CAREFREE LEARNER II

TEACHER RESOURCE GUIDE

Introduction

This packet contains a collection of activities designed to be used before, during, and after field trips aboard the Carefree Learner II, Sarasota High School's Floating Classroom. These lessons are aligned primarily to 7th grade Florida Science Standards, but can be adapted for other grade levels as needed. Activities focus on Sarasota Bay ecology, estuary systems, water quality, food webs, biodiversity, scientific observation, and human impacts on marine environments.

The goal of these activities is to provide students with authentic, hands-on scientific experiences that connect classroom learning to the Sarasota Bay estuary ecosystem. Through field investigations, scientific sketching, organism identification, data collection, and collaborative activities, students will explore how marine ecosystems function and why they are important to protect.

This document is a work in progress and will continue to grow as additional activities and resources are developed. If you would like to contribute activities, resources, or revisions, please upload them to the shared folder with your name included in both the heading and file name.

CFL Activity Share

For questions, suggestions, or contributions, please contact Megan Ehlers, Director of the Carefree Learner Program.

A huge thank you to Nicole Roth, 6–12 English Program Specialist, for contributing the Links to Literacy lessons, and to Sarah Burkett for her ideas and support for this project.

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Pre-Trip Activities

Classroom Activities

1. **True or False:** Test the students prior knowledge using these questions tied to 7th gtade standards.
2. **See, Think, and Wonder:** Explore photos of seagrass beds in water with varying turbidity and photogaphs of the Roberts Bay Bird rookery twenty years ago using a Thinking Routine from Harvard Project Zero.
3. **KWL:** Use a K-W-L chart to tap into students' background knowledge. After or during the trip, students will fill in the Learned column to reflect on new knowledge.
4. **Boat Rules Video:** Start at 3:30, we are in the process of updating this video.

Bayfront Park Actvities

Trips start at 11:15 am, but some groups choose to spend sometime around Bayfront Park. These activites can directly tie into the fieldtrip or stand on their own.

1. **Sarasota Bay CSI**: See Lesson 1. Students will practice collecting and analyzing sample water quality data in the classroom before applying these skills in real-world field investigations at Sarasota Bay's Bayfront Park and/or aboard the CFL II.
2. **GooseChase EDU**: Create an account and place students into teams for the *CFL Bayfront Park Ecosystem Extravaganza*. In this interactive scavenger hunt, students (or team leaders) will explore the abiotic and biotic factors of Bayfront Park by taking photos, locating important features, and answering questions related to the estuary ecosystem. Activities and questions can be customized and edited by the teacher.

Lesson 1: Sarasota Bay CSI - Water Quality Investigation

Objectives:

- Collect and analyze qualitative and quantitative water quality data from Sarasota Bay. (SC.7.N.1.1)
- Explain how abiotic factors such as salinity, dissolved oxygen, turbidity, temperature, pH, and nitrogen affect marine organisms and estuary health. (SC.7.E.6.6)
- Identify ways human activities impact Sarasota Bay, including runoff, pollution, erosion, and habitat destruction. (SC.7.E.6.6)
- Describe how limiting factors such as water quality, habitat availability, food supply, and pollution can affect populations in an ecosystem. (SC.7.L.17.3)

Key Vocabulary:

- Estuary, Watershed, Salinity, Turbidity, Dissolved Oxygen (DO), pH, Nutrient Pollution, Ammonia, Nitrates, Nitrites, Phosphates, Runoff, Abiotic Factor, Biotic Factor, Habitat, Algal Bloom

Activities:

1. **Diamond 9** Students brainstorm factors that may impact the water quality and overall health of Sarasota Bay, then evaluate and prioritize their ideas using the Diamond 9 strategy.
2. **How's My Waterway?** In this lesson plan, students will learn how to use the Environmental Protection Agency (EPA) How's My Waterway tool to explore and visualize water quality data and determine the health of their local waterbodies.
3. **Sarasota Bay CSI** Students will practice collecting and analyzing sample water quality data in the classroom before applying these skills in real-world field investigations at Sarasota Bay's Bayfront Park and/or aboard the CFL II.

