



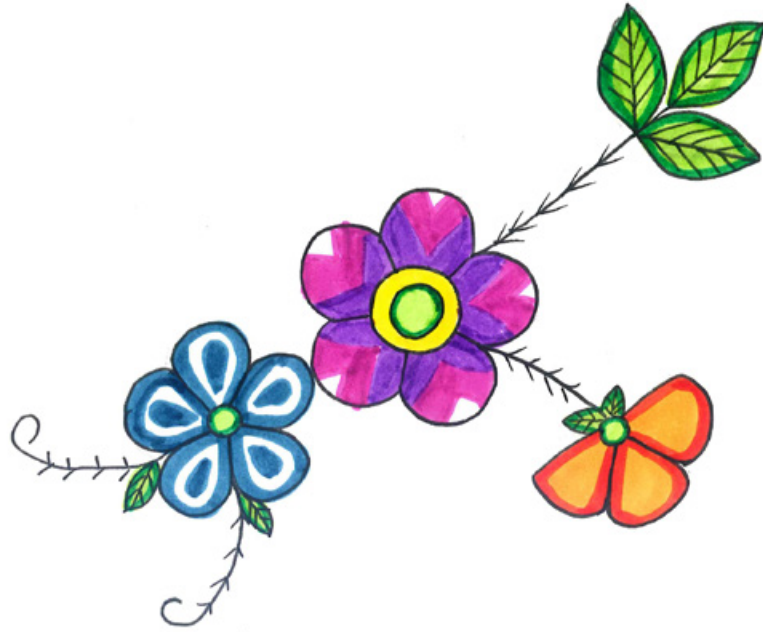
Muskrats and Fire

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Primary Illustrations by Michela Carrière



Map courtesy of Jay Sagin.



Long, long ago

Indigenous people used fire on the land. Research and data shows that Indigenous people in fact shaped the landscape of North America with fire. Indigenous oral histories and western researchers have presented theories on how the Indigenous peoples' practice of setting fire to the land impacted the wildlife of North America. This is a story about the outcomes of my research, The Muskrat Project.





A delta is

a community of living things and the interactions between those living things. It is a community of plants, decomposers, bacteria, scavengers, predators, birds, and of muskrats. Each plant and animal has a special role within the delta community.

This is a story of a delta, lakes within that delta, muskrats, fire practices, and land-based knowledge.





A boy known as

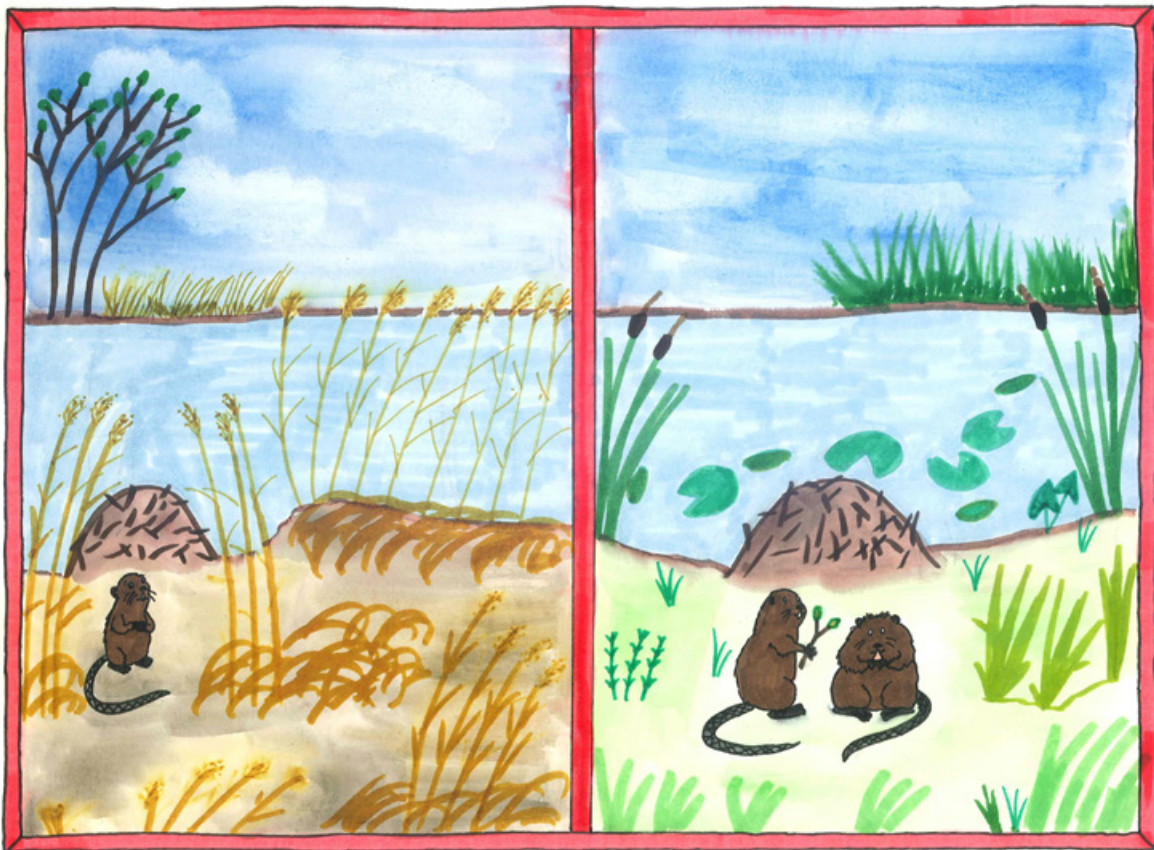
Six Eagles walks softly between the sweetflag and the bulrushes. He bends and extends his small hand to poke at the young plant shoots. It is spring. Everywhere there are pools of water between slushy mounds of snow. The air the young boy smells is bursting with mossy scents of melt and aromas of the in-between seasons. In the sky he sees the first eagles soaring high, clean and bright in their movements. Far off he hears the calls of geese, telling him stories of where they have travelled. The land is his well-being, his mino-pimatisiwin. Six Eagles makes a small nest of last years' bulrushes and waits for his father.



