



# Using Open Source Tools for Accessible & Inclusive Eclipse Science & How You and Your Community Can Get Involved in the Eclipse Soundscapes Project



Dr. Trae Winter  
Chief Scientist  
ARISA Lab  
2023-09-30

MaryKay Severino  
Education Director  
ARISA Lab  
2023-09-30



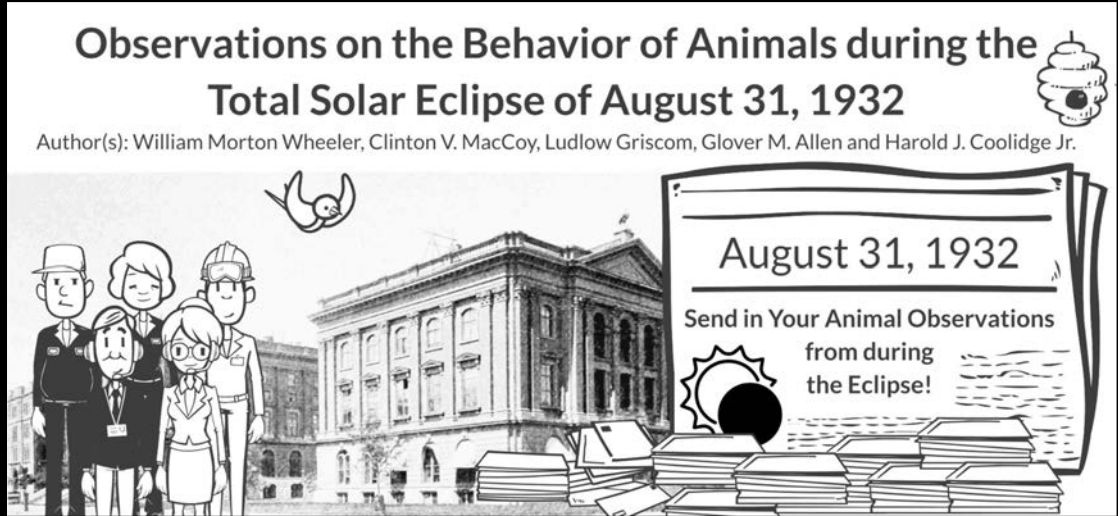
## Science Question:

How does life on Earth, specifically wildlife, respond to solar eclipses?

## Recreating a Study from ~ 100 years ago!



Map Courtesy of: [GreatAmericanEclipse.com](https://www.GreatAmericanEclipse.com)



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Eclipse Soundscapes is supported by NASA award No. 80NSSC21M0008





# Previous Studies Demonstrate that Solar Eclipses are Multi Sensory Events



**Watch** the Moon slowly creep in front of the Sun until it blocks the Sun from view.



**Listen** to animals, insects and people change their behavior as day suddenly becomes night.

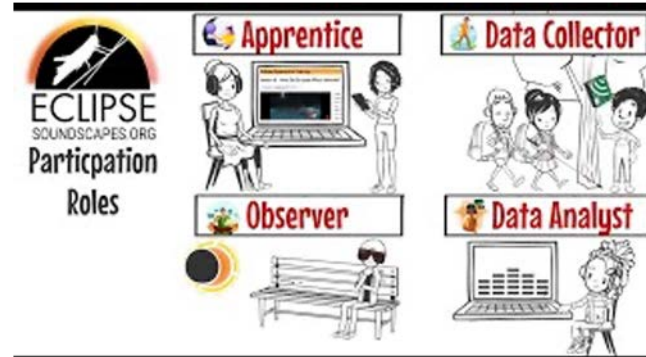


**Feel** the temperature change as the Sun's warm rays are briefly blocked from reaching the Earth.



# How to Participate?

Collect & analyze observations and sound data from the October 14, 2023, annular eclipse and the April 8, 2024, total solar eclipse to help us understand the impact of solar eclipses on various U.S. ecosystems.



**FREE** Online



## APPRENTICE (Online Eclipse Learning)

Learn about solar eclipses via free online learning and earn a certificate of completion.

