Forgotten Ecologies: Architecture for Natural Coexistence within Albertan Agrarian Landscapes

by

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Dalhousie University is located in Mi'kmaq'i,
the ancestral and unceded territory of the Mi'kmaq.
We are all Treaty people.

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Abstract

Western epistemologies based on a dualism between man and "nature" have created economic systems at war with ecological systems. The segmented Alberta prairie landscape perpetuates this dualistic thought through economic tasks that are separate from "nature". How can architecture be designed to support non-human tasks and facilitate interactions that foster the development of empathy with the more than human world?

A research and visitor center will be designed within a proposed grassland preserve in Southern Alberta to help focus on landscape as ecological process. The proposed preserve reestablishes natural systems and species so that one can observe, appreciate/respect, and understand how to live within the prairies while supporting its ecologies and inhabitants.

The project uses ecological spatial concepts and relations between the near and the far, both physically and temporally, to inspire architecture that frames ecosystem relationships and the connectivity between all things.

Acknowledgements

Chapter 1: Introduction

Agriculture and Dualism

Agriculture-based knowing, or "Agrilogistics," as Timothy Morton coins it, is the foundation of the dualistic separation of man and nature (Morton 2016, 42). In agrilogistics thinking, "nature" is seen as constant, the realm of god, an uncontrollable wilderness separate from our agricultural landscapes. A false duality was created between man and nature, allowing for the blind destruction and polluting of natural systems. Western epistemologies rooted in agrilogistics have created an economic system separate from but in direct conflict with local ecological systems.

We can see the consequences of agrilogistic thinking but are trapped within a landscape and economic system that reinforces this dualistic thought. As Gregory Bateson says in *Steps to an Ecology of Mind,* "most of us are governed by epistemologies we know to be wrong" (Bateson 1973, 461). The daily tasks that are required by our constructed landscapes are at odds with ecological thinking and can cause debilitating cognitive dissonance. The simple task of buying a carton of eggs (figure 2) is inseparable from the industry that allowed for its production and its cascade of environmental fallout.

The gridded agricultural landscape of Alberta perpetuates this dualistic thought. A new way of relating to the agricultural landscape is needed in Alberta that includes tasks that are embedded in local ecology, inspiring holistic ways of knowing. This new way of knowing consults Indigenous stories and research that focus on belonging to a landscape and the processes and interactions of multiple human and

Figure 1. Non-human actors are consulted throughout this thesis, including the bison, grouse, swallow, and burrowing owl.
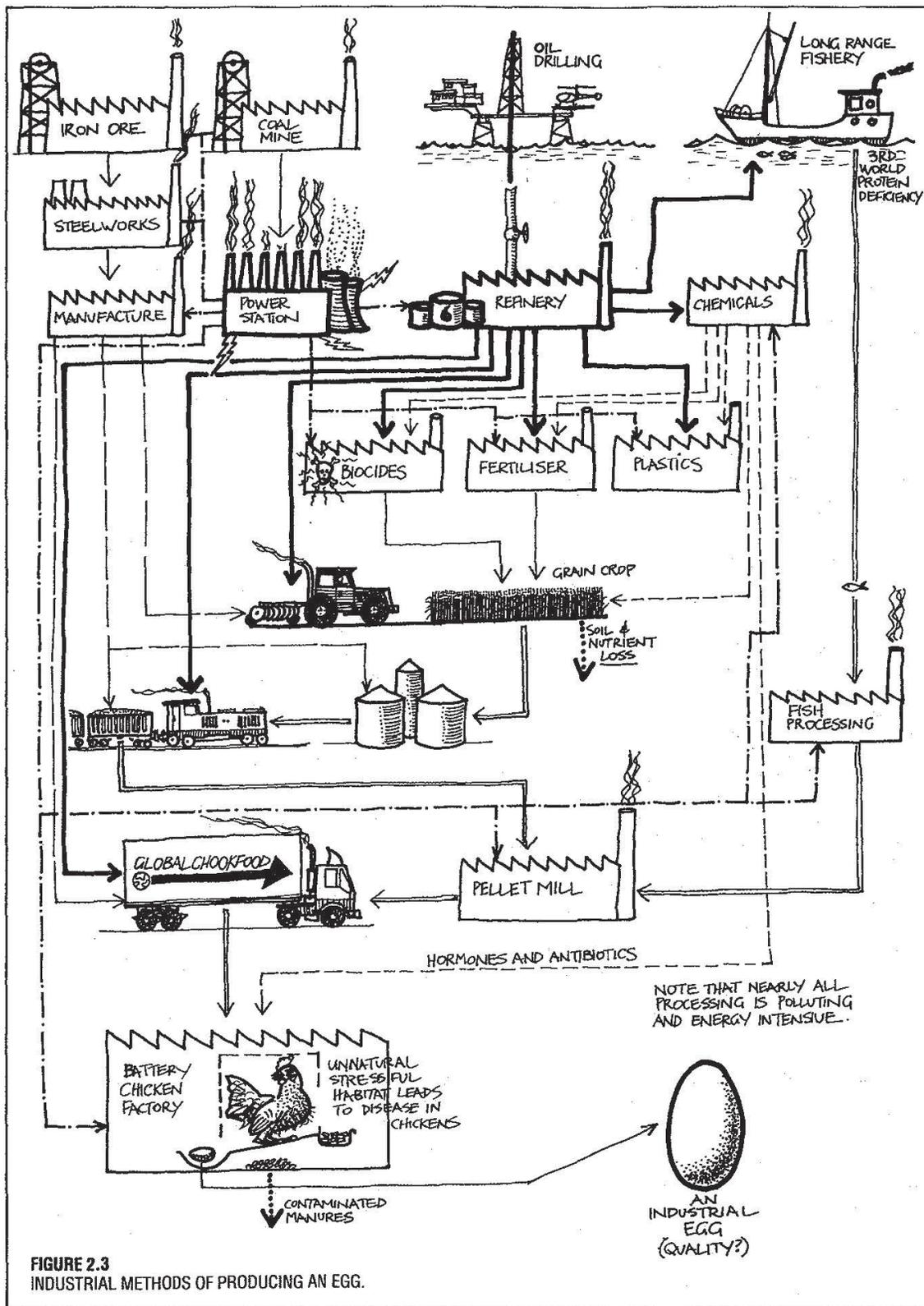
FIGURE 2.3
INDUSTRIAL METHODS OF PRODUCING AN EGG.

Figure 2.   An illustration of the production process of an industrial quality egg that has become interconnected with larger systems of industry. Illustration by Bill Mollison (Mollison 1988, 24)

non-human actors. Indigenous stories speak to ways of understanding and being that speak to relations with nature as beings.

Taskscapes, Landscapes, and Dreamscapes

To understand the relation between the unconscious and landscape, methods of mapping will be used as a way of diagramming various cycles and their associated taskscapes, or activities within the landscape(s), and the experience, phenomena, and unconscious memories/ associations that create narrative within dreamscapes. Taskscape, as described by Tim Ingold, is the temporal ensemble of tasks performed by both human and non-human actors. (Ingold 1993, 152). This taskscape affects and is affected by the landscape in a cycle of reinforcing each other continuously. The actions within this taskscape result from all actors' conscious and unconscious decisions.

This unconsciousness is the result of both internal and external factors. Bateson separates these into individual, social, and ecosystem (Bateson 1973, 461). If drawn out, we can start to map and study how landscape can reinforce patterns of thought through rituals, narratives, myths, and art which I will refer to as dreamscapes.

Alberta History

Starting in 1870, the Canadian Dominion Land Survey grid was laid out militantly to take quick ownership of Southern Alberta. 160-acre quarter sections were surveyed out and given to settlers. I myself grew up on the corner of one of these quarter sections.

Acres of monoculture within this new grid have broken the prairie ecosystem having detrimental effects on

biodiversity, water quality, and migration routes (Figure 3). The Siksikaitsitapi's (All Blackfoot-speaking tribes) way of life was destroyed on a multitude of levels, from the bison (by the focused extirpation of the bison in the 1870s) to property ownership models of the 1800s, road systems in the 1900s, and mega-farm monoculture systems. Each of these has erased and impeded the connectivity of natural ecologies, habitats, and the people who depend on them for sustenance and way of life. At each level of the so-called advancement of Western society, the Siksikaitsitapi were

BIODIVERSITY RISK   SURFACE WATER QUALITY   GROUND WATER QUALITY

0.8   0.8   0.9

0.9   0.9   1.0

1.0   1.0
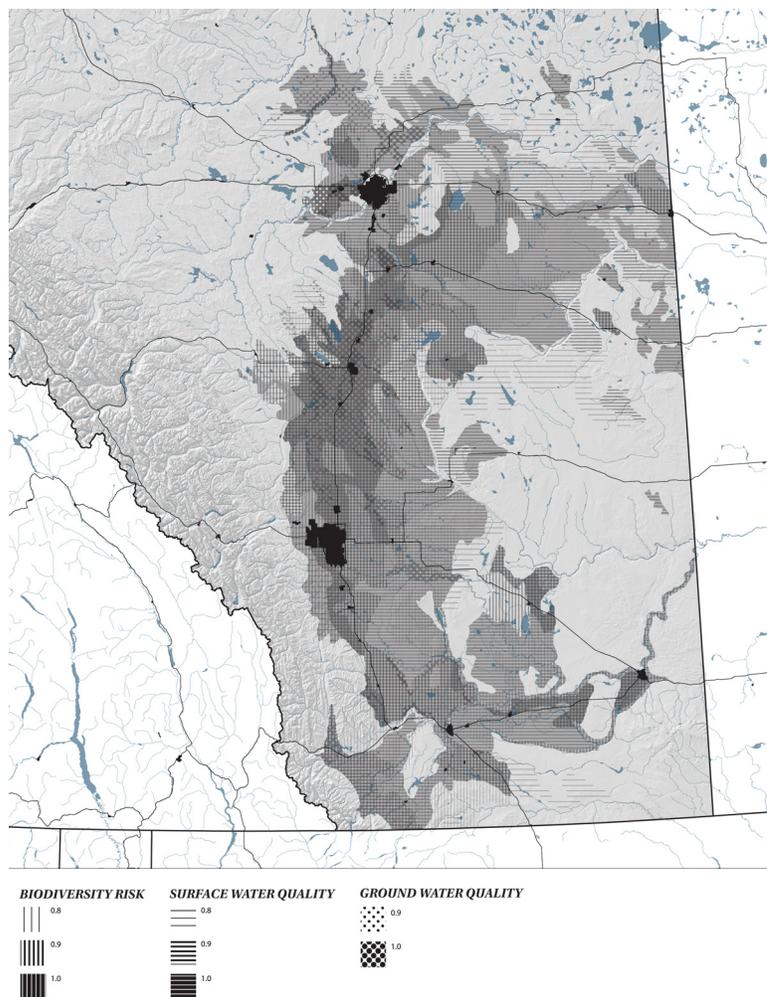
Figure 3.   Map of southern Alberta showing the areas of highest biodiversity and water quality risks. Unsurprisingly, these areas overlap and correlate with agriculture. (Data from [NASA 2015] [ESRI Canada 2023][Government of Alberta 2003])

forced to sign treaties that would place them on reserves. Children taken into residential schools could not speak their language or carry out customs, further contributing to the cultural genocide that is all around us.

The ideals of efficiency (from train lines to highways) have bypassed our connectivity to and with that landscape. Passing by quickly, the landscape is never known for its complexity but is separated into mental zones, artificial/natural, leisure /resource, a machine for economic consumption. I grew up in this landscape and have taken for granted the complexity of the plains that appeared simple and defined—straight roads squaring in acres of yellow canola, wheat, and barley.

Writing this thesis has taught me that trying to situate the environment into our agricultural framework does not work. Ecology is so complex that it can never be known in its entirety. I began the thesis by searching for how agriculture and nature could combine to mutually coexist through
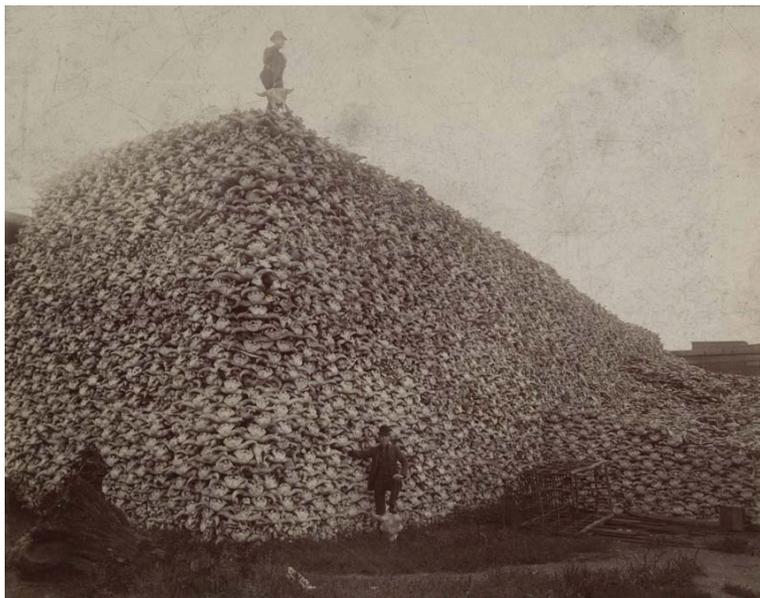
Figure 4. Photograph of a man standing on top of a mountain of bison skulls in Detroit, Michigan. These skulls were to be ground for fertilizer. (Burton Historical Collection, 1892)

permaculture and green technologies (figure 5). Through research and attempting to design an experimental farm I was made aware that agriculture is the antithesis of nature. Nature mutated for human purposes. We can not design a way of living within the processes of land by starting with our current agricultural processes. We must look at the processes of land, understand how the relations interweave ,and then situate ourselves within those processes as minimally as possible or by increasing and reinstating lost habitats.

> When we came across the continent cutting the forests and plowing the prairies, we have never known what we were undoing. We cannot know what we are doing until we know what nature would be doing if we were doing nothing. (Berry 1996,100)

Non-Human Taskscapes

This thesis will attempt to create a method of being in the
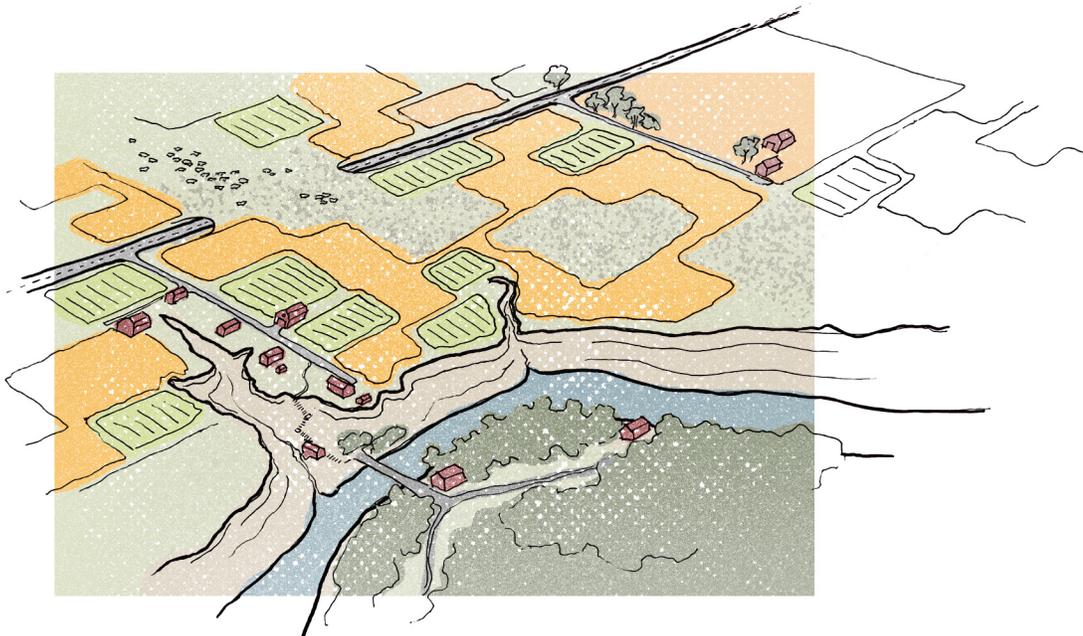
Figure 5.   Initial wish image of an imagined eco-village with agricultural systems that works with local ecosystem taskscapes instead of against them. This idea was abandoned as it started with the current agricultural system attempting to reinsert nature. To understand how to connect ourselves with land, we first need to humble ourselves to natural processes.

both created this abstracted landscape and are reinforced through it. It will do so by reincorporating extirpated ecology into agricultural landscapes through the tasks of non-human actors, the bison, grouse, swallow, burrowing owl, and native grasses. Interaction with the tasks of these non-human actors will be designed to shift focus onto these processes.

The needs of these non-human actors overlaid on the current agricultural landscape create moments of interaction and edges which require new design solutions. The bison's migratory pattern requires a connection of parkland to grassland. This route will be reincorporated through the reuse of provincial grazing lease land and land bridges. Sharp-tailed grouse depend on diverse and expansive grassland habitats with different compositions of grass height, shrubbery, and flowering to complete their annual tasks of mating, nesting, and brooding. Water collection through architecture will be designed to provide these habitats through bio-swales.

These processes will be framed through architecture and landscape to allow for interactions that reinforce the unconscious knowing of oneness with nature. Perspectives will be focused through architectural interventions on the edge and the intersections of taskscapes. These perspectives are framed through a nature and research center that is designed to support non-human tasks and facilitate interactions that foster the development of empathy with the more than human world.

Chapter 2: Conceptual Framework

Landscape

A generic framework of understanding how landscape can affect the unconscious was drawn out in the mind map of figure 6. This method of analysis may risk being reductive as the effects of landscape on the mind are not uniform. Every individual sees and experiences landscapes differently. John Stilgoe, in *What is Landscape,* suggests that only with great effort can one view the landscape from another person's perspective (Stilgoe 2015, 18). Even with great effort, it is never possible to entirely shift one's perspective to understand the full depth of another's. The way that a painter may see the landscape is much different than a farmer, a hunter, or a biologist. These perspectives are constantly changing, and it is essential now more than ever that multiple and diverse perspectives are inquired upon.

Landscape is more than just geography. It embodies the lives, tasks, and stories of multiple generations within a palimpsest of layers and clues to past ways of knowing. Landscape is a social product that is continually molded by human changes in the material world (Cosgrove 1998, 13). Ingold compares this dynamic of both the physical and the immaterial landscape to a painting that is continually being painted, adding new layers and new brush strokes as it develops (Ingold 1993, 162). The landscape is the painting, and the brush strokes of this painting are formed by the small actions on the landscape that Ingold describes as taskscape (Ingold 1993, 157).
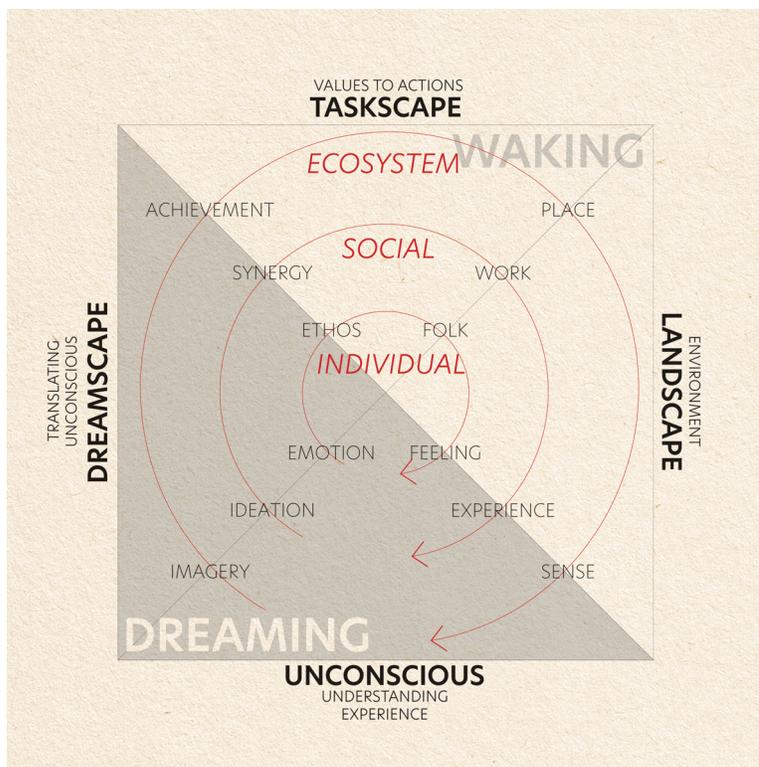
Figure 6.   Map of the interaction between landscape and unconscious, waking and dreaming. This map uses theory from Ingold and Bateson combined with the "Notion of Life" diagram by Patrick Geddes.

