

# **Biscayne Nature Center for Environmental Education**



## **Curriculum Materials for Fifth-Grade Program**

(Revised April 2014)

**Miami-Dade County Public Schools  
Department of Mathematics and Science**

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# **Biscayne Nature Center for Environmental Education (BNCEE)**

Division of Academics, Accountability and School Improvement

**Department of Mathematics and Science**

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## INTRODUCTION TO THE BISCAYNE NATURE CENTER FOR ENVIRONMENTAL EDUCATION

<http://science.dadeschools.net/bncee/default.html>

The ***Biscayne Nature Center for Environmental Education (BNCEE)*** was established by Miami-Dade County Public Schools (M-DCPS) in 1971 to provide instructional programs that foster an awareness and appreciation of the natural world and promote an understanding of ecological concepts. Units of study emphasize the special geological features, natural resources, and habitats of South Florida while encouraging students to develop a sense of stewardship and to live harmoniously with our vital native communities.

In addition to classroom curriculum materials and activities, the *BNCEE* programs feature one and two days of field investigations in our **National Environmental Study Area\*** located within Miami-Dade County's Crandon Park on Key Biscayne. Daily, three M-DCPS environmental science Educational Specialists instruct approximately 60 students, their accompanying classroom teachers, and parent chaperones in hands-on ecological studies and multisensory observations within our varied ecosystems. Each year, more than 6,000 students visit the coastal strand hammock (native woods), intertidal zone, mangrove swamps, vegetated sand dunes, unique fossil mangrove rock reef, and extensive seagrass beds associated with this sand barrier island.

### ADDITIONAL ACTIVITIES

**All *BNCEE* programs are designed to promote student FCAT 2.0 achievement with activities modeled after the M-DCPS' District Pacing Guides and the Next Generation Sunshine State Standards (NGSSS). Some of these student- or teacher-directed, inquiry-based learning programs include the following:**

Designation as Member of Homeland Security Weathernet Network (2003)  
Professional Development for Teachers  
South Florida Regional Science & Engineering Fair  
Miami-Dade County Public Schools Elementary Science Fair  
Curriculum writing, design, and evaluation  
Conference and symposium presentations  
Dade County Science Teachers Association  
SECME

\*1976 U.S. Department of the Interior, National Park Service designation.

## AWARDS

- Florida Department of Education: Statewide Program of Distinction
- Florida Department of Education: Statewide Program of Quality
- Miami-Dade County Public Schools: Award of Outstanding Achievement

## COMMUNITY SERVICE

With the assistance of student groups, teachers, parents, and governmental agencies, the *BNCEE* has been or is actively involved in meeting the following special community needs:

- Mangrove mitigation
- Environmental education workshops
- Dune restoration
- Protection of native habitats
- Science-fair organization
- Establishing nature trails
- Park personnel training
- Expanding environmental education
- Teacher mentoring
- SECME



**BISCAYNE NATURE CENTER FOR ENVIRONMENTAL EDUCATION  
KEY BISCAYNE, FLORIDA**

**PROGRAM OVERVIEW**

During the visit to the Biscayne Nature Center for Environmental Education (*BNCEE*), each student participates in several field and/or laboratory investigations depending on the length of visit, tides, weather, and other environmental conditions. Fifth-grade students attend for one or two days. Before taking part in activities at the Nature Center, students are given a review of safety rules and information concerning potentially harmful land and sea organisms. Five major interdependent relationships in nature are stressed throughout the program. They are: **VARIETY, PATTERNS, BALANCE, CHANGE, and ADAPTATION.**

The woodland investigation involves a meander through the coastal hammock of northern Key Biscayne where the teacher and students relate the five major interdependent relationships in nature to the plants and animals they observe. Evidence of environmental problems and selected harmful organisms in the habitat are identified.

Onshore and offshore activities may include investigations of the seagrass habitat, rock reef, mangrove swamp, intertidal zone, and sand dunes. The seagrass and/or mangrove investigations involve wading when conditions permit. Students are required to wear life jackets during the seagrass investigation. A minimum of **NINE ADULTS FROM THE PARTICIPATING SCHOOL (i.e. one adult chaperone for every five students)** are needed **IN THE WATER** for the wading investigations.

The progression laboratory session offers students the opportunity to closely examine organisms found in the marine habitat. Students are actively involved in observing marine organisms, using microscopes, retrieving computer data, handling live animals, and measuring invertebrate specimens. Observations, drawings, and measurements are recorded in a laboratory booklet for further discussion at the school.

The contribution of the classroom teacher is important to the learning experience of the students visiting the *BNCEE*. Classroom teachers are encouraged to work with their students at school on the following: personal preparation, program content, safety rules, expected behavior, and performance of the standards identified on the following pages.

**The program activities focus on:**

1. Looking for evidence of the 5 major interdependent relationships in nature: Variety, Patterns, Balance, Change, and Adaptation.
2. Looking for evidence of environmental problems, discussing their solutions, and planning to conserve the environment by not littering and by protecting wildlife.
3. Observing safety procedures and identifying harmful land and sea animals and plants.
4. Working like a scientist; that is, observing carefully, recording accurately, making claims, providing evidence to support their claims, interpreting data, and arriving at explanations (reasoning) that support their claims.
5. Recognizing natural habitats and the plants and animals that live in those habitats. Deciding why it is important to leave these habitats in their natural state.



## **THE NEXT GENERATION SUNSHINE STATE STANDARDS AND THE FLORIDA STATE STANDARDS FOR LANGUAGE ARTS AND MATHEMATICS**

The students attending the *Biscayne Nature Center for Environmental Education (BNCEE)* will engage in activities designed to apply learning with an increased emphasis on higher-order thinking skills. The *BNCEE* program for elementary schools will assist the teacher guiding students toward the performance on selected Grade 5 Big Ideas and benchmarks found in the Miami-Dade County Public Schools District Pacing Guides, Next Generation Sunshine State Standards (NGSSS) and the Florida State Standards for Language Arts and Mathematics. Please note that not all Big Ideas and benchmarks may be addressed by the teachers at the *BNCEE*.

### **BIG IDEAS AND BENCHMARKS ADDRESSED IN DISCOVERY LABORATORY ACTIVITY:**

**Body of Knowledge: N: Nature of Science**

**TOPIC I: Practicing Inquiry**

**Big Idea 1: The Practice of Science**

**SC.5.N.1.1** Define a problem, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types such as: systematic observations, experiments requiring the identification of variables, collecting and organizing data, interpreting data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

**SC.5.N.1.2** Explain the difference between an experiment and other types of scientific investigation. (Assessed as SC.N.1.1)

**SC.5.N.1.4** Identify a control group and explain its importance in an experiment. (Assessed as SC.N.1.1)

**SC.5.N.1.3** Recognize and explain the need for repeated experimental trials.

**SC.5.N.1.6** Recognize and explain the difference between personal opinion/interpretation and verified observation.

**SC.5.N.1.5** Recognize and explain the authentic scientific investigation frequently does not parallel the steps of “the scientific method.”

## **BODY OF KNOWLEDGE: P: Physical Science**

### **TOPIC IV: Physical and Chemical Changes**

#### **Big Idea 9: Changes in Matter**

**SC.5.P.9.1** Investigate and describe that many physical and chemical changes are affected by temperature.

#### **Big Idea 2: The Characteristics of Scientific Knowledge**

**SC.5.N.2.1** Recognize and explain that science is grounded in empirical observations that are testable; explaining must always be linked with evidence.

**SC.5.N.2.2** Recognize and explain that when scientific investigations are carried out, the evidence produced by those investigations should be replicable by others.

## **BODY OF KNOWLEDGE: L: Life Science**

### **TOPIC XIII: Plants and Animals**

#### **Big Idea 14: Organization and Development of Living Organisms**

**SC.5.L.14.2** Compare and contrast the function of organs and other physical structures of plants and animals, including humans, for example: some animals have skeletons for support – some with internal skeletons others with exoskeletons – while some plants have stems for support.