Today his father will demonstrate how to set fire to the edge of the small lakes. Six Eagles remembers that fire helps create new plants, healthy plants, colourful plants, beautiful tasting plants for all the animals. He knows muskrats build their homes using plants like bulrushes, mint, horsetail, cane grass, and sedge. His father showed him last spring how muskrats eat their plant-built homes, so he knows they need lots of vigorous plants to build healthy homes and get fatter! The boy also knows his people each year in the spring, harvest hundreds and hundreds of muskrats. The muskrat is part of mino-pimatisiwin.



Six Eagles recalls when his father showed him a large muskrat house pointing out that it was a dry looking house, not fresh and soft. His father said the dryness meant the house had no muskrats in it. Further along the lake edge, his father had pushed a long, thin, straight, dry diamond willow into the muskrat house. The father was carefully checking the texture of the house and locating the runways. He was teaching his young son the importance of understanding how many muskrats were in a house by the feel of the house and by the smell of the vegetation used in the muskrat house. Six Eagle's father suggested, that just like a builder of canoes, a muskrat needed the very best materials to make a warm, dry house for its kits.





Six Eagles stands up and watches his father approach. The tall man has a basket in which he has fire embers. The man reaches into the cone-shaped basket gently lifting glowing embers out and sets

them near the base of the old brown cane grass. Quickly a flame rises up and licks at the next clump of last year's plants. In no time the edge of the small lake is in flames. The burning grasses smell earthy and clean. Black smoke rises signalling the end of the muskrat season and the start of new life in the delta.



To the east, Six Eagles can make out his father's brother and his family setting fire next to the egg-shaped lake. Further to the south, his mother's family are laying fire on the five lakes joined by the skinny silver river. He thinks about the importance of fire and how his people use fire to nurture the land as he observes and follows his father. The boy listens, learns, and practices what his father shows him. Six Eagles knows that he will pass on the skills, ethics, and knowledge to others, mino-pimatisiwin, the good life; he reflects as he slips his hand into his father's.





Years and years later

a young Indigenous person named River is curious about the environment surrounding his community. He asks his grandparents, "Where have all the muskrats gone?" River understands some of the Cree language, and he can apply his grandparents' scientific methods. He was taught how to navigate on land and water using traditional ways and to use a global positioning system. River can identify plants in Cree and knows how to weigh, measure, and collect data. His grandparents' oral history indicate that people harvested muskrats in the Cumberland House area, an area within the Saskatchewan River Delta, the seventh largest inland delta in the world. River learns the delta is home to hundreds of plant and animal species. His learning leads him to archives that state the muskrat thrived in this wetland area, and records indicate that during the late 1800s to the mid-1900s, upwards of 750,000 muskrats were harvested annually by local people.

