

Winter Ecology

Educator Guide



Partner of Indiana Dunes
National Lakeshore



"In the end, we will protect only what we love.
We will love only what we understand.
We will understand only what we are taught."
Senegalese poet and naturalist Baba Dioum

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Table of Contents

Welcome.....	4
Pre Visit Activities	
It's Cool to stay Warm.....	5
Tip Your Hat to Winter	10
Tricky Tracks	16
The Water Race	20
Academic Standards	
3rd Grade Academic Standards.....	23
4th Grade Academic Standards.....	24
5th Grade Academic Standards	26

FUNDING PROVIDED BY:





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Dear Educator,

You hold in your hands the blueprint for a great experience for you and your students. Contained in this packet are activities and background materials to help prepare for your trip to Dunes Learning Center.

By making use of these materials, you can make this whole experience a rich part of your curriculum. Curriculum standards in science, social studies, language arts and mathematics are supported by the activities included in all Dunes Learning Center programs.

The suggested lessons to prepare for your visit included in this packet will require about five hours of class time. You can spread that out over the two weeks between now and when you visit the Learning Center. Post-visit lessons will take about 3 hours.

As a learning center, we are especially interested in how we might improve any aspect of the materials or support we provide. We encourage you to send us any comments you have regarding this packet as you work through it.

If you have questions, please call Dunes Learning Center at (219) 395-9555, extension 5 and ask for the Education Director. We want your trip to Dunes Learning Center and its integration into your curriculum to be one of the highlights of your school year.

Sincerely,

The Dunes Learning Center Staff

Pre-Visit Activity 1: It's Cool to Stay Warm

Overview: Indiana Dunes National Lakeshore, located at the southern tip of Lake Michigan, is home to more than 1,500 plant and animal species that have developed different strategies to survive during the hot months of summer, the freezing temperatures in the winter and everything in between. This activity will highlight migration, hibernation, dormancy and staying active/adaptation. The animals that stay active use strategies such as huddling, curling, fluffing of the fur or feathers, shivering, increasing insulation and tunneling in order to protect themselves from the cold.

Objective: Students will research an organism found within the Indiana Dunes National Lakeshore and determine what strategy it uses to survive during the winter months. Students will bring their findings to discuss during their visit to Dunes Learning Center.

Subjects:

- Biology
- English/Language Arts
- Art

Approximate time required: 2.5 hours

- 1 hour of research
- 30 minutes to plan
- 1 hour to create

Materials included in pre-visit kit:

- Animal Adaptation Cards
- Permanent Resident Birds of Indiana
- Guide to Animal Tracking and Behavior
- Who Lives in the Snow?
- Our Wild World Series: Whitetail Deer

Additional materials needed:

- It's Cool to Stay Warm! Worksheet (1 per student)
- Pencils, crayons, markers, etc.
- Construction paper
- Cereal boxes (1 for each student)
- Glue
- Library and Internet access

Teaching Suggestions:

1. Discuss with the class the season of winter and how it affects people. What changes do the students and their families make in their dress, food, homes and vehicles?

2. What about animals? How do they adapt to winter? Do they make similar changes in their coats, food, homes and travel? Using the student's ideas, highlight the four winter survival strategies: hibernation, dormancy, migration, or adaptation.
3. Pass out the *It's Cool to Stay Warm Worksheet* to each student. Have each student review the list and choose one organism to research for their Cereal Box Presentation. Students can use the guided questions on the back of the worksheet to help them with their investigation.
4. Allow students to utilize the internet, library, and other resources provided in your pre-visit kit to research their organism and answer the questions on the worksheet.
5. Pass out one cereal box to each student and have them glue construction paper on all sides to cover it completely.
6. Students will transfer the information they collected about their organism to the different sides of the box. For example, the front of the box could have the common and scientific name of the organism and a picture of it. The side of the box could indicate its habitat, what it eats and what eats it. The other side could be its winter survival strategy and 5 interesting facts. The students can get even more creative and put a game on the back of the box like a maze, dot to dot, or crossword puzzle. Encourage the students to be creative!
7. Allow students to present their boxes to the class or trade with each other.
8. Students should feel confident in knowing the survival strategy of their organism when they come to Dunes Learning Center. The first activity they do upon arrival will use this information in a fun activity called "Winter Dance of the Dunes".



It's Cool to Stay Warm!

Choose one organism that you want to learn more about. The list below includes plants and animals that can be found in the Indiana Dunes. Research the strategies your organism uses to survive in a winter environment and record your findings on the other side of this worksheet.

Birds

Barred Owl
Black-Capped Chickadee
Blue Jay
Dark-Eyed Junco
Downy Woodpecker
Great Blue Heron
Red-Tailed Hawk
Screech Owl
Tufted Titmouse
Ring-Billed Gull
Canada Goose
Ruby-Throated Hummingbird
Sandhill Crane
American Goldfinch
Red-Headed Woodpecker

Insects

Karner Blue Butterfly
Praying mantis
Goldenrod Gall Fly
Dragonfly
Monarch Butterfly

Mammals

Beaver
Chipmunk
Coyote
Easter Cottontail Rabbit
White-Footed Deer Mouse
Flying Squirrel
Grey Squirrel
Little Brown Bat
Mink
Muskrat
Opossum
Raccoon
Red Fox
Short-Tailed Shrew
Vole
White-Tailed Deer
Woodchuck

Plants

Maple Tree
Poison Ivy
White Pine
Jack Pine
Serviceberry
Cottonwood
Black Oak
Skunk Cabbage
Marram Grass
Prickly Pear Cactus

Reptiles and Amphibians

Bull Frog
Garter Snake
Painted Turtle
Spotted Salamander
Hognose Snake
Green Frog
Eastern Box Turtle
Spring Peeper