**SC.3.L.14.1** Describe structures in plants and their roles in food production, support, water and nutrient transport, and reproduction.

**SC.4.L.16.4** Compare and contrast the major stages in the life cycles of Florida plants and animals, such as those that undergo complete and incomplete metamorphosis, and flowering and non-flowering seed-bearing plants.

**SC.3.L.15.1** Classify animals into major groups (mammals, birds, reptiles, amphibians, fish, arthropods, vertebrates and invertebrates, those having live births and those which lay eggs) according to their physical characteristics and behaviors.

### **TOPIC XIV: Interdependence**

#### **Big Idea 17: Interdependence**

**SC.4.L.16.3** Recognize that animal behaviors may be shaped by heredity and learning.

**SC.4.L.17.4** Recognize ways plants and animals, including humans can impact the environment.

**SC.5.L.17.1** Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycle variations, animal behaviors and physical characteristics

**SC.5.L.15.1** Describe how, when the environment changes, differences between individuals allow some plants and animals to survive and reproduce while others die or move to new locations.

## **TOPIC XV: Flow of Energy from the Sun through the Food Chains**

### **Big Idea 17: Interdependence**

**SC.4.L.17.3** Trace the flow of energy from the sun as it is transferred along the food chain through the producers to the consumers.

**SC.4.L.17.2** Explain that animals, including humans, cannot make their own food and that when animals eat plants or other animals, the energy stored in the food source is passed to them.

**SC.3.L.17.2** Recognize that plants use energy from the sun, air, and water to make their own food.

## **MATHEMATICS: MEASUREMENT AND DATA**

**MAFS.5.MD.2.2** Make a line plot to display a data set of measurements in fractions of a unit ( $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{1}{8}$ ). Use operations on fractions for this grade to solve problems involving information presented in line plots. For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.

**MAFS.5.G.1.2** Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the

two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).

**MAFS.1.MD.3.4** Represent and interpret data.

**MAFS.K12.MP.1.1** Make sense of problems and persevere in solving them.

**MAFS.K12.MP.2.1** Reason abstractly and quantitatively.

**MAFS.K12.MP.5.1** Use appropriate tools strategically.

**MAFS.K12.MP.6.1** Attend to precision.

**MAFS.K12.MP.4.1** Model with mathematics.

## **LANGUAGE ARTS: READING INFORMATIONAL TEXT**

**LAFS.5.RI.1.3** 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.

**LAFS.5.RI.2.4** Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topics or subject area.

**LAFS.5.RI.4.10** By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, at the high end of the grades 4–5 text complexity band independently and proficiently.

## **LANGUAGE ARTS: WRITING**

**LAFS.5.W.3.8** Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.

**LAFS.5.W.3.9** Draw evidence from literary or informational texts to support analysis, reflection, and research.

## **LANGUAGE ARTS: SPEAKING AND LISTENING SKILLS**

**LAFS.5.SL.1.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.

## **SOCIAL STUDIES**

**SS.5.G.3.1** Describe the impact that past natural events have had on human and physical environments in the United States through 1850.

### **BIG IDEAS AND BENCHMARKS ADDRESSED IN SEA GRASS MEADOW ACTIVITY:**

**BODY OF KNOWLEDGE: L: Life Science**

**TOPIC XIII: Plants and Animals**

**Big Idea 14: Organization and Development of Living Organisms**

**SC.5.L.14.2** Compare and contrast the function of organs and other physical structures of plants and animals, including humans, for example: some animals have skeletons for support – some with internal skeletons others with exoskeletons – while some plants have stems for support.

**SC.3.L.14.1** Describe structures in plants and their roles in food production, support, water and nutrient transport, and reproduction.

**SC.4.L.16.4** Compare and contrast the major stages in the life cycles of Florida plants and animals, such as those that undergo complete and incomplete metamorphosis, and flowering and non-flowering seed-bearing plants.

**SC.3.L.15.1** Classify animals into major groups (mammals, birds, reptiles, amphibians, fish, arthropods, vertebrates and invertebrates, those having live births and those which lay eggs) according to their physical characteristics and behaviors.

**SC.3.L.15.2** Classify flowering and non-flowering plants into major groups such as those that produce seeds, or those like ferns and mosses that produce spores, according to their physical characteristics.

**SC.4.L.16.1** Identify processes of sexual reproduction in flowering plants, including pollination, fertilization, seed dispersal, and germination.

**TOPIC XIV: Interdependence**

**Big Idea 17: Interdependence**

**SC.3.L.17.1** Describe how animals and plants respond to changing seasons.

**SC.4.L.16.2** Explain that although characteristics of plants and animals are inherited, some characteristics can be affected by the environment.

**SC.4.L.16.3** Recognize that animal behaviors may be shaped by heredity and learning.

**SC.4.L.17.4** Recognize ways plants and animals, including humans can impact the environment.

**SC.5.L.17.1** Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycle variations, animal behaviors and physical characteristics

**SC.5.L.15.1** Describe how, when the environment changes, differences between individuals allow some plants and animals to survive and reproduce while others die or move to new locations.

## **TOPIC XV: Flow of Energy from the Sun through the Food Chains**

### **Big Idea 17: Interdependence**

**SC.4.L.17.3** Trace the flow of energy from the sun as it is transferred along the food chain through the producers to the consumers.

**SC.4.L.17.2** Explain that animals, including humans, cannot make their own food and that when animals eat plants or other animals, the energy stored in the food source is passed to them.

**SC.3.L.17.2** Recognize that plants use energy from the sun, air, and water to make their own food.

## **BODY OF KNOWLEDGE: E: Earth/Space Science**

### **TOPIC XVI: Earth Structures**

**SC.4.E.6.4** Describe the basic differences between physical weathering (breaking down of rock by wind, water, ice, temperature change, and plants) and erosion (movement of rock by gravity, wind, water, and ice).

**SC.4.E.6.3** Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable.

## **LANGUAGE ARTS: SPEAKING AND LISTENING SKILLS**

**LAFS.5.SL.1.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.

**SS.5.G.3.1** Describe the impact that past natural events have had on human and physical environments in the United States through 1850.

## **BIG IDEAS AND BENCHMARKS ADDRESSED IN COASTAL STRAND HAMMOCK ACTIVITY:**

**BODY OF KNOWLEDGE: L: Life Science**

**TOPIC XIII: Plants and Animals**

**Big Idea 14: Organization and Development of Living Organisms**

**SC.5.L.14.2** Compare and contrast the function of organs and other physical structures of plants and animals, including humans, for example: some animals have skeletons for support – some with internal skeletons others with exoskeletons – while some plants have stems for support.

**SC.3.L.14.1** Describe structures in plants and their roles in food production, support, water and nutrient transport, and reproduction.

**SC.4.L.16.4** Compare and contrast the major stages in the life cycles of Florida plants and animals, such as those that undergo complete and incomplete metamorphosis, and flowering and non-flowering seed-bearing plants.

**SC.3.L.15.1** Classify animals into major groups (mammals, birds, reptiles, amphibians, fish, arthropods, vertebrates and invertebrates, those having live births and those which lay eggs) according to their physical characteristics and behaviors.

**SC.3.L.15.2** Classify flowering and non-flowering plants into major groups such as those that produce seeds, or those like ferns and mosses that produce spores, according to their physical characteristics.

**SC.3.L.14.2** Investigate and describe how plants respond to stimuli such as the way plant stems grow toward light and their roots grow downward in response to gravity.

**SC.4.L.16.1** Identify processes of sexual reproduction in flowering plants, including pollination, fertilization, seed dispersal, and germination.

## **TOPIC XIV: Interdependence**

### **Big Idea 17: Interdependence**

**SC.3.L.17.1** Describe how animals and plants respond to changing seasons.

**SC.4.L.16.2** Explain that although characteristics of plants and animals are inherited, some characteristics can be affected by the environment.

**SC.4.L.16.3** Recognize that animal behaviors may be shaped by heredity and learning.

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**SC.5.L.17.1** Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycle variations, animal behaviors and physical characteristics

**SC.5.L.15.1** Describe how, when the environment changes, differences between individuals allow some plants and animals to survive and reproduce while others die or move to new locations.

