

**USING GEOGRAPHIC INFORMATION SYSTEMS TO
LINK ECOLOGICAL DATABASES WITH BLACKFOOT *TRADITIONAL*
ENVIRONMENTAL KNOWLEDGE**

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ABSTRACT

Contemporary science has a minimal temporal experience with regional ecology. A linkage with Blackfoot/Blackfeet *traditional* environmental knowledge and information provides a unique perspective for notions of *sustainability*. This thesis explored the cultural contexts of two ways of perceiving the surroundings in the context of environmental science. Using GIS (Geographic Information Systems) to link ecological databases and Blackfoot environmental knowledge must be executed with caution. Before linkages could be established, common ground and residual barriers were identified. As a pilot analysis, Blackfoot significant sites were linked to Eco-region polygons. It is the association to *water, weather and/or climate* that suggests a significant link between paradigms. Missing linkages provide a basis for dialogue and future research considerations.

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Chapter 1

INTRODUCTION

1.1 Introduction

In the fall of 2001 research was undertaken in an attempt to bring the natural sciences and traditional knowledge of the Blackfoot¹ closer together. Specifically the following question was asked: Are there linkages between the ecological constructs of western/European frameworks, i.e., ecological databases, derived from scientific methodologies *and* information subject to the Blackfoot experiential memory, i.e., Blackfoot environmental knowledge? The thesis is not an attempt to *integrate* the Blackfoot experience (data) into a scientific model. It is a search for *complimentary* linkages.

The need for collaboration and consultation with First Nations people on traditional knowledge is a global situation. The UN Convention on Biological Diversity lists traditional knowledge, innovations, and practices as a “cross cutting issue”. “These cross cutting issues have an important role to play in bringing cohesion to the work of the Convention as they provide the substantive bridges or links between the thematic programmes (Secretariat of the Convention on Biological Diversity, 2001-2004)”. Given that the knowledge of Indigenous peoples is rooted in practicality, their applications affect various aspects of biodiversity, among other things.

¹ Blackfoot refers to the Blackfoot Confederacy/People, which includes the Blackfoot – Siksikaa, the Bloods – Apaitapiiks, the North Peigan – Aamskapi Piikunni, and the South Peigan – Apatohsii Piikunni. A common reference for a Blackfoot speaking about self is to use, “*Niitsitapi*.” The interested reader may start with Bastien (2004).

Geographic Information Systems (GIS) as a spatial information management tool is unique in that it provides a mechanism that is congruent with Indigenous thought processes (Wolf Leg, personal communication, pc. 2002). Time and space are perceived in a distinct manner from contemporary science (Russell, P. pc, 2002) and GIS is useful in that it frames the Blackfoot experience with respect to its spatial association on the earth. "Familiarity and experience created the perceived landscape, while memory drafted in onto the mind in the form of a cognitive map (Yellowhorn, 2000). Thus, "people, once familiar with a country, have no need of maps, and get their bearings from attending to the landscape itself rather than from some inner representation of the same (Ingold, 1996)".

Rock formations found on the Great Northern Plains are a good indicator to the spatial extent of the traditional areas encompassing the Blackfoot way of life (Nikiforuk, 1992). With its 28 radiating spokes and central cairn, the Majorville Wheel, among other sites, is an icon/symbol that provides deep insight into the Blackfoot perspective (Wolf Leg, 2003). Like current Geographic Information Systems (GIS) that utilize points, lines and/or polygons to link "places" with a database; the rock symbols are locators or identifiers that are linked to a *living* memory and are past down via oral custom. "The apparent continuity in use and construction of the Majorville Cairn...suggests that a very ancient and stable ceremonial tradition existed on the Alberta Plains (Vickers, 1986: 67)."

For the purposes of inquiry, this thesis will demonstrate that the Blackfoot ceremonial lifestyle and its continuity in the twenty first century regarding ancient teachings and traditions are an approach to *sustainability*. "Often *traditional* knowledge is not regarded as relevant to a contemporary indigenous or cultural group, but as knowledge relevant to the

past, and therefore implicitly obsolete, and in need of *preserving* (Ad hoc open-ended inter-
sessional working group on Article 8(j) and related provisions of the Convention on
Biological Diversity, December 2003).” Before we construct new management models, with
limited baseline information, it is apparent that there must be a resolution to dealing with and
coming to terms with the unique Indigenous cultures of the world. The variance between
Indigenous cultures mirrors the biodiversity in the surroundings; however, there are common
threads. To accommodate the wide use in the literature of both Indigenous knowledge and
traditional knowledge, they are recognized here and will be referenced in the context of
Blackfoot Environmental Knowledge (BEK). In this case, Blackfoot specifies a particular
region/experience/knowledge base in space. That being said, the task at hand is enormous
and this endeavor constitutes a good start.

The information that regards Blackfoot attributes were gathered from interviews with
“Keepers” of ancient Blackfoot knowledge, wisdom, and insight (*Omahkitaapiiks*); library
and museum archives; and published/unpublished work from authors and academics
(including but not limited to archaeologists, anthropologists, and ethnographers). More
recently, significant efforts within academia have made the case for the validity of *Native
Science, Indigenous Science, and/or Aboriginal Science* (Cajete, 2000; Goodenough, 1996;
Simpson, 1999, Yellowhorn, 2002, 2000, among others); there is a growing presence,
awareness and sensitivity to the richness of Indigenous Knowledge (IK) throughout the
world. The applications of IK, in its ancient wisdom, insofar as it is alive in the current
generations, are as valid to the pursuit of knowledge as the Indo-European scientific
approach.

For demonstration purposes, Eco-Regions (Strong 1992, Strong & Leggat 1981) were used as a pilot analysis for exploring the linkages between ecological databases and Blackfoot environmental knowledge (BEK). Contemporary science has a minimal temporal experience with regional ecology and therefore a linkage with BEK will form a complimentary relationship that may enhance the endeavors of environmental scientists (among others) whose efforts are aimed at balancing the entities of sustainability and mitigating the impact of the human interaction with the environment.

1.2 Objectives

The primary goal of the research is to facilitate the exchange of environmental and/or ecological information between *Omahkitaapiiks* – Keepers of traditional Blackfoot knowledge and wisdom and natural scientists using Geographic Information Systems (GIS).

The main objectives include:

- Capture of Omahkitapi testimony regarding the research topic;
- Development of a GIS database and map series that houses information derived from the following knowledge bases:
 1. *Blackfoot* Environmental Knowledge (BEK), and
 2. *Indo-European* (western) Ecological Science (IES);
- Using *Eco-Regions* as a pilot database, determine if linkages are present between databases derived from IES and BEK;
- Review and refinement of *Eco-Region* classifications to reflect Blackfoot Environmental Knowledge

- Provide examples of missing links to support recommendations for further environmental research in the study area.

Information derived from one paradigm may not be compatible for insertion into another paradigm whereby analysis is conducted and conclusions drawn. This is especially true in the case of language, i.e., the English language is noun based, whereas, the Blackfoot language is action oriented (Littlebear, pc. 2001); the syntax are different. This thesis aims to bypass barriers/constraints imposed by grammatical syntax by providing spatial *attribute* information from the Blackfoot perspective juxtaposed with the Indo-European perspective of the *surroundings*. It is imperative that we are comparing apples with apples. Complexities and further constraints are imposed when the comparison is not drawn from a parallel perspective.

With GIS the emphasis is on *space* with a reference to time. It's a de-emphasis of time which would otherwise contextualize the information in a linear fashion. Literally, the *Majorville wheel* is anything but linear. If the scientific methodology could be likened to a cookie cutter, analysis within the scientific paradigm would, in effect, cut a lot of pertinent information from the Blackfoot experience. Analysis of Blackfoot environmental knowledge (BEK) in the context of Indo-European science (IES) would fall short of a complete Blackfoot picture. Therefore, the goal is to provide a model that references the Blackfoot traditional knowledge in its spatial orientation. This allows the attributes and variables inherent to Blackfoot *environmental* knowledge (BEK) and Indo-European science (IES) to be brought into the height of investigation. From this point, it is apparent that beyond validation there are

repositories of knowledge in First Nations communities equipped with their own syntax. The close relationship of Indigenous cultures and the environment suggests that this information is not intended for power or authority, but rather for the maintenance of biodiversity and other intrinsic values of the natural surroundings. The knowledge represents a significant set of baseline information to set meaningful benchmarks. They are mechanisms for achieving a realistic concept of sustainability.

The model used to provide the foundational structure for the linkage process includes the use of *Analogy*, *Occupation*, and *Continuity*. These are diverse concepts originating from equally diverse arenas. Given the multi-disciplinary approach of sustainability, the following caveat serves as a framework which addresses the need for and outlines the *experimental* approach being utilized.

1.3 Caveat

The polarity of paradigms between written and oral traditions can be traced via the language or syntax of the baseline communicative grammatical structures. The customs of written and oral histories carry with them, *in* the language, a set of values (Wolf Leg, pc. 2002) held by the collective culture (Littlebear, pc. 2003); which then become manifest in daily acts of life. Over time, these values are embedded in the *tacit infrastructure* (Dormaar, pc. 2002) and a *collective agreement* (Littlebear, pc. 2002) is established and maintained in the language. Analogous to genetic coding, one does not *instruct* the heart to beat; one does not question the blueprint of the “*collective agreement*,” and the daily functioning of societies repeat their rhythms. Thus it can be said that language and land are critical aspects of culture such that the three are symbiotically, inextricably linked.

Cultures depend on the land that in turn shapes their way of life; this is especially true for early Europeans and other First Peoples around the world. The impact a culture or group of people has on the land can be both a positive and/or negative effect, not unlike positive and/or negative feedback loops. When the culture and natural laws of the surroundings support each other, over time, trends develop and become mirror images of one another. Or as Danilo Anton states, “ecosystems and cultures do not exist separately (1995:208).” For Anton, ecosystem restoration must also take place in the human dimension or to use his wording, the “associated culture...”

To reconstruct a local diversity, it is necessary to restore not only the species and their relations, but also the associated culture (208)...There are huge material, social, natural, historical, and ethical limitations and many reasons for not proceeding. However, the task is possible and desirable and, in the near future perhaps, we may find that it is unavoidable for survival (209)...Although the scope of damage to ecosystems is clearly critical, more significant in the long run is the loss of traditional and popular knowledge and practices in the effective management of social, environmental, agricultural, and economic systems in communities throughout the world (Anton, 1995: 215). (Emphasis added)

Taken from the Indo-European paradigm, Tom Ingold informs us that: “differences between the activities of hunting and gathering on the one hand, and singing, story-telling and the narration of myth on the other, cannot be accommodated within the terms of a dichotomy between the material and the mental, between ecological interactions *in* nature and cultural constructions *of* nature (Ingold in Ellen & Fukui, 1996:144).” The dichotomies inherent to the English language impede on the fluid transmission of information from Indigenous Knowledge/Science to European frameworks. Leanne Simpson states:

Once Indigenous Knowledge is textualized and constructed in TEK (traditional ecological/environmental knowledge), it can easily be taken out of context. It can be inserted into western paradigms and models to produce results that undermine Aboriginal rights (Simpson 1999: 85). (Brackets mine)

In addition:

The rapid acceleration of technological growth associated with industrial and postindustrial society's poses, through cumulative impacts of many individual decisions, a risk to the health of... ecological systems ... We recognize that people will always value nature for different reasons and, therefore, a pluralistic approach is necessary to address this problem (Costanza et al, 1992:5).

It is imperative that the pluralistic approach is appropriate to the cultural contexts of the Indigenous knowledge being subsequently extracted. For example, a central tenet in the Blackfoot worldview includes the inextricable link between the self and the surroundings. The opposite is true with respect to the Indo-European scientific (IES) paradigm. The exclusion of *self* from the perspective of IES puts limitations on attributing Blackfoot information in IES constructs. Given this constraint, it is important that meaningful analysis is carried out that not only reflects good scientific practice but explicitly acknowledges the importance of ethical cultural representation by disallowing an authoritative claim to the knowledge. That is to say, the information is dynamic and a model that promotes static representation must be modified to accommodate for meaningful representation of Blackfoot traditional knowledge.

1.3.1 Subjective Knowledge in Objective Parameters

This section outlines the model that forms the foundation for the linkage process. It makes reference to the scientific and judicial arena, whereby the idea(s) of subjective analysis is explored. Without the proper tools in approaching knowledge captured via *experiential* modalities, the *subjective* knowledge itself will carry little weight. Through the use of *Analogy, Occupation, and Continuity* a model is sculpted in an attempt to hold the paradoxical paradigms in a complimentary space without promoting contradictions.

Arena I: Scientific

Provided here is a delineation of Bohr's position with respect to the subjective level of interaction between the experimental design and the subsequent data as expressed by Jan Faye (1992) in, "Neils Bohr: His heritage and legacy." In order to demonstrate the inextricable link between "subject" and "object," Bohr borrows the experience of his mentor, Harold Hoffding, a psychologist. Faye provides a statement made by Bohr in 1929:

The impossibility of distinguishing in our customary way between physical phenomena and their observation places us, indeed in a position quite similar to that which is so familiar in psychology where we are continually reminded of the difficulty of distinguishing between subject and object (Bohr in Faye, 1992:147; emphasis added).

In a gathering of Scandinavian scientists the same year, Bohr comments in a similar fashion:

...the linkage of the atomic phenomena and their observation, elucidated by the quantum theory, does compel us to exercise a caution in the use of our means of expression similar to that necessary in psychological problems where we continually come upon the difficulty of demarcating the objective content (ibid). (emphasis added)

It follows that, "...only that which can be *experienced* can be defined unambiguously, that is, the atomic object possesses well-defined properties *only* with respect to *experiential* conditions (Faye, 1992:170)" (emphasis added). Given the "uncontrollable disturbance" imposed via the "measuring instrument" there is no possible means to "distinguish the knowledge of the atomic system from that of the measuring instrument (Faye, 1992:171)." The experience of the measurement presupposes the *information* about the system.

Referencing the situation as a *paradox*, Bohr's insights are provided as a caveat to approaching knowledge contained in the subjective domain:

The elucidation of the paradoxes of atomic physics has disclosed the fact that the unavoidable interaction between the objects and the measuring instruments set an

absolute limit to the possibility of speaking of a behavior of atomic objects which is independent of the means of observation (Faye, 1992:170).

Suggesting *analogy* as an efficient means to “achieve understanding,” Bohr provides that:

[This] would not be necessary, if reality did not manifest qualitative differences. But the parts of reality, as they are known through experience, are not homogenous, and analogy is therefore a necessary means to achieve understanding (Bohr in Faye, 1992:105).

A basis is formed via analogy between the experimental and the experiential such that in full scope, the process is a movement towards *wholism* based on the principles of complementarity. Employing Bohr’s insights, an analogy will be drawn between particle physics and paradigms, for the purposes of discussion. Made possible through the use of spatial programming, Figure 1.1 depicts the foundational model used to explore linkages between the material and the mental.

Spheres A and B denote IES (*Indo-European Science*) and BEK (*Blackfoot Environmental Knowledge*), respectively. Sphere C represents the observing system, or measuring device

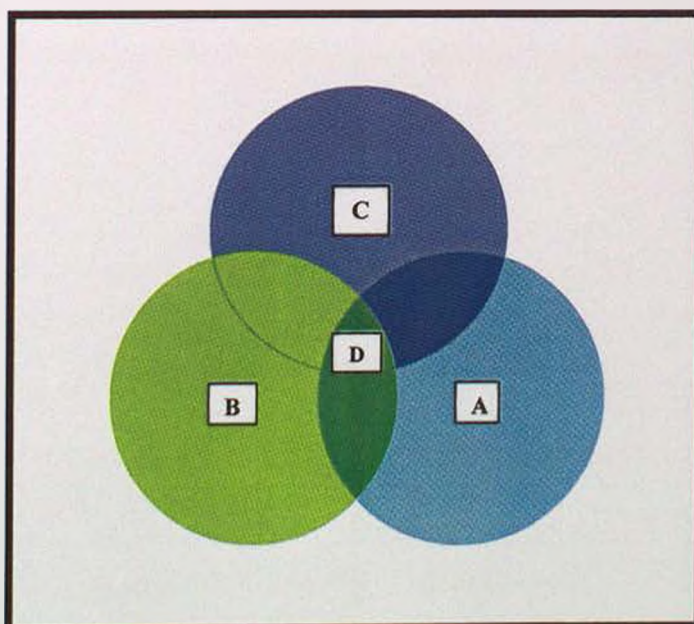


Figure 1.1: Particle-Paradigm//Accelerator-Collision Analogy

(i.e., GIS) and region D, refers to the resultant information (interpretations) and subsequent links about and between each sphere/domain/body of knowledge. Because we are dealing with two frames of reference, i.e., two separate domains that constitute a *way of knowing*, the use of analogy to convey information from one knowledge base to another provides an efficient tool to facilitate the exchange of ecological/environmental information. The analogy suggests that we are colliding cultures. Whereas, this has already taken place, we can use the time of settlement as a reference. Before we can clear the debris between cultures to establish linkages based on environmental phenomena, we need to know the scope of blockages.

Arena II: Judicial

The challenge with respect to the inclusion of oral testimony in scientific parameters is in identifying and validating another *way of knowing* without assuming authority. The oral tradition or culture of the Blackfoot people, among other Indigenous peoples, contains generations of information that span millennia.

In *Delgamuukw vs. British Columbia*, Lamer's perspective or consideration of the importance of oral cultures and/or testimony is outlined in the following:

Oral accounts of the past include a good deal of subjective experience. They are not simply a detached recounting of factual events but, rather, are "facts enmeshed in the stories of a lifetime." They are also likely to be rooted in particular locations, making reference to particular families and communities. This contributes to a sense that there are many histories, each characterized in part by how a people see themselves, how they define their identity in relation to their environment, and how they express their uniqueness as a people (Lamer in Isaac, 1998:70; emphasis added).

Lamer applies the ideas of oral histories in the context of Aboriginal Title, which he comments, “appears to be grounded both in common law and in the **Aboriginal perspective on land** (Lamer in Isaac, 1998: 84)” (emphasis added). Lamer stresses that,

...in practical terms, this requires the courts to come to terms with the oral histories of Aboriginal societies, which, for many Aboriginal nations, are the only record of their past (Lamer in Isaac, 1998:70).

Thus, the requirement in this thesis is the ability to come to terms with the oral histories of Aboriginal peoples with respect to scientific and technological applications. At the same time, there may be implications at the level of politics (Yellowhorn, 2000), the concept of *title* serves to provide a context with which to *consider* the Blackfoot perspective of the surroundings from Elder (*Omahkitaapi*) testimony. Title has three dimensions, *Occupancy*, *Continuity*, and *Exclusivity*. *Occupancy* refers to the practices of a First Nation pre-sovereignty. *Continuity* takes the practices of pre-sovereignty occupation and determines their status in present terms. Together, occupancy and continuity provide a meaningful forum to discuss Blackfoot traditional knowledge. (*Exclusivity*, as a test for Title, goes beyond the needs of the research for scientific purposes and therefore, the interested reader may consult with Thomas Isaac’s “Aboriginal Law”, among other sources.)

1.4 Summary

In most instances the nomenclature of scientific inquiry is not the same vernacular used in the every life of the lay person. Combining western science and Blackfoot environmental knowledge is difficult given that in various instances misappropriation of information has occurred to adversely impact First Nations People and the environment. Thus, what

constitutes protocol in capturing Indigenous knowledge is not necessarily the same as when deploying the scientific methodology. There are various modalities that can be adopted to incorporate oral testimony. Establishing a "common ground" is important. In addition, consideration of the landscape beyond the Cartesian reality is critical to the effort of dealing with cultural material. The earth, the landscape provides a medium, a common ground to explore linkages. The use of GIS simulates the common ground; but the intellectual space must be made available in order to reflect autonomy in the bodies of knowledge being considered.

Traditional knowledge of many Indigenous peoples is quantifiable to some degree; the information may be *textualized* or inserted into scientific models. However, the guiding principles and foundations of the approaches to knowledge acquisition differ (spatially and temporally) with respect to IES (western science) and BEK (traditional knowledge). Therefore, simply inserting BEK into IES runs the risk of marginalizing the holders or keepers of the ancient knowledge base. This is affirmed by Simpson, "TEK (traditional ecological/environmental knowledge), now separated from its holders, becomes open to the cultural interpretation of the dominant society (1999:85)."

With the model being proposed and deployed in this thesis, the process does not separate the information from the people. The model itself is essentially a preparation of space to provide fertile ground for linkages between IES and BEK (Region D, Figure 1.1). Ultimately, the real linkages are illuminated with meaningful dialogue. "Dialogue implies a very deep change in how the mind works. In doing so each participant has to suspend his or her own tacit

infrastructure of ideas. Freedom from the tacit infrastructure of ideas, worldview, and so forth, brings about the true spirit of dialogue (Leroy Littlebear, JD).”

On a global scale, the need for collaboration and consultation with First Nation’s people is recognized. It must be encompassed by an empowering process that does not assume authority of the resultant or extracted information. The model used in this thesis allows for a discussion of knowledge inherent to the Blackfoot way of life. Understanding that the ceremonies of the Blackfoot peoples’ way of life are inextricably tied to the surrounding environment (and cosmos) provides for meaningful links at an ecological level.

We can still interpret the information but with this model, it goes beyond scientific interpretation. It makes it applicable to the lay person which science often leaves out. If we are to achieve sustainability, it must be meaningful and applicable to the individual consumer who in turn utilizes the technology that is invented through scientific discoveries. (Often times it is the technology which impacts the environment.)

Chapter 2

ORAL TESTIMONY AND LITERATURE REVIEW

2.1 Introduction

This chapter lays the foundation that will provide the holding mechanism for bringing the paradoxical paradigms into a brief overlap. The tone is set by bringing brief summaries from the interviews with mentors and is followed by a literature and oral review of relevant material pertaining to the Blackfoot and European experience; experience that relates to the knowledge and knowledge acquisition inherent to both perspectives of the land and surrounding environment.

As a Blackfoot woman scientist, it is an everyday thing to consider both paradigms. On the other hand, for a scientist not exposed or with limited experience with the Blackfoot paradigm the core knowledge will be contained by a periphery of cultural bias or otherwise non-awareness of how to decipher the information. Conversely, for the Blackfoot, decoding the scientific information takes time. The neat thing is that, the two are really not so different however, in order to understand these linkages awareness of the approaches to knowledge and understanding what constitutes knowledge is critical. Further, the process occurs in conjunction with a deconstruction of the tacit framework carried by each individual that we often call their world-view. Fortunately, once we clear the debris of this process, there is clarity between cultures, at least, a little more clarity than the previous generation.

Clarity is arrived at when the actual *collision* of cultures (Figure 1.1) is translated with respect to the effect on the biodiversity of the Blackfoot traditional territory. Like other Indigenous peoples around the world, the intrinsic value of the land, i.e., its biodiversity was a diligent effort of several generations in an endeavor to ensure the dynamic continuity and succession of the surrounding environment. This endeavor is inherent to the Blackfoot paradigm and transmitted from generation to generation in the tacit infrastructure, i.e., the language. Thus, for the Blackfoot, the oral tradition is an integral part in how the interaction at the human-human level is translated and how it constitutes and contributes to the interaction of Blackfoot people and their environment.

Stepping in and out of world-views and jumping from one view to another requires specific conditions and a holding structure that supports this process. The sensitivity of Native and non-Native relations, at times volatile, makes this effort unique given that in linking knowledge bases, we are also suggesting that a tacit link become established between the two approaches to knowledge acquisition.

From the oral testimony it is evident that not only do the Blackfoot perceive themselves to be part of the environment, we also see that, the mineral make-up of the Blackfoot was equilibrated with the flora and fauna. Literally, at the molecular level, the Blackfoot were in equilibrium with the chemical constituents of the surrounding environment. We see also that in the Blackfoot way of life, the Blackfoot women are carriers of the cornerstones of the culture. Their contribution to the make-up of the Blackfoot heritage was noted by all *Omahkitapiiks (Keepers of ancient Blackfoot knowledge and wisdom)*.