**FREE** ANY Location



## OBSERVER (Eclipse Day Activity)

During the 2023 annular eclipse or the 2024 total eclipse path, go outside and observe with all of the senses available to you. Then share these observations with the ES team via the ES website!

**Equipment Required** 70%+ Eclipse Path



## DATA COLLECTOR (Eclipse Week Activity)

Collect data using an AudioMoth Recorder along or near (70%+) the 2023 annular eclipse path or the 2024 total eclipse path. Then share the data with the ES team by mailing the MicroSD card!

**FREE** Online



## DATA ANALYST (Online Data Activity)

Analyze sound data in 2024 and 2025 alongside scientists on the ES website. **(Coming 2024)**

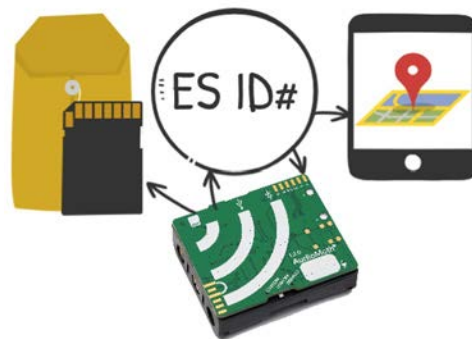


Partner






# DATA COLLECTOR









ES PROJECT PARTICIPATE RECEIVE UPDATES RESOURCES



Eclipse Soundscapes Data Collectors will collect important soundscapes data outside using an AudioMoth device for 5 days during the October 14, 2023 annular solar eclipse and/or the April 8, 2024 total solar eclipse. This page contains all information needed to train Data Collectors to complete this important role.

Data Collectors will get their device ready, choose an outdoor location, place the device outside 2 days before the eclipse, collect it 2 days after the eclipse, submit important recording location information, and then mail the MicroSD card to ES team. Once you submit your location info below and mail your data, you will earn a certificate for your submission!

### Data Collection Kit Components

 AudioMoth Device	 Waterproof plastic bag	 Zip Ties	 Padded Return Envelope	 3 AA batteries	 64 GB MicroSD card
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**Build Your Own Kit**

You will need: 1 AudioMoth Device (available from [LabMaker](#)), 1 waterproof plastic bag, zip ties (to attach AudioMoth to tree/pole), padded return envelope (to mail ES Team your MicroSD card), 3 AA batteries, & 64 GB MicroSD card (not included with AudioMoth). Please note that the ES Team will not be able to return MicroSD cards to participants who send us their data.

**HOW TO MAKE YOUR AUDIOMOTH MORE ACCESSIBLE WITH BUMP DOTS**

**Apply for a Free Kit:**

[CLICK HERE FOR FREE ES KIT INFO & APPLICATION](#)

Free 2023 Annular Eclipse Data Collector Kit Application Period is Closed.  
[Sign up for Updates](#) to be alerted when the next application period opens.