Taskscape

Who is the painter in this analogy of landscape? Is it the one who lays down a gravel road, the wind that shapes the hoodoos, or the glacier that carved the coulees and hills on its retreat to the Hudson's Bay? It is all three and an innumerable amount more. Taskscape, as defined by Tim Ingold, is an ensemble of tasks performed by both humans and non-humans, blending into a flow of constant presence. (Ingold 1993, 157). In *Critique of Everyday,* Lefebvre speaks about these daily tasks accumulating together to eventually create significant change (Lefebvre [1947] 1992, 134).

> We have learned how to perceive the face of our nation on the earth, in the landscape, slowly shaped by centuries of work, of patient, humble gestures. The result of these gestures, their totality, is what contains greatness (Lefebvre [1947] 1992, 134).

Thinking about landscape as an unraveling of tasks opens one up to seeing the past as embedded in the physical world and continually affecting the present, both positively and negatively.

A simple example of a task affecting the landscape is found in the art piece *A Line Made By Walking* by Richard Long in 1967 (figure 7). By simply walking back and forth through a grassy meadow, a mark is created. The mark itself creates a visual memory of the act of walking. This memory not only connects us to the past action but also suggests future actions. In this simple way, the taskscape molds the landscape and suggests repeated tasks.

A LINE MADE BY WALKING

ENGLAND 1967

Figure 7. *A Line Made by Walking*. Photograph by Richard Long 1967 (Long 1967)

This can be compared to any animal track or, more dramatically, a buffalo rubbing stone. As bison wandered across the prairies, they would encounter large stones that had been transplanted by the moving glaciers of the Pleistocene. The bison, plagued by mosquitoes, would rub themselves on these stones until the surface was smooth (Bryan 2015, 43). Deep grooves formed in the Earth around the base of the stones as the swirling herd rolled around them (Gayton 1992, 100). These impressions around the stone can be seen from satellite imagery in figure 8.

The buffalo no longer roam the great prairie, but their tasks remain embedded in the very landscape. Some large gashes extending down into coulee valleys are now considered to be the remaining trails of large herds of bison (Gayton 1992, 100). These physical remnants are

Figure 8. Buffalo rubbing stones seen from Google Earth (Google Earth 2023)

Figure 9. Buffalo rubbing stone in Nose Hill Park, Calgary Alberta. Photograph by Maureen Flynn-Burhoe (Flynn-Burhoe 2007)

disappearing due to agriculture, but the memory remains. The grass remembers the buffalo. Bison graze differently than cattle, who are not selective grazers. Bison feed mostly on grass when unbounded in rangeland and will avoid forbes creating a different biodiversity in plant life than seen with cattle (Helzer 2010, 20). These grazing habits have slowly evolved, and the relationship between grass and bison creates a biodiverse habitat for multiple species.

This relationship shows that the tasks on the landscape affect not only its physical attributes but also its relational aspects. Richard Manning describes this great plains landscape as one of "co-evolved species, a given collection of plants and animals that evolution has fine-tuned not just to exist in a place but to exist, in fact to thrive, in and only in the presence of another" (Manning 2009, 16). The removal of the bison from the prairies that occurred in the late 1800's has had an immeasurable effect on the natural ecosystems on a scale that is incomprehensible. It is one of many species that has gone by the wayside in the name of human exceptionalism.

Unconscious

Unconscious and consciousness are elusive terms to define. For the purpose of clarity, I am suggesting that the repeated tasks in the landscape and our perspective of the landscape significantly effect our unconscious. In other words, our habits and what we pay attention to affect who we are.

In Western dualistic epistemologies, we often think of ourselves with a separation between mind and the outside world and even our physical bodies. Merleau-Ponty argues in *Phenomenology of Perception* that the mind is not separate from the body or external factors but depends on

and is made from them. "Consciousness does not begin to exist until it sets limits to an object, and even the phantoms of 'internal experience' are possible only as things borrowed from external experience" (Merleau-Ponty and Landes 2012, 27). Gregory Bateson also questioned this dualistic thinking and attempted to explain the mind as a combination of internal and external factors (Bateson 2015, 95).

In his book *Steps to an Ecology of Mind*, Bateson describes consciousness as a central component in the coupling of societal, individual, and ecosystem cybernetic systems (Bateson 1973, 415). Cybernetics is a system of relationships that evolves on feedback loops. An example of this is the buffalo eating specific grasses causing forbes to grow in their place, creating a cascade of relationships with other non-humans. Each system, the individual, the societal, and the ecosystem run on feedback loops of relationships that create a sense of balance and homeostasis. When one of these systems, such as the societal system, is unbalanced a cascade of unknown issues can result. We often do not think about the long-lasting effects of our actions on the ecosystem. Bateson argues that "Consciousness contains systematic distortions of view in which, when implemented by modern technology, become destructive of the balances between man, his society, and his ecosystem" (Bateson 1973, 415).

Dreamscape

The dreamscape consists of the stories we tell ourselves through our rituals, dreams, and cultural narratives. Our stories and myths reveal some of our unconscious.

> Rituals reveal values at their deepest level... men express in ritual what moves them most, and since the form of expression is conventionalized and obligatory, It is the values of the group

that are revealed (Turner 1969, 6).

The way we view the world begins to be enveloped and reinforced by the stories we tell ourselves. These stories affect how we view the landscape and then act within it.

In order to create change, we must change the stories we tell about the landscape. We must learn the processes of non-humans and hold them in a higher regard than our own and change the way we see the world in order to change the way we live in it.

I am proposing that this cycle of landscape to taskscape to unconscious to dreamscape is cyclical and self-reinforcing. We can attempt to change how we think, but if we do not change how we act and interact with the landscape, we are reinforcing the same colonial ways. Action and attention in all scapes, including landscape, taskscape, unconscious, and dreamscape, are required to make systematic change.

Chapter 3: Agrologistic World View

> They began to specialize in doing things the planned way. In effect, they cast out from the Garden the concept of their own total systemic nature and of it's total systemic nature. After they had cast God out of the Garden, they really went to work on this purposive business, and pretty soon the topsoil disappeared. After that, several species of plants became 'weeds' and some of the animals became 'pests'; and Adam found that gardening was much harder work. He had to get his bread by the sweat of his brow and he said, 'It's a vengeful God. I should have never eaten that apple' (Bateson 1973, 411).

Albertan Landscapes

Figure 10. Albertan Agricultural Landscape (Google Maps 2023)

In English, the word landscape is derived from the Frisian word "landscop," meaning shoveled land (Stilgoe 2015, 2). The original meaning of the landscape belongs to the act of creating from the Earth something under human control and guidance. This Western epistemology of control and dominance over nature stems from the start of agriculture through thinking that Timothy Morton coins as agrilogistics (Morton 2016, 42). Timothy Morton suggests in *Dark Ecology* that a dream for control of the future caused by the unpredictable landscape of the last ice age drove those in Mesopotamia to start the task of agriculture (Morton 2016, 43). This led to a dualistic distinction between agricultural landscapes and natural landscapes, an unconscious abstraction of useful and unusable. Society grew dependent on agriculture, becoming the prime focus of survival (figure 11). Understanding of nature was lost, and topsoil was used up unknowingly as the constant provision from nature was assumed, causing famines and ecological disasters (Todd and Todd 1994, 138). This has continued to the modern industrial farm, where an estimated 24 billion tons of topsoil is lost each year (Todd and Todd 1994, 138). We have now

domesticated most of the Earth with agrilogistics embedded in our humanistic systems (Morton 2016, 43).

This agrilogistic thinking played out during the colonization of the Western great plains. During the industrial revolution, many who owned manufacturing industries also owned land within the plains, and their values and ideologies extended into the landscape (Todd and Todd 1994, 141). The grassland landscape was seen as a machine that could be harnessed if engineered properly (Manning 1995, 262). Through 1909 and 1919, cultivated land in the prairies of Montana sprang from 250,000 acres to 3.5 million acres (Forrest et al. 2004, 13). This was during a period of unusual rainfall followed by drought, which created a lack of native grass vegetation to hold down the soil during years of drought. This short-sighted "great plow up" eventually led to the ecological
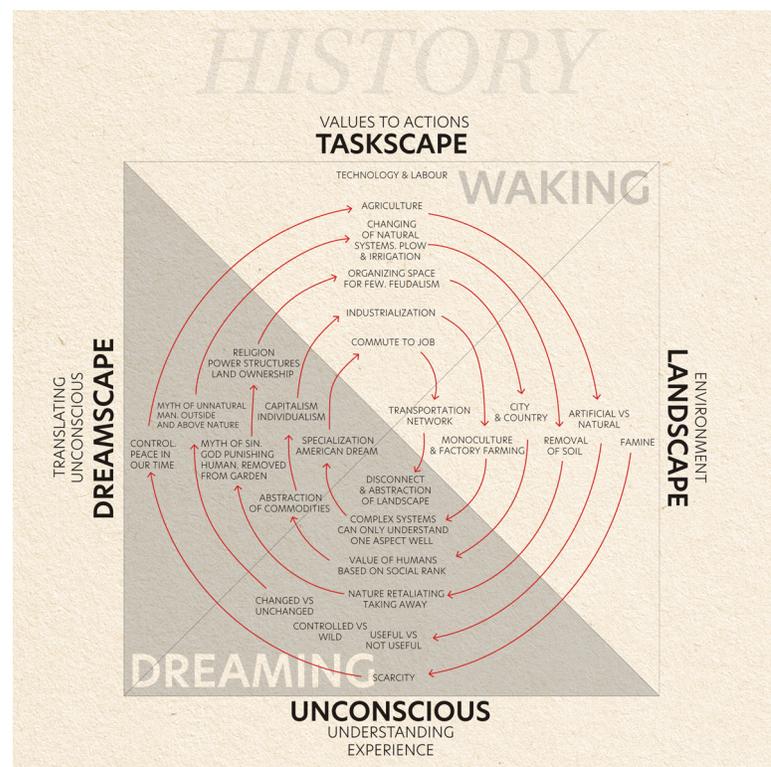

Figure 11.   Diagram of Agrilogistic Historical progression. Each step has become reinforcing to future actions separating us further from coexistence with Nature.

disaster of the dust bowl in 1935, in which 5 million tons of soil were estimated to be lost (Forrest et al. 2004, 13). Droughts like these are not uncommon in the plains, but the prairie requires co-evolved animal and plant species to survive these droughts (Manning 2009, 95). The great plains have still need to recover from this transformation to cultivated land, and it was estimated in 2004 that 99% of rural landscapes in the great prairies are either farmed or have managed grazing, including protected areas (Forrest et al. 2004, 15).

The gridded agrarian landscape of Alberta is one of these agrilogistic systems that has superseded the natural landscape. The colonization and domestication of the western plains came into full force with the Canadian Dominion Land Survey in 1870. The Survey was laid out in a militant fashion and was designed by John Stoughton Dennis who was known as a bungling military leader (Olsson, Rogers, and Ballantyne 2010, 17). The grid featured townships of approximately 36 square miles, divided further into 36 sections of 1x1 square miles, as seen in figure 12 (Olsson, Rogers, and Ballantyne 2010, 20). This grid overlaid on the landscape takes no consideration of the natural topography or the natural systems that were already in place. The Canadian government quickly laid this grid out as a land grab to assert ownership before the Americans (Olsson, Rogers, and Ballantyne 2010, 17). The grid is a remnant of this short-cited colonial thinking and is reinforced by current land ownership. There is little reason for the grid other than to section ownership parcels. If we are to design with nature, this grid should be ignored or lightly referenced, if at all.
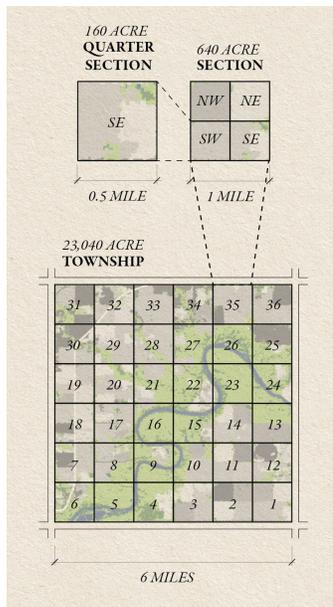
Figure 12. Canadian Dominion Land Survey grid is made up of townships, sections, and quarter sections.
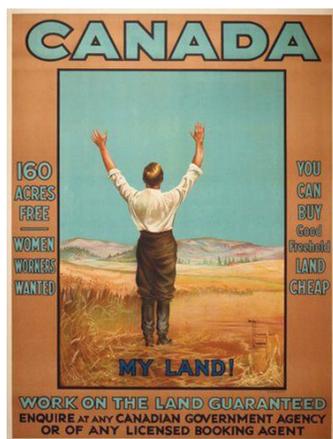
Figure 13. Canadian immigration poster (Canada Government 1920)

LAND USE

GRASSLAND
SHRUBLAND
WETLAND
FOREST
AGRICULTURE
MUNICIPALITY
WATER

DOMINION LAND SURVEY GRID
FIRST NATION RESERVE
RAILWAY
MERIDIAN LINE
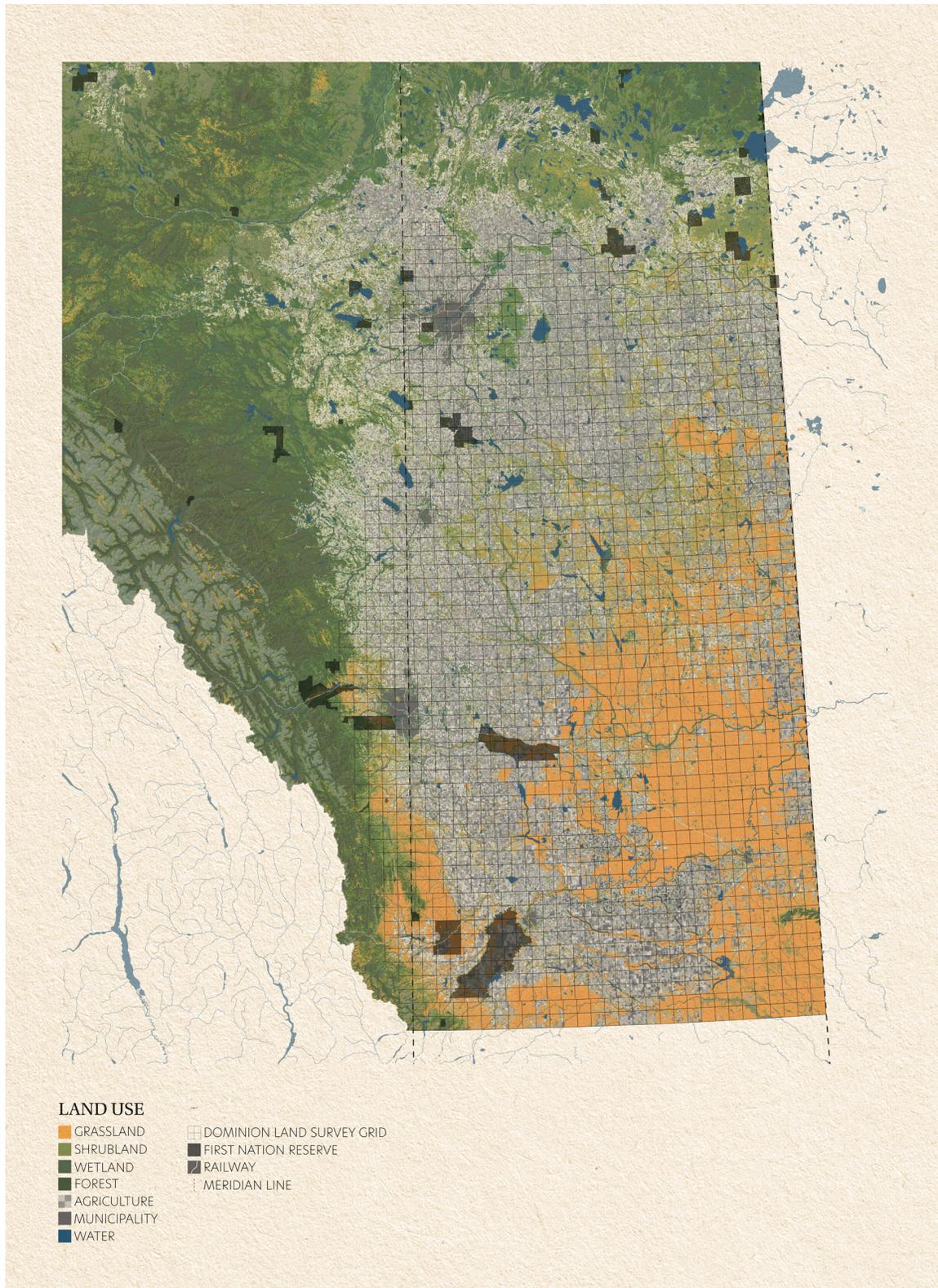
Figure 14.   Canadian Dominion Land Survey grid overlaid on the landscape has created a disconnect between the parkland forest and grassland. Agriculture and private property have eliminated migratory routes and habitat. (Data from [ESRI Canada 2023][Agriculture and Agri-Food Canada 2018][Department of Natural Resources Canada 2022])

Agricultural Taskscapes

When driving through the prairies of Alberta, one now passes many small farms houses perched on the corner of quarter-sectioned fields, patches of aspens line the edge of an old wooden fence lined with old farmer's hats. Fields of yellow canola and golden wheat stretch far between perfectly straight gravel roads stretching to the blue horizon.

Moving through this landscape involves traveling along these straight gridded roads by vehicle or flying overhead. Traveling in an airplane changes perspective, both because of the speed of travel and viewpoint. John Stilgoe retells a story from Beryl Markham in which she condemns pilots' and passengers' view of the landscape as having no realization of life and accused "passengers as detached, able to observe but feel nothing about the landscapes below" (Stilgoe 2015,
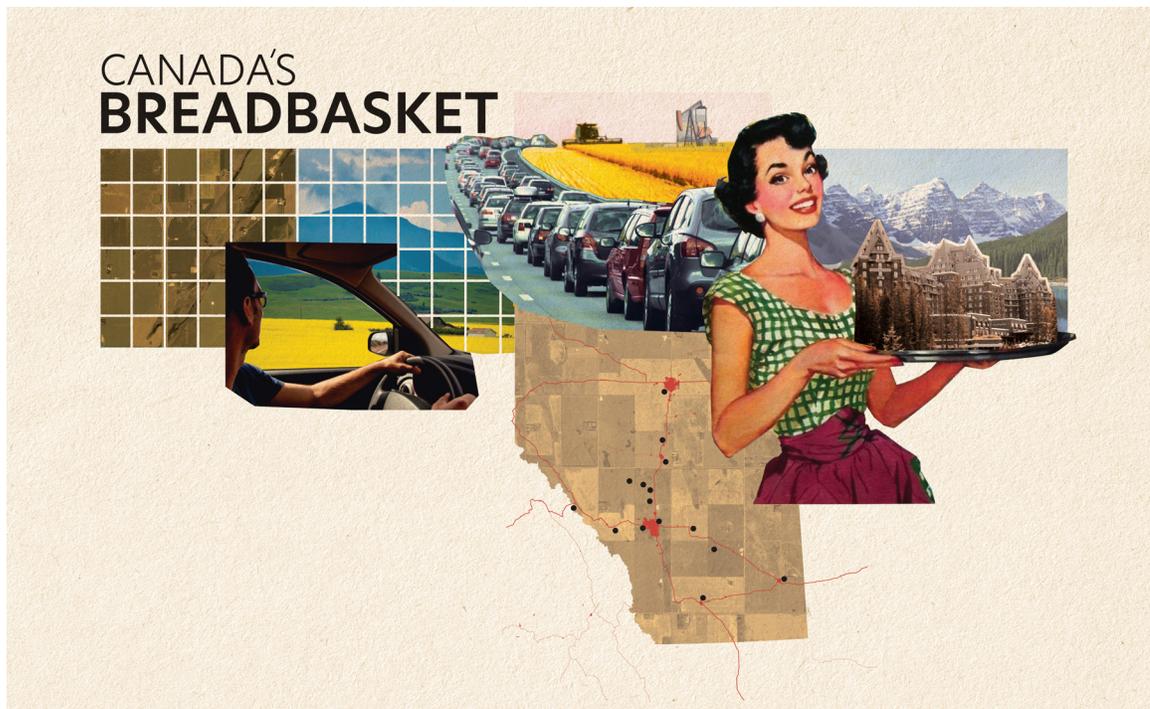
Figure 15.   Collage of the current view of landscape in Southern Alberta from a Western perspective. The black dots on the Alberta map represent my memories of when I felt close to "Nature," usually within a 20-minute drive of a highway system.
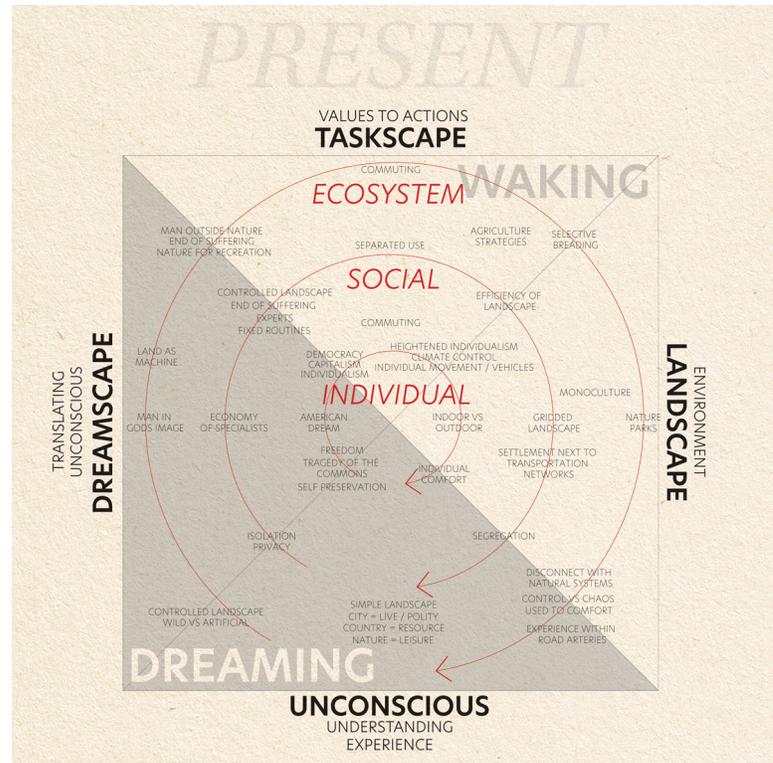
Figure 16.   Diagram of present Western ideology and the relationship between the physical landscape, temporal taskscape, and ephemeral dreamscape.