The presentation of brief interview summaries plant seeds that require unique conditions to ensure maturation. These ideas are gestated within the context of a *matrilineal mitochondrial matrix* that demonstrates the unique complimentary relationship between Mitochondrial DNA (mtDNA) and the *traditional* approach to Blackfoot knowledge, *Kimmapiipitsin*.

Supported by a link in the feminine domain the review shifts to the collision of cultures.

Given the past tense status of this phase in our collective history as North American people, we are able to move beyond these barriers. However, these concepts must be acknowledged so that the process we are entertaining is meaningful for both parties who are holders of IES and BEK respectively.

Lineages of knowledge inherent to IES and BEK are brought to the fore and present the evolution of their inherent characteristics. Physics is used given its unique insight into the next generation (or revolution) of physics, and science as a whole. The implications of these insights may not be realized yet, but they are critical to a discussion between paradigms so that we are discussing the analogy of *particles and paradigms* in its appropriate context. Said another way, we must discuss the linkage of information based on cutting edge science to ensure that the process is not linked with an obsolete idea. As will become evident, the notion of “colliding” particles, or paradigms, cumulatively impacts the culture and the environment; it is an aggressive approach.

Environmental scientists, new as an instituted discipline, broad in its application, must be able to integrate the sciences. With this all encompassing or “whole-istic” approach the

process of establishing linkages between IES and BEK becomes permissible. That is, the attributes of BEK must be understood in a broad context. A spectrum that supports a scale which includes the sub-atomic level through to the scope of Eco-Region parameters (as a pilot) provides a process that can then be replicated for other eco-parameters and maintains a meaningful context. Difficult at first in some respects, however, what we are left with is a broad foundation for tacit linkages and meaningful dialogue. That is the aim of the oral and literature review, to piece together information that becomes the ground work for cross-cultural and cross-disciplinary dialogue. The ecological linkages of IES and BEK can become manifest in the human dimension if done in an appropriate manner.

2.2. Oral Testimony

This section provides a brief summary and overview of key concepts provided by eight *mentors/Omahkitapiiks*. Additional individuals, Reggie Black Plume, Camille and Lucy Russell, were consulted for purposes of research design and protocol but their interviews are not summarized here. Tobacco and honoraria were provided to the participants acting in the capacity of mentor or consultant in the research. The interview process varied from interviewee to interviewee and is reflective of an *evolving* process. That is, over the course of conducting interviews, the methodology, or approach was *dynamic* and accommodated for inevitable circumstances.

2.2.1. Interview Context Summary

These summaries are drawn from various field notes and transcribed material from audio/visual sources². For the purpose of presentation, alphabetical placement will produce the following order: (i) Dormaar, Johan; (ii) Knowlton, Stan; (iii) Little Bear, Leroy, (iv) Mistaken Chief, Duane; (v) Russell, Pablo; (vi) Wolf Child, Harrison; and (vii) Wolf Leg, Allen. As *advisor*, Beverly Hungry Wolf's summary will appear as the final set of information.

2.2.1.1 Dormaar, Johan

Dr. Dormaar's particular interest in Plains culture provided a unique perspective in the research. The bulk of discussion was reserved for the topic of *tacit knowledge*. Dormaar's comments include that the level and degree of interaction of the Blackfoot with *their* environment afforded a unique perspective about the landscape. He comments that, the Blackfoot *lived on, slept in and were exposed to climatic conditions by a separation of four millimeters (4mm)*; making reference to the thickness of a tipi. The *mineral makeup* of the Blackfoot people was similar to the plants and animals. For Dormaar, this would have significant implications to the ways in which people make decisions. The perspective of the landscape effected the decision making process.

Dormaar's interest in the *age of lichen growth on rock formations* was discussed while at a field site visit to Sundial Butte where the *Onokakatsi* formation is situated. Suffice it to say,

² These summaries represent a fraction of the information provided by the participants; substantive material from the discussions will be added appropriately to other sections of the paper. Rather than using quotes, italics will appear in the summaries to refer to direct wording from the participants. Italics are maintained in order to emphasize the presence and relevance of the human spirit.

rock formations have provided a significant level of inquiry and interest on behalf of the academic community, *inter alia*. Like carbon dating, lichen growth is an indicator of the age of the rock formations, but as Dormaar concludes, these are estimates.

2.2.1.2 Knowlton, Stan

Mr. Knowlton has been a significant contributor to this research. His previous research experience with respect to the Blackfoot traditional territory provided significant leverage with respect to the development of the GIS base layers and particularly on *place names*. Language factored in to significantly impact the ebb and flow of the dialogues. Knowlton's background with respect to linguistics and his research and development of the Blackfoot Syllabium, as an internationally recognized orthographic representation of the Blackfoot language, provides a global framework for protecting *Blackfoot Intellectual/cultural property rights*.

In a field site visit to the Sundial butte, accompanied by Dr. Dormaar, discussion on erratics, receding glaciers, retreating waters and immediate landscape provided for information transmission in its spatial location. The value in attending "Onakakaatzi" with Knowlton and Dormaar is difficult to express. There is a unique feeling as a researcher when representatives from two world views meet on the land.

2.2.1.3 Littlebear, Leroy

To summarize, Dr. Littlebear described the relationship between language and how it translates, over time, as the *tacit infrastructure*, or paradigm, of a people. As a *collective*, an

agreement is set up and speaks to the way a people *interpret reality*. Littlebear makes reference to the “business of science” he says, according to Einstein is *Reality*. The surroundings are in a constant *flux*, things are *forever in motion, changing, combining, and recombining*. The condition on which these *premises* are based and on which the culture or *collective agreement* interprets reality is *determined by the language, and in many ways is the language*.

These *foundational premises*, or *tacit infrastructure, manifest in the language*. For the Blackfoot this has implications on space and time as domains. A reference in time is provided by a reference in space such that, as Littlebear indicates, *asamooy* is a derivative of *asamoo*; that is, *a long time ago*, comes from *traveling a long distance*. On a day to day basis, time is not important. Over time, the repetitions or migrations in the surroundings are mirrored in the language and the functionality of it.

Littlebear further comments, *only when there is a significant shift*, in the daily *happenings*, is it recorded and remembered in the oral custom. Information includes *references in many cases, to dreams*. Thus, for the Blackfoot, *information about reality is not limited to states of awokeness*, it includes dream states; noting that these *markers, or stories*, in turn mark the land. For example, the (Blackfoot) people have a story about *Nato 'kshiskoo*, or *Sacred Springs* (Tunnel Mountain, Banff National Park). Over time it has also been referred to as *Iinniokssisko (Buffalo Springs)...* *We are connecting to the land through those stories*, comments Littlebear.

2.2.1.4. Mistaken Chief, Duane

In relating the *Niitsitapi (Blackfoot; Real People)* perspective, also, *Kipaitapiisinnoon (Our way of life)* Mistaken Chief comments on a *rule* or *law* inherent in the (Blackfoot) peoples' Creation Story³. Such terms as "*kimmapiypitsinni*" and "*aikimotsiyao 'p*" are terms that refer to notions like *compassion* and *sharing*. Arrived at through a process of renewal the implications are carried out at several levels. For example, animals and cosmic entities are also capable of *kimmapiypitsinni* and the concept is therefore *not limited to the realm of humans*.

With respect to *transfers* and *protocol* the initiation into *Blackfoot Societies* involve this *renewal* process⁴. The transfers are not an every day event or happening, *Matohkoi 'na 'ka 'piiwa*. The event or transfer is a process that involves the initiate going from the every day state to a state that is referred to by Mistaken Chief as, *Aatsimapi*, or *sacred state*. The individual receives a *new* life and in return they *give* an offering. In many cases, all material possessions are given up in a transfer and the new society member(s) *would walk away from the Sundance with just a bundle*. The "offering" reflected how much an individual wanted this new life. This is common in the ways collectively contained within the context of *Kipaitapiisinnoon (Our way of life)*.

Mistaken Chief stresses that having the feeling of *kimmapiypitsin* and putting it into action are two different things. *The state of "having" came from a previous state of need, which then resulted in the acquiring of alliances – "iitsikimawa/ was given a gift". Kimmapiypitsin*

³ This concept is discussed in section 2.3.

⁴ Discussion regarding Blackfoot societies appears in section 2.6.

is related to *aatsimihkasin* (lit. *sacred way behavior; returning the state of things back to the sacred balance – Aatsimapi*). Through *Aatsimoyihkaan* (lit. *sacred way speaking*) and *Aatsimihkasin* the (Blackfoot) people endeavor to achieve *aatsimaapi* (*aatsimaapi is a state of harmonized balance, a sacred delicate state*). Thus, with every action, *I'tsinoohpatsimihkaso 'p*, the people manifest these sacred ceremonies to renew and return the universe back to its sacred state, *Atsimaapi*.

One alliance common to the Blackfoot people is the beaver. *Through awareness of the environment and teachings of the Beaver, given to Beaver Bundle holders, or "Iiyaohkiimiiksi* (lit. *The ones that have water*), the people had the capacity to forecast *weather and bring success in hunting*. For these Bundle holders, including Mistaken Chief's paternal grandparents, water and weather are significant aspects. Noting that, *these are important matters to our people... We have to pay attention to everything and have respect for everything in the universe*.

An example of sacred alliances also appears with *Paapaitapiiks / Dream people*. Providing a source for answers through dreams, Mistaken Chief stresses that *if we lose respect for Paapaitapiiks, we lose the ability to source our dreams for answers*. In this manner the,

Niitsitaapi perspective prepares us to participate in a universe far greater than man and reason alone... Knowledge is in the universe which is made up of interdependent things that are tangible and intangible – physical and spiritual... We also understand that without these relationships and alliances we cannot survive. In terms of education and the environment, we need to know what these alliances are and how to maintain them.

2.2.1.5. Russell, Pablo

In dialogue with Pablo Russell, the centrality or importance of *linee*, or bison to the Blackfoot people provided a hub for discussion purposes. Not limited to food, clothing, and shelter, *we also followed the buffalo spirit*, comments Russell. The buffalo manifested in the form of food, clothing, shelter, and ceremony/spirit, in turn resulting in a *self dependent proud people*. Russell talked about the traditional territory, *Niitoahsinaan*, the earth, *kshahkoom*, and the sun, *Naatosi*.

Making reference to significant sites, *place is very important to us, there are certain places in our land that are very strong, energy wise; where spirits gather...usually high points; mountain tops; high hills. Places where buffalo would gather ... for us place is more important than time*, states Russel. To illustrate the perspective of time at a daily scale, Russel points out that, for the Blackfoot, a *lifetime was measured in days*; and equates to a people who *lived for the moment*; and moments intercepted seasonal variations. In particular the people moved with the seasons;

Spring came time to open pipes...when yellow flowers in bloom it was time to hunt the buffalo...And then in summer...that was time for babies to be born...summer...that's our new year; berries were picked, dried and we moved to the mountains to get tipi poles, we went...at the time when the wood was strong and easy to peel; and then fall time, we hunted the buffalo for the fur, so we would be warm in the winters...and other berries were ready...Wintertime...that was the time of telling stories...Every season had its purpose.

With respect to movement about the landscape, Russell provides that the (Blackfoot) people *would move every three days so the grass could stand back up, we didn't overuse an area.*

There were specific areas like *buffalo jumps* and places we went for vision quests...areas we

went to get the ochre to paint our faces with. The difference in *mountain herbs* and *prairie herbs* brought the people to the harvest places when they were *ready to be picked*.

Russell stresses that the individual *Bands* or *clans* occupied specific areas⁵. For example, *Ihpoahsiiks* would have knowledge (prairie people) that varies from *Mistakshistapiiiks* (mountain people). Therefore, when seeking knowledge in the oral custom, Russel stresses that information must be acknowledged with respect to its Band or, in this case, location/spatial affiliation.

Commenting on women in Blackfoot culture, *women are stronger spiritually...they pick the sweetgrass, the sage, the berries, the herbs, the roots because their closer to mother earth and therefore when they pick these things it is stronger energy*. Commenting on the *self* in Blackfoot culture, Russel states that: *[i]t's going to go back into the earth, its going to become dirt... eventually decay*. For the Blackfoot, Russel states:

...Our hair is the grass on the prairie; our bones are the mountains; our veins and arteries are rivers, streams, creeks; our breath is the wind; our heart is in the middle of the earth.

...So for us Mother Earth is more than just a provider. For us, She's our teacher, our protector; we learn from Her... we heal from Her; if we feel like giving up, we sit on Her.

*...If you look at nature...She knows She's beautiful...She shows it...
in a sunset...a valley...a coulee...*

Gathering a sense of self in the surroundings epitomizes the Blackfoot perspective of their environment. Including all of its internal cycles, the loss or impact of the buffalo to the Blackfoot people was a detrimental experience, Russel elucidated on these concepts and his comments will be discussed in the text.

⁵ Discussion regarding differentiation between Bands (Clans) and Nations (Tribes) is discussed in section 2.6.

2.2.1.6. Wolf Child, Harrison

The information provided by Mr. Wolf Child was through his relation of an old story, referred to as *Iiniskim*. The story was given in the Blackfoot Language and includes the *song* or verse that *called* the buffalo, during a time of need/starvation. Before relating the story Mr. Wolf Child talked about, how, in the past, *iskohtsik*, the *people* (Blackfoot) would rely on the *old ones*. The information contained in the story itself (for the interested reader) can be found in various published material including Barrett (1921), Uhlenbeck (1911) and Hungry Wolf (1977), *inter alia*. In particular, Reeves provides a good account.

In summary fashion, there are four key elements that emerge from the story; i) that the information was provided in a dream, ii) that the use of Isee, and iii) Asaani, were used with respect to prescribed protocols, along with iv) a song. The rites or protocols on *how* to conduct the combination of the four key elements were provided in the dream and manifested into the lived reality of the people up to present day.

Iskohtsik, we strived to treat people well and look upon them with a good heart. We had peace makers *Sikshinaakiks*, to protect the camp. *For our people we live in a different world today*. But as Namstatomahka conveys: In today's world, one can still utilize the *luck* or *charm* of the *Iiniskim* to provide for the things like the buffalo once did.

2.2.1.7. Wolf Leg, Allan J. (Sr)

Mr. Wolf Leg focused on two primary themes, *values* and *practices*, from whence all his teachings were based. He used the Sundance encampment as a *symbol* to show how the values and practices function within Blackfoot way of life. The information will be displayed spatially and discussed in greater detail in section five. For the (Blackfoot) people, *Ecology...is a symbol of the gifts we have...Mythology is one of our greatest teachers*. For the Blackfoot people, the function of the *subconscious* is two-fold. One, it served as a *recording package* and at the same time it had, in place, *assumptions* that uphold the internal *framework*.

In looking at the Peoples' territory, *we are land based people*. Ecological concepts are represented in *symbols* throughout the cultural artifacts; ecological gifts are *packaged into bundles*; and ecological interactions are carried out in ceremonial rites or *rituals*, by ceremonial *leaders* (also *Heroes*). Significant events resulting from various *travels* about and beyond the territory are captured (stored) in *stories*. The information is diverse from Band to Band and integration between these units would be a distortion of the information. Wolf Leg stresses that *legends* must be *placed* with the Bands in the *Sundance encampment* to determine the *clans that looked after* a particular area.

Mr. Wolf Leg comments on the Intellectual Property Rights (IPR) with respect to traditional knowledge, that there is information *common to everybody*. But the information must be accessed with respect to the protocols, i.e., *frameworks* inherent to the Blackfoot culture/way of life. The *old* information gets transferred from generation to generation carried within the

internal social framework. But as Wolf Leg states, *English is a poor vehicle for Blackfoot thought*, and must be considered when looking at how Blackfoot attributes are recorded in historical/archival documents.

Wolf Leg places the first Sundance at around 200 ad. Previous to this, the (Blackfoot) people had other *recording* mechanisms, i.e., the “medicine” wheels. Over time weathering and other effects have changed the original designs. During a field site visit, Wolf Leg commented that the distribution about the “Majorville” wheel was color coded during construction. There was a cessation in the construction of these *recording mechanisms*, which took place up to the Sundance, around 2000 bp. The *Okaan* (Sundance), comments Wolf Leg, *took over... it became a living recording mechanism*. After this period of shift, newly constructed *monuments* were mainly of *directional* and/or *territorial markings*.

Previous to the Sundance the people looked to the *Iiyokimii Ohkoinimaan* (Beaver (Water) Bundle (Pipe)). The Beaver Men, or *Iiyohkimiiks*, were responsible for the wheels or “medicine wheels” as they are known today. In the time of his childhood, his family would visit the “Big Rock Wheel” (Majorville Medicine Wheel). It was a symbol to show the people *how* to live, and they would *approach* the wheel four (sacred) times. Today, the Beaver Bundle or Water Pipe is looked at as the oldest of knowledge storages and sources.

In addition, other monuments, such as that belonging to *The Buffalo Women*, are meant to *memorialize* something. Adding that, the Blackfoot *culture is maternal...the woman balances*

everything. Another symbol that records or memorializes environmental knowledge is the *tipi*. If you look at the *tipi*, comments Wolf Leg,

...The top of the tipi symbolizes the universe...on the bottom are the mountains...the earth...and water songs belong here, with the animals and are put inside the beaver bundle and is the main constitution of our life; at the top...Makoyohsokoyi (the Wolf Trail) the Milky Way, also the puff balls which brought the Sundance songs, all Spomikpiksin songs are at the top; in the middle part of the tipi is the personality of the owner, his source of power. The tipi takes the universe and folds it inside, the universe is inside the tipi and its part of you, and painted on the lining, the spider web, and symbolizes the universe...it just keeps repeating...

2.2.1.8 Hungry Wolf, Beverly

I visited Beverly Hungry Wolf, *Sikskiaaki* on a number of occasions. I also attended Beaver Bundle ceremonies (Bloods & South Peigan/Blackfeet), Medicine Pipe Bundle ceremonies (Blood), an Okaan (Blackfeet, South Peigan), and the Blood Sundance with my advisor. Her published account and documentation of women in "The Ways of my Grandmothers" in particular is an inspiration for this thesis. I had the opportunity to drive with her to these sacred events where our dialogues varied from discussions on *naming*, place names, to women's roles/responsibilities as bundle keepers, and focused a great deal on *pokaks*, the children. *Sikskiaaki* has many rights as a ceremonial woman. Her guidance and role as advisor/arbiter to ensure the authenticity of my attempts to bring two worlds/paradigms together, I am forever indebted.

She has provided me with the opportunity to participate in many ceremonies and to experience the transmission of the knowledge of the *holy ways*. Along with her family, they will be a stronghold to the current and next generations. I can only hope that many more people have the opportunity to learn from *Sikskiaaki* along with other Blackfoot wisdom

keepers. As with the other summaries I will continue to draw on information presented during interview sessions. To close the section off, I will end with *Sikskiaaki's* comment on the role of women over time for the Blackfoot People:

The main ceremonies come from the (Blackfoot) women. Men, warriors, get their own personal knowledge//medicine from their dreams/visions and serves them in daily affairs. But the main constituents that make up the Blackfoot way of life come from the women.

2.3. Common Ground

In an effort to propose a common reference point wherefrom linkages may be spawned, and in order to provide a basis for discussion that guides meaningful dialogue between paradigms, ideas of *common ground* are explored. Indigenous Peoples throughout the world ascribe an interrelatedness to all that surrounds them. Resonant in many indigenous languages and thought, is the phrase or reference: "We are all related." This section makes reference to an article entitled: "Geneology in the Era of Genomics." The notion that there is interrelatedness among humans evidenced through DNA, adds a new dimension to the validity of Indigenous thought.

"Mitochondrial DNA has provided ground-breaking insights into the history of humans (Manrubia, *et al*, 2003; 163)." The mtDNA is passed on from mother to offspring, thus, is only "propagated" by the daughter (Manrubia, *et al.*, 2003). According to Manrubia (*et al*, 2003:158), the "mitochondria carried in all human cells are the global legacy of a single woman." In 1987, Cann, *et al*, found that this woman lived between 140,000 and 290,000 years ago (in Manrubia, *et al*, 2003:158). From an IES perspective, there is empirical

evidence to suggest that we are in fact, *all related*, or for Manrubia and her colleagues, share a “*common ancestry*”, or a “*universal ancestral population* (2003:164)”.

Mistaken Chief makes reference to an origin story as he relates the foundational premise upon which the Blackfoot people approach life (section 2.3.4). *Kimapiitsin*, for the Blackfoot originates with the inception of death, at the request of the first woman, *Kipiitaaki*, created by *Creator*. Percy Bullchild (1998) articulates the story in his, “American Indian Genesis,” providing details from oral accounts; himself a Blackfeet, or South Peigan. The inception or origin of death is a pre-requisite to the notion of *kimapiitsin* (Mistaken Chief, 2003. Pers. comm.). Death gives way to life, and is a transitory process that invokes *kimapiitsin*, among other things, and serves as the prelude to the reception of knowledge through “renewal frameworks (Littlebear. pc. 2003).”

Both examples are grossly summarized and presented here. The idea is that, for the Blackfoot, the information is timeless and provides a way to approach life, remembering the intent of the *original* woman, i.e., *Kimapiitsin*. If we consider the “mitochondrial eve” to be analogous to “*Kipiitaaki*,” then there is a basis of commonality. In this manner, the two paradigms share a common reference point, albeit in extremities. What we are left with at the end of the day, is a Matrilineal Mitochondrial Matrix (M^3) that links all human beings in the feminine dimension, extending beyond space and time, we *are* all related. From an idealistic perspective, this would be all that is required to establish common ground. However, there are significant residual perceptions that disallow a *free* or *open* dialogue to ensue.

2.4. Barriers and Buffalo

The section opens with a look at the cultural (tacit) linkages in Blackfoot way of life between buffalo (*Bison bison*) and Blackfoot women. In order to capture this, two event themes or ceremonies relating buffalo “Iniks” and Blackfoot women “Niiitstitaapiikiiks” will be explored in subsection 2.4.1. Section 2.4.2 takes the settlement period as a time referent to depict the perceptions of buffalo and Blackfoot women. Applying the analogy, Figure 1.1 is initiated and the collision of cultures is examined but not exhaustive. Misappropriation of cultural information would ensue, if there are residual barriers based on these early perceptions. These gaps have the potential to inhibit the objectives of the research, and that is to *facilitate the exchange of information*. By stating the obvious we can access deeper insight; this is the intent: to move beyond the barriers.

2.4.1 Cultural Links: *Bison bison* and Blackfoot Women

There are many angles with which to capture essential components of culturally significant associations between “Iniks (bison)” and “Aakiiks (women)”. Several volumes of text would elucidate on the inherent characteristics that are associated with this *inextricable* link; that amount of information is beyond the scope of this research. What will be mentioned are two components of the Blackfoot Culture: i) *Iiniskim “Buffalo Stone”* and ii) *Maotoakiiks “Buffalo Women’s Society”*. The objective is to create an awareness of and sensitivity to the scope of the Blackfoot woman’s role in maintaining an *environmental* equilibrium with the buffalo.

2.4.1.1 *Iniskim*: “Buffalo Stone”

The origin of the “*Iniskim*” as a ceremonial aspect of Blackfoot way of life comes from a woman, cited as “Weasel Woman” by Clark Wissler (Wissler and Duvall 1908:85-87) who also provides the most detailed account according to Brian Reeves (Reeves & Kennedy eds. 1993:195). “Stone” refers to a type of fossil, *Ammonites* and/or *Baculites*, and has general bison anatomical characteristics. Dr. Reeves provides significant information documented in various locations. Two of his works were used as primary references for research purposes including information found in “Kunaitupii: Coming Together on Native Sacred Sites, Their Sacredness, Conservation and Interpretation (1993),” and documented in audio/visual format, “The Sacred Geography of the Blackfoot People (1992)”. In addition to Wolf Child’s account, Beverly Hungry Wolf (Sikskiakii) was also consulted with to provide a brief overview of the linkage between buffalo and Blackfoot women via the origin of *Iniskim*. As stated previously, Uhlenbeck (1911) also provides a good reference of early accounts in the literature. “*Iniskimiksi*” are also given treatment by Yellowhorn (2002) and McMillan and Yellowhorn (2004) and by Hungry Wolf (1977) among others.