# AudioMoths



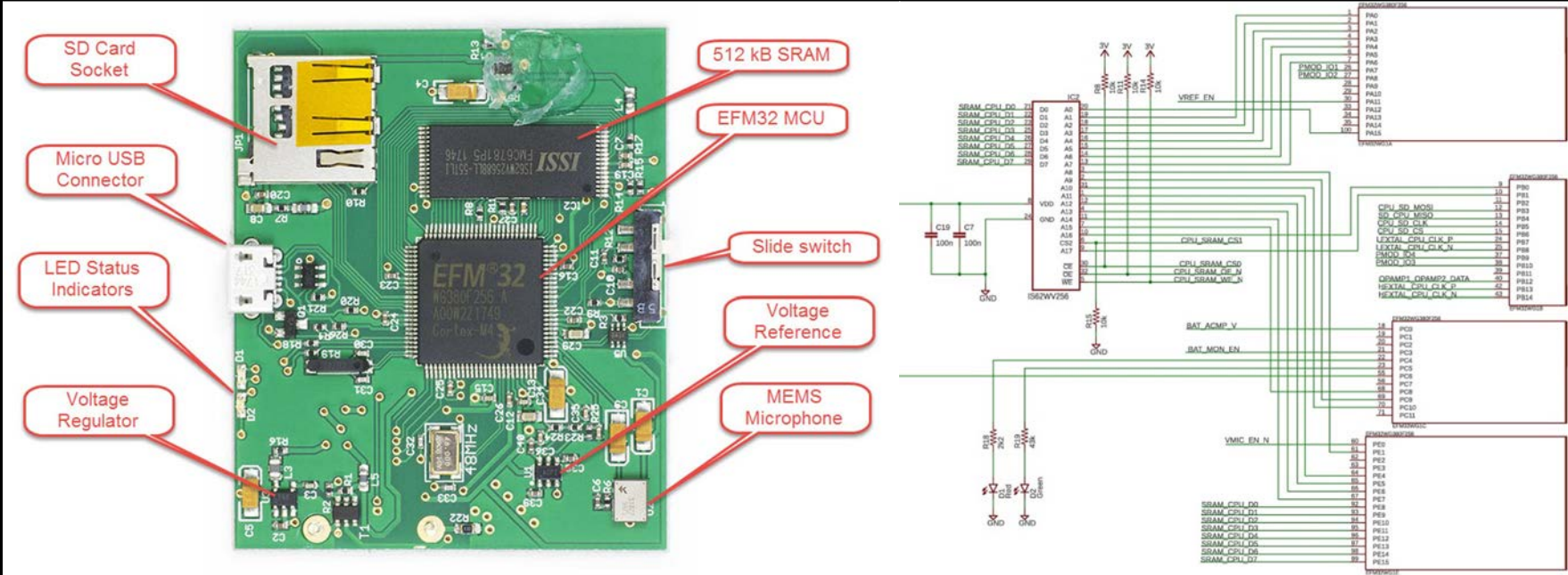
- Science grade data recorders
- 80% as good at < 1% of the cost (<\$100)
  - <https://groupgets.com/>
  - [LABmaker](#)
- Completely open source
- Heavily used by soundscape ecologists, hobbyists (birders) Designed for in-class and informal educator use
- Not accessible

<https://www.openacousticdevices.info/>

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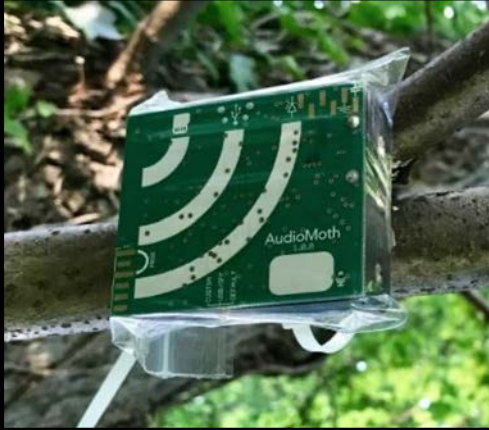