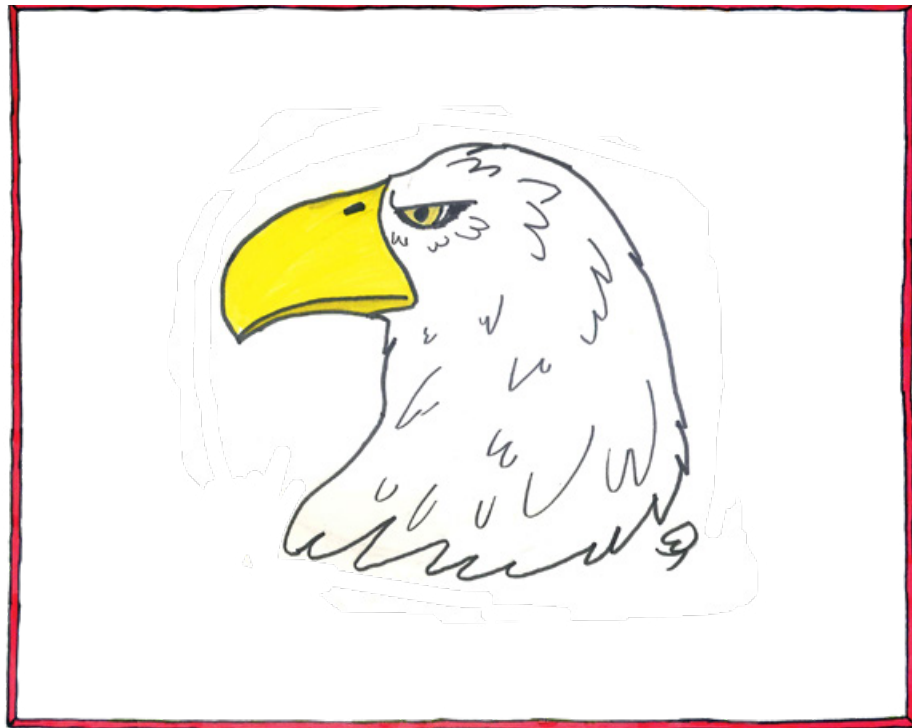


River was taught by his grandparents, as they were taught by their grandmothers and grandfathers. His grandparents taught him to name the plants in Cree and to understand the uses for the plants. They raised him to understand the interconnectedness of plants and animals. He is learning the ethics of the land, of *mino-pimatisiwin*. They reminded him to always collaborate and learn from others in order to create new knowledge. His grandparents have a different way of knowing.





From historical oral accounts, relevant data, and River's interviews with Elders and experts, he discovers the annual spring practice of fire as a local land management tool. The local ecosystem suffers if fire is not part of land management practices. He learns that Saskatchewan environment policies and practices have changed. River interviews N-28 and N-90 fur trappers and determines they no longer practice setting fire to lake edges in the spring due to the changes in government policies. Thus, River decides to research local fire burning practices and the impacts on the land for his community. He titles the research, The Muskrat Project.