For purposes of inquiry the story of “*Iniskim*” has been broken down into four elements:

i) *Time* period, ii) Dream origin, iii) Protocol, and iv) *Singing the buffalo back*. The elements are presented in the greatest respect and are not meant to *dissect* the story, but to use it as an illustration of the inherent properties of one of many *legacies* in Blackfoot oral heritage.

- i) *Time* period: The exact date may be significant in terms of modern concepts of dating events, but the notion of time in this context, the reference is to a *time* when the people were without buffalo. “If there is no meat, the people are having hard times (Russel, personal communication, 2002).” It was a time of humility among the people, with starvation encroaching on the people, a young girl had come upon an ammonite fossil that resembled the shape of a buffalo, showing

itself to her as she was gathering wood. It lay on a bed of buffalo hair and was singing to her (Hungry Wolf personal communication, 2003).

- ii) *Dream Origin*: Having wrapped [it] in a blanket. It had spoken to her in her dream that night. She was told to prepare the people for the return of the buffalo.
- iii) *Protocol*: In her dream she was instructed on protocol that would assist, or manifest the ensuing return of the bison. Handling or having *kimapiipitsin* in taking care of the *liniskim* were provided, i.e., protocol; the use of sacred *iisi* and *asaann*⁶ and; the transfer of the buffalo song were provided (Wolf child, 2002).
- iv) *Singing the Buffalo Back*: The people were to prepare for a wind storm. That night, for those who believed in the young woman and her dream, *sang* and prayed all night. The following morning, the buffalo had returned, but they were to leave the first buffalo alone (Hungry Wolf, 2003). *Treating* the fossil with affection, in a sacred way, and with *kimmapiipitsin* the song was sung all night, bringing the buffalo back; *singing* the buffalo back.

The discussion surrounding *liniskim* is lengthy in and of itself; it is a significant event in the memory of the Blackfoot people. Having originated in a time of need among *all* the people, in a dream, it became manifest through a woman, a *heroine*. The dream, now a story past down from generation to generation, reiterates the notion of *kimmapiipitsin* and addresses the significance of faith in dreams and the link between *liniiks & Aakiiks*.

2.4.1.2. *Moatokiiks*: “Buffalo” Women’s Society

Sacred *societies* among the Blackfoot do not permit the uninitiated to speak of ceremonial events or other details of a sacred nature. Among the Blackfoot people, the *Moatokiiks* is the only society to be exclusive to women. Given attention by early writers (Wissler (1913), Mails (1972), among others) there in fact, is a significant level of documentation with respect to the *Moatokiiks*.

⁶ Translations for I’sii and A’saan are not provided. Maintenance of their sacred/intrinsic value is upheld in the language.

According to Wissler, the first mention of the women's society appears in Maximilian's brief account (1913). His account states: "the endeavor to imitate the manners of the buffalo cows" as a key aspect of the ceremony (Wissler 1916: 430). Without specifying detailed information, the only society, exclusive to *Akiiks* (women) regards the *imitation* of buffalo; another example of a sacred *ecological* link between the two subjects in question.

Maotokiiks are mentioned in this section to provide the reader with key (tacit) *links* that exist between the buffalo and Blackfoot women. Delineating specific information about the rites involved would be an infringement on the *Intellectual/Cultural property rights* that belong to the *Society* members, past/present/and future. Suffice it to say, at an ecological level as well at a *sacred* level, a symbiotic relationship between *Iiniiks* (*Bison bison*) and *Aakiks* (Blackfoot women) in Blackfoot culture/heritage was present pre-sovereignty. Of particular note is the continuation of ceremonial rites of the sacred Women's Buffalo Society in the twenty first century; despite attempts to eradicate the ways of the Blackfoot and the existence of the buffalo. This is the topic of discussion in the next section.

2.4.2. Early Settlement Period – Late nineteenth century era

The previous section gave some indication to the level of environmental association that exists between *bison bison* and Blackfoot women. Limited to two examples of cultural links, the discussion may have also including information about the *tacit infrastructure* or *tacit knowledge* that Blackfoot women carry in regards to Blackfoot *heritage*. Nonetheless, a foundation is formulated that is rooted in the matrilineal heritage of the Blackfoot people.

Whereas only two examples are presented, this should not diminish the importance of the environmental equilibrium established over time between bison and Blackfoot women. Referring back to Figure 1.1, the paradigms or particles are, in essence, accelerated and collided. In the case of Sphere A, (i.e, Indo-European Science), and Sphere B, the cultures accelerated collision is captured best by the portrayal of the effect, or impact to the Iiniiks (buffalo) and Aakiiks (women); given their symbiotic relationship as noted in the previous section.

The next two sections explore the early settlement period and is an attempt at a depiction of the environmental impact the paradigm of the time had on the bison populations and the perceptions of Blackfoot women. Should this paradigm be perpetuated today, there is little room for a Blackfoot perspective; its *integration* would result in a distortion, misappropriation and/or marginalization of culturally sensitive information.

2.4.2.1 Fur Trade: Effects to *Bison bison* Populations

Perhaps the most striking collision between the Indigenous peoples of the Northern Great Plains and the newcomers was the fur trade of buffalo. Estimates of bison populations range from 50 to 60 million, in prehistoric times (Kidd 1985:5). At the turn of the 20th century Anderson comments that the “Kingly race that once roamed a continent were almost wiped out for *a dollar a hide* (1921:21)”. (Italics mine)

A journalist with an interest in archaeology provides that around eleven thousand years ago,

The herds of bison flourished, becoming ever more abundant in the years immediately following the retreat of the ice until they were masters of the grasslands, a single species ascendancy that does not seem to have occurred anywhere else in the world... Certainly when white explorers first came upon the great herds that blackened the

prairie they were aghast: they had never seen such countless multitudes (Bryon 1991: 32).

Bryon further elucidates that:

Without the bison, it is doubtful if people could have existed at all on the arid plains; certainly not in the way that they did. For the bison was much more than a food source; its hide provided shelter, clothing shoes, bedding and blankets; its bones were made into tools for shaping stone scraping hides, working leather and for sewing; its sinews and hair were twisted into cordage; its horns, bladder, paunch and scrotum were used as containers; its dried dung was indispensable as fuel on the treeless plains...To the Indians, the bison eventually became far more than a prey animal. It loomed larger in their spiritual lives (ibid).

The link between the plains people and the bison were "tied inexorably." Since bison were never domesticated the people followed the source of

...their sustenance in daily and seasonal cycles from the high plains in summer to the shelter of foothills and valleys in winter. If the herds prospered, the people prospered; when the herds failed, the people starved. It is difficult to find other examples of such single species dependency (ibid: 32-33).

According to the following schematic, Figure 2.1, adapted from *The Beaver*, in addition to the prairies, the herds also,

wandered south across Texas to the burning plains of northeastern Mexico, westward across the Rocky mountains into New Mexico, Utah and Idaho, and northward across a vast treeless waste to the bleak and inhospitable shores of Great Slave and Hudson Bay (Anderson 1921:22).

The bison territory is juxtaposed with the plains Indians territory and the original depiction is retained to provide early perceptions of the Hudson Bay Company. Lamenting on the last of the buffalo herds, James W. Shultz who married into the south Peigans, recalls the decrease in the range of the bison,

Their range was also smaller, extending from the mouth of Judith River eastward to the Round Butte, on the north side of the Missouri, one hundred and twenty-five miles. They were far more plentiful on the south side, between the Missouri and the Yellowstone, but so were the hunters. The white hunters were the most destructive of all and piled up more than one hundred thousand buffalo hides along the Yellowstone that winter, which they sold for about two dollars each to Eastern tannery buyers. As

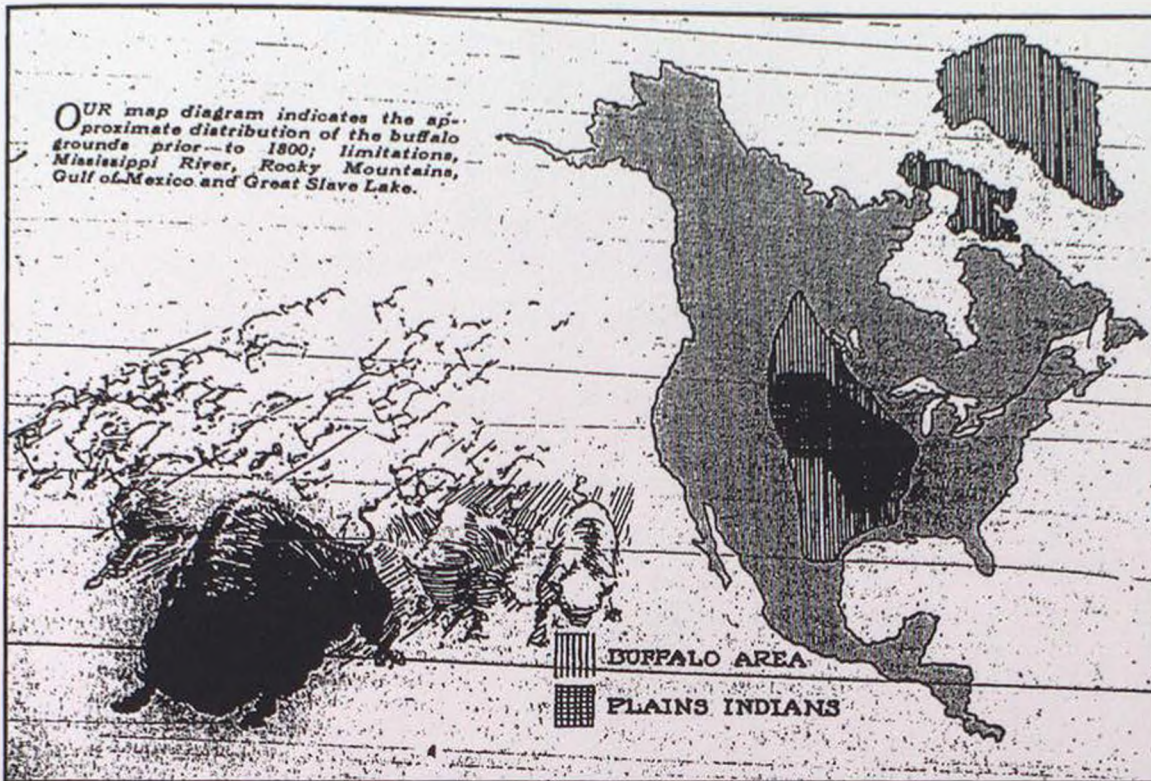


Figure 2.1: “Approximate distribution of the buffalo grounds prior to 1800.”
 (Schemata depicted in *The Beaver*)

the season advanced, the hunters had to ride farther and farther to find the game. There was no doubt but that the end of the trade was near (1925:209).

Following the last of the bison herds into present day Montana, around the Missouri River, after signing the treaty, Red Crow and the Blood people returned to the present day *Blood Reserve*, in 1880 (Dempsey 1980). “In 1881, we starved,” the loss of the buffalo meant a lot to “us” (Russell, P. pc. 2002).

By 1908, the estimate of wild bison provided by William T. Hornaday, were 25 in the Rocky Mountains, total in Canada was 300, 130 were captive in Europe, and 1116 in the United States, with a total of 2047 (Anderson 1921). Providing significant aspects of the Blackfoot way of life (food/clothing/shelter/ceremony), the dessimation of the bison populations gave

way to death and starvation of the Blackfoot people, among other Plains people who depended on the buffalo.

Samek (1953) provides a quote by Father Constantine Scollen, an Oblate missionary who had known the Blackfoot for sixteen years. He described the dreadful situation among the Blackfoot "in a scathing eleven-page letter to the assistant commissioner of the North West Mounted Police at Fort Walsh:

*I [have] seen a Blackfoot brave withdraw from his lodge that he might not listen to his crying children when he had not meat to give them!
...Many sustained life by eating the flesh of poisoned wolves, some have lived on dogs, and I have known others to live several days on nothing else but the old bones which they gathered and broke up, wherewith to make a kind of soup
(Samek 1953:39).*

Starving the Blackfoot onto reservations, removing the substrate that sustained them, the people were forced to establish a life without the abundance of buffalo. Russel makes reference to a count that took place pre-treaty, "there were 7000 buffalo, per man, woman, and child (pers. Comm. 2002)." How does one measure the loss, or impact of the rapid decline of 50-60 million bison?

2.4.2.2 Portrayal and perceptions of Blackfoot women

Perceptions of Blackfoot women in Blackfoot society may be acknowledged from various frames of reference; some information has already been provided. The inherent and intrinsic value of the feminine role in Blackfoot culture is central to the functionality of the Nation(s). Not only is the role as life giver significant to the people as to be *sacred*, but as many of the mentors to the research note, and succinctly stated by Russell (pc. 2002): "The women are stronger spiritually."

The Earth as Mother, among other things, in the Blackfoot way of life and the mother's of the Blackfoot nations are looked at in a similar fashion. The role as provider and life-giver are captured in the reference to the traditional territory, *Niitoahsinaan* – “where we get our life/sustenance from”. Littlebear's remarks include that the Blackfoot men are, in effect, “spokesman”; that in fact, it is the women who hold the knowledge. Wolf Leg provides similar information and adds that, the *Holy Women* of the Nation *hold* the matrix that makes up the reality of the Blackfoot way of life. Finally, in section 2.2.1.8, Sikskiakii (Beverly Hungry Wolf) provided a synopsis of the perceptions of women, recall that in terms of central tenets in Blackfoot ways of knowing, the main ceremonies come from the women.

Portrayal of Blackfoot women in dominant society, during the settlement period, placed a significant amount of attention on the “White” woman juxtaposed with the “Indian” woman. As one historian points out, “there was a concern to forget the past, to present Aboriginal women as a menace to the emerging community, and to encourage and celebrate the arrival of white women (Carter, 1954).” The depiction of Aboriginal women as prostitutes, among other things, was a manipulation of cultural identity to segregate “newcomers” from the Native population; by policy and perpetuation in the media, according to Carter's claim. In particular, Carter draws attention to a comment made by legal historian, Constance

Backhouse:

...with its attendant emphasis on the activities of Indians rather than whites, revealed that racial discrimination ran deep through the veins of nineteenth-century Canadian society (Backhouse cited in Carter 1954:187).

Portrayed as prostitutes in the media and minds of the European settlers, Carter provides evidence of a closer look at the notion of prostitution:

In 1882, for example, Chief Crowfoot of the Blackfoot and his wife complained that the farm instructor on their reserve had demanded sexual favours from young girls in return for rations, and when an investigation proved this to be the case, the man was dismissed (Carter, 1954).

The attempt was to segregate the newcomers from the Native population:

... Their arrival coincided with developments such as the treaties and the growth of ranching and farming, which served to consolidate the new order and to allow the recreation of Euro-Canadian institution, and their presence helped to justify existing policies that were aimed at segregating the new community from indigenous contacts. The Canadian state at this time was increasingly adopting segregationist policies towards the Aboriginal people of the West, and central to these policies were images of Aboriginal women as dissolute, dangerous, and sinister, in comparison to their fragile and vulnerable pure white counterparts (Carter 1954:159).

For the Blackfoot women, survival in a time of severance from the regular patterns of life had implications at various levels. Carter elucidates:

As a Touchwood Hills farm instructor told a visiting newspaper correspondent in 1885, the charges of immorality among farm instructors on the reserves were in many instances all too true: "The greatest facilities are afforded the Indian instructor for the seduction of Indian girls. The instructor holds the grub. The agent gives him the supplies and he issues them to the Indians. Now you have a good idea of what semi-starvation is" (Carter, 1954).

In turn, we have deeper insight into the ideas or allegations of prostitution among Aboriginal women. Juxtaposed with the reality of the Native woman, non-Native woman's perspective was also influenced, as Carter explicates in the next citation:

At the time of Mary Inderwick's arrival in the West, the consolidation of Canada's rule was beginning but was not yet secure. Inderwick wrote that they should have been "isolated in the mountains" rather than settled on nearby reserves, and that the sooner they became extinct the better for themselves and the country (Carter 1954:158).

The work of the Convention (Biodiversity) also calls for recognition of the vital role women play and affirming the need for the full participation of women at all levels of policy-making and implementation (for biological diversity conservation). Not accounting for the limitations of the existing dominant *tacit* framework diminishes the credibility of traditional

environmental knowledge, given that the women are central to the functioning of the Nation. Therefore, the question must be asked: Are these early perceptions persistent in the present paradigm? If so, any analysis of Blackfoot environmental knowledge, or any traditional Indigenous knowledge of any First Peoples, runs the risk of perpetual marginalization of not only the feminine aspects but the Indigenous paradigm/perspective as a whole.

The previous sections provided the cultural links between two specific related aspects, Bison and Blackfoot women. The collision of cultures had significant effects and this is evident in various forms. The affinity for the Blackfoot people to be in a state of *Aatsimaapi* suggests that the degree of separation from the *perceptions* and *perspectives* of the Blackfoot women need to be addressed. With these ideas in mind, the next section captures an Indo-European perspective of the environment with ensuing classification schemes relevant to the areas in question, i.e., The Great Northern Plains & Blackfoot Traditional Territory - Niitoahsinaan.

2.5. Indo-European Perspectives of the Environment

Working with the assumption that all science can be deduced to physics (Peat 2002), ideas of classical (Newtonian) and quantum mechanics will be presented for a streamlined approach to delineating the IES paradigm. Awareness of the notions of particles, with respect to the “particles zoo” is briefly discussed. The goal is to capture the IES perspective of the environment. There are significant implications to the “perceptions of the natural world (Barbour 1999),” based on the presence of “quanta.” The scope is then extrapolated and Eco-region parameters are discussed. Notions of sustainability with respect to *ecosystem health*

and resultant ideas of ecosystem management will round off the discussion of the IES paradigm.

2.5.1 Classical vs. Quantum Perceptions of Reality

The methodology of conjectures and refutations efficiently characterizes the *modus operandi* of Indo-European derived sciences. The embodiment of the paradigm is structured around syllogistic syntax, among other things. The scientific methodology carried out via “experimental” observation and deductive reasoning, is supported by a foundation that “sees” the environment as an object for “investigation” and later for manipulation (Peat, 2002). F. David Peat introduces the notion of “experiment” in the following excerpt:

Physical science in the West is associated with the birth of the experiment at the hands of Galileo. Galileo's first experiments are seen as having transformed the scientist from a passive observer into one involved in an active engagement of nature, an engagement in which the scientist selects and isolates an aspect of the world which can then be observed in a repeatable way. Experiments are designed to exclude or control external influences and to emphasize a few key variables, or conditions, which can then be studied in a repeatable fashion. In its extreme form one finds echoes of Hans Eysenck's dictum "if it cannot be measured, it does not exist" (Peat, 2002:250).

Truth from a classical perspective weighs heavily on numbers or measurements of the experiment. According to Peat,

...numbers are seen as concepts within a worldview whose language is based in nouns; a worldview that deals in the concepts of classes, or collections, of objects. While numbers cannot be held in the hand, they are abstractions that can be grasped in the mind; they are the objects of thought that can be manipulated and moved around in a mental universe (2002:163).

Inevitably the syntax is associated with the noun based worldview. Recalling from Littlebears' information, in between the dichotomies, eg., “black/white, good/bad, saint/sinner,” there is a “water tight boundary” separating these pairs of opposites (pc. 2003).

It is an all or nothing approach. Numbers or symbols used in IES mathematical equations are inherent to the paradigm.

Table 2.1 summarizes key revolutions in the history of physics as presented in Julian Barbour's "The End of Time." The information provided is meant to be an overview of significant time frames, rather than an in depth analysis of the history of "science".

Table 2.1: Revolutions in Physics*

ID	Date	Period	Contributing Scientist(s)	Main Characteristics
R1	1543	Copernican Revolution	Copernicus (1543), Kepler and Galileo (1602)	Heliocentric solar system
R2	1687	Newtonian Revolution	Isaac Newton	3 famous laws of motion and theory of universal gravitation
R3	1905	Special Theory of Relativity	Albert Einstein	Space/time inextricably linked
R4	1915	General Theory of Relativity	Albert Einstein	World without gravitation
R5	1925/6	Quantum Mechanics	Planck (1900); Einstein (1905); Bohr (1925); Schrödinger (1926); and Dirac	Existence of <i>quanta</i> and implications to a perception of the natural world

* Information extracted from Julian Barbour's "The end of time," pg. 12-13.

The inception of a new perception of the self in relation to the surroundings took place with Copernicus' conjecture of an heliocentric universe; verified by Kepler and Galileo. That the sun is centre in contrast to an earth centred (geo-centric) universe epitomizes science. That science cuts to the heart or centre of reality is prevalent in this first revolution, R1. The controversy surrounding these early debates need not be discussed however there is considerable documentation on the subject and only brief mention is made here.

Discussed in slightly more detail in section 2.6, the Blackfoot regard the sun as centre and this is evident in the *Akokatsinni* – “Sundance”. However, there is definitely a temporal differentiation in these two perceptions of reality and the centre of this universe. For example, this understanding is an inherent awareness in Blackfoot epistemology. Its inception does not begin with the first Sundance it is however emphasized from the time of its inception and on an annual, renewal basis. Therefore, as baseline, temporal comparisons between the paradigms suggest that the Blackfoot way of knowing is *older* than R1.

2.5.2. The Particle Zoo

Perceptions of continuity are replaced by ‘lumps’ or ‘quanta’ and depict a *discontinuous* nature of particles. That is, according to “Bohr’s theory, an atom emits a light quantum (photon) of a well defined energy by jumping from one orbit to another (Barbour, 1999:188).” The notion of a jump delimits the ideas of a linear *continuity*. In addition,

Both electrons and photons can, depending on the circumstances, exhibit wave or particle behavior. Otherwise they behave very differently. Many photons can be present simultaneously in the same state (a state being a characteristic set of properties of particles, such as position and direction of motion), but for electrons this is impossible – there can be at most one in any given state. The two kinds of particle have different statistical behavior, so-call Fermi-Dirac statistics for electrons and Bose-Einstein statistics for photons. In fact, there are now known to be many different particles, each with an associated field (Barbour, 1999:191).

The concept of ‘particle zoo’ is used to describe the montage of matter. In order to contain the vast array of elementary particles, statistics is applied to differentiate.

They satisfy either Fermi-Dirac statistics, and are thus called fermions, or Bose-Einstein statistics, in which case they are called bosons. In addition, nearly all particles have an antiparticle. An antiparticle is identical to the original particle in some respects, but opposite to it in others; in particular, a particle and its antiparticle always have opposite charges (Barbour, 1999:191).

The following excerpt provides critical extensions of the implications of *fermions* and *bosons* as classifications for the ‘particle zoo’:

Particles with half-integral spin are called fermions and those with integral spin (including 0) are called bosons. Thus, electrons and protons are fermions and photons are bosons. It is a very deep feature of nature that all the elementary particles that constitute matter are fermions, whereas the fundamental particles that are responsible for the forces that bind fermions together are all bosons. (Photons, for example, transmit the electromagnetic force that binds together electrically charged particles.) Matter, therefore, is an assembly of fermions held together by forces conveyed by bosons (Atkins, 1994).

The implications of a *discontinuous* framework lead to two main categories of the 'particle zoo'. Continuity shifts to quantization in field theory (Barbour, 1999) but essentially the implications are that the surroundings are discontinuous; not continuous, as was the perspective of classical Newtonian Physics. Given that the quantization energy is extremely minute, witnessing or sensing the jumps in the macroscopic lived experience does not occur.

The main differentiation between classical and quantum perceptions of reality are due to the scales at which the inquiries operate. From a macroscopic to microscopic analysis of physical reality, the ideas of *science* take on a new perspective. For science, and in particular for physics, the existence of *quanta* implies that the classical interpretations do not provide sufficient interpretations of reality (see Table 2.1 – "R5").

