



Balcones Canyonlands National Wildlife Refuge  
24518 FM 1431, Marble Falls TX 78654  
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## **BENEFICIAL INSECTS**

**(or It's a Bug's Job)**

### **VOLUNTEER DIRECTIONS**

#### Need to Know

1. Your station, BENEFICIAL INSECTS (Station #6), will help students understand what insects do and how they are beneficial to us. The idea of “habitat” introduced at Station #5 will be reinforced to show the close relationship between insects and man. Describe how living organisms modify their physical environment to meet their needs. Identify and describe the roles of some organisms in living systems. Predict and draw conclusions about what happens when part of a system is removed. Make wise choices in the use and conservation of resources.
2. You **must include something about the Golden-cheeked warbler and Black-capped vireo into this program (a section in this guidebook has more on both birds)**. Any logical tie-in is good: insects as food, habitat the birds forage to find the food, insect threats to the birds, etc. After all, these birds are the reason there is a refuge near Austin. Furthermore, all of the resource management and public use management plans on the refuge must consider how these birds will be affected by man-induced impacts.
3. The section in these directions called “Organism and Environments” is a specific science TEK requirement. **Get to know the Organism and Environments TEKS and be ready to share this with the students.**
4. **A map** of the stations is in this guidebook to help you direct your group to the next station. They go clock-wise in number order. Please be ready to direct your group to the next sequential station.

#### **Sequence of Stations in Going Buggy**

1. What is an Insect?
2. Insect Families and Life Cycles
3. Collecting and Studying Insects
4. Insect Senses
5. Insect Habitat
- 6. Beneficial Insects**
7. Aquatic Insects



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### **GOLDEN-CHEEKED WARBLER (GCW)**

HABITAT: Old forests with big trees; shady, dense forests in steep-sided canyons & slopes as well as drier, flat hill tops. Requires Ashe Juniper (“cedar”) bark to construct nest. **Spanish Oak, Live Oak, cedar foliage provides insects, caterpillars, spiders, beetles for food.**

TERRITORY: 5-20 acres to forage;

NEST TERRITORY: 3-6 acres/ nesting pair

Female constructs Cup nest in old cedar and Hardwood (oak, elm) trees at least 15' high. All nests require cedar bark. **Bark is woven with spider webs.** Nest is tucked in forked vertical limb & camouflaged. Warblers usually nest only once/season unless accident or predation. Male stays nearby singing & defending during incubation. 3-4 eggs are hatched in 12 days & fledge 8-9 days later. Parents care for them for 1 month.

GCWs migrate to pine/oak habitat of southern Mexico & Central America in July-mid-August & return in mid-March.

### **BLACK-CAPPED VIREO (BCV)**

HABITAT: Dense, shrubby, broad-leafed (shin oak, hackberry, sumac, agarita, persimmon, Texas Mountain Laurel) young forest. Patchy habitat with 30-60% cover interspersed with open grassland.

Shrubby vegetation reaching from ground level to 6- 7' high.

TERRITORY: 1-16 acres NEST TERRITORY: 2-4 acres

Male & female select nest site between 3-'6' off ground (door knob height) in dense cover. Pendulous Cup Nest is made by female from grasses and **spider webs** and is suspended from its rim in the fork of a branch. Nest is completed in 2-3 days. They may nest more than once /year building a new nest each time. Incubation is 14-17 days and this work is shared by male & female (as well as fed by both). Fledge in 10-12 days.

BCVs arrive in mid-March to mid-April and stay until mid Sept. They spend their winter in western Mexico.



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## **ORGANISMS AND ENVIRONMENTS**

Within the living environment organisms, have characteristics, life cycles and interactions with all components of the natural environment. The natural environment plays a key role in the organism's survival. When changes in the environment occur organisms thrive, become ill or perish.

### **Example of Interaction with Environment**

Golden-cheeked warblers require cedar bark to build their nests for successful nesting here in Texas in the spring. The removal of cedar trees for development and grazing has resulted in the Golden-cheeked warblers having less natural environment in which to build nests and the species chances of survival have been reduced. The refuge provides an area where the cedar trees are protected which in turn protects the Golden-cheeked warbler.

### Getting Ready

Use the laminated activity station sign to identify your table (in the guide book).