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**SC.4.L.17.3** Trace the flow of energy from the sun as it is transferred along the food chain through the producers to the consumers.

**SC.4.L.17.2** Explain that animals, including humans, cannot make their own food and that when animals eat plants or other animals, the energy stored in the food source is passed to them.

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## **BODY OF KNOWLEDGE: E: Earth/Space Science**

### **TOPIC XVI: Earth Structures**

**SC.4.E.6.4** Describe the basic differences between physical weathering (breaking down of rock by wind, water, ice, temperature change, and plants) and erosion (movement of rock by gravity, wind, water, and ice).

**SC.4.E.6.3** Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable.

### **LANGUAGE ARTS: READING INFORMATIONAL TEXT**

**LAFS.5.RI.1.3** 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.

**LAFS.5.RI.2.4** Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

**LAFS.5.RI.4.10** By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, at the high end of the grades 4–5 text complexity band independently and proficiently.

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**LAFS.5.W.3.9** Draw evidence from literary or informational texts to support analysis, reflection, and research.

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## SOCIAL STUDIES

**SS.5.G.3.1** Describe the impact that past natural events have had on human and physical environments in the United States through 1850.

**SS.5.A.2.2** Identify Native American tribes from different geographic regions of North America (cliff dwellers and Pueblo people of the desert Southwest, coastal tribes of the Pacific Northwest, nomadic nations of the Great Plains, woodland tribes east of the Mississippi River).

### **BIG IDEAS AND BENCHMARKS ADDRESSED IN MANGROVE SWAMP ACTIVITY:**

**BODY OF KNOWLEDGE: L: Life Science**

**TOPIC XIII: Plants and Animals**

**Big Idea 14: Organization and Development of Living Organisms**

**SC.5.L.14.2** Compare and contrast the function of organs and other physical structures of plants and animals, including humans, for example: some animals have skeletons for support – some with internal skeletons others with exoskeletons – while some plants have stems for support.

**SC.3.L.14.1** Describe structures in plants and their roles in food production, support, water and nutrient transport, and reproduction.

**SC.4.L.16.4** Compare and contrast the major stages in the life cycles of Florida plants and animals, such as those that undergo complete and incomplete metamorphosis, and flowering and non-flowering seed-bearing plants.

**SC.3.L.15.1** Classify animals into major groups (mammals, birds, reptiles, amphibians, fish, arthropods, vertebrates and invertebrates, those having live births and those which lay eggs) according to their physical characteristics and behaviors.

**SC.3.L.15.2** Classify flowering and non-flowering plants into major groups such as those that produce seeds, or those like ferns and mosses that produce spores, according to their physical characteristics.

**SC.3.L.14.2** Investigate and describe how plants respond to stimuli such as the way plant stems grow toward light and their roots grow downward in response to gravity.

**SC.4.L.16.1** Identify processes of sexual reproduction in flowering plants, including pollination, fertilization, seed dispersal, and germination.

## **TOPIC XIV: Interdependence**

### **Big Idea 17: Interdependence**

**SC.3.L.17.1** Describe how animals and plants respond to changing seasons.

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## **TOPIC XV: Flow of Energy from the Sun through the Food Chains**

### **Big Idea 17: Interdependence**

**SC.4.L.17.3** Trace the flow of energy from the sun as it is transferred along the food chain through the producers to the consumers.

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**SC.3.L.17.2** Recognize that plants use energy from the sun, air, and water to make their own food.

## **BODY OF KNOWLEDGE: E: Earth/Space Science**

### **TOPIC XVI: Earth Structures**

**SC.4.E.6.4** Describe the basic differences between physical weathering (breaking down of rock by wind, water, ice, temperature change, and plants) and erosion (movement of rock by gravity, wind, water, and ice).

**SC.4.E.6.3** Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable.

### **LANGUAGE ARTS: SPEAKING AND LISTENING SKILLS**

**LAFS.5.SL.1.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.

### **SOCIAL STUDIES**

**SS.5.G.3.1** Describe the impact that past natural events have had on human and physical environments in the United States through 1850.

## TEACHER PREPARATION LIST

The lead teacher, who has attended the water safety training, must attend the water-related field trip.

### 1. PARENTAL PERMISSION FORM AND HEALTH STATEMENT

- Complete the M-DCPS Water-Related Field Trip Packet FM #6614 <http://forms.dadeschools.net/webpdf/6614.pdf>
- Duplicate the M-DCPS Parent Permission form in the Water-Related Field Trip Packet FM #6614, and send a copy home for the parent to complete. Parent must check the box, by the statement **“I HEREBY CERTIFY MY CHILD IS A COMPETENT SWIMMER,” IF APPLICABLE, AND SIGN IN 2 PLACES.**
- **NOTE:** To participate in the water activity, each child must have a check by the statement **“I HEREBY CERTIFY MY CHILD IS A COMPETENT SWIMMER,”** on the Parent Permission Form. If not, the child will only participate in the dry or land portion of the field trip activities, including laboratory activities.
- The school principal will be requested to verify the Parent Permission forms for any student without a signed and completed field trip form.
- When returned, cut the form in half -- **TOP PORTION TO BE RETAINED AT SCHOOL, BOTTOM PORTION TO BE COLLECTED BY A BNCEE STAFF MEMBER UPON ARRIVAL TO THE CENTER.**

### 2. STUDENT PREPARATION CHECKLIST

- See page 19
- Duplicate, discuss with your students, and have each one take a copy home.

### 3. M-DCPS EMERGENCY CONTACT ROSTER:

- Found in the M-DCPS Water-Related Field Trip Packet FM #6614
- Complete and bring a copy to the BNCEE.

### 4. LETTER TO CHAPERONE AND CHAPERONE INFORMATION ON STUDENT SAFETY PROCEDURES

- Duplicate and give a copy to all chaperones.
- Chaperones must be at least 18 years of age and should not bring children who are not enrolled in your class.
- Chaperones should be at your school site by 8:15 a.m.

### 6. LUNCHES

- Pack in plastic garbage bags or have students carry individual lunches.
- Lunches should NOT require refrigeration, since they may be stored on a picnic table in the shade.
- Pack cold drinks in ice chests.

### 7. LITTER PATROL

- Organize student teams for after-lunch cleanup.

### 8. BUDDY SYSTEM

- Organize buddy/partner teams.

- Issue or artistically create (no straight pins) nametags.
- Pair students; i.e., high reading/low reading performance, English/non-English-speaking student.

**9. TRANSPORTATION**

- Have students ready to board the bus at the specified time.
- There is no charge for transportation.

**10. CLOTHING**

- Notify all teachers, chaperones, and students to bring a towel, change of clothes, and shoes.
- This requirement is applicable for students participating in either the 1-day or 2-day field experience.

**11. CAFETERIA**

- Make arrangements regarding free lunches prior to the trip.
- Inform the cafeteria staff that lunches should be ready for pick up by 8:15 a.m.

**12. SUGGESTED ORDER OF BEFORE AND AFTER SCHOOL-SITE ACTIVITIES**

- See page 20 for details

**MIAMI-DADE COUNTY PUBLIC SCHOOLS  
LETTER TO CHAPERONE**

Dear Chaperone:

Thank you for your interest in and cooperation with our program at the *Biscayne Nature Center for Environmental Education (BNCEE)*. Please bring a complete change of clothes and shoes for either the **one- or two-day field experience** as you will be expected to participate in the wading experience by accompanying the students into the shallow water.

We at *BNCEE* believe that you can help best by:

- Being at the school by 8:15 a.m.
- Staying at the rear of the line on field programs.
- Keeping the group compact by not allowing students to lag behind.
- Reporting discipline problems immediately to the instructor in charge.
- Reporting any ill students to the BNCEE staff.
- Taking any ill students back to the Nature Center building.
- Encouraging students to pick up their litter during the lunch period and to keep the restrooms clean.
- Assisting BNCEE staff in the laboratory.
- Accompanying the children to restrooms, both for restroom breaks and when they are changing clothes.
- Making sure that all the safety procedures are observed.
- Ensuring that the children stay out of roadways and parking lots.