# AudioMoths



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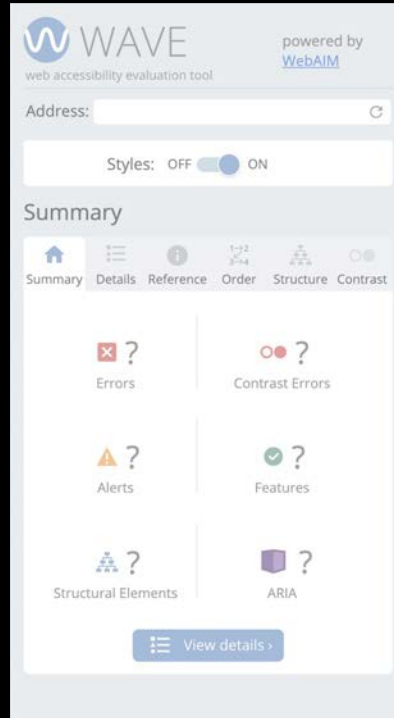
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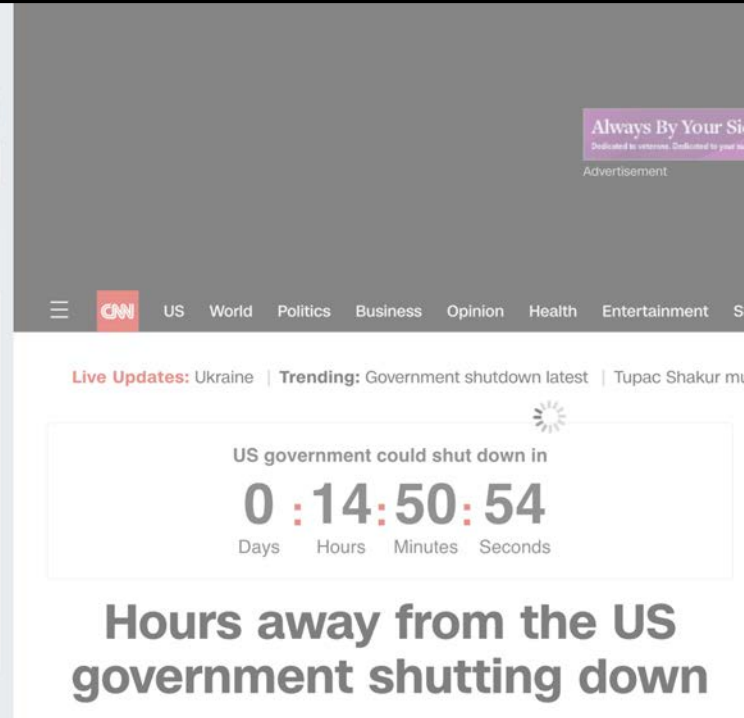


# Accessible Web Pages

- All pages meet or exceed current WCAG guidelines
- <https://wave.webaim.org/>
- Audio, video, text
- Conversational language



The screenshot shows the WAVE web accessibility evaluation tool interface. At the top, it says "powered by WebAIM" and "web accessibility evaluation tool". There is an "Address:" field with a refresh icon. Below that, a "Styles:" toggle is set to "ON". The "Summary" section is visible, showing a navigation bar with "Summary", "Details", "Reference", "Order", "Structure", and "Contrast". The main content area displays six categories of issues: Errors (red X icon), Contrast Errors (red circles icon), Alerts (yellow triangle icon), Features (green checkmark icon), Structural Elements (blue triangle icon), and ARIA (purple square icon). A "View details" button is at the bottom.



The screenshot shows a CNN news article. The top navigation bar includes "US", "World", "Politics", "Business", "Opinion", "Health", and "Entertainment". A "Live Updates: Ukraine" and "Trending: Government shutdown latest" are visible. The main headline reads "US government could shut down in 0 : 14 : 50 : 54" with "Days", "Hours", "Minutes", and "Seconds" below it. Below the headline, the text "Hours away from the US government shutting down" is displayed in large, bold letters. An advertisement for "Always By Your Side" is visible in the top right corner.

# ES Programming Ideas for Libraries, Facilitators, Educators



## Guide your community in becoming ES Apprentices!

Utilize Apprentice Training resources to host eclipse learning events. Each person can take the Apprentice Training quiz and earn their own Apprentice certificate afterwards!



## Invite Patrons to be ES Observers!

- If you are handing out eclipse glasses, provide them with an Eclipse Soundscapes flyer and invite them to be Observers.
- Meet before and after with your community to talk about and submit observations on the ES website together.



## Be an ES Data Collector in 2024!

- Put out AudioMoth on display several weeks before for patrons to look and touch.
- Choose a recording location together.
- Hang up a poster explaining that eclipse soundscapes are being collected and why. Then ask your community/group to write their ideas on what animal & insect changes they think will happen on the bottom of the poster.
- Sign up for Updates to be alerted of next free Data Collection Kit application!



Kit Cost: ~\$150



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# Resources

- External eclipse resources from NASA, AAS, others
- All Eclipse Soundscapes material is covered by a permissive Creative Commons License.
  - Free to use and change with attribution
- Educational resources developed by in-classroom educators, not scientists!
- Designed for in class use and informal educator use



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## Lesson Plan: What is a solar eclipse?