27). This is similar to traveling in a vehicle along a gridded road of the Canadian Dominion Land Survey. The straight roads and parceled sections reinforce the same thinking that considers land as property and an abstraction into dollars. The speed at which we travel through the prairies by vehicle allows one to become disconnected from the prairie as the landscape is never seen for its intricacies.

Relational effects on the ecological taskscapes are found within plant breeding and cattle grazing. We have cultivated plants that now depend on us for survival (Todd and Todd 1994, 136). These introduced plants remain unlinked from the natural ecosystem and require irrigation, fertilizer, pesticides, and herbicides, which all continue to disturb natural systems. Cattle grazing has also entirely replaced

natural grazing systems. In order to work with the land, an understanding of cattle grazing rotation is needed.

In his book *The Wheatgrass Mechanism*, Gayton argues that the great plains may be the most changed biome on the planet (Gayton 1992, 25). It could be argued that grasslands are the least appreciated and most misunderstood biome as well.

Economic tasks like cattle grazing have become simple and linear—a momentum maintained under the cult of progress. As Leroy Little Bear puts it, "Singularity manifests itself in the thinking processes of Western Europeans in concepts such as one true god, one true answer, and one right way. This singularity results in a social structure consisting of specialists" (Little Bear 2000, 82). Very little is known about the consequences of these economic tasks, and very little is asked.

> The cowman who cleans his range of wolves does not realize that he is taking over the wolf's job of trimming the herd to fit the range. He has not learned to think like a mountain. Hence we have dustbowls, and rivers washing the future into the sea (Leopold 1949, 132).

We must learn to think like the landscape in all its relations to design for it.

Western Dreamscapes

The disconnect continues into Western dreamscapes in which the human is placed outside nature and told to preside over it. In Abrahamic traditions, the vision of the creation of man is separate from other animals in which the human's body is molded from the Earth, but his spirit is breathed through God, creating a distinct separation from the earthly body and the metaphysical spirit. In the words of Gregory Bateson, "If you put God outside and set him vis-a-vis his

Figure 17.   Comparison of 2 different representations of landscape by British landscape designer Humphry Repton in the 1700s showing different ideas of landscape and how much human control is placed over them. These are visual representations of Western dreamscapes. (Repton 1789, 12 & 13)

Figure 18.   "The Herd," drawn from memory by Martin S. Garretson, shows an overwhelming scene of the migration of buffalo on the landscape. This representation describes an alternate dreamscape — one full of life and beings. We can instill new emotions and ideas depending on how we represent the landscape. (Garretson 1860)

creation and if you have the idea that you are created in his image, you will logically and naturally see yourself as outside and against the things around you" (Bateson 1973, 101). Ian McHarg suggests in *Design with Nature* that this original story of the uniqueness of humans and humans being given dominion over nature encourages exploitative actions rather than creative actions (McHarg 1971, 26).

I grew up within a conservative Christian community and have felt this disconnect with natural beings. Through studying ecosystem functions, the history of Alberta, and researching Indigenous ways of knowing, I have come closer to a genuine empathy for nature, but a mental disconnect still remains. The transfer of analytical knowledge to emotional engagement is still a gap that has taken much effort to cross. In *The Wheatgrass Mechanism,* Don Gayton likens our disconnect from the Earth to the loss of a mother, the loss of a relational bond with the Earth in which our morals around how to act with the Earth have become unclear (Gayton 1992, 144). He vulnerably describes the feeling of a lack of care for the Earth due to this disconnect (Gayton 1992, 145). This final chapter of the book is quite unsettling to hear from an ecologist who has devoted their life to biology and writing on ecosystems. There is a spiritual and emotional disconnect with the ecosystem. How can we start to develop genuine empathy with the Earth?

Where Do We Go from Here?

We have now domesticated most of the Earth with agrilogistics embedded in our humanistic systems (Morton 2018, 43). It becomes hard to see any other way of being in the world when we are dependent on the current system.

These circuits and balances of nature can only too easily get

out of kilter, and they inevitably get out of kilter when basic errors of our thought become reinforced by thousands of cultural details (Bateson 1973, 461).

Within a capitalist system, we are all trying to guarantee our safety, not with food but with capital. The tragedy of the commons is caused by this market system that is disconnected from ecology, resulting in consequences to the ecosystem that no one truly wants (Vogel 2015, 202). For a future of coexistence to manifest, humans must make peace with contradictions between human and non-human taskscapes. We must rethink our economic temporalities to be set within ecological loops (figure 19).

> If we are to learn to reassemble some of this productivity, we must know something of the landscape's original condition, the relationship between all species, including humans. This is how we must address sustainability (Manning 2009, 17)
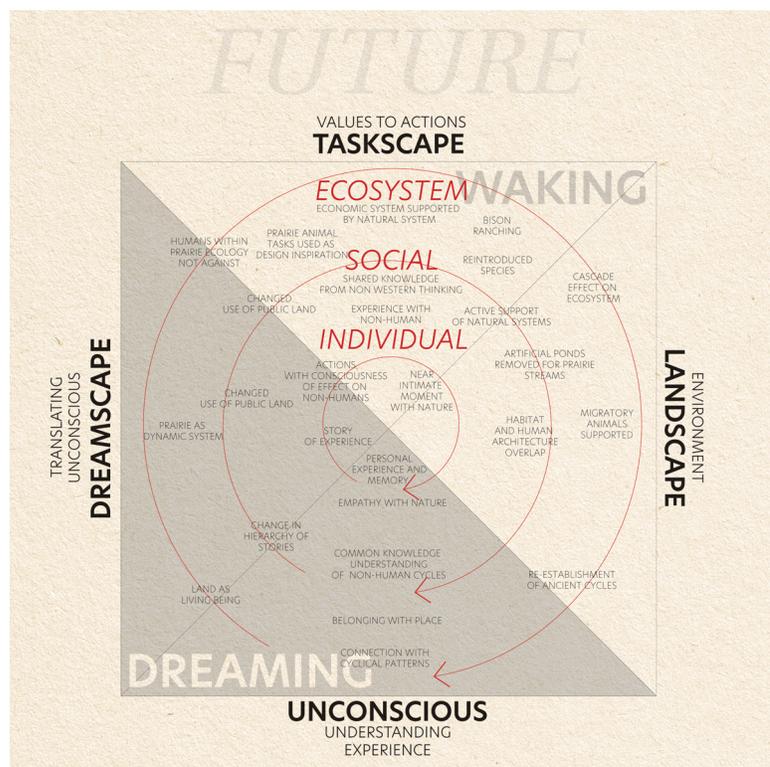
Figure 19.   Diagram of a future relation between Taskscape, Landscape, Dreamscape, and Unconscious to help reinforce that humans are part of nature.

Figure 20.   An early wish image about designing with the ecosystem in mind, intertwining the artificial and natural landscape, invigorating them with myths and stories from various cultures.

In *Thinking Like a Mall*, Vogel emphasizes that practicing restoration ecology helps instill the virtue of humility (Vogel 2015, 119). This restoration of ecosystems should be understood as aiming to let processes that are not wholly understood come to dominate a landscape, learning to live within a degree of uncertainty (Vogel 2015, 106).

To start to see the way forward, we must also start to change our dreamscapes and develop empathy with the more than human world. We must look at other ways of seeing the landscape by researching and deep mapping the history of the place. This can be done by studying how the prairies have changed through colonization, listening to the world views and stories of Indigenous nations, and viewing the landscape through the eyes of non-humans.

Chapter 4: Landscape as Process and Making Relations

Non-Western Taskscapes in the Alberta

This land of the North Western great plains is the land of the Siksikaitsitapi (Blackfoot-speaking nations) or the Niitsitapi (the real people). The Siksikaitsitapi tribes include the Kainai, Siksika, Piikani, and Aamskapi Pikuni. The Siksikaitsitapi's way of being in the land is based on living within the processes of land (Figures 21 and 22). Balance is the law of life and becoming one in balance within the interrelated relations of the landscape (Bastien and Kremer 2004, 12). In *Blackfoot Ways of Knowing*, Betty Bastien explains that learning from the behavior of animals can illuminate unknown workings of the landscape that reveal balance and harmony (Bastien and Kremer 2004, 93). Leroy Little Bear also explains in an article on traditional knowledge that "Certain events, patterns, cycles, and happenings are readily observable on and from the land, for example, animal migrations, cycles of plant life, seasonal rounds, and so on" (Little Bear 2012, 522).

Landscape is a process. This is more evident than ever in native grasslands, which are at the low end of ecosystem succession and change much quicker than climax systems such as forests. The grassland regrows regrows yearly and constantly fluctuates grasses and forbes depending on climate and disturbances such as rainfall, grazing, wind, and wildfire.

Western thought often views the world as static. How does object one affect object two? Indigenous author and scientist Robin Kimmerer in *Braiding Sweetgrass,* describes

Figure 21.   Migration map of various Siksikaitsitapi groups. This map shows an Indigenous nomadic lifestyle that flows with the natural processes of the ecosystem. The Siksikaitsitapi would travel with the changing of climate, availability of forage, and migration of bison. Within this landscape are many spiritual places that foster a spiritual connection with the land. This map shows only a small portion of this way of life. (Data from [The Blackfoot Confederacy of Alberta 2017, 22 & 23][Brumley 1988][Calling Last 2023][Glenbow 2013, 41][Oetelaar 2006, 387])

Figure 22. A calender describing some of the actions taken by various Siksikaitsitapi groups along their yearly round that is shown in the previous map. (Data from [The Blackfoot Confederacy of Alberta 2017][Oetelaar 2006][Bastien and Kremer 2004][Lapier 2015])

science as a language of objects, which reduces a process into its parts (Kimmerer 2013, 49). Knowing the landscape as process involves knowing the relationships between these parts. This viewpoint of the relations between parts is embedded in Indigenous language.

> Aboriginal languages are, for the most part, verb-rich languages that are process- or action-oriented. They are generally aimed at describing "happenings" rather than objects (Little Bear 2000,78).

> Moreover, our language teaches us that everything alive is both physical and spiritual ... that everything is interdependent and interconnected... and that humans are only a small part of the whole... and thus, that everything we do to our Earth Mother, we also do to ourselves (Bartlett 2015, 289).

This way of viewing the world is fundamentally different from English-based languages that are more noun based. We must recognize how much this can affect one's emotional connection to the Earth and how important Indigenous languages are to continue fostering this connection.

Non-Human Relations

The key to building with land is observing the relationships on it and within it. In *Fundamentals of Ecosystem,* Eugene Odum describes "living" organisms as inseparably related to each other and the "nonliving" environment (Odum 1971, 8). A problem with this quote may not be seen at first until we try to shift our perspective. There is a distinction between "living" and "non-living," a fundamental view that a Westerner may never think to question. Robin Kimmerer describes in *Braiding Sweetgrass* that Indigenous languages, such as Ojibwe, are about relationships and process, giving the natural environment animacy. "Nouns and verbs both are animate and inanimate" (Kimmerer 2013, 53). When describing a bay, Kimmerer uses the word *wiikwegamaa,* meaning "to be a bay" (Kimmerer 2013, 54). "To be" gives

life to something that we may consider dead. What does it mean to be a prairie?

Empathy is needed on a landscape scale. Animal ethicist and feminist philosopher Lori Gruen argues in *Attending Nature* that we must create empathy with the non-human world but laments that this empathetic engagement is challenging with large-scale natural entities (such as a prairie) because they lack emotion within Western epistemologies (Gruen 2009, 31). I would argue that this is due to our language used to describe natural environments and our objective thinking about the environment. Bateson describes Martin Bruber's distinction between "I-Thou" and "I-it" relationships and how "I-it" relationships do not allow for love to form. Bateson argues that if we see the ecosystem as a cybernetic system or system of relationships, we can have an "I-thou" relationship with the ecosystem at large (Bateson 1978, 421). We may be able to empathize with grasslands if we start to understand the relations within the processes and interactions of non-humans.

Gruen's ideas of engaged empathy describe how we can develop empathy with non-humans through study. She argues that we can create empathy by learning about the conditions of non-humans but also understanding why it is in this position (Gruen 2009, 30). This type of empathy requires effort in learning and motivates the empathizer to act ethically (Gruen 2009, 30). Engaged empathy requires understanding how an animal functions in the environment, how they co-evolved within the landscape, and are within relationship with the environment. We can foster this understanding with non-humans by imaginatively placing ourselves in their position (Klaver 2014, 140).

Empathizing through being with and observing an animal, telling stories about the animal, and researching its needs and evolutionary history using scientific research, can help us create a more empathetic view of non-humans. This study of interconnectivity can also extend beyond non-humans to help us understand our own relations to the ecosystem. This empathy can enliven the dreamscapes of our daily life as we witness these beings interact.

Non-Human Taskscapes

Ecosystems and relations can be understood in part through observing an animal. To attempt this observation, various actors of the Alberta prairie landscape were chosen to be researched and studied. The taskscapes of the bison, the sharp-tailed grouse, the swallow, the burrowing owl, and Alberta's glacial-formed land morphology were studied to illuminate unknown connections between them and other ecosystem pieces (figure 23). It is important to note that because of the scope of this thesis, the research is purely literary, and to understand an ecosystem truly, one must go to it and observe it in person. Understanding takes years of observation. Research from afar can often distill relationships into the working of parts, and special attention must be made to focus on creating relationships with those beings and understanding how one being affects another. The nature and research center described in later chapters will provide space for researching and observing in situ. It would also give space to enliven imagination and inspire artists, providing space for the display of this art to help shift our dreamscapes and spiritual connections to the land.
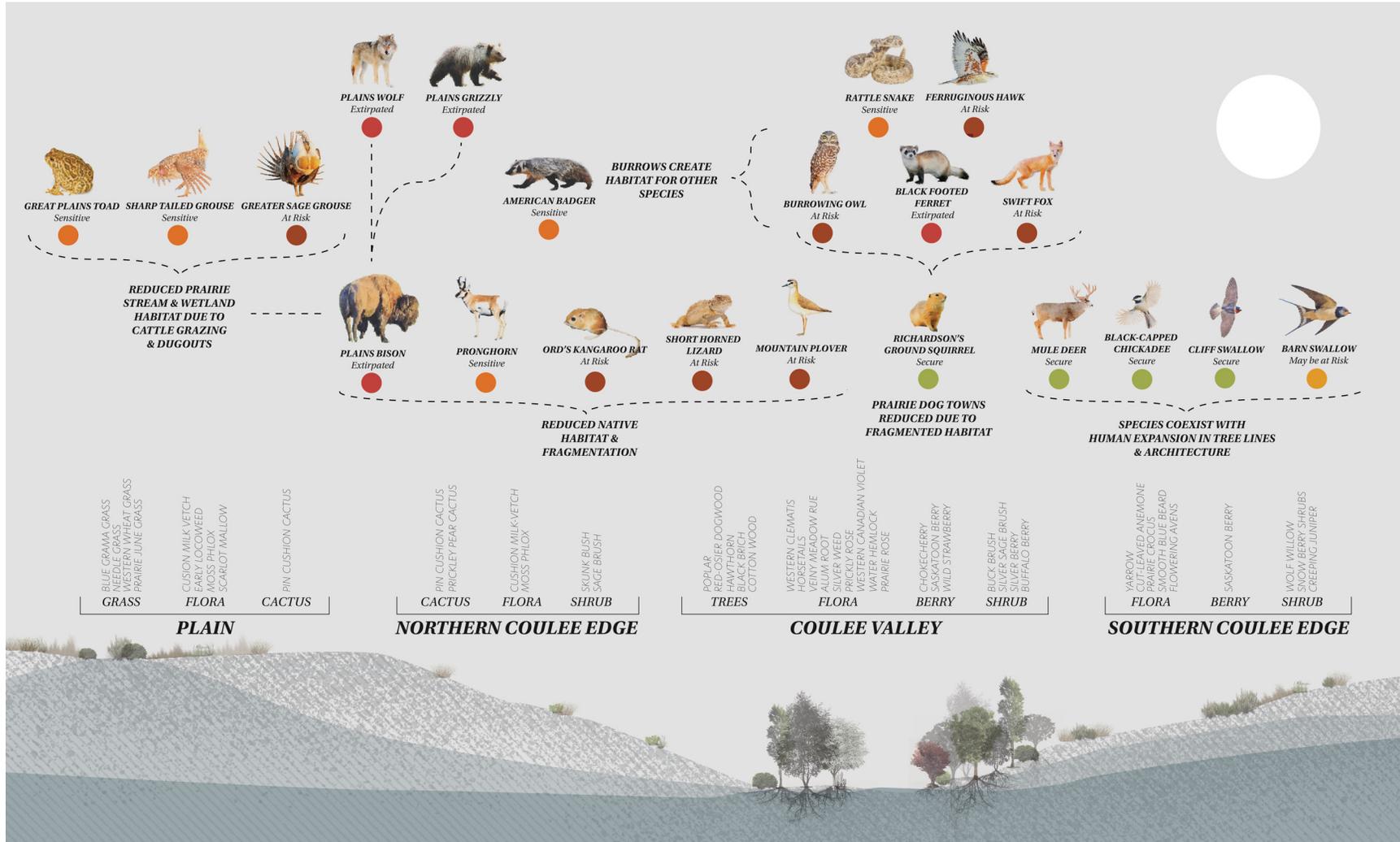
Figure 23.   Interrelation between species and landscape. The least amount of vegetation forms on the Southern coulee edge due to prolonged sun exposure and melting/ evaporating of snow on those slopes. (Data from [Government of Alberta 2023][Kuijt, Bain, and Flanagan 2014])

Chapter 5: Ways of Reading Landscape - Ecology and Architecture (Methodology)

Ecological Structure

To design spatially and formally to encourage animals to interact with the architecture, ecological structure principles were reviewed and extended to architectural intervention. The structural pattern of the ecological landscape can be divided into spatial elements of patch, edge, corridor, and matrices of all three (Dramstad, Olson, and Forman 1996, 14). These structural elements come together to form a landscape mosaic. Many of the land mosaics in the current agricultural landscape are fragmented; patches are too small, corridors are cut by roadways, and connectivity is missing on a large scale. By learning ecological structure principles, architects and planners can start making informed design decisions consider non-human taskscapes and enable designers to have informed conversations with ecology experts to help mitigate habitat loss and fragmentation.

