WE MOVE AND WE STAY

Uŋkihdakapi k'a Uŋowanžiyaŋkapi
Imbabaamaadizimin

An Exhibition About Contemporary
and Historic Ojibwe and Dakota People

Teacher and Chaperone Guide

Human lives swirl around a center, moving yet staying over space and time.

We move and we stay, growing and changing over lifetimes or generations. Our relatives provide for us, and we look after them. We are all connected.

We move and we stay on this land. Home is a big place, and we shift with the seasons to use its resources.

We move and we stay, trading with and learning from others. But we always return to our center—home, family, and community.

Every object evokes a maker, a purpose, and a story.

The objects in We Move and We Stay were made by generations of Dakota, Ojibwe, and other Native people whose "center" was right here in Minnesota. Discover their stories.

Museum Activities for Grades K-12

Connections to the Minnesota Academic Standards

Science Museum of Minnesota®

CLEAN WATER LAND & LEGACY AMENDMENT

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VISITING THE MUSEUM

- Give chaperones copies of *At The Museum* student pages.
- Add your own page(s). Connect with your own unit.
- Choose the activities which meet your needs best. You can use just one page!
- Components are not sequential. You can start anywhere in the exhibit.
- If your time at the Museum is limited, choose just a few stops.
- Don't try to rush your students to finish the suggestions.

ABOUT THIS GUIDE

The *We Move and We Stay* exhibit showcases beautiful and meaningful objects created by Native Americans who live in the place we call Minnesota today. It is important to note that the name Minnesota comes from the Dakota language: **Mnísota Makhóčhe: "where the waters reflect the skies."**

Beyond the stories that explain the objects and exhibits, the focus of this educator guide is STEM (science, technology, engineering, and math) concepts. The STEM threads included in the student activities and classroom connections relate to:

- properties and characteristics of materials, especially materials made from natural sources
- the process and products of engineering design
- the seasonal round of work, natural processes, and interconnections of Native life and the natural world
- inherent mathematical structures and concepts

Today, thousands of Native Americans have careers in STEM fields. STEM ideas and concepts are present throughout Native life. This guide and student museum activities spotlight contemporary Minnesotans in STEM-related careers who are Native American or work in Native communities. Each student activity page includes a *STEM Spotlight*—a quote taken from the longer interviews found in the Resources section (page 16)—to introduce the exhibit activity.

Use exhibit explorations from the guide with your students to add new ideas about:

- inappropriate cultural stereotypes
- contemporary Minnesota connections between STEM and traditional Native lifeways

What's in a Name?

The words "Native American" and "Indian" are used to describe a diverse group of people whose ancestors lived in the Americas before the arrival of Europeans and subsequent groups. Both terms—Native American and Indian—are non-indigenous, words coined by non-Natives. Like "Latino" or "Asian," Native American—the term used in this guide—is a general category that neglects the social, linguistic, economic, cultural, religious, and geographic diversity that exists within these groupings of people. Native Americans identify themselves by the name of their Nation or tribe, such as Dakota, Ojibwe (Anishinaabe), or Ho-Chunk. Many prefer more specific affiliations, such as "Leech Lake Band of Ojibwe" or "Sisseton-Wahpeton Dakota Oyate."

(with permission from American Museum of Natural History)

Thank you to individuals who provided information and interviews for this guide: Shane Bowe, Paul Dressen, Nikki Jourdain, Pat Kruse, Gabe Miller, Jim Rock, and Sean Sherman.

Special thanks to our Educator Guide consultant, Becky Beane, whose advice and suggestions were essential support.

EXHIBITION OVERVIEW

The objects in *We Move and We Stay* were made by generations of Dakota, Ojibwe, and other Native peoples whose "center" was or is right here in Minnesota. An advisory group of Native Americans developed the theme—*We Move and We Stay*—as a way to explain cycles of life, space, and time.

The area next to the *Race: Are We So Different* exhibition on Level 4 includes objects, videos, interactive activities, and written information that highlight Native American life in Minnesota. Loose clusters of exhibit cases provide glimpses into several sub-themes.

Seasonality and Connections to the Land and Resources

We move and we stay on this land. This place is home. Home is a big place, and we shift with the seasons to use its resources.

Native communities are closely connected with the land and its resources. The landscape is full of meaning. Certain places—like Bdote, where the Mississippi and Minnesota Rivers come together—remain sacred and powerful. For centuries, Minnesota's landscape and natural resources shaped Native life and interactions. Natural resources depend on seasonal cycles and the health of the environment.

Exhibit components connected to this theme:

- pottery and other items with spiritual world designs
- traditional tools and technology associated with changing seasons
- bison as an important resource
- resources related to healthy water and relationships with water
    - *Cloudy Waters* video installation by Mona Smith
    - birch bark canoe

Family and Life Cycle

We move and we stay, growing and changing over lifetimes or generations. Our relatives provide for us, and we look after them. We are all connected.

Ojibwe and Dakota families are traditionally part of a web of relationships. Each individual's actions affect family, clan, community, and environment, and the balance of these relationships is central to a good, healthy life. People exchange gifts to strengthen bonds, honor life stages and accomplishments, and affirm cultural values of kinship, respect, sharing, bravery, and compassion.

Exhibit components connected to this theme:

- objects that reflect family relationships
- star quilts and other artwork with star designs
    - an interactive design activity

Tradition and Innovation

We move and we stay, combining new materials and ideas with traditional beliefs and techniques. We move and we stay, trading with and learning from others. But we always return to our center—home, family, and community.

For thousands of years, Minnesota's Native people had strong connections to other groups through a web of trade and interaction. The influx of European missionaries, soldiers, traders, and settlers in the 1800s resulted in the loss of Native homelands by treaty and attempts to stamp out indigenous cultural and religious practices. In spite of these pressures, Native people maintained strong ties to their roots.

It's tempting to divide Native history into two big epochs—before and after contact with Europeans—and to consider post-contact culture and artifacts less "authentic." But Native makers have been incorporating new materials, designs, and techniques into their traditions for thousands of years. Many longstanding traditional practices in Native art and technology were once innovative. Every new work is both inspired by the past and a modern revolution.

This theme is evident in many areas and in many objects. Among them are:

- **Jingle dresses**, created and worn by women to accompany a dance with a 100-year-long history, now made with modern materials.
- ***All Races Bouquet #3***, done in birch bark by artists Pat and Gage Kruse, incorporating many traditional plant and animal designs into a new format.
- **Ornaments, projectile points, and designs on clothing and ceramics** that provide evidence of trade among Native American groups across North America.
- ***Non-negotiable***, painted by artist Jim Denomie, with both historic and modern references to illustrate how "history is connected to today."
- **Courting flutes**, traditionally crafted and played by young men, fell into disuse and the art was almost lost until a few carvers relearned how to make them and started teaching others.

About the Whipple Collection

Missionary Henry Whipple, Minnesota's first Episcopalian bishop, arrived in Minnesota in 1859 along with other European settlers moving into the newly formed state. Like most missionaries, Bishop Whipple urged Native people to adopt Christianity and a settled lifestyle. But his deep friendships with Native people made him a strong critic of many other United States policies toward American Indians. After the Dakota War in 1862, Whipple pleaded for clemency for Dakota prisoners. He gained national prominence as a reform advocate for Indians and as an advisor to four presidents over 40 years.

A believer in many of the assimilationist policies that devastated Native American communities, he was also a passionate supporter of Dakota and Ojibwe people and an avid collector of Native American art (although "art" wasn't a concept held by Native communities at the time). Whipple collected these objects during a time of dramatic changes and rapid transitions for Native communities. His collection forms the basis of this exhibition.

In Honor of the People (www.inhonorofthepeople.org) and *We Move and We Stay* exhibit

ADDITIONAL EXPLORATIONS

In addition to *We Move and We Stay*, you can visit other exhibits at the Science Museum to learn more.

RACE: Are We So Different? (Level 4)

Addressing Sterotypes

The Vanishing Race

Edward S. Curtis' photographs of Native Americans posed in outdoor settings, in the midst of traditional activity, perpetuated the romantic stereotype of the "noble savage." Historical literary and artistic depictions of "the Vanishing American/Indian" provided justification for the conquest of North America by settlement, since progress would eventually render this way of life and activities extinct anyway.

Mississippi River Gallery (Level 5)

Place Names and Seasonal Round Activities

Wild Rice

An exhibit piece about wild rice and the ricing process also describes threats to this traditional resource, and spotlights efforts at the Leech Lake Reservation to monitor and manage factors that impact wild rice growth. The installation includes a ricing boat and pole, a photo sequence of rice processing, and maps of rice lake areas.

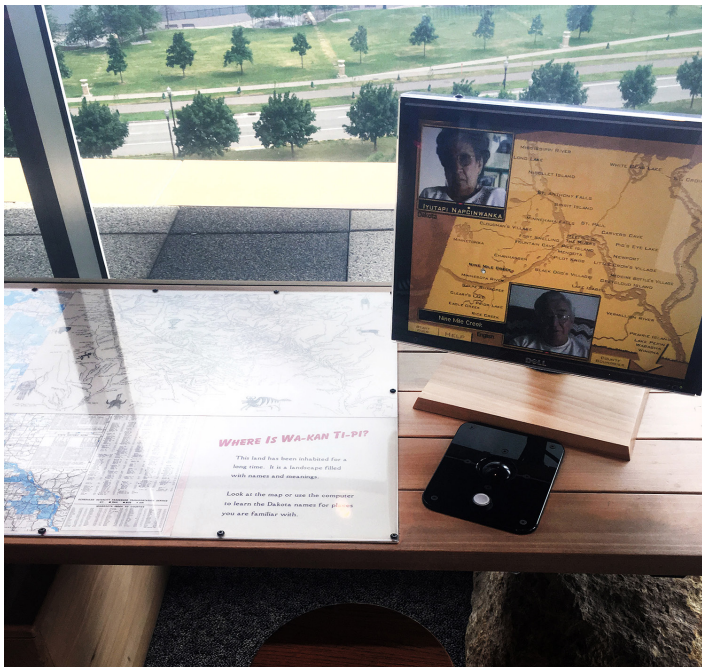
Where is Wakan-Tipi?