Discussion Points:

- Before the Lab
  - What makes Sarasota Bay an estuary?
  - Why are estuaries important nursery habitats for marine organisms?
  - What human activities might affect Sarasota Bay water quality?
  - Why would different parts of the bay have different salinity or turbidity levels?
- During the Lab
  - How do the quantitative data compare to your predictions?
  - What evidence of human impact do you notice around the field sites?
- After the Lab
  - Which water quality parameter best reflects ecosystem health?
  - How could excess nutrients lead to algal blooms and seagrass loss?
  - How might storms, rainfall, or drought affect Sarasota Bay water quality?
  - What can people do to improve the health of Sarasota Bay?
  - What limiting factors might affect organisms living in Sarasota Bay?

Lesson 2: Field Guides and Biological Drawings

Students will begin by learning the purpose and techniques of biological drawings used by scientists to record observations accurately in the field. Using organisms collected aboard the CFL II, students will create sketches following biological drawing rules. Students will then investigate how adaptations help these organisms survive. (SC.7.17.1-3)

Objectives:

- Create accurate biological drawings using proper scientific drawing techniques.

- Identify and explain adaptations in Sarasota Bay organisms that help them survive in their environment.
- Compare adaptations between different marine organisms and relate them to each organism's lifestyle, habitat, and/or feeding strategy.

Key Vocabulary:

- Adaptation, habitat, estuary, ecosystem, predator, prey, competition, niche, producer, consumer.

Activities:

1. **Field Guide - Adaptations** Students will create a field guide comparing the adaptations and physical features of three different marine species observed during the field trip. Using scientific sketches, labels, notes, and observations, students will identify similarities and differences between the organisms and explain how their adaptations help them survive in the Sarasota Bay estuary ecosystem.
2. **Field Guide - Native and Invasive Species** During a short hike on Edwards Island, students will observe, sketch, and compare native and invasive plant species. Using the field guide, students will record observations learn how invasive plants may impact Florida's ecosystems. Identify Organisms using the SEEK App SEEK is a free app that uses AI to help identify organisms and determine whether species are native or invasive.
3. **Biological Drawing and Adaptation Worksheet** Students will create a biological drawing and adaptation profile using two organisms collected on the CFL II. Adaptations may relate to feeding, camouflage (predator or prey), or movement. For each organism they will create a biological drawing, label the structures related to the organism's adaptation, and explain how the adaptation helps the organism survive.
4. **Extension**: Students can work in teams to compare the organisms, features, or adaptations they selected for their field guides. Teams should discuss similarities and differences between species and explain how each adaptation helps the organism survive in Sarasota Bay.

Discussion Points:

- How do feeding adaptations help reduce competition between organisms in Sarasota Bay?
- Did any adaptation seem especially suited for survival in Sarasota Bay? How might that organism survive differently in another ecosystem, such as a coral reef?
- Why is careful observation important in marine science and scientific research?

Lesson 3: Estuary Eats - Sarasota Bay's Food Web

Organisms observed aboard the CFL II will be used to build a Sarasota Bay food web. Using the SEEK by iNaturalist app and the Sarasota Bay Estuary Program Bay Roamer's

Guide, students will identify organisms, classify them, and determine their roles within the estuary ecosystem.

This activity may be completed collaboratively as a class or individually/in small groups. The lesson integrates taxonomy, ecology, organism identification, and ecosystem interactions.