Patch

Patch is an area that represents a specific habitat or niche (Dramstad, Olson, and Forman 1996, 19). Patch size, on a landscape conservation scale, can be used to determine appropriate habitat expanses for animals. Many species need a mosaic of various patch types to complete their annual cycles of migration, mating, nesting, wintering, and brooding. In architecture, the roof, rooms, wall faces, and landscape can be considered and designed as patches that facilitate space for these needs.

PATCH

EDGE

CORRIDOR

Figure 24. Ecological structure principles of patch, edge, and corridor
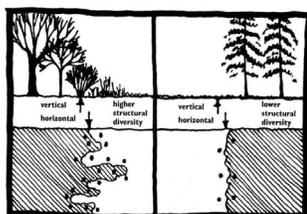
E1. Edge structural diversity
Vegetative edges with a high structural diversity, vertically or horizontally, are richer in edge animal species.
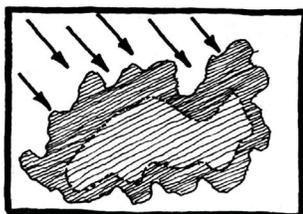
E2. Edge width
Edge width differs around a patch, with wider edges on sides facing the predominant wind direction and solar exposure.
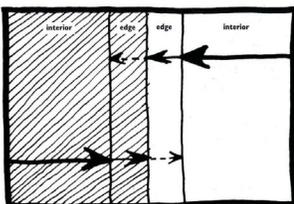

E4. Edge as filter
Patch edges normally function as filters, which dampen influences of the surroundings on the patch interior.
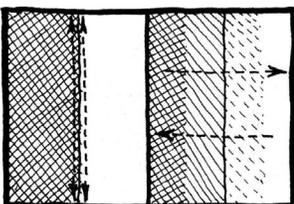
E5. Edge abruptness
Increased edge abruptness tends to increase movement along an edge, whereas less edge abruptness favors movement across an edge.
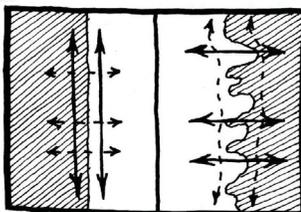
E7. Straight and curvilinear boundaries
A straight boundary tends to have more species movement along it, whereas a convoluted boundary is more likely to have movement across it.

Figure 25. Ecological edge principle diagrams by Richard Forman (Dramstad, Olson, and Forman 1996, 28-30)

Corridor

Landscape connectivity between patches is of utmost importance to the health of ecosystems (Dramstad, Olson, and Forman 1996, 35). The connection between patches in Alberta are often segmented due to monoculture agriculture and infrastructure. Corridors can be created through architecture at points of conflict between natural and industrial landscapes. Intersections of corridors can also affect diversity of animals. "Intersection effect: At the intersection of natural-vegetation corridors, commonly a few interior species are present, and species richness is higher than elsewhere in a network." (Forman 1996, 43). These corridors can either be fully connected or a stepping stone depending on the size and proximity of patches.

Edge

The edge condition exists on the perimeter of a patch separating two types of habitat patches (Dramstad, Olson, and Forman 1996, 27). The edge is an area of interaction and filtering of species that creates a more diverse habitat because it shares traits of both flanking habitats. Within architecture, the concept of edge can be pulled and expanded beyond a simple border. The wall can be considered an edge, just as a veranda can be considered an edge. We can learn from ecology principles by expanding this border and occupying it with various programs and spaces for both humans and non-humans.

Edges naturally suggest movement. Harsh edges suggest parallel movement, while gradients and harsh curves suggest perpendicular movements (figure 25). These moves are instinctual amongst animals, including humans. As we design the edges of our buildings, we can keep these

principles in mind to include the inhabitation and use of non-humans (figure 26). Some examples of designing for non-humans with these principles are creating slight overlaps at roof edges, using exterior materials that may foster the growth of plants or inhabitation of insects, orienting materials on facades to create habitat for bird species, utilizing gaps between structural elements, and strategically draining rainwater into bio-swales to create new corridors and edges near the architecture.
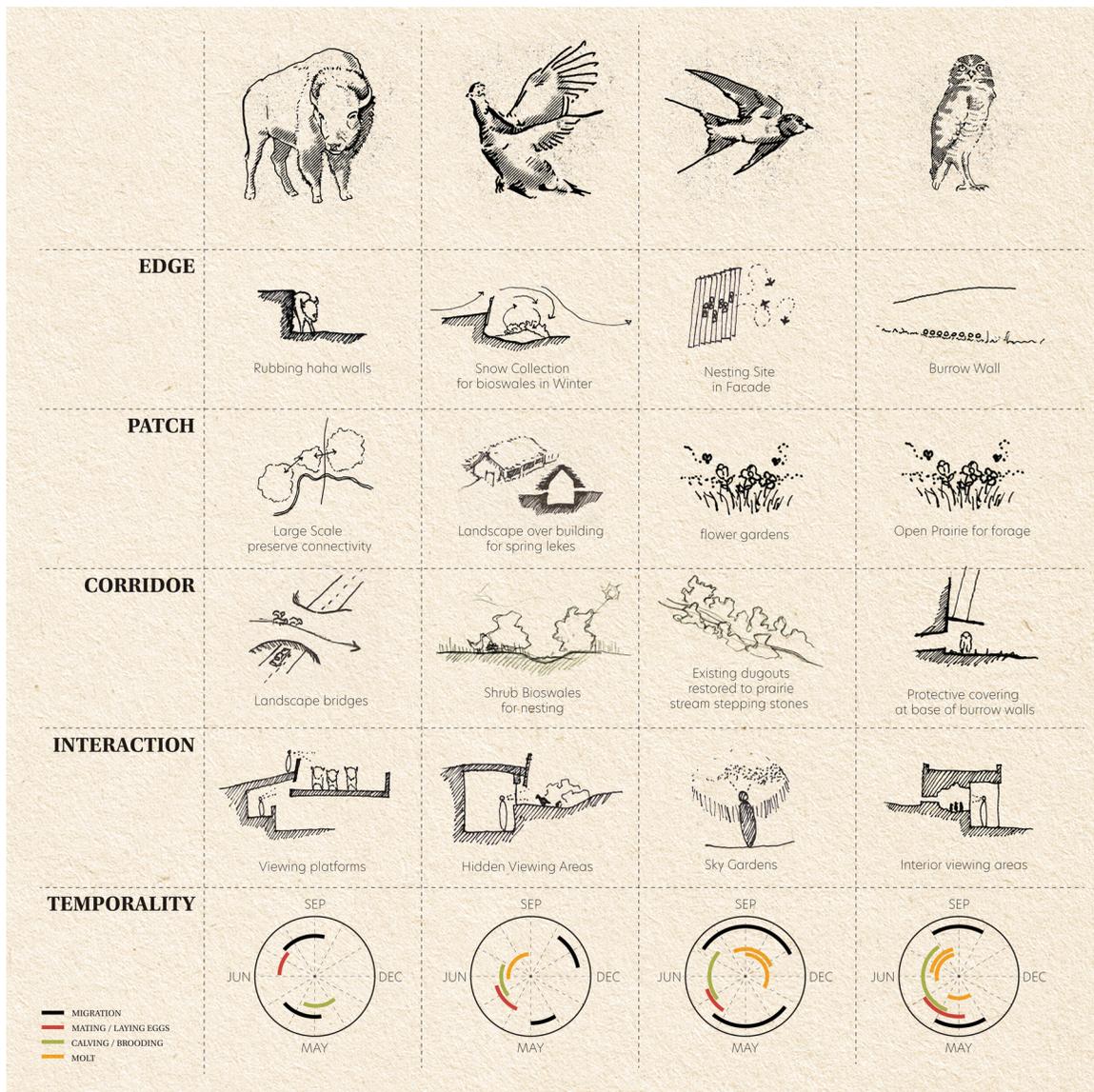
Figure 26. A diagram was used to connect the ecological structural principles with non-human actors through architectural intervention.

Perspective and Presence

Architecture can be used as an armature to reveal and highlight natural events and non-human taskscapes at these patch, edge, and corridor conditions. By shifting our focus to the intersections of architecture and non-human taskscapes, we can start to observe, learn, and foster empathy. The first method of shifting focus in a prairie landscape is through positioning and bodily presence. The second method is by sequencing a shift of perspective between near and far experiences—moments of interaction segmented by moments of reflection.

Presence

The creation of present-moment awareness in architecture is one that can connect our bodies to what is happening in the landscape. These happenings include the phenomenology of the taskscape, the feeling of wind over one's skin as shadows of clouds drift across seas of grass, the buzzing of an insect through a field of wildflowers, and the sky shifting as a warm chinook wind passes over from the rocky mountains. These moments can be amplified through architecture by guiding one's attention to their bodily movements and focusing perspectives. Japanese Zen Buddhism architecture is one that attempts to create an architecture of presence.

In traditional Japanese architecture is the concept of Ma or "boundary in motion" (Kawai 2018, 14:45). This is the moment along an edge between two patches, whether they be cultural, sacral, or ecosystem. An architect can dramatize this edge or boundary experience through physical gaps, spaces of engagement, framing of different views, changes in material, activation of peripheral vision, or forcing a

visitor to reposition their body (crouch, manoeuver, step up, step down). These can help create mental thresholds between spaces. A series of these small thresholds can help gradually shift a viewer's state of mind into one more grounded in the present moment. In traditional Japanese temples, small thresholds are created through sliding doors that are opened and closed between each room in a progressional route (Kawai 2018, 35:30). These moments of interaction encourage visitors to focus on the physical act of opening the door, which brings their mind into the present action of their body. Within a temple, this reflection is often combined with links to nature through Zen rock gardens that encourage a casting of the imagination into a relatively empty vista of sand and stone. This connection between a physical presence and reflective gardens allows wonder to take over, creating an intimacy with the present moment and our bodies in space. Gaston Bachelard refers to this leap as intimate immensity (which we find in abundance when we tune into the Earth) (Bachelard and Danielewski 2014, 186). We cast our imagination into an immense space, and it becomes a reflection of ourselves, a space of daydream. "since immense is not an object, a phenomenology of immense would refer us directly to our imagining consciousness." (Bachelard and Danielewski 2014, 180).
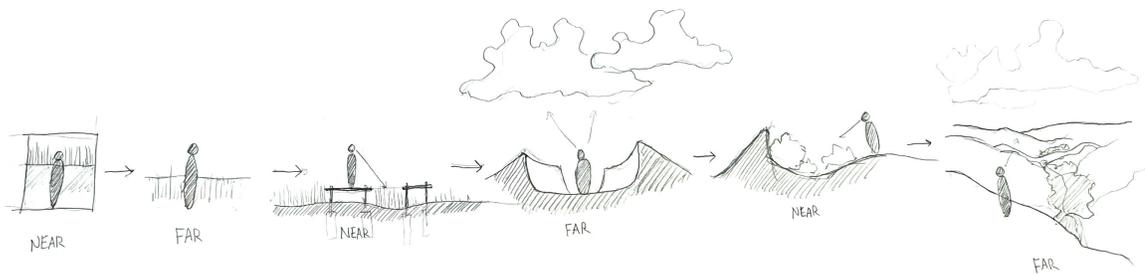
Figure 27.   Conceptual sketches of the fluctuating sequence between Near and Far, reflection and projection. Within these moments are spaces for intimate immensity.

Far and Near

The prairie landscape is a landscape of immensity. Authors like Gaston Bachelard compare these immense spaces to spaces of daydream (Bachelard and Danielewski 2014, 179). The prairie is a landscape that allows one to fall into thought and contemplation. Wallace Stegner writes in *Wolf Willow* that this landscape "is a country to breed mystical people, egocentric people, perhaps poetic people. But not humble ones. At noon the total sun pours on your single head; at sunrise or sunset you throw a shadow a hundred yards long. It was not prairie dwellers who invented the indifferent universe or impotent man. Puny you may feel there, and vulnerable, but not unnoticed." (Stegner 2000, 8). The viewer throws themselves into the expansive view and is lost in thought. The prairie is a reflection of the self as we stand and cast our minds into the landscape.

Figure 28.   Far Prairie Landscape (Evans 1986, 51)

The land is usually rich in diversity. The emptiness of the prairies is an illusion created by agriculture and Western consumption (Manning 2009, 13). The homogeneity of grass is due to the missing non-humans in the landscape we removed. The grassland is a landscape of subtlety. Subtle shifts in grade create streams. Subtle changes in grazing patterns can affect vegetation distribution damaging the whole ecosystem (Manning 2009, 165). The landscape is constantly flowing and changing. Drought and fire can dramatically shift the vegetation that grows from year to year. To build humbly within this landscape requires subtlety, something that does not come naturally within the built landscape.

Near experiences that reveal these subtleties can inform the imagination that fills the immensity of this Prairie landscape.

Figure 29.   Near images of prairie vegetation and textures (Evans 1986, 26 & 43)
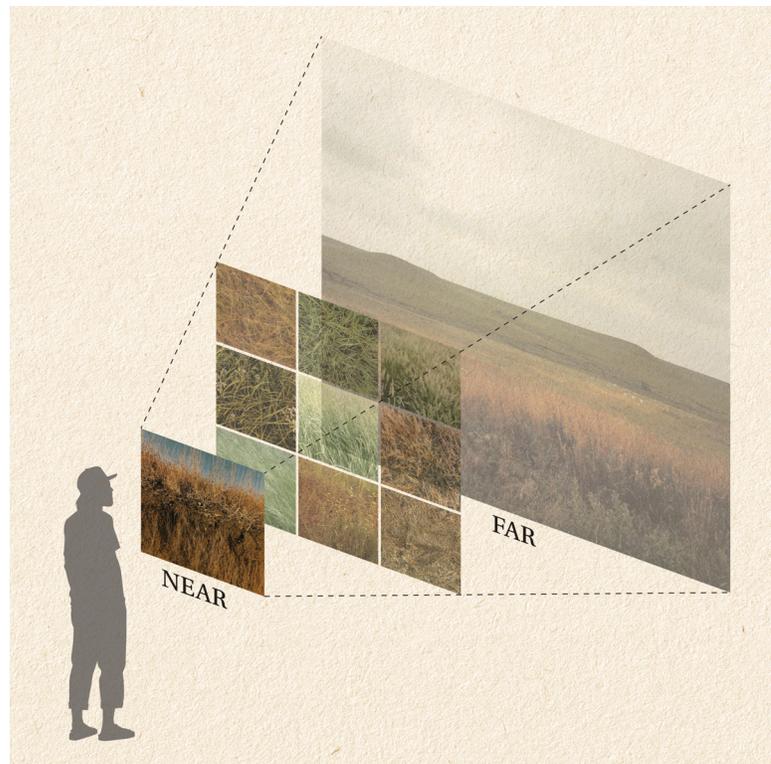
Figure 30.   Casting ecosystem-informed imagination into the landscape creates a vivid and dynamic understanding of place.

When something is hidden from view, it allows the viewer to fill in the missing pieces, allowing something to contain more and be richer through our imagination (Kawai 2018, 11:30). The imagination that is cast out onto this landscape is dependent on the viewer.

Casting our imagination into the prairie requires knowledge and is a reflection of ourselves and our understanding of the landscape. Without understanding and relation with nature the image cast out will not reflect the ecosystem. When looking over a prairie, does the viewer see a dynamic system of non-humans and climate relations or a land viable for economic export? Architecture can be used as a tool to shift our attention to the subtle workings of the ecosystem so that the projected imagination is environmentally informed.

Near experiences with non-humans, art, and educational spaces can be a way that architecture can frame the relationships of the prairies. By pairing these near spaces with reflective viewing areas into the landscape, we can attempt to cast an informed imagination into the landscape. One that imagines the subsurface burrows winding through forests of grassroots that stretch many feet into the dark soil or imagining the bison roaming just over the next coulee edge.

To shift this far perspective, we need to look closer. By sequencing between moments of near interaction and far reflective spaces, we can bring focus to the relations of the prairie. Adding to our imaginations in the near so that we can project the learned into the far. This would be done so with the intent of shifting focus from self over landscape to self within and in relation to the process of landscape.

Active and Passive

The last method used to design with nature is using active a passive strategies. If the form and placement of the building is designed with non-humans and climate in mind, it becomes impossible to value engineer out because it is part of the base ethos of the architecture.

Passive architectural strategies can be created through structures that utilize the force of gravity for water collection, maximize solar gain/ South Eastern exposure, and take advantage of the natural heat from the Earth. Passive architectural strategies will ensure that the building blends seamlessly into the surrounding landscape.

Active architectural strategies may require more complex consideration, such as providing movable louvres for changing sun exposure needs or altering the use of the building at different parts of the year depending on the ecosystem and climatic needs.

By designing with passive and active strategies and invigorating them with experiential moments of near and far, we can attempt to make an architecture that not only lightly affects the place it is situated but creates moments where we can develop understanding and empathy with the more than human world.

Chapter 6: Bison and Migratory Patterns

These concepts and methods are used to test how architecture can act as a tool to engage with the non-human world and facilitate non-human taskscapes of migration and annual cycles. Architecture is used as a framing device to draw attention to these taskscapes and guide attention to the interconnection of the prairies at both the large and small scales, both physically and temporally.

To test this, a nature and research center was designed that forms a land bridge on the edge of a highway passing through a proposed prairie preserve in Southern Alberta (figure 37 and 39). The nature center allows for the free migration of animals while also creating interaction points for near experiences with non-humans and far experiences through vistas and look-offs. The bison are the main migratory animals focused on.

Migration

Bison are plains wanderers. Bison herds would originally migrate across the plain in order to find plentiful grass in the dynamic grassland (Helzer 2010, 134). Bison winter in the forest of the parkland ecoregion of Alberta, where they find shelter from winter storms and eat grass that has grown throughout the summer (Morgan 1980, 143). During the summer, they follow the grass as it matures towards Southern Saskatchewan to mate (Morgan 1980, 158). The bison would return to the parkland in reaction to the availability of grass and water as the weather changes towards autumn (figure 33) (Morgan 1980, 156). Through these movements, a co-evolved system of buffalo grazing,

Figure 31.   Bison Grazing in Maxwell Game Preserve, Roxury, Kansas (Evans 1986, 52)

Figure 32.   Bison Grazing in Maxwell Game Preserve, Roxury, Kansas (Evans 1986, 52)

grass, water, and climate are displayed. Connecting to a migratory animal can help one to contribute to a sense of belonging within a natural ecosystem (Stringer 2018, 149)

Migration is now restricted within Alberta's current agrarian landscape. Private property, roads, fence ways, and extensive monoculture are at odds with this migration. Bison no longer exist within this landscape and are considered extirpated from Alberta. The erasure of the bison was due to a combination of over-hunting and racial prejudice against Indigenous nations' whose way of life was dependent on bison (Manning 2009, 38). This was one of many events that have contributed to the cultural genocide that is all around us. The very existence of migratory animals is in conflict with agriculture that pens in private property to avoid unwanted grazing of cropland. The prairie cannot be reinstated to its ecological truth without these animals, .
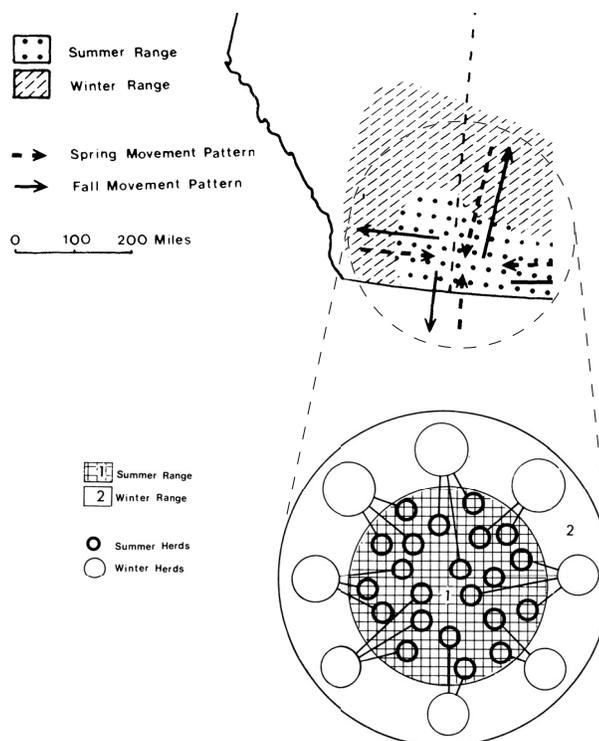
Figure 33.   Prehistoric Bison Migration on the Northern Canadian Prairies (Morgan 1980, 157)

Grazing Patterns

One of the most destructive changes to the grassland biome is the shift from the grazing patterns of buffalo to cattle. Bison graze differently than cattle and can provide various habitats that increase species richness and patch structure (Shamon et al. 2022, 4). Bison graze sporadically, grazing one area heavily and moving onto a new area, creating a patchwork of heavily grazed areas (Gayton 1992, 104)(Shamon et al. 2022, 4). Bison also graze on mostly grasses and are more selective than cattle (Hezler 2010, 20).