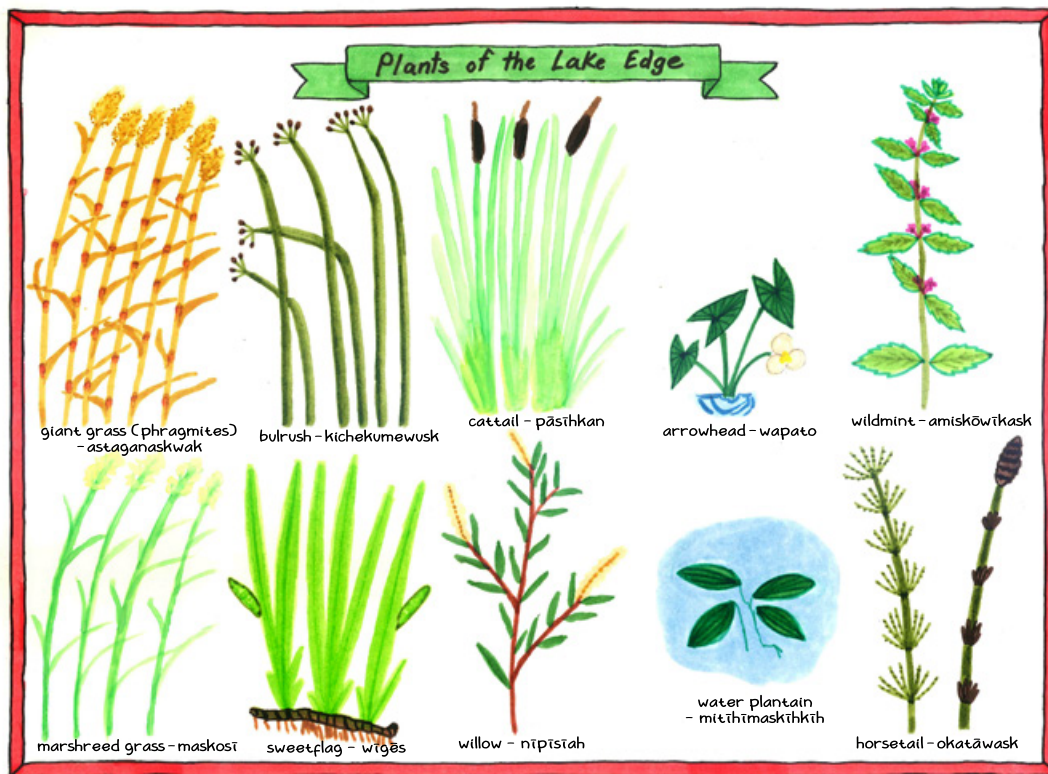




For The Muskrat Project, River selects four lakes within his father's trapline to use as a model. River includes high school students from the local Charlebois Community School to help with the research. River asks friends from toxicology and environmental science, trappers, hunters, fishers, local knowledge keepers, and local scientists to help him in the research. He maps out the lakes, and in the spring is guided by local trappers. Local Charlebois Community School students assist in setting fire to half of each of the four lakes. It is wonderful. Students flourish and are engaged in new learning. Teachers collaborate with River in new teaching strategies; trappers share environmental science and the ethics of the land with others; the toxicology and environmental scientists share their knowledge and skills and gain so much in new ways of understanding the environment.



Six months after burning half of each of the four lakes, River and local Elders take more Charlebois Community School students on the land, training them in the protocols of collecting plants.