Based on the existence of *quanta*, the *perceptions* of the *natural* world require a refining process. For Barbour, this in turn has implications to the way in which, as a science, we view *time*. Not to be taken lightly, time is an important aspect of experimental analysis. The observing instrument is inextricably linked to the *modus operandi*, as such, is an extension of the *tacit infrastructure* of the Indo-European scientific paradigm. "Absolute objectivity and absolute subjectivity denote ideals that we can only perpetually approach but never reach

(Faye 1992:88).” In the same respect, absolute time is an ideal and this must be dealt with in conjunction with the perception of the natural world.

The “irrationality appears because of a continuous series of subjects and objects...” both hindering *and* promoting the “acquisition of knowledge, partly making it impossible for such acquisition ever to be brought to an end and partly determining the continued progress made by our search for knowledge (Faye, 1992:88).” The absolutism falls based on a series of *objective* elements being *subject* to the “concept of consciousness” given that *it* (consciousness) “underlies the concept of matter,” from an epistemological point of view.

Finally,

In the interaction between subject and object the former is confronted with various pairs of contrasts in its attempt to bring unity and continuity to the latter. The most important are unity/plurality, mind/matter and continuation/evolution (Faye 1992:89).

Recalling the opening statements regarding paradoxical positions of reality, the *perpetuation* of these *pairs of contrasts* is inherent to the dichotomous nature of a noun based language. These partitions or barriers created by a *dualistic* notion of reality are irreconcilable for the time being; however they are important to keep in mind, especially when considering classifications of *scientific* origin.

2.5.3 Ecosystem Classification: Eco-Regions

The analysis of Eco-regions is a central theme of the research. The topic of discussion here regards the parameters involved in distinctly characterizing each *region*. Classification within the province of Alberta is highlighted here, although greater scope of analysis is considered for the Great Northern Plains (Padbury et al. 2002).

In 1981, Wayne Strong (ecologist) and Keith Leggat (climatologist) compiled the "Eco-Regions of Alberta" commissioned by *Alberta Energy and Natural Resources*; founded on the definition of *Eco-Regions* provided by the subcommittee on Biophysical Land Classification (1969): *Eco-Regions* are "an area characterized by a distinctive regional climate as expressed by vegetation." The regional climate, to a large extent, dictates the distribution of plant or vegetation communities with respect to *inter alia*, species composition, physiognomics, and successional patterns, (Strong & Leggat, 1981). However, climate data alone does not allow a succinct delineation of Eco-Regions. The recurring vegetation, soil and moisture sequences generally constitute an Eco-Region. The *regional* climate is affected primarily by three major climatic regimes, i.e., i) Prairie, ii) Cordilleran, and iii) Boreal. These *Ecoprovinces* interact and influence heat and moisture availability for the delineated Eco-Regions (Strong & Leggat, 1981).

Classification of Eco-Regions is primarily dictated by antecedent climate conditions. Soils, moisture regimes and the distinct vegetative communities change in response to varying climate conditions. The Eco-Regions are highly correlated with soil great group zones, which were used where agriculture eliminated the presence of native vegetation; especially in the southeastern part of the province (Strong 1992). Explicitly, Eco-Regions are *micro*-climate areas based on the interaction of dominant climatic regimes. Thus, when speaking of Eco-regions, or plant communities, the primary reference parameter is *climate*.

In 1992, Strong strengthened the classification analysis by updating/revising climatic characterization and re-assessment of pre-1980 information. The following table outlines the

Table 2.2: Comparison of areal extents for Eco-regions delineated in 1981 & 1992

Item	1980-1981			1990-1992		
	Ecoregion	Area km ²	% Area	Ecoregion	Area km ²	% Area
1	Short Grass	46 926	7.1	Dry Mixed Grass	47 299	7.2
2	Mixed Grass	31 063	4.7	Mixed Grass	29 924	4.5
3	Fescue Grass	14 403	2.2	Fescue Grass	12 291	1.9
4	Aspen Parkland	73 268	11.1	Aspen Parkland	52 148	7.9
5	Montane	3 538	0.5	Montane	5 714	0.9
6	Subalpine	23 133	3.5	Subalpine	26 060	3.9
7	Alpine	18 506	2.8	Alpine	14 656	2.2
8	Boreal Mixedwood	285 611	43.2	Lower Boreal Cordilleran	93 061	14.1
9	Boreal Foothills	63 362	9.6	Upper Boreal Cordilleran	33 029	5.0
10	Boreal Uplands	27 098	4.1	Low Boreal Mixedwood	76 900	11.6
11	Boreal Northlands	47 588	7.2	Mid Boreal Mixedwood	210 143	31.8
12	Boreal Subarctic	26 437	4.0	High Boreal Mixedwood	39 856	6.0
13	N/A	N/A	N/A	Boreal Subarctic	20 104	3.0
	TOTAL:	660 933	100.0		661 185	100.0

Eco-Regions delineated in 1981 compared to those outlined in 1992. The most notable changes to the classification scheme occur in the mid to northern extents of the Province. Other changes include areal extents, eg., Aspen Parkland decreased from 73 268 km² to 52 148 km²; approximately a 30% shift.

Ecoregion [1] maintains approximately the same parameters, but the nomenclature has been changed from "Short Grass" to "Dry Mixed Grass." With the Cypress Hills gaining Montane status, the percent has increased overall for the Eco-region but remains less than one percent of the Provincial area. Moving further north, into the boreal forest, there are also significant

edits to the classification breakdown, as well as to the areal extents of the *regions*. From this it is evident that the process of *classification* is dynamic, climates will continue to change and mechanisms to prepare for change have been given a great deal of attention. Given that, Eco-regions as central foci of the thesis more discussion and analysis is provided in the text.

2.5.4 Ecosystem Health

Ideas of healthy ecosystems provide a frame of reference or set of benchmarks with which to determine the state of an ecosystem. On a geologic scale, ecosystems have differed from period to period, thus any defined *state* of an ecosystem is relevant to the *present*, as a frame of reference. Considering that absolute classification of ecosystems is unlikely, due to the constant change, there will be modifications to the database over time; as is evident from the table. However, these classifications aid in pursuits of providing baseline conditions for ecosystem management.

Costanza, *et al.* (1992) propose an operational definition of Ecosystem Health:

An ecological system is healthy and free from "distress syndrome" if it is stable and sustainable – that is, if it is active and maintains its organization and autonomy over time and is resilient to stress.

Resiliency and autonomy are key aspects of this definition. When an "ecological system," is responsive to change it is resilient and with time, maintains its autonomy. When the ecosystem cannot sustain the nutrient flow required for maintenance and organization, it can be said to have the "distress syndrome"(Costanza *et al.*, 1992). From the definition, it follows that an ecosystem is sustainable when it is healthy such that interaction by human beings is *within the natural* parameters, expressed as eco-systemic autonomy before, during, and after human activity.

The discussion of healthy ecosystems leads to a foundation for sustainable ecosystems (and sustainable economies). Here, Spangenberg (*et al*, 2000) make reference to the UN Department of Economic and Social Affairs, and specifically the “*Indicators of Sustainable Development, Framework and Methodologies*.” From which they note:

Sustainability as described in Agenda 21 has four dimensions: social, economic, environmental and (implicitly) institutional (2002:431; emphasis added).

The inextricable link between these entities from a global sustainable perspective implies equal proportions at the local level. The local/global paradigm of “sustainability...

... Then can be characterized as the long-term preservation of the viability of the overall system and its components. In a dynamic system this includes not only a certain degree of resistance (the ability to resist externally enforced changes), but even more its level of resilience (the ability to recover from and to adapt to pressures). The resulting state of the system is not a static balance, but a dynamic evolutionary process of permanent change. In this process, sustainability can be regarded as a benchmarking criterion, distinguishing those states of the system that still have the potential to serve human needs in the long run from the ones no longer sustaining human civilization and consumption patterns (Spangenberg *et al*, 2002: 431-432).

Healthy ecosystems are the benchmarks of sustainability as well as the goal or aim of sustainable development. In turn, this implies a balance of social, economic, and environmental dimensions *and* the social collective, described above as institutional.

2.5.5 Ecosystem Management

Balancing the entities of *sustainability*, i.e., social, economic, environmental and institutional, decentralizes decision making and necessarily implies the pluralistic approach. There are various approaches to ecosystem management currently being developed, implemented or evaluated for effectiveness.

Critical to the discussion here is not an analysis or comparison of management regimes, but that there is an inability across disciplines and levels of society to incorporate the principles at a practical level. Various interests and stakeholders often put little emphasis on environmental issues; "Growth means development, and the environment takes second place (Anton, 1995)."

Technology as an inorganic entity has consumed our attention and with that, consumption of diversity. If there is a sustainable approach, if there is a sustainable way to live off the land, there is no need to re-invent the wheel. The next section explores the ways of life of the Blackfoot people. As a sustainable existence, historically referred to as "subsistence" economies, the elements of sustainability are present. The question is: can there be a resurgence of indigenous knowledge in *modern* management/co-management regimes?

2.6. Blackfoot Interaction with their Environment

From the interview process, a great deal of information was provided with respect to *ways* in which Blackfoot people consider their environment. In particular, Russell drew attention to the relative relationship between the Blackfoot anatomy of self in correlation with the *surroundings*, recalling that, "our bones are the mountains, our hair is the grass on the prairies, our breath is the wind (pc. 2002)." In this manner, there is little evidence of a reference to a partition or barrier, or substrate that separates the self from the surroundings.

The interaction with the surrounding environment is separated by the thickness of a hide. To illustrate the concept of connectivity between the self and the surroundings, the Blackfoot

Tipi will be discussed here. The utility in conveying the Blackfoot manner of *enfolding* the universe *with* the tipi can be recalled from Wolf Leg's interview(s). As well, Stan Knowlton used a schemata of a tipi in many of our discussions. In addition, other mentors made reference to the tipi. For example, the top of the tipi, where the poles emerge from the structure represents the cosmos (Littlebear, 2003). From an interview conducted in the winter of 2000 with Camille and Lucy Russell, this region is also referred to as *Piita's Nest*.

Moving down and at/near the top of the hide, this upper region of the tipi contains, Makoyohsokoyi, or Wolf Trail (Milky Way), as well, on the west side, contains the *female butterfly – Appani*. This region is also collectively referred to as the area of *Paapoakaan*; the *Dream domain(s)*. It speaks to the way in which the people consider the importance of dream reality. For Littlebear, there is no separation between experiences in dreams and experiences in lived reality. Recall from Dormaar's discussion, the separation between the self and the surroundings was a 4mm thick wall of hide. "*The tipi takes the universe and folds it inside...The universe is inside the tipi... and its part of you* (Wolf Leg)."

In this manner, once the universe is captured inside the structure becoming *enfolding* with the owner, there are no domains or partitions separating the self from the surroundings (and the cosmos)⁸. Thus, the tipi is not a metaphor for the self and the universe; it *is* the self connected in a fundamental way to the surroundings (not limited to the physical/material domain).

These are laws that are inherent to the matrix of *Blackfoot reality*.

⁸ Enfolded and Implicate are similar but no direct parallel is drawn in this discussion for simplicity.

According to Wolf Legs teachings, at all possible times in space, the Blackfoot People are subject to two sets of laws, i.e., "Spiritual" and "Natural" Laws. Further, this can be translated on the basis of "values" and "practices" respectively (Wolf Leg, personal communication, 2002). Values concur with spiritual laws and manifest into daily, seasonal, annual (etc) practices. The following sections are set up in order to accommodate for these internal Blackfoot perceptions and interactions of/with the surroundings. For all intents and purposes, Wolf Leg's teachings will be applied here as a framework for gaining perspective of the Blackfoot way of life.

2.6.1 VALUES: Society Life

The *Societies* of the Blackfoot make up what UNESCO refers to as "Institution Dimensions":

The institutional dimension is essentially inter-personal, i.e. societal, covering the system of rules governing the interaction of the members of any society. These rules are called institutions; they provide the means of societal decision making and their effectiveness is reflected in good (or bad) governance. In turn, this system is the necessary precondition for economic activities and determines their form, from subsistence economies to communist systems or in free market globalised trade (Spangenberg et al, 2002:431).

The role of the *Societies* in the Blackfoot way of life as "law libraries" provides the frame of reference for conduct in the community group as a whole. If an individual, or group of people, are opposed to a particular alliance, they have the option of separating. Such is the case with the North Peigan, *Apatohsii Piikunni*. Upon agreement with the Bloods, the newly formed group or faction formalized themselves as a Blackfoot Nation (Wolf leg, personal communication, 2002).

In, "Dog Soldiers, Buffalo Women, and Bear Men"⁹, Thomas E. Mails compares lists of *All Comrade Societies* among the Blackfoot originally compiled by: Edward S. Curtis (*The*

⁹ Also published under the title: "Dog Soldier Societies of the Plains" (1998).

North American Indian, vols. 6 (1911) and 18 (1928); Clark Wissler, *Societies and Dance Associations of the Blackfoot Indians*, American Museum of Natural History Anthropological Papers, vol. 11 (1913); Walter McClintock, *The Old North Trail* (1910) and *Old Indian Trails* (1923). His comparison draws on the dynamic nature of Societies from tribe to tribe, noting that each originated in a specific geographic location followed by a series which spread out, "of which one by the same name existed in several tribes (Mails 1973:78)."

The societies were often in a state of transformation: societies might begin in one tribe and later be adopted by another; different names were often used to describe identical groups; some societies ceased to exist before others; not all Indian society names were translatable into English (Mails, 1973:83).

In the following citation, Mails marks the functionality, or roles and responsibilities, of the *All Comrades*:

The more general functions of the Societies were primarily to preserve order in all circumstances and to punish offenders against the public welfare whenever necessary. They protected the camp by guarding against possible surprise by an enemy. When a band was moving to a new campsite, the members of the warrior Societies rode ahead, at the sides and in the rear to protect the others. The Societies took turns checking on the movements of the buffalo herds so as to know where they could be found for tribal hunts. A spirited rivalry among the orders reinforced the military spirit so essential on the Plains (ibid, 85).

In addition to the *All Comrades*, there are other Societies among the Blackfoot Confederacy, which include the *Buffalo Cow Society* (Maotokiiks), the *Bear Society*, the *Medicine Pipe Society*, and the *Water Society* (Mails, 1973). According to oral accounts, once the instruction from dreams/visions became manifest into lived reality among the Blackfoot, or *Niitsitaapi*, the protocol, or method of operations (*modus operandi*), became entrenched in society life. Wolf Leg uses the analogy of "law libraries;" that these *values* and/or protocols governed the existence or *way of life* of the Blackfoot people.

The following table (2.3) is a list of societies of the *All Comrades* prepared by Wissler in 1913. The essence of Mails characterization with respect to *transformation* can also be what Littlebear refers to as the *flux*. The table captures the dynamic, ebb and flow, inherent to the evolution of the *Societies* captured at this particular point in time, i.e., 1913.

The diversity among Societies between Nations and among Nations suggests a significant level complexity; each with distinct origins, songs, and other rites intrinsic to *Societies* of the Blackfoot. The pre-requisite for entering Societies is based on *Kimapiipitsin*, recalling from Mistaken Chief's interview. His analogy of the *initiation* process into a Society was that of a "new life." *Initiation* into Societies is equivalent to a transition into a *new* life, with a new set of protocols.

Table 2.3: Societies among the Blackfoot Confederacy

Peigan	Blood	Blackfoot/Blackfeet
Pigeons		
Mosquitoes	Mosquitoes	Mosquitoes
		Bees
		Prairie Chickens
		Crows
Braves	All-brave dogs	All-brave dogs
		Bad Horns
All-brave dogs	Braves	Black-Soldiers
Front-tails	Black-Soldiers	Braves
Raven-bearers	Raven-bearers	Raven-bearers
Dogs	Dogs	Dogs
Kit-foxes	Horns	Horns
Catchers	Catchers	Catchers
Bulls	Bulls	Bulls
		Kit-foxes

Mistaken Chief comments about the information he was given with respect to *transfers* in the old days, "Often times they [new initiates] would leave the Sundance Camp without possessions," save for the newly acquired *Bundle* on the woman's back (2002, personal communication). Mistaken Chief acknowledges this event in one's life as entering a different realm. The possessions that were offered or given up for the *initiation* into a society reflect the movement into the new way of life.

The following excerpt from Mails is a delineation of the how the *Mosquito Society* came to be. It is intended to provide insight into the concept of *origin* stories, noting the *subjective* elements of the iteration:

There was once a man who hunted in a place where there were many mosquitoes. They came in swarms and stung him so badly that we wondered if they were going to kill him. He took off his clothes and lay down on the ground. The mosquitoes quickly covered him until he lost all feeling. Then he heard strange voices singing:

Mosquitoes, mosquitoes, get together, get together;

Mosquitoes, get together.

Our friend is nearly dead!

He saw mosquitoes having a dance. They sat in a circle and sang; they jumped up and down, springing this way and that, always dancing in the direction of the sun. Some wore red and others yellow. They had claws attached to their wrists and long plumes hanging from their heads. He heard a voice say:

"Brother, because you were so generous and let us drink freely from your body, we give you the society of mosquitoes and make you the leader."

Then that man came safely home and started the Society of Mosquitoes. The members wore buffalo robes with the hair side outward. Some painted themselves red and others yellow, with stripes across nose and eyes. They wore plumes in their hair and eagle claws attached to their wrists to represent the bill of mosquitoes (1973:93).

The Mosquitoes provided the man with their *Society rituals*, who in turn shared it with all Blackfoot Nations (Table 2.3). Now a governing institution, the Mosquitoes had the *rites* and duties to carry out disciplinary measures within the tribe/Nation. As an example of a linkage between humans and insects, the Mosquito societies have since become extinct as an active

All Comrade Society. However, the information is resonant in the minds of a few Blackfoot people.

The lists and information about Blackfoot Societies provided in this section are not complete. As noted, the transformation of Societies mirrored the surrounding *flux* and thus *listing* of such societies, here, does not imply a complete and final compilation. The following section demonstrates the *practices* or patterns embedded in the way of life of the Blackfoot; likewise, it is an overview and not a complete depiction.

2.6.2 PRACTICES: Patterns of Life

In an Occasional Paper (No.3) of the *Prairie Conservation Forum*, entitled, "The Prairie Landscape: Perceptions of Reality," authors Johan Dormaar and Russel Barsh cite Uhlenbeck's 1912 documentation regarding the "seasonal round" of the South Peigans. The information is included here to provide an early published account of patterns intrinsic to Blackfoot lifestyles for one of the divisions:

Far down on the Maria's river [literally: Bear Creek], there they stayed till late in spring...They waited for the bulls, that they had shed their hair... We shall move up [away from the river]. Then they moved up. It was in the Battle-coulee that they camped. In the morning the chiefs went around saying: come on, we shall move. When the buffaloes were far, we overtook them in the Cypress Hills; when they were not far, we overtook them in the Small Sweetgrass hills...Following skinning, when the slices of meat are dry, then we shall move. We shall move down over on Milk river [literally: Little Creek]. Close by [that river] are the better buffalo...We shall make a circle [to chase the buffalo]. We shall camp on Bad-water [a lake]. They camped...After the meat and skins were dry, the chief said: Come on, we shall move to the Manyberries [a local name]. We shall camp there. The berries were found to be ripe...When they moved again, the chief said: We shall move. We shall camp at Buffalo-head [a local name], we shall camp there, and there we shall chase elk. And there they camped...When the hides were all good, then [the chiefs] said: We shall move to the mountains [the Cypress Hills]. We shall cut the lodge poles. Then they started to move. Then they separated [by bands]. Then they would move this way. They camped over there at Long-lakes [a local name]. There are many berries, [especially] cherries. They camped there...Then the chief would say: We shall move

[alongside Milk river] to Woman's point [a local name]. We shall camp along the river to hunt buffalo and antelopes...Then the chief said: We shall cut our lodge-poles from Cut-bank river...By that time it was late in the fall...When it snowed [first] in the fall, then they would hurry, that they moved down [near the lower country]. There [down] on the river, there they would be camped about. There they waited, where the buffalo would come the nearest. To that place they would move. They would carefully look, where they [themselves] would be during the winter. Then they camped in different places all along the river. In the beginning of the winter they were all happy (Uhlenbeck in Dormaar & Barsh, 2000; 6-8).

Mails comments that, “the three divisions were essentially independent politically,” the Bloods, Peigans and Blackfoot or *Apaitsitapi*, *Apikunni*, and *Siksika*, “yet they acted in concert whenever it was necessary to repel invaders or put a neighbor in his place by an offensive thrust (1973:81).”

The importance of *time* with respect to patterns or rhythms of the environment played a significant role in the life of the Blackfoot people. Russell points out that “every season had its purpose (2002, personal communication).” In his commentary with respect to his stay in Blackfoot Country (1792-93), Peter Fidler notes: “Though Alberta has many choice regions, this High River area is without peer. It is the land of sunshine, short grass, and Chinooks.” Part of his expedition Fidler’s stay with the Blackfoot over the winter gives some indication to the setting of a winter camp, among other things.

Seasonal forecasting, as notes Dormaar and Barsh, was required in order to intercept each resource when it was available for exploitation (2000). The internal patterns or rhythms of the Blackfoot people reflect the external cycles of the surroundings. Here Mails comments on the seasonally based activities:

When the various bands of each tribe left their winter quarters to assemble for the great tribal encampment in the spring, the head chief invited band chiefs and the

leaders of the societies to a feast at which they discussed the general route of the coming summer's travels they followed or intercepted the buffalo. An understanding and agreement having been reached, the head chief appointed two or three of the younger Societies to be the camp police for the season;...Theoretically, the Societies chosen to preserve order were subject to the dictates of the tribal chief, yet their duties were so clearly defined and understood that they were mainly their own masters (1973:85).

A rotation of duties among Societies over periods or terms reduced the probability of a Society group or member of a Society becoming a "Super Cop" or other label referring to a misappropriation of power (Russell, P. pc. 2002).

The spring time meant mobility or migration with the buffalo, among other things. In addition to ripe berries and medicines to be picked at specific locations at specific times, the Bands of each nation also distributed themselves throughout the land they refer to as, "*Niitoahsinaan*, where we derive our sustenance" (Russell, P. pc. 2002). The distribution of Bands was established and maintained such that a particular region was occupied by Bands or sets/groups of Bands over several generations, in seasonal rotation. Russell provides two examples of Bands deriving their name from their preferred locations of sustenance. One example refers to the "Ihpohsiiks," the Band preferred the prairie landscape (pc. 2002). The other example, "Mistakshestapiopiiks" refers to "mountain people."

The ideas of sustenance and sustainability converge for the author of, "In the Absence of the Sacred". Revisiting Marshall Sahlins' *Stone Age Economics*, here Jerry Mander notes that, hunter/gatherer economies, "*deliberately* did not accumulate surpluses." According to Sahlins, "a good case can be made that hunters and gatherers work less than we do; and, rather than a continuous travail, the food quest is intermittent, leisure abundant, and there is a

greater amount of sleep in the daytime per capita per year than in any other condition of society (Mander, 1991:248).” Guided by values of *Society Life*, individuals, bands, nations, and the collective Blackfoot Confederacy practiced a sustainable *way of life*. The practices mirrored the natural laws, based on values, derived from the *Spiritual* laws in the surroundings.

2.7 Ownership and Ideas of Intellectual Property

Technological innovations and subsequent patents require significant screening processes; and once obtained, protect the rights of the inventor or proponent. This section outlines some considerations with respect to Intellectual Property Rights (IPR) expressed in the literature focusing on Indigenous Peoples Knowledge. “Indigenous cultural knowledge has always been an open treasure box for the unfettered appropriation of items of value to Western civilization (Greaves in Brush & Stabinsky, 1996:25).”

