



## SALT ART

### OVERVIEW

Salinity is a measurement of the dissolved salt content in water. It distinguishes fresh water from brackish water and salt water. Salinity is measured in [parts per thousand \(ppt\)](#). The salinity of water has a large influence on the [variety of species present](#) in an [aquatic ecosystem](#). Salinity is especially important for estuaries, such as the Indian River Lagoon (IRL). Salt water from the Atlantic feeds through the six inlets connected to the IRL mixing with freshwater runoff from creeks, rivers and canals to create brackish water.

The IRL is a grouping of three lagoons: Mosquito Lagoon, Banana River and the Indian River. It spans 156 miles along Florida's east coast from Ponce de Leon Inlet in the Mosquito Lagoon to Jupiter Inlet near West Palm Beach.

The [red mangrove \(\*Rhizophora mangle\*\)](#) is what is known as a keystone species, which means it plays a crucial role in the functioning of the estuarine ecosystem. Red mangroves provide critical habitat for animals above and below the water and their prop roots sustain shorelines against erosion. One of the exceptional characteristics of red mangroves is their ability to tolerate harsh saline environments where other plants can't survive. They accomplish this by being salt excluders – which in this case means they allow water to pass into their roots but block the salt.

During this lesson, students will use Kilroy data to explore how much salinity varies for red mangroves in the Indian River Lagoon and then paint a watercolor picture of a red mangrove adding varying levels of salt to the painting to convey the concept of the varying levels of salinity that these remarkable trees can tolerate.

This resource helps students visualize and communicate the ranges of salinity in the IRL using scientific data in conjunction with art.

## TOPICS

Art, science, salinity, aquatic ecosystems, the Indian River Lagoon

## AUDIENCE AND SETTING

Middle school students to adult learners. Possible settings include art and science classrooms.

## DURATION

One to two 45-minute class periods to watch two short videos, collect salinity data and paint with watercolor paint and salt.

## OBJECTIVES

- Integrate art with science and technology to convert scientific data into a visual art form
- Identify benefits of integrating art and science
- Utilize art as a means to convey scientific data in a meaningful way
- Use, interpret and explore data sets
- Identify, reason and comprehend the range of salinity levels in the Indian River Lagoon
- Understand the importance of monitoring environmental variables to help protect waterways such as the Indian River Lagoon
- Create an artwork to communicate salinity data trends in the Indian River Lagoon

## GUIDING QUESTIONS

- Why is salinity important to the health of the Indian River Lagoon?
- How much do salinity levels vary throughout the Indian River Lagoon?

## KEY TERMS

**Brackish water** a mixture of fresh and salt water.

**Data/Information art** includes many art forms to convey data to viewers in an appealing and educational format.

**Data visualization** is visual communication of data; it involves the creation and study of art in pictorial, graphical or audio format to share data quickly and easily.

**Estuary** partly enclosed coastal body of water with a connection to the ocean; comprised of brackish water, a mix of fresh and salt water.

**Keystone species** a plant or animal that plays a crucial role in the functioning of an ecosystem.

**Red mangrove** a salt tolerant plant that is found in tropical estuaries around the world.

**Salinity** a measure of the dissolved salt content of water.

**Water quality** the chemical, biological, and aesthetic characteristics of water. Water quality in a healthy environment supports a rich and varied community of organisms and is safe for humans.

## KEY CONCEPTS

- Salinity is a vital element in estuarine environments such as the Indian River Lagoon.
- Red mangroves are salt tolerant plants that are keystone species in tropical estuaries like the Indian River Lagoon.
- Art and science can be integrated to communicate information in an effective, meaningful way.

## MATERIALS

- Web access
- Watercolor paper or any kind of strong paper or cardboard
- Table salt
- Paintbrushes
- Water
- Watercolor paint or water and food coloring

