

MOUNTAINFILM FOR STUDENTS

REWILDING HONEYBEES

DIRECTOR Cameron Nielsen DURATION 10 min

Honeybees, who are essential for agricultural success, are in dire need of an upgrade in their digs. Conventional man-made beehives lose 40 to 50 percent of their colonies each year, but this is not the case in the wild, where bees exist in healthier, happier conditions. Progressive conservationist Michael Thiele is "re-wilding" honey bees — introducing swarms to habitats that are more conducive to the instinctive preferences that allow them to thrive.



Standards

COLLEGE AND CAREER READINESS ANCHOR STANDARDS FOR READING

CCSS.ELA-LITERACY.CCRA.R.1 / Key Ideas and Details

Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

CCSS.ELA-LITERACY.CCRA.R.8 / Integration of Knowledge and Ideas

Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.

CCSS.ELA-LITERACY.CCRA.R.9 / Integration of Knowledge and Ideas

Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

CCSS.ELA-LITERACY.CCRA.R.10 / Range of Reading and Level of Text Complexity

Read and comprehend complex literary and informational texts independently and proficiently.

COLLEGE AND CAREER READINESS ANCHOR STANDARDS FOR SPEAKING & LISTENING

CCSS.ELA-LITERACY.CCRA.SL.1 / Comprehension and Collaboration

Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

CCSS.ELA-LITERACY.CCRA.SL.2 / Comprehension and Collaboration

Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

CCSS.ELA-LITERACY.CCRA.SL.3 / Comprehension and Collaboration

Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric.

CCSS.ELA-LITERACY.CCRA.SL.4 / Presentation of Knowledge and Ideas

Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.



Key Vocabulary apiary, apiculture, bees, ecology, honeybee, agriculture, ecosystem

Filmmaker Interview



CAMERON NIELSEN

Why did you become a filmmaker and how did you get started?

I became a filmmaker out of my concern for the decline of the honeybee population and wanted to give bees a voice. I think that real change comes out of good stories that allow people to empathize with someone's situation. I got inspired to make a film about a mural artist painting 50,000 honeybees in murals (the number of bees in a healthy thriving hive). At the time I was an undergraduate at Quest University Canada, where I had the option to create my own curriculum. So, I started reading books, studying different documentaries, watching tutorials online, experimenting with equipment, and asking lots of questions. I was really passionate about

the subject I chose to make a film on so I poured my heart and soul into the project and fell in love with documentary storytelling in the process. Is there an action you hope people are inspired to take after seeing this film? I hope that people keep bees in a way that allows them to thrive.

"I think that real change comes out of good stories that allow people to empathize with someone's situation."

When you made the film, did you have a specific audience in mind?

I wanted to reach as broad of an audience as possible but was focused on people that were already environmentally conscious or might have an interest in bees.

When editing the film, was there anything you wished you could have included in the final cut?

When editing *Rewilding Honeybees*, I cut a scene with Professor Thomas D. Seeley suggesting that commercial beekeeping is like raising chickens meat/eggs, and observing bees in the wild is like bird watching. I thought it was an interesting message but in the end, didn't make sense to keep in the film.

What are some of the challenges you encountered while making this film?

In the first cut of the film, I included a scene where the main character, Michael Thiele, criticized commercial beekeeping in a harsh way. When I showed the film to Michael, he didn't like the way he came off, because it was divisive instead of calling for change so we had to go back and film the scene again even though I didn't want to. However, it made the film better in the end.

What's the next big adventure or film project on the horizon for you?

I am attending the UC Berkeley Graduate School of Journalism to continue growing as a filmmaker and storyteller.

What is one piece of advice you can give students that you wish someone had shared with you?

If you're interested in becoming a filmmaker, invest in good audio equipment early, it makes all the difference.



Pre-Screening Activities

Pre-Screening Activity 1

This article, titled <u>"Bumblebees are going extinct in a time of 'climate chaos</u>" by Douglas Main from *National Geographic*, will give students background information on why bee populations are decreasing as a result of rising temperatures.

You could read the article as a class, divide into small groups, or complete a jigsaw to read this article. Small groups are responsible for reading a section and reporting to the class a short summary of what they learned.