Use this map and computer station to hear Dakota-specific names of places close to the Mississippi River. The entrance to Wakan-Tipi, also known as Carver's Cave, is in St. Paul and provides an example of the principle of symmetry in Dakota culture/cosmology (see the Educator Resources section for an article about Wakan-Tipi).

Sportsology (Level 3)

Indigenous Sports and Games

This interactive exhibit includes components highlighting traditional Native American games and sports that are still practiced today, such as lacrosse, archery, ring and pin games, spear-throwing, and tchungkee.



CONNECTING WITH THE CLASSROOM

This section includes pre- and post-visit suggestions that can enhance your students' experiences during the field trip.

- Review student pages for connections to your curriculum. Related standards are on page 28.
- Introduce field trip and expectations for field trip activities.

Before Your Visit

Introduce Native American life in Minnesota if you have not done so already. For specific information on each federally recognized tribe, go to the websites listed under Minnesota Indian Tribes (page 16).

Use one or more resources from the Educator Resources section (page 16) to introduce the lifeways and/or contemporary experiences of Dakota and Ojibwe people.

Read one or more of the STEM Spotlight Interviews with or to your students (page 19). These accounts are all from people who work in STEM-related careers to support Native American traditions in contemporary life. Many of these professionals are of Native American ancestry.

The activities below are organized into four subject areas:

- Challenging stereotypes about Native Americans
- Engineering and innovation
- Resource availability and the seasonal round
- Star stories and indigenous cosmology

ENGINEERING AND INNOVATION

Engineering is the use of science, math, and creativity to solve a problem. People all over the world and throughout time have used materials from nature to design technology to solve problems.

Grades K–2

Describe objects by their properties and also whether they are natural or human-made. These are important concepts in science and engineering.

- Ask students to look around the room and decide which things are human-made and which are natural. Make a class list.
- Play "I Spy."
    - Students can play in pairs or as a whole class. A student picks an object, then uses one word to describe a property of the object to the other student(s). "I spy something *soft, brown, bumpy, etc*." Describing only one property at a time, how long does it take the other student(s) to identify the object? When the object is guessed, the other student takes a turn.

See At the Museum K–2 for field trip student activities.

Grades 3–5; Grades 6–8

Read excerpt from *Indian Boyhood* (excerpt in Appendix on page 26; full PDF available through link in the Resources section on page 18), then ask students:

"Write a paragraph about you, fiction or non-fiction, about a time when you were outside and used things from nature to complete a task or solve a problem. This could be a time when you were camping, hiking, fishing, playing with friends, or doing other activities."

See At the Museum 3–5 and At the Museum 6–8 for field trip student activities.

Grades 9–12

Read the STEM Spotlight Interviews with Pat Kruse, Nikki Jourdain, and Gabe Miller about natural resources (page 18). Watch a YouTube video of Pat Kruse describing the importance of birch bark as a resource: youtube.com/watch?v=sKtXiOkhNsY

Discuss: Each of the interviewees describes one or more natural resources important to his or her community. What new insights do you gain from the experience of these people, regarding the resource they describe, the role of the resource within the natural environment of their community, or the implications of changes in the environment that may threaten that resource?

See At the Museum 9–12 for *field trip student activities*.

RESOURCES AND THE CYCLE OF SEASONS

The cycle of seasons refers to the way that seasonal availability of natural resources—and the work of gathering and processing them—structures daily life and guides annual routines and activities, including family relationships, housing types, movement and migration, and many other aspects of Ojibwe and Dakota life. Seasonal activities change not because of a calendar date, but because people who follow the cycle of seasons are responsive to weather and environmental changes. Ojibwe and Dakota people traditionally took only what they needed to support their lifeways. In western scientific understanding, ecology deals with the concept of sustainability, or meeting the "needs of the present without compromising the ability of future generations to meet their own needs...." (Brundtland Commission Report: en.wikipedia.org/wiki/Brundtland_Commission).

Grades K–2; Grades 3–5

Read stories about seasonal food availability at different times of the year. One suggestion is *The Birchbark House* by Louise Erdrich (also see Children's Literature, page 17). List and compare activities performed, food available, clothing worn, and environmental differences at two different times of year.

Define terms and show pictures of foods that may be referenced in the exhibit. Terms include: wild rice, winnowing, bison, maple syrup, sustainability.

Learn more about the gathering and processing activities, tools, and recipes for manoomin (wild rice). *Ricing with Tommy Sky*, from the Great Lakes Indian Fish & Wildlife Commission (see Educator Resources, pg. 16), includes reproducible activities such as a word search and coloring pages: glifwc.org/publications/pdf/Ricing_Supplement.pdf

Learn more about the gathering and processing activities, tools, and recipes for ziinzibaakwadwaboo (maple sap). This link to *Iskigamizigan (Sugarbush): A Sequel to Growing Up Ojibwe* includes kid-specific reproducible activities: glifwc.org/publications/pdf/Iskigamizigan_Supplement.pdf

See At the Museum K–2 and At the Museum 3–5 for field trip student activities.

Grades 6–8, Grades 9–12

Define terms and show pictures of foods that may be referenced in the exhibit. Terms include: wild rice, winnowing, bison, maple syrup, sustainability.

Research and learn about major food sources available to the Ojibwe and Dakota people and the methods and practices around gathering and using these foods.

Bison

Students can read the STEM Spotlight interview with Gabe Miller from the Prairie Island Indian Community (page 19) and learn about bison from these websites: prairieisland.org/community/buffalo/

Wild Rice

Students can view online video concerning wild rice cultivation practices and tools among the White Earth Reservation.
About wild rice: realwildrice.com/history

See At the Museum 6–8 and At the Museum 9–12 for field trip student activities.

STAR STORIES AND INDIGENOUS COSMOLOGY

Ojibwe and Dakota people understand the stars and sky as a mirror of the Earth. In this worldview, the sky is the origin of people and the locations of stars are very important reminders about people, places, and things on the Earth. This symmetrical view of the world is represented in Ojibwe and Dakota star stories and in the design of tipis, quilts, and many other important objects. For more background knowledge on Native cosmology, see page 17 in the Resources section.

Grades K–2

Using a mirror, talk about reflection and symmetry (things being equal along an axis). Connect this to the Ojibwe and Dakota understanding of the stars and sky as a mirror of the Earth. Stars are very important reminders about people, places, and things on the Earth.

Connect the importance of the star shape to its use on the quilt and artwork students will see at the museum. Tell the story of the Red Morning/Day Star (found in the Educator Resources section on page 17 under "Dakota and Ojibwe Cosmology"). For more information on the importance of quilts and star shapes in Ojibwe and Dakota cultures, see "Native American Quilt-making Educational Resources" in the Educator Resources section on page 17.

See At the Museum K–2 for field trip student activities.

To help understand the ideas of mirroring and symmetry, students can make star-shaped origami: origami-fun.com/origami-modular-star.html.

Grades 3–5; Grades 6–8

Discuss the Ojibwe and Dakota people's understanding of the stars and sky as a mirror of the Earth. Show examples of this symmetrical view of the world as represented in Ojibwe and Dakota star stories and in the design of tipis, quilts, and many other important objects.

Connect the importance of the star shape to its use on the quilt and artwork students will see at the museum. Tell the story of the Red Morning/Day Star (found in the Educator Resources section on page 17 under "Dakota and Ojibwe Cosmology"). For more information on the importance of quilts and star shapes in Ojibwe and Dakota cultures, see "Native American Quilt-making Educational Resources" in the Educator Resources section on page 17.

Read the interview with Jim Rock (page 25) about the importance of Dakota and Ojibwe cosmology and its overlap with the study of astronomy.

See At the Museum 3–5 and At the Museum 6–8 for field trip student activities.

After Your Visit

Review activities you did at the Science Museum.

ENGINEERING AND INNOVATION

Grades K–2

Materials matching activity

For each item on the page, discuss: What was it made from? How do people use each item? Here are some ideas (*list these words on the board*): Eat / Wear / Hold things / Travel / Dig. Many of these things could also be given as gifts. Which one would you like to give someone?

Grades 3–5

In a think-pair-share, have students review the engineering design process and the notes they made on the *At the Museum* page.
Discuss: *Is a similar tool made or used today? How is it similar to or different from the tool you imagined and planned at the museum?*

Grades 6–8

In a think-pair-share, have students review the engineering design process and the notes they made on the *At the Museum* page.
Discuss: *Is a similar tool made or used today? How is it similar to or different from the tool you imagined and planned at the museum?*

Discuss the concept of sustainability and how human groups exist in a sustainable or non-sustainable relationship with the natural world. Discuss material use as it impacts sustainability and ecosystems. In a think-pair-share, have students list how the new tool is better or worse in terms of sustainability.

Discuss the objects made from birch bark the students found in the exhibits. Read parts of the STEM Spotlight Interviews with Pat Kruse (page 24) and Paul Dressen (page 20), or have students read them.

Think-Pair-Share:

Read this quote from Pat Kruse:

Birch bark has so many uses: storage, boat, cup, houses, medicine. It doesn't rot. Birch bark is a miracle thing, amazing, sacred.

- Why did the people who created objects from bison bones or birch bark use those materials?
- What happens if there are no more bison or if all the birch trees are gone?
- What are some ways that humans might support the success of bison herds or birch tree growth?

Wild ricing, 1930s

Wild ricing, 2012

RESOURCES AND THE CYCLE OF SEASONS

Grades K–2

Discuss the foods and tools students suggested using at this time of year. Are these foods available at other times of the year? Ask students about special foods they only eat at certain times of year. Why are these foods not eaten at other times of the year?

Grades 3–5; Grades 6–8

Start a discussion with students about what they saw in the exhibit. Note the title: *We Move and We Stay*; ask students what tools they found that would help traveling to places for new sources of food or for carrying food sources. Why is moving so important to peoples who follow a Cycle of Seasons?

Grades 6–8; Grades 9–12

Discuss the concept of sustainability and how human groups exist in a sustainable or non-sustainable relationship with the natural world. Discuss natural resources and the role of human behavior as it impacts sustainability and ecosystems.

Ask students to read the STEM Spotlight Interviews with Nikki Jourdain (page 23) or Shane Bowe (page 21) and/or research the work being done by the Red Lake Department of Natural Resources: redlakednr.org/fisheries.