Guided Research Questions

1. What is the common name of your organism?
2. What is the scientific name?
3. Where does it live? What kind of ecosystem or ecosystems is it found within the Indiana Dunes National Lakeshore? Open beach, foredune, oak savanna, eastern deciduous forest or wetland?
4. What does it eat?
5. What eats it?
6. What is its winter survival strategy? Does it migrate, hibernate, go dormant or stay active and adapt?
7. List 5 interesting facts about your organism:

It's Cool to Stay Warm

Category	Explanation of Points					Score Received
	1	2	3	4	5	
Research Subject Clear	No name or drawing provided	Only common name of organism is provided	Common name and drawing of organism	Common name and scientific name found	Common name, scientific name, and drawing are clear	
Accurate Information	No information provided; no research questions answered	Little information given; few research questions answered	Adequate information given; some research questions answered	Most research questions answered	All research questions answered	
Organization of Information	No attempt was made to organize information; only used 1 side of the box	Attempt to organize information - only used 2 sides of box	Mostly organized - used 3 sides of box	Information organized but not complete - used 4 sides	Information clear ; used all sides of the box; well organized	
Overall Neatness and Creativity	Box is not neat nor creative	Attempted to be neat and creative	Partially neat and creative	Almost entirely neat and creative	Box is very neat and colorful, subject is clear with creativity	
Total						/20

Pre-Visit Activity 2: Tip Your Hat to Winter

Overview: The thought of cold winter weather can make people want to stay warm and cozy indoors and forget that there are many fun things to do outside during the winter season. Sledding, skiing, hiking, making snowmen and snowball fights are some of our favorite activities. Winter can bring the potential for several cold-related illnesses, including hypothermia and frostbite. The more common of the two illnesses is frostbite. Proper dress and preparation is important to preventing frostbite during outdoor play.

Objective: Students will identify the things they value most about winter and share these values with their peers. Students will learn about cold –related illnesses and how to prevent them. Students will learn how to dress appropriately for winter outdoor activities.

Subjects:

- Art
- English/Language Arts
- Health and Wellness

Approximate time required: 30-45 Minutes

Materials included in the pre-visit kit:

- Frostbite Fact Sheet

Additional materials needed:

- Winter Hat Template (1 per student) included in this Teacher Packet
- Pencils, crayons, markers and/or colored pencils
- Magazines, scrap paper and other collage materials
- Closet Scavenger Hunt worksheet (1 per student) included in this Teacher Packet



Teaching suggestions:

1. Ask students to name some of the things that they like about the winter season. Share an example of something that you valued as a child and discuss how important that item is to your life right now. Discuss how values are important and how experiences pertaining to those values play a part in shaping your life as you mature. How do we preserve our values?
2. Pass out the Winter Hat Template and instruct the students to think about the things that they value about the winter season and draw or write about those items on the hat or create a collage using magazines and other items.
3. Allow each student to present their hat and share at least one of their values with the class.
4. Choose one or more of the values and ask the class to brainstorm on ways someone might protect that value. For example:

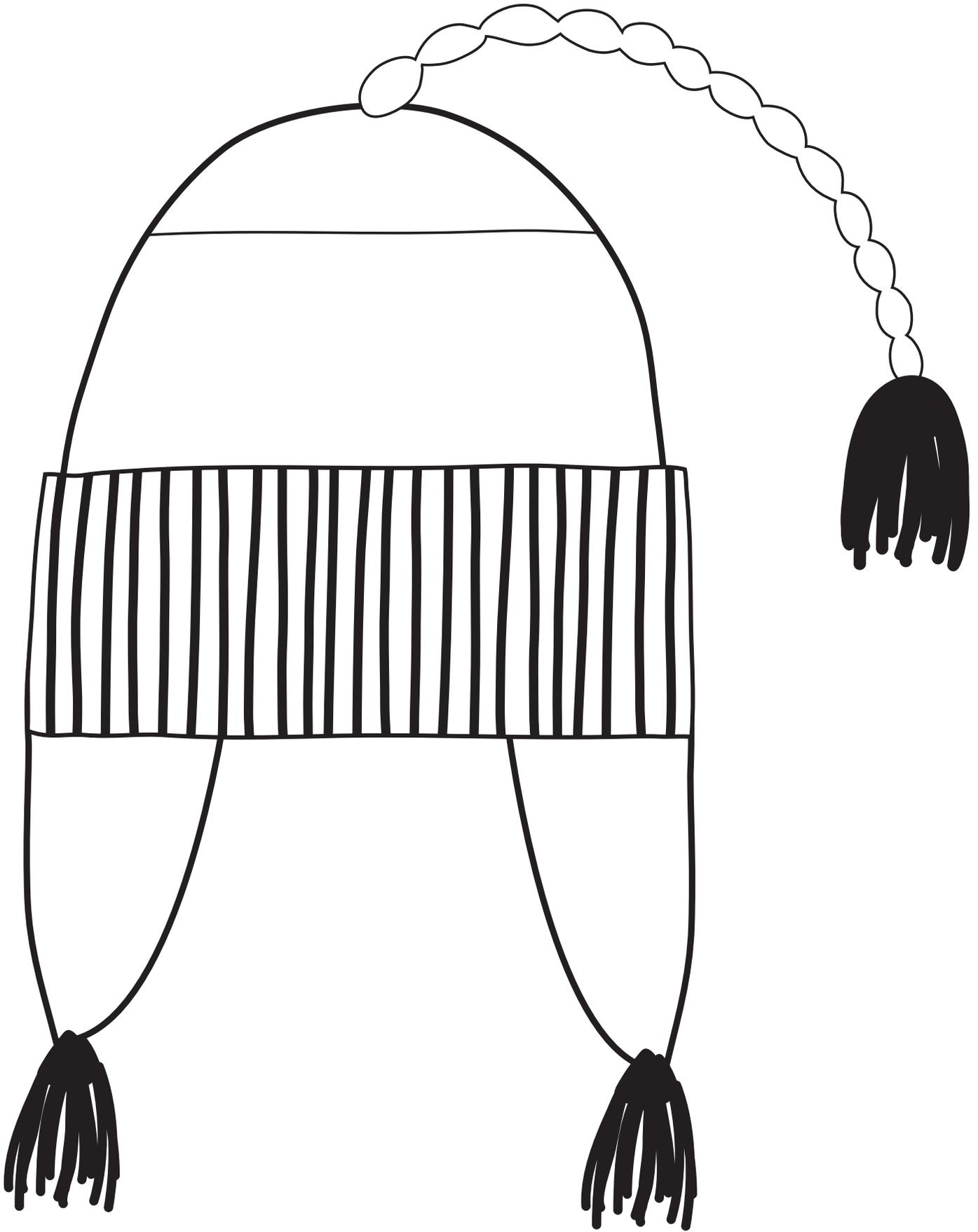
Value: Watching the birds come to the bird feeder in the winter.