### **Materials List**

Laminated Activity Signs (2)  
Table (1)  
Station Guide Book  
Flip board  
A map of a path at Doeskin Ranch  
A collection of insect habitat cards

### Taking Flight!



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## Station 6 – BENEFICIAL INSECTS

### Goals

Understand the role of insects. Understand the benefits of insects to nature and humans. Emphasize native bees (mason bees' life history and benefits).

### Background

This station begins by quickly exploring the answers to such questions as: What benefits do humans see from insects in the ecosystem? Are we dependent on insects? What would happen if there were no insects? The leader shows the children a number of different items, or points to something relevant in nature nearby, and asks the children what each item has to do with insects. Over the course of this activity, the children acquire an understanding of how insects have a positive impact on their world:

- Insects pollinate the flowers of plants.
- Insects recycle dead trees, plants, and animals by eating them.
- Insects limit mold and bacteria by eating other animal's leftovers.
- Many animals eat insects, and some only eat insects.
- Insects feed on other insects that eat our crops. (ETC.)

### SOLITARY (NATIVE) BEES

The European honeybee has been in a well-documented decline in the U.S. since the 1950s as a result of agricultural intensification, diseases, parasites, and pesticides. Unabated loss of this bee will have significant repercussions for large-scale, intensive agriculture to be sure. However, it will not be an ecological calamity. The conservation challenges facing native bees are where the real concerns for natural ecosystems lay.

There are 4 types of solitary bees:

1. Miners
2. Mason
3. Leafcutter
4. Carpenters



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The nesting habits of native bees can be classified into two categories: deadwood-nesters and ground-nesters. The majority of native bees in Texas are members of the latter group and either nest in burrows dug of their own labor in bare ground, in preexisting underground cavities (rodent burrows), or within clumps of vegetation. Species that nest in dead wood generally live in tunnels left by wood-boring beetle larvae in standing dead trees, under the loose bark of downed wood, or in hollow stems.

The main contrast between the honeybee (imported) and the Mason bee (native) can be made in how the bees gather the honey and then carry it back to the hive/nest. Honeybees are very efficient pollen carriers, using leg pockets, but this means not a lot of pollen gets spread around; also, honeybees tend to go to the same flower or tree until the nectar is depleted. Mason bees instead spread pollen that has gathered on the hairs of their stomach, spreading like flour from a sifter, and they will “flit” from blossom to blossom and tree to tree, increasing “cross pollination” and strengthening the fruit.

## **Activities**

### **1. Pictures to discuss (2-4 minutes)**

#### **Fruits, Vegetables, Chocolate Bar, Coffee**

Insects pollinate the flowers of these plants and plant by-products. Without insects visiting the flowers of these plants, few plants would pollinate and few flowers would produce seeds. If they couldn't produce seeds, they would eventually die off and disappear from the planet. Flies do more pollinating than any other type of insect. Bees are next, and then butterflies. Chocolate is made from the seeds of a cocoa tree's fruit. Coffee is made from coffee beans.

#### **Fallen Trees, Rotting Wood**

Insects recycle dead trees and plants by eating them. Plants, especially trees, consume a lot of the nutrients available in the soil and so lock up a lot of an ecosystem's nutrition. Subsequent generations of plants need these nutrients returned to the soil so that more plants can grow. Insects provide this service, particularly termites and beetles. Without insects, fungi and bacteria would decompose plant matter only very slowly. Dead plants and trees would pile up and it would be a very long time before they turned to dirt and provided room and nutrients for more plants to grow.



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## **Dead Bird, Raccoon Scat**

Insects recycle dead animals by eating them. Insects, especially flies, beetles and ants, very quickly consume dead animals. Although some birds and other animals are also scavengers, insects are the primary reason dead animals and dung don't pile up everywhere and make the world stink. Consider that the larvae that emerge from the eggs of a single fly can consume half a cow in just a few days. Here in Texas we have dung beetles that pat dung into little balls and then roll those balls off, where they bury the dung balls with their eggs. When the beetle eggs hatch, the beetle larvae eat the dung in the safety of an underground burrow.

## **Rotten Food in the House**

Insects limit mold and bacteria by eating other animal's leftovers. Ever wonder why old food left in the fridge only gets moldier and stinkier over time, while old food left outside usually disappears in a day or two? Although some animals will eat old food that's sitting outside, much of the food is eaten by insects like ants, flies, and beetles. The food hardly has time to get moldy and stinky. While mold can stink, bacteria are responsible for most of the stench. Mold and bacteria decompose organic matter much more slowly than insects recycle it.