Created in collaboration with Tracey Kline, Lynn Public Schools, Lynn, MA

Grades 6-8, NGSS: MS-ESS1-1 Earth's Place in the Universe

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### NGSS STANDARD

**MS-ESS1-1:** Develop and use a model of the Earth-Sun-Moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.  
(Clarification Statement: Examples of models can be physical, graphical, or conceptual.)

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### LEARNING/ CONTENT/ LANGUAGE OBJECTIVE:

Students will be able to describe what a solar eclipse is in writing using a diagram.

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### LANGUAGE DEMAND:

Essential / Academic Vocabulary: solar eclipse, cosmic chance, orbit, shadow

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## LESSON STRUCTURE

### Beginning / Frame the Learning

*(clear entry routine, Do-Now, Activator, etc.; frame the lesson by sharing and explaining lesson objective, agenda, and goals)*

#### Do Now: Notice and Wonder:

Look at the diagram and write down 3-5 sentences and/or questions.

- Teacher will provide a diagram of a solar eclipse without it being labeled a solar eclipse.
- Have students share some of their thoughts on the diagram with the whole class and write them down on chart paper.
- Diagram provided in [Lesson Resources](#) below.

#### Review the objective with students.

### Middle

*(I do- teacher directed; we do- practice with the teacher; you do- partner/small group application with teacher support)*

\* Revisit language objective and agenda; formative assessment- check for understanding (intervention and extension opportunities available)

#### I do:

- Teacher shows a 1 minute video clip to students that describes what a solar eclipse is and why they occur. Teacher should stop and explain when needed throughout the video.
- Read text with the whole class. Teacher should stop and explain when needed.
- Video clip and text provided in [Lesson Resources](#) below.

#### You do (pairs):

- In pairs, students will complete two-column notes using the reading. They work together, but must each write the notes so they each have a copy.

### End

*(you do- independent application; summarize learning; clear exit routine)*

\* Formative assessment-exit ticket, check for understanding, etc.

#### You do:

- Individually, students will use their notes to create two diagrams and write about each diagram. One diagram will show the alignment of the Sun, Moon, and Earth during a solar eclipse. The second diagram will show the Moon's orbit around Earth misaligned so that a solar eclipse does not occur. Students will write 2-3 sentences explaining each diagram. **Student Directions:** 1. Draw a diagram of a solar eclipse. Label the Sun, Earth, and Moon. Write 2-3 sentences explaining why solar eclipses happen. 2. Draw a diagram of the Moon's orbit around the Earth. Write 2-3 sentences explaining why there is not a solar eclipse every month.



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## DIFFERENTIATION

*What supports and scaffolds am I providing based on the [WIDA can-do descriptors](#)?*

### DO NOW Word Bank/Sentence Starters:

- Provide word bank and sentence starters for students who need it.  
I notice ...  
I wonder...

### Two Column Notes Modifications:

- Provide cloze/fill-in-the-blank notes for students who need support finding information.
- Adapt the provided Cloze Two Column notes HANDOUT by adding numbers next to each topic and then write these numbers on the student's text next to the paragraphs in which they can find the topic and its details.
- Two Column Cloze Notes provided in [Lesson Resources](#) below.

### Diagram & Writing Modifications:

- Provide diagrams without labels.
- Provide sentence starters.  
Diagram 1 shows \_\_\_\_\_.  
Solar eclipses happen because \_\_\_\_\_.

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## FORMATIVE ASSESSMENT

*How am I measuring success? (Connection to your Content/ Language objective)*

Teacher can measure student success based on the diagrams and writing.