2.7.1 Compensation: Monetary Motivation?

The great diversity of externally valuable Indigenous Knowledge necessitates diversity in strategies to protect it (Greaves in Brush & Stabinsky, 1996). Here, Greaves distinguishes between *control* of information versus *compensation*:

But none of us, indigenous or otherwise, can allow ourselves to forget that the IPR agenda for indigenous people is not mainly about compensation. The main issue for indigenous societies is control of cultural knowledge. Control is different from ownership and different from compensation. Control is understood at several levels (Greaves in Brush & Stabinsky, 1996:29).”

Mistaken Chief provides that not all information is meant for all Blackfoot people. While the Societies hold the information with the subsequent duties and obligations, protection of

sacred information is among those responsibilities. It was once thought that the Blackfoot, along with other Indigenous Peoples, would either cease to exist, or become assimilated. Fortunately, Society dances and rites which have been performed since time immemorial, remain alive and intact.

Ethnographers, and other social scientists and academics, have documented a significant amount of information specific to the Blackfoot way of life. Not intended for *everyone* but kept in a sacred way for the benefit of everyone, Society members and past members today face a significant challenge in reclaiming and maintaining the heritage of the Blackfoot way of life.

Taken from this reference point, IPR from an Indigenous perspective deals mainly with the ability to protect the authenticity of the information, and ensure that appropriate applications are implemented rather than, use of information simply for monetary gains. Indigenous knowledge bases provide a way to live, if information is set outside the parameters intended by the origin stories, the marginalization of information extends to the culture or group. This way of life, or right to live, is what Simpson refers to as undermining their Aboriginal rights. Thus, sharing of information that exhibits misappropriation would be counter-intuitive for any Indigenous group.

2.7.2 Autonomy vs. Authority in the Information Age

Surendra J. Patel argues whether the current IPR system serves the interests of Indigenous knowledge.

For a long time in the past, the contribution of indigenous people to the accumulation of world knowledge was plainly ignored. In the obsessive concern with the marvels of

modern science and technology, it was altogether overlooked. Few recognized that modern science and technology did not build on empty foundations (Patel in Brush & Stabinsky, 1996:305).

According to Patel, future policy considerations would need to consider a...

...progressive decommercialization of IPR in technology, and eventually making technology the common heritage of humanity, as is the position now of all science and indigenous knowledge. It will then create the great trinity of indigenous knowledge, science, and technology, which could be harnessed to the attainment of the major aspirations of humanity – the conquest of poverty, illiteracy, ill health, ill housing, and inequalities among people, nations, races, genders, and religions (Patel in Brush & Stabinsky, 1996:319).

Idealistic in its context what remains evident is the necessary dialogue between (Blackfoot)

Society members and scientists engendered with the dominant paradigm but seeking a different way in which to perceive the environment so that ensuing action or management reflects a sustainable model.

2.8 Summary

The ideas presented in this chapter frame the *tacit infrastructures* of IES and BEK and specifically, the collision conveyed by the analogy (Figure 1.1). Providing a demonstration of the polarity between the paradigms of IES and BEK, one gets a sense for the inevitability of the collision of cultures. If nothing else, an appreciation for the task at hand is illuminated.

Exposing residual barriers in the common space with common ground rooted in M^3 , the model has acquired some flesh by now. Via qualitative inspection, we see that the realities of IES suggest a need for a reform in the perception of the natural world (Table 2.1). Eco-Region classification is a dynamic process and this is illuminated by Table 2.2. The concept

of a cookie cutter is evident, and most prominent is the separation of self and the surroundings.

Conversely, the Blackfoot experience is based on tending to the state referred to as *atsimapi*. That is, by projecting thoughts and actions of *kimapiipitsin* at the human-human level, the result is reciprocity in all relationships. The activity is at the neurological level and plays out in the lived domain. The result, diversity and dynamic equilibrium in the surrounding environment (flux). The *Society* life and the patterns of life demonstrate the concept of “I am the land” or “I am the earth.” The Mosquito Society, the Matokiiks (Buffalo Women’s Society), and the Iiyohkimiiks (Water Society), as examples, are all indicative of the inexorable ties that the Blackfoot people, are in fact the land, *viz. a viz.* surroundings.

Chapter 3

METHODOLOGY

3.1 Introduction

Eighty percent of GIS is data. That is, if digital data is not readily available or accessible, it needs to be constructed, digitized, etc., and this is a timely process. Ecological databases along with geographical information are in many instances readily available. With respect to Blackfoot environmental attributes and information, there is limited (if any at all) that exist in digital form. As previously mentioned various individuals provided data and in various formats. Initially, a *cost analysis* with respect to time was conducted but was found to be inappropriate with respect to the magnitude of the study area. Technical upgrades were sought and a simplified analysis was constructed. It is felt that, until such time that an appropriate model reflecting the autonomy of paradigms is accepted, it is not necessary to carry out rigorous analysis on significant sites. Archaeological surveys have been conducted but often fail to consider the *lived* cultural contexts and other implications. Therefore, the analysis provided here is a foundational basis for linking knowledge basis and is not a collapse of boundaries between paradigms; rather it is a process which takes into account the parameters involved in deriving attributes/variables of BEK and IES.

Originally, section 3.2 was set up as a considerate mention of the minimal requirements with respect to *memory*, in particular the processing and storage capacity required in order to

maintain the project. In the twenty first century this may be irrelevant in certain circles. Given the extent of the area of interest and the study area, it is important to make note that a significant amount of memory space was required to carry out this task. The knowledge of the Blackfoot people is *spatial*, and as “walking files” the Blackfoot are also, necessarily “walking geographic information systems” (Wolf Leg, pers. comm.. 2004). Taking into consideration that the information on the map can also be the map in the mind, mention of computer memory also has implications on the notions of the depth of the Blackfoot memory. That is, only so much attribute information can be represented, the rest, as a lived process, remains in the lived domain. Various technical issues arose and most were related to the ability of the computer memory to process/store/manipulate the attributes/variables of both BEK and IES. (Made mention here and omitted in the final editing of the text.)

The remainder of the chapter lays out the datasets obtained and constructed (section 3.3), the corresponding metadata and the ways in which the information was manipulated (section 3.4) in order to prep the themes for overlay analysis (section 3.5). Some important considerations are mentioned, especially where the construction of new databases was carried out.

3.2 Technical Requirements

In regards to the repeatability of the research design, the following are minimum requirements and can be carried out in most, if not all GIS environments (eg. PAMAP, ArcINFO, ArcGIS, etc.).

3.2.1 Processing and Storage Capacity

****omitted****

3.2.2 Software Specifications and Data Transferability

With a number of GIS software packages on the market with a wide range of users, the benefit of digital spatial files is the transferability from one GIS environment to another.

ArcView 3.2 was used as the primary GIS software to carry out the technical aspects of the research design. All functionality for the analysis was handled within ArcView 3.2 but can be easily adapted to meet other GIS frameworks.

3.3 DATA CAPTURE & METADATA

The following section is broken down into three areas of information sources and/or types; i) Ecological layers, ii) Archaeological databases, and iii) Blackfoot events. Each part identifies the source(s) of information with subsequent *metadata* required for importing and/or manipulating data in the ArcView project. Intended as a brief overview of the datasets, Table 3.1 provides information for each layer of spatial attributes used in the GIS analysis.

3.3.1 Ecological Databases

Dataset items 1 to 6 are derived from AgraSID data compiled by Prairie Farm Rehabilitation Administration (PFRA). Item 7 was derived from Tokarsky/Shetson and imported to digital format. Items 8 and 9 were provided to the researcher by Dr. Stefan Kienzle, professor of Geography at the University of Lethbridge.

Table 3.1. Summary: Meta Data for layers used in GIS project

Data Set		Source	Compiled by	Projection/Scale	File format
Item	Title				
1.	EcoRegions	Richard Hardin PFRA - Lethbridge	Agrasid derived coverages	Unprojected/Geographic	ArcINFO coverage
2.	Ecodistricts	Richard Hardin PFRA - Lethbridge	Agrasid derived coverages	Unprojected/Geographic	ArcINFO coverage
3.	Landscape	Richard Hardin PFRA - Lethbridge	Agrasid derived coverages	Unprojected/Geographic	ArcINFO coverage
4.	Texture	Richard Hardin PFRA - Lethbridge	Agrasid derived coverages	Unprojected/Geographic	ArcINFO coverage
5.	Soils	Richard Hardin PFRA - Lethbridge	Agrasid derived coverages	Unprojected/Geographic	ArcINFO coverage
6.	Watersheds	Richard Hardin PFRA - Lethbridge	Agrasid derived coverages	Unprojected/Geographic	ArcINFO coverage
7.	Surficial Geology	Dennis Sheppard	Fulton, R.J. 1995	Lambert Conic Conformal; 1:5 000 000	E00 file
8.	Surface Hydrology	Stefan Kienzle	Undergrad student; n/a	Alberta 10TM, 500 000m shift	ArcView shape file
9.	Digital Elevation Model	Stefan Kienzle	Stefan Kienzle 2001	Alberta 10TM, 500 000m shift	ArcView grid and tiff image
10.	Archaeological Sites	Ian Townsend/Neil Mirau	n/a	Unprojected/Geographic	Comma delimited text, new ArcView shape file (point)
11.	Blackfoot Winter Count	Glenbow Museum Archives; Stan Knowlton	Hugh Dempsey, 1965; Adolf Hungry Wolf, 1977; Anonymous	Unprojected/Geographic	New ArcView shape file (point)
12.	Blackfoot Place Names	Stan Knowlton & Duanne Mistaken Chief	George W. Dawson, 1883, Pablo Russel,	Unprojected/Geographic	Integrated with hydrology layer, new point shape file created

3.3.1.1 AGRASID Derived Coverages

During a visit to the PFRA Lethbridge office, Richard Hardin provided the researcher with “semi-detailed 1:100,000 soils data for the White Zone of Alberta. AGRASID 3.0 ([HTTP://www.agric.gov.ab.ca/soil/agrasid/manual.html](http://www.agric.gov.ab.ca/soil/agrasid/manual.html)).” The data were used in the delineation of EcoRegions, EcoDistricts, Soil Texture, Surface Morphology, and Soil Zones provided as *Agrasid Derived Coverages* that were used for GIS analysis and cartographical presentation (mainly for use in Chapter 4).

The data were *unprojected* or in Geographic format and is used to provide baseline ecological information for the study area. These datasets are comprised of polygons with attribute information. Provided as ArcINFO coverage files, the following flow diagram represents the steps taken to bring the data into the ArcView project and prepare it for manipulation and analysis:

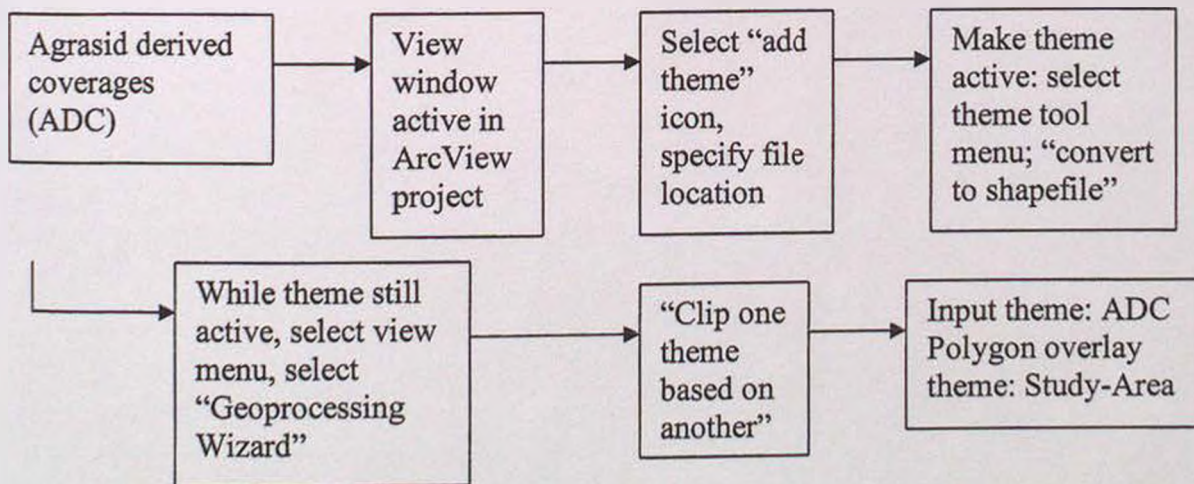


Figure 3.1. Flow diagram: Processing steps for AGRASID Derived Coverages (ADC)

3.3.1.2 Southern Alberta Hydrology

The data was delineated by an undergraduate student in Geography at the University of Lethbridge. Dr. Kienzle, provided the hydrological network as base data for the analysis. The information was a projected theme in Alberta 10TM with a 500 000m shift.

3.3.1.3 Southern Alberta DEM

Also provided by Dr. Keinzle, the DEM created in ArcINFO was converted to an image file format, or TIFF image with .tif file extension. Imported into ArcView via the "add theme" icon as an Image Data Source. Projection parameters are equivalent to the hydrology layer, i.e., Alberta 10TM, 500 000m shift.

3.3.1.4 Surficial Geology of Canada

Compiled by Fulton, R.J. in 1995, the "Surficial materials of Canada," was provided by Dennis Shepperd . The Geological Survey of Canada, Map 1880A, provides a broad spectrum of parent material categories of surface material. The data was compiled at a 1:5 000 000 scale showing the distribution of surficial materials in Canada. The units are subdivided according to different characteristics of texture, thickness, and landform.

Provided as an E00, or Arcexport file format, readable by most GIS packages, the data were imported via the ESRI ArcView Import 71 utility. Brought into ArcView project theme in like manner as previous datasets, clipped to fit study area and area of interest.

3.3.1.5 PFRA WATERSHED PROJECT (Version 2.0)

The information that makes up the drainage basin information is derived from the watershed project by the PFRA. Created over the past twenty-eight years, along with maintenance and distribution, covering the prairie provinces, the information provides a unique perspective of

the study area. Provided as an E00 file, the data were rendered via equivalent procedure as 3.3.1.4, above.

3.3.2 Blackfoot Environmental Knowledge

This part of the project entailed creating new shape files and adding attribute "place name" information to the existing hydrology layer. This section outlines the creation and integration of information to portray Blackfoot attributes both within the area of interest and the study area.

3.3.2.1 Archaeological Database

Dr. Ivan Townsend of the Dept. of Geography provided a dataset comprised of archaeological sites in North America. The dataset was provided to Dr. Townsend by Neil Mirau and contained the *Latitude* and *Longitude* for 65 sites. No other attribute information was provided in the database.

Several archaeological surveys have been conducted in the study area. John Brumley (1988) provides a summary and appraisal report "Medicine wheels on the northern plains," in an attempt to sub-classify the broad range of "medicine wheels" on the plains. His work consisted of classifying 67 sites of archaeological significance and includes descriptions of the environmental setting.

Provided as a comma delimited text file, the data were preprocessed and then imported into ArcView. Each site was linked to the corresponding eco-dataset from above and is explained in s. 3.5.2. As above, the dataset was clipped with respect to the study area.

The study area includes information about place names that comprise a rich oral tradition, while the extent of stories as attributes to sites are not included here, it must be acknowledged that the place names and significant sites are necessarily referenced to stories or significant events that took place.

3.3.2.2 Blackfoot/Blood Winter Count

To provide an overview of the occupational patterns of one of the Blackfoot divisions, the Blood winter count is used to show the area accessed by the Bloods for the area of interest. The Blackfoot people's oral account of history is kept in the collective memory and recallable at any time by particular individuals. "Many Guns was the last one to keep a winter count (Wolf Leg, 2002; personal communication)," of the Siksika Nation and member of the Spumiapis Band (Royal, 1938; unpublished manuscript).

Among the Bloods,

PakapOtokan, or Bad Head, was a wise man who was interested in the history of his People. Chief of the Buffalo followers band, he signed both the Lame Bull Treaty of 1855 the 1877 Treaty Number Seven...He kept in his memory an ancient winter count for the Bloods (Hungry Wolf, 1977:196).

For demonstration purposes, the Blood Winter Count captured by Hugh Dempsey (1965) was used as the primary reference (1810-1883). In addition, information from a second, unpublished, winter count was consulted and covers the years 1779 – 1924; provided by Stan Knowlton (pc. 2001). The information spans over 100 years and is inclusive of 1780-1883. Those entries marked with an asteric (*) in Table 3.2 were used to construct the "Winter Count" network and which are presented and discussed in subsequent chapters.

Table 3.2: A Blackfoot Winter Count: Time spent on the Great Plains for the Bloods inclusive of the years 1780 – 1883.

Year	Symbol	Event	Note: (Courtesy Dempsey)
1780		When white man with short hair first came	n/a
1784		Coughing sickness first appearance	n/a
1791		When there were many wolves	n/a
1810*		<i>Kaohsoyiiks/itsitotohpiyan</i> When the cropped tails came	Wilson P. Hunt led the Astoria Expedition which passed just south of Blackfoot country in the summer of 1811. Irving (1897:187) observed that the party cropped the tails of the horses purchased from the Arikara
1813*		<i>Itakesaopi</i> When many of us went to war	Many Bloods went to raid the Crow Indians on the Big Horn River (WB)
1818*		<i>Stokani</i> Winter Sundance	A winter camp on sheep River was threatened by an attack from Crees, so a holy woman vowed an immediate Sun Dance to help her People. The attack did not come.
1819*		<i>Saskina/pastsimesin</i> Coughing/epidemic	In the winter of 1819/20, traders at Edmonton House reported that a measles epidemic had wiped out one third of the Blackfoot and Gros Ventre tribes. (Edmonton House Entries for Feb 6 and March 15, 1820).
1825		<i>Itaka/ennastop</i> Many/when they made a peace treaty	Wilson and Legal were told that the tribes participating in the treaty included the Bloods, Gros Ventres, Flatheads, Nez Perces and Kutenais.
1826*		<i>Misa-ohkokinisiw/itomahsikamotspi/sapo</i> Strong Goose Neck/when we made a big steal/Crows	Strong Goose Neck. Or more correctly Merganser Neck, is a butte located just west of Belt, Montana (WB).
1831*		<i>Kipp/otsitsitawpipi/etotoahtay</i> Kipp/when he lived there/where the rivers meet	In October 1831, James Kipp and seventy-five men established Fort Peigan at the confluence of the Missouri and Maria Rivers (Chittenden, 1954, 333)
1832*		<i>Otsitsitohkkanipi/omahksistowan/itstoyemiw</i> When he was camped there/ Big Knife/ where he wintered	In July, 1832, David D. Mitchell and sixty men established Fort McKenzie on a narrow ridge separating the Teton and Missouri (Chittenden, 1954, 336). Wilson was told the wintering place was called "Straight or Narrow Place on Milk River".

1833*	<i>Kakatosen/otsitsenisipi</i> Stars/when they fell	This meteoric shower was seen throughout much of North America on the night of Nov 12, 1833, and is recorded in the winter counts of other plains tribes. The Bloods were camped on the Highwood River at the time (W).
1834*	<i>Sapo/itotayiskatahpi</i> Crows/when we laid in wait	This winter count referred to a Blood horse stealing party which successfully raided a Crow camp on the Yellowstone (WB).
1837	<i>Apiksosin</i> Smallpox	This disease was brought to the Upper Missouri on the steamboat St. Peters of the American Fur Company. About two thirds of the Blackfoot nation died during the epidemic (Bradley, 1900).
1842*	<i>Itake-piskiopi/akokimikoy</i> When at Women's Buffalo Jump/many in one camp	A large number of Bloods gathered at Women's Buffalo Jump near the Porcupine Hills, in south-western Alberta, and killed many buffalo. This may be the same Women's Buffalo Jump excavated by the Glenbow Foundation in 1958-59 (see Forbis, 1960)
1844*	<i>Itayak/etohpommaop</i> Separated/when we went to trade	The Bloods separated into two parties for trading, one going to the British at Rocky Mountain House and the other to the Americans on the Missouri River
1847*	<i>Kataetsinipoka/otsitmot sok/assinay</i> Not a Favorite Child/when he was defeated/ Assiniboins	This Blood Indian was killed by Assiniboins on the Milk River
1849*	<i>Nisitsippi/otsenotsaw/assinay</i> Fifty/when they were killed/ Assiniboins	In December 1849, Edwin T. Denig (1952:145) reported that fifty-two Assiniboins had been killed by Blackfoot on the Marias, while the latter lost twenty-five
1864*	<i>Sikapiksosin</i> Black smallpox	An epidemic of scarlet fever ravaged the Blackfoot tribes during the winter of 1864-65. By spring, Father Albert Lacombe reported to traders at Edmonton House that 1, 100 Blackfoot had died. (Edmonton House entry for March 24, 1865)
1869*	<i>Apiksosin</i> Smallpox	The disease struck the Blackfoot in the autumn of 1869, again originating with a Missouri River steamboat. By the spring of 1870, the death toll was estimated to be 1,080 Peigans, 630 Bloods and 676 North Blackfoot. (See <i>Winnipeg Manitoban</i> for Sept 16, 1871)
1876*	<i>Itakainiskoy</i> When there were plenty of buffalo	The Mounted Police reported buffalo plentiful in the Blackfoot hunting grounds during the winter of 1876-77, but by the spring the herds were confined mostly to the Cypress Hills area (Turner, 1950, vol. 1, 326)

3.3.2.3 Blackfoot Place Names

Stan Knowlton, via personal communication, provided the author with archival maps including that constructed by George Dawson, commissioned by the Royal Geological Survey of Canada (1884); as well as the *Mounted Police Stations and Patrols* (1888). Duane

Mistaken Chief provided *metadata* information for *Place Names* used in the construction of the "Blackfoot Confederacy" map published by the Red Crow Community College in 1993. Original drafted by William Holy Singer III.

The spatial information extracted from these sources were transferred into the GIS project as attribute information to either existing archaeological databases, or hydrology layers and new themes were created to house information where no existing point, line, or polygon existed. For example, a site identified with a Blackfoot label on the hardcopy map was located in the hydrology layer, the attribute table was opened, two new fields previously created, "Blackfoot_Label" and "English_Translation," were then assigned the information.

Also, obvious archaeological sites, such as "Aki Piskun" were located and labeled with the same procedure as with the line theme above. Where sites were identified on the hardcopy map, and no point line or polygon was present, a new point theme was created containing the attribute fields similar to those integrated above. Thus, the Blackfoot environmental information is situated in a series of datasets. The time required for a more adequate representation of Blackfoot environmental attribute/information falls beyond the scope or timeframe for the current project. However, it is hoped that this information provides a sufficient portrayal of Blackfoot occupation in the area of interest and study area.

3.4 DATA MANIPULATION

There were a number of data sources incorporated into the ArcView Project making up various scales and projections. In order to conduct analysis of integrated data sets, a common scale and projection needed to be selected. This section outlines the functionality utilized to provide scale and projection units for the map series containing all ecological layers of both paradigms.

3.4.1 Scale selection

The determination of scale is due in large part to Strong's work on Eco-regions and Ecodistricts for Alberta (1992). In particular, the basemap was constructed in 1:1 000 000 scale and is considered as a working scale unit. For best fit onto 8.5 X 11 page dimensions, 1:2 000 000 scale was used for the ecological layers and a 1:1 000 000 scale used for the base map. The Area of Interest, or traditional Blackfoot territory was constructed at 1: 6 000 000. At this scale, the content or information is for presentation rather than precision purposes.

3.4.2 Projection Parameters

Unable to re-project the TIFF image in ArcView (ArcINFO may have been employed) but the decision to render all images to the projection of the base image was settled upon, i.e., Alberta 10TM. The Area of Interest was projected to Albers Equal Area Conic. All projecting and re-projecting was done using the ArcView Projector!.

3.5 DATA ANALYSIS

GIS is limited *only* by the imagination. In an idealistic sense, this is the case. However, the analyses contained in this project are limited with respect to the extent of the study area. The type of analysis for the research is limited to overlay analysis resulting in a layered base map of ecological attribute/information from both perspectives.

3.5.1 Hillshade Derivation

Delineated for utility in depicting the place for each site, the hillshade was constructed with respect to the DEM provided by Stefan Kienzle. With the DEM *Legend Editor* activated, the *advanced* options button was selected; assigning minimum and maximum cell brightness values at 10 and 90 respectively.