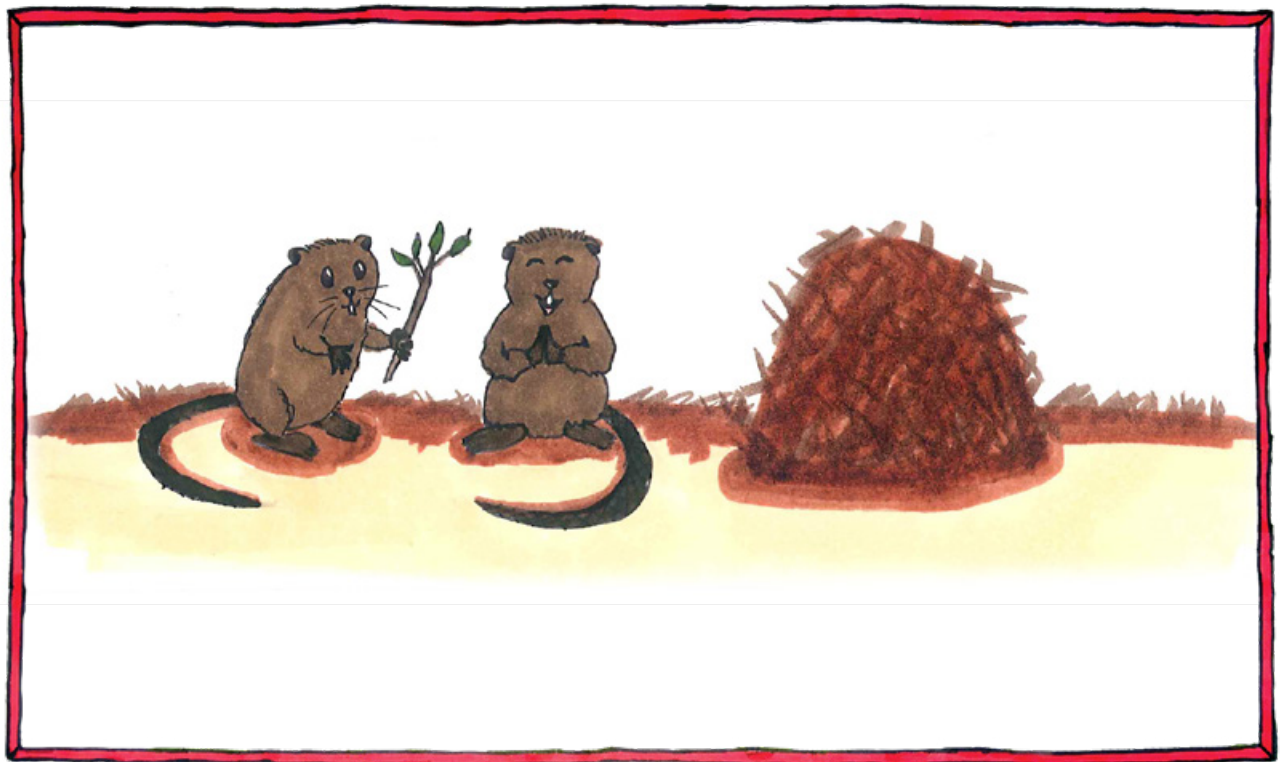


The students help collect 80 plant samples, half from the burned side of the lakes and half from the unburned side of the lakes. They weigh all the plant samples and take inventory of the plant types. River makes charts of all the data, and he meets with the N-28 and N-90 trappers to tell them of his findings. What River and the students have found is that burning directly impacts the vegetation found in muskrat habitat. He found where burning was done, there were eight different types of plants. All eight were required for healthy muskrats and healthy muskrat home building. In the areas where there was no burning done, there were only four plant types, and all of the plants were dry and unhealthy. They were the wrong type of plants for healthy muskrats and muskrat homes.



* The Cree language is rooted in oral traditions and, as a result, there are variations in spelling when it is written. We respectfully acknowledge and affirm that other spellings may be used.

The final part of the research journey was to go into the field to harvest muskrats. River organized several muskrat camps and had Elders share their knowledge of muskrat habitat, harvesting, and habits. The students harvested several muskrats, weighed and measured them, and then recorded their data. They found conclusive evidence that muskrats were heavier, longer, and healthier in the burned areas versus the muskrats harvested in the unburned areas.



River and the students shared their findings and practices of taking children on the land to discover solutions for local science problems with local educators. River met with the trappers and confirmed what they had been saying, that the practice of spring fires rejuvenated the local ecosystem promoting a healthy muskrat population. River gathered Saskatchewan environment people together, and they collaborated on practices for renewing the land with fire. River spoke with educators in the community supporting the need to learn about local histories to understand that there are other ways of knowing. He imagines the lives of others and the need to take responsibility for the past by building new knowledges and bringing cultures together by engaging students in land-based activities. He believes that land-based learning is how the land raises a child, it is mino-pimatisiwin.





arrowhead - wapato



marshreed grass - maskosī



horsetail - okatāwask



willow - nīpīsīah



water plantain - mitihimaskihkih



wildmint - amiskōwīkask



giant grass (phragmites) - astaganaskwak



sweetflag - wīgēs



bulrush - kichikumewusk



cattail - pāsīhkan

Connections to curriculum

Grades 1 – 8

Grade 1 - Science

- LT1.1 Differentiate between living things according to observable characteristics, including appearance and behaviour.**
1. What does a muskrat look like and how does a muskrat move?
- LT1.2 Analyze different ways in which plants, animals, and humans interact with various natural and constructed environments to meet their basic needs.**
2. What does a muskrat need to live? What is their house like? What does a muskrat eat? How does a muskrat move?

Grade 2 - Science

- AN2.3 Assess the interdependence of humans and animals in natural and constructed environments.**
3. In what ways do humans help the muskrats?

Grade 3 – Science

- PL3.2 Analyze the interdependence among plants, individuals, society, and the environment.**
4. What did Six Eagles notice about the relationship between plants and the muskrats?
- PL3.1 Investigate the growth and development of plants, including the conditions necessary for germination.**
5. Why do you think fire was so important for different species of plants?

Grade 4 – Science

- HC4.2 Analyze the structures and behaviours of plants and animals that enable them to exist in various habitats**
6. What might be a local environment (like the muskrat habitat) that you would want to investigate, and how might you investigate it so that you do not harm the plants and animals living there?
- HC4.3 Assess the effects of natural and human activities on habitats and communities, and propose actions to maintain or restore habitats.**
7. Who might you seek/learn from when learning about the traditional ways of how to care for and value the plants and animals in your local community?

Grade 5 – Science

- WE5.2 Investigate local, national, and global weather conditions, including the role of air movement and solar energy transfer.**
8. In what ways does weather impact the plants and the muskrats in their environment?

Grade 6 – Science

- DL6.2 Examine how humans organize understanding of the diversity of living things.**
9. Inquire into how plants are named and classified in both traditional ways and in western science.
- DL6.4 Examine and describe structures and behaviours that help:**
- Individual living organisms survive in their environments in the short term.
 - Species of living organisms adapt to their environments in the long term.
10. What are some adaptations that muskrats have that make them suited for their environment?