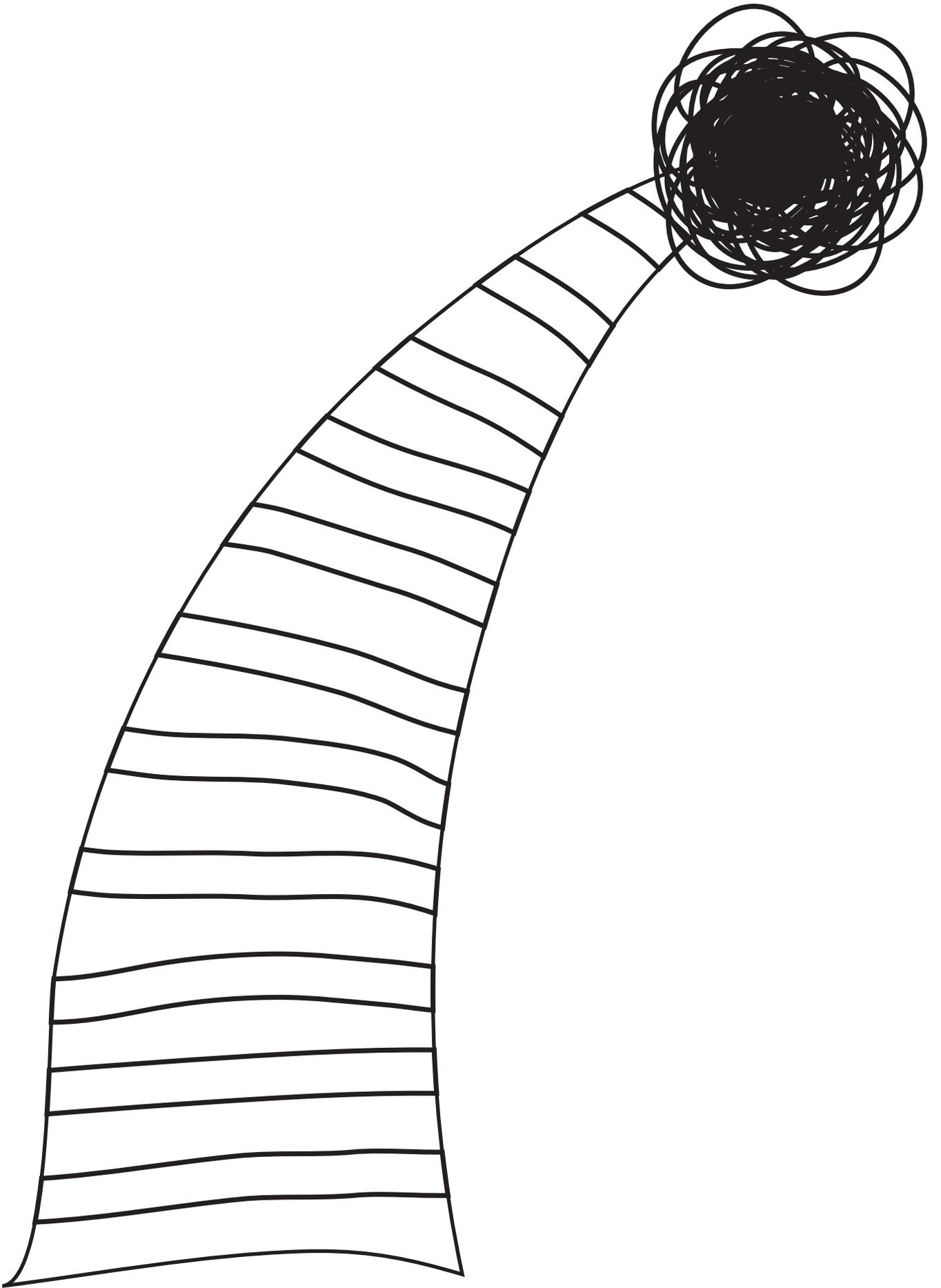
How do I preserve it:

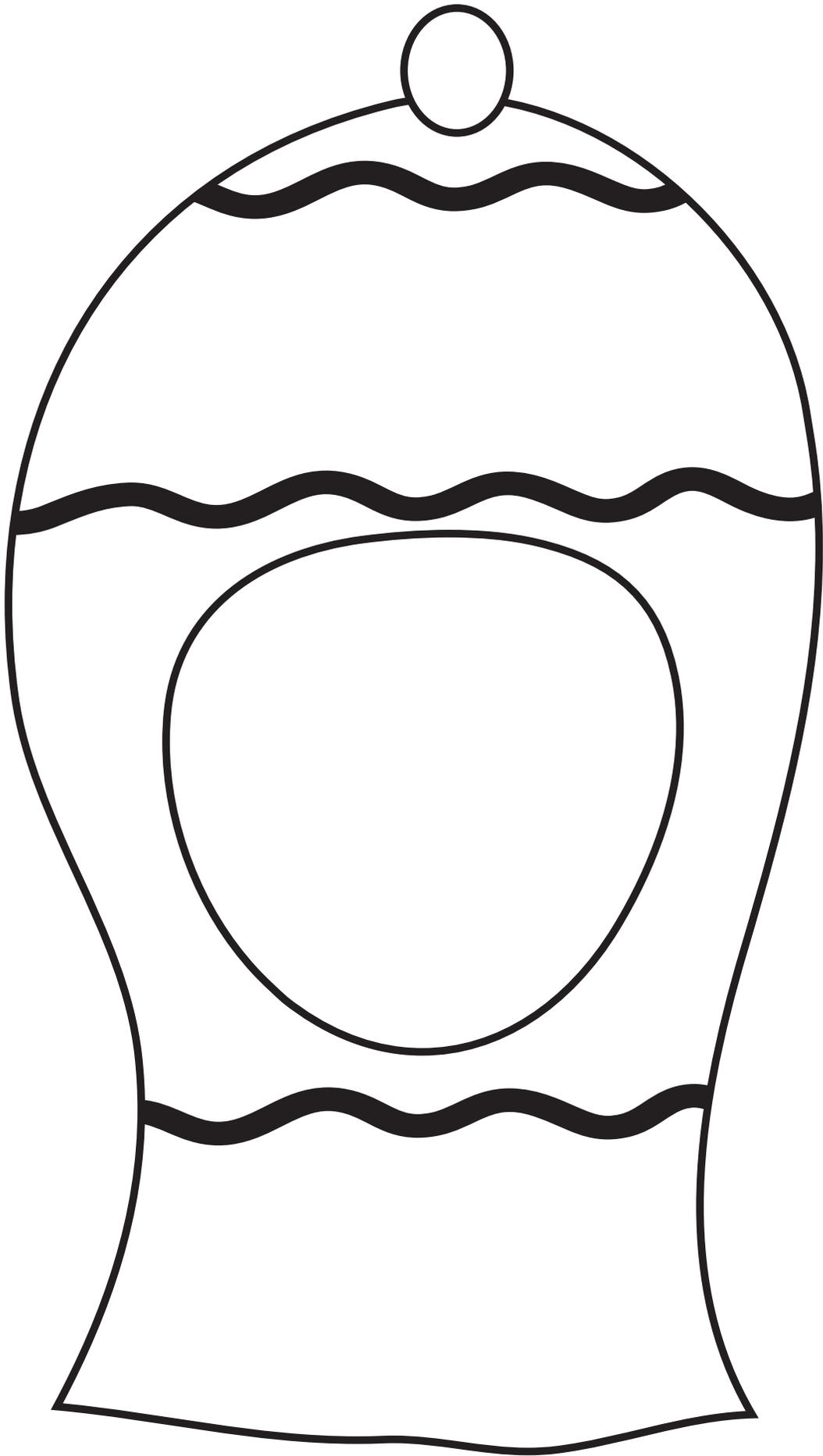
- *Continue to feed the birds when I get older so that my children will learn to love watching birds too.*
- *Put up bird houses and provide nesting material to encourage birds to stay in the backyard.*
- *Use recycled objects to make bird feeders and provide fresh drinking water.*

Many of the values will be preserved simply by doing or sharing the activity with other people. Understanding that people play a significant role in protecting and passing on values is one of the most important keys of fostering stewardship and conservation of the things we care about.

5. Winter outdoor play activities are bound to be on the value list such as sledding, snow ball fights and making snow forts. Ask the students to list the types of clothing that allows them to spend time out in the snow.
6. Introduce the fact that we all value our fingers and toes and when we don't dress properly frostbite can happen. Show the students the picture on the Frostbite Fact Sheet and review the information on the sheet.
7. Pass out the Closet Scavenger Hunt worksheet and instruct the students to take some time to hunt for the items on the list when they go home.
8. Collect or discuss the Closet Scavenger Hunt worksheet and review it so that you can determine what items will be needed for your trip. Dunes Learning Center can provide many of the items and encourages students and teachers not to feel like they have to go out and spend money on these items solely for the purpose of the trip. If you have a large number of students that do not have the proper winter apparel please contact the Education Director to communicate your needs so that we can ensure that every child is properly dressed for the outdoor activities.







Closet Scavenger Hunt

Not sure that you have all of those articles of clothing for your trip to Dunes Learning Center? Then it is time to go on a closet scavenger hunt! After you find an article of clothing, check the box under the appropriate item that says "Have it". If you don't have it, ask around to see if you can borrow it from someone else and mark the box that says "Can borrow it". If you still can't get your hands on what you need, check the box that says "Don't have it". Your teacher will help you obtain those items. **DON'T BE LEFT OUT IN THE COLD!** Fashion is not something you need to worry about for the trip. It's better to be mismatched and warm than fashionable and freezing.

WICKING LAYER

Long Underwear (top and bottom)

- Have it
- Can borrow it
- Don't have it

Two Pairs of Warm Socks

- Have it
- Can borrow it
- Don't have it

Warm Shirt

- Have it
- Can borrow it
- Don't have it

WARMING LAYER

Scarf

- Have it
- Can borrow it
- Don't have it

Warm Pants

- Have it
- Can borrow it
- Don't have it

Heavy Sweater

- Have it
- Can borrow it
- Don't have it

WEATHERPROOF LAYER

Hat & Gloves (2 Pair)

- Have it
- Can borrow it
- Don't have it

Winter Coat

- Have it
- Can borrow it
- Don't have it

Warm, Waterproof Boots

- Have it
- Can borrow it
- Don't have it

Pre-Visit Activity 3: Tricky Tracks

Overview: Students will learn to observe animals by studying their tracks and will understand how animals can be grouped according to the way they move.

Objective: Track recognition skills gained from this activity will prepare students for an animal identification program during their visit to Dunes Learning Center. In addition, students will be confident and excited when they see animal tracks in the Indiana Dunes.

