Looking to Learn: Materials for Teachers

Michigan *Legacy* Art Park

Volume II:

Exploring the Natural World Through Time and Place

By Jaye Lynn Trapp

Frog, William Allen

Exploring the Natural World

The natural world is full of wonders to behold! It encompasses all living and non-living things occurring naturally. The complex nature of plant and animal life is of great interest to many, especially people who wonder about and closely observe their surroundings. There are those who specialize in the natural sciences. Botanists study plant science. Biologists are interested in life and living organisms. Ecologists study the interaction between living organisms and their environment. Geologists are fascinated by the structure of the Earth beneath the surface. They examine the rocks that make up the Earth's composition, and the processes by which they change over time. Additionally, visual artists often look to the natural world as a source of inspiration.

Whether you choose to focus on one particular area, or simply take in the unexpected beauty that can be found in the park, we invite you to explore the natural world. As you hike the Michigan Legacy Art Park trails and enjoy the trails that wind through the woods, think about the works of art that you encounter. Consider how they reflect, and blend into, nature. Take time to stop often. Look, listen, and breathe in the natural wonders that surround you.

Be sure to invite conversations by posing questions that are provided in this educational booklet. These initial questions may serve as a launch to a unit of study, as an ongoing inquiry while visiting the park, or as a means of informal assessment at the end of a unit.

- What makes a place natural?
- What resources does the natural world provide?
- What can we learn from nature?

The conversations that these questions elicit will lead to a greater understanding of the scientific and philosophic concepts explored here. The questions are designed to support critical thinking skills by having students draw analogies between the sculptures and the concepts presented. In addition, while discussing the sculptures, your students will develop more of an appreciation for the creative processes that visual artists use to communicate messages.

Nurture/Nature by David Barr

"Walking makes the world much bigger and thus more interesting. You have time to observe the details."

—Edward Abbey

Art Vocabulary

Because the collection of Michigan Legacy Art Park consists of outdoor sculpture, it may be helpful to familiarize students with the following art vocabulary prior to your visit.

BALANCE

The equal "visual weight" of shapes, lines, color, texture or space on both sides of an imaginary center line in a work of art.

FORM

The three-dimensional area of an object. An object that has height, width, and depth is three-dimensional, and can be walked around on all sides.

LINE

An element used to define a shape and show the edges of an object. A line is a path made by a moving point.

ORGANIC SHAPES

A shape is a two-dimensional area with height and width. Organic is a term used to describe curving or naturally occurring shapes, such as those found in nature.

REPETITION

When one or more of the elements of art, such as lines, shapes, or colors, occur several times within a work of art. If an element is repeated consistently in the work, it creates a pattern.

RHYTHM

The illusion of motion or movement created by repeating elements, such as lines or shapes, in a work of art.

TEXTURE

The way a surface feels or looks like it feels. It can be real (tactile) or implied (visual). A few examples are: smooth, rough, shiny, dull, bumpy.

SYMBOL

Something that represents something else by association, resemblance, or convention. An object used to represent something invisible.

Science Vocabulary

The sculptures featured in this educational booklet focus on the natural world. Therefore, it may be helpful to familiarize students with the following physical science vocabulary prior to your Michigan Legacy Art Park visit.

BATHYMETRY

The study of underwater depth of lake or ocean floors; the underwater equivalent to topography. They typically show seafloor relief or terrain as contour lines.

The name comes from the Greek words bathus, meaning "deep," and metron, meaning "measure." Bathymetric charts and maps are typically created to support safety of surface or sub-surface navigation.

BIODIVERSITY

This term refers to the rich variety of plant and animal life that exists on our planet.

BIOMES

Regions that share the same climate and support similar types of plants and animals. Biomes are a way to classify similar types of ecosystems around the world.

ECOSYSTEM

A biological community made up of living organisms and their surrounding environment. All of the plants, animals, and type of terrain in any area.

ENVIRONMENT

Natural surroundings in which humans, animals, and plants develop and grow during their lives.

HABITAT

A type of natural environment in which a particular species of organism lives. It is characterized by both physical and biological features. A species' habitat is those places where it can find food, shelter, protection, and mates for reproduction.

HUMAN-ENVIRONMENT GEOGRAPHY

The branch of geography that describes and explains aspects of interactions between humans or societies and their natural environment.

LAKE

A large body of water enclosed on all sides by land and fed by rivers and streams. All of Michigan's lakes are fresh water, although some lakes are salt water.

RIVER

A long and winding (meandering) body of fresh water that erodes and shapes the land. The sediments that rivers transport end up in lakes or oceans.

Frog, William Allen

KEY IDEAS

- Frogs are amphibians that can be found in various biomes around the world.
- They are sensitive and dependent on specific ecosystems.
- Their origins can be traced back millions of years, but frog populations have declined significantly since the 1950s.
- More than one third of frog species are considered to be threatened with extinction.