You could also have students write a quick three-sentence summary of the article, using these sentence stems:

Main from National Geograph	nic, tells that bees are important because
	·
nowever, as a result of	
Because of	the bee population is

Example: Bumblebees are going extinct in a time of climate chaos" by Douglas Main from *National Geographic*, tells that bees are important because **bees are responsible for spreading pollen and fertilizing crops that we eat.** However, as a result of **rising temperatures and temperature swings**, the bee population has **decreased**. Because **bees are better suited to cold weather**, the bee population is **declining because of rising temperatures**. For example, the last five years were the hottest ever recorded in 139 years, according to the U.S. National Oceanic and Atmospheric Administration.

Pre-Screening Activity 2

This video, <u>The Amazing World of Bees</u> (6:55) from Animalogic, is a very informative, easy to watch video explaining the evolution of bees, amazing bee facts, as well as covering the impacts pesticide use, parasites, fungi, and global warming have on the bee population.

You could show this video to the class prior to watching the film *Rewilding Honeybees*, to give students background information on why bees are so important and why their populations are decreasing. Students could write two things they learned on a sticky note to share with the class, or they could do a simple turn and talk to a partner, to share two things they learned from the video.

After they watch this video, they could share a prediction about what they think the film *Rewilding Honeybees* will be about. After watching the film, students could share if their prediction about the video was true or false.

Pre-Screening Activity 3

This infographic, from EcoSapien, titled <u>"The Amazing</u> <u>World of Bees"</u> gives easy to read and interesting facts about bees.

You could have the students review this with a partner or by themselves and write down 2-3 questions they have on a sticky note. They could then rotate through the classroom, or share their questions with the class to see if anyone either has the answer and/or has the same question that they have.

Example: What is waggle dancing?

You could then divide the class up into groups based upon the similarities of questions they have, and they would be responsible for doing a quick search (you could limit it to up to 10 minutes, dependent upon the time constraints you may have), and then the small group would be responsible for presenting their question and the answers to it.

Example: This video from the Smithsonian Channel explains what a <u>waggle dance</u> is.



Discussion Guide

GENERAL/OPEN PROMPTS

1. What are the benefits of rewilding honeybees, as articulated in the film, Rewilding Honeybees?

EXPLORING SELF

1. In the film, Michael Thiele argues that rewilding honey bees puts the way we think about bees upside down, and that with this shift, our role as human beings shifts too. What do you think Thiele means by this? How would changing our relationship to bees change our role as human beings?

EXPLORING THE WORLD

1. In the film, *Rewilding Honeybees*, (6:30-6:49) Michael Thiele states that the decline of the bee population shows us the "consequences of that kind of commodity-driven thinking." What is he referring to? Thiele continues, and states "Where are the ethics and moral? Where is the respect for life? That we all belong to each other, that the way we treat this life form represents the way we treat ourselves." What is he referring to when he says that the way we treat this life form [bees], represents the way we treat ourselves?

EXPLORING FILMMAKING

- 1. Why do you think the filmmaker, Cameron Nielsen, chose to make this short film? What was his motivation behind filming this approach to supporting the bee population, as opposed to making a film about traditional apiarists/beekeepers?
- 2. Rewilding Honeybees is Cameron Nielsen's second film about bees. His other film, <u>The Good of the Hive</u>, focuses on a mural at Janney Elementary School in Washington D.C and the work of Matthew Willey, an artist whose mission is to hand-paint 50,000 murals of honey bees around the world, and "ignite radical curiosity for planetary health issues through art and storytelling." Do you think *Rewilding Honeybees* supports this mission? What are some other ways Cameron Nielsen and Matthew Willey could ignite radical curiosity in honey bees? What other issues would be important to cover?

EXPLORING SOCIAL ISSUES

- 1. Why do you think honey bees thrive in the wilderness vs. in apiaries?
- 2. What is the difference between an apiculturist and an apiarist?
- 3. In the film, Michael Thiele states that there is no state or federal regulation to grant bees any basic rights, and that instead the primary focus of apiarists and agriculture is to make money. What would basic rights for the honey bee look like? How would that benefit the lives of honey bees, and thus our agriculture? Do other animals have basic rights?

SENSE OF WONDER

1. What would the world look like without apiaries? Would agriculture still exist if there were only wild hives? Would we still be able to get all of our avocados, apples, almonds, and other produce and food that is dependent upon bee pollination?