Subjects:

- Math
- Science

Approximate time required: 45 – 60 minutes

Materials included in the pre-visit kit:

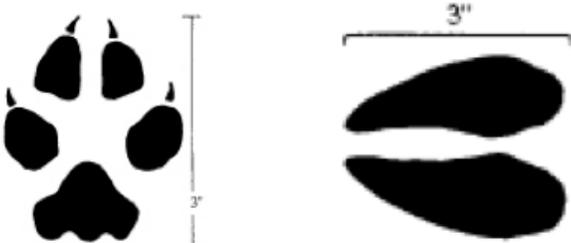
- Laminated animal track sheets (10 sheets per set)
- Mystery of the Tricky Tracks picture book

Additional materials needed:

- Tricky Tracks worksheet (1 per student) found in Teacher Packet
- Writing Tool
- Rulers
- Optional –12 scrap pieces of paper (6 labeled with an F and 6 labeled with a H)

Teaching suggestions:

1. Tell the class that you are going to teach them how to be track detectives. Detectives look at clues to solve a puzzle and there are 3 important clues when observing animal tracks and they all start with the letter P: PRINT, PATTERN and PLACE. The first clue when tracking is to observe the PRINT. How big is it? What shape is it? Is it the print from the front foot or the hind foot? Once a footprint is observed it is important to determine the design that the footprints make. This design keeps repeating itself and is called a track PATTERN. The last thing they need to be aware of in tracking is where the animal lives, it's PLACE, which is the Indiana Dunes for this exercise.
2. Instruct students to use their rulers to measure the length of the front and hind prints of the animals on their Tricky Track sheets. Be sure to measure the total length of the print. Measurements should be recorded on the worksheet in inches.



3. Students will also need to identify the track PATTERN of each animal. We will focus on three track patterns for this activity: STRAIGHT-WALKING, HOPPING and WADDLING. Invite the students to imitate each walking pattern.
 - STRAIGHT-WALKING: To walk this pattern, the students will move their right hand and left foot at the same time and likewise for their left hand and right foot. Canines, felines and many hoofed animals walk this way.
 - HOPPING: The hopper's pattern is interesting because the larger hind feet land in front of the smaller front feet. The arms swing ahead first to take the body's weight and the back feet follow, swinging around to the outside of the hands and landing slightly in front of them. Rabbits, frogs and squirrels are hoppers.
 - WADDLING: This is one of the more difficult patterns to imitate. The animal's weight shifts to the right as both the left hand and foot move forward at the same time, then shifts to the left as the right hand and foot move in their turn. When done slowly and with some exaggeration, waddling can give a clear impression of an animal slowly lumbering along. Bears, raccoon, and penguins waddle.
4. After reviewing break students up into groups and pass out the Tricky Track sheets. Each sheet includes a picture and the name of an animal along with its front and hind footprints (actual size) and track pattern. The students will work together to measure the print and determine whether the track pattern is straight-walking, hopping or waddling. They will write their findings on the Tricky Tracks worksheet.
5. Review the answers with the class and close the activity with reading the story "The Mystery of the Tricky Tracks".

Extensions:

- Reinforce the track patterns made by the different walking styles by inviting students to practice the different types of walking and place pieces of paper labeled with F or H to mark the placement of the hands and feet to make a visual pattern.
- Winter is the perfect time to put on your detective hat and go outside to search for tracks. How many different tracks can you find? Have the students measure the print and identify the track pattern just like they did in the activity. Can they identify the animal that made it?
- Make your own tracks in the snow. Compare walking and running tracks. Measure the distance between each print (stride). What happens to the distance between the footprints when you start to run? Have students create their own track patterns while others try to guess how they were made.
- Play track charades. Have the students act out the walking pattern of an animal they learned about.
- You may be able to obtain various rubber replicas and molds of animal feet from a local nature center or scientific supply company. You can use ink pads or paint and have the students create a journal or picture. Use Plaster of Paris with the molds to create track casts.

Tricky Tracks Worksheet

Using the Track Cards in your packet, measure the length of the track and identify the track pattern for past and present mammals that call the Indiana Dunes home.

- **Straight-walking** animals move their right hand and left foot at the same time then the left hand and right foot.
- **Hopping** animals are interesting because the larger hind feet land in front of the smaller front feet.
- **Waddling** animals move the left hand and foot forward at the same time, then the right hand and foot.

Black Bear

Length of track F: _____ H: _____

Track pattern type _____

Raccoon

Length of track F: _____ H: _____

Track pattern type _____

Cottontail Rabbit

Length of track F: _____ H: _____

Track pattern type _____

Beaver

Length of track F: _____ H: _____

Track pattern type _____

Coyote

Length of track F: _____ H: _____

Track pattern type _____

Opossum

Length of track F: _____ H: _____

Track pattern type _____

Whitetail Deer

Length of track F: _____ H: _____

Track pattern type _____

Red Fox

Length of track F: _____ H: _____

Track pattern type _____

Skunk

Length of track F: _____ H: _____

Track pattern type _____

Grey Squirrel

Length of track F: _____ H: _____

Track pattern type _____

Tricky Tracks Answer Key

Using the Track Cards in your packet, measure the length of the track and identify the track pattern for past and present mammals that call the Indiana Dunes home.

- **Straight-walking** animals move their right hand and left foot at the same time then the left hand and right foot.
- **Hopping** animals are interesting because the larger hind feet land in front of the smaller front feet.
- **Waddling** animals move the left hand and foot forward at the same time, then the right hand and foot.