INSPIRATION

There are few places on earth with more area where land and water meet than Michigan. Here the bogs and marshes, ponds, lakes, streams and rivers provide a niche for life. Frogs can warn us well in advance of potential danger to our environment, so we can act to preserve this special place. Artist Bill Allen believes "that frogs embody the spirit of transformation and survival that we in northern Michigan possess, with their unique progression from tadpole to full-grown frog." This sculpture was inspired in the fragile habitats where frogs live. Allen said, "I have chosen to sculpt a frog because I believe they represent some of northern Michigan's most unique and special gifts. They are the harbingers of spring," with each species adding to the chorus.

BACKGROUND

Bill Allen's art is inspired by his deep affection for nature. Some of his public work can be viewed at zoos, museums of natural history, and nature centers across the country. *Frog* is made of galvanized steel and coated with copper, then painted with the rich colors of a Michigan frog.

DISCUSSION QUESTIONS

- What words might you use to describe the texture of *Frog*?
- What materials did the sculptor use? What is the overall effect?
- What lines, shapes, and patterns do you see in this sculpture?
- Do animals have characteristics that people don't have? Name some.
- If you could have a characteristic of a frog what would you choose? Why?
- What animal reminds you of yourself? What makes you say that?

Unravel, Sandra Osip

KEY IDEAS

- Patterns are found everywhere in nature and are made up of organic shapes that repeat themselves.
- Natural patterns include spirals, meanders, waves, tessellations, cracks, stripes, and symmetries.
- Early Greek philosophers studied patterns in an attempt to explain order in nature.

INSPIRATION

While this work of art is manmade, it explores the idea of organic shapes found in nature. *Unravel* draws its inspiration from spiral growth forms. Sandra Osip achieved this effect by flexing and riveting thin pieces of metal to create a form that would be unlikely to exist using any other combination of fastening. The segments of this bronze sculpture expand, overlap, and spiral around from one another like the natural forms of insects, nautilus shells, pine cones, hurricanes, minerals and layers of slate. An interesting thought to consider is that you are contemplating some of the same ideas about patterns and the sense of order found in the natural world as some of the early Greek philosophers did.

BACKGROUND

As well as paying homage to nature, the sculptor acknowledges a deep gratitude to her art professor at Wayne State University. Osip said, "Mr. Fike was not only a professor of metalsmithing, but also a mentor and inspiration for many individuals..." After learning the technical skills necessary to understand and work with metals, Osip used the creative process to explore new ways of inventing forms. *Unravel* is one of them.

DISCUSSION QUESTIONS

- What is the overall form of this piece?
- What kinds of lines do you see in this sculpture?
- What shapes do you see in this sculpture?
- Do you see any repeating patterns in this sculpture? Where?
- Do you think this sculpture is abstract or representational? In what ways?
- If you had to name this sculpture, what would you call it? Why?
- Turn your back to this work of art. Try to draw the objects or shapes that you remember most clearly. Why do you think you remembered it as you did?
- *Frog* and *Unravel* are made of metal. But, while the medium is the same in both sculptures, the texture is quite difference. Describe the differences.

Serpent Mound, Patricia Innis

KEY IDEAS

- When early settlers ventured into the territories of present day Ohio, Michigan, Indiana, Illinois, Wisconsin, Minnesota, and Missouri, they found thousands of mounds built by the first people to inhabit the land.
- Some of the mounds were in the shape of birds, reptiles, and fabulous beasts.
- Archaeologists have unearthed bones, pottery, ceremonial tools, exotic carvings, and weapons from the mounds.

INSPIRATION

Serpent Mound evokes another time and place, of centuries past. Patricia Innis' one-hundred and twenty-foot long earthen sculpture, winding its way through the woods, is reminiscent of the ancient mound-builders who lived throughout the Ohio and Mississippi River Valleys. The people who built the mounds were called the Yam-Ko-Desh, meaning "prairie people." As Europeans settled in the Midwest, they were fascinated by the mounds scattered throughout Michigan and beyond. Archaeologists have determined the mounds to be burial sites after finding skeletons, arrow and spear heads, stone tools, pottery vessels and more. As well as embodying the Yam-Ko-Desh culture, the serpent also represents the numerous types of snakes inhabiting Michigan. In many cultures, the snake was revered and viewed as a symbol of rebirth because of its ability to shed its skin.

BACKGROUND

Patricia Innis' installation references ancient history and reminds us of the importance of honoring the past. Both the serpent and the egg are formed from sand and topsoil. Native grasses will blanket the serpent, while moss grows on the egg. Small ceramic effigies (figures) representing "wishes for the world," were created by area school children, and are buried along the perimeter of the serpent.

DISCUSSION QUESTIONS

- What is the first thing your eyes see when you look at this sculpture?
- What shapes do you see? What textures do you see?
- In what ways is this sculpture both a work of art and a result of the natural world?
- What can people learn by studying cultures of the past?
- Why is it important to honor the past?
- How can people of today honor the past?

Satisfaction From Nature, Byung Chan Cha

KEY IDEAS

- Landscapes are subject to the processes of erosion and uplift, deposition, depression, and shifts in the ground.
- Finding places in the natural world that invite us to be still and in-tune with our true nature are a treasure.

INSPIRATION

Satisfaction from Nature encourages one to stop, have a seat, and take in the beauty of the forest. In framing the real forest, the artist also suggests a framed piece of artwork. Consider how art and nature mirror one another. Both stimulate a variety of responses that reflect the experience of the viewer. Indulge your creative spirit. Move around so the view you see through the frame changes. Find your perspective and, in it, your work of art.