## **Golden-cheeked Warbler, Frog, Lizard**

Many animals eat insects, and some only eat insects. Without insects, most of these animals would die and never be seen by people again. The golden-cheeked warbler, an endangered bird (depicted), is one of these animals. One of Doeskin Ranch's primary purposes is to preserve golden-cheeked warbler habitat. The golden-cheeked warbler is an insectivore, meaning that it primarily eats insects. They prefer to feed their young soft-bodied prey, such as caterpillars and spiders, rather than hard-bodied prey such as beetles.

## **Calling In The Troops, Ladybugs, Wasps And Praying Mantis**

Some crop plants like corn and cotton, which are important to humans, come under attack by pest insects. They call in the troops by emitting



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chemical signals that attract “bodyguard” insects like wasps. Plants evolved the ability to produce these chemical distress calls long ago.

Researchers have been probing how plants use these chemicals to communicate with animals. Their surprising findings have begun helping farmers boost the amount of crops they produce — and they do it with less need for toxic pesticides.

### **A Bee, is a bee, is a bee?**

Ask students:

1. How many types of bees do they think there are?
2. What do the words “native” and “solitary” mean?
3. What differences do you see between the bees?

European Honeybees make honey by collecting nectar from flowers. Without honeybees, there would be no honey.

Native (indigenous, from a place) or Solitary (lives alone) bees also pollinate flowers. The orchard Mason bee, a “solitary” bee, is very important for the pollinating of Texas' fruit.

Continue presentation with flip chart and talk about solitary bees and conservation information.

### **SOLITARY BEES**

The solitary bees that we will be talking about today are:

Miners  
Mason  
Leafcutter  
Carpenter



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## Commonalities among solitary bees:

Most nests are dug  
Underground  
In existing cavities and crevices  
Excavated into soft wood or plant stems  
Do not live in colonies but can share nests

### **Andrenid (mining) bees**

Over 2000 species  
Solitary, females dig burrows in ground  
Lay egg on large ball of pollen at the end of tunnel

### **Mason Bees**

300 species world wide, 140 in North America  
Make compartments of mud in their hollow nests  
Great spring pollinators, very efficient fruit tree pollinators  
Handle cold well.

### **Leafcutter bee**

Make small discs of leaves or petals

### **Carpenter bees**

500 species worldwide  
“semi-solitary”  
Males cannot sting, females can but generally don’t.  
Prefer open faced flowers

## **Habitat Loss, Degradation, and Fragmentation**

Much pollinator habitat has been lost to agriculture, resource extraction, and urban and suburban development. Although these land uses can provide floral resources and benefit some pollinators, many bees and butterflies are habitat-specific, and the loss of habitat that provides sites for overwintering, foraging for pollen and nectar, or nesting can be detrimental to these species.



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Habitat degradation, the decline in habitat quality, is another serious concern. For example, the loose, friable soil required by ground-nesting bees may be trampled by heavy foot traffic or the use of off-road vehicles. In cities, ground-nesting species may be particularly limited due to the large amount of landscape that has been covered with concrete or other impervious surface.

Many pollinators are adversely affected when large, intact tracts of habitat are broken up into smaller, isolated patches by road construction, development, or agriculture. These habitat fragments may not be large enough to meet all pollinator needs by themselves. Establishing and maintaining connectivity—safe passage among patches—is key to pollinator persistence in these areas.

## 2. Insect matching (5 minutes)

This activity demonstrates the important beneficial roles that insects play in our world

1. Place plastic bins (6) with pictures of roles in the bottom on the ground.
2. Students reach into bag contain the laminated cards with insect pictures and match the insect with the role by placing the picture in the correct bin.

Correct matches:

Pollinators: fly, bee, butterfly

Decomposers:

Dead trees: termites, beetles

Dead animals: fly, dung beetle

Rotten food: ant, fly, beetle

Food source: caterpillar, spider

## Quiz Your Guests

1. Name two ways insects are beneficial to us.
2. What would happen if all the yucca plants at the Refuge died?



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**Take Away: Insects need water, too!! You can help by placing rocks or sticks in a shallow birdbath or plant pot liner. Do NOT cover the rocks or sticks with the water. Many insects, like bees, cannot swim and need a landing spot or perch from which to drink water without drowning.**