Black Bear		
Length of track	<u>F: 4 1/4"</u>	<u>H: 7"</u>
Track pattern type	<u>WADDLING</u>	

Raccoon		
Length of track	<u>F: 2 1/2"</u>	<u>H: 4"</u>
Track pattern type	<u>WADDLING</u>	

Cottontail Rabbit		
Length of track	<u>F: 1"</u>	<u>H: 3 1/2"</u>
Track pattern type	<u>HOPPING</u>	

Beaver		
Length of track	<u>F: 3"</u>	<u>H: 6"</u>
Track pattern type	<u>WADDLING</u>	

Coyote		
Length of track	<u>F: 2 1/2"</u>	<u>H: 2 1/4"</u>
Track pattern type	<u>STRAIGHT WALKING</u>	

Opossum		
Length of track	<u>F: 1 1/4"</u>	<u>H: 2"</u>
Track pattern type	<u>WADDLING</u>	

Whitetail Deer		
Length of track	<u>F: 3"</u>	<u>H: 3"</u>
Track pattern type	<u>STRAIGHT WALKING</u>	

Red Fox		
Length of track	<u>F: 2 1/4"</u>	<u>H: 2"</u>
Track pattern type	<u>STRAIGHT WALKING</u>	

Skunk		
Length of track	<u>F: 2"</u>	<u>H: 2"</u>
Track pattern type	<u>WADDLING</u>	

Grey Squirrel		
Length of track	<u>F: 1 1/2"</u>	<u>H: 2 1/4"</u>
Track pattern type	<u>HOPPING</u>	

Pre-Visit Activity 4: The Water Race

Overview: The individual actions of people affect the water quality in our watersheds. A watershed is the area of land where all of the water that is under it or drains off of it flows to a common place. For example, all of the water that falls within the Lake Michigan Watershed flows to Lake Michigan. Water is essential to everyone and everything on the planet.

When people think about water pollution most think of large pipes dumping tainted materials into a water body. Thanks to the Clean Water Act, *point source* pollution (you can point at the source) is restricted, monitored and reduced from these types of sources. The most common source of water contamination today is from *non-point source* pollution (you can't point at the direct source). Litter, fertilizer, animal waste, pesticides, motor oil, grass clippings and sediment are all examples of non-point source pollutants. When water moves across the land it picks up these pollutants and runs off directly into lakes, streams and sewers, causing damage to aquatic habitat and organisms such as fish, insects, amphibians and birds. It also reduces the capacity of water resources to be used for drinking water and recreation. Many people assume that water that runs off into the sewers is treated before it is returned to a water body but many times this is not the case. Solutions to urban storm water pollution problems require participation from everyone! We can reduce and eliminate non-point source pollution by using best practices such as cleaning up pet waste from our yards, putting trash in its proper place, using fertilizer and pesticides sparingly and as directed, properly disposing of motor oil, fixing leaks in vehicles and preserving our wetlands and other green spaces in our communities. Clean water is everyone's business!

Objective: Students will describe forms of non-point source pollution, identify best practices to improve water quality and provide reasons why people should care about the health of their watershed.

Subjects:

- Physical and Environmental Science

Approximate time required: 45 minutes

Materials included in pre-visit kit:

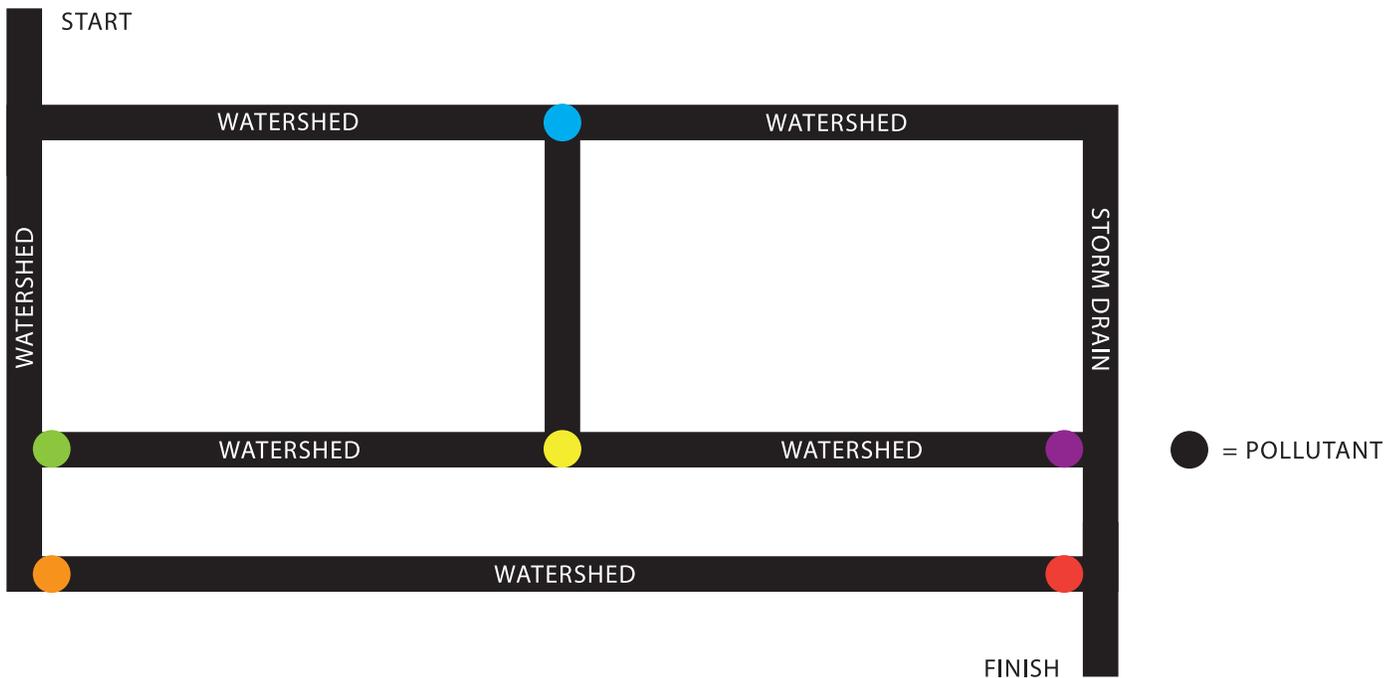
- Water Race ACTION cards
- Water Race SCENARIO cards
- Photos of Storm Drains
- Assorted Watershed and Clean Water Brochures

Additional Materials needed:

- Self-sticking paper, stickers or scraps of felt
- Scratch paper to record findings at the end of each round

Preparation:

- Visit <http://cfpub.epa.gov/surf/locate/index.cfm> to find out what watershed you are currently in. It is best to scroll to the bottom to “Locate By State”. Choose your state and zoom in to your area. Print this map or have the internet page bookmarked to share the visual with your class.