We appreciate anything you do that makes the program a more enjoyable and safe learning experience for each child.

Sincerely,

*BNCEE Staff*

## CHAPERONE INFORMATION ON STUDENT SAFETY PROCEDURES

The program at the *Biscayne Nature Center for Environmental Education* is designed so that students can learn about the environment and have fun at the same time. For a safe visit, please ensure that **STUDENTS** observe the following safety rules as well as any other instructions given by *BNCEE* Staff:

1. **USE THE BUDDY SYSTEM AT ALL TIMES:** Stay with your buddy and remain with your group throughout the program. If health or restroom needs make it necessary to leave the group, you must get permission from your teacher and be accompanied by an adult.
2. **NO SWIMMING AT ANY TIME:** WADING WILL BE INCLUDED IN THE SEAGRASS AND/OR MANGROVE INVESTIGATIONS WHEN WEATHER AND OTHER CONDITIONS PERMIT. WADING MEANS WALKING IN SHALLOW WATER.
3. **SHOES ARE TO BE WORN AT ALL TIMES:** Shoes must be worn in the water, because there may be bottle tops and broken glass, which may cause injury. Many plants and animals are harmful when stepped on. Open-toed shoes, sandals, or Crocs™ are not acceptable.
4. **STAY WITHIN THE BOUNDARIES GIVEN YOU:** During the wading investigation, stay between the instructor and the shore. Stay in line behind the instructor and in the middle of the open pathways while you are in the woods.
5. **REPORT ALL INJURIES OR ILLNESSES:** First-aid supplies are available.
6. **ONLY TOUCH** those plants or animals given to you or which you are told to touch.
7. **IN CASE OF STORMS,** be quiet, listen and follow instructions. Alternative activities will be planned.
8. **NO GUM CHEWING IN THE WATER.**
9. **NO RUNNING.**

**NOTE: THE *BNCEE* INSTRUCTORS MAY REMOVE ANY STUDENT WHO DOES NOT FOLLOW THE SAFETY RULES OR THE FIELD AND LABORATORY PROCEDURES FROM AN ACTIVITY.**

Check	STUDENT PREPARATION CHECKLIST
<input type="checkbox"/>	1. I have the Parent Permission Form for the Water-Related Field Trip form completed and signed (in two places) by one of my parents. The emergency contact name, phone numbers have been filled in. I gave the completed form to my teacher.
<input type="checkbox"/>	2. I have packed a towel and a complete change of clothes including underwear and shoes for both days. I have included a plastic bag for wet clothes.
<input type="checkbox"/>	3. I will bring with me a raincoat, sweater or jacket, sun hat, sunscreen, and insect repellent (no sprays, please) as appropriate.
<input type="checkbox"/>	4. I have packed a lunch in a strong bag with one or two canned drinks <b>(no glass bottles or thermos jugs)</b> . Lunches and drinks are clearly identified with my name. I have packed a lunch that does not require refrigeration.
<input type="checkbox"/>	5. I know my buddy's name and am aware of all the student safety procedures.
<input type="checkbox"/>	6. I will wear shoes that can get wet. I will wear shoes, shorts, and shirts for wading. I will not wear a bathing suit, sandals, Crocs™ or open-toe shoes. For cold-weather wading, I will be prepared to wear shoes, long pants, and a long-sleeved shirt over a t-shirt in the water. Old sneakers, water shoes and booties are acceptable.

## SUGGESTED ORDER OF SCHOOL-SITE ACTIVITIES

The activities on the following pages should be completed in the classroom. The timing and arrangement of the activities are left to the classroom teacher's discretion. The *BNCEE* staff, however, offers the following suggestions:

**BEFORE** your students visit the *BNCEE*, have them:

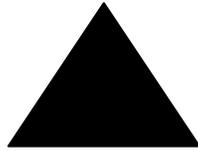
1. Do a web quest, and complete the CONSERVATION PLEDGE (see page 21).
3. Review the FIVE MAJOR INTERDEPENDENT RELATIONSHIPS IN NATURE. (see page 22). There is a teacher guide, and student worksheet included.
3. Define the ENVIRONMENTAL VOCABULARY LIST (see page 24). Teachers should encourage the students to use the Frayer's model.  
A teachers guide and description of the model are included in page 26.  
A student worksheet is included in page 28.  
Each student should complete at least one of the definitions.
4. Complete the **ENVIRONMENTAL VOCABULARY WORD SEARCH** (See page 29)
5. Have student research and report on different species of fish, plants, birds and reptiles they may encounter at the *BNCEE*. (See page 30)
6. Have student draw or find pictures on different species of fish, plants, birds and reptiles they may encounter at the *BNCEE*. (See page 30)

**AFTER** your students visit the *BNCEE*, have them:

1. Complete any of the activities from the LITTER LESSON PLAN (see page 31).
2. Complete any of the activities from the PHYSICAL AND CHEMICAL CHANGES LESSON PLAN (see page 34).
3. Complete any of the activities from the WEATHER/EROSION and NATURAL DISASTER LESSON PLAN (see page 37).
4. Do any of the additional post-visit extension activities listed on page 39.

**Do a web quest to find the following information:**

**CONSERVATION PLEDGE**



I give my pledge as  
An American to save and  
Faithfully to defend from waste  
The natural resources of my country, its  
Soil and minerals, its forest water and wildlife.

Name \_\_\_\_\_  
School \_\_\_\_\_  
Florida State Tree \_\_\_\_\_  
Florida State Shell \_\_\_\_\_  
Florida State Reptile \_\_\_\_\_  
Florida State Bird \_\_\_\_\_  
Florida State Flower \_\_\_\_\_  
Florida State Mammal \_\_\_\_\_

You can fill in some of the above blanks by using the following websites:

<http://www.worldatlas.com/webimage/countrys/namerica/usstates/flsymbols.htm>

<http://www.flheritage.com/facts/symbols/symbol.cfm?id=15>

## Directions: Read and discuss with students.

### FIVE MAJOR INTERDEPENDENT RELATIONSHIPS IN NATURE:

#### TEACHER GUIDE

Five interdependent relationships in nature, **PATTERNS**, **VARIETY**, **BALANCE**, **CHANGE**, and **ADAPTATION**, are recurring themes at the *Biscayne Nature Center for Environmental Education*. This page will help the student understand the meaning of these concepts and recognize examples of each. The definitions and examples on this page can be used as a guide for discussion. The *BNCEE* staff will lead students in field explorations where examples of each relationship can be discovered in nature.

1. **PATTERN:** The design, shape, form, repeating action or behavior of things in nature.

- a. The shapes and venation of leaves.
- b. A sea turtle returning to the same beach each year to lay her eggs.
- c. The daily sunrise in the East and sunset in the West.

2. **VARIETY:** Differences among organisms in the same group.

- a. Butterflies belong to a special group of insects. Each kind can be identified by special markings.
- b. Students in the class are in a similar age group, yet each varies in height and weight.

3. **BALANCE:** The way things depend upon each other and their environment.  
Food webs and food chains represent balance in nature.

- a. Caterpillar → mocking bird → hawk
- b. Green plant → grasshopper → frog → snake
- c. Grass → cow → boy or girl (hamburger & milk)

4. **CHANGE:** Nothing in nature stays the same: it is always moving, and changing forms and appearance. Example: weather is constantly changing.

5. **ADAPTATION:** Special features of a plant or animal that help it survive (a body part with a special job).