Of *Satisfaction from Nature*, David Barr wrote, "Perched on the crest of a forest glade, this sculpture provides a witty framing of a natural vista. The viewer is cleverly focused on an infinitely and subtly changing panorama of dappled light, vegetation, butterflies, and seasons... nothing stays fixed in time."

BACKGROUND

Byung Chan Cha was the first student from the Interlochen Arts Academy (IAA) to create a sculpture for Michigan Legacy Art Park. This work, created in 2001, represents the partnership between the two institutions, which provides sculpture students experience with professional artists.

DISCUSSION QUESTIONS

- How does this work of art invite you in?
- Why do you suppose it is located where it is? Why does the artist's choice of location matter?
- Once students have a seat on the bench, ask sensory questions: What do you see? What sounds do you hear?
- What emotions do you feel as you sit and take in the beauty of natural world?
- Take a look at the title of this work of art. Does knowing the title change your understanding of this piece? Does knowing the title of a work of art limit your understanding, or focus it?
- Do you have a favorite season that draws you into nature and invites you to sit a spell? What is it?

Nurture/Nature, David Barr

KEY IDEAS

- This installation, a set of stone mysteries, is about cycles found in the natural world.
- All things are connected. All places are connected. Humans need to be good stewards in caring for the natural world.

INSPIRATION

As an artist, David Barr's goal was always to transform ideas into new, visible expressions. And that is what he has done in *Nurture/Nature*. This sculpture is a metaphor for the fragility of the natural world. Barr devoted much of his life to studying nature's cycle of growth, decay and regeneration. The knowledge and understanding he gained from observing this process allowed him to creating works of art that reflect his experiences. Of this sculpture, Barr wrote, "Without caring for the egg, there is no bird. In art history, the egg is a timeless and universal symbol of life. From prehistory on, choosing to carve in the hardness of granite conveys reverence for form."

BACKGROUND

David Barr believed that the space around a sculpture is very important, so many of his works are exhibited in large outdoor venues. "When I look at nature, if I look at a flower or a tree or anything else, I see a color and I see a form and they are revealed to me through light and space and time. Those elements are present in everything I do: the actualities of those elements.""

DISCUSSION QUESTIONS

- What forms do you see when looking at this sculpture?
- What might the stones represent? The "egg?"
- What might this work symbolize?
- The title of this sculpture is *Nurture/Nature*. Why do you think the artist called it that?
- In what ways does the environment nurture people? What are some ways that individuals can nurture the environment?
- With a partner, come up with an analogy between this work of art and something else. (An analogy is like a metaphor. It compares one thing to another, providing clarity or identifying hidden similarities between two ideas.)

Big Two-Hearted, David Barr

KEY IDEAS

- *Big Two-Hearted* was inspired by Ernest Hemingway's, short story, "Big Two-Hearted River," written in 1938.
- This installation was created in 2000 to commemorate the 100th anniversary of Ernest Hemingway's birth.
- Hemingway's family spent their summers in northern Michigan, which is where the author developed a love of fishing, hunting, and the sportsman's life.

INSPIRATION

David Barr's installation was influenced by Ernest Hemingway's short story. Both artist and writer held a deep fascination for the relationship between humans and the natural world. Barr's sculpture invites the viewer to "wade" through the dry river bed, follow the meanderings, listen to the sounds under foot, notice the surroundings, and fully experience the natural world. This is not dissimilar to the way Hemingway invited his readers to experience the rituals involved in trout fishing: wading through the water, baiting the hook, casting the line, and hoping for a catch. The trout represents the natural world and all of its fragility. The river represents one's journey through life. At times, it is clear, shallow, and easy to navigate the manageable currents. At other times, it is murky, deep, and difficult with its swift currents that can drag a person down at a moment's notice. In both the sculpture and the short story, the viewer/reader is transported to the philosophical and psychological world of the individual, seeking a way to exist in the natural world.

BACKGROUND

David Barr's work is structured, yet poetic and visually harmonious. He has drawn inspiration for his work from biology, geology, history, literature, and philosophy.

DISCUSSION QUESTIONS

- What might the brook trout represent? What might the river represent?
- How does nature heal us?
- In what ways does this sculpture capture the short story's messages?
- David Barr said, "Art must penetrate the consciousness. It must become a state of being. It must dwell within, awakening insight." In what ways does this sculpture awaken you?
- After reading Hemingway's short story, discuss why you think Nick decides to wait for another day to fish the deep water, to fish the swamp?

Trout by Gary Kulak in David Barr's *Big Two-Hearted*

Michigan, Brian Ferriby

KEY IDEAS

- Contour lines are used to show elevations in topographic maps.
- A place's history is decided by its geography.