## PROCEDURE

1. Watch the following videos with students:

1. [Dilute Solutions](#) - An introduction to parts-per notation used to describe dilute solutions. Includes a demonstration of measuring the concentration of salt in sea water by boiling off the water.
2. [Kilroy Academy Intro 101: The Kilroy Network](#) - Learn how to navigate ORCA's Kilroy Public Map Display and Database.
2. Pull up [ORCA's Kilroy Public Map Display](#) in the classroom for students:
  1. Find the Kilroy at Vero Shores on the map and zoom in as close as you can get.
  2. Look at the coastline surrounding the Kilroy. Most of the greenery you are seeing are red mangroves.
3. Observe how much the salinity varies over several months by plotting salinity against time for the Vero Shores Kilroy (for example July-Oct, 2015). This is a lot of data, so be patient as the graph loads. It will take a minute or so to plot.
4. Explain and discuss how art can be an effective communication tool for scientists. Provide examples using illustrations, photographs, or any variety of media. Examples:
  1. [Why Art Matters](#)
  2. [Making Water Pollution Visible](#)
  3. [ORCA Pollution Gradient Maps & Campaign for a Clean Indian River Lagoon](#)
5. Instruct students to find pictures of a [red mangrove](#) or provide example pictures for students.
6. Instruct students to draw a red mangrove on water color paper or other sturdy paper. This will be the picture students will paint over with salt.
7. Allow students to decide how they want to convey the idea of the extreme differences in salinity that a mangrove can tolerate. There is no one right way to do this. Encourage students to be creative!
8. Provide students with water, paintbrushes, watercolor paint or food coloring, salt and watercolor paper or other sturdy paper.
9. Emphasize painting in steps will help as the salt MUST be added while the paint is still wet.
10. Tell students to sprinkle more salt on the picture while it is still wet on areas with higher salinity. Watch the texture increase as the salt absorbs the water around it and leaves the pigment behind. Salting leaves light spots where the salt grains landed.
11. Ask students to describe how the different amounts of salt influenced the texture of the painting.
12. Discuss the varying levels of salinity in the IRL and the importance of monitoring water quality to determine the health of waterways.

## **FLORIDA STANDARDS**

### [LAFS.K12.SL.2.5](#)

Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.

### [SC.912.L.17.2](#)

Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.

### [VA.912.F.3.1](#)

Use technology applications and art skills to promote social and cultural awareness regarding community initiatives and/or concerns.

### [VA.912.F.3.10](#)

Apply rules of convention to create purposeful design.

### [VA.912.O.1.5](#)

Investigate the use of space, scale, and environmental features of a structure to create three-dimensional form or the illusion of depth and form.

### [VA.912.O.2.3](#)

Investigate an idea in a coherent and focused manner to provide context in the visual arts.

### [VA.912.S.1.2](#)

Investigate the use of technology and other resources to inspire art-making decisions.

### [VA.912.S.2.2](#)

Focus on visual information and processes to complete the artistic concept.

### [VA.912.S.2.3](#)

Demonstrate visual-thinking skills to process the challenges and execution of a creative endeavor.

### [VA.912.S.3.2](#)

Demonstrate a balance between spontaneity and purpose to produce complex works of art with conviction and disciplined craftsmanship.

## **OCEAN LITERACY PRINCIPLES**

### [Ocean Literacy Principle #5](#)

The ocean supports a great diversity of life and ecosystems.

### [Ocean Literacy Principle #6](#)

The Oceans and humans are inextricable interconnected.

## **EXTENSION**

Encourage students to add dimension to their paintings by adding objects or materials to the paper/cardboard or adding glue and letting it dry before painting to add dimension.

## **ADDITIONAL RESOURCES**

### [Welcome to Kilroy Academy](#)

Learn what ORCA's online STEAM education program offers and how to navigate [www.kilroyacademy.org](http://www.kilroyacademy.org).

### [Why Art Matters](#)

Learn why art is a vital subject and tool for environmental conservation.

### [Kilroy Academy Intro 101: The Kilroy Network](#)

This introductory video guides users to navigate ORCA's interactive Public Kilroy Map Display and Database to access real-time water quality data from the Indian River Lagoon.

### [Where is the Indian River Lagoon and Why is it so Unique?](#)

### [Why Monitor Our Waters?](#)

Learn how real-time monitoring of environmental variables such as salinity can help the Indian River Lagoon.

### [The Effects of Salinity and Temperature on Dissolved Oxygen](#)

### [Human Health and the Indian River Lagoon](#)

Learn about the important interconnections between humans and the Indian River Lagoon.

### [Aquatic Ecosystems](#)

This video describes different aquatic ecosystems on earth and the importance of zones of tolerance for the species living in aquatic ecosystems.

### [National Wildlife Federation – Red Mangrove](#)

[COSEE Florida Water as Habitat Episode 7: Mangrove Restoration](#)

Understand the rich biodiversity mangroves provide the ecosystem and efforts to restore its habitat with Melinda Donnelly, Post Doctoral Research Fellow at the University of Central Florida.

[Maps of the Indian River Lagoon](#)

[Map of IRL](#)

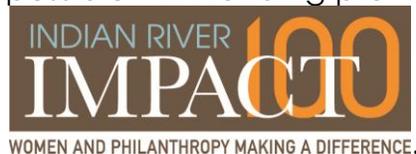
[Watercolor Salt Paintings](#)

[Time lapse video creating a salt painting](#)

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