

ABUNDANT CALIFORNIA

ORANGES: A TASTE OF CALIFORNIA SUNSHINE

OVERVIEW

Who doesn't love sweet, juicy navel oranges? In this lesson, students read about agricultural innovator Eliza Tibbets, observe individual navel oranges up close, and compare the taste of navel oranges to other citruses. In doing so, they begin to understand the important role navel oranges have played in shaping California.

GRADE LEVEL: 3-5



CENTER FOR ECOLITERACY



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CALIFORNIA FOOD FOR CALIFORNIA KIDS® downloadable resource

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Learning in the Real World®

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CALIFORNIA FOOD
FOR CALIFORNIA KIDS®

ORANGES: A TASTE OF CALIFORNIA SUNSHINE

FOOD AND CULTURE OVERVIEW

Although most people are aware that food provides nourishment, we rarely consider the geographic, historical, and cultural conditions that have influenced what we eat and how we procure, prepare, and serve it. By exploring food through a prism of culture, time, and place, we build a deeper appreciation of how regional characteristics have shaped our global food system.

LESSON OVERVIEW

Who doesn't love sweet, juicy navel oranges? They keep well, are easy to eat, and taste delicious. They are also suited to California's climate, soaking up the sun as they ripen in the fall and winter.

We can thank Eliza Tibbets for these refreshing, healthful oranges. The energy and resourcefulness of this early California settler helped move navel oranges from rarity to becoming one of California's most important crops and the world's most popular fruits.

In this lesson, students read about Eliza Tibbets, observe individual navel oranges up close, and compare the taste of navel oranges to other citruses. In doing so, they begin to understand the important role navel oranges have played in shaping California.

GRADE LEVEL

3-5

LENGTH

One to two 50-minute periods

LEARNING OBJECTIVES

Students will:

- Describe one chapter in the history of California’s navel orange industry.
- Hone observation skills, identifying sufficient details of a particular navel orange to pick it out from others.
- Compare the tastes and textures of different citrus varieties grown in California.

STANDARDS CONNECTIONS

NEXT GENERATION SCIENCE STANDARDS

Disciplinary Core Ideas:

- Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)
- Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth’s resources and environments. (5-ESS3-1)

Science and Engineering Practices:

- Obtaining, Evaluating, and Communicating Information. Communicate scientific and/or technical information orally and/or in written formats, including various forms of media as well as tables, diagrams, and charts.

CA HISTORY-SOCIAL SCIENCE CONTENT STANDARDS FOR CALIFORNIA PUBLIC SCHOOLS. KINDERGARTEN THROUGH GRADE 12

4.4. Students explain how California became an agricultural and industrial power, tracing the transformation of the California economy and its political and cultural development since the 1850s.

COMMON CORE STATE STANDARDS-ENGLISH LANGUAGE ARTS

- RI.3.3. Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. RI.4.3. Explain events, procedures, ideas, or concepts in a historical, scientific or technical text, including what happened and why, based on specific information in the text. RI.5.3. Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
- W.3.7. Conduct short research projects that build knowledge about a topic. W.4.7. Conduct short research projects that build knowledge through investigation of different aspects of a topic. W.5.7. Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.

VOCABULARY

- **Agriculture** - farming.
- **Arid** - having little rain.
- **Cash crop** - a crop produced to sell rather than to be used by the grower.
- **Citrus** - an acidic fruit with juicy flesh and a spongy rind.
- **Clone** - a plant or animal that has identical genes to its parent.
- **Grafting** - attaching a twig or cutting from a plant to the trunk or stem of another living plant.
- **Industry** - a branch of business or trade, such as the citrus industry.