3.5.2 Geoprocessing Wizard

Once the data were entered into the ArcView project and rendered into a common projection, the Geoprocessing Tool was employed to synthesize data sets, using the “assign data by location” or spatial join function found under the view/geoprocessing wizard button. Ecological attribute information was joined to the archaeological point file. Each site within the study area was assigned appropriate ecological/spatial data including: surficial geology, soilzone, eco-region, ecodistrict, surface texture, morphology, landscape, elevation and watershed.

3.5.3 Percent Occurrence Parameters

Having attributed each site contained in the study area with ecological attribute/information, a new or value added database exists and can be used for empirical analysis. For each attribute field added to the archaeological database a summary of points contained in each

ecological boundary was summarized. In the ArcView project, with the (value-added) database window open and the ecological attribute field active, the *summarize* option under the field drop down menu was selected. Appendix C contains the summary tables for the ecological/spatial attributes assigned to each *site*. The following equation provides an example of the parameters for deriving percent occurrence (PO) for each Eco-region.

$$PO_{ER} = \frac{\text{Number of sites within ER}}{\text{Total number of sites in Study Area}} \times 100 \quad [3-1]$$

3.6 SUMMARY

The ecological databases were readily available and importable into ArcView. Blackfoot attributes and information required dataset building from published, unpublished and archival records. Recalling that the Blackfoot are in many ways, *walking GIS files*, it is important to note that the information is a demonstration of BEK and not a compilation of *all* that is out there. Further, with the stress that Clans/Bands have varying information, the representation of information in this research is grossly incomplete.

The task requiring the greatest amount of attention was the building of the Blackfoot attribute layers. The information was taken from varying sources and a great deal of cross-referencing was required. The process was carried out under research conditions and as mentioned in the opening chapter, this undertaking is nothing more than a good start. Given this, it is hoped that the information will be validated, and that the information will be added to with time; as is the case with any GIS.

The ecological databases/layers were linked/joined to each significant/archaeological site. Each site is characterized by ecological information: elevation, eco-region, ecodistrict, watershed, major watershed, morphology, texture, soil; critical for portraying the variability between and among sites.

Site specific information with respect to the Blackfoot experience is not suitable for current formats. In time however, virtual and actual reality tours will provide the deepest insight into the Blackfoot paradigm. Recall that: *only that which can be experienced can be defined unambiguously* (Faye, 1992). The research thus, is merely a preparation that takes the reader to the doorway of the tipi containing the Blackfoot Universe. It is a context for considering the surrounding environment with respect to the Blackfoot experience.

Chapter 4

STUDY AREA

4.1 Introduction

Over time the areas occupied by the Blackfoot have varied, “depending on how far back you go,” notes Camille Russel in an interview conducted in winter 2000. The eastern border used to lie close to the present day Saskatchewan/Manitoba border (Russel, C. 2000, personal communication). So as to keep the context and integrity of Blackfoot information the traditional territory is referred to as “Niitoahsinaan” and will in the technical sense be referred to as the “Area of Interest”. The study area is then taken from this perspective and partitioned based on national and provincial jurisdiction.

This chapter will provide an overview and scope of environmental conditions and land use(s) for the study area. Explicitly, the study area will be delineated with respect to: Climate, physiography, including surficial (quaternary) geology, soils, Eco-regions, and ecodistricts. In addition, watersheds and hydrology will be presented for the study area. The chapter closes with a qualitative overview of traditional, historic and present land uses.

4.2 Location

Figure 4.1 depicts the approximate extent of the study area with respect to the delineated territorial area, according to oral testimony. Comprising approximately one quarter of the areal extent of the *area of interest* (or Blackfoot traditional territory, or *Niitoahsinaan*), the

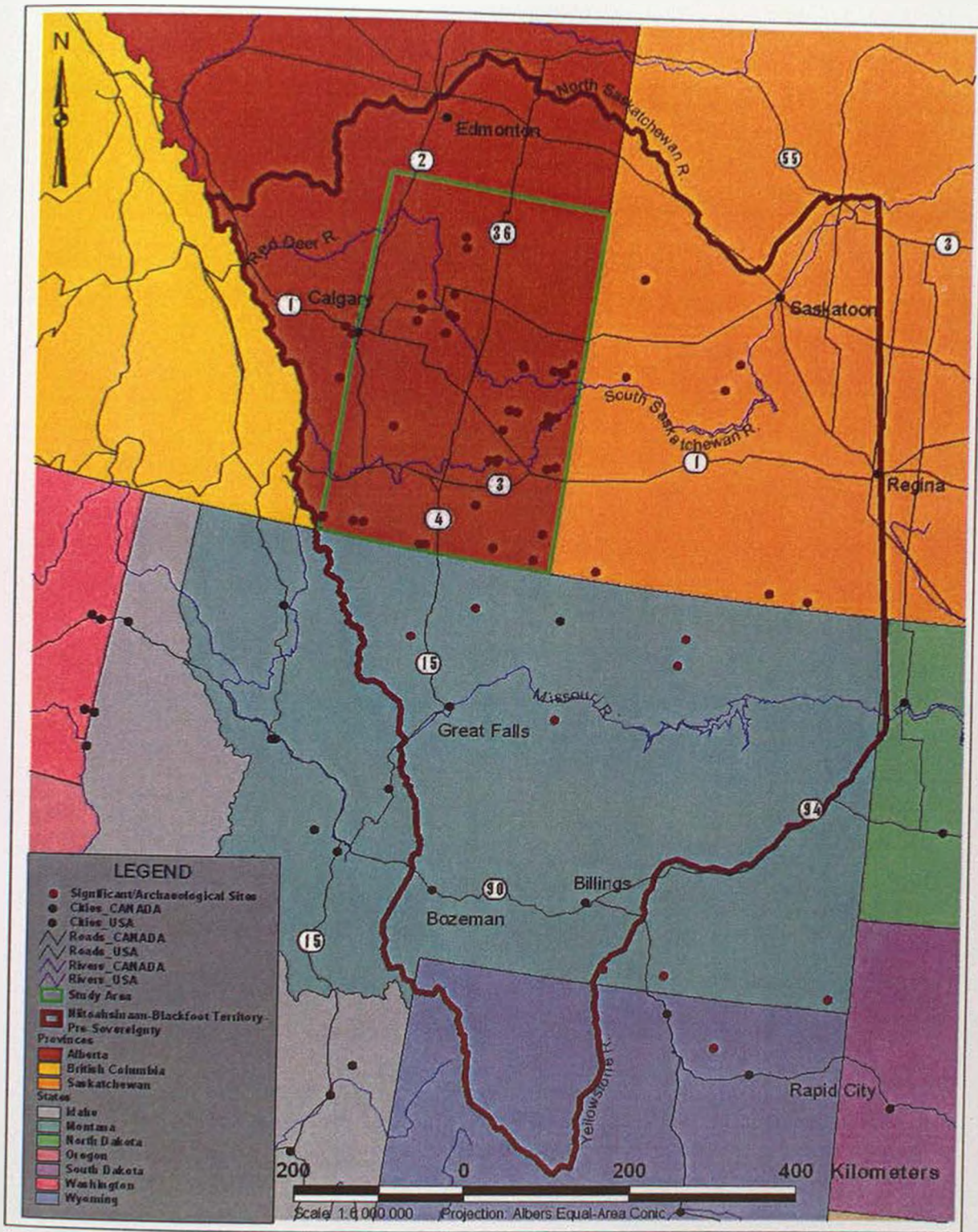


Figure 4.1: Study Area with respect to Area of Interest "Niitoahsinaan"

study area lies within the provincial boundary of Alberta, and was determined/selected by access and/or availability of digital data. Nikiforuk (1992) comments that, "the placement of the wheels corresponds to the borders of...the Blackfoot Confederacy."

4.3 Climate

Climate conditions vary throughout the study area and may be generally characterized as having a cold continental climate. The seasonal gradation of temperature and precipitation is highly influenced by prevailing winds and by arctic air masses. Summer and winter temperature variations are influenced by east to west increases in elevation as well as by increases in latitude (Strong, 1992). Precipitation also varies along these gradients. Situated on the lee side of the Rocky Mountains, in addition to the continental conditions, the area is characterized as a dry climate and becoming "progressively drier as one moves southeastward (The Applied History Research Group, 1997)."

Along the foothills, the mid-latitude dry climate (or semi-arid climate) differs from that of the plains as a result of its elevation and proximity to the Rocky Mountains (Gryba, 1983). At the other extent of the study area, the Cypress Hills are generally cooler than the surrounding plains (Longley, 1977). Extremes in temperature and precipitation vary from year to year as well as by the seasons with little moisture and high winds. These characteristic continental conditions of high variability occur on a daily basis as well (Longley, 1972; see also Longley & Powell 1971).

The extent of the study area, aside from the Cypress Hills, falls into the Grassland Ecoclimatic province (Eco-Regions Working Group, 1989) and specifically the *Subhumid Grassland (Gs)*, *Transitional Grassland (Gt)* and the *Arid Grassland (Ga)* Ecoclimatic Regions. The Cypress Hills are characteristic of the *Boreal Southern Cordilleran (SCb)* Ecoclimatic region (see Eco-Regions Working Group, 1989). Table 4.1 gives a brief overview of the climatic features and the location of the stations for which the information is derived. Provided here is reference to climate features, given the issue of global climate change, more in depth climate data is available. However, the aim here is to provide an overview of the climate for areas within/adjacent to the study area.

Table 4.1: Ecoclimatic Regions in Study Area*

Ecoclimatic Region	Climate Station	Climate Feature	Comment
Subhumid Grassland (Gs)	CARDSTON, AB (1154m)	Summers - warm and dry; Winters - cold with frequent Chinooks that ameliorate temperature and reduce snow cover	Significant late summer moisture deficit causes most plants to become dormant.
Transitional Grassland (Gt)	EDMONTON INT'L A., AB (715m)	Summers - cool; Winters - long and cold with continuous snow cover	Summer evaporation and precipitation rates are almost equal, which minimizes the potential severity of the late summer moisture deficit
Arid Grassland (Ga)	KINDERSLEY KY, SASK (683M)	Summers - warm and semiarid; Winters - cold, limited snow cover due to wind redistribution and reduced snowfall	Late summer moisture deficit, caused by low precipitation and high evapotranspiration
Southern Cordilleran (SCb)	ROCKY MT. HOUSE (1015m)	Summers - rainy and cool; Winters - v. cold with severe temperature moderated by frequent Chinooks	Frost-free period ranging from 50-100 days; annual total precipitation ranges from 400-600mm.

* Information extracted from Eco-Regions Working Group, 1989

Spatial variability and extremes in temperature and precipitation affect not only today's natural socio-economic systems (Sauchyn, 2002), it also significantly impacted the ebb and flow of the Blackfoot way of life. In turn, it will continue to impact our daily interactions with the surrounding environment.

4.4 Surficial Geology

Early documentation of the quaternary stratigraphy in Southern Alberta comes from Dawson and McConnell (1884, 1895) and just south of the study area but within the area of interest, Alden and Stebinger (1913), give an early account of deposition. Others have also contributed significantly to the knowledge of quaternary stratigraphy in the area including Horberg (1954), Alley (1973), Jackson (1980), Leboe (1996), and Barendregt and Irving (1998), *inter alia*. Stalker (1956, 1957, 1959, 1960, 1962, 1963a, 1963b, and 1965, *inter alia*.) fills in gaps and provides a formulation and compilation of the deposits for the study area. Particularly, Stalker (1963b) focuses on southern Alberta and provides a composition for sections along the Old Man River.

A distribution of quaternary geology polygons is depicted in Figure 4.2 for the study area. Adapted from the "Surficial Materials of Canada, 1880A" compiled by Dr. R.J. Fulton (1995). Broken down according to parent, or genetic, material and further subdivided with respect to *texture, thickness, and landform*. The majority of the study area is comprised of *till blanket* and *coarse grained material*. In addition there are: *till veneer, fine grained, alluvial and eolian deposits, glaciofluvial plain, glaciofluvial and alpine complexes, colluvial blocks and fines, colluvial rubble, colluvial sands, and water polygons* depicted in Figure 4.2.

A junction where science and traditional Blackfoot knowledge meet is in the *Origin* of valleys. The Quaternary Period, or the last great Ice Age, drastically disrupted the pre-existing drainage system and left it in disarray (Stalker & Barendregt in Barendregt *et al*

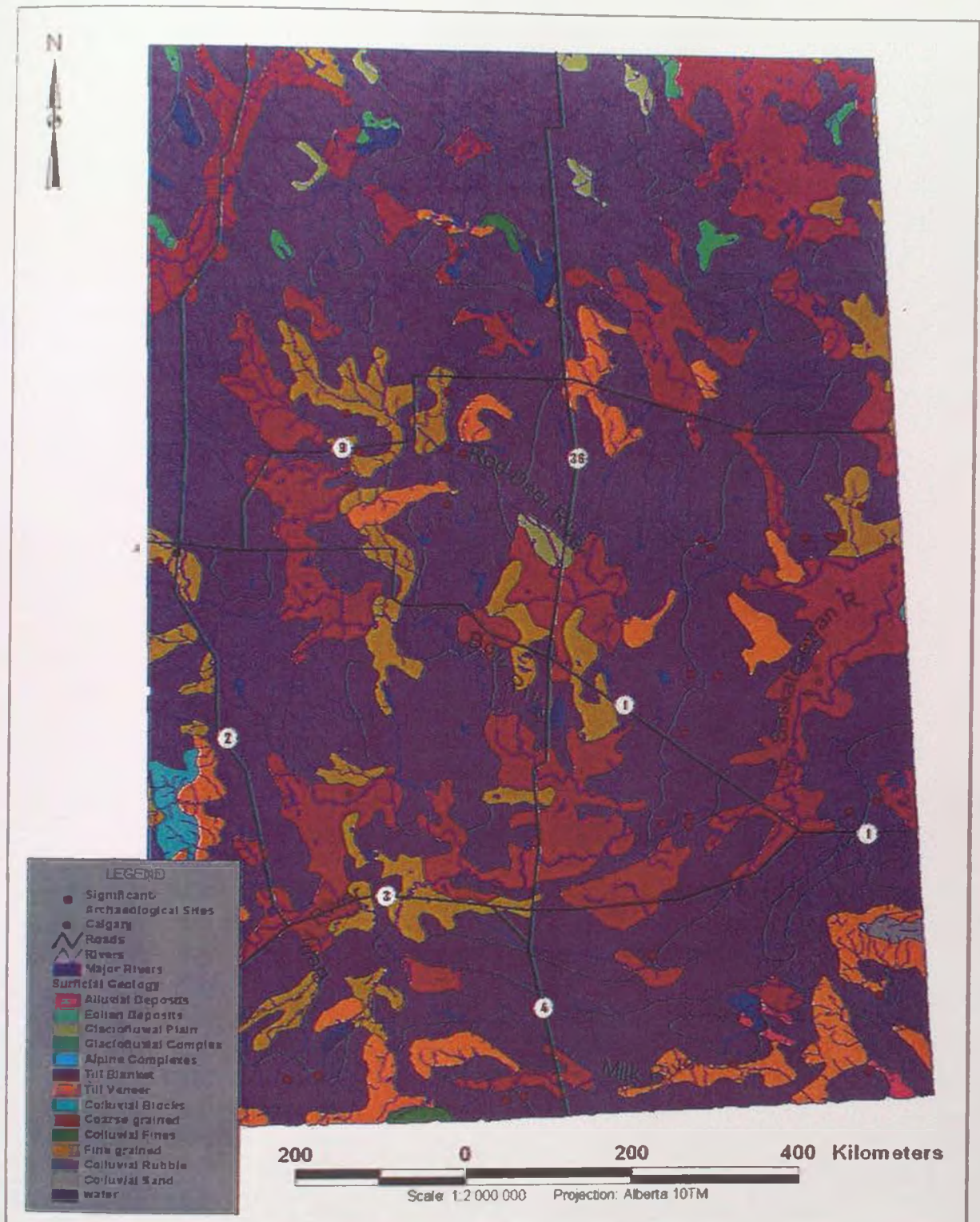


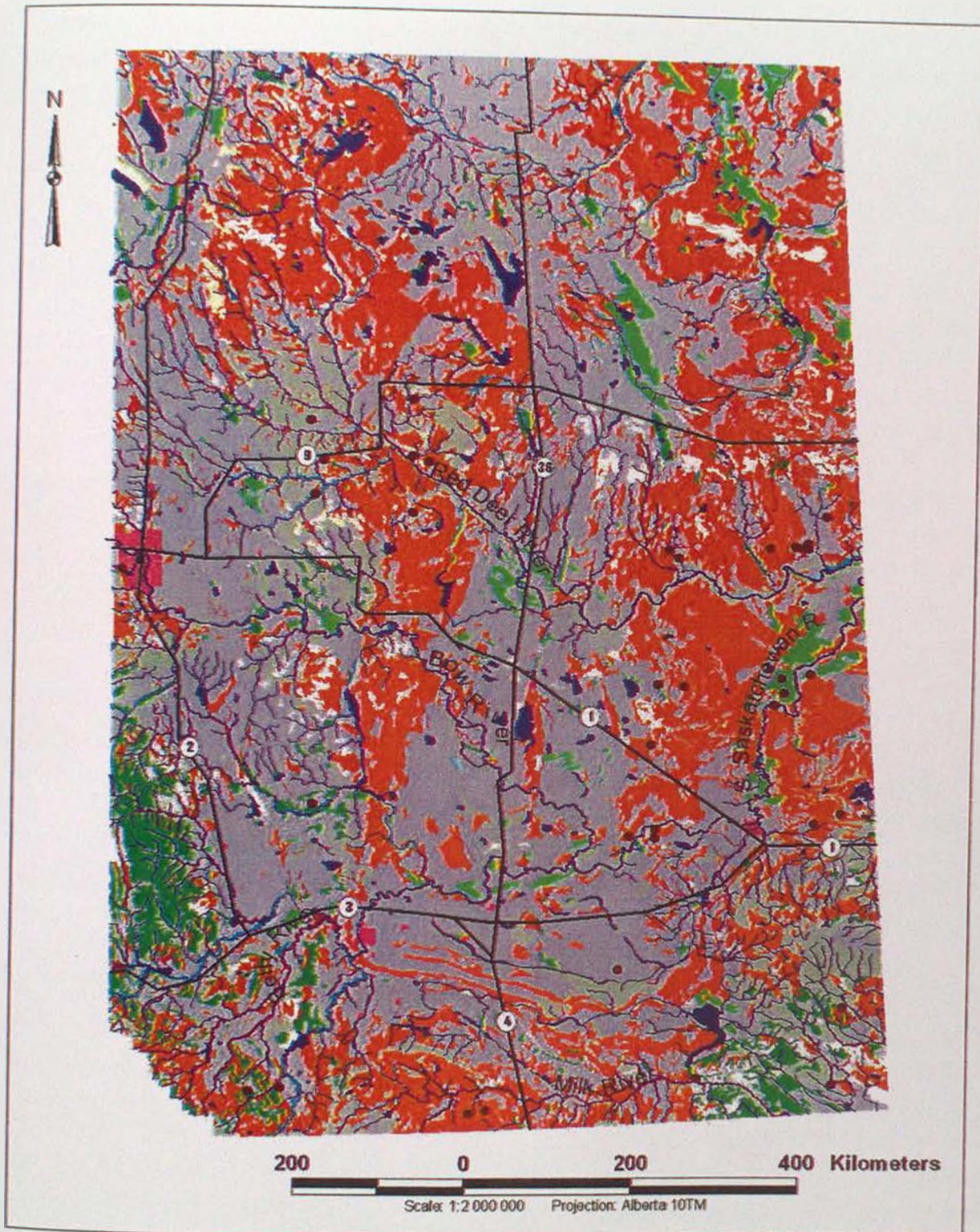
Figure 4.2: Surficial Material polygons contained in the study area. Information adapted from *Surficial Materials of Canada Map 1880a*

1988). In particular the community of *Okotoks* derives its name from this ancient event of *Napi*, his robe, his friend, and his careless etiquette of *taking* back his robe, from the rock (erratic) thus causing a reaction from the rock, which in turn chased *Napi* and his friend, before coming to its final resting place near “Okotoks,” Alberta, having carved out the valleys/landscape we see today (Wolf Leg. pc. 2002). Stalker notes the mass on the ‘*Big Rock*’ at about 18, 000 tons (1956).

4.5 Physiography

The foothills on the eastern border of the study area mark a transition zone between the mountains and the Great Plains, and are characterized by ridges and hills paralleling the mountain ranges. The Landscapes (Figure 4.3 a & b) and Surface Morphology (Figure 4.4) give a more localized view of the study area. The watersheds contained in the study area (Figure 4.5) provide a perspective of the major drainage patterns giving rise to a sense of the regional physiography.

Drainage patterns are from west to east and consist of the Milk River which flows into the Missouri-Mississippi drainage system, the Oldman-Bow-South Saskatchewan rivers and the Red Deer River all form the Saskatchewan River system (Vickers, 1986). There are ten major watersheds that fall into the study area, including: Battle River, Bow River, Eagle Creek, Lodge Creek – Battle creek – Frenchman River, Milk River, North Saskatchewan River, Oldman River, Red Deer River, Seven Persons Creek, and the South Saskatchewan River drainage basins.



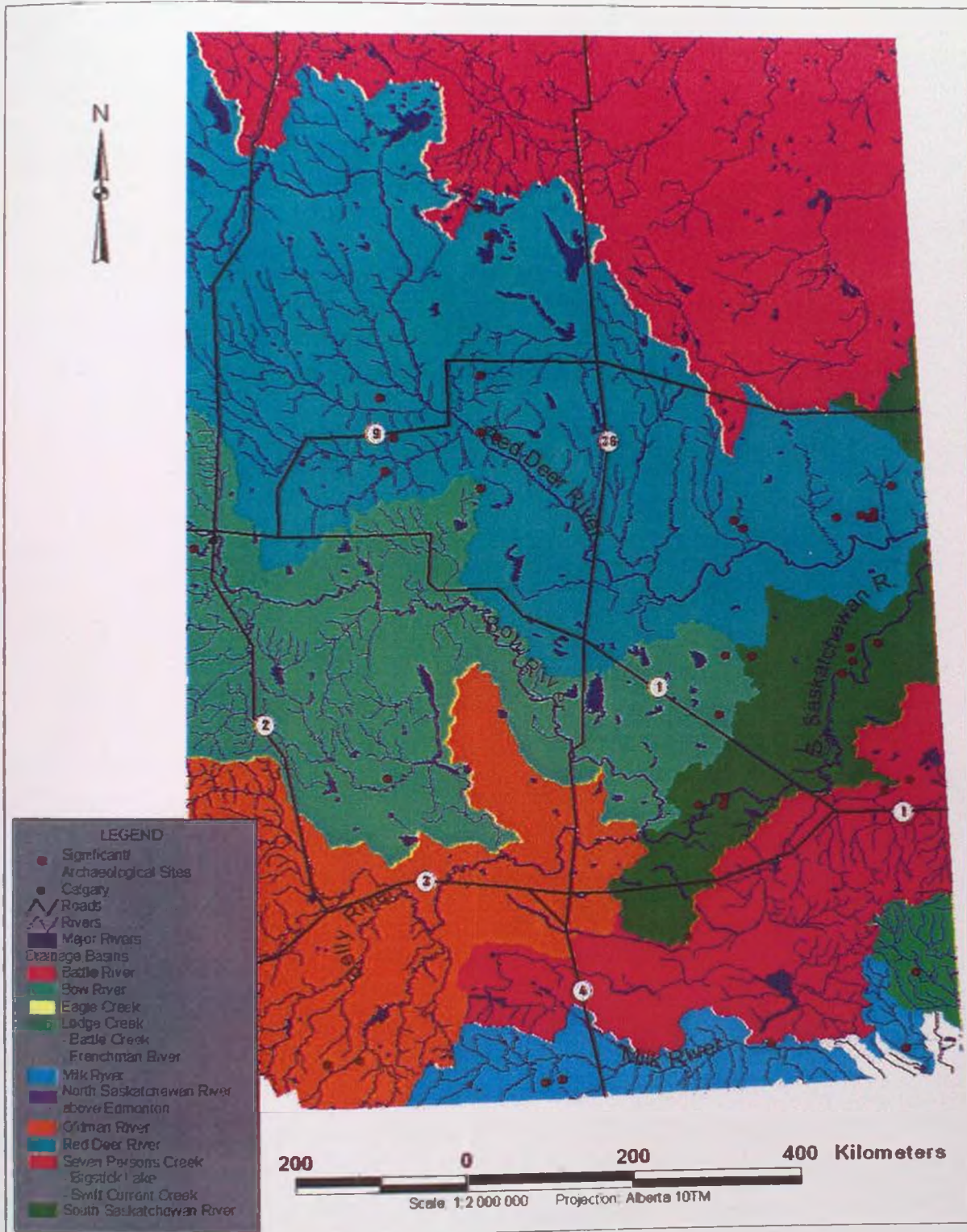
**Figure 4.3a: Landscape polygons for Study area.
Information adapted from Agrasid 3.0.**



Figure 4.3b: Legend corresponding to Landscape polygons for Study Area. Information adapted from Agrasid 3.0.



