Indiana Dunes Education

National Park Service
U.S. Department of the Interior

Indiana Dunes National Park
Education Department

West Beach Walk

Summary:

The marram grass covered dunes throughout the park provide homes to many species of plants and animals; this is a fragile and vulnerable habitat. On your program have the opportunity to climb the dunes by stairs at West Beach, hike along a wooded trail and catch a spectacular view of Lake Michigan. Participate in activities to learn how wind, water, waves and plants work together to form dunes and this fragile habitat. Discover ways that humans can alter or save the dunes.

Objectives: students will be able to

1. List the three forces that combine to form sand dunes.
2. Explain how wind, waves, and plants help form and stabilize dunes.
3. Identify and describe the characteristics of at least two dune plants.
4. Describe what they observed, heard, and felt while exploring the dunes and beach.
5. Give examples of ways humans can help protect the dunes.

What to Expect During Your Trip:

This program is totally outside exposed to the elements from the beach, wind and sand dunes. Come prepared for cold winds or hot sun. Hike can be exhilerating; please let rangers know if flexiblility of route is needed to accommodate physical needs of the group.

Setting:

West Beach; 1.5 to 2 hours

Age/Grade:

Pre - school through 3rd Grade

Ratio of students to ranger:

No more than 30 to 1 is requested. We will accommodate larger groups within reason with the teacher's assistance.

Safety Issues:

Trips/falls while hiking, avoid poison ivy, complete a tick check when returning from a hike in the woods, in excessive heat, please bring water.

Background Information:

The first dunes of Indiana were formed approximately 15,000 years ago when the last of the Ice Age glaciers swept down from the North. As the climate warmed, the southward movement of the glacier was halted, and a glacial deposit called a moraine was formed. This moraine acted as a dike holding back the water of the melting glacier forming what is now Lake Michigan. Waves, wind, and plants have all combined to bring sand to the southern and eastern shores of Lake Michigan and begin the dune building process. The process of dune building that began over 15,000 years ago is still continuing today. Through the dynamic process of succession, a variety of biological communities succeed one another on the dunes of West Beach. Each community changes the physical and biological environment making conditions suitable for the next community.

The shoreline of the new lake first stood at 640 feet elevation, but this was only temporary. The increasing influx of meltwater from the melting ice to the north soon caused the lake to breach its morainic dam near what is now the southwest part of Chicago. As water passed out of the opening in the moraine and down the DesPlaines and Illinois valleys, the level of Ancestral Lake Michigan fell. A new, lower lake level was established when the down-cutting of the DesPlaines River was stabilized by a boulder-rich zone with the Valparaiso Moraine. The new lake level, which stabilized at 620 feet was also only temporary. When the boulder field near southwest Chicago was breached, the lake began to lower again until a third level at 605 feet was reached. This resulted because the down cutting of the Illinois River and its tributaries virtually ceased when the river reached bedrock. This third lake level was to be the last stage of ancestral Lake Michigan.

By this time, the glaciers had completely left the Lake Michigan Basin. A new drainage was opened at the Strait of Mackinac, to the north, which was lower than the outlet at Chicago and continues to be the principal drainage of the lake up to the present. Geologists refer to the three lake levels of ancestral Lake Michigan as the following:

Glenwood: 640 feet elevation Calumet: 620 feet Tolleston: 605 feet

At each of these lake stages, beaches and their accompanying foredunes are preserved. The transition to modern day Lake Michigan was a gradual one involving numerous rises and falls of the lake level. Even today the lake level is not fixed, as can be seen by a three to four-foot rise during the past several years. The mean average level of Lake Michigan over the past 100 years is about 585 feet elevation.

Prerequisite Classroom Activities:

Before your visit to Indiana Dunes National Park, please take a moment to read over these activities. We suggest that you do one or more of the described activities for additional classroom involvement and learning.

1. Have each student write a story pretending that they are a grain of sand and the travels they make.
2. Explore the different uses of sand
3. Explore what makes the wind blow.
4. Study root structures of plants by planting and growing beans.
5. Find different areas in the world, which have sand dunes and compare these dunes to the southern shore of Lake Michigan.

Vocabulary:

Glacier - A giant mass of ice that covered the area a long time ago.

Wooded dune - A sand dune that is covered with a forest of trees.

"Live" dune - A sand dune that is slowly moving with constant wind movement.

Leaf decomposition - Leaves that are being eaten by insects and worms.

Soil - tiny particles of rock, minerals and the waste of decomposers.

Marram grass - The main dune building grass.

Roots - The part of the plant that is under the ground.

Sand grains - Tiny particles of different rocks and minerals.

Extension or Follow-Up Activity:

Class reflection paper or writing sample:

Ask each student to write a short essay, letter or story about what they learned on their field trip to Indiana Dunes National Park. Rangers love receiving mail from their students. Send the ranger the packet of essays from your class (or a copy of them), and your ranger will send your class a certificate from the dunes. Send your essays to:

Indiana Dunes National Park
1100 N. Mineral Springs Road
Porter, IN 46304
Attn: Your ranger's name or just Education Department

If you are using this essay as a class assignment for a grade, we would like to suggest that each essay contain the following elements. Use the rubric below to score them.

The name of the park and the location of their field trip—for example:
Douglas Center, Indiana Dunes National Park

Three facts they learned on the field trip.

A brief explanation of why Indiana Dunes is unique and therefore a national park.

At least two things the student can do to help take care of his or her national park.

Fill in the blank of this statement and provide an explanation: I would like to learn more about _____ at Indiana Dunes.

*** For advanced groups, add the following element:

Tell the park rangers if you would like to bring your families and friends to the dunes and if so what would you do here and where would you go.