Objectives:

- Identify Sarasota Bay organisms using SEEK by iNaturalist, the Sarasota Bay Estuary Program's Bay Roamer Guide, or other field guides.
- Classify organisms as producers, consumers, and decomposers, and construct a Sarasota Bay food web using observed organisms to explain how energy moves through the estuary ecosystem. (SC.7.L.17.1)

Key Vocabulary:

- Food Web, Producer, Consumer, Predator, Prey, Decomposer, Scavenger, Estuary, Ecosystem, Habitat, Biodiversity, Phytoplankton, Zooplankton

Activities:

1. **Observe organisms collected aboard the CFL II or seen in Sarasota Bay.**
2. **Use SEEK by iNaturalist and the Bay Roamer's Guide to identify each organism.**
   - Identify Organisms using the SEEK App SEEK is a free app that uses AI to help identify plants and animals. Thanks in part to observations contributed by Sarasota High School Marine Science students, many organisms found in Sarasota Bay can be accurately identified down to the species level using the app. No registration is required, and the app does not collect personal user data. You can learn more about the app here: SEEK.
   - Bay Roamers Guide
3. **As a class, create a list of organisms observed or create Food Web Cards** Students will create food web cards for the organisms observed and research the species to determine what eats what.
4. **Estuary Eats Food Web**
   a. Class Food Web: On flipchart paper, the floor, or a wall:
      - Place producers at the bottom.
      - Add primary consumers, secondary consumers, and predators above them.
      - Draw arrows up showing energy flow from each trophic level.
      - Discuss: Which organisms have the most connections? Which organisms are top predators What might happen if one organism disappeared?

   b. Group or Individual Food Webs:
      - Select 6–10 organisms observed aboard the CFL II or during the field investigation.
      - Identify each organism using SEEK by iNaturalist and the Bay Roamer's Guide.
      - Determine what the organism eats, and what eats it.
      - Create a food web diagram showing feeding relationships and energy transfer. Include least one producer, consumers, arrows showing energy flow up the

web, and labels for organism names and trophic levels.
    - Write a short explanation describing how the organisms depend on one another within Sarasota Bay.

Discussion Points:

- How are producers important to the entire Sarasota Bay ecosystem?
- What might happen if seagrass habitats disappeared?
- How might pollution or poor water quality affect the food web?
- Why do estuaries like Sarasota Bay support such high biodiversity?

Lesson 4: Bird and Bay Biodiversity BINGO

Objectives:

- Understand that a rookery is a nesting area for birds and explain how predation, competition, and limiting factors influence survival within the ecosystem. (SC.7.L.17.2–3)
- Explain how the Roberts Bay Bird Rookery is impacted by erosion caused by boat wake and describe the role of the breakwater in reducing erosion and protecting habitat. (SC.7.E.6.6)
- Identify bird species observed at the rookery and describe their nesting behaviors and adaptations.

Key Vocabulary:

- Rookery, Nesting Behavior, Mating Behavior, Predation, Competition, Limiting Factors, Habitat, Erosion, Adaptation

Activities:

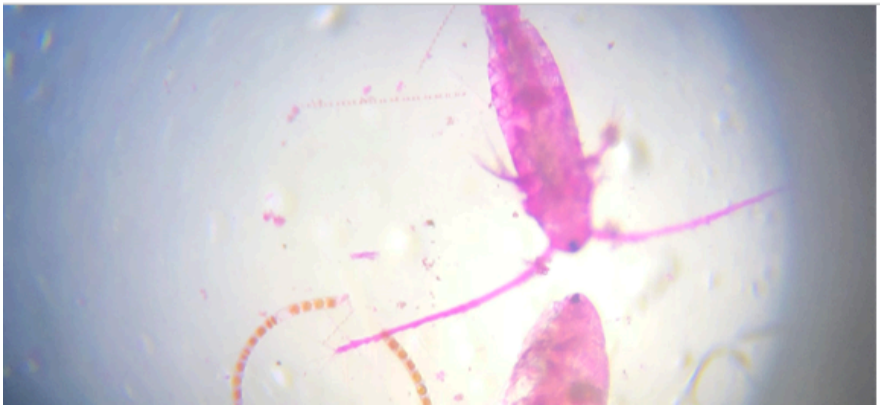
1. **Bird BINGO** Due to differences in bird species and behaviors during nesting season, there are three different Bird BINGO cards available. One version focuses on species that may be observed during the Edwards Island hike, while the others highlight birds and behaviors commonly seen from the CFL II and surrounding Sarasota Bay habitats.
    - Bird BINGO Winter
    - Bird BINGO Summer and Spring
    - Bird BINGO Rookery and Island
2. **Bay Biodiversity BINGO** Interested in creating your own BINGO sheet based on the field trip standards? Use this template and the accompanying list of standards aligned vocabulary terms to create student or teacher designed BINGO cards.
    - Blank Bay Biodiversity BINGO Card
    - Bay Biodiversity Terms