Activities

Activity 1: Part 1

The \$11 billion almond industry of California is directly dependent upon mass quantities of bees for pollination. However, the almond industry's use of pesticides and overuse of bees is responsible for killing up to 30% percent of the bee population leased to California's central valley to help with almond production.

For this activity, students will be reading two articles and an infographic to contrast the information presented in the articles and infographic, to build critical thinking skills around information presented and news sources.

First, using Newsela.com (you can create a free account using your school's Google Drive account or school email), search for the article <u>"Like sending bees to war": the deadly truth behind the almond-milk obsession"</u>. *Note:* The article can be translated into Spanish, can be read aloud to the students, or the Lexile Score can be changed to adapt reading levels. The lowest Lexile Score this article comes in is 600, which correlates to a 3rd-grade reading level. However, when placed at this reading-level, the vocabulary and length of the article is shortened to make it more accessible.

It is recommended to read this article first as a class and discuss its findings, and the synergistic relationship between almond trees, bees, economic demand, and the use of pesticides.

As the teacher, this could either be a quick discussion, or you could graph the discussion to anchor thinking, by using a four-square, and filling it in as you learn facts from the article. Some questions that may follow the discussion or can help with the discussion are:

- Why do you think the almond farmers are inclined to use pesticides?
- Why do you think there is such a high economic demand for almonds?
- How does the high demand of almonds impact the beekeeper?

Almond Trees	Bees	Economic Demand	Use of Pesticides
• Orchards cannot function without bees	 Almond production demands that bees arouse from winter dormancy two months earlier than what is natural to pollinate almonds Bees concentrated in one spot lead to the increased likelihood that they will become sick and spread sickness quickly Dennis Arp loses 30% or more of his bees per year (one third of his workforce) 	 Average American eats 2 lbs of almonds per year Sales of almond milk has grown 250% to 1.2 billion (4x more than any other plant-based milk) Almond groves in Central Valley in California are the size of Delaware (up from 500,000 acres in 2000) 	 Dennis Arp has to apply regular chemical treatments to his bee colonies so they won't die. He has to keep enough bees alive to pollinate the almonds of the Central Valley 35 million pounds per year of pesticide is used to produce almonds in the Central Valley One of the herbicides used is glyphosate, which has been linked to cancer in humans

Activity 1: Part 2

After completing Part 1 and dependent upon the students' reading ability, they can either review this infographic, titled <u>"Committed to Honey Bee Health"</u> or read this article, <u>"A Mutually Beneficial Relationship,"</u> which are both provided by CaliforniaAlmonds.com, which is a division of the Almond Board of California and is responsible for providing information and research to the stakeholders of the Almond industry.

After reading the <u>first article from Newsela.com</u>, provide these two sources (infographic and article from CaliforniaAlmonds.com, or either/or) asking students to think critically about the information presented in these two sources.

Although both sources were developed as ways to explain what the Almond Industry is doing to help the honey bee in response to high economic demand of almonds, it would be interesting to ask the students the following questions:

- Does the article/infographic contain enough information to explain almond agriculture's negative impact on the honeybee? Why or why not?
- What information did these two sources from CaliforniaAlmonds.com omit?
- Why do you think information covered in the first article from Newsela.com was omitted from the article/ infographic from CaliforniaAlmonds.com?



Optional: If your students are interested in the effects of glyphosate, here are links to more articles that discuss the effects of glyphosate use on both humans and the environment, and recent rulings in courts nationally and internationally:

- <u>"California court upholds verdict in Monsanto cancer case"</u> from the Associated Press via ABC news (July 21, 2020)
- <u>"Germany to ban use of glyphosate weedkiller by end of 2023"</u> from the Agence France-Presse via *The Guardian* (September 4, 2019)

After reviewing these two sources and optional articles on the use of glyphosate, it would be interesting to rewatch *Rewilding Honeybees* to discuss whether or not rewilding honeybees would potentially help the almond industry.

RECOMMENDED EXTENTIONS

<u>"Rewilding: One California man's mission to save honey bees</u>" is a *Rueter's* article featuring Michael Thiele, the passionate apiculturist in the film, *Rewilding Honeybees*. The article could be used to reinforce everything learned in the short film.