Grade 7 – Science

- IE7.1 Relate key aspects of Indigenous knowledge to their understanding of ecosystems.**
11. In what ways might you work with traditional knowledge keepers to learn more about your local ecosystem?
- IE7.2 Observe, illustrate, and analyze living organisms within local ecosystems as part of interconnected food webs, populations, and communities.**
12. Create a food web involving the muskrats.
 13. Investigate your local environment and create a food web from the knowledge you gather.

Grade 8 – Science

- WS8.2 Examine how wind, water, and ice have shaped and continue to shape the Canadian landscape.**
14. The muskrats utilize deltas and other waterways. How have those waterways been created? Investigate through the lens of both traditional knowledge and western science.

Grades 9 - 12

Grade 10 –Science

- SCI10-CD3 Examine biodiversity through the analysis of interactions among populations within communities.**
1. Why is biodiversity important? What might be some problems if we didn't have biodiversity?
 2. Trapper, toxicologist, environmental scientists, and teachers all have knowledge to share about the muskrats. Who else might we ask that is knowledgeable about the muskrats? What makes them knowledgeable?
 3. Fire impacts the plants used by the muskrats. What are some other factors that might affect the muskrats?
 4. Why might it be important to collect plants in a certain way?

Grade 11 – Environmental Science

- ES20-AS1 Analyze the function and condition of freshwater aquatic systems such as rivers, streams, lakes, wetlands, and watersheds.**
5. What are some factors to notice about body of water to see how healthy they are?
 6. What is unique about a delta? How is it different from a stream or a lake?
- ES20-TE2 Examine the role plants play in an ecosystem, including the ways in which humans use plants.**
7. What are some important plants that grow in your community, and how are they used?
- ES20-TE3 Recognize the need for intact habitat to support animal populations and biodiversity.**
8. What plants benefit from fire to restore and renew the plants and their habitats?
 9. Are other animal species benefited from fire?
- ES20-ES1 Examine the methods, mindsets, and purposes of environmental science.**
10. How might you engage in land-based learnings in your community?
 11. How might we examine more sustainable ways to engage with our land?

Grade 11 – Health Science

- HS20-HC1 Analyze how western, Indigenous, traditional, complementary, and alternative approaches to health care can contribute to a holistic (e.g., mental, emotional, physical, and spiritual) perspective of health.**
12. When looking at your community, what are some medicinal uses for the plants?
 13. How might you learn more about the plants in your community, both from a western viewpoint and a traditional way of knowing?
 14. We have learned much about the importance of fire to support diversity of plants. What are some other ways to maintain diversity of species in a community?





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The Muskrat Project research started with the quest to answer questions posed by Charlebois Community School students. The search for answers led me on an adventure and journey into learning other ways of knowing and understanding. This research process caused me to examine my western worldview and to recognize that there are other ways of expressing knowledge, other methods of collecting data, and other approaches to learning, sharing, and acquiring skills and ethics. The research practice altered my pedagogy and transformed my understandings of land-based learning.

For me, land-based learning is how land and language informs and teaches a person or persons. It is the ethics, languages, knowledge, and skills of the land



which illuminates identity and builds relationships. The local Cree language describes the colour of the sunset, the texture of snow, and accentuates the senses. It expresses codes of conduct between wildlife, environments, and others. In my research titled *The Muskrat Project*, I have learned that land and language influence pedagogy, that they are interconnected. I was not brought up on the land, but I have been formed by my language, skills, and ethics. I also have 35 years of living on the land with my family and extended family near the village of Cumberland House. It is family and community that have informed me in how land and language teach, and in *mino-pimatisiwin* (the good life). The young people of Cumberland House posed questions about: Why is the river water so brown? Where have all the muskrats gone? The Elders and experts of Cumberland House encouraged me to seek out authentic answers. The way I have chosen to represent *The Muskrat Project* research findings is in this small book titled *Muskrats and Fire*.

Thank you Solomon; you guided me on the land, in your Cree language, and in your ways of knowing. Our youngest daughter Martina did a science project 10 years ago on the health of muskrats in the Saskatchewan River Delta. She is my motivation. The illustrations were based on drawings from some of our Charlebois Community School student artists: Wynter, Martina, Marissa, Louis, and Talon. Michela created her own drawings and used the drawings of students and the interviews with local Elders for her interpretations of the final drawings presented in *Muskrats and Fire*.

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