INSPIRATION

All maps are an abstraction, meaning that they are a simplification of the reality being mapped. Most of the information from the natural world is removed, until the object remaining is on the edge of being unrecognizable, focusing the attention of the viewer on what the cartographer, or map maker, believes is essential. *Michigan* is a bathymetric map of Lake Michigan, which means it is an underwater topographic map. When a viewer stands on the shore of Lake Michigan and looks out over the lake, it appears infinite and powerful. When viewed from an aerial perspective, looking down at the Earth, the same lake seems small and fragile. This sculptural representation of Lake Michigan speaks of the finite, fragile nature of the lake and invites its viewers to consider what lies beneath the water's surface. It also serves as a reminder that every person has a responsibility to be good stewards of the environment.

BACKGROUND

Brian Ferriby's sculptures allow him to combine his passions for architecture, music, and the environment. As can be seen in *Michigan*, the artist embraces space and form like architecture, movement and rhythm like music, and beauty and simplicity like nature. Ferriby has chosen to work in steel and copper, acknowledging the mining industry of Michigan's Upper Peninsula.

DISCUSSION QUESTIONS

- What perspective did the sculptor use when creating this piece?
- How does the viewing experience change when standing in different places around the sculpture?
- In your opinion, would this sculpture be as effective if it were presented horizontally, rather than vertically? Why or why not?
- How does this sculpture capture the rhythm and movement that can be found when observing Lake Michigan?
- Why might the artist have chosen to portray Lake Michigan as a bathymetric map? What effect does it have on the viewer?
- How is the material the sculptor chose a symbol for the subject matter?

Bringing It All Together

Have some fun with language! Use the sculptures featured in this booklet, or others you find on the trail, as your inspiration.

Choose a work of art that interests you as the subject of a poem. Think of words that are related to this sculpture and make a Word List. Next, circle the words that you think will be most effective to use in your poem.

CREATE A CINQUAIN POEM

A cinquain is a short, poem with a structure of five lines and eleven words. The lines are set out like this:

Line 1. Subject - one word

Line 2. Description - two words

Line 3: Action - three words

Line 4: Feeling - four words

Line 5: Re-name subject - one word

Outside

A forest

Full of sculptures

Museum without a roof

Outside

Tree

Tall, slender

Reaching, bending, swaying

Majestic tower rising above

Impressive

CREATE SOME ANALOGIES

An analogy is a comparison of two things.

As you hike the trails, or back in the classroom, create analogies based on an identified relationship using two words as a starting point. Here are a few examples using art and nature words as starting points.

- Part to Whole:
  Finger is to hand as petal is to flower.
- Worker and Product:
  Painter is to portraits as writer is to books.

TEACHER NOTE

Prepare ahead of time: Create index cards, each with a grade-appropriate word relating to either art, nature, or science words found in this booklet. Or, develop your own word list. Have students draw two cards from a container of index cards.

MICHIGAN LEGACY ART PARK Tour Analysis Grid Name: Date: Place a "+" for yes answer Place a "-" for no answer Place a "?" for unsure	**GEMOTRIC SHAPES**	**ORGANIC SHAPES**	**REPETITION OF SHAPES**	**HAS A SENSE OF RHYTHM**	**HAS SYMBOLIC REPRESENTATION**	**GEMOTRIC SHAPES**
FROG						
UNRAVEL						
SERPENT MOUND						
MICHIGAN						
SATISFACTION FROM NATURE						
NURTURE/NATURE						
BIG TWO-HEARTED						

AFTER YOUR DAY AT THE ART PARK

Describe your outdoor museum experience in...

A word _____

A phrase _____

_____

A sentence _____

_____

_____

_____

Suggested Activities By Grade Level

Kindergarten & First Grades

Exploring Michigan's Plants and Animals

AT THE PARK

Tour the park with a special focus on *Frog* and *Unravel*. Make sure to share the notes from the previous pages of this booklet. On your walk, ask your students the discussion questions provided in this booklet about the featured sculptures.

IN THE CLASSROOM

Make a poster of these Overarching Questions to display in your classroom.

- What makes a place natural?
- What resources does the natural world provide?
- What can we learn from nature?

Collect natural objects (or pictures of objects) and sort them by attributes. Invite conversations about textures, size, and shapes.

Identify and draw patterns found when observing plants and animals. Have conversations about what might be causing these patterns.

Read books about the natural world. Discover what animals live where they do and why they live there. Wonder about the many ways plants and animals meet their needs so that they can survive and grow.

Create a "Cycles Found in Nature" bulletin board. Include visual images and vocabulary terms to support the concept of "cycles." Examples may include: Forests (birth, growth, decay, regeneration), Plants (seed, seedling, plant, flower, fruit), Frogs (eggs, tadpoles, frogs), Butterflies (caterpillar, larvae, butterfly), Twenty-four hours (day, night). Seasons (fall, winter, spring, summer).

Plant a window garden in your classroom. Have students plan, observe, and experiment with seeds. Keep a journal of the growth process in the form of drawings or words.

Discuss food webs and how animals interact together in an ecosystem. Make a model of how living and non-living organisms are dependent on each other in a freshwater (rivers, ponds, streams, wetlands) or forest ecosystem and get their energy from other animals and the sun. (Examples: Deer eat buds and leaves, therefore, they usually live in forested areas. Grasses need sunlight, so they often grow in meadows. Plants, animals, and their surroundings make up an ecosystem.)

Have a classroom conversation about the effects of human impact on the land. Provide examples through picture books and informational text. Examples might include cutting trees to produce paper and using resources to produce bottles.

