _____seconds.

NOTES