

FUN-ology! Seasons Make the World Go ‘Round: A Three Lesson Unit – 3-5 Earth and Space Science

Lesson Three: Connecting seasonal rounds to seasonal weather patterns and the organisms we observe

This is the final lesson of a three-lesson unit and students will synthesize western scientific knowledge and tribal seasonal round information. The students will create a list of organisms they observe and identify the stages in their life cycles. Finally, students will share information regarding unique life cycles of organisms via their personal seasonal rounds.

In this three-lesson unit students will analyze and interpret data using western models of data tables and traditional seasonal rounds of Montana’s Indian tribes. Students will synthesize their experiences from previous lessons to build their own seasonal round using a combination of the models they have studied. Students will explore life cycles and how biotic (living) and abiotic (non-living) factors influence each other throughout the unit using multiple ways of knowing.

The first lesson introduced students to the Salish moons and the seasonal delights each moon brings with it. The students explored air temperature data and analyzed it for trends (e.g. does it seem to get warmer or colder throughout the month?) and created a line graph of their data.

The second lesson explored seasonal rounds from the Salish, Shoshone Bannock, and Nez Perce tribal perspectives. The students applied average temperature data to the seasonal rounds to help them understand how the rounds work and how western science and traditional knowledge both help people to understand more about the world around them.

Phenological (or “fun-ological”) data has been collected by human beings for millennia. Phenology is the study of cyclic and seasonal natural phenomena, especially in relation to climate and plant and animal life. To survive, subsist, and thrive in a harsh environment such as Montana, tribes had to observe, track, interpret, analyze, predict, and transfer phenological knowledge. This knowledge was shared from generation to generation and helped families know where the best winter, spring, summer, and fall campsites were as well as what plants and animals that could be found during each season; plants and animals that would provide food, shelter, clothing, and tools.

When one observes the landscape, weather, seasons, animal behaviors, plant availability, water availability, and uses this information to maximize their natural resources, this is called a seasonal round. Seasonal rounds can be movement within a landscape for subsistence or a round can also be based upon events that help us acknowledge those seasonal changes that happen yearly, such as birthdays or annual hunting trips or summer family camping trips to a special place. More than just annual events, seasonal rounds include those indicators such as trees getting their leaves again after winter, leaves turning orange and yellow and brown in the fall, and the longer, warmer, sunnier days of summer. Seasonal rounds remind us we are passengers on a sphere that has an annual journey around our star, the sun. This journey around our star, the tilt of the Earth on its axis, and the Earth’s daily rotation create the seasons no matter where we live on Earth. Where we live, north of the equator, south of the equator, east of a major mountain range, or west of an ocean determines our weather and climate.



This lesson is a special collaborative endeavor between the Montana Office of Public Instruction Indian Education for All Unit and the Montana Natural History Center and is made possible through Indian Education for All grant funding.

Montana State Science Standards

3-ESS2-Earth's Systems

Systems		
<p>Students who demonstrate understanding can:</p> <p>Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. [Clarification Statement: Examples of data at this grade level could include average temperature, precipitation, and wind direction.] [Assessment Boundary: Assessment of graphical displays is limited to pictographs and bar graphs. Assessment does not include climate change.]</p>		
<p>The performance expectations above were developed using the following elements from the NRC document <i>A Framework for K–12 Science Education</i>:</p>		
<p style="text-align: center;">Science and Engineering Practices</p> <p>Analyzing and Interpreting Data</p> <p>Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.</p> <ul style="list-style-type: none"> Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships. 	<p style="text-align: center;">Disciplinary Core Ideas</p> <p>ESS2.D: Weather and Climate</p> <ul style="list-style-type: none"> Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. 	<p style="text-align: center;">Crosscutting Concepts</p> <p>Cause and Effect</p> <ul style="list-style-type: none"> Cause and effect relationships are routinely identified and used to explain change.
<p>San Diego County Office of Education Science Resource Center Educator tools to support the implementation of NGSS</p> <p><i>Articulation of DCIs across grade-bands: K.ESS2.D; 4.ESS2.A; 5.ESS2.A; MS.ESS2.C; MS.ESS2.D</i></p>		
<p><i>Montana State Standards Connections:</i></p> <p>Mathematics</p> <p>3.MP.2 Reason abstractly and quantitatively.</p> <p>3.MP.4 Model with mathematics.</p> <p>3.MP.5 Use appropriate tools strategically.</p> <p>3.MD.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.</p> <p>3.MD.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in bar graphs.</p>		

IEFA Essential Understandings

Essential Understanding 1: Tribal Diversity

There is great diversity among the twelve sovereign tribes of Montana in their languages, cultures, histories, and governments. Each tribe has a distinct and unique cultural heritage that contributes to modern Montana.