What do these sources say about the use of natural resources at the Red Lake Nation? Which resources seem to be under pressure from changing climate conditions? Review the chart of objects you found. Which ones could be in danger? What kinds of adaptations would you suggest (e.g. using different materials, changing traditional practices, etc.)? Discuss the pros and cons of your suggestions.

Extension Activity:

2016 was the wettest year on record in Minnesota. How do you predict this might have changed the environment around Red Lake? What do you think happened to the wild rice growth/harvest?

Introduce students to a contemporary indigenous entrepreneur and chef named Sean Sherman, "The Sioux Chef," who has a has a restaurant called Owamni on the Mississippi River in Minneapolis (https://owamni.com) and prepares gourmet food using seasonally available indigenous foods. See these videos/resources to find out more about Sean Sherman:

NPR article | npr.org/sections/thesalt/2014/10/07/354053768/the-sioux-chef-is-putting-pre-colonization-food-back-on-the-menu

***Saveur* (A cooking magazine) article** | saveur.com/sean-sherman-sioux-chef

STAR STORIES AND INDIGENOUS COSMOLOGY

Grades K–2; Grades 3–5

Show images of Ojibwe constellations and their corresponding "pictures" as you tell the stories of these Ojibwe constellations. See page 17 in Educator Resources for an excellent electronic resource called *Native Sky Watchers*. Ask students to color in the images. Show how Western scientific constellations are mapped in relation to the Ojibwe ones.

Grades 3–5; Grades 6–8

1) Create a paper quilt. Ask students to take out the student page with their design of an object or symbol they thought was important in the exhibit. Pass out a "Quilt Square" or a piece of paper cut 4" by 4". Ask students to fold the square into 4 (quadrants), and reproduce their symbol on one of the quadrants. Then have them repeat the design exactly across the other quadrants.

2) Once students have a basic quilt square, they can reproduce these squares, color them, and join them with other students' squares to make a class record of the trip to the exhibit.

3) Research, discussion or writing topics:

- the importance of the quilt as a gift bestowing honor on the receiver
- how the D(L)akota idea of *kapemeni*—what is above is also below—explains the idea of symmetry.

4) Constellation/planetary observation: students can make observations of the night sky and look for constellations or for Venus, the Red Day/Morning Star. Some resources for assisting the classroom teacher on seasonal stellar observations can be found at: nightsky.jpl.nasa.gov/planner.cfm.

EDUCATOR RESOURCES

Websites:

Minnesota Indian Tribes
In Minnesota, there are seven Anishinaabe (Chippewa, Ojibwe) reservations and four Dakota (Sioux) communities. These are federally recognized Indian Tribes and have independent nation status. The following is a link to Native community websites, which contain a wealth of resources:
mn.gov/portal/government/tribal/mn-indian-tribes

The American Indian Science and Engineering Society (AISES)
AISES is a national, nonprofit organization focused on increasing representation of American Indians, Alaska Natives, Native Hawaiians, Pacific Islanders, First Nations and other indigenous peoples of North America in science, technology, engineering and math (STEM) studies and careers.

Winds of Change magazine (available to view online) highlights young people in STEM careers, and opportunities for career development. aises.org

Red Lake DNR
This educator guide includes interviews with Red Lake DNR staff members, Shane Bowe and Nikki Jourdain, from the Water Resources Division, on page 21. redlakednr.org

Prairie Island Indian Community
This educator guide includes interviews with Gabe Miller and Paul Dressen, staff at PIIC, on page 19. prairieisland.org/community

Pat Kruse, Birchbark Artist
Pat Kruse harvesting birch bark:
youtube.com/watch?v=67I_YrR0A5I

Joyce Lovelace, "Sacred Harvest", *American Craft Council Magazine*, Oct/Nov, 2016. Retrieved 12/19/16.
craftcouncil.org/magazine/article/sacred-harvest

This educator guide includes a STEM Spotlight interview with Pat Kruse (page 24), creator of birch bark art in the exhibition.

Bdote Memory Map
Sisseton-Wahpeton Dakota Oyate media artist Mona Smith created the Bdote Memory Map and the *Cloudy Waters: Dakota Reflections on the River* media installation in *We Move and We Stay*. The Bdote Memory Map includes overviews of the Dakota history of the confluence of Minnesota and Mississippi Rivers, with numerous links, videos, and resources that reinforce connections to the land, particularly the river.
bdotememorymap.org | vimeo.com/106965889

Great Lakes Indian Fish and Wildlife Commission (GLIFWC)
To introduce students (K–8) to the lives of contemporary Ojibwe kids, download booklets from GLIFWC. Formed in 1984, GLIFWC represents eleven Ojibwe tribes in Minnesota, Wisconsin, and Michigan. There are three booklets about ricing, water, and *Growing Up Ojibwe*. glifwc.org/publications

Ojibwe Lifeways
Ojibwe Lifeways introduces the hunting and gathering traditions of the Anishinaabe (Ojibwe or Chippewa) people of Minnesota. There is also a teacher's guide for this source:
http://files.dnr.state.mn.us/mcvmagazine/young_naturalists/young-naturalists-studyguides/ojibwe_studyguide.pdf

Treuer, Anton. "Ojibwe Lifeways", *Minnesota Conservation Volunteer*: Sept-Oct., 2012. Minnesota Department of Natural Resources. Accessed online 5/5/2017.
http://files.dnr.state.mn.us/mcvmagazine/young_naturalists/young-naturalists-article/ojibwe/ojibwe.pdf

In Honor of the People
This website, jointly created by the Minnesota Historical Society and the Science Museum of Minnesota, provides in-depth information about the people and objects connected to the Whipple Collection. inhonorofthepeople.org

Leech Lake Field Guide and Journal
The Leech Lake Band of Ojibwe Division of Resource Management Environmental Lands Department offers a downloadable resource booklet (69 pages) that contains descriptions and photos of numerous plants and animals found in the area, along with space to document observations. llojibwe.org/drm/fieldguide.html

Minnesota Center for Social Studies Education
A vetted resource with the Dakota and Ojibwe benchmarks in the 2011 K–12 Academic Standards in Social Studies. Some of the resources also relate to STEM topics.
mncsse.org/curriculum/dakota-ojibwe-resources

Oyate
Oyate, The People (Dakota), is a Native American/American Indian advocacy and education organization that

- provides critical evaluation of books and curricula with Indian themes, including children's literature;
- advocates for Native Americans/American Indians to be portrayed with historical accuracy, cultural appropriateness and without anti-Indian bias and stereotypes;
- conducts workshops and a summer institute; and
- administers a small resource center and reference library.

oyate.org

Ojibwe People's Dictionary/Photo Gallery
The Ojibwe People's Dictionary is a University of Minnesota-supported resource for Ojibwe language learning that includes an extensive photo gallery, stories and interviews with Native speakers, and support for language acquisition. ojibwe.lib.umn.edu

The Ways
Produced by Wisconsin Public Television, *The Ways* is an ongoing series of stories from Native communities around the central Great Lakes. This online educational resource for students in grades 6–12 features videos, interactive maps, and digital media exploring contemporary Native culture and language. theways.org/about

There are three videos from this website in the exhibition:
- Spearfishing | theways.org/story/spearfishing
- Deer hunting | theways.org/story/hunting-deer
- Tall Paul performance | theways.org/story/prayers-in-a-song

American Indians in Children's Literature (AICL)
AICL provides critical perspectives and analysis of indigenous peoples in children's and young adult books, school curricula, popular culture, and society. americanindiansinchildrensliterature.blogspot.com

National Museum of the American Indian (NMAI)
NMAI offers lesson plans, web links, and a series of online videos about wild rice cultivation practices, tools used, the social importance of rice, and present-day issues including pollution and water quality monitoring among the Leech Lake Band of Ojibwe.

Native American Quilt-making Educational Resources
Three different websites offer information about Native quilting traditions:

- From the National Museum of the American Indian: *To Honor and Comfort: Native Quilting Traditions* nmai.si.edu/sites/1/files/pdf/education/quilts.pdf
- An online exhibition of Native quilts from Michigan State University: museum.msu.edu/museum/tes/thc/exhibit%201.htm
- Instructions to create a paper quilt: illuminations.nctm.org/unit.aspx?id=6528

Dakota and Ojibwe Cosmology

- An interview with Jim Rock, who explains the interdisciplinary and holistic aspects of Dakota star knowledge. Phillips Indian Educators website: pieducators.com/wisdom/jim_rock#pedagogy
- An article by Jim Rock and Roxanne Gould explaining the concept of kapemeni and the significance of a Dakota sacred site Wakan Tipi and Indian Mounds Park in St. Paul: journals.sagepub.com/doi/abs/10.20507/AlterNative.2016.12.3.2
- A Dakota sacred site -- Wakan-Tipi (Carver's Cave) in St. Paul.

Dakota Access Pipeline
Resources for teaching about the Dakota Access Pipeline: kylewhyte.cal.msu.edu/nodapl

Birchbark Books
Located in south Minneapolis, Birchbark Books is a resource for Native books, Native arts, jewelry, and community events. Their mission "*...is to help schools stock their libraries with informative, sensitive, honest and appropriate books on Native American subjects. History, fiction, memoir, language, poetry, children's and young adult's books—we have them and would love to share.*" birchbarkbooks.com

Waasa Inaabidaa—We Look In All Directions
This is a 6-part documentary series on Ojibwe-Anishinaabe history and lifeways: ojibwe.org/home

Norrgard, Larraine, prod. Waasa-inaabidaa (*We Look In All Directions*). PBS. WDSE-TV, Duluth, Minnesota, 4 Apr. 2002.

Books:

Braiding Sweetgrass

A Potowatami professor of botany, Kimmerer tells her story of integrating traditional knowledge and ways of thinking with her academic and professional career as a plant ecologist and environmental educator. Dr. Kimmerer's webpage at SUNY-Syracuse: esf.edu/faculty/kimmerer/

Kimmerer, Robin Wall. *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge, and the Teachings of Plants*. Minneapolis, MN: Milkweed Editions, 2013.