Challenge your students to become good stewards of the Natural World. In the classroom, create a recycling box for cans and bottles, and a place to reuse paper.

Second & Third Grades

Exploring Michigan's Natural Resources

AT THE PARK

Tour the park with a special focus on *Frog*, *Unravel* and *Serpent Mound*. Make sure to share the notes from the previous pages of this booklet. On your walk, ask your students the discussion questions provided in this booklet about the featured sculptures.

IN THE CLASSROOM

Make a poster of these Overarching Questions to display in your classroom.

- What makes a place natural?
- What resources does the natural world provide?
- What can we learn from nature?

Collect and observe objects found in nature. Have students group objects by similarities and differences and present their reasoning for sorting objects as they did. Ask scientific questions about how patterns are organized. Discuss why and how patterns occur.

Individually, students create a sketchbook of patterns they collect. With guidance and support, students label each sketch with a simple sentence.

Make a class book called "Finding Patterns in the Natural World." Use "zoom in" photographs, gathered from magazines and calendars, of plants, animals, and rocks. On each page, include an image and a caption about the patterns shown through the use of repetition of color, lines, shapes, textures.

Extend the study of patterns by taking it into other areas of the curriculum. Mathematics has patterns. Music has patterns. Where else might this idea lead you?

Create a classroom bulletin board of rubbings done with leaves, tree bark, and other natural objects. Label each one with the name of the natural plant or object.

Read books about frogs. Study the frog's life cycle. Discuss how the changes that organisms go through during their life form a pattern.

Introduce questions about the natural world. Design experiments to gather more information and test to support or refute ideas.

- How does land change and what are some things that cause it to change?
- What are the different kinds of land and bodies of water?
- What do plants need to grow?
- How many types of living things can be found in a place?
- How are materials similar and different from one another, and how do the properties of the materials relate to their use?

Challenge your students to become good stewards of the Natural World. In the classroom, create a recycling box for cans and bottles, and a place to reuse paper.

Fourth & Fifth Grade

Exploring the Great Lakes' Ecosystems

AT THE PARK

Tour the park with a special focus on *Serpent Mound* and *Michigan*. Make sure to share the notes from the previous pages of this booklet. On your walk, ask your students the discussion questions provided in this booklet about the featured sculptures.

IN THE CLASSROOM

Make a poster of these Overarching Questions to display in your classroom.

- What makes a place natural?
- What resources does the natural world provide?
- What can we learn from nature?
- Define "ecosystem." Present examples of the types of ecosystems found in Michigan. (i.e. river and stream ecosystems, coastal dune ecosystem, Great Lakes ecosystem, forest ecosystem) Identify what living and non-living components all ecosystems have in common.

Share basic facts about Michigan to reference throughout your unit(s) of study.

- State is made up of two large peninsulas—Upper Peninsula and Lower Peninsula
- Bordered by four of the five Great Lakes, with over 3,300 miles of shoreline
- Over half of the land in Michigan is forested (most is in the upper peninsula)
- More than 6,000 lakes and hundreds of miles of streams and rivers
- Major rivers include the Kalamazoo, Manistee, and the Grand River
- Vegetation is highly varied. U.P. forests are mostly coniferous, with a mix of red and white pines. L.P. also has evergreen forests, but more hardwoods ~ oak, beech, ash, and maple.
- Four seasons which range from frigid winters to steamy summers.

Collect samples of pond or river water and use it to study energy flow and food chains. Use cause

and effect questioning to examine relationships in this ecosystem.

Research one of Michigan's ecosystems and design a brochure or poster to promote it.

Learn about the Mound-builders and identify the places where archaeologists have found evidence of these early cultures. Use maps to mark their locations and trace their trade routes in Michigan and throughout the Ohio and Mississippi River Valleys.

Research and report on a fascinating topic related to the Pre-Columbians that lived in Michigan. Choose one of these ways to share your findings: write an informational essay, a narrative story, a comic strip with captions, or a children's picture book with text.

Read maps and study the natural landforms (rivers, lakes, wetlands, hills, meadows, forests). Think about how a place (Michigan) shapes the people who live there. How do they adapt to, use, and modify the natural resources?

Become a naturalist or a citizen scientist. Choose a plant or tree in your schoolyard, or backyard, to observe several times a week. Keep a log or journal of the changes that occur over time. Describe what you see. Be specific. Make sketches in your journal of your observations.

Sixth through Eighth Grades

Exploring the Biodiversity of the Great Lakes

AT THE PARK

Tour the park with a special focus on *Michigan*, *Satisfaction from Nature*, and *Nurture/Nature*. Make sure to share the notes from the previous pages of this booklet. On your walk, ask your students the discussion questions provided about the featured sculptures.

IN THE CLASSROOM

Make a poster of these Overarching Questions to display in your classroom.

- What makes a place natural?
- What resources does the natural world provide?
- What can we learn from nature?

Thomas Wolfe, an important American writer in the first half of the 20th century, said, "Nature is the one place where miracles not only happen, but happen all the time." What are some of nature's miracles? Discuss.

Use regional and state maps to identify Michigan's inland waterways.