Figure 4.4: Surface Morphology polygons for Study area. Information adapted from Agrasid 3.0.



**Figure 4.5: Major Drainage Basins contained in Study area.
Information adapted from PFRA Watershed Project.**

4.6 Soils & Vegetation

Derived from parent material and weathering processes, the distribution of soil great groups for the study area include: Solonetzic soils, Brown Chernozem, Dark Brown Chernozem, Regosol, Brunisol, Gleysol, and Black Chernozems. Generalized for the study area and adapted from the PFRA Agrasid (3.0) data, Figure 4.7 depicts the distribution of soils for the study area.

The work of Strong (1992), *Ecoregions and Ecodistricts of Alberta* and Strong & Leggat (1981), *Ecoregions of Alberta*, have been adapted and slightly modified by the Agrasid 3.0 data; Figures 4.8 and 4.9 depict the Ecoregions and Ecodistricts of the study area. A total of seven *Ecoregion* classifications fall within the study area, along with fifty-eight *Ecodistricts*.

Ecodistricts being subdivisions of Eco-Regions, are characterized generally as *physiographic* regions, *inter alia* (Strong, 1992). Note the nomenclature in regards to Blackfoot contexts, eg. "Blackfoot," "Rainy Hills," "Wintering Hills," etc. The nature and validity of ecodistricts convey a bridge with BEK and demonstrates that representation of Blackfoot information that already exists in modern classification schemes and is therefore, embedded in the *tacit infrastructure* and lends itself as a supporting mechanism to considering the Blackfoot attribute information.

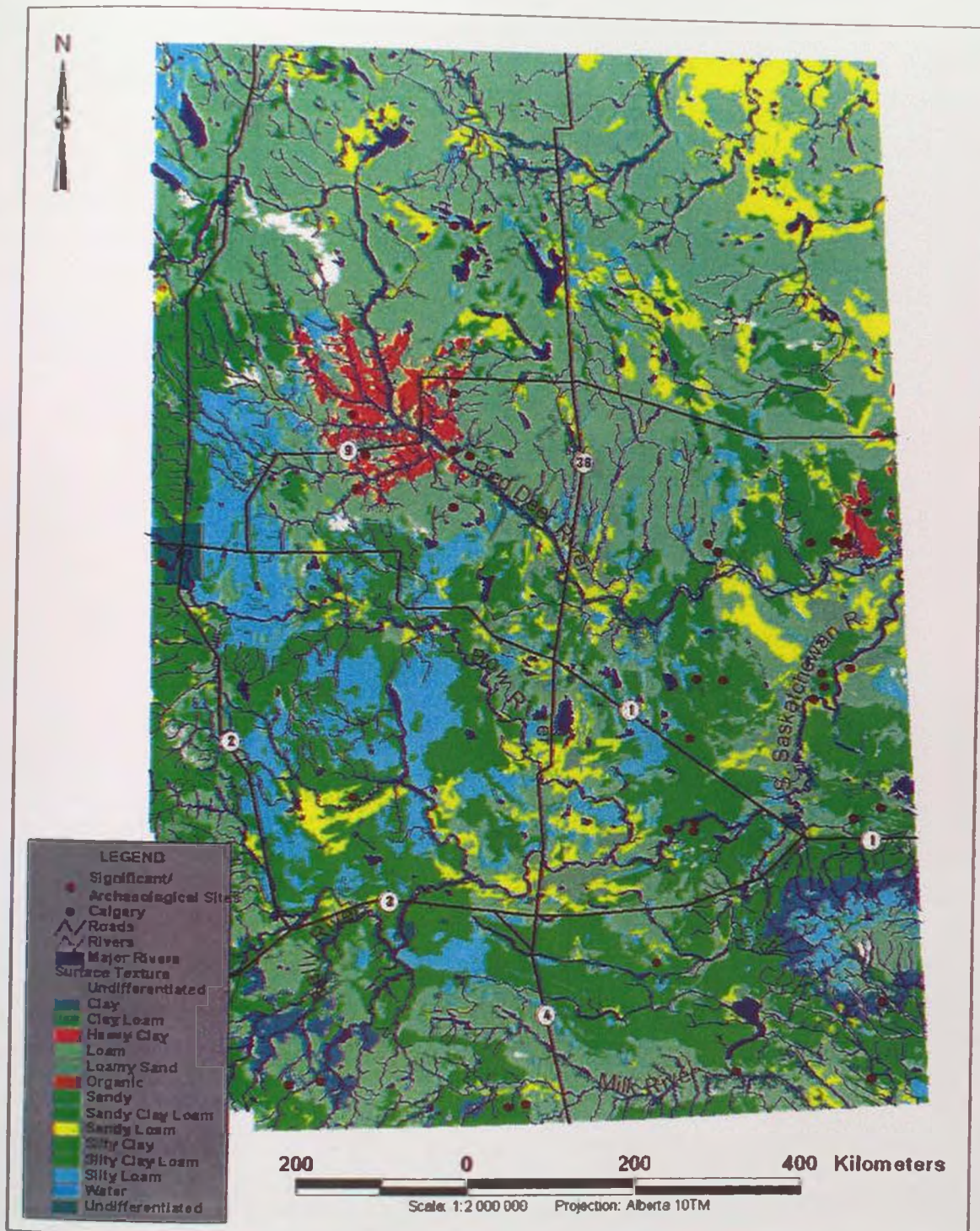


Figure 4.6: Surface Texture polygons for Study area.
Information adapted from Agrasid 3.0.

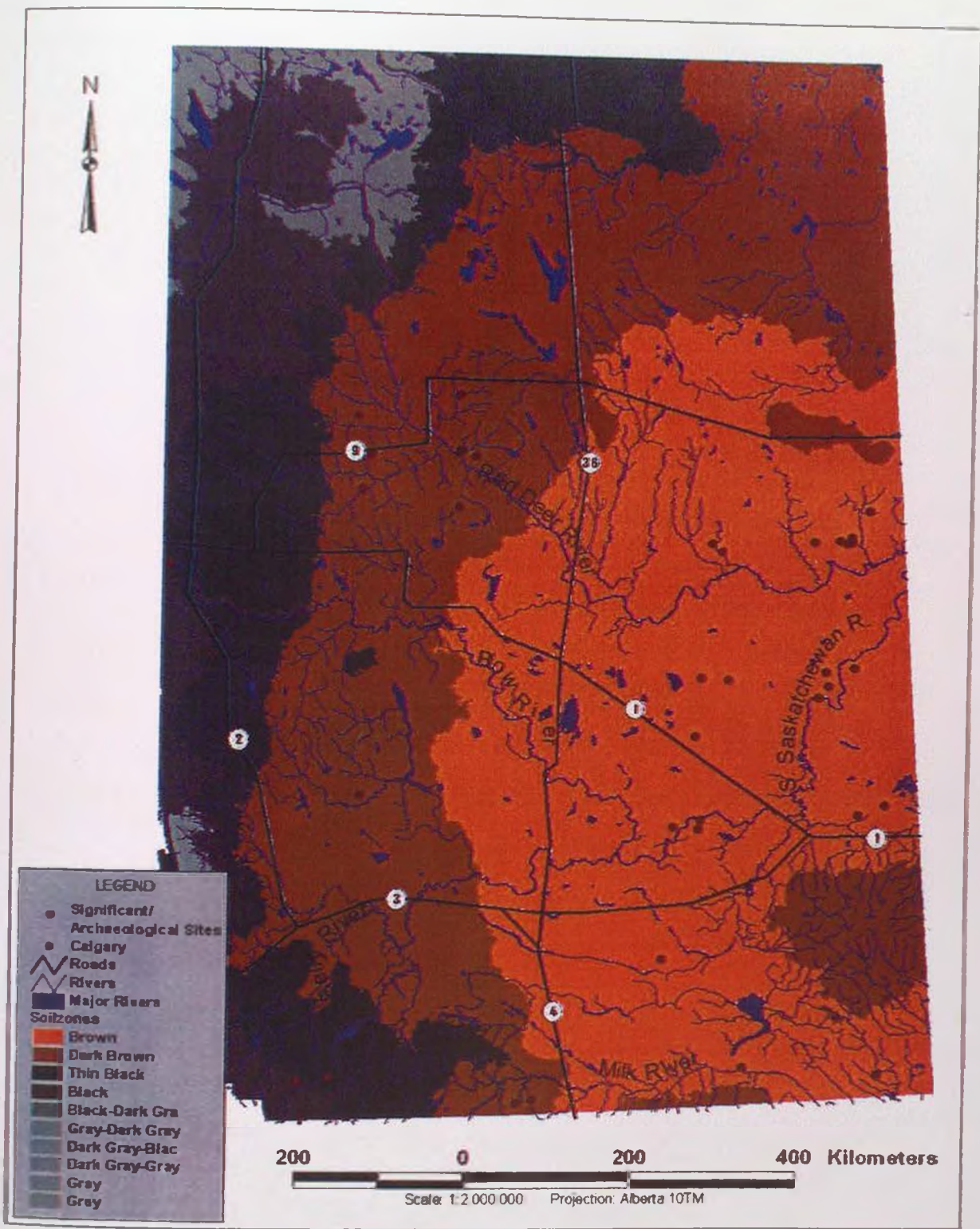


Figure 4.7: Distribution of Soil zones contained in the study area. Information adapted from Agrasid 3.0.

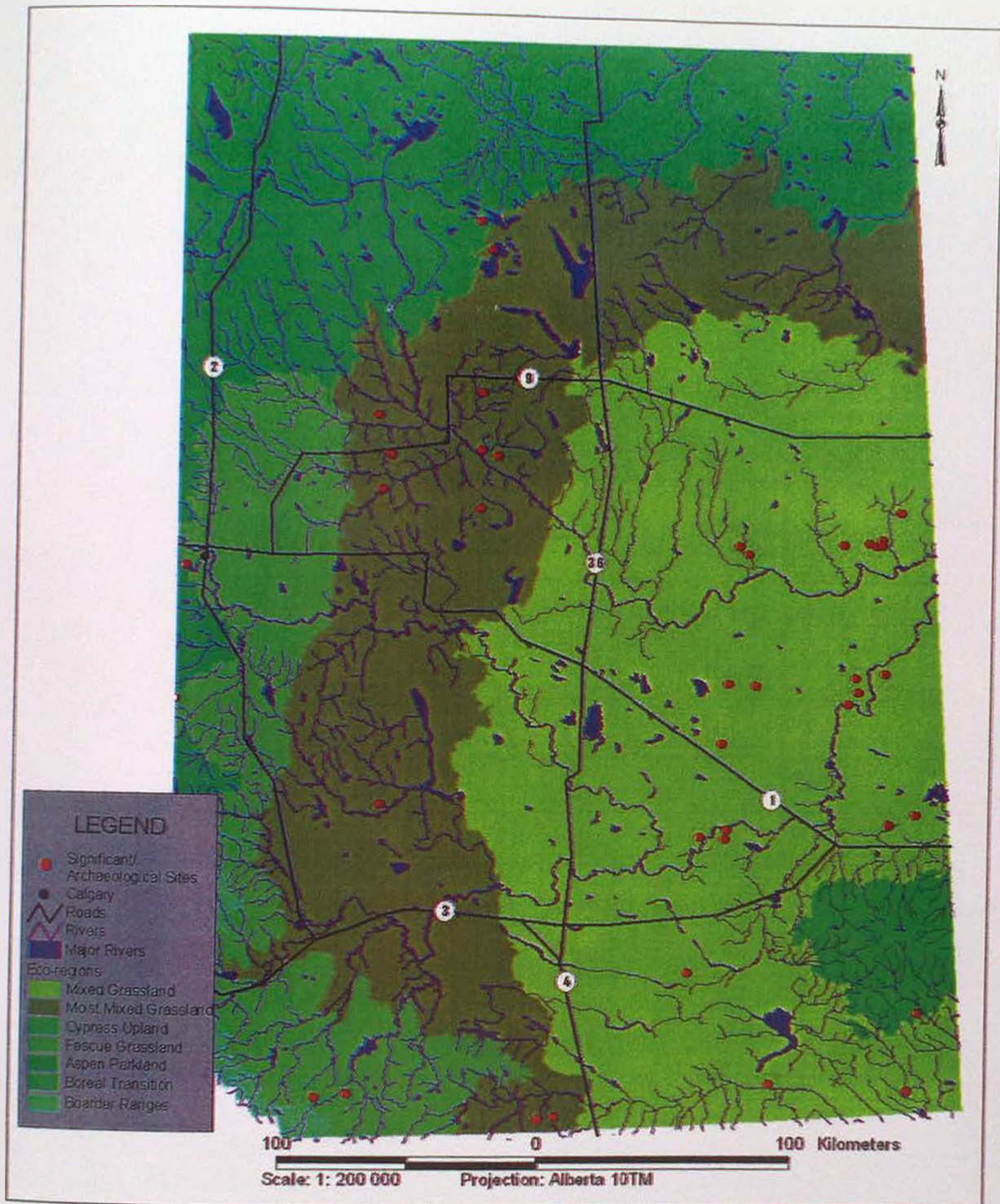


Figure 4.8: Distribution of Eco-Regions for Study Area. Polygons vary slightly from Strong (1992). Information adapted from Agrasid 3.0.

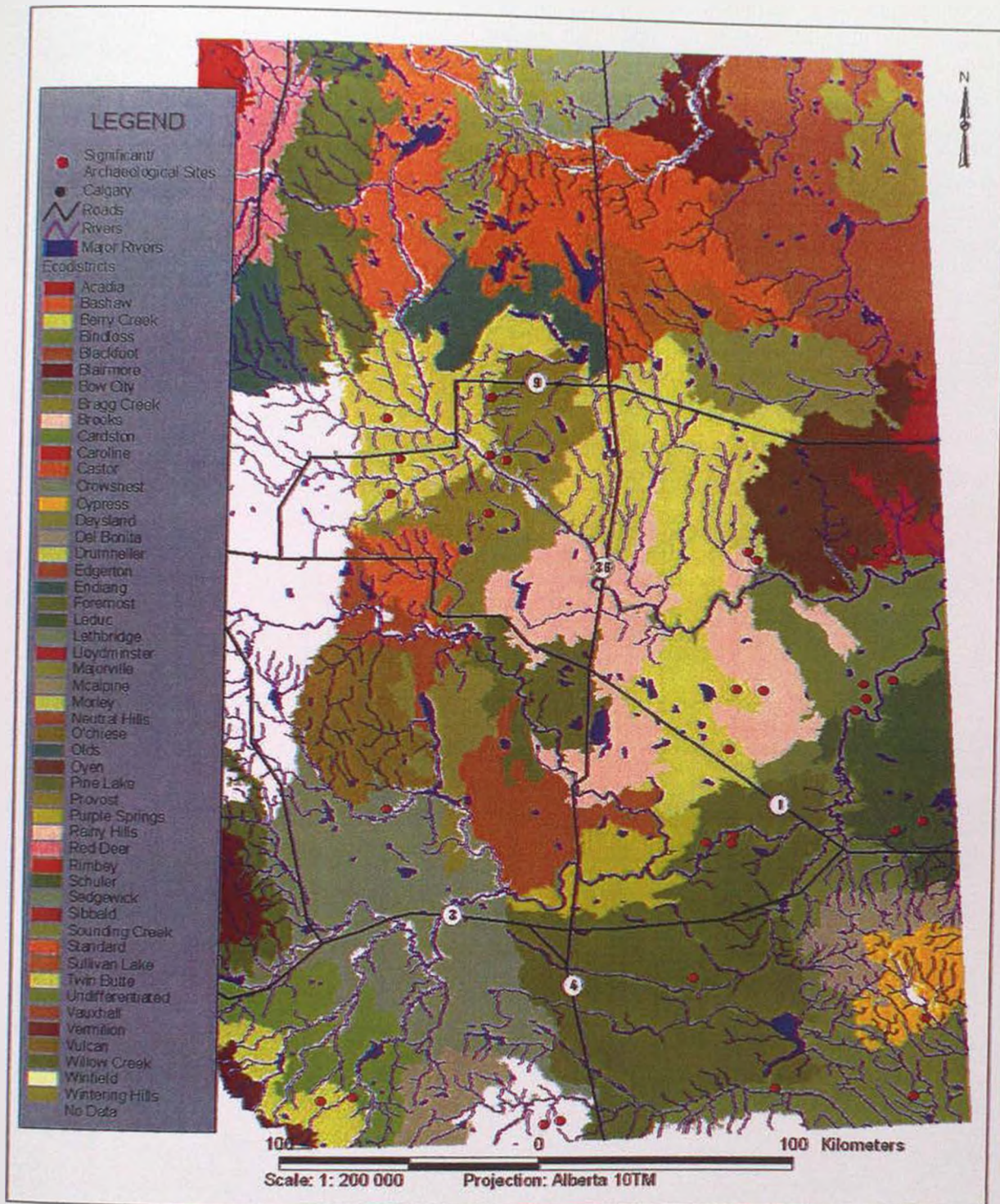


Figure 4.9: Distribution of Ecodistricts for Study area.
Polygons vary slightly from Strong (1992).
Information adapted from Agrasid 3.0.

4.7 Land Use

4.7.1 (Pre-historical) Traditional Land Use

As part of the research design, the text is comprised of delineating an aboriginal viz. a viz. Blackfoot perspective of the land. This is driven by the understanding of the *land uses* and activities by that of the Blackfoot people. More detail is provided in the following chapter. By way of introduction, the following is an excerpt from Vickers (1986) depicting the *seasonal round* of the *Alberta Plains Indians*:

1. *Winter (November/December-March): Occupation of the forested valley bottoms, foothills and parklands; great degree of sedentism; subsistence by both stalking and communal hunting of bison; dried meat supplements. Both aggregation and dispersion of population occurred.*
2. *Spring (April-May/June): Removal from winter sites to valley edges to take advantage of sunlight, dry slopes, etc. Both stalking and occasional communal hunting are postulated. Mobility would be a function of weather.*
3. *Summer (June/July-August/September): Great mobility, especially while water is available in sloughs. Dispersed camps occur in broken topography suitable for stalking bison. There was probably population aggregation for ceremonial purposes at certain times. Most sites thought to represent this season are small, scattered tipi ring encampments distant from water and wood.*
4. *Fall (October-November): Removal from the now dry plains to mesic environments, where activities include preparation and conduct of major communal kills, and preparation of dry stores. Movement to winter camp locales occurred late in this period (Vickers, 1986:7-8).*

Johnston (1987) depicts the *seasonal round* of the *Peigan*⁹. Campsites, burial sites, harvest sites, ceremonial sites, and other uses are *memorialized* (Wolf Leg, 2002; personal communication) on/in the landscape with evidence strewn about the territory. Recorded now as *archaeological sites*, much information has been documented in an attempt to delineate the Blackfoot or Plains experience on the Great Northern Plains.

⁹ Recall that the Blackfoot Confederacy is made up of four divisions, Peigan here refers to the South Peigans or Apatohsii Piikunni.

Co-evolution with plant species have resulted in a diversity of plant uses among the Blackfoot. Johnston (1987) and Hellson and Gadd (1974) provide quantitative and qualitative information regarding the plant uses among the Blackfoot. A quantitative summary of plants used in *Religion and ceremony, birth control medicine, horse medicine, diet, craft and folklore*, as per the compilation by the authors of "Uses of Plants in Traditional Blackfoot Life (Helson and Gadd 1974)," provides an extensive overview. Johnston notes that approximately 185 species were used or known by the Blackfoot people. He comments on the amount reported by Hellson and Gadd at 100 species.

The site/seasonal variations of land occupancy and land use were correlated with Bands from each Tribe (Russel 2002 and Wolf Leg 2002, personal communication). Both parties, Wolf Leg and Russel, stress that the information derived from oral testimony is dependent on the Band the individual is affiliated with; such that *environmental knowledge* is necessarily *spatial knowledge, inter alia*. Congruent with the experience of the Gitxan, the interpretation of their *perspective* was depicted with the use of GIS.

4.7.2 Historical → Present Land Use

The fur trade industry had reached its peak concurrent with the installment of the railway, reaching its Blackfoot country in 1883. It brought with it a wave of settlers, who experienced, first hand, the unpredictable climatic conditions native to the Great Plains. In particular, within the *Palliser Triangle* drought pushed settlers to Parkland areas and eventually to the boreal forest, clearing large areas for agricultural purposes (Wilson & Dijks in Berendregt *et al* 1993).

In an effort to *transmute* the "Dust Bowl" of the 1930s, the "New Farming Frontier" resulted in a catch-22 situation; according to Wilson and Dijks (1993), the new wave of settlers increased perpetuation of poor tillage practices that "worked" in good years, leading to soil drifting with the return of drought conditions.

In the present, the Foothills range is used for cattle on native pasture, and crop production. There are thirteen irrigation districts in the South Saskatchewan River system. There is also important winter habitat for wildlife ungulate species, and important recreation areas as well as protected areas. In addition, other land uses include, but are not limited to: Real estate, urban development, historical and ecological reserves, ranching, oil & gas developments, as well as other projects and/or activities.

On a final note, a quote from Wilson and Dijks' provides a retrospective and prospective summary for the area contained in the *Palliser Triangle* which makes up a significant portion of the Study Area:

Farmers, filled with the euphoria that a few good years can bring, purchased more land in anticipation of future profits. When the crunch came, banks were blamed for placing farmers in high-debt situations, but despite the predictable rise of protest movements, the result was again local depopulation. These pump-like reciprocal swings of settlement and depopulation obviously mirrored the environmental changes that were occurring, and will doubtless continue. Irrigation programs have opened some lands, but have caused others to be lost through salinization as salt-rich waters evaporate from prairie fields. As increasing demands outstrip the supply of surface and subsurface water even in good years, the "New Farming Frontier" is still being abandoned locally, both in the United States and Canada, and some scientists now advocate a return of the area to native grassland as a buffalo common (1993:56).

Chapter 5

RESULTS AND DISCUSSION

5.1 Introduction

Meaningful representation of Blackfoot attribute information is dealt with in the context of *occupation* and *continuity* carried by the analogy process. Section 5.2 considers the *traditional* and *successional patterns* of the Blackfoot as an introduction to pre and post sovereignty activities. This allows us to consider the information in the context of *Kiipatapisinoon*, the Blackfoot way of life; GIS allows us to capture the context of the lived Blackfoot experience and illustrate the Blackfoot paradigm in terms of the spatial memory of experiences and events. Framing the Blackfoot (spatial) paradigm and using the same space to incorporate the western ecological constructs, in turn creates *space* for linkages.