- a. Fins of a fish. . . . for swimming; wings on a bird. . . . for flight
- b. Web building. . . .the manner in which some spiders catch their food

**THE FIVE MAJOR INTERDEPENDENT RELATIONSHIPS IN NATURE**  
**Student Worksheet**

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Teacher's name: \_\_\_\_\_

**1. PATTERNS:**

a. definition: \_\_\_\_\_

\_\_\_\_\_

b. example: \_\_\_\_\_

\_\_\_\_\_

**2. VARIETY:**

a. definition: \_\_\_\_\_

\_\_\_\_\_

b. example: \_\_\_\_\_

\_\_\_\_\_

**3. BALANCE:**

a. definition: \_\_\_\_\_

\_\_\_\_\_

b. example: \_\_\_\_\_

\_\_\_\_\_

**4. CHANGE:**

a. definition: \_\_\_\_\_

\_\_\_\_\_

b. example: \_\_\_\_\_

\_\_\_\_\_

**5. ADAPTATION:**

a. definition: \_\_\_\_\_

\_\_\_\_\_

b. example: \_\_\_\_\_

\_\_\_\_\_

## ENVIRONMENTAL VOCABULARY LIST

1. **ADAPTATION:** A special feature or behavior of a plant or animal that helps it survive (such as a body part with a special job).
2. **BALANCE:** The way things depend upon each other and their environment.
3. **CHANGE:** The way living things physically go from one form to another over time, that is, grow, move, reproduce, die, and decompose or the way non-living things weather or erode.
4. **CONSERVATION:** Keeping the environment in a safe and sound condition. using the environment wisely.
5. **CONSUMER:** Any animal that eats plants or animals.
6. **DECOMPOSER:** An organism that chemically breaks down dead plants and animals.
7. **ECOLOGY:** The study of the way plants and animals depend on each other and their environment.
8. **ENVIRONMENT:** All of the living and non-living things that surround and affect an organism.
9. **FOOD CHAIN:** A chain of dependence where green plants are the producers and animals are the consumers.
10. **HABITAT:** The special place where a plant or animal lives.
11. **LITTER:** Materials that man has thrown about which make the environment unhealthy or unattractive.
12. **NICHE:** The special job a plant or animal has in nature, especially its place in a food web or food chain.
13. **PATTERNS:** The design, shape, form, repeated action, or behavior of things.
14. **POLLUTION:** The addition of harmful substances to the environment.
15. **PREDATOR:** An animal that hunts for and eats other animals.
16. **PREY:** An animal that is hunted and eaten by a predator.
17. **PRODUCER:** An organism that can make its own food.
18. **SCAVENGER:** An animal that feeds on dead matter.
19. **VARIETY:** Difference among things of the same group.

20. **PHOTOSYNTHESIS**- a chemical process by which chlorophyll- containing plants use light to convert carbon dioxide and water into carbohydrates, releasing oxygen as a by-product
21. **FOOD WEB**- a complex of interrelated food chains in an ecological community.
22. **CARNIVORE**- is an organism that derives its energy and nutrients from a diet consisting mainly or exclusively of animal tissue.
23. **HERBIVORE**- is an animal that is adapted to eating plants.
24. **OMNIVORE** – is an organism that eats both plants and animals as their primary food source.
25. **VERTEBRATE** - members of the subphylum Vertebrata that includes the fishes, amphibians, reptiles, birds and mammals, all of which have a backbone.
26. **INVERTEBRATE**- organism that lack a backbone or spinal column.

# ENVIRONMENTAL VOCABULARY LIST

## Framer's Model: Teacher's guide

The Frayer Model is a graphic organizer used for vocabulary and word analysis. This format allows students to synthesize and apply information they already know, or have previously learned, to a word. This association or prior knowledge and connections, to classroom content, helps to form lasting and meaningful experiences. These meaningful experiences that are personal to the student will help increase proficiency in many objectives beyond vocabulary.

This vocabulary development tool will be used to help make sense of complex concepts. The Frayer Model stresses the ability of students to understand a word within the larger context of a reading selection/text. This format requires students to think and describe the meaning of a word and concept.

Each student will choose a term, and the teacher will guide them through the completion of the activity.

1. The student writes the word in the "word" box:
2. The student will write the **definition** in the student's own words, using the definition from the vocabulary list.
3. The student writes words that characterize the vocabulary word **(facts/characteristics)**.
4. In this box the students will list **examples** of the key or concept work.
5. In the fourth and final box, the students will list **non-examples** of the key or concept word.

**NOTE: The students can include drawings in the examples and non-examples boxes.**

## Frayer's Model: Teacher's guide, cont.

### Frayer Model Example

<b>Critical Characteristics</b>  Body covered by hair Mammary Glands Lungs 4 Limbs Give birth to young	<b>Non-critical Characteristics</b>  Color                  Diet Sex/Gender          Size Life Span             Age Number of parents after birth
<b>Mammals</b>	
<b>Example</b>  Man                  Monkey Cat                   Mouse Horse                Elephant Girl                   Cow	<b>Non-example</b>  Snake                Mosquito Duck                  Lizard Frog                   Bird Crab                   Fish

# Environmental Vocabulary Word

## Student Worksheet:

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Teacher's name: \_\_\_\_\_

# Fruyer Model

Definition in your own words	Facts/characteristics
Examples	Nonexamples

Word

# ENVIRONMENTAL VOCABULARY WORD SEARCH

R D E R I E E V W E T Z W A H R X A S Y W E M F O  
Y O R G H N A F R G Y S I H E E E S N R E T T A P  
N U T C N R V O S A J P G A R C N N V U K K M S C  
Z W I A I A V E E R X K R B B U V J P E Y X E O G  
N N U E D I H O R C C E E I I D I H B A L A N C E  
I M T C N E T C X T O B T T V O R R U V B S K K W  
A Y S M F Y R M J G E L A A O R O V V L U Z P U S  
H A O F N N K P H O W B O T R P N N T M Y K Z I U  
C O N S E R V A T I O N R G E B M B E V U I S U V  
D S C A V E N G E R C A I A Y K E R W X I E T Y Q  
O P R E Y L O E N D D A T Q T A N T P T H S C O I  
O Z T U I W G O Z A G I R S F E T U R T Z D F K S  
F O G K O T I V P S U S E N V D A L N E S M V R O  
S K K A P T D T I K J F E T I C F Y A B V Q H T D  
S F R L U D A I L B N R L J Y V S P C K G P N Z E  
F R Q L A T J J F M W W I Q B O O L J L B L P E V  
M O L H I V W S M Q G G D E T Q J R S R S R S M B  
O O S O S Y K R F K Q Q V O G Y I D E R E K R U W  
P A N V B A G G O M E Z H F F C B T O J N V E D K  
B G B H T N K C F P V P B Y X Q N V P A N Z T B G  
F W S S Y P Y Q G P O K J F B B E W D O O F T Z T  
B P N D E V M M P I T N I B B G G C U Z P Q I U K  
J I R Y J U H L B G I C C T K L S G C X R G L P L  
K L F H D W M E P B G W W S G L K E S Q K U I P I  
Y M R E S O P M O C E D M T Q S B M H J O X S P W

ADAPTATION  
BALANCE  
CARNIVORE  
CHANGE  
CONSERVATION  
CONSUMER  
DECOMPOSER  
ECOLOGY  
ENVIRONMENT  
FOODCHAIN  
FOODWEB  
HABITAT  
HERBIVORE

INVERTEBRATE  
LITTER  
NICHE  
OMNIVORE  
PATTERNS  
PHOTOSYNTHESIS  
POLLUTION  
PREDATOR  
PREY  
PRODUCER  
SCAVENGER  
VARIETY  
VERTEBRATE

## Research:

1. Have students research and report about salt-water plants and animals:

### Submerged plants

1. turtle grass
2. manatee grass
3. shoal grass
4. *Sargassum* algae

### Near Shore Trees

1. black mangrove
2. red mangrove
3. white mangrove

### Mangrove Animals

1. mangrove tree crab
2. Liguus snail
3. fiddler crab

### Seagrass Animals

- |                  |                   |                   |
|------------------|-------------------|-------------------|
| 1. filefish      | 5. sponges        | 9. toadfish       |
| 2. scorpion fish | 6. porcupine fish | 10. sea cucumber  |
| 3. pipefish      | 7. swimming crab  | 11. grunts        |
| 4. goby fish     | 8. pink shrimp    | 12. spiny lobster |