Key Concepts of Essential Understanding 1

- The twelve sovereign tribes, located in what is now the state of Montana, are distinct from one another in their history, culture, and language.

- Tribal sovereignty is the inherent right of tribes to independent self-governance.
- Tribal governments are fully functioning governments that provide an array of services similar to those of federal, state, and local governments.
- The political, demographic, and cultural landscape of Montana has rapidly changed in the last two hundred years.
- American Indian individuals and tribes are still here with distinct and intact governments, languages, and cultures that contribute to modern Montana.

Essential Understanding 3: Oral Histories as Valid as Written Histories

The ideologies of Native traditional beliefs and spirituality persist into modern day life as tribal cultures, traditions, and languages are still practiced by many American Indian people and are incorporated into how tribes govern and manage their affairs.

Additionally, each tribe has its own oral histories, which are as valid as written histories. These histories predate the “discovery” of North America.

Key Concepts of Essential Understanding 3

- The term spirituality within a cultural context can be limiting and misconstrued. Spirituality to Indigenous peoples generally refers to one aspect of their worldview in which all things are connected. Spirituality in this context does not necessarily equate to nor denote religion.
- A complex history of pre-Columbian tribal migrations and intertribal interactions, European colonization and Christianization efforts, and federal assimilation policies have contributed to the broad range of spiritual beliefs held by American Indians today.
- Despite this history, Native people have retained their spiritual beliefs and traditions – tribal languages are still spoken, sacred songs are still sung, and rituals and ceremonies are still performed.
- It is not important for educators to understand all the complexities of modern day American Indian cultures; however, they should be aware of their existence and the fact they can influence much of the thinking and practice of American Indians today.
- Humor plays an important role in American Indian cultures, there was no “stoic” Indian.
- Tribal oral traditions, ideologies, worldviews, and the principles and values associated with them, are as valid as other such traditions from around the world and should be accorded the same respect and standing.
- Educators should be aware that portions of these principles and values are private and are to be used and understood by certain individuals, groups, or the entire tribe. Tribal culture bearers, experts, and others can assist educators in navigating these situations.

Learning Objectives

Students will:

- utilize seasonal weather data using tables and graphical displays;
- add scientifically obtained average monthly temperatures (abiotic factors) to their own seasonal round;
- identify and add important organisms (biotic factors) that are relevant to their personal seasonal rounds.

Background Information

[The Salish Seasonal Round by Julie Cajune](#)

[Salish, Pend d'Oreille, Blackfeet, and Kootenai background knowledge building on seasons](#) from Glacier National Park's [Workhouse](#) Curriculum

[The Story of the Bitterroot](#) video (Part 1 of 7)

[Blackfeet Seasonal Round](#)

[Blackfeet Seasonal Round Teacher Toolkit](#)

[Nez Perce Seasonal Round](#)

[Shoshone Bannock Seasonal Round or "Great Circle"](#)

[NGSS-aligned lesson: Differences between Climate and Weather](#) and [NSTA review of lesson](#)

[Make your own phenology wheel from Montana Natural History Center](#)

Materials

- *Huckleberries, Buttercups, and Celebrations*, by Jennifer K. Greene
(*this book has been purchased and sent to all public Montana elementary school libraries by the Office of Public Instruction Indian Education for All Unit)
- Seasonal round examples from Lesson Two and example of personal seasonal round provided at the end of this lesson
- Student personal seasonal round started in Lesson Two
- Various Tribal Month Names document provided with this lesson

Procedure

Teacher tip – Excellent culturally responsive instruction would include weaving the following into the class discussion:

- *Tribal knowledge of all plants, animals, weather patterns, ways the climate has changed over time, geologic features, etc. on both aboriginal territories and treaty lands has existed for thousands of years and has been shared throughout the generations. This knowledge continues to grow and be shared among tribal members and contributes to the way tribes manage natural resources on their lands.*
- *Tribal worldviews (epistemologies) include a belief that all things are connected and related. Therefore, every tree, every bird, every insect, every human is part of an interconnected web. If one is to respect oneself, one must respect all other beings. The values of respect, reciprocity, redistribution, and responsibility guide how knowledge of the natural world is gained, used, and shared.*
- *Both Western science and traditional knowledges are valid ways of knowing and understanding the world around us. They were both developed by vastly different cultures for different purposes. Traditional ecological knowledge evolved to support subsistence and survival. Western science was developed to measure and prove ideas about how the universe works. Both help us make sense of the many mysteries about life, the planet we live on, and our place in the universe.*
- *Seasonal rounds vary with each tribe and are dependent on where they live and the climate of that location.*

Class Discussion

Begin with a think-pair-share of what students recall from Lessons One and Two:

- What weather data were you able to interpret from the data tables?
- What weather data were you able to interpret from the graphical displays you created?
- What weather data were you able to interpret from the seasonal rounds?

Introduce students to the attached document with the many names of the months given by tribes. Ask students what they notice and wonder about this chart and encourage students to revisit the seasonal round examples to help put together a larger picture of each tribe's unique connection to their place.

Small Group Work

Ask students to break into small groups to discuss what they can infer about the different organisms depicted in the seasonal rounds. Ask them what they notice and why those observations would be placed in that part of the seasonal round (e.g., "Why do birds lay eggs in the spring?"). Do they see any evidence of phenology? Give students plenty of time to make and share their observations here.

Ask students to describe the organisms they observed in the seasonal rounds. When applicable, ask them to describe how their organisms' life cycles are depicted in the seasonal round. Allow this conversation to drift toward the understanding that seasonal rounds describe that organisms have unique and diverse life cycles, but all have in common birth, growth, reproduction, and death.

Ask students how the seasons impact their own lives. Are there any cycles they come back to year after year? Have students take a few moments to write down any organisms they can think of that impact their lives year after year, and the part of the organisms' life cycle they interact with. Do they gather huckleberries, medicinal plants, make jam, hunt, collect eggs, or otherwise interact with the life cycles of other organisms? Ask them to write the month they do these activities next to the organism they list. This list will form the outline for the personal seasonal rounds they will create later in this lesson.

Remind students about the book *Huckleberries, Buttercups, and Celebrations* by Jennifer K. Greene that was read in Lesson One. Oral tradition and the transfer of knowledge and stories is integral to tribal identity. Have students share at least one story that helps them connect to an organism on their list with a partner in their group (e.g., I hunt deer and the last deer hunt I went on . . .). Ask students to switch partners and share the story they learned from the other student with their new partner. Allow time for a discussion about how it feels to have someone else share your story. Did it make them feel important? Do they think they did a good job listening and remembering their partner's story? What might life look like for them if they had to rely on their memories alone to pass information?

Individual Work

Tell students it is time for them to think about their own stories again, and how they would like to record them in a seasonal round. Students will now add to their personal seasonal round they started in Lesson Two. Encourage students to refer to the seasonal rounds from Montana tribes or the personal seasonal round example found at the end of this lesson if they need inspiration, reminding them that, just like the tribal seasonal rounds, theirs should be unique to them and their sense of place.

Give students time to add additional data they would like to add to their seasonal rounds, such as the ways in which changing seasons bring unique moments, celebrations, activities, foods, and experiences year after year.

To wrap up the lesson, have students share their seasonal rounds with a partner/small group/whole class, reiterating the importance of passing information through oral and pictorial means. Conclude the lesson by asking students to reflect on the unique aspects of their lives within the context of their seasonal rounds, modern scientific data and collection, and the sacred history and continued relevancy of Montana's Tribal Seasonal Rounds.

Assessment

Students will interpret seasonal round data to glean seasonal information and present this information to the class. This can be assessed through student presentations.