Cattle are non-selective and feed on a variety of species compared to bison (figure 34) (Hezler 2010, 121). This has put more pressure on forbes species, decreasing habitats for species of birds that require forbes to attract insects. Cattle are also more susceptible to heat than bison and find cover within riparian habitats putting pressure on this already rare habitat (Hezler 2010, 18 & 133)(Shamon et al. 2022, 5). This pressure of grazing of riparian edges, combined with
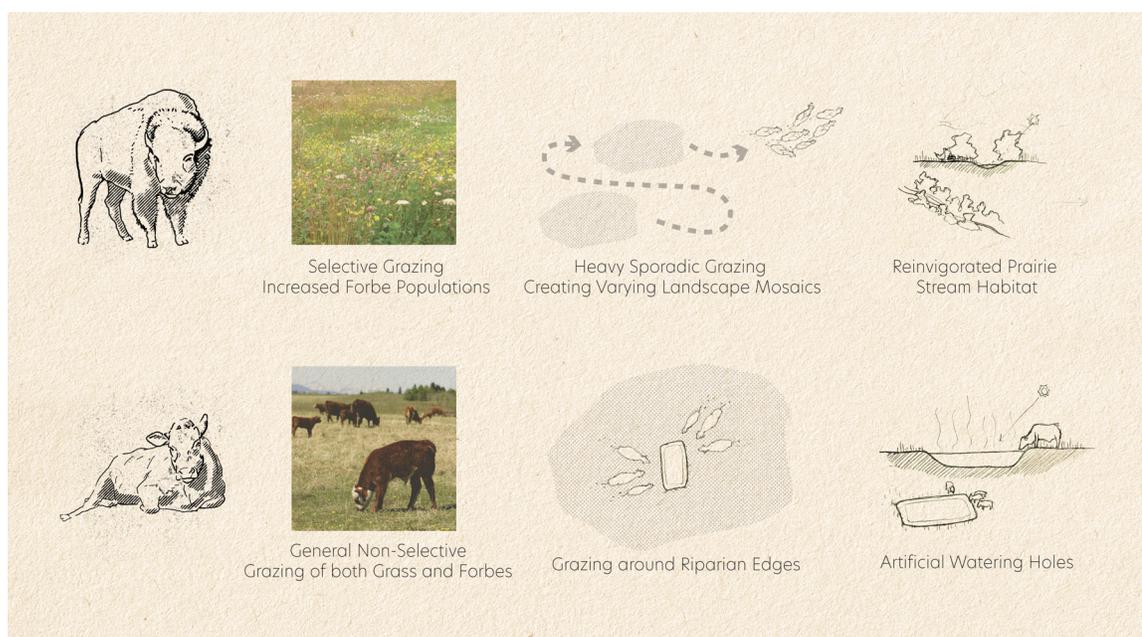
Figure 34.   Diagram showing the differences between Cattle and Bison grazing.

the digging of artificial ponds across the plains to provide watering holes for cattle, have eliminated many prairie streams and riparian edge habitats (Manning 2009, 121).

Grasslands require grazers to produce varied habitats and control species growth. For a grassland to be appropriately managed, ranching requires constant moving and highly managed herds of cattle. Through multiple examples of existing attempts to reintroduce bison herds, little management is needed, and the herds are minimally handled compared to cattle (Shamon et al. 2022, 8). By loosening our grip on the grazing system and letting a non-human take over, we can start to relinquish control of the ecosystem.

Bison will migrate naturally due to co-evolution with the dynamic landscape, naturally creating mosaics of landscape habitats through their grazing patterns that many other species within grasslands require. (Forrest et al. 2004, 29). By allowing bison to repopulate the prairie landscape we can learn the relations of a natural prairie and how to live within them.

Reintroducing Bison and Public Property

Large expanses of publicly owned land in Alberta are currently being used as lease land for cattle grazing that could be switched to bison grazing. According to the Alberta Grazing Association, there is around 8 million acres of crown grazing land throughout Alberta (AGLA 2023). Richard Manning, in *Rewilding the West* talks at length about the reuse of public land for reinstating natural prairies and reintroducing bison (Manning 2009, 118). His research is mainly focused on public land in Montana through the research publication *Ocean of Grass* that located the best land for conservation

based on best habitat, most undisturbed prairie, and an overlap with public land (Manning 2009, 7). To locate the site for the research and nature center, this method of mapping was mimicked in Alberta.

Bison habitat was mapped using a combination of land cover type, distance to water, and slope (figure 35). These factors for determining bison habitat were taken from a combination of the research papers "Assessing Potential Habitat and Carrying Capacity for Reintroduction of Plains Bison in Banff National Park" and "The Potential of Bison Restoration as an Ecological Approach to Future Tribal Food Sovereignty on the Northern Great Plains" (Steenweg et. al. 2016, 9)(Shamon et al. 2022, Data sheet 3). A suitability map was created for bison that took into account various factors including land cover type, distance to water, slope,

Figure 35.   Bison suitability map that takes into consideration slope, land cover type, distance to water, and crown land. (Data from [NASA 2015][ESRI Canada 2023][Alberta Environment and Protected Areas 2022][Alberta Agriculture and Forestry 2023][Natural Resources Canada 2020])
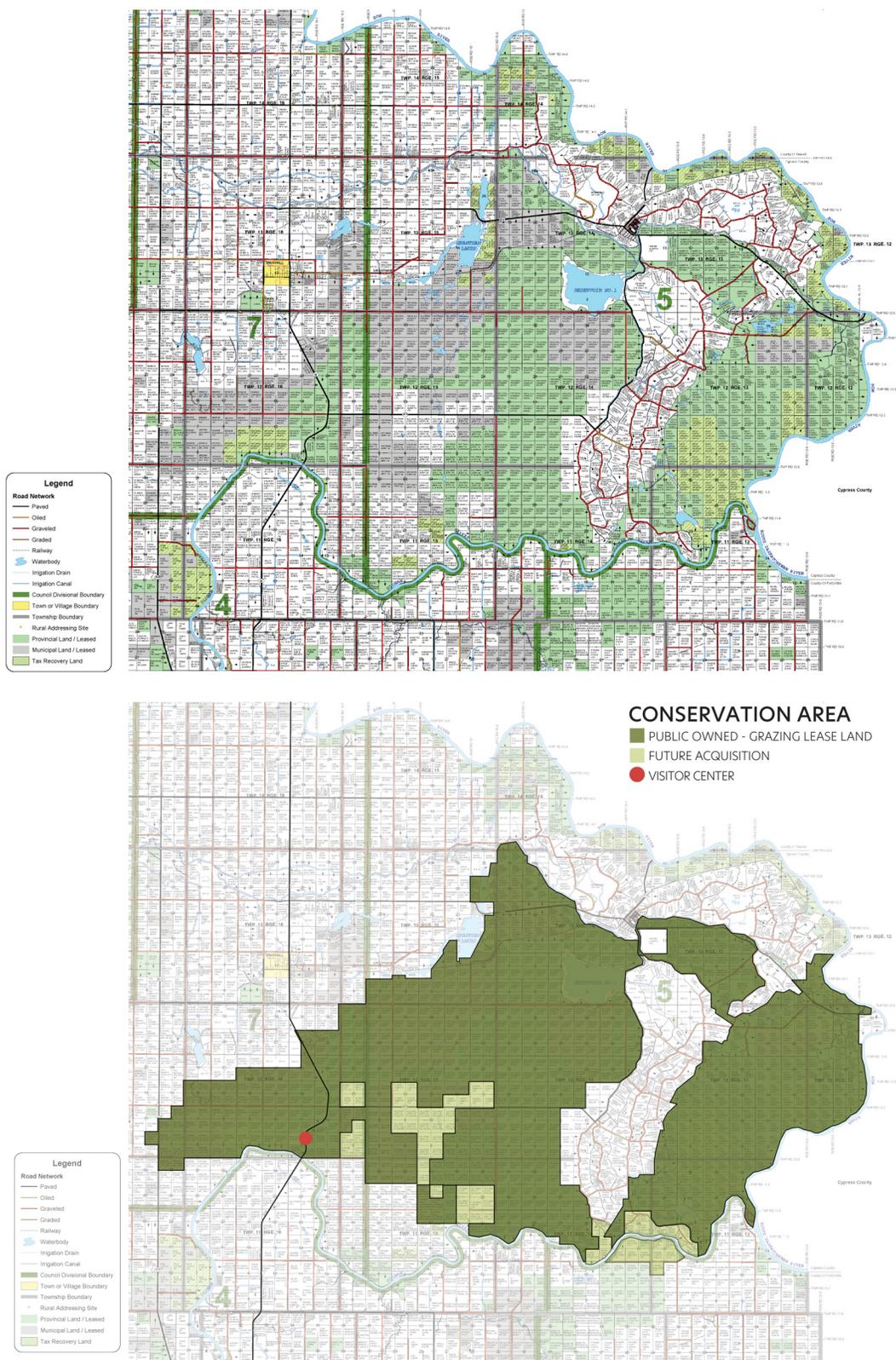
Figure 36. Large expanses of publicly owned land in Alberta are currently being used as public lease land for cattle ranching. These public lands could be converted to bison grazing. (Taber County 2022)
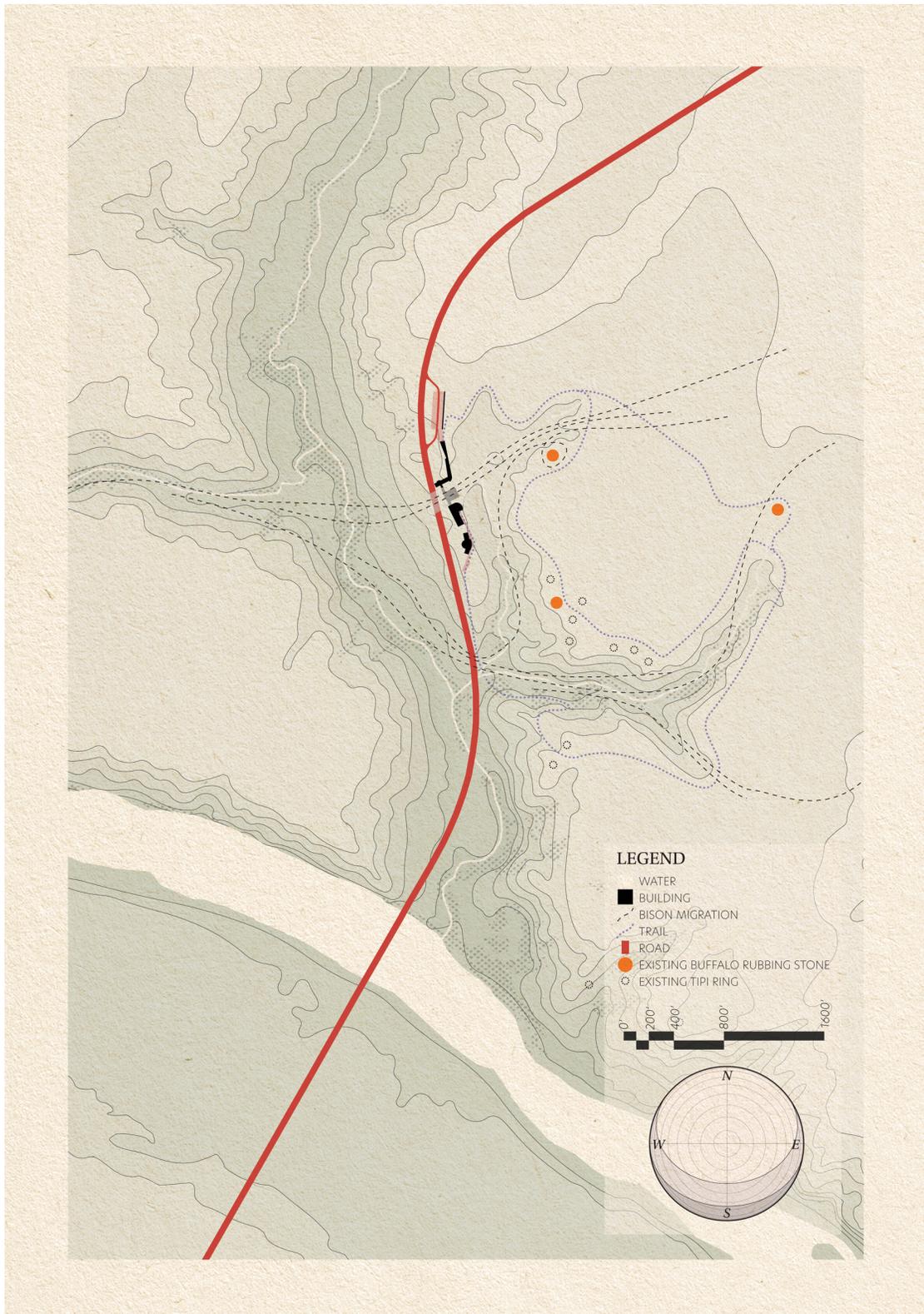
Figure 37. Site plan within Taber County Alberta. The nature and research center is located on a Northern ridge along the edge of the Veteran Memorial Highway near the Old Man River. It creates a land bridge, East and West, over the highway at an area of gradual slope to allow for bison to migrate passed freely.

and public crown land. A large area of provincial and county public land suitable for bison was located in Taber County, Alberta (figure 36).

This public land in Taber County was chosen based on bison suitability, access, and possible public engagement. It is located between the two large urban centers of Medicine Hat and Lethbridge, an hour drive from each through the highway system. This location is hoped to influence public opinion on the use of public land and private land for grazing. Conversations on switching cattle to bison could be facilitated by using this public land as a test site for bison grazing.

Building and Dreamscapes

The Veteran Memorial Highway crosses directly through this proposed preserve providing an opportunity to experiment with the edge condition between the Alberta road infrastructure and the Natural ecosystem (figure 36). A research and nature center was designed in combination with a land bridge to facilitate bison migratory tasks while also creating a space for the public to interact with the natural environment (figures 37, 38, and 39).

Within the nature center is a gallery hall that leads directly under the landscape bridge to a contemplation room (figure 40 and 43). This room rests in the center of a long spine half submerged in the landscape (figure 39). Along the gallery would be displays and descriptions of the bison migration and the connection the Siksikaitsitapi have within the landscape. Through understanding this narrative and experiencing the migration, one would gain new stories to add to their dreamscape.

Figure 38. Preliminary sketch of the center placing a land bridge within the middle of the facility to provide an intersection between human and non-human taskscapes.

PROGRAM

1. Entrance Ramp
2. Reception
3. Washroom
4. Gallery
5. Cafe
6. Elevator Lobby
7. Gallery Corridor
8. Contemplation Space
9. Labs
10. Burrowing Owl Exhibit
11. Grass Exhibit
12. Green House
13. Office
14. Mechanical
15. Auditorium
16. Classroom
17. Look off
18. Natural Garden
19. Sky Garden

Figure 39.   Floor plan of the nature and research center. The middle of the facility forms a land bridge over the highway. Various spaces beside this land bridge provide spaces of near interaction with non-humans as well as look-offs over the surrounding landscape.

At least twice per year, the bison will migrate past this area, from which spectators can watch from a look off and cafe area that runs parallel to the overpass (figure 40 and 41). A quote from Alexander Henry in 1801 describes an experience that this thesis attempts to recreate.

> I had seen almost incredible numbers of buffalo in the fall, but nothing in comparison to what I now behold. The ground was covered at every point of the compass, as far as the eye could reach, and every animal was in motion (Henry 1801, 167).

This describes the visitor's first experience of nearness with a non-human and the concept of near and far, bringing together the experience of wonder similar to the experience of a single wave in the expansive ocean, a single bird within a swarm, and the self within the community. Throughout the building, these near experiences reinvigorate the environmental imagination of the viewer and enliven the perspective they cast over the far landscape. This near

Figure 40.   Section A - Showing the cafe and viewing dock that runs parallel to the land bridge. Underneath this bridge is a gallery hall that is centered by a reflection space in the middle of the facility.

Figure 41.   Rendered View C: Showing the movement of bison across the land bridge. This movement is reflected in the design of the viewing dock that runs beside the bridge.

PROGRAM

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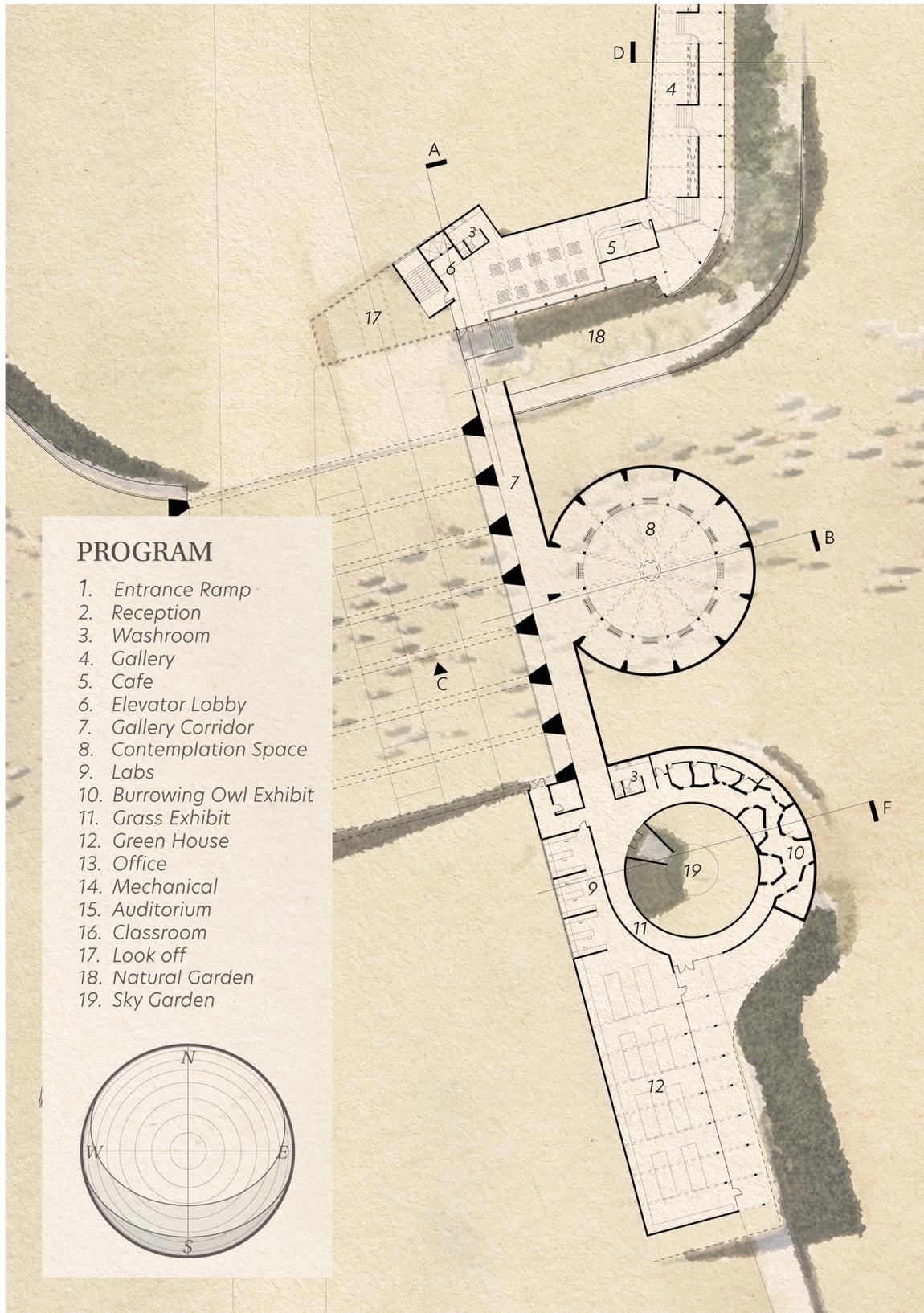
Figure 42. Zoomed-in portion of the floor plan showing the central reflection space (8) along the migration gallery corridor (7).

experience is temporal, only happening twice per year, creating an event that would need to be anticipated by the visitor. This planning would connect the visitor with the far temporal process of migration.

