The Stone Soup Leadership Institute's BETA Program
Redwood High School Environmental Science & Tech Program

Daniela Fernandez – Sustainable Ocean Alliance
Marine Biology

1. Introductions/Leadership Cards **5 Minutes**

• Read Synopsis of the story
• Watch this video from Daniela Fernandez describing her programs at Sustainable Ocean Alliance and their goals to creating a better future: https://www.youtube.com/watch?v=NG6mVbsfPEo

2. Language Arts **10 minutes**

• Teacher identifies 1-3 organizations in your community that targes water conservation/sustainability. Facilitate a discussion: what are three ways that this organization positively impacts your community?

3. STEM Activities **10-20 minutes**

• Let's explore the importance of our oceans is critical to a more sustainable future. The Earth's surface is approximately 510,000,000 km2 and is 7/10 covered by oceans. Of which 1/2 covers the Pacific Ocean, the Atlantic Ocean 1/4, the Indian Ocean 1/5 and the Arctic Ocean 1/20. What parts of the Earth's surface cover each ocean? Display answers in scientific notation (optional) Answer Key:

Pacific = **178,500,000** km2 Indian = **71400000** km2
Atlantic = **89250000** km2 Arctic = **17850000** km2

Pacific Ocean =510,000,000· 7/10· 1/2 = 178,500,000 km^2 = 1.785·10^8 km^2
Atlantic Ocean = 510,000,000· 7/10· 1/4 = 89,250,000 km^2 = 8.925 * 10^7 km^2
Indian Ocean = 510,000,000· 7/10· 1/5= 71,400,000 km^2 = 7.14 * 10^7 km^2
Arctic Ocean = 510,000,000· 7/10· 1/20=17,850,000 km^2 = 1.785 * 10^7 km^2

• Discover & Design a Marine Protected Area
https://www.nationalgeographic.org/activity/create-a-marine-protected-area/

- **Design a Marine Protected Area:** Brainstorm all the ways humans use the ocean and write it somewhere where everyone can see it (like white board).
- **Examples**: Fisherman - fish, boats – transportation, hotels - tourist services, locals - visit the beaches, scientist - research & testing, etc.
- Brainstorm and list ocean resources that may not be visible but are important for human use. Example. Minerals, offshore drilling for oil and gas, wind and wave energy.
- Brainstorm and list how animals use ocean. Food, shelter, finding mate, give birth and raise offspring.
- Invite students to make connections by identifying how different ocean resources have competing uses. Invite students to write on the board and draw a line connecting any two ocean uses that could compete with one another.
    - Connect "fishermen" and "food" and because "fishermen take fish out of the sea that other fish might eat"
    - Connect "offshore drilling" and "shelter/habitat" and because "an oil spill could pollute the animals' habitat"

4. Sustainable Career Pathways **10 minutes**

• Sustainability Certificate: Oceanography - City College of San Francisco - Oceanography
• Career Pathways

> Oceanographer - What is Oceanography?

- An Oceanographer is a scientist who covers a wide range of topics that span the broad reach of the ocean including marine life and ecosystems, ocean circulation, plate tectonics of the sea floor and many others. Here are the 4 main disciplines within oceanography.
  - **Biological Oceanographers**: Biological Oceanographers, also known as marine biologists' study marine ecosystems and their inhabitants.
  - **Physical Oceanographers**: Physical oceanographers study the physical conditions of the oceans including waves, currents, eddies, coastal erosion and interactions between the atmosphere and ocean.
  - **Chemical Oceanographers:** Chemical Oceanographers study the composition of seawater, its processes and cycles and the chemical interaction between seawater, the atmosphere and the seafloor.
  - **Geological Oceanographers:** Geological Oceanographers examine the history of sea-floor spreading, plate tectonics, and ocean circulation to assist in the understanding of the oceans floor.
- Average Annual Salary: **$93,850** is the average annual salary for an Oceanographer, however, working at NOAA (National Oceanic and Atmospheric Association) or for the federal government would yield a salary range of $106,630 - $197,300.

> Aquaculturist - Aquaculture Area of Opportunities

- Aquaculturist understand the growth, development and production of aquatic animals by raising them in controlled environments.
- Average Annual Salary: **$64,170**

> Blue Entrepreneur - Sustainable Ocean Alliance - Ocean Solutions Accelerator

- The Sustainable Ocean Alliance has assisted in propelling 45 world-leading ocean tech start-ups and counting. Blue Entrepreneurs are individuals who are interested in starting a small business, scalable start-up or large company to assist in the development or protection of the ocean.
- Average Annual Salary: **$60,000 - $120,000**

5. Close: Evaluation/ Writing **5 minutes**

• What inspires you about Daniella's story?