MATERIALS

- Copies of the “10 Fun Facts about Navel Oranges,” “California’s Orange Queen,” and “What Makes It Unique?” student handouts
- Navel orange for each pair or individual student
- Bag or box for holding oranges
- Scissors
- Tape or glue
- Napkins
- Additional citruses for a comparison tasting (optional)
- Plates for serving citruses (optional)
- Sharp knife (optional)
- Toothpicks (optional)

PREPARATION

- Make copies of the student handouts. (You may choose to have “10 Fun Facts about Navel Oranges” and “California’s Orange Queen” available online for students to read.)
- Procure enough navel oranges for each pair or individual student.
- (Optional) If you will be doing a comparison tasting, obtain at least two each of several other citruses. Possibilities include tangerines, satsumas, clementines, tangelos, valencias (juice oranges), and so on. Keep one fruit of each kind whole; and peel, section, and cut up the others. Set up a separate serving plate for each citrus, placing the whole fruit in the middle and the pieces around it. Have toothpicks available for tasting.

DIRECTIONS

- 1 Show students a navel orange and ask them what they know about this type of fruit. Share the “10 Fun Facts about Navel Oranges” student handout.

- 2 Invite students to read “California’s Orange Queen” to learn about Eliza Tibbets, who launched the California citrus industry. Ask students the following “5 W” questions about Eliza Tibbets and her contribution to California agriculture:
 - o **Who** was Eliza Tibbets?
 - o **What** did she contribute to California agriculture?
 - o **When** did she start growing navel oranges?
 - o **Where** did she first grow navel oranges?
 - o **Why** was she interested in trying new crops?

- 3 Point out that while navel oranges all seem to look alike, they are surprisingly different when examined up close. Explain that students will have a chance to observe a particular orange and to get to know it well enough to pick it out from all the oranges.

- 4 Give each student (or pair of students) a navel orange to observe. Guide them to look very carefully and closely at their orange, suggesting that they notice specific characteristics such as:
 - o **Color:** What color is your orange? Is it exactly the same color all over? Are there any areas that are lighter or darker orange, or greener?
 - o **Texture:** What is the texture of your orange’s skin? Is the texture the same all over? Are there any places where it is smoother or rougher?
 - o **Shape:** What shape is your orange? Is it exactly round, or is it a bit misshapen? Does it have any bumps or ridges?

- o **Size:** What size is your orange? When you hold it in your hand, how close do your fingers and thumb come to each other?
 - o **Navel:** What size and shape is your orange’s navel? What else do you notice about it?
 - o **Other features:** Does your orange have any scars or other characteristics that might set it apart?
- 5 After allowing students to observe their orange, have them exchange oranges with another student or pair of students. Encourage students to observe how this new orange is the same or different from their orange. Direct them to give back the oranges, and then to exchange with a different student or pair of students, again comparing this new orange with their orange.
 - 6 Give students copies of the “What Makes It Unique?” student handout. Invite students to use words and pictures under each heading to describe the unique characteristics of their original orange as accurately as they can.
 - 7 Direct students to cut out the outline from the student handout, fold on the lines, and tape or glue the sides together to form a cube.
 - 8 Collect all of the oranges in a bag or box, and then randomly distribute them on desks or tables around the room. Challenge students to walk around and find their original orange. Encourage students to refer to their “What Makes It Unique?” cubes to resolve any difficulties or disputes in identifying the oranges.
 - 9 (Optional) Conduct a class taste testing of different citruses, comparing the students’ navel oranges to other citruses. See the lesson “Savoring California: A Comparative Tasting of California Fruits and Vegetables” (<https://www.ecoliteracy.org/download/savoring-california-comparative-tasting-california-fruits-and-vegetables>) for more details.
 - 10 Give students napkins and invite them to peel and enjoy their oranges. Develop a class list of adjectives describing the taste.

EXTENDED LEARNING

- Identify the different parts of an orange and determine their function.
- Use Harvest of the Month materials to explore other aspects of navel oranges (see Resources).
- Take students on a field trip to a nursery or navel orange orchard to see grafted trees. Have students observe the tree trunks to identify where the graft took place. Find out why orchardists graft trees other than seedless navel orange trees. (See Resources for a directory of some California orange growers.)
- Research where navel oranges grow in California and find out their growing requirements. Learn how drought and climate change may affect California's citrus industry.