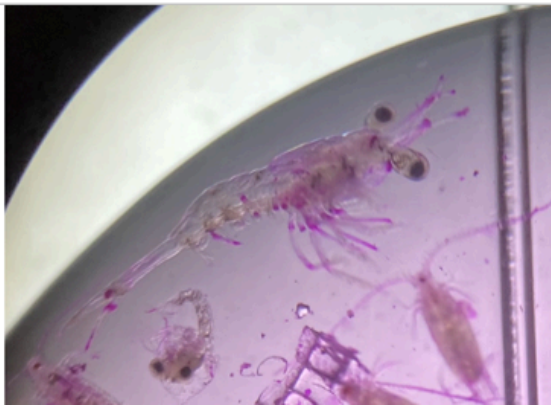
Discussion Points:

- Which bird behaviors did you observe during the activity, and how do those behaviors help birds survive during nesting season?
- View the Roberts Bay Bird Rookery PDF showing the habitat before the breakwater was installed to reduce erosion.
  - What impact did erosion have on the mangroves and bird habitat?
  - How might human activity, seal level rise, or habitat loss affect birds living in the rookery or other places in the bay?
- Why are mangroves important for nesting birds and the overall health of the estuary ecosystem?
- Which bird species seemed best adapted to the estuary environment, and what features or behaviors helped them survive there?

Lesson 5: Plankton Population Sampling

A plankton sample may be collected during the field trip for analysis aboard the CFL II, in the classroom, or at a later date after being returned to the school. Samples may be kept live, stained with Rose Bengal dye (which turns living organisms pink, see below), or prepared using both methods for comparison.





Objectives:

- Collect and analyze population data from a Sarasota Bay plankton sample. (SC.7.N.1.1)
- Classify plankton as producers and consumers in estuary food webs. (SC.7.L.17.1)
- Explain how abiotic factors such as salinity, dissolved oxygen, turbidity, temperature, pH, and nitrogen affect marine organisms and estuary health. (SC.7.E.6.6)

Key Vocabulary:

- Producer, consumer, plankton, phytoplankton, zooplankton

Activities:

Plankton ID Guide - Simple

Plankton Field Guide Worksheet

On the boat:

Plankton Identification: Students will use stereoscopes to observe live plankton samples. Using identification guides or the Plankton Field Guide sheet, students will record observations, sketch organisms, and note behaviors. Dry erase markers may be used on laminated ID sheets for quick identification and population counts.

In the classroom:

1. **Initial Observations**: Students will observe the plankton sample using a thinking routine such as See, Think, Wonder or I See, I Think.
2. Watch the TedEd - The Secret Life of Plankton
3. **Plankton Identification**: Using plankton guides and/or field guide sheets, students will identify organisms, classify them as producers or consumers, and analyze their role in the Sarasota Bay food web.

Discussion Points:

- Which plankton organisms were producers and which were consumers? How did you determine their role in the food web?
- How are plankton connected to the Sarasota Bay food web you created in the previous food web activity?
- Why are phytoplankton important to marine ecosystems and the organisms living in Sarasota Bay?
- What adaptations did you observe that help plankton survive in the water column?

Lesson 6: Link to Literacy - Haiku on the Bay

Learning Intention

Today we will learn how to use our observations of Sarasota Bay to create a Haiku poem that captures a scientific and sensory moment in nature.

