



Balcones Canyon Lands National Wildlife Refuge  
518 FM 1431, Marble Falls TX 78654  
(512) 339-9432 X 70, jennifer\_brown@fws.gov  
Cell: (830) 220-9254

## **INSECT SENSES**

### **VOLUNTEER DIRECTIONS**

#### Need to Know

1. Your station, INSECT SENSES (Station #4), will help students understand how insect senses are different from our own and how insects and other arthropods use their senses. The station builds on anatomy introduced in What is an Insect (#1) and Studying Insects (#3) and helps prepare the students for information imparted in Insect Habitat (#6). Species have different adaptations that help them survive and reproduce in their environment. Insect senses are different from our own. Discuss how insects see (also bioluminescence), smell (pheromones), and hear sound as time allows.
2. You **must include something about the Golden-cheeked warbler and Blackcapped vireo into this program (a section in this guide book 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 guide book 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 Bridges to Birding**

1. What is an Insect?
2. Insect Families and Life Cycles
3. Collecting and Studying Insects
4. **Insect Senses**
5. Insect Habitat
6. Social & 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 1012 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).

Place the red ball/bead on the wire in the field about 50 feet from the station (or at a safe distance) where the students can try to look for it and find it.

### **Materials List**

Laminated Activity Signs (2)

Table (1)

Station Guide Book

Flip board

Red cellophane to look through

Straw-filled cylinders to approximate insect compound eyes

Insect Eyeglasses - 3

Handouts of "Information Sheet 6, Honey Bee Senses"

### **Taking Flight!**

Station 4 – INSECT SENSES : Goals

1. Understand how insect senses are different from our own
2. Understand how insects use their senses
3. Understand other arthropod senses



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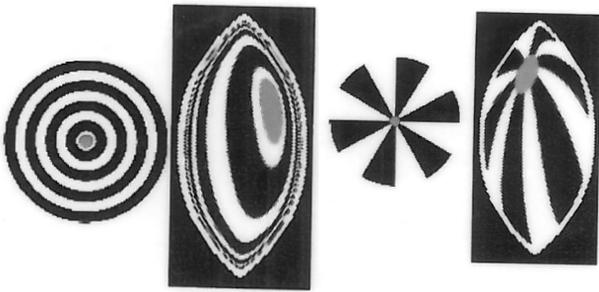
Lesson (flip board contains this information)

## 1. Insect Eyes

Insect see things differently than we do. They can see light that we can't. This light is called ultraviolet light. Just like dogs can hear sounds that are too high pitched for us to hear, insects can see light that has wavelengths too short for us to see. For example bees don't go to flowers because of the colors that we can see. Bees choose flowers for the ultraviolet colors that they can see.

Some insects don't see all the colors we can see. Red is a color that some insects don't see. If you hold red cellophane in front of your eyes you will see the world like these insects do. The colors don't look right do they?

**ACTIVITY 1:** Have the students look through the cellophane. Tell them to describe what the insects' world looks like through it.



The shape of an insect's eye also affects what it sees. Below are examples of what we see and what we believe a bee sees.

Insects have compound eyes. This means that their eyes are divided into segments. Scientists are not sure what insects see

through their compound eyes. Some think that they see lots of whole pictures each from a slightly different angle. Others think they see parts of the whole picture that their brain then puts together into the complete picture like putting together a puzzle.

**(ACTIVITY 2:** give each student a roll with straws to look into, they must hold it away from their eye about 6").

## 2. Insect Smell

Insects and other animals, even people, release chemicals from their bodies called pheromones. Pheromones are chemicals released by an organism into its environment enabling it to communicate with other members of its own species. In insect these chemicals are used to send a lot of different kinds of messages. Pheromones can signal alarm, create a trail to food, or signal sexual availability.

**ACTIVITY 3:** Place a red bead on a piece of wire out in the field to show how little smell is needed for an insect to detect it.



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**OPTIONAL ACTIVITY:** A small box containing film canisters are filled with various scents, a number is on the bottom of each canister. Mix up the containers then hand out one canister to each student. Have them find the other canister with their same scent. A canister decoding chart is in the guide book.

### 3. Insect Sounds

Insects make different sounds. Like pheromones, the sounds can communicate different things. Ask the kids what sounds insects make and why they make them.

**ACTIVITY 4:** Make a sound like a cricket. Use the toy in the Ziploc bag to give the students a cricket sound. The toy is a Ziploc bag in the guidebook.

4. Ask the kids about fire flies; do they know why fire flies flash and how they make the light; talk about bioluminescence and relate it to the chemical light sticks and bracelets they might have seen or owned. (information on bioluminescence is in the guidebook)

### Tips & Options:

You can find many interesting “fun facts” about insect senses. For instance, a grasshopper's ear seems to be placed close to its knee. Butterflies taste with their feet. Bees, too, are always favorites to discuss with students. When a bee stings, she releases an odor called an alarm pheromone to alert others to the danger. This pheromone stays on clothing, so if you are stung you should wash your clothing before wearing it again.

### Quiz Your Guests

1. Do insects have eyes like human eyes? (No, they have “compound” eyes.)
2. Humans release and react to smells like an insect. These smells are called what? (Pheromones)

### Take Away

What are the chemicals called that insects communicate with?