ASSESSMENT

Ask students to write a paragraph describing the navel orange and its importance in California's history. Their paragraph should include details about what a navel orange looks and tastes like, and how oranges helped to spark California's growth.

RESOURCES

- California Orange Groves and Growers. <http://www.caltrade.com/directory/agriculture/oranges/>.
- Geisseler, Daniel, and William R. Horwath. "Citrus Production in California." UC Davis. https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Citrus_Production_CA.pdf.

- Harvest of the Month: Oranges. http://harvestofthemonth.cdph.ca.gov/documents/Winter/Oranges/Oranges%20-%20Educator's%20Newsletter_Final.pdf.
- Lee, Ching. "The History of Citrus in California." *California Country Magazine*. March/April 2010. <http://www.californiacountry.org/features/article.aspx?arID=695>.
- Ortlieb, Patricia, and Peter Economy. *Creating an Orange Utopia: Eliza Lovell Tibbets and the Birth of California's Citrus Industry*. Swendenborg Foundation Press, 2011.
- Center for Ecoliteracy. "Savoring California: A Comparative Tasting of California Fruits and Vegetables." Center for Ecoliteracy. <https://www.ecoliteracy.org/CA-Thursdays-Tasting-Lesson>

BACKGROUND

Citrus is a genus of flowering plants that includes oranges, lemons, limes, tangerines, grapefruits, pomelos, citrons, kumquats, and others. Fragrant and full of juice, citrus are eaten fresh, pressed for juice, or preserved in marmalades and pickles.

THE HISTORY OF CITRUS

Scientists believe that citrus plants originated in Australia, but the earliest historical references to oranges are in an ancient Chinese manuscript from 2200 B.C. Europeans became interested in citrus when they began trading with the Far East. The citron became established in Europe in about 310 B.C. and was followed by the sour orange, the lemon, the sweet orange, and eventually the pomelo, an early form of grapefruit.

Christopher Columbus brought citrus to the New World in 1493. Spanish missionary Junípero Serra planted the first citrus seeds in California in 1769 while

building the California missions. In 1840, frontiersman William Wolfskill began the first commercial citrus farm in California, growing oranges and lemons he got from the San Gabriel Mission.

During the California Gold Rush of 1849, there was a huge demand for oranges in the gold country because fresh citrus helped prevent and treat scurvy, a disease caused by vitamin-C deficiency. Wolfskill's business boomed and established a market for citrus fruit.

NAVEL ORANGES

The original navel orange was the result of the mutation of a common sweet orange growing at a monastery in Bahia, Brazil in 1820. A missionary sent cuttings from that tree to the U.S. Bureau of Agriculture in Washington, D.C., in 1870 for propagation. The superintendent of the Bureau, William Saunders, sent two of the cuttings to Eliza Tibbets in California. (Another seven were sent to Florida, but those didn't survive.)

Eliza tended the cuttings, establishing two trees that thrived in the California climate and produced fruit far superior to the oranges then available. They were sweet, large, and ripened in the winter.

Soon, Eliza and her husband, Luther Tibbets, began selling and giving away cuttings from the two parent trees. In a short amount of time, oranges exploded as a cash crop in California. Southern California became a global hub for citrus, and by the turn of the 20th century, Riverside was the wealthiest city per capita in all the United States.

The Bahia orange became known as the Riverside Orange, but its name was later changed to the Washington Navel Orange. Today, nearly all of the navel orange trees grown in the state are descendants of Eliza Tibbets's original trees.

HEALTH BENEFITS OF CITRUS

Navel oranges, like all citruses, are high in Vitamin C, an antioxidant that prevents scurvy and is necessary for a healthy immune system. Navel oranges are also a good source of beta-carotene, which gives oranges their color and is important for maintaining cell structure. In addition, navel oranges are a good source of fiber and contain many other nutrients and phytonutrients.