D(L)akota Star Map Constellation Guide

Native researchers, educators and cosmologists detail and depict D(L)akota star knowledge and its relevant connections to other facets of D(L)akota lifeways, in conversation with Western scientific understandings of astronomy.

Lee, Annette, Jim Rock and Charlene O'Rourke *D(L)akota Star Map Constellation Guide: An Introduction to D(L)akota Star Knowledge. North Rocks,* CA: Lightning Source-Ingram Spark Publishers. 2014.

Indian Boyhood

Ohíyesa (Charles A. Eastman), co-founder of the Boy Scouts of America, shares an autobiographical account of his traditional Dakota boyhood in the late 1800s.

Eastman, Charles. *Indian Boyhood*. New York: McClure, Phillips, 1902. Indian Boyhood, by [OHIYESA] Charles Eastman - Full Text Free Book. Project Gutenberg, 5 July 2008. Web. 12 Apr. 2017.

Free EBook:
gutenberg.org/files/337/337-h/337-h.htm

Ininatig's Gift of Sugar: Traditional Native Sugarmaking

In this book—part of the We Are Still Here series—an Anishinaabe (Ojibwe) man demonstrates for young people the art and science of maple sugar processing.

Wittstock, Laura Waterman., and Dale Kakkak. *Ininatig's Gift of Sugar: Traditional Native Sugarmaking*. Minneapolis: Lerner Publications, 1993.

Powwow

The author photographed Montana's Crow Fair, the largest powwow held in the United States, and documented the variety of dances, traditions, and family and tribe relationships.

Ancona, George. *Powwow*. San Diego: Harcourt Brace Jovanovich, 1993.

Niimiwin: Everyone Dance

A look at the Powwow celebration with children from the Fond du Lac Band of Lake Superior Chippewa including preparation, the Grand Entry, the dancing, the feast, and an invitation to Native and non-Native alike to "see you at the next year's Powwow."

Savage, Leah, Nikki Willgohs, and Jill Pertler. *Niimiwin: Everyone Dance*. Minneapolis: IGI, 2009.

From Fond Du Lac MN Head Start:
fdlrez.com/headstart/boardbooks.htm

STEM SPOTLIGHT INTERVIEWS

Gabe Miller

Environmental Specialist / Program Manager, Land and Environment Department, Prairie Island Indian Community

At Prairie Island Indian Community, as many as 120 buffalo (aka American bison) graze in large fields. Along with conventional hay (non-native plants such as alfalfa or cool season grasses), the Prairie Island herd also eats hay (dried prairie grasses) from 285 acres of reservation prairie. Miller, who has a master's degree in wildlife ecology and conservation, manages the prairies and assures the native food sources for the buffalo. The day-to-day care and management of the herd are the responsibility of the Buffalo Project manager and his staff. Miller also oversees environmental issues for the Tribe including (but not limited to) water quality, run-off pollution, and invasive species on the reservation, and represents the Tribe regarding environmental information to external agencies and organizations.

Miller is German/Dutch, not Native American. The Tribe often hires outside the community because too few community members have the necessary education or experience in specialized fields. In Miller's department, only one of the six staff members is of Native descent.

What are the main responsibilities of your job?
Miller wears many hats for the tribe. Funding for his position comes from the Environmental Protection Agency (EPA) and other federal grants. Miller oversees his department, builds the environmental program, and guides environmental policy, compliance, and representation. In addition to duties described by grants, Miller also works under the direction of the Tribal Council to oversee land management of natural/wild areas as well as native habitat restoration areas. Miller represents the Tribe to other state, federal and NGO environmental agencies/offices. The Tribe's natural resources—wildlife, habitat management, invasive plant/wildlife management, and culturally important natural resources such as wild rice and other native foods and medicines (both within natural areas and in the gardening program)—are within his jurisdiction. Sometimes Miller also oversees archaeological resource preservation and representation within the region.

What are your responsibilities regarding the buffalo herd at Prairie Island?
Miller is very active in management of native hay resources and is working on a program to expand pasturelands.

Describe some interesting and challenging elements in your work with the bison.
"Early on," Miller says, "there was a general assumption that the bison could be managed much like beef cattle. After some experience and challenges, we learned that bison have unique needs. Compared to cattle, bison need less protein and more acreage per animal. Understanding those needs is key to keeping the herd healthy and growing." The Tribe continues to make improvements in its infrastructure and management for the betterment of the herd.

How did you get interested in the field of wildlife ecology?
Miller always enjoyed working/playing outdoors. When he entered a natural resource program at Central Lakes College (after starting a major in biology), Miller realized how much he enjoyed learning about plants and animals. He found a need for, but a general societal apathy toward, stewardship of natural resources. He continued his career with a wildlife focus, but his biggest pride is now the land management work that he does. "It provides so many benefits—not only to the land, but to the wildlife and the people who depend on basic natural resources (clean water, air). It benefits the human race's long term health, well-being, and even our survival as a species."

Paul Dressen

Director of Education, Prairie Island Indian Community

Dressen works with all enrolled members of the Prairie Island Indian Community, whether or not they live on the reservation, and with all types of educational programs—tutoring programs at the local and Red Wing school districts, liaisons working with schools, one-on-one student programs, and a local parent committee.

Working with the bison herd

Dressen prefers to use the Dakota word *ṭaṭaŋka* when talking about the animals in the herd. Most people call them buffalo, but bison, or Plains bison, is the more appropriate name. Dressen leads programming for groups who are interested in learning more about the bison—he drives groups into the herd area, and discusses bison biology, the uses of bison, and more. He finds the Intertribal Bison Council's "Buffalo Box" a great resource because it shows materials made from the bison (sinew or bladder, for example) and their traditional uses.

How do tribal members interact with or use the herd?

Native people have had connections with bison for millennia. There were 30 million bison before European contact, and only 1085 left around 1900. The US government's intentional extermination of the bison disrupted the close and deep historical connections between Native people and the animals. Today, the Inter-tribal Bison Council works to reestablish Native herds and connections. With renewed recognition of the relationships between *ṭaṭaŋka* and Dakota people, growth ot the bison population has been steady and valued. There are over 400,000 bison today!

Funding is provided by the Edwin Buck Memorial Bison Project to support the herd, which has now grown to about 100 animals.

The Prairie Island Community harvests several bison each year. Enrolled tribal members get an allotment of meat each month from a community meat locker. The Tribal Council considers other requests from enrolled members, too. For example, hides are used for drums or can be tanned, and skulls have spiritual uses.

How did you get into your area of work?

Dressen grew up on a farm in the area, and has a degree in biology. He has worked at PIIC for 27 years.

Shane Bowe

Water Resources Program Director, Red Lake DNR

What are the challenges facing natural resources in Red Lake?

With more than 800,000 acres to cover, Bowe says, "it's extremely challenging to thoroughly manage and protect everything with the small number of staff in the Water Resources Program. Seeking additional funding often takes us down roads that are tangential to our mission. The projects may even be great but they often take time away from our core mission of monitoring and protecting the Band's water resources. Development, both current and future, presents us with some clear natural resource-related concerns."

Specifically, the most buildable areas happen to be in the areas with sensitive lakes and red pine forests. Urban sprawl is increasing off the Reservation, and Bowe expects the same in the Red Lake Nation.

Describe your "favorite" project to promote/enhance sustainability of natural resources in Red Lake.

A photovoltaic solar system installed at the Boys and Girls Club may become Bowe's favorite. Electricity produced will be monitored in real time and show the actual offset in their electric bill. This can promote not only alternative energy but a simple awareness of electrical use.

A joint project with the Science Museum of Minnesota and the Red Lake DNR

Along with scientists from the Science Museum, Bowe is involved with the International Multiagency Arrangement related to water quality on Lake of the Woods. An area of Lake of the Woods is very similar to Red Lake: it's large, windswept, shallow, and high in nutrients. This project, which began in early spring of 2016, could be useful in figuring out what the "natural" nutrient regime was like at Red Lake prior to European settlement. Did it have blue/green algae? What were the sources of phosphorus and nitrogen? What was the phosphorus in the water column like? Paleolimnological analyses helps answer some of these questions. smm.org/scwrs/fieldnotes/red-lakes-research-could-reveal-connections-between-climate-nutrients-and-water

How are area youth involved in the Red Lake DNR's activities?

The Red Lake DNR staff provides

- presentations for elementary schools about how and why the DNR staff catch aquatic invertebrates and what the creatures indicate about water quality;
- an annual water festival for 5th graders;
- presentations, some field work, and equipment support for a program called River Watch at the high school (river.watch); and
- an internship program for college students.

What got you interested in natural resources work?

Bowe was always interested in biology. An internship with an amazing mentor at the MN DNR let him see career options that allowed him to work outside and make the world a better place. Bowe says, "What more could you want out of a job?"

What kind of educational background did you need or would you recommend to others who do your kind of work?

In general, natural resources positions are becoming more and more competitive. A lot of positions require a bachelor's degree, but aren't really going to be available to a potential candidate without a master's degree. "Along with the degree, I highly recommend working as an intern early and often throughout college and working hard on soft skills" [i.e. interpersonal skills and attitudes that support knowledge and technical skills in the workplace].

How does your work relate to cultural heritage of the community?
Bowe and his colleagues at the Red Lake DNR use science-based methods to protect species important to Band members' traditional practices. The Fisheries program monitors fish populations, especially walleye, and manages them sustainably. The Red Lake DNR is developing a climate change monitoring strategy for the entire Midwest (EPA Region 5) that will incorporate Traditional Ecological Knowledge (TEK) and phenology in order to assess and protect things like maple trees and berries. They also assess wild rice densities in areas traditionally used by Band members and have cooperatively used science-based arguments to push back against attacks on the wild rice water quality standard.

The Red Lake DNR has a website and a newsletter. Staff attend many public events as well as hold public meetings whenever a project's impact might concern the public. They try to have meetings in each and every community on the Reservation since not everyone can travel easily. redlakednr.org

Jerilyn (Nikki) Jourdain

Non-point Source Water Pollution Specialist / Climate Change Coordinator, Red Lake Department of Natural Resources (DNR)

"Traditionally," Jourdain says, "our culture has relied on personal observation and passed-down knowledge of things like medicinal plants, agricultural techniques, and hunting and fishing cycles. We can reclaim our position as 'natural scientists' only if we make it important again in our own society—and I'm going to be a part of that in some way!" rlnc.education/student-success-stories

What is your climate change project about?
The project began by working through a curriculum about climate diversity and model forest planning, reviewing data collected over 25 years by the Red Lake DNR about water resources, forestry, and other natural resources on the reservation. It continues by by reaching out to other tribal programs and other departments within the Red Lake DNR, to inform them about the project and collect further data.