- Set up a “watershed and storm drain” in the classroom (using chairs and desks), gymnasium (using tape, rope or cones) or outside (using chalk, ropes or cones) with one starting line and one finish line (see suggested layout below).

Teaching suggestions:

1. Ask students if they live in a watershed. Inform them that EVERYONE lives in a watershed and explain using the prepared watershed map. Ask students to share ways that humans use water on a daily basis. Do they know where their water comes from? How do pollutants enter the watershed? Introduce point and non-point source pollution.
2. Go to the location of the watershed and storm drain maze. Tell the kids to imagine that they are drops of water moving through the watershed and into the storm drain. Show them the picture of the storm drain to help them connect with the activity. Identify the entrance and exit. Read Scenario 1 to the class. Allow students to move through the maze. There are no sources of pollution. The drops of rain enter and exit the storm drain clean and healthy. Record the number of polluted rain drops on the scrap paper.
3. Regroup and return to the start line. Read Scenario 2 and assign POLLUTANT cards to 4-6 students. Position them at different locations throughout the watershed. The “pollutants” will mark the “drops of water” with stickers as they flow past. Record the number of water drops that exit the drain with stickers attached to them.
4. Regroup and return to the start line, POLLUTANTS should remain where they are. Read Scenario 3 and

assign BEST MANAGEMENT PRACTICE (BMP) cards to 4-6 students. Position these students after the appropriate pollutants (the garbage can will stand by litter, the pooper scooper by the animal waste, etc). The BMP's will remove the stickers, therefore cleaning up the pollution from the drops of water. Record the number of polluted water drops that exit. Did the number increase or decrease? Why?

5. Regroup for the final round. Pollutants and BMPs stay in the maze. Read Scenario 4 and assign 2-4 students to be the WASTEWATER TREATMENT PLANT just before the finish line. They, just like the BMP's, will remove the "pollutants" from the drops of water as they pass by. How many polluted rain drops cross the finish line for this round? Record your findings.
6. Return to the classroom and graph out the observations on the board. Ask students to discuss what they observed with each scenario. Review the different types of non-point source pollution and the best management practices that were used in the activity. Ask students what actions they are going to take at home to reduce their contribution to water pollution. Utilize the informational brochures in your teacher kit for more information.

Extensions

- Want to get your students involved? Contact your local MS4 Coordinator to set up a drain stenciling project in your community.
- Have students contact their local wastewater treatment plant or public works department to determine whether their street runoff enters the treatment plant or if it flows directly into the river or filters into ground water systems.



Academic Standards: 3rd Grade

STANDARD	DESCRIPTION	PROGRAM ELEMENT
Mathematics 2014		
Measurement: 3.M.2	Choose and use appropriate units and tools to estimate and measure length, weight and temperature. Estimate and measure length to a quarter-inch, weight in pounds, and temperature in degrees Celsius and Fahrenheit.	<i>Grumphets and Tricky Tracks</i>
Science 2010		
The Nature of Science	Students gain scientific knowledge by observing the natural and constructed world, performing and evaluating investigations, and communicating their findings.	<i>Grumphets and Its Cool to Stay Warm</i>
The Design Process	As citizens of the constructed world, students will participate in the design process. Students will learn to use materials and tools safely and employ the basic principles of the engineering design process in order to find solutions to problems.	<i>Grumphets</i>
Standard 2: Earth Science	Core Standard: Observe and describe how natural materials meet the needs of plants and animals (including humans). (3.2.5 and 3.2.6)	<i>Camouflage, Active Over-wintering Strategies, Migration Game, Grumphets, Parachute Cache, Squirrel Tight Rope, It's Cool to Stay Warm</i>
3.2.5	Describe natural materials and give examples of how they sustain the lives of plants and animals	<i>Camouflage, Active Over-wintering Strategies, Migration Game, Grumphets, Parachute Cache, Squirrel Tight Rope</i>
3.2.6	Describe how the properties of earth materials make them useful to humans in different ways. Describe ways that humans have altered these resources to meet their needs for survival.	<i>Grumphets and Migration Game</i>
Standard 4: Science, Engineering and Technology	Core Standard: Define a real world problem and list criteria for a successful solution. (3.4.1)	<i>Migration Game</i>
3.4.1		
Speaking & Listening		
Guiding Principle	Choose and use the appropriate tools to estimate and measure length, mass and temperature in SI units.	<i>Grumphets and Tricky Tracks</i>
	Students listen actively and communicate effectively for a variety of purposes, including for learning, enjoyment, persuasion, and the exchange of information and ideas. Students adjust their use of language to communicate effectively with a variety of audiences and for different purposes. Students develop an understanding of and respect for diversity in language use, patterns and dialects.	<i>Migration Game, Grumphets, Active Over-wintering Strategies, It's Cool to Stay Warm, Tip Your Hat to Winter, Tricky Tracks</i>