SELECTING ORANGES

When selecting navel oranges and other citruses, look for fruit with even, unblemished flesh. They should have a fragrant, citrusy smell. Navel oranges that feel heavy for their size will be the juiciest.

10 FUN FACTS about navel oranges



1. Navel oranges get their name because one end looks like a navel, or **belly button**.



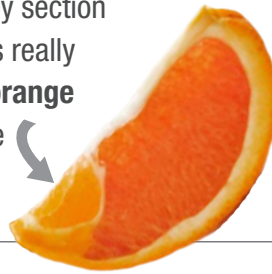
2. Navel oranges don't have seeds, so you can't grow a navel orange tree from seed.

3. All navel orange trees are clones of each other and come from a single tree in **Brazil**.



4. Navel oranges ripen from fall to winter and can keep on the tree for many months.

5. The hard, lumpy section at the navel end is really a second **young orange** growing inside the orange's skin.



6. California

is the **top grower** of navel oranges in the country.

7. California's first navel orange tree was planted in **Riverside in 1873** and is still producing fruit today.



8. Navel oranges helped make Southern California what it is today, bringing money—and many, many people—to the state.

9. The only way to grow a new navel orange tree is to **graft** it: cutting a blossoming bud from a navel orange tree and joining it with another citrus tree's trunk.

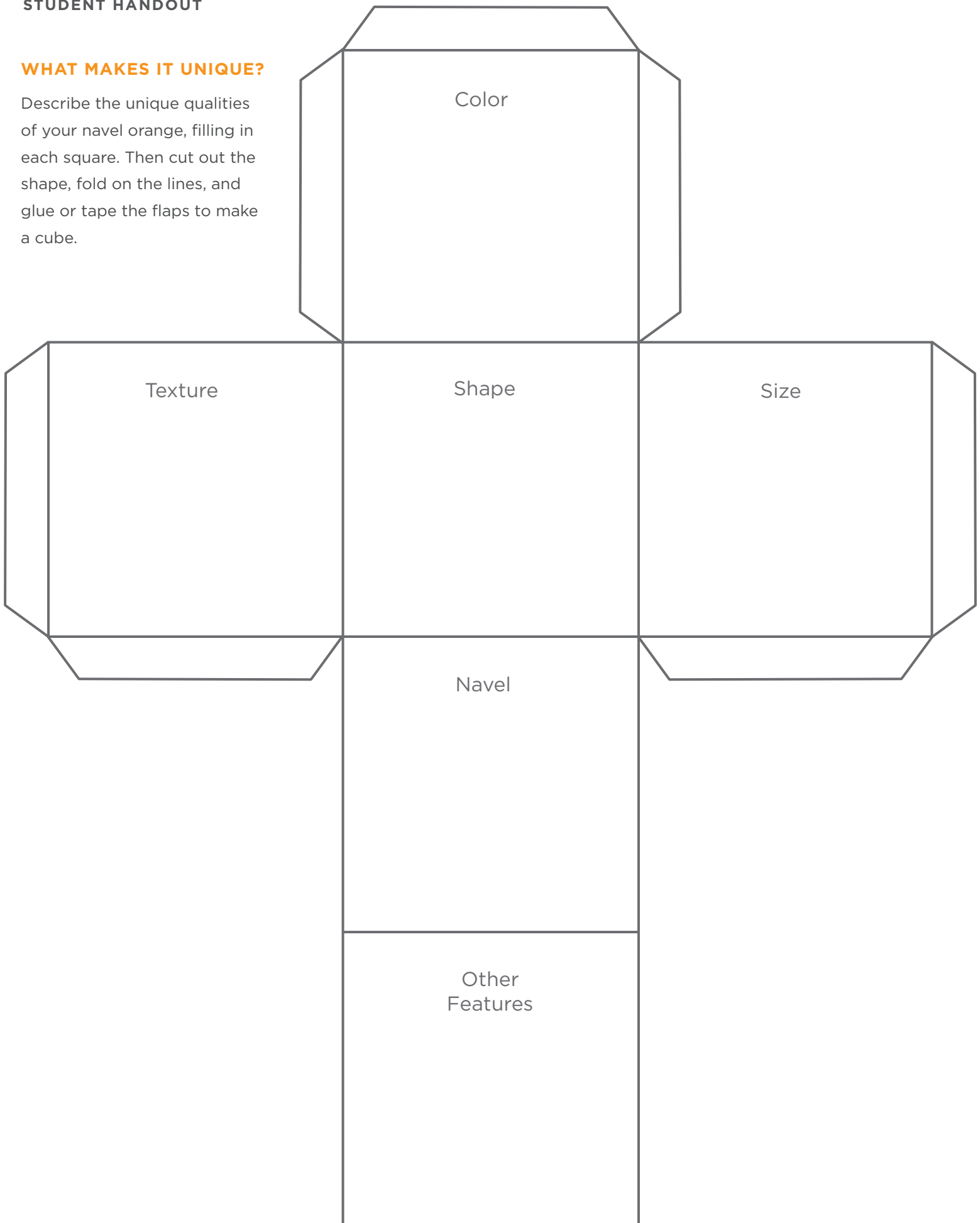
10. The navel orange is a citrus—a group of plants that have juicy, tart fruits with a spongy rind. Other citruses are tangerines, lemons, limes, and grapefruit.