What is an example of something you found in your research?
The Red Lake population of whitefish, which has cultural importance, crashed about three years ago. The water was too warm for the coldwater fish, and the population may never rebound to previous levels. Jourdain would also like to ask for stories from community people who have seen changes (farming, fishing, berries, medicines).

What changes would you anticipate for Red Lake Nation, in light of climate change?
Jourdain anticipates that shifting seasons (for example, early ice out, earlier spring signs) might affect people's livelihood, with higher temperatures, changes in types of species in the forests, and heavier but less frequent precipitation events (rainfall or snow). For example, heavy rain during ricing season can ruin the whole crop. She also notes that traditional Ojibwe month names no longer reflect the actual experience. Sugar Moon—the sugarbush time, which used to be around April 23—no longer happens in April. The sap run and gathering is now much earlier. Strawberry Moon was mid-June, but now strawberry time is earlier. November was called Ice or Freezing Over Month, but now they have open water in November.

What got you interested in natural resources work? What kind of educational background did you need or would you recommend to others who do your kind of work?
See Jourdain's story in her own words at rlnc.education/student-success-stories.

An enrolled member of the Red Lake Nation, Jourdain would like more Native people involved in STEM. She's a willing mentor to younger community members. Another goal is to encourage and support more people to speak up about important environmental matters at Red Lake.

Pat Kruse

Birchbarker artist, Red Cliff Band of Superior Chippewa & descendant of Mille Lacs Band of Ojibwe

How long have you been working with birch bark?
Kruse learned how to work with birch bark through cultural classes in school, and has worked off and on since he was a kid, both at Leech Lake and Mille Lacs.

How would you describe birch bark?
Kruse describes birch bark in numerous ways. "It's like super-thick paper. It's waterproof. It can be cut. It comes in many colors and all colors are important. "In the spring, it's like a 'skin,' and in fall, hardened."

Birch bark can be many colors. Summer bark is yellow on the inside. Second growth grows back after white bark is peeled, kind of thick to use. Kruse can split the bark and that makes different colors.

Kruse feels strongly that since he is taking the skin off the tree, it is important to pray before he takes any bark. He feels it is right to thank the natural world for human survival and to ask for forgiveness.

Birch bark has so many uses: storage containers, boats, cups, houses, medicine. It doesn't rot. "Birch bark is a miracle thing, amazing, sacred."

Birch bark is a beautiful material but gathering it can be dangerous and requires a lot of physical work. Once it's peeled, the bark needs to dry for 30 days. Kruse says, "You need to fail a million times to better understand how to do it."

Kruse and his son Gage use sinew for sewing birch bark pieces together because it's stronger and longer lasting than traditional tree roots and basswood inner bark (*wigub*).

Where do you look for inspiration? How do you balance tradition and innovation?
Some people see innovations as "non-authentic," but Kruse feels that he walks in the footprints of the people before him and then adds his own style and signature. He's worked closely with his son since Gage was a little boy, and feels very lucky that he can pass these skills and love of the work on to the next generation. But Gage does really great work, and Kruse also learns from him when they work together.

Several years ago, Kruse had a residency at the Minnesota Historical Society to study collections of birch bark work. He saw intricate designs and techniques that contemporary artists were rarely using. He strives to produce quality pieces based on old and new techniques. He's learning an old technique called "scrape work," in which the top layer of bark is scraped off to produce designs.

***We Move and We Stay* at the Science Museum features two very large art pieces by you. Please say more about them.**
The two pieces, *My Brother's Blanket* #10 and *All Races Bouquet* #5, are some of the largest ever made. Each piece has more than 1,000 pieces of birch bark in a variety of colors. Symmetry is very important in these pieces. The designs were laid out using cedar pins and fish bones. A tribute to Pat Kruse's mom and grandma, who made lots of different kinds of blankets, *My Brother's Blanket* #10 is based on star quilt designs. To finish it, the father-and-son duo needed 40–50 diamonds of the same color, and they almost ran out of birch bark!

Pat Kruse harvesting birch bark | youtube.com/watch?v=67l_YrR0A5I

Joyce Lovelace, "Sacred Harvest", *American Craft Council Magazine*, Oct/Nov, 2016. Retrieved 12/19/16 craftcouncil.org/magazine/article/sacred-harvest

Pat Kruse: 2015 Fellowship, Native Arts and Cultures Foundation | nativeartsandcultures.org/pat-kruse

Jim Rock

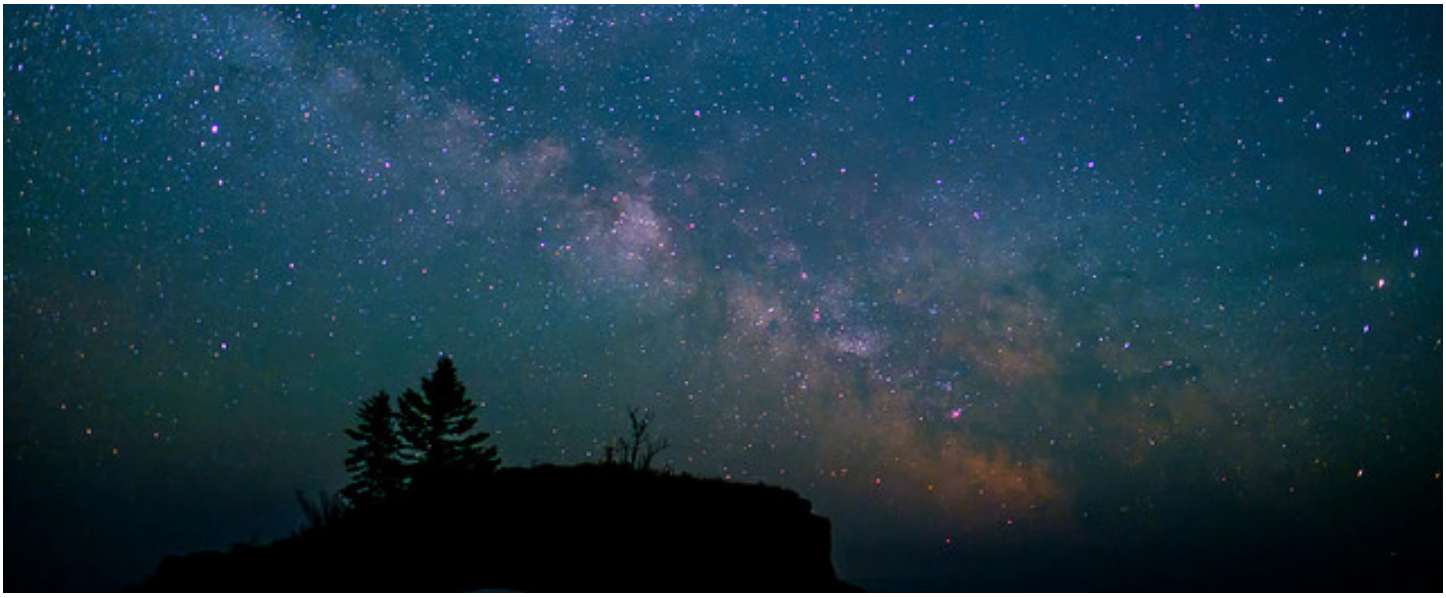
Dakota scholar and Program Director, Marshall W. Alworth Planetarium at the University of Minnesota-Duluth

Please tell us about your study of Dakota star knowledge/ethnoastronomy?

When asked to describe Dakota cosmology, Rock says "[Our] cosmology is a mirror of the natural world in the sky. . . .there is symmetry and geometry reflected in these ideas." Rock explains how the Dakota constellations are an important part of everyday life and of following the seasonal round: "Where we are on earth is reflected in star stories. The stories were told annually. . . . the plant constellations and animal constellation [helped us to] move through the seasons." Rock also explains how star stories have spiritual importance: "We come from the stars and we return to the stars; we come from the earth and return to earth. We know we must be the best relative(s) we can be to each other between Father Sky and Earth Mother. And not just as two-leggeds being good relatives to other two-leggeds, but with ALL our relatives, the four-leggeds, wingeds, rooted, crawling, swimming, etc. . . . all are our relatives." Rock talks about how this understanding of the relationship of the earth to sky/spirit world is represented in many aspects of culture, such as tipi design. The movement of stars reveals numeric patterns that guide behavior; thus, star stories are both "artistic and functional," as Rock says: "They teach us how to live in times of change."

In a recent interview (pieducators.com/wisdom/jim_rock#pedagogy, accessed 5/10/17), Rock further describes an indigenous view of math and science as "interdisciplinary. It doesn't mean that 'everything is thrown together in some random way.' That's unfortunately the outside perception. But we're not afraid to see patterns of patterns. We're not afraid to see the metapatterns and the patterns of connections. Being an astronomer, that's how we see those stars, constellational patterns. So I call that [interdisciplinary view] a 'constellation of thoughts.' There's a weaving, so it's interdisciplinary, like the music piece or the storytelling piece may have multiple purposes, objectives and multiple seeds that are planted in our soul that grow and bear fruit over time. There's the mathematics that's in the music and the ethics and values so it's interdisciplinary. . . . this is natural numeracy [learning to read nature in its own languages and number patterns]."

For more information about Jim Rock's work, please see references in the Educator Resources section under Dakota/Ojibwe Cosmology.