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## LESSON RESOURCES

- [What is a solar eclipse? LESSON PLAN](#) (Google Doc): When you open this link you will be prompted to make a copy of the Google document. This will allow you to download, print, and/or edit the above lesson plan to best meet your needs.
- [What is a solar eclipse? LESSON SLIDES](#) (Google Slides): When you open this link you will be prompted to make a copy of the Google slides. This will allow you to edit either of these slide options to best meet the needs of your classroom.
- [Video Clip, START – 00:57, from Solar Eclipse 101 | National Geographic](#) – Video clip is also embedded in Lesson slides. Entire video is not recommended for this lesson.
- [Do Now “What is a solar eclipse” HANDOUT](#) (Google Doc): When you open this link you will be prompted to make a copy of the Google document. This will allow you to download, print, and/edit the Google document to best meet the needs of your classroom.
- [Text/Reading “What is a solar eclipse” HANDOUT](#) (Google Doc): When you open this link you will be prompted to make a copy of the Google document. This will allow you to download, print, and/edit the Google document to best meet the needs of your classroom.
- [Two Column Notes for “What is a solar eclipse” HANDOUT](#) (Google Doc): When you open this link you will be prompted to make a copy of the Google document. This will allow you to download, print, and/edit the Google document to best meet the needs of your classroom.
- [Two Column CLOZE Notes for “What is a solar eclipse” HANDOUT](#) (Google Doc): When you open this link you will be prompted to make a copy of the Google document. This will allow you to download, print, and/edit the Google document to best meet the needs of your classroom.



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## Lesson Plan: Nature during a Solar Eclipse

Created in collaboration with Tracey Kline, Lynn Public Schools, Lynn MA

[READ MORE](#)



## Lesson Plan: Multi-sensory Observing

Created in collaboration with Tracey Kline, Lynn Public Schools, Lynn MA

[READ MORE](#)



## Home Extension Eclipse Day Activity & Post-eclipse Data Literacy Activity

[READ MORE](#)



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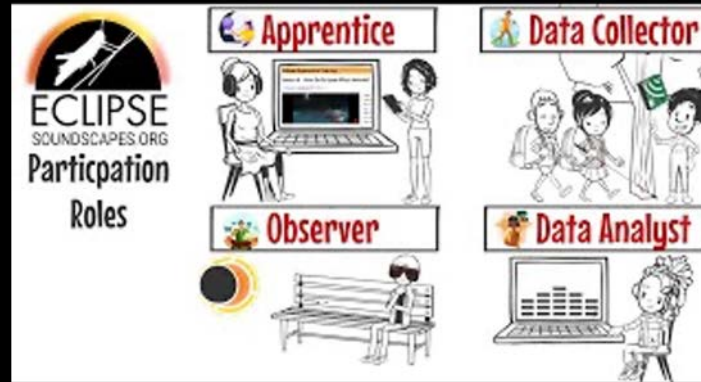






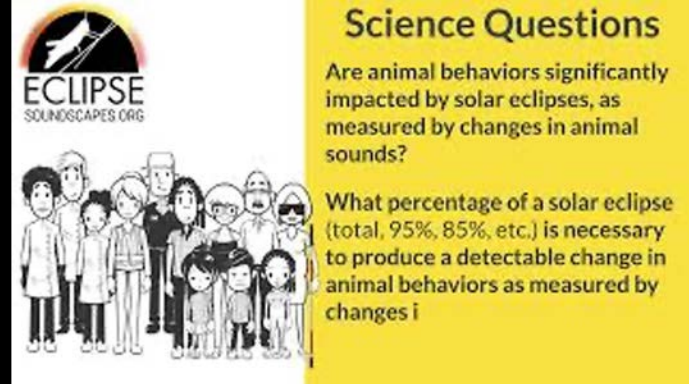
# More info...

## Participation Roles



Time: 2:20

## The Science



Time: 3:26

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# How to Participate?

Help collect observations and sound data from the October 14, 2023, annular eclipse and the April 8, 2024, total solar eclipse to help us understand animals and insects respond?

**FREE**

**OBSERVER**  
(Eclipse Day Activity)

**ANY**  
Location



Find on  
SciStarter



During the 2023 annular eclipse or the 2024 total eclipse path, go outside and observe insect & animal behavior with all of the senses available to you. Then share these observations with the ES team via the ES website!

**Equipment  
Required**

**DATA COLLECTOR**  
(Eclipse Week Activity)

**70%+**  
Eclipse Path



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