From the viewing dock, one could see three buffalo rubbing stones near the site (figure 37). These are stones that bison, plagued by mosquitoes, would use to itch themselves (figure 43). After generations of use, deep grooves have formed around the base of the stone as the herd swirled around them. A skylight at the entrance of the land bridge mimics one of these stones. As the herd tramples over this area, the structure reverberates underneath, amplifying the sound within the visitors center (figure 44). By placing this space underneath the bridge, the bison are left undisturbed, and a new near interaction is created that is audible and multi-sensory.

Figure 43. Bison trampling around the stone to itch themselves. This experience would be mimicked through the use of the skylight over the contemplation area.

Figure 44. Section B - Showing the reflection space under the land bridge. As the bison run over the bridge, the sound is amplified, creating a new physical experience for the visitor.

The situating of the project within a proposed nature preserve allows us to reinstate natural cycles on a territory scale while creating a moment for visitors to experience this cycle. These experiential near moments are speckled throughout the building relating the visitor to the natural environment.

Chapter 7: Grouse, Glaciers, and Land Morphology

The form of the center draws inspiration from the geological, topographical and ecological traces that can be read through patterns within the landscape. Various edge conditions and microclimates are created as wind, water, and non-humans passes over the form of the center. A process of modeling with sand was paired with program to create desired microclimates, edge conditions, and enable a sequential experience of far and near. The intent of these forms was to create a regenerated prairie stream habitat for grouse species and create a form that blends and flows naturally with the landscape.

Figure 45. Vegetation affected by landscape Morphology (Alberta Parks 2018)

Figure 46. Map of Alberta Landscape formed through glaciation affecting soil composition, land morphology, and vegetation (Alberta Geological Survey 2013)
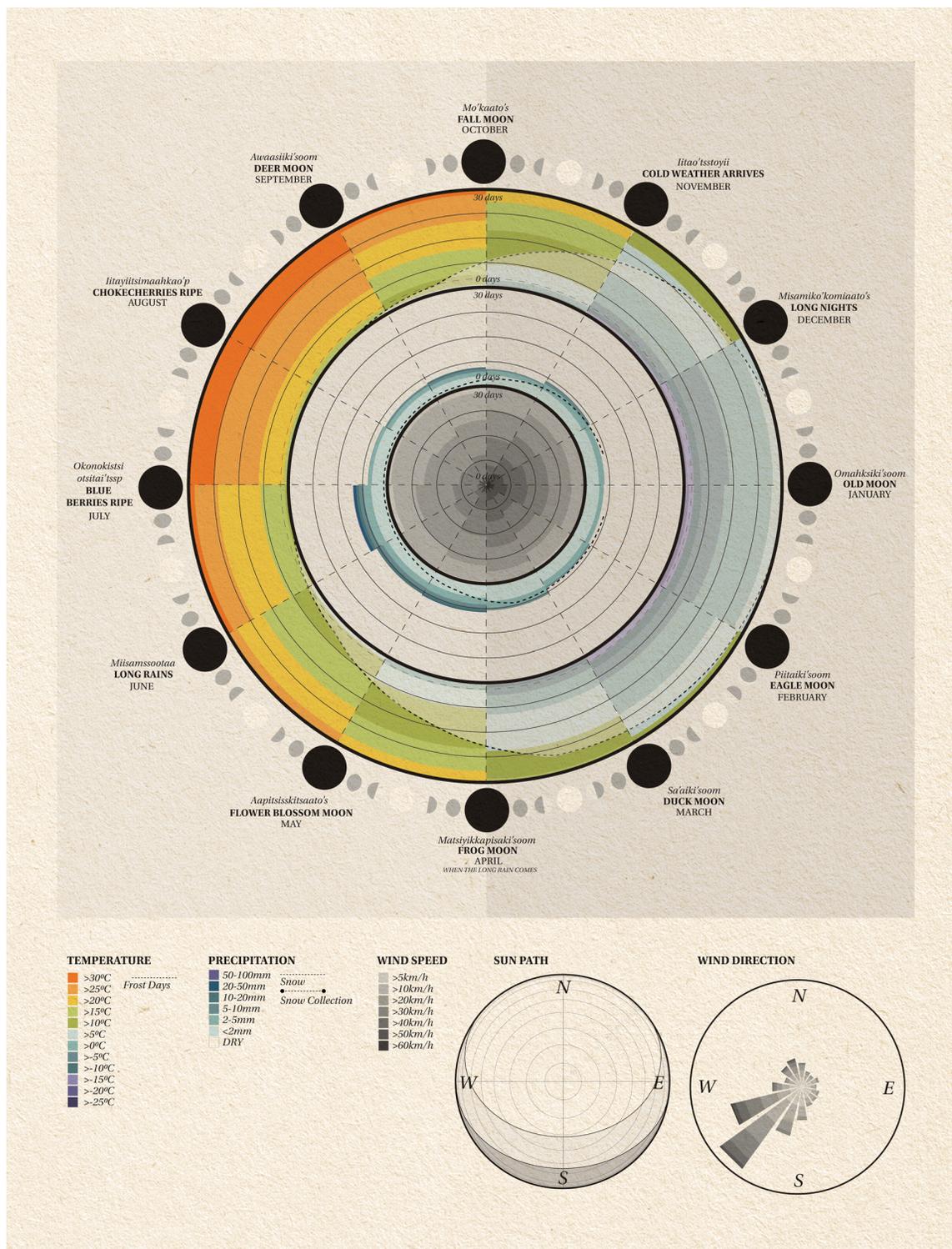
Figure 47.   Annual calender of climate in Lethbridge, Alberta (Data From [Meteoblue 2023] [Marsh 2014])

Glaciers, Water, and Microclimates

Non-human taskscapes start with a deep time understanding of the geographic history of the plains landscape and climate. Alberta was formed through glaciation (figure 46). These shifts in ice scraping across the landscape formed moraine ridges, valleys, and various soil deposits (Alberta Parks 2018). Microclimates were formed around these morphologies based on slope, wind, solar exposure, and soil types. As glaciers retreated from the Rockies to the Hudson Bay, meltwater formed dry coulee valleys that now hold small streams. One of these valleys is the project site, the Expanse Coulee, which drains into the Oldman River and is located within the proposed Taber County preserve.

Prairie habitats and vegetation distribution depend on subtle changes within landscape morphology and water flow. Wind passing over hills and vegetation creates negative pressure on the leeward side, affecting the accumulation of snowdrifts. The north-facing coulee edge is able to hold much more plentiful vegetation than the south-facing edge
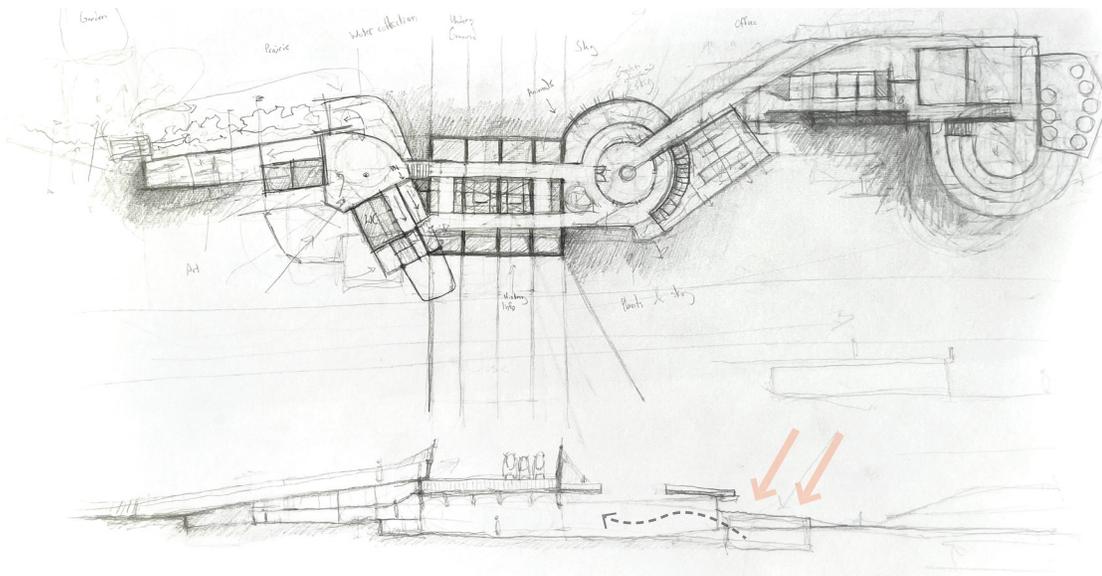
Figure 48. Sketch of the section of the visitor center. The greenhouse is located on a lower elevation than the gallery to move warm air through the building passively.

due to sun exposure (Kuijt, Bain, and Flanagan 2014, 12). Some of these microclimates can be seen from satellite images above the landscape (figure 47). More snow is able to accumulate on this face, providing more moisture for plant species. This difference in vegetation makes the south-facing edge of the coulee an ideal location for increasing biodiversity. Situating the thesis project on a South facing coulee ridge, allows the nature center to take advantage of sun exposure. Heat can be collected through greenhouses located at lower elevations on the coulee slope and then be released through passive ventilation (figure 48).

Sand Models

Sand models were used as process models to shift and mold the land in a way similar to glacial movements. This was a means of quickly forming different combinations

Figure 49.   Sand models were used to quickly create building form while remaining embedded within the landscape.

of slopes and microclimates while allowing for a type of sketch modeling that can capture movement. Ridges and depressions of sand were formed with various programs in mind. The organization of the program started to become evident through modeling. As hills of programing were made, corridors were pushed through intuitively, creating various combinations of microclimates and habitat niches.

By designing through modeling, one can create gestures, reacting and adapting, and letting intuition guide the hands to create corridors through the building. Modeling playfully enables one to let go of the programmatic needs temporarily and access the imagination. One can design as if they are wind or bison, choosing the path of least resistance through the terrain. The building becomes a moraine carved into the Earth with new edges and microclimates while the roof remains occupiable and passable. These moves and scale of the sand model allowed for the building to flow with the landscape.

Figure 50. The final sand model inspired the form of the building.

Figure 51. The final sand model inspired the form of the building. The Eastern (top) edge is lifted to allow for sun to enter in the morning while the west remains embedded in the Earth. Various sections of the building dip down to allow for lateral crossing of the form.

The nature center is submerged into the landscape, allowing processes to flow over while taking advantage of passive heating and cooling. This move was inspired by the Hidatsa cache storage pits and Earth lodges that are built with sod over top of wooden frames (figure 53) (Wilson 1987, 87) (Nabokov & Easton 1989, 105). This move is now common amongst earth ships and passive houses as the temperature of the Earth stays at a constant temperature of around 15 degrees. Submerging the building takes advantage of this constant temperature lowering heating and cooling energy loads.

This passive heating strategy is paired with passive ventilation taking advantage of strong Western winds. Throughout the prairies, the Siksikaitsitapi use the wind to draw air and smoke out of the top of tipis (figure 52). A changing wind flap at the top of the tipi is used to achieve optimal air outtake depending on the direction of the wind. This strategy of actively changing the building to the environment inspired
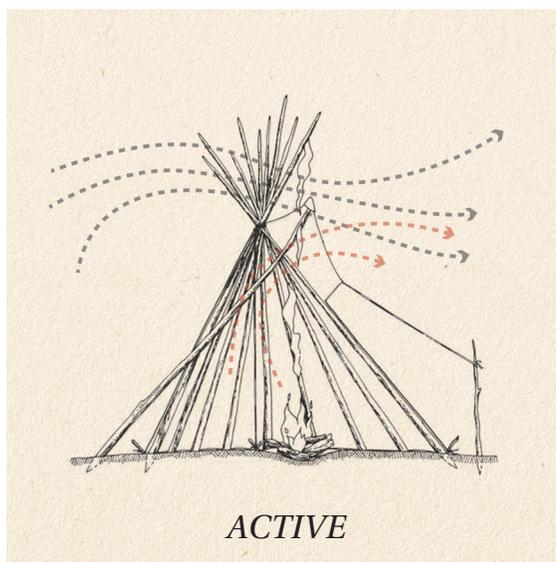

ACTIVE

PASSIVE

Figure 52.   Diagram of Active strategies within Siksikaitsitapi tipi flaps to extract air through thewind. (Base drawings sourced from Nabokov 1989, 119)
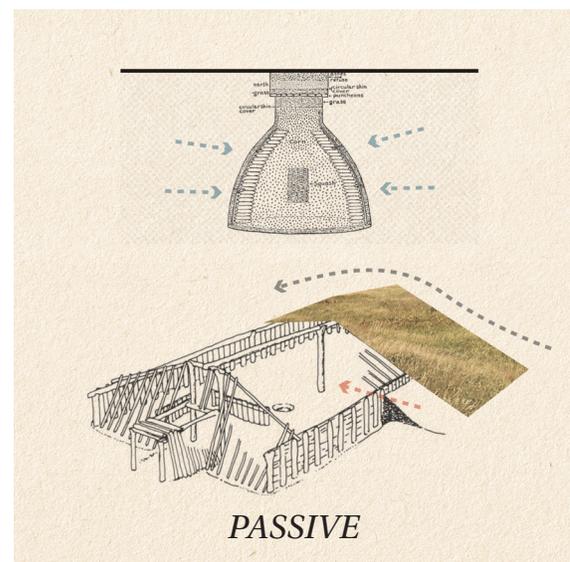
Figure 53.   Diagram of Passive strategies within Hidatsa and Mandan architecture. (Base drawings sourced from Nabokov 1989,105 and Waheenee, Wilson 1987, 87)

the skylights of the nature center. Within a gallery hall, skylights use the passing wind to create negative pressure at the leeward side of the opening, passively drawing air through the building (figure 54). Louvers were added within these skylights to change based on sun location and time of year. Air could be drawn in from either underground piping beside the base of these subterranean walls or through one of the greenhouses, depending on seasonal needs.

The sand models have dips and ridges consider both the territory and local site conditions. The 'topographical' shifts in the center enable bison to cross over the highway through the subtle dipping and rising of the nature center arch. The building opens on the eastern side to allow for the sun to heat the building in the morning and orientates itself perpendicular to the strong western winds (figure 47). These moves create micro-climates of being on or in/under Earth, and change depending on ecosystem's needs. By pushing the mass of the building up or down into the Earth the architecture also positions the viewer in new relations with these microclimates. This allows the building to create habitat and connections to non-human taskscapes.

The nature center uses the western winds to collect snow drifts in winter to create a micro-climate on the Eastern edge that mimics the prairie stream through bio-swales (figure 55). Lowering the building into the landscape and lifting the Eastern side creates negative air pressure along the Eastern edge. This landscape move, combined with a wind fence along the facade edge of the building, creates a microclimate that collects snow during the winter to melt in spring (figure 54 and 55). Within Alberta's central dry grasslands, water collection is of utmost importance. One of the moisture providers in this dry habitat are snow

drifts created by strong winds blowing in from the Western Rockies (Gayton 1992, 61). Wind fences, within agricultural practices, have been used to create artificial snow drifts on the leeward side of wind fences. This strategy can be designed into the building to create an edge condition that collects snow drifts and shades Western sun exposure in the evening. This moisture, combined with the drainage of water from the roof or parking lot, allows for the creation of a shrub filled bio-swale.

Grouse and Bioswales

This created prairie stream habitat provides space for grouse species to nest and brood their young. Grouse require a diverse mosaic of grassland habitats throughout their annual cycle of mating, nesting, brooding, and wintering (figure 56).

Figure 54.   Section D: Section through the gallery and skylights that use the wind to draw air out of the building passively. A lowered area and window on the Eastern side give the visitor a new perspective on the landscape and connects them to the riparian stream habitat.

PROGRAM

1. Entrance Ramp
2. Reception
3. Washroom
4. Gallery
5. Cafe
6. Elevator Lobby
7. Gallery Corridor
8. Contemplation Space
9. Labs
10. Burrowing Owl Exhibit
11. Grass Exhibit
12. Green House
13. Office
14. Mechanical
15. Auditorium
16. Classroom
17. Look off
18. Natural Garden
19. Sky Garden

PRAIRIE STREAM BIO-SWALE
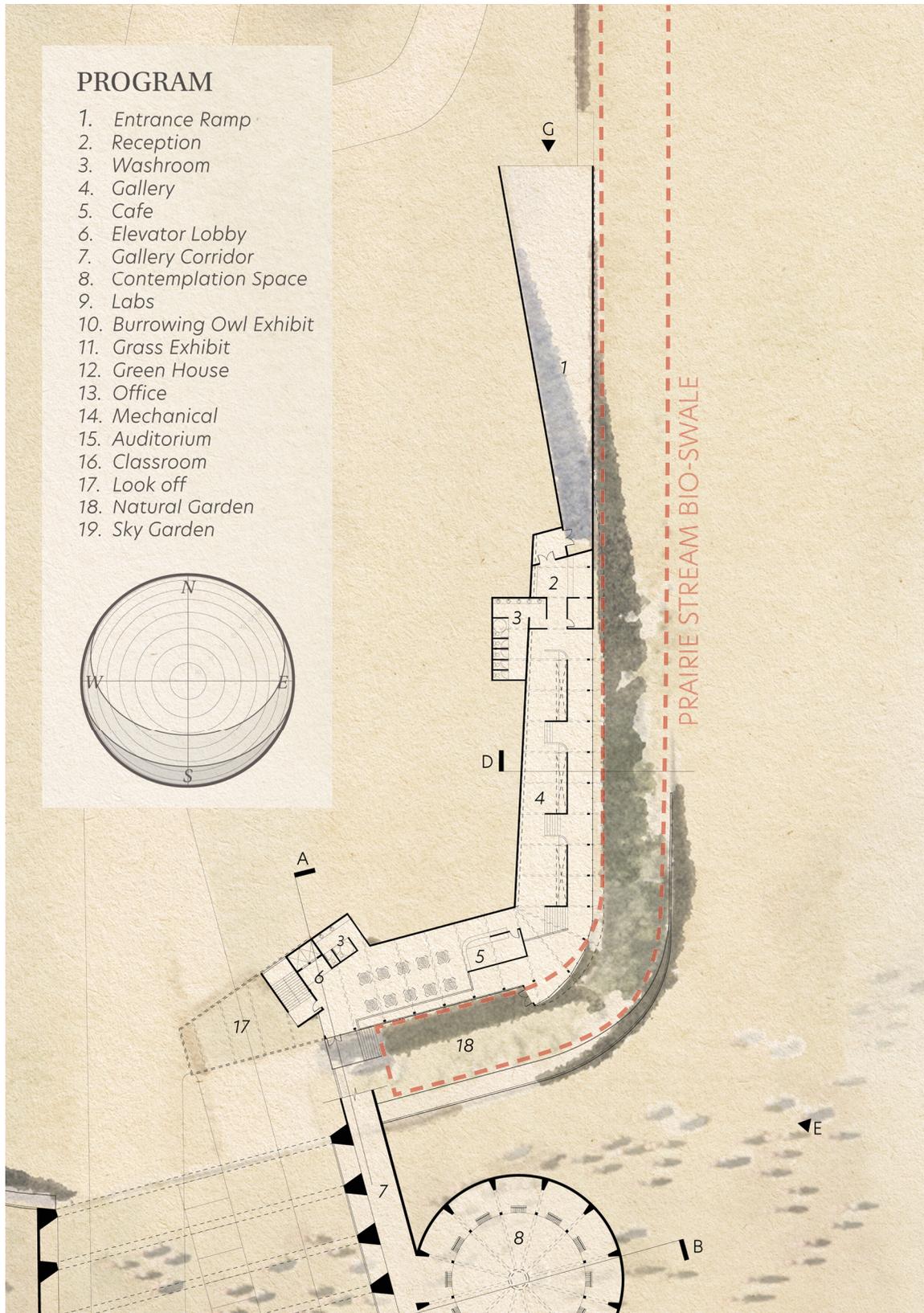
Figure 55.   Zoomed-in portion of the floor plan showing the entrance ramp (1) and gallery corridor (4). Outside of the gallery, the bio-swale habitat ends in a natural garden area (18).
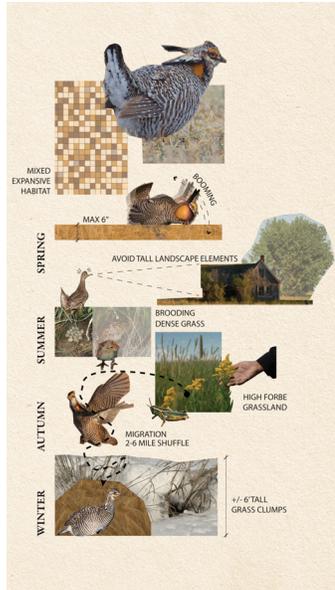
Figure 56. Annual cycle of a prairie chicken grouse that requires 3 different grassland habitats throughout the year.
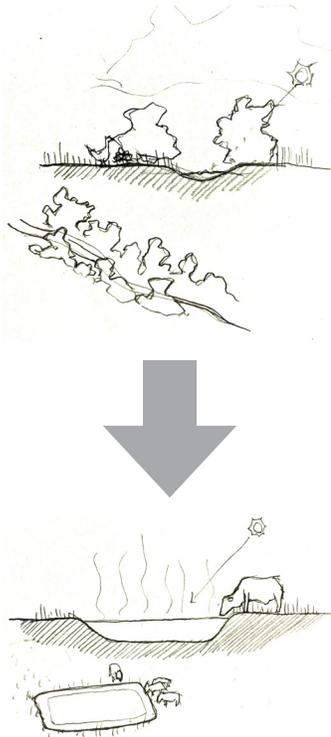
Figure 57. Change of Riparian Streams and vegetation through Cattle Ranching

Brushed prairie stream areas full of shrubbery are essential to prairie grouse species. Sharp tailed grouse nest within areas of brush that have high amounts of cover (Johnsgard 2016, 134). These brushed areas are usually located within prairie streams or areas with higher moisture levels. Throughout the colonization of the western plains, dugouts were created on almost every square mile of grassland (Manning 2009, 121). These artificial ponds were dug to hold onto as much water as possible for agriculture and animal husbandry (figure 57). This has eliminated significant amounts of prairie stream habitat and pressured existing riparian vegetation (Manning 2009, 122). This, in combination with cattle grazing, has had large effects on the habitat of grouse species within Alberta. The building recreates this natural habitat through its form and strategic drainage.