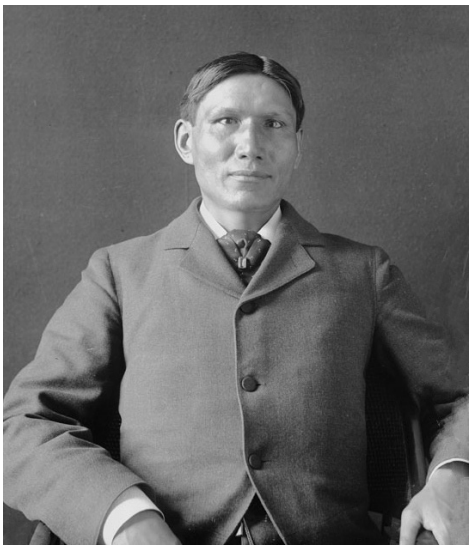


Courtesy Jason Carpenter / Flickr / CC BY-NC-ND 2.0

APPENDIX

Dakota Author Spotlight: Ohíyesa (Charles Eastman)

Born in Minnesota in 1858, Charles Eastman was a Dakota doctor, writer, and activist. His mother died shortly after his birth, and he was raised by his grandmother, Dowanhotawin ("Her Singing Voice is Heard"), who was baptized with the name Ellen Eastman. As a child, he learned about herbal medicine from his grandmother. He graduated from Dartmouth College in 1887 and earned a medical degree from Boston University in 1889. He used both European and Native American healing practices to benefit his patients, and was the only physician to tend to the Lakota at Wounded Knee. He co-founded the Boy Scouts of America, helped found 32 reservation chapters of the YMCA, and wrote many books about Native American history, culture, and contemporary issues.



Courtesy Wikimedia Commons / Public domain

Excerpt from *Indian Boyhood*
(Complete text available online at: gutenberg.org/files/337/337-h/337-h.htm)

We were not only good mimics but we were close students of nature. We studied the habits of animals just as you study your books. We watched the men of our people and represented them in our play; then learned to emulate them in our lives. In the interior of the forest there were lakes with many islands, where moose, elk, deer and bears were abundant. The water-fowl were wont to gather here in great numbers. . . . The forest also was filled with a great variety of birds. To me, as a boy, this wilderness was a paradise. It was a land of plenty. To be sure, we did not have any of the luxuries of civilization, but we had every convenience and opportunity and luxury of Nature. We had also the gift of enjoying our good fortune, whatever dangers might lurk about us; and the truth is that we lived in blessed ignorance of any life that was better than our own.

SUMMER
When our people lived in Minnesota, a good part of their natural subsistence was furnished by the wild rice, which grew abundantly in all of that region. . . . The wild rice harvesters came in groups of fifteen to twenty families to a lake, depending upon the size of the harvest. Some of the Indians hunted buffalo upon the prairie at this season, but there were more who preferred to go to the lakes to gather wild rice, fish, gather berries and hunt the deer. There was an abundance of water-fowls among the grain; and really no season of the year was happier than this.

August is the harvest month. There were many preliminary feasts of fish, ducks and venison, and offerings in honor of the "Water Chief," so that there might not be any drowning accident during the harvest. The preparation consisted of a series of feasts and offerings for many days, while women and men were making birch canoes, for nearly every member of the family must be provided with one for this occasion. The blueberry and huckleberry-picking also preceded the rice-gathering. . . .

On the appointed day all the canoes were carried to the shore and placed upon the water with prayer and propitiatory offerings. Each family ... entered the lake, assigning two persons to each canoe. One manipulated the paddle, while the foremost one gently drew the heads of [the rice stalks] toward him and gave it a few strokes with a light rod. This caused the rice to fall into the bottom of the craft. The field was traversed in this manner back and forth until finished. The real work was when they prepared the rice for use. First of all, it must be made perfectly dry. They would spread it upon buffalo robes and mats, and sometimes upon layers of coarse swamp grass, and dry it in the sun.

When all the rice is gathered and dried, the hulling begins. The rice is heated over a fire-place. A young man, having washed his feet and put on a new pair of moccasins, treads upon it until all is hulled. The women then pour it upon a robe and begin to shake it so that the chaff will be separated by the wind. . . . [We] let nothing go to waste, and labored incessantly during the summer and fall to lay up provision for the [winter]. Berries of all kinds were industriously gathered, and dried in the sun. Even the wild cherries were pounded up, stones and all, made into small cakes and dried for use in soups and for mixing with the pounded jerked meat and fat to form a much-prized Indian delicacy.

FALL

As soon as hunting in the woods began, the customs regulating it were established. . . . A hunting bonfire was kindled every morning at day-break, at which each brave must appear and report. The man who failed to do this before the party set out on the day's hunt was harassed by ridicule. As a rule, the hunters started before sunrise, and the brave who was announced throughout the camp as the first one to return with a deer on his back, was a man to be envied. . . .

WINTER

When I was about twelve years old we wintered upon the Mouse river, west of Turtle mountain. It was one of the coldest winters I ever knew, and was so regarded by the old men of the tribe. . . . There was a great snow-fall, and the cold was intense. The snow was too deep for hunting, and the main body of the buffalo had crossed the Missouri [River], where it was too far to go after them. But there were some smaller herds of the animals scattered about in our vicinity, therefore there was still fresh meat to be had, but it was not secured without a great deal of difficulty. . . . The men had their bows and arrows, and a few had guns. The huge animals could not run fast in the deep snow. . . . The hunters brought many of them down.

SPRING

With the first March thaw the thoughts of the Indian women of my childhood days turned promptly to the annual sugarmaking. This industry was chiefly followed by the old men and women and the children. The rest of the tribe went out upon the spring fur-hunt at this season, leaving us at home to make the sugar.

The first and most important of the necessary utensils were the huge iron and brass kettles for boiling. Everything else could be made, but these must be bought, begged or borrowed. Little. . . . basswood and birchen basins were made to receive the sweet drops as they trickled from the tree. As soon as these labors were accomplished, we all proceeded to the bark sugar house, which stood in the midst of a fine grove of maples on the bank of the Minnesota river. It is usual to make sugar from maples, but several other trees were also tapped by the Indians. From the birch and ash was made a dark-colored sugar, with a somewhat bitter taste, which was used for medicinal purposes.

A long fire was now made in the sugar house, and a row of brass kettles suspended over the blaze. The sap was collected by the women in tin or birchen buckets and poured into. . . . the kettles. Each boy claimed one kettle for his especial charge. It was his duty to see that the fire was kept up under it, to watch lest it boil over, and finally, when the sap became sirup, to test it upon the snow, dipping it out with a wooden paddle. . . . My grandmother set herself in earnest to store up sugar for future use. Being a prudent woman, she did not give it to us after the first month or so, except upon special occasions, and it was thus made to last almost the year around. The sugaring season extended well into April, and the returning birds made the precincts of our camp joyful with their songs.

MINNESOTA ACADEMIC STANDARDS

The Science Museum of Minnesota provides a field trip destination that allows teachers and students to reinforce Minnesota Academic Standards. Use of the materials in this guide in combination with a field trip to *We Move and We Stay* will help you link learning experiences to the following content standards.

SCIENCE
Grades K–2
The Nature of Science and Engineering
Kindergarten
Nature Of Science And Engineering
0.1.1.2.1 Use observations to develop an accurate description of a natural phenomenon and compare one's observations and descriptions with those of others.
0.1.2.1.1 Sort objects in to two groups: those that are found in nature and those that are human made.

Grade 1
1.1.1.1.1 When asked "How do You Know?", students support their answer with observations.
1.1.1.1.2 Recognize that describing things as accurately as possible is important in science because it enables people to compare their observations with those of others.
1.1.3.2.1 Recognize that tools are used by people, including scientists and engineers, to gather information and solve problems.

Grade 2
2.1.2.2.1 Identify a need or problem and construct an object that helps to meet the need or solve the problem.
2.1.2.2.2 Describe why some materials are better than others for making a particular object and how materials that are better in some ways may be worse in other ways.

Physical Science
Kindergarten
0.2.1.1.1 Sort objects in terms of color, size, shape, and texture, and communicate reasoning for the sorting system.

Grade 2
2.2.1.1.1 Describe objects in terms of color, size, shape, weight, texture, flexibility, strength and the types of materials in the object.

Grades 3–5
Nature of Science and Engineering
Grade 3
3.1.1.2.3 Maintain a record of observations, procedures and explanations, being careful to distinguish between actual observations and ideas about what was observed
3.1.3.2.1 Understand that everybody can use evidence to learn about the natural world, identify patterns in nature, and develop tools.
3.1.3.2.2 Recognize that the practice of science and/or engineering involves many different kinds of work and engages men and women of all ages and backgrounds.

Grade 4
4.1.2.1.1 Describe the positive and negative impacts that the designed world has on the natural world as more and more engineered products and services are created and used.
4.1.2.2.1 Identify and investigate a design solution and describe how it was used to solve an everyday problem.
4.1.2.2.2 Generate ideas and possible constraints for solving a problem through engineering design.

Grade 5
5.1.1.2.1 Generate a scientific question and plan an appropriate scientific investigation, such as systematic observations, field studies, open-ended exploration or controlled experiments to answer the question.
5.1.3.2.1 Describe how science and engineering influence and are influenced by local traditions and beliefs.

Life Science
Grade 5
5.4.1.1.1 Describe how plant and animal structures and their functions provide an advantage for survival in a given natural system.
5.4.2.1.2 Explain what would happen to a system such as a wetland, prairie or garden if one of its parts were changed.
5.4.4.1.1 Give examples of beneficial and harmful human interaction with natural systems.

Grades 6–8
Nature of Science and Engineering
6.1.2.1.4 Describe the trade-offs in using manufactured products in terms of features, performance, durability and cost.
6.1.2.2.1 Apply and document an engineering design process that includes identifying criteria and constraints, making representations, testing and evaluation, and refining the design as needed to construct a product or system to solve a problem.
6.1.3.1.1 Describe a system in terms of its subsystems and parts, as well as its inputs, processes and outputs.
7.1.1.2.1 Generate and refine a variety of scientific questions and match them with appropriate methods of investigation, such as field studies, controlled experiments, review of existing work, and development of models.
7.1.1.2.4 Evaluate explanations proposed by others by examining and comparing evidence, identifying faulty reasoning, and suggesting alternative explanations.
8.1.1.2.1 Use logical reasoning and imagination to develop descriptions, explanations, predictions and models based on evidence.

8.1.3.2.1 Describe examples of important contributions to the advancement of science, engineering and technology made by individuals representing different groups and cultures at different times in history.
8.1.3.3.2 Understand that scientific knowledge is always changing as new technologies and information enhance observations and analysis of data.
8.1.3.3.3 Provide examples of how advances in technology have impacted how people live, work and interact.