### Rock reef animals

- |                            |                |                        |
|----------------------------|----------------|------------------------|
| 1. <i>Batillaria</i> snail | 4. octopus     | 7. <i>Asaphis</i> clam |
| 2. hermit crab             | 5. tooth snail | 8. barnacle            |
| 3. limpet                  | 6. oyster      | 9. chitin              |

2. Have students draw or find pictures of:

### Land Plants

- |                                 |                   |                        |
|---------------------------------|-------------------|------------------------|
| 1. parts of a plant             | 5. sea oats grass | 9. gumbo limbo         |
| 2. parts of a leaf              | 6. sabal palm     | 10. wild coffee        |
| 3. edible plants of So. Fla.    | 7. sea grape      | 11. poisonwood         |
| 4. dangerous plants of So. Fla. | 8. strangler fig  | 12. morning glory vine |

### Land Animals

- |                        |            |                      |
|------------------------|------------|----------------------|
| 1. land crabs          | 4. opossum | 6. squirrel          |
| 2. snakes of So. Fla.  | 5. raccoon | 7. birds of So. Fla. |
| 3. insects of So. Fla. |            |                      |

## SUGGESTED POST VISIT ACTIIVITES

### LITTER LESSON ACTIVITIES

**Big Idea 6:** Earth Structures

**Topic XVI:** SC.4.E.6.3 Earth's Resources

**SC.4.E.6.3:** Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable.

#### ACTIVITIES:

1. Have students create art out of pieces of litter. Help students collect pieces of litter for their art projects and find examples of trash art or sculptures made from items that would be considered trash. Ask them to think of other ways to reduce, recycle or reuse trash.
2. Have students paint windows with pictures or words to encourage people to not litter.

**Teachers:** Ask local businesses to donate supplies and in return your students will decorate their windows. Ask your local chamber of commerce to recommend businesses that might also be interested. Parents of students in your school who own their own businesses might be prospects. Students can also paint the windows of your school or other schools in your district. Make sure displays are positive.

3. Have students make claims about the most common type (plastic, paper, food wrappers, cans, etc.) of litter found in classrooms of different grade levels and different areas of the school. Your students should survey litter found in your classroom. Now try a short walk down the hall, perhaps to lunch, looking for litter. Record observations on the type and location of litter. If time permits, survey your school grounds and other classrooms. Maps and charts could be made.
4. Assist one half of your class in painting a landscape mural that is litter-free; assist the other half of the class in painting a landscape mural full of litter. Display them in your school so the rest of the student body will recognize the difference litter-free can make.
5. Devise a mathematics lesson using litter as the basis for the problem. You can use the following data:

Recycling one ton of newspapers saves 17 trees. **According to 2010 Environmental Protection Agency** data, the single biggest component of

**municipal solid waste (MSW)** is paper and paperboard that represents 29% of the total. Yard trimmings and food scraps comprise 27%, plastics 12%, metals 9%, rubber, leather and textiles 8%, wood 6%, glass 5% of the MSW. Less than 45.4% of waste paper is being recycled. Each American produces 4.4 pounds of trash per day.

6. Weigh a newspaper and determine how many trees are needed each year for your class, assuming that each student receives a newspaper each day. How much trash does your class produce each day?

7. **Students:** Research how litter affects the environment. Record your findings within guidelines.

**Teachers:** Help students find materials that will give them adequate information to complete their research projects. Students can use the resources your library provides or research topics on the Internet (from credible sources.) Tell your students how you want to record their findings.

8. **Students:** Use your school library to find information on the effects litter has on the environment. From this information write a research paper using your teacher's specifications.

**Teachers:** Help students to become familiar with your school library if they are not already. Students may need direction to find the appropriate information for this paper.

9. Have students write a play or a skit to encourage people not to litter or a play or skit that demonstrate the negative effects litter has on Florida.

10. Take pictures of your students and post them on a bulletin board Inside/outside your classroom with the headline "We're Too Cool to Litter." Children love to have their pictures displayed, so incorporate photos into your classroom activities.

11. Encourage students to always throw their litter away. Also encourage them to keep all their areas clean: their desk, classroom, homes, yard, or bedroom. Remind them that all of these areas are a reflection of themselves. They should take pride in these areas and that means keeping them litter-free.

12. Supply your students with latex gloves and send them on a litter scavenger hunt on the school grounds. They will be amazed at the different types of litter they will find.

13. Help students adopt an area to keep clean inside your school or on school grounds. Post a sign that reads, for example, "This Area Is Litter-Free, Thanks To Mrs. Johnson's 3rd Grade Class."

14. Encourage your students to carry litter-free lunches to school. Remind them to pack their lunches in items that can be reused or recycled rather than thrown away.

15. Before your visit to the *Biscayne Nature Center for Environmental Education*, select students in your class to act as litter patrol captains. Their job is to encourage non-littering activity, be in charge of litterbags, and be responsible for bus and site cleanup on field trips.

**EVALUATION:** Is your classroom neater at the end of the day? Can your students defend not littering on an economic basis? Will one of your students drop a gum wrapper without feeling a little guilty?

# PHYSICAL AND CHEMICAL CHANGES LESSON

## Experiment 1: Physical Properties & Physical Change

### Big Idea 9: Changes in Matter

#### TOPIC VI: Physical and Chemical Changes

**SC.5.P.9.1:** Investigate and describe that many physical and chemical changes are affected by temperature.

Materials:

Un-popped popcorn kernels

Microwave oven

Brown bags

Graph paper

Pencils

1. Distribute a piece of graph paper and 25 dried kernels of un-popped popcorn to each student.
2. Have the students describe or list the physical properties of the popcorn. Ask the students to use as many words as they can to describe the kernels (include the color, the size, the texture, the hardness, the amount, etc.).
3. Have the students cluster the kernels onto one area of the graph paper and draw around the space that the kernels occupy on the paper.
4. Have them count and record the number of squares on the graph paper that the kernels occupy.
5. Explain that the students have observed and described the physical properties of the un-popped popcorn kernels.
6. Explain that you are going to cause a physical change in the popcorn by introducing heat using the microwave oven.
7. Place the popcorn in bags and pop the corn for the appropriate number of minutes.

*(Explain that each of the popcorn kernels has water inside its cells that heats up in the microwave oven. When water inside the kernel heats, the water turns into steam; as the water expands, it increases in energy and takes up more space. This causes an increase of energy and pressure inside the kernel. The kernel also contains starch, which becomes more fluid-like as the kernel heats. Eventually, the outer shell of the kernel bursts open, releasing the pressure,*

*steam and fluid-like starch. Rapid cooling and drying of the starch results in the fluffy shape of the popcorn we eat.)*

8. After the corn is popped, distribute 25 kernels of popped popcorn to each student.
9. Have the students describe or list the physical properties of the popped popcorn. Again ask the students to use as many words as they can to describe the kernels (include the color, the size, the texture, the hardness, the amount, etc.) comparing the popped popcorn to the un-popped.
10. Then have the students cluster the popped kernels onto one area of the graph paper as before and draw around the space that the popped kernels occupy on the paper. Have them count and record the number of squares on the graph paper that the kernels occupy.

*(Explain that the students have observed and described the physical properties of the popped popcorn kernels and that they have witnessed a physical change in the popcorn. [The chemical properties of the popcorn have not changed in any major way. It is still comprised of a large starch complex carbohydrate molecule.]*

11. Have the students eat the popcorn and explain that at that point, they are causing first another physical change in the popcorn (grinding the popcorn into smaller bits with their teeth), then a chemical change in the popcorn, since their body is digesting or breaking down the molecules that comprise popcorn.

## **Experiment 2: Chemical Properties & Chemical Change**

Materials:

Vinegar

Baking soda

Clear plastic cups or glasses

Paper towels

Spoon

Water

pH or litmus paper (optional)

*This experiment demonstrates a chemical reaction. Chemical reactions result in the formation of a new substance with new physical and chemical properties after two or more substances are combined. A chemical reaction is accompanied by the production of a gas, or a change in temperature, color, pH, or odor.*

1. Have the students describe or list the physical properties of the vinegar (include the color, odor, texture, amount, etc).
2. Have the students test the vinegar with pH or litmus paper if available in order to test for this chemical property.