Success Criteria

By the end of this lesson, students will be able to:

- Explain the structure of a Haiku (5–7–5 syllables, nature focus).
- Record sensory observations (sight, sound, smell, touch) from their boat trip.
- Select one image or scientific detail from the bay as inspiration.
- Write a Haiku that follows the correct syllable pattern.
- Share and reflect on how their poem connects science with art.

Materials

- Student worksheet (see editable version below)
- Pencils/pens
- Optional: Photos or sketches from the boat trip

Lesson Flow:

1. Engage – What is Haiku? (10 minutes)

- Teacher introduces a Haiku:
  - Originated in Japan as nature-focused poetry.
  - Short poems capturing a single moment or image.
  - Structure: **3 lines → 5 syllables / 7 syllables / 5 syllables**.
- Share 1–2 sample Haiku about nature (count out syllables as a class. Discuss imagery and meaning). Example Haiku:

Old pond, still and deep,

A frog leaps, a sudden splash,

Water's gentle sound.

- Quick class brainstorm: What moments stood out on the boat? (Examples: dolphins, seagrass, pelicans, water patterns, weather shifts).

2. Explore – Science to Poetry (15 minutes)

- Students use the worksheet to:
  - Recall or record (depending on if they've gone onto the boat yet or not) sensory observations from their field trip (what they saw, heard, smelled, touched).
  - Choose one specific image (e.g., mangroves, fish, waves).
  - Draft words/phrases that capture mood, science detail, and imagery.
- Teacher circulates to help students shape ideas into 5-7-5 syllable format.

3. Create – Writing the Haiku (10 minutes)

- Students compose at least one Haiku.
- Encourage focus on:
  - Vivid nature detail (science link)
  - Capturing a moment in time.
- Optional extension activity: Illustrate or sketch alongside the poem.

4. Share – Reflection and Celebration (10 minutes)

- Volunteers read their Haikus aloud.
- Teacher invites discussion: How did science knowledge (ecosystem, species, environment) enrich your poem?
- Wrap up: Haiku helps us connect science and art through observation.

Lesson 7: Link to Literacy - Hexagonal Thinking: Building Connections with Vocabulary

Hexagonal thinking is a versatile activity that encourages critical thinking, discussion, and creative connections between concepts. Students arrange hexagon-shaped cards with ideas and terms, creating a web of interconnectedness while justifying their choices. This activity promotes deeper understanding of learned concepts.

Learning Intention

Students will use hexagon thinking to connect key science vocabulary words related to Sarasota Bay ecosystems, demonstrating their understanding of the interrelationships among organisms, habitats, and human impact.

Success Criteria

- I can accurately define and explain vocabulary terms related to Sarasota Bay.
- I can make meaningful connections between scientific concepts.
- I can explain and justify my group's hexagon arrangement using evidence from class and the field experience.

Materials

- Hexagon tiles (paper, laminated, or magnetic) with one vocabulary word printed on each (template below)
- Vocabulary word bank (e.g., estuaries, mangroves, seagrass beds, salinity, biodiversity, food web, invasive species, pollution, adaptation, predator, prey, tide, current, sustainability, nitrogen cycle)
- Chart paper or whiteboard space for group displays
- Markers/pens

Lesson Flow:

1. Introduction (5 minutes)

- Teacher reminds students of their upcoming (or recent) Sarasota Bay boat trip.
- Brief discussion: "What kinds of living things and environments did/will we see in the Bay?"
- Explain activity: "We are going to use hexagon tiles with vocabulary words to show how the Bay's organisms, habitats, and environmental factors are interconnected."

2. Vocabulary Review (5 minutes)

- Pass out a short vocabulary list with definitions or have the students match the definitions to the correct vocabulary word.
- Quick "turn and talk" — students pair up to share what they already know about 2–3 of the words.
- Teacher clarifies any misconceptions.