Life Science
7.4.4.1.2 Describe ways that human activities can change the populations and communities in an ecosystem.

Earth Science
8.3.4.1.2 Recognize that land and water use practices affect natural processes and that natural processes interfere and interact with human systems.

High School
Nature of Science and Engineering
9.1.1.1.2 Understand that scientists conduct investigations for a variety of reasons, including: to discover new aspects of the natural world, to explain observed phenomena, to test the conclusions of prior investigations, or to test the predictions of current theories.
9.1.1.1.6 Describe how changes in scientific knowledge generally occur in incremental steps that include and build on earlier knowledge.
9.1.2.1.1 Understand that engineering designs and products are often continually checked and critiqued for alternatives, risks, costs and benefits, so that subsequent designs are refined and improved.
9.1.2.2.1 Identify a problem and the associated constraints on possible design solutions.
9.1.3.2.1 Provide examples of how diverse cultures, including natives from all of the Americas, have contributed scientific and mathematical ideas and technological inventions.
9.1.3.2.2 Analyze possible careers in science and engineering in terms of education requirements, working practices and rewards.

Life Science
9.4.4.1.2 Describe the social, economic and ecological risks and benefits of changing a natural ecosystem as a result of human activity.
9.4.4.1.3 Describe contributions from diverse cultures, including Minnesota American Indian tribes and communities, to the understanding of interactions among humans and living systems.

SOCIAL STUDIES

Grades K–2
History
Kindergarten
0.4.2.4.1 Compare and contrast traditions in a family with those of other families, including those from diverse backgrounds.

Economics
Grade 2
2.2.4.5.1 Classify materials that come from nature as natural resources (or raw materials); tools, equipment

Grades 3–5
Economics
Grade 3
3.2.4.5.1 Explain that producing any good or service requires resources; describe the resources needed to produce a specific good or service; explain why it is not possible to produce an unlimited amount of a good or service.

History
3.4.1.2.1 Examine historical records, maps and artifacts to answer basic questions about times and events in history, both ancient and more recent.

Geography
Grade 4:
4.3.4.9.1 Explain how humans adapt to and/or modify the physical environment and how they are in turn affected by these adaptations and modifications.

High School
Economics
9.2.3.4.1 Explain how the availability of productive resources and technology limits the production of goods and services.

Geography
9.3.4.9.1 Analyze the interconnectedness of the environment and human activities (including the use of technology), and the impact of one upon the other.

ENGLISH AND LANGUAGE ARTS

Kindergarten
0.1.1.1 With prompting and support, ask and answer questions about key details in a text.
0.6.8.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
0.8.1.1 Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups:
0.8.4.4 Describe familiar people, places, things, and events and, with prompting and support, provide additional detail.
0.10.6.6 Use words and phrases acquired through conversations, reading and being read to, and responding to texts.

Grade 1:
1.6.8.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
1.8.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups:
1.8.4.4 Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly.

Grade 2:
2.1.7.7 Use information gained from the illustrations and words in a print or digital text to demonstrate understanding of its characters, setting, or plot.
2.8.4.4 Tell a story or recount an experience with appropriate facts and relevant, descriptive details, avoid plagiarism by identifying sources, and speak audibly in coherent sentences.

Grade 3:
3.1.6.6 Distinguish their own point of view from that of the narrator or those of the characters.
3.6.3.3 Write narratives and other creative texts to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences:
3.6.8.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.
3.8.1.1 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
3.8.7.7 Locate and use information in print, non-print, and digital resources, and identify reasons for choosing information used.

Grade 4:
4.6.3.3 Write narratives and other creative texts to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences:
4.6.8.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.
4.8.1.1Engage 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:
4.8.3.3 Identify the reasons and evidence a speaker provides to support particular points.
4.8.7.7 Locate and use information in print, non-print, and digital resources, and identify reasons for choosing information used.

Grade 5:
5.6.3.3 Write narratives and other creative texts to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences:
5.6.8.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.
5.8.1.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly:
5.8.7.7 Locate and use information in print, non-print, and digital resources, and identify reasons for choosing information used.

Grades 6–8
6.7.1.1; 7.7.1.1; 8.7.1.1 Write arguments to support claims with clear reasons and relevant evidence.
6.7.3.3; 7.7.3.3; 8.7.3.3 Write narratives and other creative texts to develop real or imagined experiences or events using effective technique, relevant descriptive details, and well-structured event sequences
6.9.1.1;7.9.1.1;8.9.1.1 Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

Grades 9–12
9.9.1.1; 11.9.1.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on [grade appropriate] topics, texts, and issues, including those by and about Minnesota American Indians, building on others' ideas and expressing their own clearly and persuasively:
9.9.2.2;11.9.2.2 Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

At the Museum
We Move and We Stay
Grades K–2

STEM Spotlight

"This wilderness was a paradise. It was a land of plenty."

—Ohíyesa (Charles Eastman)

Born in 1858, Ohíyesa (Charles Eastman) was a Dakota doctor, writer, Native American activist, and co-founder of the Boy Scouts of America.

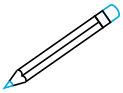
Courtesy Wikimedia Commons / Public domain

Bring your students to the Cycle of Seasons cases in *We Move and We Stay*.

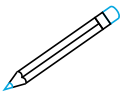
what season is it now? (Circle the word)

Fall Winter Spring Summer

At the Museum
We Move and We Stay
Grades K–2



What does it look like outside?
Draw some things you see during this season.



Draw a picture of food you could gather and tools and clothes you would use during this season.

Engineering and Innovation

STEM Spotlight

"Birch bark has many uses: storage, boat, cup, houses, medicine...."

—Pat Kruse, birchbark artist

Photo courtesy Bockley Gallery / All rights reserved

Look at the big canoe near the ceiling.

look at the pieces of birch bark under the canoe

This kind of canoe is used to travel on rivers and lakes.

Circle the words that describe birch bark.

soft strong hard brown white floppy squishy

waterproof natural flexible sturdy green bumpy

Draw a box around words that describe a good canoe.

Some words will have both a circle and a box.

At the Museum
We Move and We Stay
Grades K–2

STEM Spotlight

Tatanka (bison or buffalo) hides can be used for many things, like drum heads or clothing."

—Paul Dressen, Director of Education at Prairie Island Indian Community

? People can use objects from nature to solve problems or make things they need.

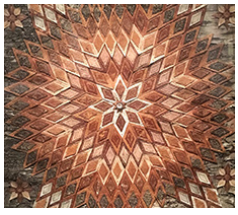
What things made from nature can you find? Draw a line from an object you found in the exhibit to the plant or animal that was used to make the object.


Ian Blacker/ flickr


Squirrel Cottage/ flickr


Steve Mays / flickr


Kabsik Par / flickrk



At the Museum
We Move and We Stay
Grades K–2

STEM Spotlight

The star is a "representation of the Anishinaabe star spirit. . . . When every person was born [they] were not forgotten by God or the Great Spirit. . . . The Spirit thought of [them] to be born. . . . We believe we're from the stars, from the heavens."

—Pat Kruse, birchbark artist

How many stars can you find in the exhibit? _____
Draw the stars you see.

At the Museum
We Move and We Stay
Grades 3–5

Engineering and Innovation

STEM Spotlight

"Birch bark has many uses: storage, boat, cup, houses, medicine...."

—Pat Kruse, birchbark artist

Photo courtesy Bockley Gallery / All rights reserved

Artists, scientists, and engineers all look at materials to understand more about how to use them in their work.

Find objects made from birch bark in *We Move and We Stay*.

- ☐ canoe
- ☐ *My Brother's Blanket #10*
- ☐ winnowing basket
- ☐ birch bark basket

Something else made from birch bark you found: _____

Write its Dakota or Ojibwe name: _____

How are all these birch bark objects similar?

_____

_____

What is one difference you noticed?

_____

At the Museum
We Move and We Stay
Grades 3-5

STEM Spotlight

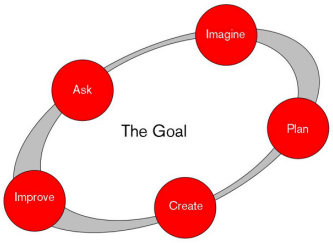
"At Prairie Island, there are 95–120 head of buffalo (aka American bison). They live in large fields on reservation land. In addition to conventional hay, the Prairie Island herd is also fed dried grasses from 285 acres of reservation prairie."

—Gabe Miller, Environmental Specialist/Program Manager, Land and Environment Department, Prairie Island Indian Community

"Our clothing, our tipis, everything we needed for life came from the buffalo's body. It was hard to say where the animals ended and the human began."

—John (Fire) Lame Deer, 1972

For thousands of years, Native people have used the resources of ṭaṭ aŋka (the word for "bison" in the Dakota language) to solve problems.



EiE Engineering is Elementary
Developed by the Museum of Science, Boston

Think about how you would use these resources.
Do some engineering at the museum by following the steps of the Engineering Design Process.

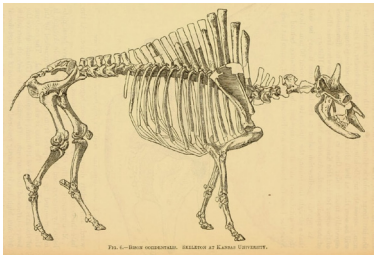
?

Ask:
Look at the bison skeleton. What tools could you make with any of the bones?

At the Museum
We Move and We Stay
Grades 3–5

Imagine:

Choose one bone. Circle it on the illustration.
What tools could you make with this one bone?



Bison occidentalis
Ehaŋna ŢaṬaŋka (Dakota)
Gete-mashkode-bizhiki (Ojibwe)

Plan:

Work with a partner or two from your class. Plan **one** tool together.
Draw how you would change or modify this bone to do the job.

Create:

Find a tool in this exhibit that has the same use as yours or looks like yours. Describe it here. Who made it? What was it used for?

Improve:

Look around and find other materials you could use to make your tool even better!