3. Then have the students describe or list the physical properties of baking soda and compare it to the vinegar.
4. Add a bit of water to the baking soda to create a solution. Have the students test the baking soda solution with pH or litmus paper if available.
5. Combine the two liquids and observe the chemical reaction.

*(The chemical reaction is evident in the bubbling or fizzing activity ~ a gas is produced, specifically carbon dioxide. Notice as you swirl the mixture, the reaction may be encouraged to continue by causing more of the molecules that comprise vinegar and baking soda to come in contact with each other. )*

6. After the reaction is complete, test the combined solution to see what other changes have occurred. Test the pH of the combined solution.
7. Smell the resulting solution to see if you detect the odor of vinegar. This chemical reaction also results in a slight drop in temperature, but the change may not be significant enough for you to detect it.
8. Is it now possible to pull the vinegar back out of the combined solution? No, you have effectively formed a new substance with new properties that are different from the two original substances.

# Weathering and Erosion

## Big Idea: 6

### Topic: X1 Earth Structures

**SC.4.E.6.4** - Describe the basic differences between physical weathering (breaking down of rock by wind, water, ice, temperature change, and plants) and erosion (movement of rock by gravity, wind, water, and ice).

**Objectives:** Students will discover the effects and processes of weathering and erosion.

**Teachers:** This can be done as a series of stations. Access to a freezer is needed, but it doesn't have to be in the room. Introduce and review types of weathering and erosion. Discuss the differences between them. Showing pictures is helpful. Also showing pictures of each process and effect is helpful. Perform weathering and erosion lab stations.

#### Materials:

carbonated water  
hair dryer  
tap water  
shallow pan  
limestone rocks  
ice trays  
350 mL (12 oz.) plastic cups  
mortar and pestle  
sand  
steel wool  
dirt  
rulers/station  
permanent markers  
quart size bowl  
spoon

## Explore

### Weathering and Erosion Stations:

The following are activities that will be used for weathering stations. Use one station for each activity. Have students document their observation in their lab booklets.

**Station 1:** Test rock samples in carbonated water vs. tap water. Observations of the physical state of the rocks are taken initially. Place one rock in 250 mL (8 oz.) of carbonated water and one rock in 250 mL (8 oz.) of tap water. Record observations every 20 minutes, during class time, and after 24 hours. Observations should include color change in the water, presence of bubbles, and if the rock is weathering.

**Station 2:** Test to show that water expands as it freezes. Fill a cup with 200 mL (6 oz.) of water. Mark the water level. Place in freezer overnight. Mark the water level after 24 hours. Record any changes in the level and physical state of the water.

**Station 3:** Test and record the effect of tap water versus carbonated water on steel wool. Place a piece of steel wool in a 200 mL (6 oz.) cup of carbonated water and another piece of steel wool in a 200 mL (6 oz.) cup of tap water. Record observations every 20 minutes, during class time, and after 24 hours. Record any changes in water color and physical or chemical changes in the steel wool.

**Station 4:** Demonstrates beach erosion. Using a pan, make a sand pile at one end and pour water at the other end. Slide the pan back and forth to create wave movement. Record observations. Have students record what happens to the sand when waves are created. Describe dispersion and deposition of the sand.

**Station 5:** In a quart size bowl, add 250 mL (8 oz.) of tap water and 250 mL (8 oz.) of sand. Stir the mixture. Fill an ice tray with the mixture. Freeze mixture for 24 hours. Next day, student will place ice cubes in different surfaces. Students will place 4 ice cubes in a pan sand. They will also place 4 ice cubes in a cup filled with 200 mL (6 oz.) of water. Finally, students will place 4 ice cubes in a pan filled with dirt. Record observations every 10 minutes. What happens to the ice cubes?

**Station 6:** (Teacher Demonstration: erosion due to hurricanes) Place 1 lb. of sand in a shallow pan. Teacher will blow the sand using a hair dryer, at a 45 degree angle, on its lowest setting. Record what happened to the sand during the “hurricane?”

### **Explain**

Engage the students in a discussion to describe the processes of both weathering and erosion in each station.

Describe how each station may or may not apply to Florida’s various ecosystems.

### **Evaluation**

Have students write a reflection on specific weathering and erosion events in Florida.

## ADDITIONAL POST-VISIT EXTENSION ACTIVITIES

*A fine bird is the pelican; its beak can hold more than its belly can!*

Students, here are a few suggested activities that you can try now that you have visited the *Biscayne Nature Center for Environmental Education (BNCEE)*:

**If you (the student/scientist) studied the SEAGRASS . . .**

1. Research the adaptations and behavioral patterns of the animals observed in the seagrass, what they eat, and what eats them. Each of you could choose one animal to study (e.g., shrimp, clams, sea urchins, sea cucumbers, fish, Portuguese man-of-war, snails, etc.). Go online, search websites and share your research with your fellow scientists.
2. Draw the ocean near our seagrass study area. Color the sea according to the depth and description of the water (e.g., yellow = sandbar).
3. Write a story describing your adventures as a shrimp growing up in the seagrass.
4. Why is the seagrass area important? Research how man uses marine organisms (living things) other than as a food source.
5. Recall the effects of the “marine protective adaptations.” Which animals stick, stab, scratch, cause a rash or skin irritation, or produce toxins? Review the possible function(s) of their adaptations. Draw each animal.

**If you explored the COASTAL STRAND HAMMOCK (or maritime forest) . . .**

1. Use the *Field Note Booklet* to review and state examples of the five (5) major concepts found in nature. Find examples of the five major concepts of nature around your school, backyard, or neighborhood.
2. Using *The Miami Herald* published on the day AFTER your hammock walk, locate the weather "STATISTICS" for the date of your walk. Complete the “weather-data” section of your Field Note booklet.
3. Situate yourself under a shade tree on the school grounds. Share with your friends the poem, song, haiku, story, etc., that you wrote in the hammock. If you didn't write one, do so now. Write about your experiences at the *BNCEE*.
4. Draw a (scale) map of your walk through the hammock, indicating on it which direction points north. Label points of interest, names of plants studied, and so on. Compare your map with your fellow scientists'/explorers' map.

5. Construct a map of your neighborhood. Label or point out places where you could improve your environment.
6. Recall the effects of the “plant protective adaptations.” Why might these plants stick, stab, scratch, or cause a rash or skin irritation. Why might they be deadly or make an animal sick if the animal ate their fruit? Draw each plant.
7. How are living things connected to other living things and to non-living things? Can you describe an example of this **connectedness** of nature in your neighborhood . . . in the city . . . in the country?

### **If you visited the MANGROVES . . .**

1. Use the *Mangrove Booklet* to review the names and descriptions of the mangrove trees and the animals that live among them. Why are the mangroves important?
2. Write a creative story. Imagine that you are a lone native Tequesta person living in the mangroves. How would you survive? What would you eat? Describe your shelter. Make a schedule of your typical day . . . work time . . . hunting time . . . play time . . . What games would you play? What kinds of tools would you need to make? From what materials would you construct the tools?
3. Measure the leaf size from the picture you made of each type of mangrove tree. Take an average with your fellow scientists of the width and length of each leaf from each type of tree. Make a bar graph of your results. Which is the widest . . . longest . . . shortest . . . thinnest? How much longer or shorter is one leaf from another?