<u>"Wild bees are building their homes from plastics--and scientists aren't sure why,</u>" by Sarah Gibbens, an article from *National Geographic*, explains how wild bees are using discarded plastic material to entirely make their nests

Ever wonder what a tiny bee harness looks like? Or how scientists learned that bees are such good swimmers? This *New York Times* article, titled <u>"Watch Bees Surf to Safety on Waves They Create"</u> by Emma Goldberg, summarizes a research study of honeybee's wings and how their wings help them to swim when they fall in water. The researchers conducted the study of bees' wings to be able to better design robots "capable of traversing sky and sea." *Note: A free account is required to access the content.*

This New York Times article, titled <u>"How Bees Avoid Bumping Into Nature's Obstacle Course"</u> details another research study of honeybees and how bees actually speed up their flying when flying in windy conditions to avoid obstacles in tight spaces. The researchers built mini bee obstacle courses, and the article shows videos of the bees making their way through the obstacles. Note: A free account is required to access the content.

National Pollinator Week was from June 22–28, 2020. The next Pollinator Week will be June 21–27, 2021. This week is celebrated in all 50 states, and has also become an international celebration of "the valuable ecosystem services provided by bees, birds, butterflies, bats and beetles." The <u>Pollinator Week Toolkit</u> is a wealth of resources for extensions, including the idea of requesting a local establishment or building to light up for Pollinator week in yellow and black, which in the past has included the Empire State Building and San Francisco City Hall. As a class, you could write to a local establishment requesting them to "light up" for Pollinator Week!

This compilation of <u>word problems</u> from the Pollinator Partnership School Garden Kit, all feature math word problems with bee-themes. <u>Here is the answer key</u>. These could be completed as a warm-up activity in any class, or as a follow-up activity to watching *Rewilding Honeybees*.

This list, titled <u>"Top 5 Must-Watch Honeybee and Beekeeping Documentaries</u>" from the website Backyard Beekeeping, gives detail on documentaries to further your interest in declining bee population and the decline in bee population.

TED-Ed's lesson and video <u>"Why do honeybees love hexagons"</u> (3:58) by Zack Patterson and Andy Peterson, details how honeybees are able to calculate angles and live in one of the most "mathematically efficient architectural designs around: the beehive." The "dig deeper" tab has recommended activities to further your students' understanding of why bees use hexagons, to answer the <u>"Honeybee conjecture,"</u> a 2000-year old math problem. In this lesson, from the Hungry Teacher, titled <u>"Mind Your Own Beeswax"</u> students use mathematics to examine the beehive, and are asked to discuss angles, areas, perimeters, volumes, as well as linear and quadratic patterns.

This article, titled <u>"How to Identify Different Types of Bees</u>" by Tom Order from Treehugger.com, which is a website dedicated to providing trustworthy content to help make sustainability mainstream, gives details on the different types of bees.

Everything you need to know about <u>Honey Bee Genetics.</u> Drone bees have only 16 chromosomes, which they get from the queen, as only the females in the colony pass down their chromosomes, as opposed to humans, where we receive 46 chromosomes, 23 from our mother and 23 from our father. There is also a section and video in the article, titled "How Beekeepers Can Hurt the Bee Population."

This lesson from National Agriculture in the Classroom for grades 3-5, titled <u>"Honey Bees: a Pollination</u> <u>Simulation</u>," is a two-hour lesson with the purpose of helping students identify the parts of the honeybee, the stages of its lifecycle, and its role in pollination.

REFERENCES

The Amazing World of Bees [Video file]. (2017, January 03). Retrieved July 25, 2020, from https://www.youtube.com/watch?v=K3oMN1a_pdg

The Amazing World of Bees. (n.d.). Retrieved July 25, 2020, from https://553b879d-e14a-4054-9f63-d41e81b5db68.filesusr. com/ugd/1f7c11_d4ec7fec3bbd442bba43cc70f1113b02.pdf

Bee Health. (n.d.). Retrieved July 25, 2020, from https://www.almonds.com/why-almonds/growing-good/honey-bees

Buggy Word Problems. (n.d.). Retrieved July 25, 2020, from https://www.pollinator.org/pollinator.org/assets/generalFiles/Buggy-Word-Problems.pdf