Using photographs of some of Michigan's lakes and rivers, and the biodiversity found in and around them, create a "Why Should We Be Concerned About Water Quality?" collage. Include messages (words, phrases, sentences) cut from the texts of magazines to include in your collage.

- What is biodiversity? Why is it important?
- How is biodiversity threatened in Michigan?
- How is biodiversity measured?
- How can people use knowledge of biodiversity to help make land-use decisions?
- How does one's personal actions affect the environment?

Design a diagram or build a model to show the interconnections and interdependence within a natural community.

Create a contour map featuring a chosen section of an important river. In the map legend, use symbols to explain your map ~ elevation, distance (scale), and other significant points. Be ready to explain the science represented in your contour map.

Conduct water quality studies of Lake Michigan or one of its tributaries. Use the scientific method when conducting research and experimenting. When sharing results, present cause and effect relationships.

Plan a field trip to a nearby river, inland lake, Sleeping Bear Lakeshore, or on the Inland Seas Schooner.

Research invasive species associated with Michigan or the Great Lakes, the problems they present, how they were introduced, and how to prevent their spread in the future. Choose one of these ways to present research findings: write an expository essay, write a persuasive essay, write an opinion letter to a state representative, write an opinion piece for the local newspaper, create a cartoon strip with images and either dialogue bubbles or captions under each frame.

High School

Exploring the Environmental Challenges Facing the Great Lakes

AT THE PARK

Tour the park with a special focus on *Nurture/Nature* and *Big Two-Hearted*. Make sure to share the notes from the previous pages of this booklet. On your walk, ask your students the discussion questions provided about the featured sculptures.

IN THE CLASSROOM

Make a poster of these Overarching Questions to display in your classroom.

- What makes a place natural?
- What resources does the natural world provide?
- What can we learn from nature?

Read Ernest Hemingway's short story, "Big Two-Hearted." Compose a literary essay, responding to each of the following questions.

- What might the brook trout represent?
- What might the river represent?
- How does being out in nature and performing the simple rituals involved in fishing serve Nick?
- Why do you think Nick decides to wait for another day to fish the deep water, to fish the swamp?

Read Dan Egan's nonfiction book, The Death and Life of The Great Lakes. Egan is a reporter for the Milwaukee Journal-Sentinel and senior water policy fellow at the University of Wisconsin-Milwaukee. This book deals with the current issues of lake ecology, environmental conditions, nonindigenous aquatic pests, and water quality.

Conduct a class debate: Should the Chicago River be returned to its normal water flow, thus breaking the link between the Mississippi River and the Great Lakes.

Read about major threats to biodiversity in the Great Lakes, focusing on cause and effect relationships. Research what it means for a species to be listed as threatened or endangered, and the role of government and individuals in protecting biodiversity. Write an opinion letter to your state legislator or local newspaper sharing your views.

Write a personal narrative about an experience you've had related to the Great Lakes.

Discuss the concept of "sustainability," evaluate how individual decisions affect the environment. Examine the UN Millennium Development Goals as they apply to global sustainability.

Have students select (or assign) a single recyclable product and trace it from a manufacturer to a recycling center. Create a diagram to show each step of the product's cycle. Make a chart or table that examines the costs of making the product and the recycling of it. Write an opinion paper answering the question: Is recycling worth it? Provide evidence to support your opinion and offer an alternative solution.

STANDARDS AND BENCHMARKS ADDRESSED

KINDERGARTEN

Interdependent Relationships in Ecosystems: Animals, Plants, and Their Environment: Connections to Nature of Science

SCIENCE

K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.
K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.
K-ESS3-1. 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. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.

ELA / LITERACY

RI.K.1 With prompting and support, ask and answer questions about key details in a text.
RI.K.2 With prompting and support, identify the main topic and retell key details of a text.
RI.K.8 With prompting and support, identify the reasons an author gives to support points in a text.
W.K.2 Use a combination of drawing, dictating, and writing to compose information/ explanatory texts in which they name what they are writing about and supply some information about the topic.
W.K.7 Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them).
W.K.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
SL.K.3 Ask and answer questions in order to seek help, get information, or clarify something that is not understood.

ART

ART.VA.I.K.3 Explore the elements of art through playful sensory experiences.

ART.VA.II.K.2 Use a variety of lines, colors, and basic geometric shapes and patterns to creatively express feelings and personal experiences.
ART.VA.III.K.1 Explore and discuss why artists create.
ART.VA.III.K.2 Recognize that art can be created for self-expression or fun.
ART.VA.III.K.3 Describe the sensory qualities in a work of art.
ART.VA.V.K.3 Identify how pattern, shape, rhythm, and movement are used throughout the arts.
ART.VA.V.K.4 Explore connections between the visual arts and other curriculum.

FIRST GRADE

Structure, Function, and Information Processing

SCIENCE

1-LS1-1. 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. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.
1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

ELA / LITERACY

RI.1.1 Ask and answer questions about key details in a text.
RI.1.2 Identify the main topic and retell key details of a text.
RI.1.8 Identify the reasons an author gives to support points in a text.
W.1.2 Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure.
W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions.
W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
SL.1.2 Ask and answer questions about key details in a text read aloud or information presented orally or through other media.