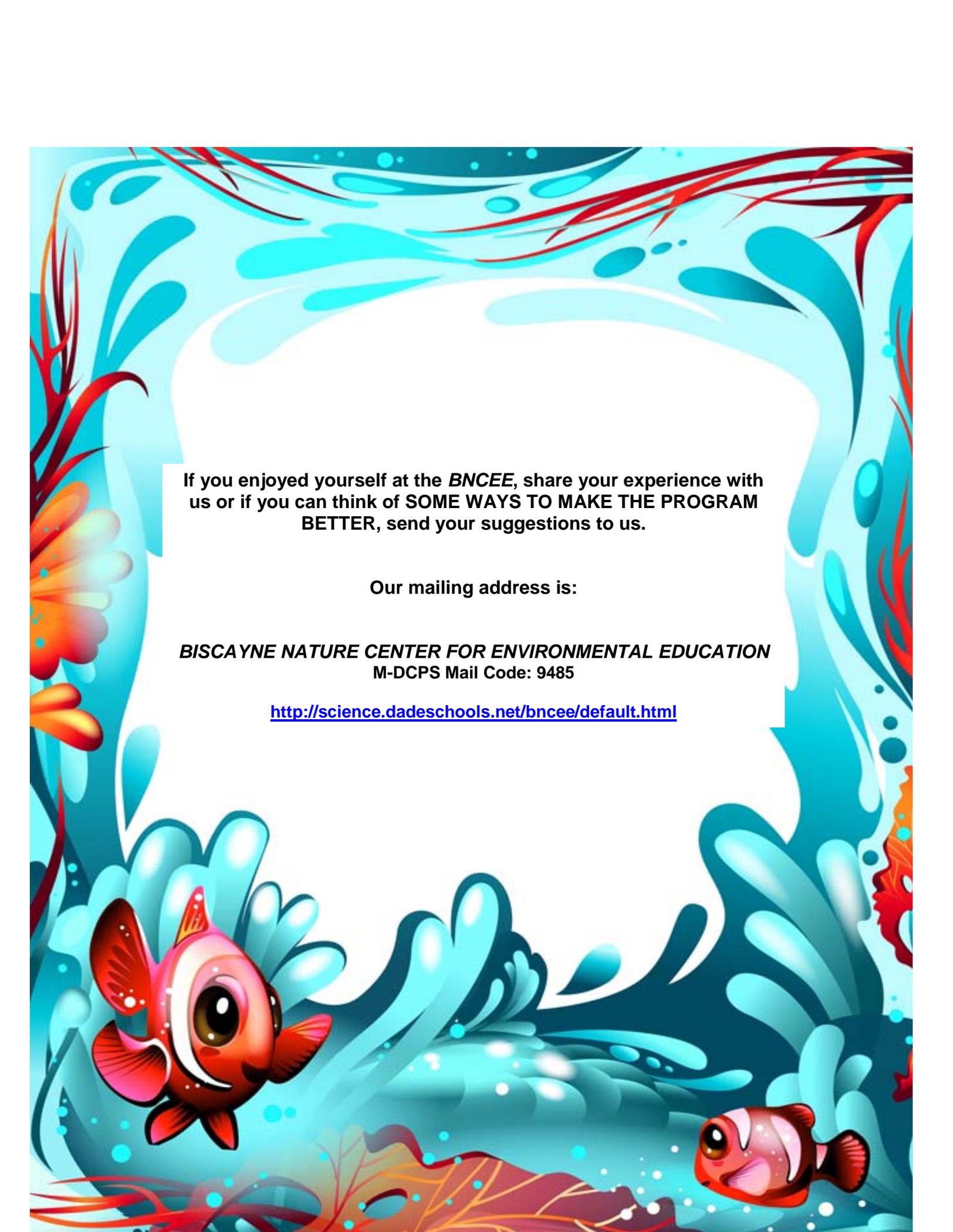
### **If you investigated the ANCIENT ROCK REEF . . .**

1. Randomly distribute popped popcorn kernels on an area of the school lawn. (Pretend that they are *Batillaria* snails.) How many kernels are on the lawn? Have small groups of students inquire and determine the number of popped popcorn kernels that are distributed on the school lawn without collecting them.
2. If you had to make the decision/choice about the future of the above natural environment/habitats and their adjacent areas, what would you suggest and why?

### **If you visited the LABORATORY...**

1. How is the lab different from your field experiences? How does a scientist's work in the lab differ from his work in the field?
2. If you enjoyed the lab, describe it and state why you did. Could you set up a lab like the one at the *BNCEE* in your home? What would you need to do first? (ANSWER: Study a book on aquaria from a library; then consult with store personnel to determine the price of the equipment before buying.)

3. Make a list of equipment costs. Take class time to complete and/or correct the lab booklet. Discuss each station with your "buddy" while completing the lab booklet. Review the lab booklet as a class.
4. The Chemical Test lab station #7 can be duplicated in the classroom. Use vinegar as an (acetic) acid; scrape a piece of chalk and use that as a material that contains calcium carbonate.
5. YOU as the TEACHER will design a lab station suitable for the *BNCEE*. Think of it as one in which other scientists like your peers will be in a position to conduct appropriate research. List the equipment and organisms needed. Design a page for the lab booklet. Send your sample to the address below.

An underwater scene with vibrant blue and red coral, bubbles, and two clownfish. One clownfish is larger and positioned on the left, while a smaller one is on the right. The background is filled with stylized, flowing blue and red shapes representing water and marine life.

If you enjoyed yourself at the *BNCEE*, share your experience with us or if you can think of **SOME WAYS TO MAKE THE PROGRAM BETTER**, send your suggestions to us.

Our mailing address is:

***BISCAYNE NATURE CENTER FOR ENVIRONMENTAL EDUCATION***  
M-DCPS Mail Code: 9485

<http://science.dadeschools.net/bncee/default.html>

## Anti-Discrimination Policy

### Federal and State Laws

The School Board of Miami-Dade County, Florida adheres to a policy of nondiscrimination in employment and educational programs/activities and strives affirmatively to provide equal opportunity for all as required by:

**Title VI of the Civil Rights Act of 1964** - prohibits discrimination on the basis of race, color, religion, or national origin.

**Title VII of the Civil Rights Act of 1964 as amended** - prohibits discrimination in employment on the basis of race, color, religion, gender, or national origin.

**Title IX of the Education Amendments of 1972** - prohibits discrimination on the basis of gender.

**Age Discrimination in Employment Act of 1967 (ADEA) as amended** - prohibits discrimination on the basis of age with respect to individuals who are at least 40.

**The Equal Pay Act of 1963 as amended** - prohibits gender discrimination in payment of wages to women and men performing substantially equal work in the same establishment.

**Section 504 of the Rehabilitation Act of 1973** - prohibits discrimination against the disabled.

**Americans with Disabilities Act of 1990 (ADA)** - prohibits discrimination against individuals with disabilities in employment, public service, public accommodations and telecommunications.

**The Family and Medical Leave Act of 1993 (FMLA)** - requires covered employers to provide up to 12 weeks of unpaid, job-protected leave to "eligible" employees for certain family and medical reasons.

**The Pregnancy Discrimination Act of 1978** - prohibits discrimination in employment on the basis of pregnancy, childbirth, or related medical conditions.

**Florida Educational Equity Act (FEEA)** - prohibits discrimination on the basis of race, gender, national origin, marital status, or handicap against a student or employee.

**Florida Civil Rights Act of 1992** - secures for all individuals within the state freedom from discrimination because of race, color, religion, sex, national origin, age, handicap, or marital status.

**Title II of the Genetic Information Nondiscrimination Act of 2008 (GINA)** - prohibits discrimination against employees or applicants because of genetic information.

**Boy Scouts of America Equal Access Act of 2002** – no public school shall deny equal access to, or a fair opportunity for groups to meet on school premises or in school facilities before or after school hours, or discriminate against any group officially affiliated with Boy Scouts of America or any other youth or community group listed in Title 36 (as a patriotic society).

*Veterans are provided re-employment rights in accordance with P.L. 93-508 (Federal Law) and Section 295.07 (Florida Statutes), which stipulate categorical preferences for employment.*

#### **In Addition:**

**School Board Policies 1362, 3362, 4362, and 5517** - Prohibit harassment and/or discrimination against students, employees, or applicants on the basis of sex, race, color, ethnic or national origin, religion, marital status, disability, genetic information, age, political beliefs, sexual orientation, gender, gender identification, social and family background, linguistic preference, pregnancy, and any other legally prohibited basis. Retaliation for engaging in a protected activity is also prohibited.