Assessment:

Rubric for Class reflection writing assignment:

Writing and organization - **4 points** the writing sample is very well written and organized by the elements provided. It has a strong introduction, middle and conclusion. **3 points** the writing sample is well written and organized by the elements provided. It includes an introduction, middle and conclusion**. 2 points** the writing sample is choppy and is not well organized. It lacks an introduction or conclusion. **1 point** the writing sample is very short and unorganized.

Grammar & Spelling - **4 points** Mistakes in spelling and grammar are minor or non-existent. **3 points** Mistakes in spelling and grammar are minimal—about 4-5. **2 points** mistakes in spelling and grammar are numerous—5-10. **1 point** mistakes in spelling and grammar are more than 10.

Facts and content - **4 points** the writing sample demonstrates the student's learning on the dunes program and includes three or more facts provided by the park staff. **3 points** the writing sample demonstrates the student's learning and includes only two facts provided by the park staff. **2 points** the writing sample does not demonstrate much learning and only includes one fact provided by the park staff. **1 point** the writing sample does not demonstrate any learning and does not include any facts provided by the park staff.

National Park Service theme - **4 points** the writing sample clearly demonstrates the student's understanding of the role of the NPS in preserving the dunes by explaining why Indiana Dunes is such a unique treasure. **3 points** the writing sample mentions the NPS and its role in preserving the Indiana Dunes. **2 points** the writing sample mentions the NPS and Indiana Dunes. **1 point** the writing sample does not mention anything about the NPS or its role at Indiana Dunes.

Stewardship - **4 points** the writing sample lists three things the student can do to assist in taking care of the Indiana Dunes. **3 points** the writing sample lists two things the student can do to assist in taking care of the Indiana Dunes. **2 points** the writing sample lists one thing the student can do to assist in taking care of the Indiana Dunes. **1 point** the writing sample does not list anything about what the student can do to take care of the Indiana.

Indiana Content Standards:

Kindergarten: Science

Physical Science

- **K.PS.1** 2016 - Plan and conduct an investigation using all senses to describe and classify different kinds of objects by their composition and physical properties. Explain these choices to others and generate questions about the objects.
- **K.PS.2** 2016 - Identify and explain possible uses for an object based on its properties and compare these uses with other students' ideas.

Life Science

- **K.LS.1** 2016 - Describe and compare the growth and development of common living plants and animals.
- **K.LS.2** 2016 - Describe and compare the physical features of common living plants and animals.
- **K.LS.3** 2016 - Use observations to describe patterns of what plants and animals (including humans) need to survive.

First Grade Science

Physical Science

- **1.PS.1** 2016 - Characterize materials as solid, liquid, or gas and investigate their properties, record observations and explain the choices to others based on evidence (i.e., physical properties).

Life Science

- **1.LS.1** 2016 - Develop representations to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.
- **1.LS.2** 2016 - Develop a model mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs. Explore how those external parts could solve a human problem.
- **1.LS.3** 2016 - Make observations of plants and animals to compare the diversity of life in different habitats.
- **1.LS.4** 2016 - Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.

Second Grade Science

Earth and Space Science

- **2.ESS.3** 2016 - Investigate how wind or water change the shape of the land and design solutions for prevention.
- **2.ESS.4** 2016 - Obtain information to identify where water is found on Earth and that it can be solid or liquid.

Life Science

- **2.LS.3** 2016 - Classify living organisms according to variations in specific physical features (i.e. body coverings, appendages) and describe how those features may provide an advantage for survival in different environments.

Third Grade Science

Earth Science

- **3.ESS.3** 2016 - Observe the detailed characteristics of rocks and minerals. Identify and classify rocks as being composed of different combinations of minerals.

Life Science

- **3.LS.2** 2016 - Plan and conduct an investigation to determine the basic needs of plants to grow, develop, and reproduce.

Illinois Content Standards:

Kindergarten:

Science Energy

- **K-PS3-1** 2017 - Make observations to determine the effect of sunlight on Earth's surface.

From Molecules to Organisms: Structures and Processes

- **K-LS1-1** 2017 - Use observations to describe patterns of what plants and animals (including humans) need to survive.

Earth's Systems

- **K-ESS2-2** 2017 - Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

Earth and Human Activity

- **K-ESS3-1** 2017 - Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.
- **K-ESS3-3** 2017 - Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.*

First Grade Science

From Molecules to Organisms: Structures and Processes

- **1-LS1-1** 2017 - Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.*
- **1-LS1-2** 2017 - Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.

Heredity: Inheritance and Variation of Traits

- **1-LS3-1** 2017 - Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

Second Grade Science

Matter and its Interactions

- **2-PS1-1** 2017 - Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.

Ecosystems: Interactions, Energy, and Dynamics

- **2-LS2-1** 2017 - Plan and conduct an investigation to determine if plants need sunlight and water to grow.
- **2-LS2-2** 2017 - Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.*

Biological Evolution: Unity and Diversity

- **2-LS4-1** 2017 - Make observations of plants and animals to compare the diversity of life in different habitats.

Earth's Systems

- **2-ESS2-1** 2017 - Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.*
- **2-ESS2-2** 2017 - Develop a model to represent the shapes and kinds of land and bodies of water in an area.
- **2-ESS2-3** 2017 - Obtain information to identify where water is found on Earth and that it can be solid or liquid.

Third Grade Science

From Molecules to Organisms: Structures and Processes

- **3-LS1-1** 2017 - Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.
- Ecosystems: Interactions, Energy, and Dynamics
- **3-LS2-1** 2017 - Construct an argument that some animals form groups that help members survive.

Heredity: Inheritance and Variation of Traits

- **3-LS3-2** 2017 - Use evidence to support the explanation that traits can be influenced by the environment.