ART

ART.VA.II.1.2 Explore the use of knowledge of the elements of art.
ART.VA.II.1.3 Explore and discuss how artists construct ideas in artworks.
ART.VA.III.1.2 Identify the purpose of community art.
ART.VA.III.1.3 Demonstrate respect for the value of other opinions in discussion.
ART.VA.IV.1.3 Describe how the subject matter of artwork may be connected to the environment in which it was created.
ART.VA.V.1.3 Identify similarities between the visual arts and other arts disciplines.

SECOND GRADE

Interdependent Relationships in Ecosystems

SCIENCE

2-LS2-1 Plan, and conduct, an investigation to determine if plants need sunlight and water to grow.
2-LS2-2 Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.
2-LS4-1 Make observations of plants and animals to compare the diversity of life in different habitats.

ELA / LITERACY

RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.
RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.
RI.2.8 Describe how reasons support specific points the author makes in a text.
W.2.1 Write opinion pieces in which they introduce the topic or book they are writing about, state an opinion, supply reasons that support the opinion, use linking words (e.g., because, and, also) to connect opinion and reasons, and provide a concluding statement or section.
W.2.2 Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.
W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).
W.2.8 Recall information from experiences or gather information from provided sources to answer a question.
SL.2.2 Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.

ART

ART.VA.III.2.1 Develop a visual vocabulary.
ART.VA.III.2.2 Recognize that art is created to fulfill personal and/or social needs.
ART.VA.III.2.3 Share personal experiences and preferences in response to works of art.
ART.VA.III.2.5 Reflect on how art expresses ideas, feelings, and opinions.
ART.VA.V.2.3 Identify similarities among the arts including vocabulary, elements of art, and principles of design.

THIRD GRADE

Interdependent Relationships in Ecosystems

SCIENCE

3-LS2-1 Construct an argument that some animals form groups that help members survive.
3-LS4-1 Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.
3-LS4-3 Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.
3-LS4-4 Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

SOCIAL STUDIES

3-G1.0.2 Use thematic maps to identify and describe the physical and human characteristics of Michigan.
3-G2.0.1 Use a variety of visual materials and data sources to describe ways Michigan can be divided into regions.
3-G4.0.2 Describe diverse groups that have come into a region of Michigan and reasons why they came (push/pull factors).
3-G5.0.2 Describe how people adapt to, use, and modify the natural resources of Michigan.

ELA / LITERACY

RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea.
RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.
RI.3.7 Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).
W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons.
W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
W.3.7 Conduct short research projects that build knowledge about a topic.
SL.3.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly.
SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.
SL.3.5 Create engaging audio recordings of stories or poems that demonstrate fluid reading at an understandable pace; add visual displays when appropriate to emphasize or enhance certain facts or details.

ART

ART.VA.II.3.3 Examine how artists turn ideas into visual solutions.
ART.VA.III.3.2 Examine how art expresses cultural traditions.
ART.VA.IV.3.2 Describe the materials and art forms used by particular cultures.
ART.VA.V.3.1 Describe how art can be found in various environments.

FOURTH GRADE

Structure, Function, and Information Processing

SCIENCE

4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
4-ESS2-1 Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.
4-ESS2-2 Analyze and interpret data from maps to describe patterns of Earth's features.

ELA / LITERACY

RI.4.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
RI.4.2 Determine the main idea of a text and explain how it is supported by key details; summarize the text.
RI.4.3 Explain events, procedures, ideas, or concepts in an historical, scientific, or technical text, including what happened and shy, based on specific information in the text.
RI.4.7 Interpret information presented visually, orally, or quantitatively (i.e. charts, graphs, diagrams, timelines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.
W.4.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
W.4.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic.
SL.4.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.
SL.4.4 Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

ART

ART.VA.II.4.4 Analyze and reflect on the uses of subject matter, symbols, and ideas to express and communicate meaning in artwork.
ART.VA.III.4.5 Analyze how art can be a reflection of society and a response to real world experiences.
ART.VA.IV.4.1 Describe how artwork communicates facts and/or experiences of various cultures.
ART.VA.V.4.4 Demonstrate cross-curricular connections through a culminating event .

FIFTH GRADE

Matter and Energy in Organisms and Ecosystems

SCIENCE

5-LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water.
5-LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and environment.

ELA / LITERACY

RI.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.
RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.
W.5.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
W.5.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.
SL.5.1 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 ad expressing their own clearly.
SL.5.4 Report on a topic or text, or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.
SL.5.5 Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.

ART

ART.VA.III.5.2 Identify and defend various purposes for creating works for visual art.
ART.VA.III.5.3 Understand and respect that there are different responses to specific art works in a global community.
ART.VA.IV.5.3 Demonstrate how history, culture, and the visual arts interrelate in making and studying works of art.
ART.VA.V.5.3 Understand and use comparative characteristics of the visual arts and other arts disciplines.
ART.VA.V.5.4 Synthesize connections between the visual arts and other disciplines in the curriculum.

MIDDLE SCHOOL (GRADES 6 – 8)

Matter and Energy in Organisms and Ecosystems

SCIENCE

MS-LS2-1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
MS-LS2-3 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an

ecosystem.
MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
MS-LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
MS-LS2-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services.
MS-ESS2-1 Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.