STUDENT HANDOUT

WHAT MAKES IT UNIQUE?

Describe the unique qualities of your navel orange, filling in each square. Then cut out the shape, fold on the lines, and glue or tape the flaps to make a cube.



CALIFORNIA'S ORANGE QUEEN

Like most people, you probably enjoy eating juicy, sweet oranges. But, did you ever wonder how these fruits became so popular?

Back in the early 1870s, **Eliza Tibbets** and her family moved from Washington, D.C., to the tiny community of Riverside, California. There, they planned to grow cash crops they would sell to support themselves.

The Tibbetses soon learned that Southern California's sunny climate is also very dry. They tried lots of different crops: wheat; corn; grapes; and orange, lemon, and lime trees. But none did very well in the arid climate.

Eliza asked her friend William Saunders at the Bureau of Agriculture in Washington, D.C., for ideas. In 1873, he sent Eliza two orange tree cuttings. They were from an unusual tree in Brazil that produced large, seedless oranges.

Eliza took special care of the cuttings. She planted them near her house and watered them by hand, sometimes even using dishpan water. Soon her cuttings grew into two healthy navel orange trees.

Everyone who tried Eliza's navel oranges loved them. They were delicious, easy to eat, and beautiful. They were also perfect for growing in the arid California climate. Their thick skin protected the fruit from drying out, and made the oranges simple to pack and ship.

Eliza's two trees quickly became famous and valuable. She and her husband began selling and giving away tree cuttings so that others could grow their own.

Soon, navel orange trees were growing all over Riverside. And new growers raced to California to buy farmland. Some people called it California's "second Gold Rush." By 1895, Riverside was a big city—and the richest in the United States—all because of oranges!

Eliza and her two orange trees started California's successful citrus industry. One of those trees still stands in Riverside and still produces oranges. It is now over 140 years old.

ELIZA TIBBETS





ABOUT THE CENTER FOR ECOLITERACY

The Center for Ecoliteracy is an internationally recognized leader in systems change innovations in education for sustainable living. Since 1995, the Center has engaged with thousands of educators from across the United States and six continents. The Center offers publications, seminars, academic program audits, coaching for teaching and learning, in-depth curriculum development, keynote presentations, and technical assistance. Books authored or coauthored by the Center for Ecoliteracy include *Ecoliterate: How Educators Are Cultivating Emotional, Social, and Ecological Intelligence* (Jossey-Bass, 2012); *Smart by Nature: Schooling for Sustainability* (Watershed Media, 2009); and *Ecological Literacy Educating Our Children for a Sustainable World* (Sierra Club Books, 2005).

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