Submerging the building can create space for additional habitat conditions throughout the rest of the year. Open dancing grounds, known as lekes, are needed for mating. These lekes are areas of grassland that are usually elevated with shortgrass or limited vegetation to allow for high visibility (Johnsgard 2016, 134). Various species of grouse complete this mating dance, including the sharp-tailed grouse, sage grouse, and prairie chicken. This habitat patch can be provided for through submerging prairie architecture and using the roof as display areas for these dances. Many grassland birds, such as the prairie chicken, also tend to avoid tall landscape elements, such as patches of trees or buildings, due to them providing spaces for predators to view the surrounding landscape (figure 56) (Hezler 2010, 36). By submerging the building, the height is reduced, eliminating this condition.

Near Experience

The floor level is lowered in the interior of the gallery to provide a viewing area of this bio-swale (figure 54). Lowering the visitors' perception to the level of the plain creates new perspectives and nearness with the natural landscape. It gives a humbled perspective of the prairie, making one contemplate the various grasses and species visible, and introduces a way of viewing the world that resembles that of a non-human animal. At different times of the year, the vegetation would change, and the viewer may catch a glimpse of a sharp-tailed grouse nesting or brooding their young. This lowered platform, combined with the habitat created on the exterior of the building, would provide opportunities for serendipitous near experiences with non-humans. This nearness continues into the rest of the building form.

Chapter 8: Swallows, Burrowing Owls, Sky, and Earth

The situating of the building and major formal moves of the building have been used to create various micro-climates. Focus can now shift to smaller moments of interaction and inhabitation to invigorate various sections of the nature center. Special focus was given to provide exhibits and interactive moments for the swallow, the burrowing owl, and native grasses, and are segmented by moments of reflection into the far. These are only some of the many installations that could occur within a building. For example, the structure of the underside of the land bridge could be designed as a habitat space for bats, or the ground/ wall condition at the base of the building could provide a habitat for insects. By playing with the edges and patches of the building, an architect can create moments of interaction and memorable experiences with non-humans.

Cliff Swallows

The edge condition at the facade of the architecture can be used to form habitat for various species. The wind fence surrounding the building facade's roof perimeter doubles as a nesting area for swallows. Eight-inch reveals and blocking provides space for these swallows that can dwell in colonies of up to 3700 nests and are known to establish themselves within architecture (Figure 58)(Veltri 2023). This facility acts as a stepping stone for these migratory birds creating an experience similar to one described by biologist John Janovy. He describes a moment of descending into a swallow colony as:

> a trip into a world one did not realize existed on earth. It is the strongest experience I have ever had in intruding into

Figure 58. Exterior facade of the gallery hall. The wind fence along the edge of the building doubles as a nesting area for swallows.
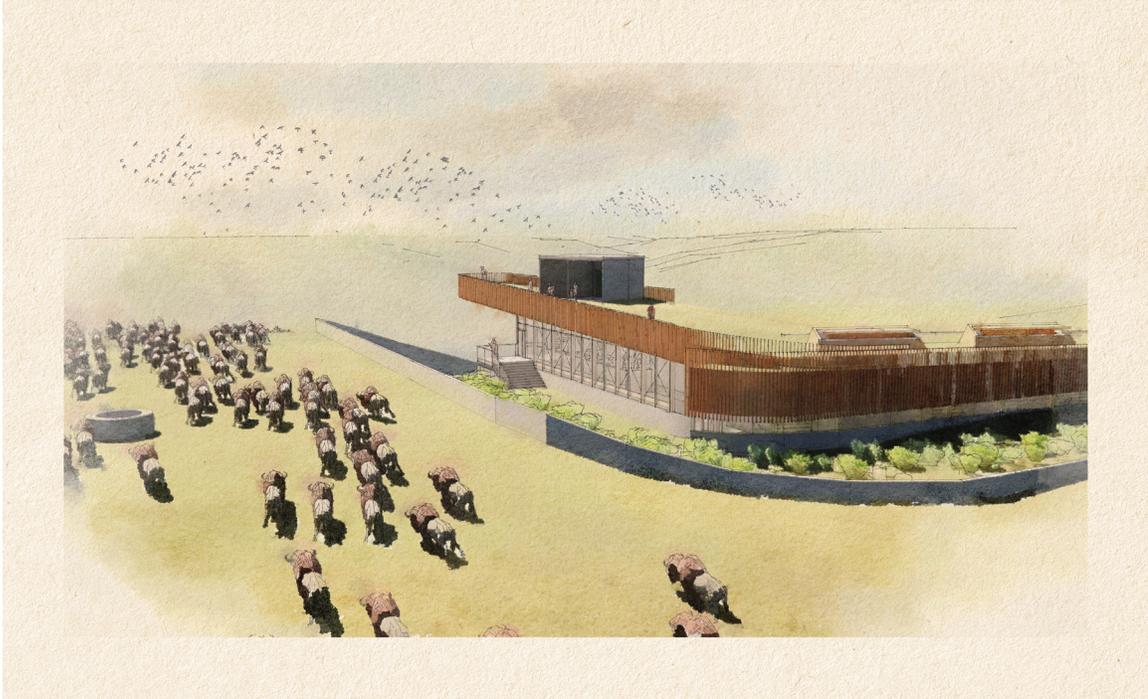
Figure 59.   Rendered View E: Showing the movement of bison across the land bridge. The edge of the viewing platform uses a wooden facade that creates nesting habitat for swallows.

the territory of another creature...The closer one gets to the colony, however, the less comfortable one is, and to climb down on the divider between the spillway flumes with the colony swirling about one's head is to intrude deep within an organism...[one] feels a sense of having been here before but perhaps on another planet, in a dream, in a previous life from which one has been incarnated (Maher 2014, 64–65).

The edge of the building, as well as the bio-swale and regenerated prairie, provide space for these birds to thrive. This habitat creates an iteration of this experience. As the visitor walks through the galleries or stands on the lookout over the surrounding prairie, they would be engulfed by the overwhelming sound of the swallows. These moments would be contrasted by areas of silence as the viewer starts to descend into the meditative space under the land bridge.

Burrowing Owls

As the circulation passes under the overpass, the focus shifts to the subsurface. The subsurface in a prairie is much

more active than the surface through relations of insects, soil types, and root systems that hold the majority of biomass in this biome. Some of these subsurface dwellers are seen as some of the biggest pests for agriculture. Prairie dogs, moles, and badgers are some of the creatures that have been hunted to reduce their effect on agriculture. The burrowing holes of these creatures provide habitat for other species, and their disturbance of the soil creates more space for colonizing plants, soil aeration, and water filtration for soil (Helzer 2010, 44). By hunting these animals, we have reduced the habitat provided and decimated the number of prairie dogs needed to support high trophic predators.

The burrowing owl is one of the inhabitants that depend on these burrows. Due to the reduction in habitat, the burrowing owl is now listed as "at risk" (Government of Alberta 2023). Burrowing owls have been known to choose man-made burrows as their homes (Shanmuga 2023). Burrows, simply made from PVC pipe and a barrel that acts as a nesting area, are often chosen as home by these animals. This burrow strategy is expanded into an edge condition that creates small enclosures with viewpoints from the interior (figure 60). Throughout the year, different periods of nesting, molting, and brooding would be observable within these enclosures. As the visitor wanders through this area, they are forced to duck and maneuver through the enclosure, creating a bodily sense to pair with the experience of the animal. This physically near experience brings one into their body and the present experience with a non-human.

Grass Roots and Soil

As a visitor rounds through the exhibit, they come across displays of grass showing the root differences between

natural plants and agricultural annuals. "Each square yard of native grass contains about twenty square miles of root hairs which allows native grasses to resist drought and return annually." (Manning 2009, 180). Labs and greenhouses for the study and revitalizing of endangered plant species were provided adjacent to this hall. Throughout this area would be displays that talk about the movements of the subsurface with display areas of microscopic root hairs and insects. Gayton describes the experience of the subsurface as similar to the changing sky.

> Prairie can be so large and featureless from this perspective that it ceases to be a landscape at all. It becomes tangible only at the microscope, hands-and-knees level. From a distance, prairie is abstract. Clouds fill in, as does the mind.

> Underneath this teepee ring is a soilscape, with strata of deposition, lenses of gravel, and columns of solonetz. An opaque mirror of the sky, soil also contains random shapes and elegant bands of colour. Both sky and soil scapes change unpredictably. (Gatyon 1992, 38)

Figure 60. Section F: This section shows the burrowing owl enclosures inviting visitors to bend and crouch to see into various burrows. This bodily movement along this corridor, paired with the experience, will make it more memorable.

Sky

These visulaizations of the subsurface are juxtaposed by a large opening to the sky (figure 60). The sky garden creates a space in which the viewer is given an opportunity to rethink their place in the landscape and cast their imagination into the far. The roof ledge is minimized in this area to both reduce visual static but also reduce space for predators to perch above the burrow entrances. This creates a space that many who call the prairies home are familiar with, lying in the grass and looking up at the living sky. If a visitor comes at night, they may also have an opportunity to look out at the stars and hear stories that connect us to the changing seasons and sky.

The nature center provides these spaces of nearness with moments of rest into the far. This oscillation back and forth would allow for the visitor to be constantly shifting from experience/ learning to resting/ reflecting. By experiencing these intimate moments, we can attempt to foster engaged empathy with non-humans, add to our dreamscapes, and reinvigorate our relations to the Earth.

Chapter 9: Human - Connection to Land and Story

What I remember are low bars overgrown with wild roses, cutbank bends, secret paths through the willows, fords across the shallows, swallows in the clay banks, days of indolence and adventure where space was as flexible as the mind's cunning and where time did not exist. That was at the heart of it, the sunken and sanctuary river valley. Out and around, stretching in all directions from the benches to become coextensive with the disk of the world, went the uninterrupted prairie. (Stegner 2000, 6)

Dreamscapes and Storytelling

The sequence within the nature center starts and ends with an expansive view of the landscape. The hope would be that as the visitor experiences the building, they are made more aware of the interconnection of beings on the prairies. This would ideally instill a feeling of greater connection with the surrounding landscape. These moments may also allow an architect to see a new method of building and working with

Figure 61.   Rendered View G: The entrance to the building is lowered gently into the landscape. The visitor enters with an expansive view of the prairie and descends into the Earth.

9

11

12

PROGRAM

1. Entrance Ramp
2. Reception
3. Washroom
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11. Grass Exhibit
12. Green House
13. Office
14. Mechanical
15. Auditorium
16. Classroom
17. Look off
18. Natural Garden
19. Sky Garden

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H

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S

160'
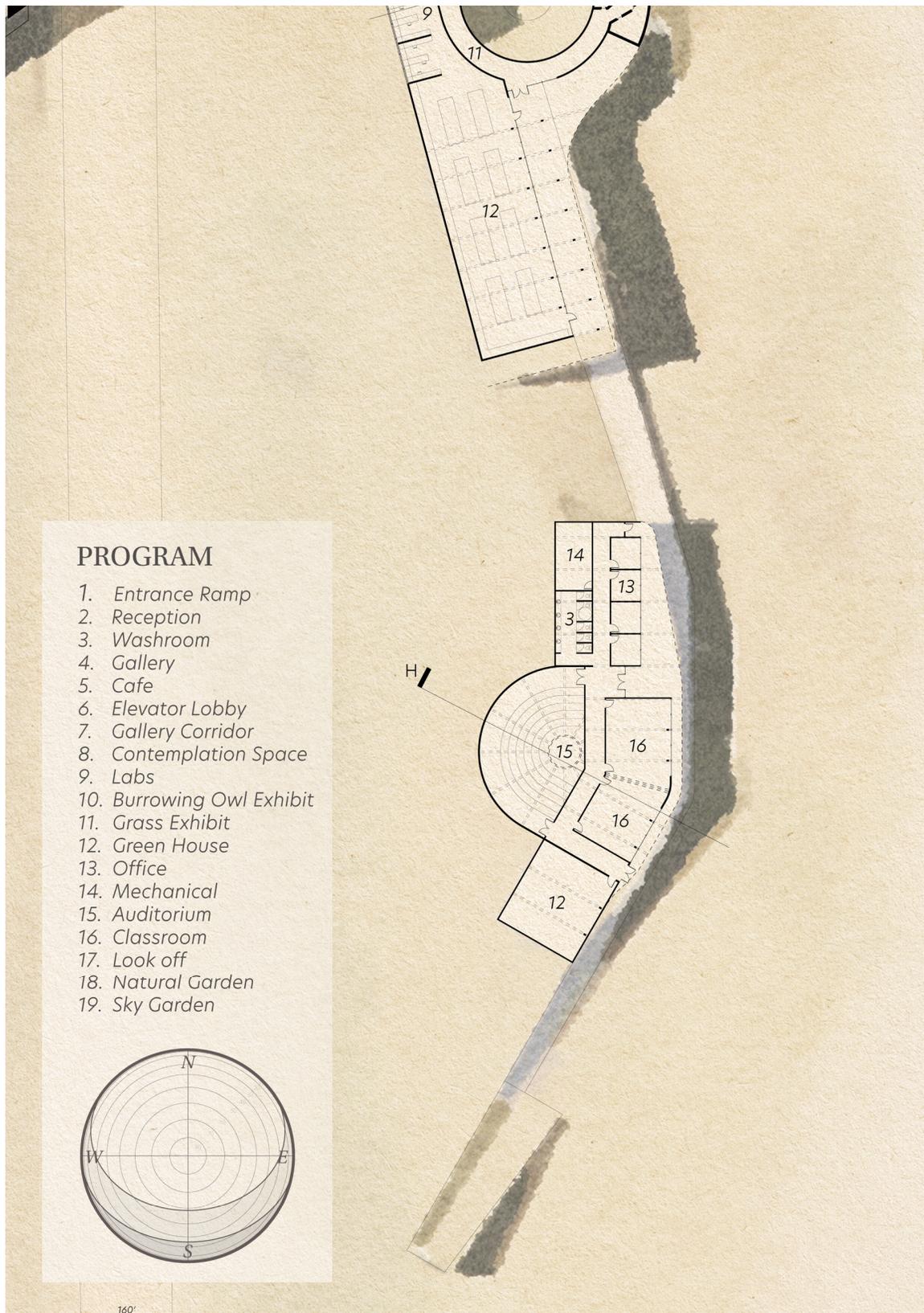
Figure 62.   Zoomed-in section of the floor plan showing the entrance auditorium (15) and classroom (16) areas. The pathway continues on into the landscape.

the Earth, and all its gifts, using architecture as a means of building micro-climates and supporting ecologies, both internal and external to its thickened surface. This play, like the sand models, allows the building to create spaces of engagement, immersion, and expansion.

The sequence is punctuated with spaces for gathering, ceremony, and exchange of stories, narratives, and knowledge about the prairie landscape. This is significant in changing our dreamscapes and unconscious attitudes toward the prairie. In the words of Susan Maher in *Deep Map Country*, "Stories that put front and center adaptation to a unique biome, that reassert the spiritual essence of place, and that look critically and creatively at human practices on the Plains are increasingly replacing narratives of winning, conquering, and mastering." (Maher 2014, 49). These

Figure 63.   Section H: Section through the auditorium designed in a semi-circle to encourage discussion and the sharing of stories.
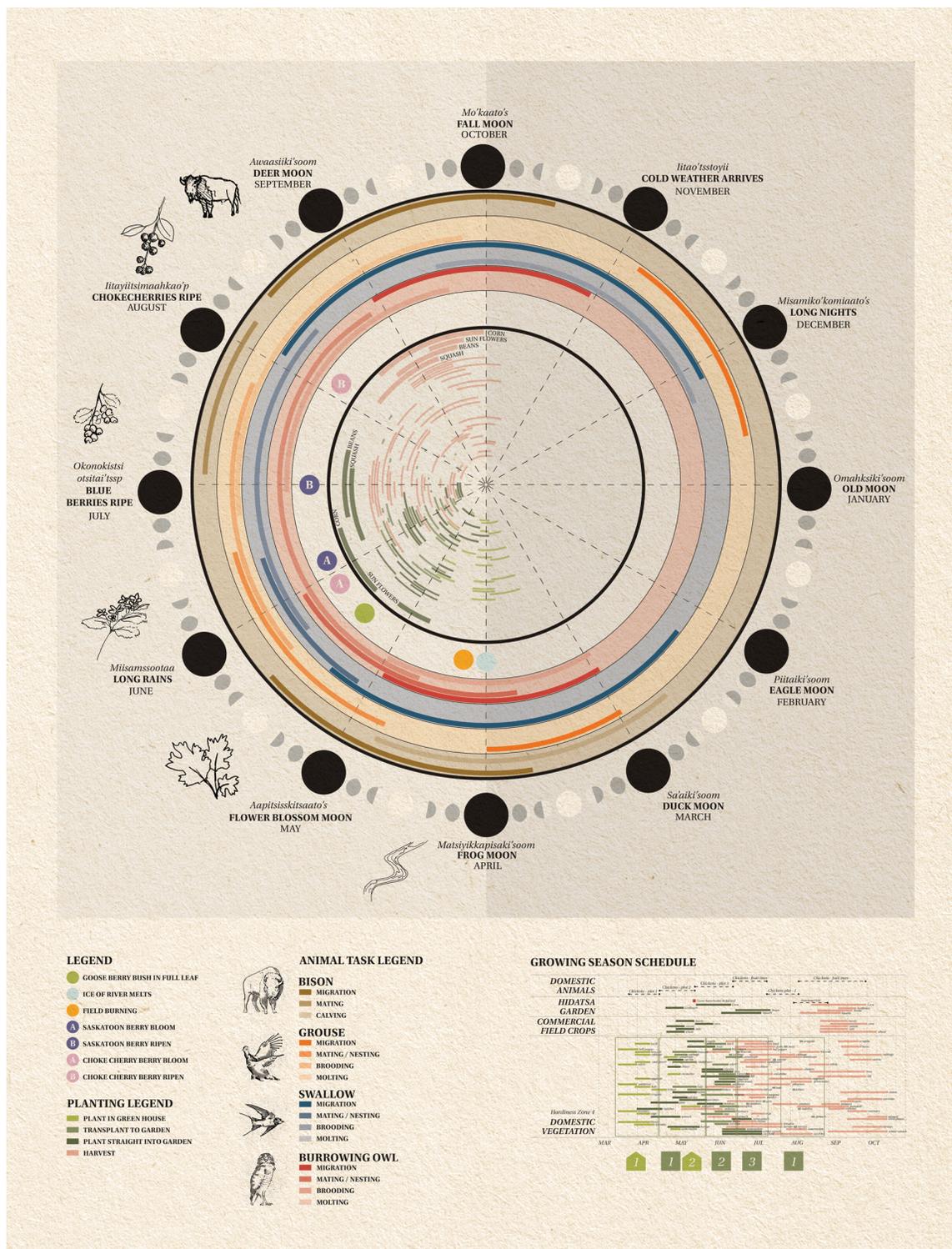
Figure 64. Annual calender of non-human tasks and agricultural planting schedules. Could a connection between agriculture and animal and vegetation cues be created through observation of nature? (data from [Waheenee and Wilson 1987][Almanac 2023])

stories, in addition to new personal experiences, are hoped to leave a great impression on the visitor.