Students will create a list of organisms they can observe in different seasons and identify the stage in their life cycles that happens during specific seasons. This will be assessed by the presence of the list and stages of the life cycle.

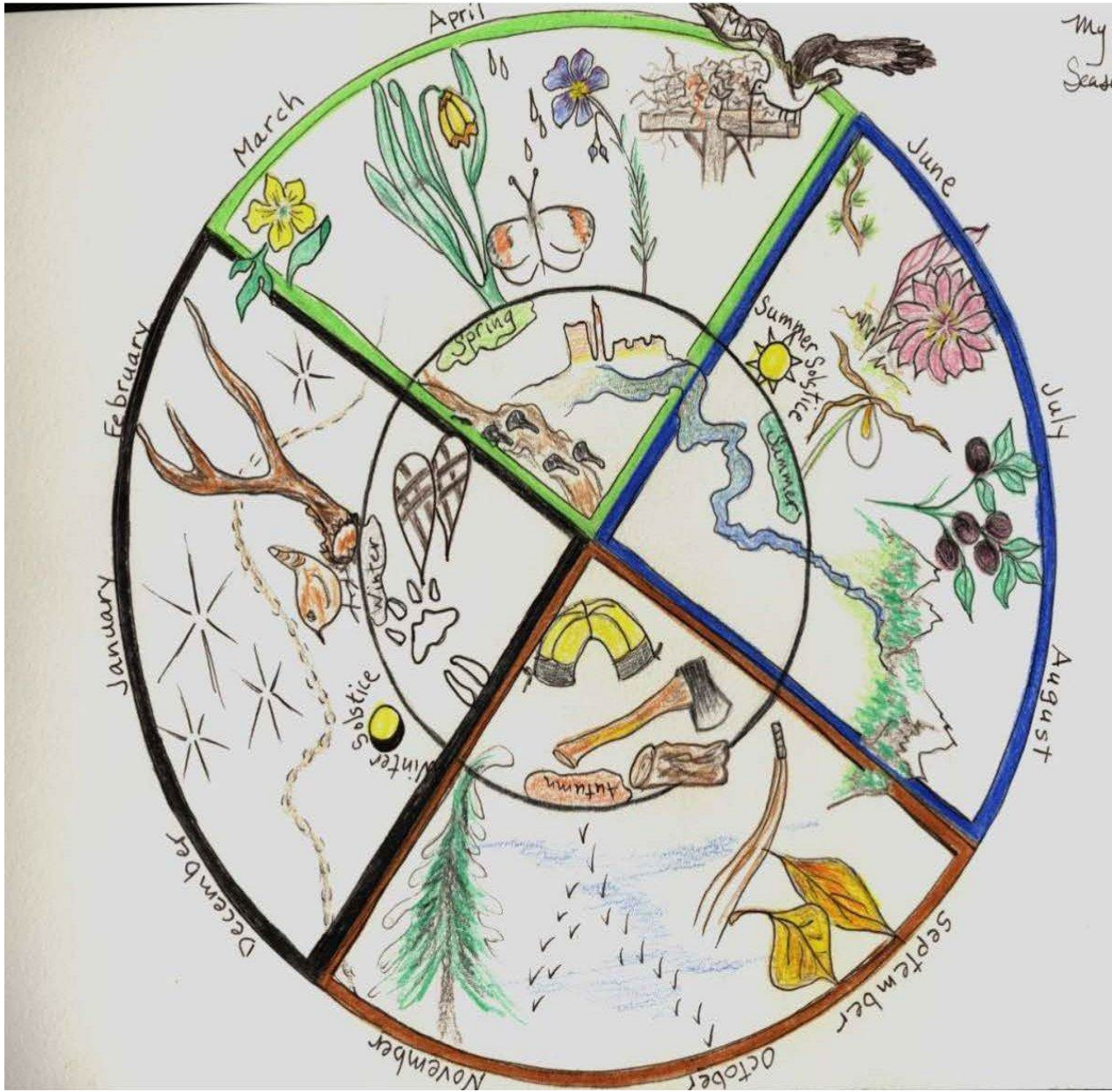
Students will share information regarding unique life cycles of organisms via their personal seasonal rounds. This will be assessed by the completion of a seasonal round.