Academic Standards: 4th Grade

STANDARD	DESCRIPTION	PROGRAM ELEMENT
Mathematics 2014		
Computation: 4.C.5	Add and subtract fractions with common denominators. Decompose a fraction into a sum of fractions with common denominators. Understand addition and subtraction of fractions as combining and separating parts referring to the same whole.	<i>In an Otter Time</i>
Measurement: 4.M.1	Measure length to the nearest quarter-inch, eighth-inch, and millimeter.	<i>Tricky Tracks</i>
Data Analysis: 4.DA.3	Interpret data displayed in a circle graph.	<i>In an Otter Time</i>
Science 2010		
The Nature of Science	Students gain scientific knowledge by observing the natural and constructed world, performing and evaluating investigations, and communicating their findings.	<i>Grumphets, Its Cool to Stay Warm</i>
The Design Process	As citizens of the constructed world, students will participate in the design process. Students will learn to use materials and tools safely and employ the basic principles of the engineering design process in order to find solutions to problems.	<i>Grumphets</i>
Standard 1: Physical Science	Core Standard: Provide evidence that heat and electricity are forms of energy. (4.1.1, 4.1.2)	<i>Grumphets and Heat Generation</i>
4.1.1	Describe and investigate the different ways in which heat can be generated.	<i>Grumphets and Heat Generation</i>
4.1.2	Investigate the variety of ways in which heat can be generated and moved from one place to another. Explain the direction the heat moved.	<i>Grumphets, Heat Generation, humans in Winter Fashion Show</i>
Standard 2: Earth Science	Core Standard: Describe how the supply of natural resources is limited and investigate ways that humans protect and harm the environment. (4.2.4, 4.2.5, 4.2.6)	<i>Migration, In an Otter Time, Lake Game, Stewardship and The Water Race</i>
4.2.5	Describe methods that humans currently use to extend the use of natural resources.	<i>Migration Game, In an Otter Time, The Water Race and Lake Game</i>
4.2.6	Describe ways in which humans have changed the natural environment. Explain if these changes have been detrimental or beneficial.	<i>Migration Game, In an Otter Time, Stewardship, The Water Race and Lake Game</i>
Standard 3: Life Science	Core Standard: Observe, describe and ask questions about structures of organisms and how they affect their growth and survival.	<i>Migration Game, Animal CSI, Tree Hike, Build a Tree, Its Cool to Stay Warm</i>

STANDARD	DESCRIPTION	PROGRAM ELEMENT
Science 2010 (cont)		
4.3.2	Observe, compare and record the physical characteristics of living plants or animals from widely different environments. Describe how each plant or animal is adapted to its environment.	<i>Animal CSI and Its Cool to Stay Warm</i>
4.3.3	Design investigations to explore how organisms meet some of their needs by responding to stimuli from their environments.	<i>Grumphets</i>
4.3.4	Describe a way that a given plant or animal might adapt to a change arising from a human or non-human impact on its environment.	<i>Migration Game, Grumphets and Lake Game</i>
Speaking & Listening		
Guiding Principle	Students listen actively and communicate effectively for a variety of purposes, including for learning, enjoyment, persuasion, and the exchange of information and ideas. Students adjust their use of language to communicate effectively with a variety of audiences and for different purposes. Students develop an understanding of and respect for diversity in language use, patterns and dialects.	<i>Migration Game, Grumphets, It's Cool to Stay Warm, Tip Your Hat to Winter, Tricky Tracks and Astronomy Skits</i>

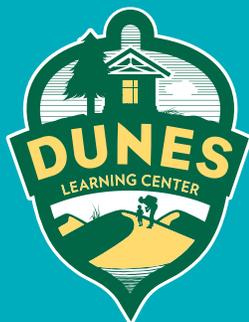
Academic Standards: 5th Grade

STANDARD	DESCRIPTION	PROGRAM ELEMENT
Mathematics 2014		
Number Sense: 5.NS.6	Understand, interpret, and model percents as part of a hundred (e.g. by using pictures, diagrams, and other visual models).	<i>In an Otter Time</i>
Science 2010		
The Nature of Science	Students gain scientific knowledge by observing the natural and constructed world, performing and evaluating investigations, and communicating their findings.	<i>Grumphets, Its Cool to Stay Warm</i>
The Design Process	As citizens of the constructed world, students will participate in the design process. Students will learn to use materials and tools safely and employ the basic principles of the engineering design process in order to find solutions to problems.	<i>Grumphets</i>
Standard 2: Earth Science	Core Standard: Observe, describe and ask questions about patterns in the sun-moon-earth system.	<i>Astronomy Skits and Night Hike</i>
5.2.1	Recognize that our earth is part of the solar system in which the sun, an average star, is the central and largest body. Observe that our solar system includes the sun, moon, seven other planets and their moons, and many other smaller objects like asteroids and comets.	<i>Astronomy Skits and Night Hike</i>
Standard 3: Life Science	Core Standard: Observe, describe, and ask questions about how changes in one part of an ecosystem create changes in other parts of the ecosystem.	<i>In an Otter Time, Lake Game, Stewardship and The Water Race</i>
5.3.1	Observe and classify common Indiana organisms as producers, consumers, decomposers, predator and prey based on their relationships and interactions with other organisms in their ecosystem.	<i>Tree hike, Build a Tree and Animal CSI</i>
Reading		
Guiding Principle	Guiding Principle: Students read a wide range of fiction, nonfiction, classic, and contemporary works, to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace. Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They read a wide range of literature in many genres from a variety of time periods and cultures from around the world to build an understanding of the many dimensions (e.g., philosophical, ethical, aesthetic) of human experience. They draw on their prior experience, their interactions with other readers and writers, and reading skills that they have developed and refined.	<i>Migration Game, Grumphets, It's Cool to Stay Warm, Tip Your Hat to Winter, Tricky Tracks and Astronomy Skits</i>

STANDARD	DESCRIPTION	PROGRAM ELEMENT
Social Studies		
Standard 3: Geography		
Physical Systems 5.3.7	Identify major sources of accessible fresh water and describe the impact of access on the local and regional communities.	<i>Lake Game</i>
Standard 4: Economics 5.4.8	Analyze how the causes and effects of changes in price of certain goods and services had significant influence on events in United States History.	<i>In an Otter Time</i>



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