California court upholds verdict in Monsanto cancer case. (2020, July 21). Retrieved July 25, 2020, from https://abcnews.go.com/US/wireStory/california-court-upholds-verdict-monsanto-cancer-case-71889223

Committed to Honey Bee Health. (n.d.). Retrieved July 25, 2020, from https://www.almonds.com/sites/default/files/2020-05/Almanac%202019%20-%20Bee%20Page%2011.pdf

Germany to ban use of glyphosate weedkiller by end of 2023. (2019, September 04). Retrieved July 25, 2020, from https://www.theguardian.com/environment/2019/sep/04/germany-ban-glyphosate-weedkiller-by-2023

Giaimo, C. (2020, June 26). How Bees Avoid Bumping Into Nature's Obstacle Course. Retrieved July 25, 2020, from https://www.nytimes.com/2020/06/26/science/bees-obstacles-collisions.html?searchResultPosition=3

Gibbens, S. (2019, June 05). Wild bees are building their homes from plastic-and scientists aren't sure why. Retrieved July 25, 2020, from https://www.nationalgeographic.com/environment/2019/06/wild-bees-building-homes-from-plastic/

Goetz, N., & Henderson, M. (2018, November 04). Honey Bee Genetics. Retrieved July 25, 2020, from https://www.perfectbee.com/learn-about-bees/the-science-of-bees/honey-bee-genetics

Goldberg, E. (2019, November 18). Watch Bees Surf to Safety on Waves They Create. Retrieved July 25, 2020, from https://www.nytimes.com/2019/11/18/science/bees-surfing-water.html?action=click

Krulwich, R. (2013, May 14). What Is It About Bees And Hexagons? Retrieved July 25, 2020, from https://www.npr.org/sections/krulwich/2013/05/13/183704091/what-is-it-about-bees-and-hexagons

Main, D. (2020, February 06). Bumblebees are going extinct in a time of 'climate chaos'. Retrieved July 25, 2020, from https://www.nationalgeographic.com/animals/2020/02/bumblebees-going-extinct-climate-change-pesticides/

McGivney, A. (2020, January 26). "Like sending bees to war": The deadly truth behind the almond-milk obsession. Retrieved July 25, 2020, from https://newsela.com/read/bees-almond-milk/id/2001004363/?search_id=c83ae190-331d-48ac-8dd7-dc948e329301

Mind Your Own Beeswax. (2015, June 20). Retrieved July 25, 2020, from https://hungryteacher.com/products/mind-your-own-beeswax/

Nielsen, C. (Director). (2016, July). The Good of the Hive [Video file]. Retrieved July 25, 2020, from https://www. thegoodofthehive.com/films

Oder, T. (2020, June 30). How to Identify Different Types of Bees. Retrieved July 25, 2020, from https://www.treehugger. com/how-identify-different-types-bees-4864333

Pollinator Week Toolkit. (2020). Retrieved July 25, 2020, from https://www.pollinator.org/pollinator.org/assets/generalFiles/ Pollinator-Week-2020-Toolkit_V2.pdf

Ross, J. (2019, October 24). 'Rewilding:' One California man's mission to save honey bees. Retrieved July 25, 2020, from https://www.reuters.com/article/us-california-beekeeper/rewilding-one-california-mans-mission-to-save-honey-bees-idUSKBN1X31CE

Spielmaker, D. (n.d.). Honey Bees: A Pollination Simulation. Retrieved July 25, 2020, from https://www.agclassroom.org/teacher/matrix/lessonplan.cfm?lpid=84

Top 5 Must-Watch Honeybee and Beekeeping Documentaries. (2020, March 11). Retrieved July 25, 2020, from https://backyardbeekeeping101.com/best-beekeeping-documentaries/

What's the Waggle Dance? And Why Do Bees Do It? [Video file]. (2016, May 10). Retrieved July 25, 2020, from https://www. youtube.com/watch?v=LU_KD1enR3Q

Why do honeybees love hexagons? - Zack Patterson and Andy Peterson. (n.d.). Retrieved July 25, 2020, from https://ed.ted.com/lessons/why-do-honeybees-love-hexagons-zack-patterson-and-andy-peterson