Resources

Williams, Amy. "Various Tribal Month Names Chart."

Wren, Christine. *Seasonal Round*. October 24, 2018. Missoula, MT: Montana Natural History Center.

Example of a personal seasonal round



Created by Christine Wren of Montana Natural History Center

Tribal Month Names

Various Tribal Month Names	Kootenai/Ktunaxa-Ksanka	Salish/Pend d'Oreille Séliš/Qíispé	Ojibwe/Anishinaabe (aka Chippewa)	Month in English
capasapsaba black cherries- Assiniboine	kəiḡmitiḡ ḡikwa'it <i>Fruit Ripening During Night</i>	Sṡ š a Spq̄ ni? <i>Month of Huckleberries</i>	Manoominike-Giizis Wild Rice Gathering/Making Moon	August
li'dekwakkwya ts'ana When Corn harvested-Zuni	ku'ḡmakaku <i>Ripening of Chokecherries</i>	Łx ʷto Spq̄ ni? <i>Month of Chokecherries</i>	Waatebagaa-Giizis Leaves Changing Color Moon	September
Hair (leaves) fall off Camas- (gathering month) Kalapuya	k' upaquḡ aqpi' k <i>Falling Leaves</i>	Sč ḡip Spq̄ ni? <i>Month of Hunting</i>	Binaakwii-Giizis Falling Leaves Moon	October
Tcaik'iru'xira Deer-breeding month- Hochungra	kṡatuk'k zupqa <i>Deer Rutting</i>	Sqʷallumt Spq̄ ni? <i>Month of Storytelling</i>	Gashkadino-Giizis Ice is Forming Moon	November
shanáx dís Unborn seals grow hair- Tlingit	k' usmukusaḡ ḡxamaḡiḡ <i>First Prayers</i>	Esṡacm̄ l Spq̄ ni? <i>Month of Trapping</i>	Manidoo-Giizisoons Little Spirit Moon	December
dayamcho yachunne branches broken by snow- Zuni	kmitxaḡtitnam <i>Dancing Month</i>	Sč ḡ č ḡtumš Spq̄ ni? <i>Shaking Hands/Shooting Month</i>	Gichi-Manidoo-Giizis Great Spirit Moon	January
piyatokonis Spruce tips drop- Passamaquoddy	nupqu nataniḡ <i>Bear Month</i>	Č qʷosqn Spq̄ ni? <i>Month of the Cold/Curled on Top</i>	Namebini-Giizis Sucker Moon	February
héentáanáx kayaan'i dís Underwater plants sprout- Tlingit	ḡikuḡ <i>Melting Snow</i>	Kʷsixʷ Sq̄ ni? <i>Month of Geese</i>	Onaabani-Giizis Hard Crust on the Snow Moon	March
li'dekwakkwya ts'ana crack bones/marrow -Lakota	kak̄kmi <i>Cracked Land</i>	Sč iȳ aḡ mn Sq̄ ni? <i>Month of Buttercup</i>	Iskigamizige-Giizis Maple Sugar Moon	April
Sākipakāwi-pisim Budding moon- Cree	'uḡumi <i>High Water</i>	Sp̄ eḡ m Spq̄ ni? <i>Month of Bitterroot</i>	Waabigwanii-Giizis Flower Moon	May
dehaluyi green corn moon-Cherokee	kuḡqukupku <i>Ripening of Strawberries</i>	Sx ʷeḡli Spq̄ ni? <i>Month of Camas</i>	Ode'imini-Giizis Time for Picking Strawberry Moon	June
wasasa red berries-Assiniboine	kuku s̄qumu <i>Ripening of Serviceberries</i>	Es Ṳ apqeyḡ l Spq̄ ni? <i>Month of Celebration</i>	Aabita-niibino-Giizis Half-way Through Summer/Raspberry	July

Resources: The People's Center, Pablo Montana; Great Lakes Indian Fish & Wildlife Commission (GLIFWC); Personal knowledge and <https://astro101.wvu.edu/>; created by Amy Williams and used with permission.