3. Hexagon Manipulation Activity (25 minutes)

- **Step 1:** Divide students into small groups (3–4 per group).
- **Step 2:** Give each group a set of hexagon tiles with one word per tile.

- **Step 3:** Students work together to arrange the tiles so that connected words touch sides. Example: mangroves, nursery, habitat, and biodiversity.
- **Step 4:** Groups discuss and record their reasoning on chart paper or with sticky notes around the hexagon web.
- **Step 5 (Optional extension):** Ask students to draw arrows or symbols to show cause/effect (e.g., pollution → seagrass loss → biodiversity decline)

4. Gallery Walk & Discussion (5 minutes)

- Groups post their hexagon webs around the room.
- Students walk around, observe, and leave sticky note comments/questions on others' webs.
- Teacher facilitates a short debrief:
  - "What connections did multiple groups make?"
  - "Did anyone have a unique or surprising connection?"
  - "How do these connections help us understand Sarasota Bay better?"

5. Reflection (2 minutes)

- Quick write in notebooks: *"One new connection I understand about Sarasota Bay is ..."*
- Volunteers share aloud.

6. Assessment (3 minutes)

- Teacher observes group discussions for accuracy and depth of connections.
- Final hexagon webs are evaluated for appropriate and justified connections.
- Exit reflection is used as a formative check of individual understanding.

Lesson 8: Link to Literacy - Sarasota Bay Interview & Summary Activity

Learning Intention

Students will practice interviewing, listening, and note-taking skills while exploring their classmates' experiences and expectations about Sarasota Bay.

Success Criteria

- I can ask meaningful questions about Sarasota Bay.
- I can listen actively and record accurate notes.
- I can write a clear summary of my partner's ideas.
- (Extension) I can introduce my partner to the class and share their ideas in a summarized fashion confidently.

Materials

- Graphic Organizer (see below)
- Clipboards or notebooks
- Pencils/pens

Lesson Flow

1. Introduction (5 minutes)

- Teacher explains: “Today, we’ll practice being scientists and communicators by interviewing each other about our Sarasota Bay trip. Scientists often interview experts, fishermen, or community members to learn more about the environment. You’ll get to do the same with your classmates.”
- Clarify that the interview is about either:
  - **Expectations** (if before trip): “What do you think you’ll see or learn?”
  - **Observations** (if after trip): “What did you actually see or learn?”

2. Modeling an Interview (5 minutes)

- Teacher role-plays a short interview with a student (1–2 questions).
- Point out: eye contact, follow-up questions, jotting down key notes instead of full sentences, and thanking the interviewee.

3. Partner Interviews (15 minutes)

- Students pair up.
- Each student interviews their partner for 6–7 minutes, then switch roles.
- Encourage students to use at least 3 premade questions and, if possible, create 1–2 of their own.

Sample Premade Questions

1. What plants or animals do you expect to see (or did you see) in Sarasota Bay?
2. Why do you think the Bay is important for the local ecosystem?
3. What is one thing you hope to learn (or learned) about the Bay?
4. Did you notice (or expect) any signs of human impact, like pollution or conservation efforts?
5. If you were a scientist studying Sarasota Bay, what would you focus on?

4. Written Summary (10 minutes)

- Students write a short summary (1–2 paragraphs) of what they learned about their partner’s expectations/observations.
- Prompts:
  - “My partner, [Name], said they expect/saw…”
  - “One thing that surprised/interested them was…”
  - “This connects to our science learning because…”

5. Sharing & Optional Extension (7–10 minutes)

- **Option A:** Volunteers read their summaries aloud.
- **Option B (Extension):** Students introduce their partner as if presenting at a conference:
  - “This is [Name]. They noticed that…”
  - Encourage short presentations (30–60 seconds each).

Assessment

- Check interview notes for completeness.
- Collect summaries for accuracy and clarity.
- Observe presentations for listening and speaking skills.

Other Resources

We hope these lesson plans provide a valuable resource for your marine science educational journey. Below are some

Roberts Bay Bird Rookey History PDF