At the Museum
We Move and We Stay
Grades 3–5

STEM Spotlight

The star is a "representation of the Anishinaabe star spirit. . . . When every person was born [they] were not forgotten by God or the Great Spirit. . . . The Spirit thought of [them] to be born. . . . We believe we're from the stars, from the heavens."
—Pat Kruse, birchbark artist

Find at least three stars on objects in the exhibit. What objects are they on?

Object name on sign: _____

Name in Dakota and Ojibwe: _____

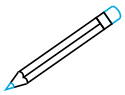
Draw a picture of what it looks like.

Why do you think the star design is on this object? What does it tell you about Dakota or Ojibwe culture?

At the Museum
We Move and We Stay
Grades 3–5

Object name on sign: _____

Name in Dakota and Ojibwe: _____



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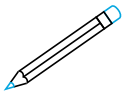

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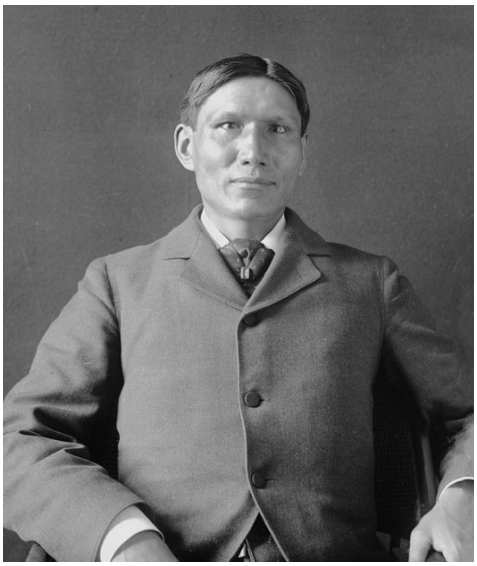
At the Museum
We Move and We Stay
Grades 3–5

STEM Spotlight

"This wilderness was a paradise. It was a land of plenty."

—Ohíyesa (Charles Eastman)

Born in 1858, Ohíyesa (Charles Eastman) was a Dakota doctor, writer, Native American activist, and co-founder of the Boy Scouts of America.



Courtesy Wikimedia Commons / Public domain

What season is it?

Use the exhibit to identify the kinds of activities you would be involved with during this season. Think about what tools, clothing, and food sources you would use. Your choices would depend on what is happening in your environment.

Look at the Cycle of Seasons cases in the exhibit.

What season is it?

_____

What is the weather like during this season?

_____

_____

During this season, some foods are available to gather from nature, and some are not. What foods might be available during this season if you had to hunt or gather them yourself?

_____

_____

At the Museum
We Move and We Stay
Grades 3–5

What tools would you need to get this food or survive outdoors in this season?

There are many in *We Move and We Stay*. Find one or more. Write its name in English and in one of the languages (Dakota or Ojibwe) also on the sign.

Tool	Dakota/Ojibwe name	Why do you think this tool is important?

Draw a picture of the season and how some of these tools might be used.

At the Museum
We Move and We Stay
Grades 6–8

STEM Spotlight

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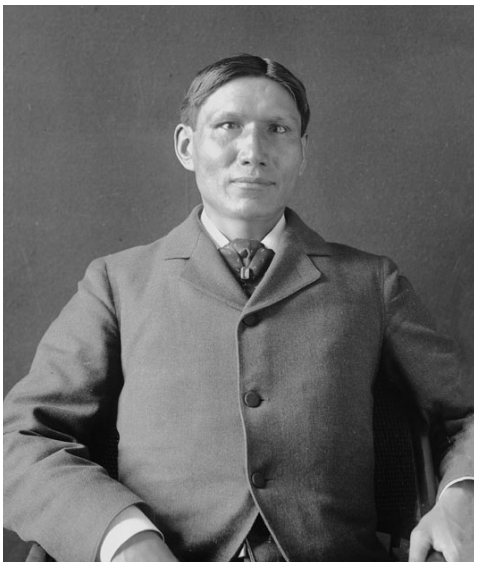

Courtesy Wikimedia Commons / Public domain

What season is it?

Use the exhibit to identify the kinds of activities you would be involved with during this season. What tools, clothing, and food sources would you use? What is happening in the environment, and how does that influence choices?

Look at the Cycle of Seasons cases in the exhibit.
What season is it?

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At the Museum
We Move and We Stay
Grades 6–8

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At the Museum
We Move and We Stay
Grades 6–8

STEM Spotlight

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—Pat Kruse, birchbark artist

Find at least three stars on objects in the exhibit. What objects are they on?

Object name on sign: _____

Name in Dakota and Ojibwe: _____

Draw a picture of what it looks like.

Why do you think the star design is on this object? What does it tell you about Dakota or Ojibwe culture?

At the Museum
We Move and We Stay
Grades 6–8

Object name on sign: _____

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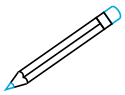

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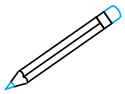

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At the Museum
We Move and We Stay
Grades 6–8

STEM Spotlight

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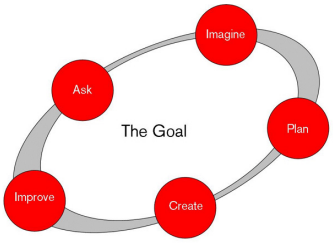
For thousands of years, Native people have used the resources of ṭ aṭ aŋka (the word for "bison" in the Dakota language) to solve problems.



EiE Engineering is Elementary
Developed by the Museum of Science, Boston

Think about how you would use these resources.
Do some engineering at the museum by following the steps of the Engineering Design Process.

Ask:
Look at the bison skeleton. What tools could you make with any of the bones?

At the Museum
We Move and We Stay
Grades 6–8

Imagine:

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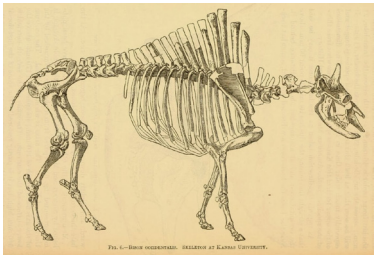

Bison occidentalis
Ehaŋna ṪaṪaŋka (Dakota)
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Plan:

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Create:

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Improve:

Look around and find other materials you could use to make your tool even better!

At the Museum
We Move and We Stay
Grades 6–8

STEM Spotlight

"Traditionally, our culture has relied on personal observation and passed-down knowledge of things like medicinal plants, agricultural techniques, and hunting and fishing cycles."

—Nikki Jourdain, Environmental Specialist, Red Lake DNR

Minnesota's Native Americans traditionally made use of many natural resources. Find objects that show connections to these resources.

Resource	Object with connections to this resource
maple tree	
	winnowing basket
deer	
porcupine	
	fish decoy
berries	

At the Museum
We Move and We Stay
Grades 6–8

STEM Spotlight

"Native people have had connections with bison for millennia. There were 30 million bison before European contact, but only 1085 left around 1900. This planned elimination by US government policy disrupted the close and deep historical connections between people and animals."

—Paul Dressen, Director of Education, Prairie Island Indian Community

In some cases, natural resources are not available any longer.
This could be because of natural or human-caused changes to the resource's environment.

?

If you could no longer use a natural resource to design a tool or other object for your use, what other material(s) could you use instead?

In the exhibit, find an object made with materials from bison or birch.

_____

Why do you think bison or birch was a good choice for this object?

_____

What material would you use instead if you couldn't get any more of this natural resource?

_____

_____

At the Museum
We Move and We Stay
High School

STEM Spotlight

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—Nikki Jourdain, Environmental Specialist, Red Lake DNR

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Resource	Object with connections to this resource
maple tree	
	winnowing basket
deer	
porcupine	
	fish decoy
berries	

At the Museum
We Move and We Stay
High School

During the 1800s, there were many drastic changes for Native people in Minnesota. Traditional materials and resources were often no longer available. **Watch the *Broken Promises* video interactive.**

What reasons does *Broken Promises* give for Dakota people's lack of access to traditional materials and resources?

_____

_____

Engineering is a way of addressing human needs by applying science concepts and mathematical techniques to develop new products, tools, processes, and systems. Part of the engineering process is understanding materials and revising the design of objects based on the materials available.

Choose one of the natural resources from the list in the chart on the previous page. If access to this material is no longer available to you, consider how you would redesign an object important to you or your community.

Find an object made with this material:

_____

Why would this material be an appropriate choice for this object?

_____

What other material(s) could be used instead? What are the trade-offs (risks, costs, benefits) for replacing the traditional natural resource?

_____

_____

_____

At the Museum
We Move and We Stay
High School

STEM Spotlight

"This wilderness was a paradise. It was a land of plenty."
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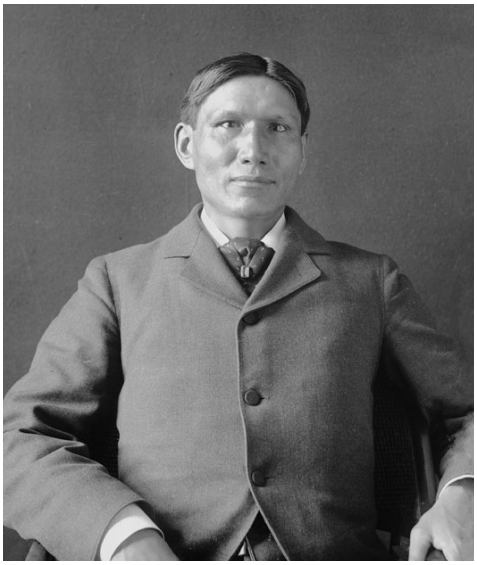

Courtesy Wikimedia Commons / Public domain

Look at the Cycle of Seasons cases in the exhibit.
What season is it?

Use the exhibit to identify the kinds of activities you would be involved with during this season. What tools, clothing, and food sources would you use? What is happening in the environment, and how does that influence choices?

During this season, some foods are available to gather from nature, and some are not. What foods might be available during this season if you had to hunt or gather them yourself?

At the Museum
We Move and We Stay
High School

?

Challenge Question:

Pick a natural resource important to the Dakota and/or Ojibwe. Predict what might happen to the availability of this resource if the environment around this resource changed. For example, what would happen to wild rice capacity if the lake were polluted, or if there were a drought? Describe a possible change for the resource you chose, and the potential effects of that change on the Dakota and/or Ojibwe people.