

**Lesson 1:**

**How are organisms responding to rapid ecosystem change?**

| **Unit: Adaptation and Evolution: Response to Climate Change in Lady Beetles** | **Essential Question: How are organisms responding to rapid ecosystem change?** |  **Duration:** 1 one-hour period, plus homework |
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| **NGSS Performance Expectation(s):** HS-LS2-6. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.HS-LS4-5. Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species. |
| **Learning Targets (Students will be able to…):** * Demonstrate understanding that climate change involves not only global warming, but also increased weather extremes and seasonal shifts.
* Explain how certain kinds of insects survive the winter.
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| **Student Evidence:** * Completed activity handouts
* Active demonstration of understanding during class discussions
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| **Materials :*** [Student Handout #1: Whiplash Weather Reading Guide *(HO 1.1)*](https://docs.google.com/document/d/1AKS9YxrZM0Rv5zzYANC6KCmF1zgrLtGU/edit?usp=sharing&ouid=111015151090405190057&rtpof=true&sd=true)
* [Student Handout #2: How Do Insects Survive The Winter? *(HO 1.2)*](https://docs.google.com/document/d/10FJwiLwfs-3jdsliCyvuT0jrGaEXPJOgQ1o7li1QwJc/edit?usp=sharing)
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| **5E LESSON SEQUENCE** |
| **Engage: What are some ways that organisms respond to temperature change?** |
| * Show the short film, “Liz Hadly Tracks the Impact of Climate Change in Yellowstone”, <https://www.youtube.com/watch?v=z6JVmhKsHDo> (7.5 min.) *Suggestion: Show the film once without commentary, pauses, or discussion. Show the film again after doing the demonstration with a live insect, see below.*
* Put an insect in a refrigerator, submerge in ice, and/or in a freezer; ask students, what do you predict will happen and why?
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| **Explore: What is the nature of climate change - is it only warming?** |
| * Re-show the short film, “Liz Hadly Tracks the Impact of Climate Change in Yellowstone” (7.5 min.) *Suggestion: Make students aware of the following four discussion questions before showing the film again, so they know how to focus their attention as they watch.*
* Facilitate a class discussion about the following questions. Encourage students to use examples from both the short film and their previous knowledge or personal experience.
1. Does climate change affect life?
2. What is the nature of climate change - is it only warming?
3. How are organisms responding?
4. Are there “winners” and “losers” in response to climate change?
* Provide students with Student Handout #1 (Whiplash Weather Reading Guide) and access to the articles linked on the Handout. Direct students to read at least the first linked article (from the Guardian), and the other two if you wish.
* Students will read the articles and record their learning on the worksheet.
* Teacher evaluates understanding, using formative assessment technique of choice (small group discussion, pair-share, whiteboards, Kahoot, whole-class discussion, etc.)
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| **Explore (homework): How do insects cope with climate change?** |
| * Students complete Student Handout #2, “How Do Insects Survive the Winter?”
* *Next day/next lesson:* Teacher evaluates understanding, using formative assessment technique of choice (small group discussion, pair-share, whiteboards, Kahoot, whole-class discussion, etc.)
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