Introduction to
Food Chains and Food Webs

Objectives:

1. To be able to group different organisms into their correct biological niches.
2. To show the energy flow through a food chain by constructing model food chains and food webs with the given drawings of organisms.
3. To describe how pollutants can be transferred from one organism to another and magnified through the food chain.
4. To be able to predict what might happen if one organism is removed from the food web.

Materials:

Organism sheets - one of each per student
Plants of the Chaparral
Animals of the Chaparral
Insects of the Chaparral

This investigation sheet - one per student
scissors
glue or tape
colored pencils or canyons

Procedure:

1. Use scissors to cut the pictures apart.

2. Sort the pictures into groups according to energy sources; producers, herbivores (first order consumers), 1st level carnivores (second order consumers), 2nd level carnivores (third order consumers), scavengers and decomposers.

3. With the colored pencils mark each group a different color. For example mark the energy sources with yellow, the producers with green, the herbivores with blue, the 1st order carnivores with orange, the second order carnivores with red, the scavengers with purple and the decomposers with brown.

4. Construct 2 food chains as they would occur in the chaparral. Paste or tape your pictures into the spaces provided. Use arrows to show that energy is passed from one organism to another. (Arrows go from the animal that is eaten to the animal doing the eating).

5. Use the same pictures to form a food web by first arranging them on your desk. Remember that a food web is several food chains linked together. Construct a food web as it would occur in the chaparral. Glue or tape your food web to the back of this sheet. Again use arrows to show that energy is passed from one living organism to another.
6. Look at your food web. If any of your organisms are shaded grey, they have been sprayed with an insecticide (bug spray) such as DDT or chlorodane, or have eaten an organism that has been sprayed with one of these compounds. If animals also eat the organism that has been sprayed, they take in the poison. The animals may not die, but the poison builds up in the organs of its body. Because larger animals eat more food that may be affected with the poison, more poison is naturally concentrated in the larger animal(s).

7. Take a dark colored pencil or canyon and mark all of the organisms in the food web that might get some of the poison into their bodies from their food.

Questions:

1. Would there be more predators or prey in a particular community? Explain.

2. Why are the 2nd level carnivores more likely to be affected by the insecticide than 1st level carnivores?

3. Explain what may happen to the other organisms if disease were to kill off one of the 2nd level carnivores in your food web.

4. Which organisms would increase in population? Why?

5. Which organisms would decrease in population? Why?

6. Describe how humans might change (or are currently changing) the food web.

7. Why can't food chains go on forever? (8th order, 9th order and 10th order consumers?)
<table>
<thead>
<tr>
<th>Plants of the Chaparral</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Toyon</strong></td>
</tr>
<tr>
<td><strong>Chamise</strong></td>
</tr>
<tr>
<td><strong>Manzanita</strong></td>
</tr>
<tr>
<td><strong>Bitter Cherry</strong></td>
</tr>
<tr>
<td><strong>Scrub Oak</strong></td>
</tr>
<tr>
<td><strong>Bacteria-Fungi-Molds</strong></td>
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<tr>
<td><strong>Sun</strong></td>
</tr>
<tr>
<td><strong>Solar Energy</strong></td>
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</tbody>
</table>

**Producer**

**Decomposers**
- Break down dead or decaying materials
- Recycling nutrients
### Animals of the Chaparral

<table>
<thead>
<tr>
<th>Animal Type</th>
<th>Species</th>
<th>Diet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coast Horned Toad</td>
<td></td>
<td>Small Insects</td>
</tr>
<tr>
<td>Western Fence Lizard</td>
<td></td>
<td>Insects - Spiders</td>
</tr>
<tr>
<td>Ground Squirrel</td>
<td></td>
<td>Green Vegetation - seeds - nuts - cones</td>
</tr>
<tr>
<td>Gopher Snake</td>
<td></td>
<td>Rats - Mice - Rodents - Rabbits - Birds - Quail - Liardes</td>
</tr>
<tr>
<td>Grey Fox</td>
<td></td>
<td>Birds - Gophers - Mice - Rodents - Rabbits - Birds - Quail</td>
</tr>
<tr>
<td>Spotted Skunk</td>
<td></td>
<td>Insects - small rodents - Birds - Carrien - eggs - some plant material</td>
</tr>
<tr>
<td>Western Rattlesnake</td>
<td></td>
<td>Rodents - Squirrels - Rabbits - Birds - Liardes - Papillae</td>
</tr>
<tr>
<td>Scrub (California) Jay</td>
<td></td>
<td>Insects - Eggs - Small Birds - Acorns</td>
</tr>
<tr>
<td>Mountain Coyote</td>
<td></td>
<td>Scrub - Mice - Rabbits - Grashoppers - Birds - Berries of various plants</td>
</tr>
<tr>
<td>California Quail</td>
<td></td>
<td>Seeds - Leaves - Berries - Insects</td>
</tr>
<tr>
<td>Brush Rabbit</td>
<td></td>
<td>Plant Material - Grasses - Herbs - Shrub - Leaves</td>
</tr>
<tr>
<td>Red-Tailed Hawk</td>
<td></td>
<td>Rodents - Squirrels - Rabbits - Insects</td>
</tr>
<tr>
<td>Rodent (Pocket Mouse)</td>
<td></td>
<td>Seeds of various plants</td>
</tr>
</tbody>
</table>
## Insects of the Chaparral

<table>
<thead>
<tr>
<th>Grasshopper (Insect)</th>
<th>Spiders</th>
<th>Beetles (Insects)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Grasshopper" /></td>
<td><img src="image2" alt="Spiders" /></td>
<td><img src="image3" alt="Beetles" /></td>
</tr>
<tr>
<td>Consumer Green Vegetation - Leaves</td>
<td>Consumer Insects</td>
<td>Consumer Plant Material - Bark - Leaves</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Butterflies (Insects)</th>
<th>Grubs &amp; Insect Larvae</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image4" alt="Butterflies" /></td>
<td><img src="image5" alt="Grubs &amp; Insect Larvae" /></td>
</tr>
<tr>
<td>Consumer Flower Nectar</td>
<td>Consumer Leaves and plant Material</td>
</tr>
</tbody>
</table>