ELA / LITERACY

RI.6-8.8 Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims.
RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.
RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
RST.6-8.8 Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
WHST.6-8.1 Write arguments focused on discipline-specific content to support claims with clear reasons and relevant evidence.
WHST.6-8.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes, to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.
SL.6-8.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade level (6, 7, 8) topics, texts, and issues, building on others' ideas and expressing their own clearly.
SL.6-8.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.

ART

ART.VA.III.6.2 Develop the skill of interpreting artwork, searching for embedded meaning, function, and personal connections at a developing level.
ART.VA.III.6.3 Develop the ability to describe how the artist's choice of materials, techniques, media technology, and processes influence the viewer.
ART.VA.III.6.4 Develop critical thinking strategies, observing, comparing, and contrasting artworks.
ART.VA.III.6.5 Develop and defend informed aesthetic opinions about works of art using artistic vocabulary at a developing level.
ART.VA.IV.6.1 Recognize and describe how art contributes to and reflects all societies and cultures.
ART.VA.IV.6.2 Develop an understanding of the historical, social, and cultural contexts of artwork with aesthetic sophistication.
ART.VA.III.7.2 Interpret artwork searching for embedded meaning, function, and personal connections at an emerging level.
ART.VA.III.7.3 Improve descriptions of how the artist's choice of materials, techniques, media technology, and processes influence the viewer.
ART.VA.III.7.4 Use critical thinking strategies to observe, compare, and contrast artworks at an emerging level.
ART.VA.III.7.5 Develop and defend informed aesthetic opinions about works of art using artistic vocabulary at an emerging level.
ART.VA.IV.7.1 Recognize, describe and analyze, and evaluate how art contributes to and reflects all societies and cultures at an emerging level.
ART.VA.IV.7.2 Articulate an understanding of the historical, social, and cultural contexts of artwork with an emerging level of aesthetic sophistication.
ART.VA.III.8.2 Effectively interpret artwork, searching for embedded meaning, function, and personal connections.
ART.VA.III.8.3 Effectively describe how the artist's choice of materials, techniques, media technology, and processes influence the viewer.
ART.VA.III.8.4 Effectively use critical thinking strategies to observe, compare, and contrast artworks.
ART.VA.III.8.5 Develop and defend informed aesthetic opinions about works of art using effective artistic vocabulary.
ART.VA.IV.8.1 Recognize, describe and analyze, and evaluate how art contributes to and reflects all societies and cultures.
ART.VA.IV.8.2 Articulate an understanding of the historical, social, and cultural contexts of artwork with aesthetic sophistication.

HIGH SCHOOL (GRADES 9 – 12)

Interdependent Relationships in Ecosystems

SCIENCE

HS-LS2-1 Use mathematical and / or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.
HS-LS2-2 Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
HS-LS2-6 Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions; but changing conditions may result in a new ecosystem.
HS-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

ELA / LITERACY

RL.9-10-1 Cite strong and thorough textural evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
RI.9-10.6 Determine an author's point-of-view or purpose in a text and analyze how an author uses rhetoric to advance that point-of-view or purpose.
W.9-10.1 Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
W.9-10.2 Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
W.9-10.7 Conduct short, as well as more sustained, research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
SL.9-10.4 Present information, findings, and supporting evidence clearly, concisely, and logically, such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
RL.11-12-1 Cite strong and thorough textural evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.
RI.11-12.6 Determine an author's point-of-view or purpose in a text in which the rhetoric is particularly effective, analyzing how style and content contribute to the power, persuasiveness, or beauty of the text.
W.11-12.1 Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
W.11-12.2 Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
W.11-12.7 Conduct short, as well as more sustained, research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
SL.11-12.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11-12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.

ART

ART.VA.I.HS.2 Intentionally use art materials and tools when applying techniques and skills to communicate ideas.
ART.VA.III.HS.1 Analyze and describe the formal characteristics of a work of art or design.
ART.VA.III.HS.2 Describe how organizational principles are used to elicit emotional responses.
ART.VA.III.HS.3 Critically observe a work of art to evaluate and respond to the artist's intent using art vocabulary and terminology.
ART.VA.III.HS.5 Recognize and understand the relationships between personal experiences and the development of artwork.
ART.VA.IV.HS.1 Observe and describe artwork with respect to history and culture.
ART.VA.IV.HS.2 Describe the functions and explore the meaning of specific art objects within varied cultures, times, and places.

ABOUT THE AUTHOR

Jaye Lynn Trapp was an educator for Traverse City Area Public Schools for 22 years. Most of those years were spent servicing students at Central Grade School. During that time, her classes participated in Michigan Legacy Art Park's educational residency program with Patricia Innis. Jaye Lynn worked closely with art teacher, Cherie Correll, helping to develop art-related curriculum for the park.

After she retired, Trapp moved to Tucson and became a docent at the Tucson Museum of Art. She now creates materials for visiting teachers and students, provides school tours at the museum, presents art talks in the community, and mentors new docents. Trapp has degrees from Central Michigan University in English, Art, and the Social Sciences, and a Masters' Degree in Humanities.

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