> The existence of storied empathy, the ability that we have as children to empathize with fictional beings, suggests that we have the capacity to engage with very different others through narrative, literature, art and story-telling and this capacity, if honed, may help us to empathetically engage with the more than human world (Gruen 2009, 32).

Classrooms are also provided to teach how to manage bison and methods of revitalizing the prairie ecosystem. In this area, stories of connection between human taskscapes and nature can be told. This includes the Hidatsa method of farming, which uses natural cues such as the melting of the river as a sign of when to plant sunflowers or the gooseberry bush being in full leaf to inform them when to plant corn, followed by squash and beans (Waheenee and Wilson 1987, 16 & 22). This can also occur through the naming of the months based on happenings within the landscape rather than abstract concepts from Western epistemologies (figure 64). By observing the shrubbery and timing of natural cycles, human tasks can be connected to the happenings of place.

Architecture can facilitate these interactions by creating space and intimate experiences with other species. With these experiences, we can develop empathy with the larger ecosystem.

The building sequence continues into the landscape, in which a viewing platform is provided over the rest of the valley. Visitors can travel on to trails leading into the surrounding landscape past buffalo rubbing stones and remaining tipi rings along the edge of the coulee with a new perspective to contemplate back on the landscape. Many of these memories lay within the landscape overlooked

and overgrown. Tipi rings and medicine wheels that once numbered in the thousands have been moved away from their locations for agricultural practices (Gayton 1992, 42).

If we start to look at the land with new taskscapes and dreamscapes, we can see the life that still remains embedded in its skin. The stories attempted to be overwritten can start to become more vivid, and a connection to the past can continue into the present. In order to do this, we must learn about the ecosystem, listen to stories from different perspectives, and deepen our dreamscapes with non-human narratives and empathy.
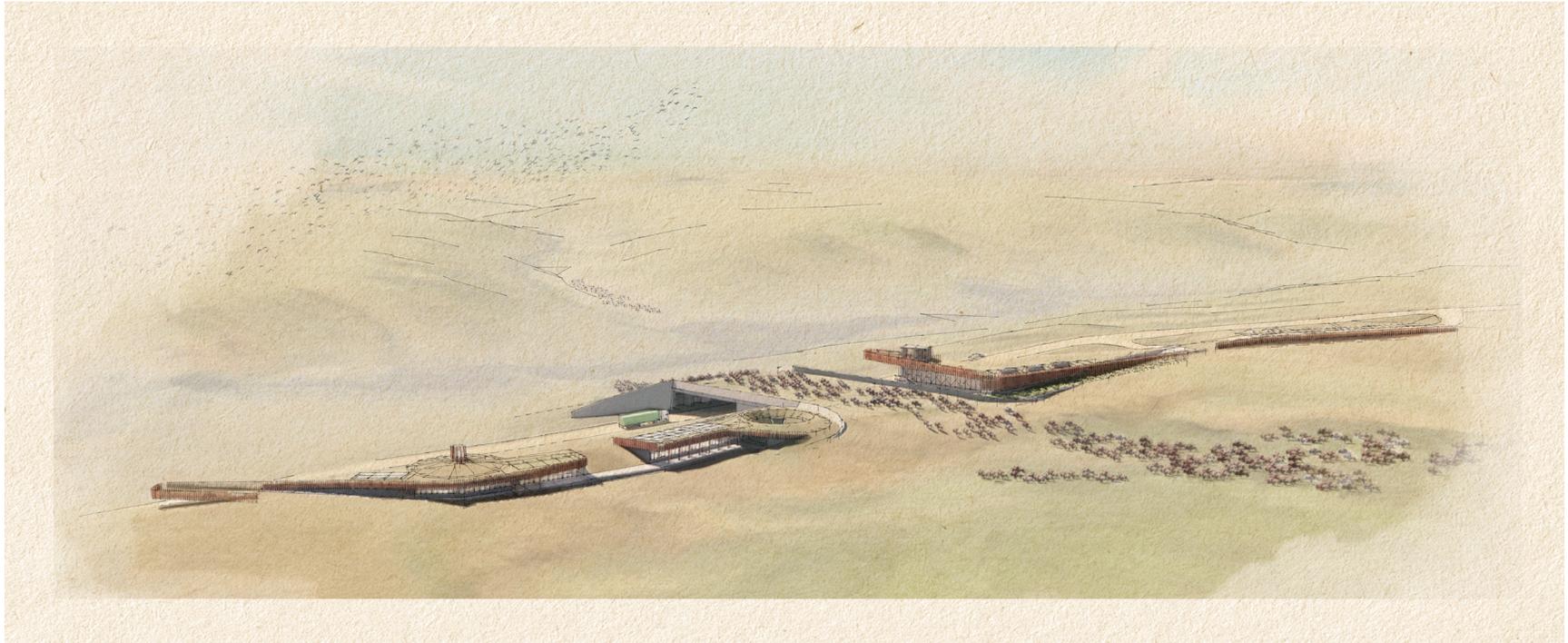
Figure 65. Landscape Render showing the nature center embedded in the landscape.

Chapter 10: Conclusion

In order to create a change in the Western unconscious, a change is needed in all three scapes: the landscape, dreamscape, and taskscape. We cannot simply focus on one. We must change how we talk about the land, whose tasks we hold in the highest regard, where we position ourselves in regard to others, and how we design for inclusion. When these become intertwined with daily life, we may see real change.

I started off this thesis year by wanting to create a way of life through agriculture and architecture that was more holistic, using passive strategies and permaculture to intertwine with the natural ecosystem. I attempted to study Indigenous ways of seeing the land in order to understand how to incorporate myself into it in a way that connected me to the larger ecosystem and allowed me to live in a way that was not negatively affecting the Earth.

 Through studying different viewpoints and the ecosystem at large, I realized how far off our current agricultural system is from this ideal and that the very heart of agriculture is at odds with the natural environment. This quote from Wendel Berry, a farmer, and activist, sums up the problem.

> When we came across the continent cutting the forests and plowing the prairies, we have never known what we were doing… because we have never known what we were undoing… We cannot know what we are doing until we know what nature would be doing if we were doing nothing. (Berry 1996, 100)

The nature and research center's design was an attempt to design a space for non-humans and humans to interact. The center attempts to reintegrate a way of moving forward and reinstating the natural cycles of the prairies while providing

spaces for people to have memorable experiences and gain knowledge from the land itself as a teacher. Architecture only goes so far, and understanding comes from being within and experiencing the landscape itself.

Architecture can not change minds, but it can provide spaces and frames for people to find wonder and connection with the land in new ways. I do believe that the way we currently design allows for agrilogistic thinking to be unchallenged and reinforces ideas of land as commodity. We can combat this by challenging it, changing what we focus on, and treating non-humans as if they are as valuable as humans. When we start to view non-humans as valuable as us, understand that we depend on them, and have genuine empathy for them, we can begin to see actions come from feeling. Feelings of hope, passion, and empathy, rather than shame, and guilt.

It is my personal opinion that guilt only goes so far as an emotional catalyst for action. In order to create an actual emotional response to the landscape, one needs to experience it and act out of love and genuine empathy. Study the plants, go for a walk through the natural prairie, learn about the relations of the animals and the plants, and read stories that animate these connections. The stories and the emotional/ spiritual connection to land are just as important as the scientific cause and effects. Stories elicit emotion, and emotion, in return, elicits action. We need to reanimate the landscape and reinvigorate our connections and imaginations in order to see with new vision.

Can architecture help this? It can provide space. Space for what actually creates change: gathering, celebrating, narrative, knowledge, art, poetry, and memorable physical embodied experiences. It can contrast and provide space

to ponder, invigorate oneself, and sit with uncomfortable thoughts. To rethink and dream of a new future.

References

AGLA (Alberta Grazing Leasholders Association). n.d. *About Us.* Accessed Feburary 28, 2023. https://albertagrazinglease.ca/about-us.php.

Agriculture and Agri-Food Canada. 2018. *Crop Inventory, 2018.* Dataset. https://open.canada.ca/data/en/dataset/1f2ad87e-6103-4ead-bdd5-147c33fa11e6.

Alberta Agriculture and Forestry, Government of Alberta. 2023. *Agrisid 4.1 (Agricultural Regions of Alberta Soil Information Database Version 4.1)*. https://geodiscover.alberta.ca/geoportal/rest/metadata/item/db848869ef74446e93fd0d9622d5b259/html.

Alberta Environment and Protected Areas, Government of Alberta. 2022. *Crown Land Reservations*. DataSet. https://open.alberta.ca/opendata/gda-82209a6e-a4ab-4f26-bf7f-2080c97d5878.

Alberta Geological Survey. 2013. *Surficial Geology of Alberta, 1:1,000,000 scale.* DataSet. https://geodiscover.alberta.ca/geoportal/rest/metadata/item/6c1d3ff5dfb34e3bbf555a3bb24b2a64/html.

Alberta Parks. 2018. *Natural Landscape Types.* https://www.albertaparks.ca/albertaparksca/management-land-use/building-the-parks-system/scientific-framework/natural-landscape-types/.

Almanac. n.d. "Planting Calendar for Lethbridge, AB". Accessed Feburary 28, 2023. https://www.almanac.com/gardening/planting-calendar/AB/Lethbridge.

Bachelard, Gaston, and Mark Z. Danielewski. 2014. *The Poetics of Space.* Translated by Maria Jolas. New York: Penguin Books.

Bastien, Betty, and Jürgen W. Kremer. 2004. *Blackfoot Ways of Knowing: The Worldview of the Siksikaitsitapi.* Calgary: University of Calgary Press.

Bateson, Gregory. 1973. *Steps to an Ecology of Mind: Collected Essays in Anthropology, Psychiatry, Evolution and Epistemology.* London: Granada Publishing Limited.

Bateson, Gregory. 2015. "Form, Substance and Difference." *ETC: A Review of General Semantics* 72, no.1: 90-104.

Berry, Wendell. 1996. *The Unsettling of America*. Berkeley: University of California Press.

The Blackfoot Confederacy of Alberta. 2017. "Traditional Knowledge and Use Assessment, City of Lethbridge: South South Saskatchewan Regional Plan Compliance Initiative Environment and Historic Resources Strategy". City of Lethbridge 2017

Brumley, John H., and Historical Resources Division. 1988. "Medicine Wheels on the Northern Plains: A Summary and Appraisal". *Archaeological Survey of Alberta Manuscript Series* No.12. Alberta Cultural and Multiculturalism Historical Resources Division.

Bryan, Liz. 2015. *Stone by Stone: Exploring Ancient Sites on the Canadian Plains*. Surrey: Heritage House Publishing.

Burton Historical Collection. 1892. *DPA4901*. Photograph. Detroit Public Library. https://digitalcollections.detroitpubliclibrary.org/islandora/object/islandora%3A151477.

Calling Last, Souta. "Blackfoot Place Map." *Google Earth*. Accessed January 24, 2023. https://earth.google.com/web/@43.45721887,-109.94105009,2722.46451588a,3891723.36330311d,30.00011814y,0h,0t,0r/data=MikKJwolCiExTEJOM3B5YmhsNHlmalhPZkhYQTFsZm9xTVB4UFNnODMgAToDCgEw?authuser=0.

Canada Government. 1920. Poster. https://www.posterteam.com/content/2689/Canada---My-Land.

Cosgrove, Denis E. 1998. *Social Formation and Symbolic Landscape*. Madison: University of Wisconsin Press.

Department of Natural Resources Canada. 2022. *First Nation Reserves (Alberta).* Dataset. https://services2.arcgis.com/jQV6VMr2Loovu7GU/arcgis/rest/services/First_Nations_Reserves_Alberta/FeatureServer.

Dramstad, Wenche E., James D. Olson, and Richard T. T. Forman. 1996. *Landscape Ecology Principles in Landscape Architecture and Land-Use Planning*. Washington, DC: American Society of Landscape Architects.

ESRI Canada, HERE, Garmin, SafeGraph, METI/NASA, USGS, EPA, USDA, NRCan, Parks Canada. n.d. *World Topographic Map.* Dataset. Accessed April 1, 2023. https://services.arcgisonline.com/ArcGIS/rest/services/World_Topo_Map/MapServer.

Evans, Terry. 1986. *Prairie: Images of Ground and Sky*. Lawrence: University Press of Kansas.

Flynn-Burhoe, Maureen. 2007. Rubbing Stone in Nose Hill Park. Photograph. Flickr. https://www.flickr.com/photos/oceanflynn/1520725524.

Forrest, S.C., H. Strand, W.H. Haskins, C. Freese, J. Proctor and E. Dinerstein. 2004. *Ocean of Grass: A Conservation Assessment for the Northern Great Plains. Northern Plains Conservation Network and Northern Great Plains Ecoregion*, WWF-US, Bozeman, MT.

Garretson, Martin S. 1860. *The Herd.* Illustration. https://parks.canada.ca/pn-np/ab/elkisland/nature/eep-sar/bison.

Gayton, Don. 1992. *The Wheatgrass Mechanism: Science and Imagination in the Western Canadian Landscape*. Saskatoon: Fifth House Publishers.

Glenbow Museum. 2013. *The Story of the Blackfoot People*. Toronto: Key Porter Books Limited.

Google Earth. 2023. https://earth.google.com

Government of Alberta. 2003. *Agricultural Land Resource Atlas*. Dataset. https://geospatial.alberta.ca/titan/rest/services/agriculture/Agricultural_Land_Resource_Atlas/MapServer.

Government of Alberta. 2023. "Bird species at risk". https://www.alberta.ca/bird-species-at-risk.aspx#jumplinks-5

Gruen, Lori. 2009. "Attending to Nature: Empathetic Engagement with the More than Human World." *Ethics and the Environment* 14, no. 2: 23–38.

Helzer, Chris. 2010. *The Ecology and Management of Prairies in the Central United States*. Iowa City: University of Iowa Press.

Ingold, Tim. 1993. "The Temporality of the Landscape." *World Archaeology, Conceptions of Time and Ancient Society* 25, no. 2: 152–74.

Johnsgard, Paul A. 2016. *The North American Grouse: Their Biology and Behavior*. Lincoln, Nebraska: Zea Books.

Kawai, Yoko. 2018. "Designing Mindfulness: Spatial Concepts in Traditional Japanese Architecture." Video. Yale. https://www.youtube.com/watch?v=gcGH6rqssfs.

Kimmerer, Robin Wall. 2013. *Braiding Sweetgrass*. Minneapolis: Milkweed Editions.

Klaver, Irene. 2014. "Landscapes of the Environmental Imagination." In *Environmental Aesthetics: Crossing Divides and Breaking Ground*. Edited by Martin Drenthen, 135 - 153. New York: Fordham University Press.

Kuijt, Job, John Bain, and June Flanagan. 2014. *Common Coulee Plants of Southern Alberta*. Lethbridge: University of Lethbridge.

LaPier, Rosalyn R. 2015. "The Piegan View of the Natural World, 1880-1920". Doctorate of Philosophy in History. University of Montana. https://scholarworks.umt.edu/etd/4582.

Lefebvre, Henri. (1947) 1992. *Critique of Everyday Life*. Translated by John Moore. London: Verso.

Little Bear, Leroy. 2000. "Jagged Worldviews." In *Reclaiming Indigenous Voice and Vision,* edited by Marie Battiste, 77-85. Vancouver: UBC Press.

Little Bear, Leroy. 2012. "Traditional Knowledge and Humanities: a Perspective by a Black-

foot." *Journal of Chinese Philosophy* 39, no. 4: 518–27.

Long, Richard. 1967. *A Line Made By Walking*. Photograph. Tate. https://www.tate.org.uk/art/artworks/long-a-line-made-by-walking-p07149.

Maher, Susan Naramore. 2014. *Deep Map Country: Literary Cartography of the Great Plains*. London: University of Nebraska Press.

Manning, Richard. 2009. *Rewilding the West: Restoration in a Prairie Landscape*. Berkeley: University of California Press.

Marsh, Andrew J. 2014. *Sun Path 2d*. https://drajmarsh.bitbucket.io/sunpath2d.html

Merleau-Ponty, Maurice, and Donald A. Landes. 2012. *Phenomenology of Perception*. New York: Routledge.

MeteoBlue. 2023. *Simulated Historical Climate & Weather Data for Lethbridge*. https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/lethbridge_canada_6053154.

Mollison, Bill. 1988. *Permaculture: A Designers' Manual*. Sisters Creek: Tagari Publications.

Morgan, Grace R. 1980. "Bison Movement Patterns On The Canadian Plains: An Ecological Analysis." *Plains Anthropologist* 25, no. 88: 143–60.

Morton, Timothy. 2016. *Dark Ecology: For a Logic of Future Coexistence*. New York: Columbia University Press.

NASA Jet Propulsion Laboratory. 2015. *Alberta SRTM Hillshade (30m / 72K / Z4x)*. Dataset. https://www.arcgis.com/home/item.html?id=88be11d34d78469bb0033dc664136d8b

Natural Resources Canada. 2020. *2020 Land Cover of Canada.* DataSet. https://open.canada.ca/data/en/dataset/ee1580ab-a23d-4f86-a09b-79763677eb47.

Odum, Eugene P. 1971. *Fundamentals of Ecology*. Philadelphia: Saunders.

Oetelaar, Gerald A., and D. Joy Oetelaar. 2006. "People, Places and Paths: The Cypress Hills and the Niitsitapi Landscape of Southern Alberta." *Plains Anthropologist* 51, no. 99: 375–97. https://doi.org/10.1179/pan.2006.031.

Olsson, Gord, Steve Rogers, and Brian Andrew Ballantyne. 2010. *Surveys, Parcels and Tenure on Canada Lands*. Edmonton: Surveyor General Branch, Natural Resources Canada.

Repton, Humphrey. 1789. *The Red Book of Ferney Hall*. Painting. https://www.themorgan.org/collection/humphry-repton/sketchbook/123227/thumbs

Shamon, Hila, Olivia G. Cosby, Chamois L. Andersen, Helen Augare, Johnny BearCub Stiffarm, Clarie E. Bresnan, Brent L. Brock, Ervin Carlson, Jessica L. Deichmann, Aaron Epps, Noelle Guernsey, Cynthia Hartway, Dennis Jørgensen, Willow Kipp, Daniel Kinsey, Kimberly J. Komatsu, Kyan Kunkel, Robert Magnan, Jeff M. Martin, Bruce D. Maxwell, William J. McShea, Cristina Mormorunni, Sarah Olimb, Monica Rattling Hawk, Richard Ready, Roxann Smith, Melissa Songer, Bronc Speakthunder, Grant Stafne, Melissa Weatherwax and Thomas S. Akre. 2022. "The Potential of Bison Restoration as an Ecological Approach to Future Tribal Food Sovereignty on the Northern Great Plains". *Frontiers in Ecology and Evolution* 10: 826282. doi: 10.3389/fevo.2022.826282

Shanmuga, Santosh. 2023. *Burrowing Owl.* https://www.allaboutbirds.org/guide/Burrowing_Owl/overview#.

Steenweg, Robin, Mark Hebblewhite, David Gummer, Brian Low, Bill Hunt. 2016. "Assessing Potential Habitat and Carrying Capacity for Reintroduction of Plains Bison in Banff National Park". *PLOS ONE* 11, no. 2: e0150065. doi:10.1371/journal.pone.0150065.

Stegner, Wallace. 2000. *Wolf Willow: A History, a Story, and a Memory of the Last Plains Frontier*. New York: Penguin Books.

Stilgoe, John R. 2015. *What Is Landscape?* Cambridge: The MIT Press.

Stringer, Ben, ed. 2018. *Rurality Re-Imagined: Villagers, Farmers, Wanderers, Wild Things*. Novato: Applied Research and Design Publishing

Taber County. 2022. *Municipal District of Taber, October 2022*. Map. https://www.mdtaber.ab.ca/p/maps.

Todd, Nancy Jack, and John Todd. 1994. *From Eco-Cities to Living Machines: Principles of Ecological Design*. Berkeley: North Atlantic Books.

Veltri, Mike. 2023. *Cliff Swallow.* https://www.allaboutbirds.org/guide/Cliff_Swallow/.

Vogel, Steven. 2015. *Thinking like a Mall: Environmental Philosophy after the End of Nature*. Cambridge: The MIT Press.