These linkages are significant if and only if, there is an apparent continuity in terms of the Blackfoot way of life. This is demonstrated in terms of the value system that is affirmed via ceremonial continuity. *Spatial* and *temporal* parameters of the Blackfoot paradigm are tabled and a *concept of continuity* is established. A final test for the relevance of the *analogy* (proposed by Figure 1.1) in section 5.3 allows us to make the process contiguous with a scientific framework, given that we are deriving the context of *continuity* from the experience of the courts (i.e., *Delgamuukw v. British Columbia*, [1998]).

Section 5.3 provides the results of the pilot analysis of Eco-Regions and Blackfoot significant sites. The linkages postulated are preliminary. They are relative to the parameters of eco-region delineation. The complementarity is based on the notions of water and weather subject to the Water Society, i.e., Iiyohkimiiks.

The Blackfoot Environmental Geographic Information System [BEGIS] (section 5.4) demonstrates the viability of spatial information management contingent on significance to the Blackfoot way of life. Environmental attribute information for the study area, derived from Agradid derived coverages (ACDs) were assigned to each site based on their mutual occurrence on the landscape. The capabilities of GIS, in carrying both sets of knowledge, are important to information management and the approach bridging the gap in baseline information. A summary of the proposed linkages and gaps or missing links (section 5.5) allows the process of Blackfoot representation in a scientific context to be evaluated.

5.2 Transition and Successional Patterns: Blackfoot Occupancy

Encompassing pre-sovereignty occupational patterns, *Pakapoatokaan's Winter Count* (section 5.2.1), provides a brief delineation of patterns for the years 1780-1883. *Blackfoot place names* (section 5.2.2) discusses the context of naming and the associations between the Indigenous self and the environment. Limited to the study area, these sites provide insight into the use and occupancy of the area. *Post treaty settlement* (section 5.2.3) provides information in regards to the spatial distribution of Bands post settlement on the Blood

Reserve. These sections contribute a lineage from pre-sovereignty to present occupation drawing on various maps and figures to portray these ideas.

5.2.1 Framing time: Pakapoatokaan's Winter Count

Coupled with the ideas presented in the preceding chapters, this section focuses on the Bloods in terms of the *Pakapoatokaan* Winter count. The information contained herein is a gross summary but is intended to provide an over view of the successional patterns for one Blackfoot Confederacy division, the Bloods. Thomas E. Mails comments that each tribe was "independent politically" and this was centred on the *Society* way of life which governed and guided the Blackfoot people and their way of life.

The winter count is taken from Hugh Dempsey's publication in 1965. In it he comments:

...their value as examples of the Blackfoot calendar system, winter counts are useful as historical records. The Blackfoot counts provide information such as the extent of hunting grounds, location of camp sites, the movement of traders into the area and the identification of chiefs. The Bad Head winter count shows that in 1813 the Bloods were raiding Crow camps in the Yellowstone country...The winter counts also provide some insight into Blackfoot attitudes towards historical events. The Bad Head count mentions the 1855 treaty with the American Government, which had no lasting effect upon the Bloods. Oddly enough, however, no mention is made of the 1877 treaty with the Canadian Government which was to have a great impact upon the tribe (Dempsey, 1965:5).

Taken from information provided by Dempsey, in particular Table 4.2, Figure 5.1 provides locations with dates that demonstrate the patterns for the Bloods for the centennial 1780-1880 approximately. No doubt there may be references in the oral tradition that elucidate a clearer pattern of movement/travel/migration for the Bloods. Based on this, however, it is clear that for the Bloods, there was access to sites throughout the entire territory. Taking into account, the two other divisions (i.e. Siksikaa and Pikunni), pre-sovereignty, the pattern, over several generations would no doubt overlap between Blackfoot Nations.

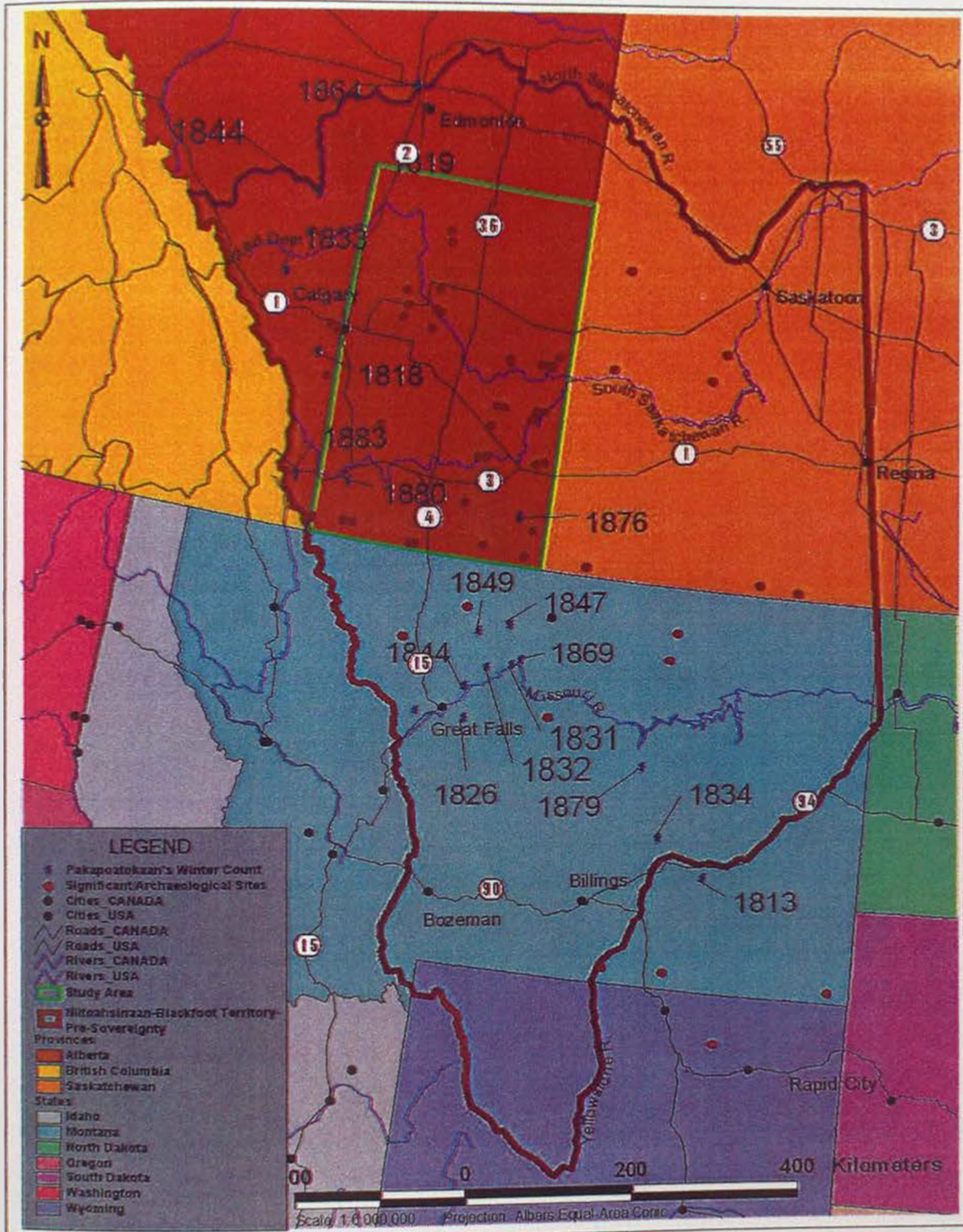


Figure 5.1: Blood Winter Count: Sites reveal locations accessed for specified year

The last name, "Heavy Shields" derives its lineage from an individual who traveled south and came into the possession of a shield belonging to the Spanish Conquistadors (Russel, pc. 2002). Thus, long expeditions such as this, are remembered over time, not just in winter counts, but in the way the peoples' oral custom dictates, i.e., naming. Mentioned here as a demonstration that naming in the Blackfoot way captures significant events and holds it in the memory of the oral custom.

When an event occurs out of the daily sequences or repetitions, the information is kept in a story, as in the oral custom. As comments Littlebear (2002), "days repeat, seasons repeat...time is just repeating itself...it just *is*." Another Blackfoot perspective of time reiterates this notion, Russell (2002) states that a "lifetime was measured in days." Because *life* is "repeating" and "recombining" the events that are captured and remembered in story are those "happenings" that veer significantly from the every-day patterns (Littlebear, pers. comm.. 2002). The inherent significance and/or intrinsic value is recorded and remembered.

Depending on the degree, they may be origin stories, or original happenings and teachings, or they may be coup stories. Either way, stories are remembered and have an associated oral tradition of tracking events in space and time. The winter count provides one example of the spatio-temporal contexts in the Blackfoot paradigm.

5.2.2 Framing space: Blackfoot Place Names

Figure 5.2 illustrates the information that was compiled via GIS overlay analysis. In the following citation appears Dawson's conception on the importance of Blackfoot place names:

"The names in these lists were received from Mr. J.C. Nelson, who, in association with Mr. A.P. Patrick, was during several years engaged in surveys in the North-west. The phonetic values of the letters are not stated and I have not ventured by transliteration to make the orthography conform to any phonetic system. It appears, nevertheless, desirable to place the original Indian names of places on record as far as possible (Dawson, 1895)."

Illustrated on the map includes the Blackfoot Reserve settlements. Additional layers (themes) incorporate, where appropriate, place names. Some sites have been cross-referenced with *mentors* however, this is a preliminary effort. A *finished* product would likely contain Blackfoot spelling according to Frantz and Russell, as well as Blackfoot syllabium. This would be a project for a team as it would require a collective approach in order to provide a succinct database of Blackfoot place names. (Many of the place stories are remembered and would be a meaningful teaching tool for schools if these audio/visual files were subsequently added from oral testimony, input into the GIS project and formatted for interactive software.) Emphasis is on stories as place, and place names being the *Title* and the memory of which is triggered by the name. Thus, place names here indicate (significant) events and demonstrate use and occupancy of the regions and paths of connective travel between wintering areas, harvest sites, ceremonial sites (etc.).

By referencing time with respect to space via the Blackfoot winter count, we see in the overlay analysis that the significant event for the year 1818 corresponds to the place name recorded by Dawson, *Stokaan*, or *Winter Okaan*. Customarily, this event, the Okaan, or Holy Lodge sponsored by Holy Women, takes place in the summer at the annual Sundance. Given the significance of this event in its usual pattern (i.e. when the berries are ripe), it is especially unusual to sponsor one in the winter time. Dempsey makes reference to the event

that took place and is included in the Table 3.2, i.e., it was the most significant event for that year count. Dawson recorded this site as “Fish Creek”, and “Stokaan” on the map/index but does not give an interpretation.

Two things can be inferred. First, that the inventory of place names includes events specific to the Blood People given that we are taking Pakapoatokaan’s winter count, who belonged to the Bloods. The second inference echoes Littlebear’s comments, recall: *asamooy* is a derivative of *asamoo*; that is, *a long time ago*, comes from *traveling a long distance*. On a day to day basis, time is not important (2003). Over time, the repetitions or migrations in the surroundings are mirrored in the language and the functionality of it. Spatial and temporal characteristics for the Blackfoot paradigm are tacitly linked and held/carried by/in the language. The *infrastructure* in turn supports *Kiipatapiisinoon*, the reality of the Blackfoot way of life. *When* a significant event occurs, its memory, i.e., the story makes reference to *where* it took place.

Even though the information wasn’t written down in 1818, the memory of the event has been restored. From a Blackfoot perspective the naming of places is a dynamic process that includes relatively new stories/events as well as old/ancient events. For example, Akii Piskuun (site #7) has both an ancient (pre-historical) account as well as stories regarding more recent activities. These are examples of how *place names* come to be and maintain their dynamic evolution of use and memory.

The complexity can be rendered somewhat by the following excerpt taken from Tom Ingold's "Hunting and Gathering as ways of perceiving the environment." In it he references Myers documentation of the Pintupi experience:

*There is thus a second level in the constitution of the landscape, one tied to the historical actions of ordinary human beings, as opposed to the 'transhistorical' actions of the ancestors... On the first level, named places were created by the ancestral beings at the sites of their activities, or at points where they entered or emerged from the ground. Connected by the paths of ancestral travel, these places make up what Myers calls a 'country' – a term he offers as one possible rendering of the Pintupi word *ngurra*. But *ngurra* can also mean 'camp' – that is, the place temporarily constituted by virtue of the everyday activities of a group of people who happen to set up there. Such places, unlike the named places envisioned as the camps of the ancestors in the Dreaming, do not endure for ever. Each is identified with the particular people who live there, and will be avoided for many years after someone thus connected to the place has died. But 'despite these identifications...camps are impermanent. Eventually they are overgrown and their associations forgotten, while significant new spaces are constantly being established (Ingold, 1996:138).*

Ingold's use of the Pintupi "Dreaming" is analogous to the Blackfoot *Papookaan*, also meaning a dream state, elucidated by more than one of the participant mentors. Recalling that the diagram represents approximately 65% of the total sites in the dataset, and that the study area is approximately 25% of the area of interest, we are reminded of the scope of significant sites in Blackfoot country. Ingold provides insight into the idea of sites as *markers* or *identifiers*:

Such features are more than mere marks, however for in their activities the ancestors did not leave a trail of impressions behind them, like footprints in the sand, while they themselves moved on. Rather, they metamorphosed into the forms of the landscape as they went along. Ever present in these forms, their movements are congealed in perpetuity (1996:137).

These comments are congruent with Wolf Leg's information during our visit to the *Majorville Wheel*. On the day of our visit in early January, the clouds were low and there was limited visibility outside a half mile radius of the monument. Wolf Leg spoke of the

Ancestral approach and as we encircled the formation, he instructed my then three year old son on offering tobacco at the four cardinal directions and then at the central cairn.

Commenting on the generations that have come to the location, there is definitely a sense of *their* presence and affirms Ingold's notion of "congealed in perpetuity."

Wolf leg comments that, "When you come here, you are entering the depths of your soul."

Entering infers a sense of timelessness where the physical/material world does not separate the initiate from those that have come before, and those that will come after. This ancestral connectivity is equilibrated for the Indigenous self in the *present*, as Ingold provides:

For in speaking about my ancestors I am speaking about myself. Throughout life, additional components of identity accrue through association with other named places, such as where one was initiated or where one has long resided, so that who one is becomes a kind of record of where one has come from and where one has been. It follows that the network of places, linked by paths of ancestral travel, is at the same time a network of relations between persons. When social relations are spoken of, as they often are, in terms of relations between places, the comparison does not draw a parallel across separate domains of society and the physical world but rather reveals that – at a more fundamental ontological level – these relations are equivalent. That level is the Dreaming. It is a level, however, that is not directly given to experience but rather revealed in the actions and events of the phenomenal world that are its visible signs (1996:138).

These ideas echo much of the information contained in the interviews. The study of the human interaction with the environment of concern to environmental scientists, suggests that from the Indigenous paradigm, there is no segregation from concepts of human/human interaction. Therefore, the interaction takes place *in* the human-human relationships, i.e., interactions. Further, environmental perception/management is thus at the level of these human qua human relationships. And these relationships are with respect to the *values* conveyed by *Blackfoot society life*, which is also, *Kipatapiisinoon*, the Blackfoot way of life.

5.2.3 Post Treaty Settlement

"The last buffalo calf was seen in the Cypress Hills in 1884 (Dormaar, 2003; personal communication)," the final bison hunt, in 1883 was followed by the settlement of the Bloods on the present day reserve (no. 148 A&B). "On July 2, 1883, the leading chiefs of the tribe gathered at the Agency to sign a new treaty...(Dempsey, 1980:136)." One that would designate and set aside lands for the Bloods according to the Indian Act, a parcel different than the one proposed by the Canadian Government that would have put the Blood people further north and east, along the south Saskatchewan river (Dempsey, 1980). Figure 3.2 contains polygons for the three Blackfoot nations that treated with the Canadian government.

When the Bloods settled, they did so in affiliation with their Band or Clan group. Figure 5.3 provides the general locations for Band settlement for the Bloods. The other Blackfoot nations are not depicted, thus the Bloods are used as an example. Taken from *Kitomahkitapiminooniks* (Zaharia & Fox, 1995), it outlines each Band recorded from Oral history. The sedentism was in stark contrast to the description provided by Russell. Recall that the Bands would camp a mile apart in their customary ways of movement about the landscape. To maintain their standard of living, the sites were vacated approximately every three days. Their distribution along rivers and on the Prairies was maintained at the time of settlement, however, in light of the circumstances, the bands were not able to rotate camp settlements.

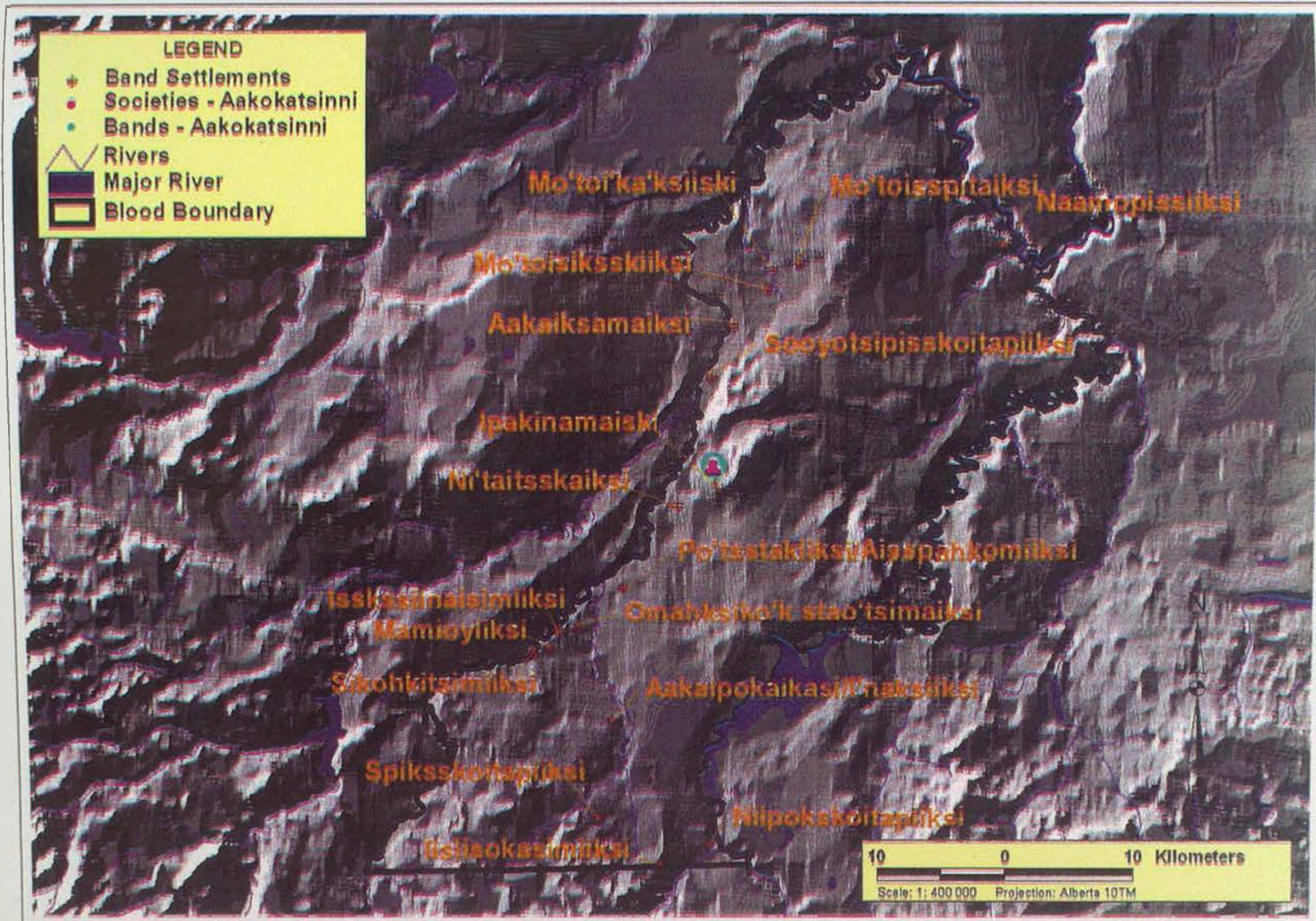


Figure 5.3: Spatial distribution of Bands/Clans at time of settlement (Depicted on Hillshade; information adapted from Zaharia & Fox 1996)

Depicted also on the map is the location of *Bands* and *Societies* at the annual Sundance, i.e., *Aakokatsinni*. As mentioned, the significance is relative to the harvesting time of Saskatoon (service) berries, or, *Otsitsi'tsspi Ookonokisstsi* (Mistaken Chief. pc. 2002; Russell, P. pc. 2002). The events location adjacent to *Mookoansin*, or the Belly Buttes is shown in Figure 5.3. Figure 5.4 is a zoom in on this site and delineates the Clan/Band distribution for the *Apaitstapiks – the Bloods*. Given that the three (and now four) divisions of the Blackfoot Confederacy are *independent* political Nations, each conducted their own Sundance (together, at times); each Tribal Nation would have their own location(s) and their own Band distribution. Again, the Bloods are used for illustrative purposes.

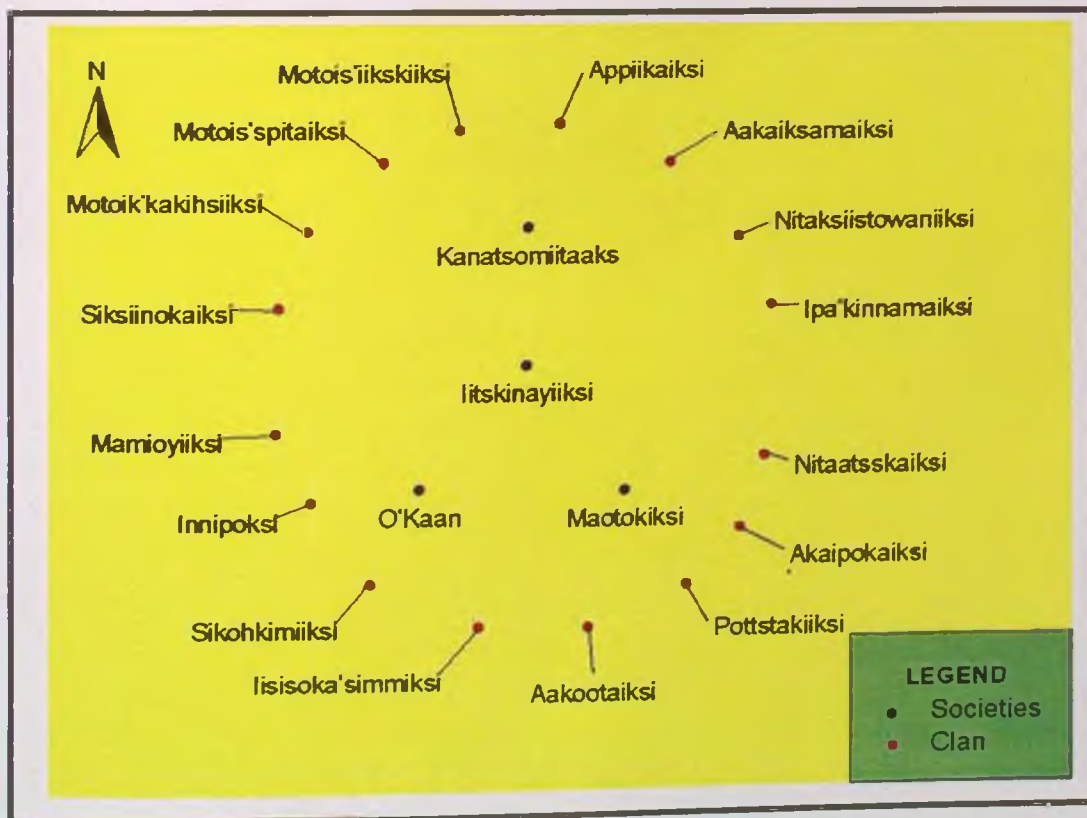


Figure 5.4: Blood Akokaatsinni
 (Adapted from drawing displayed in Blood Chief and Council Chambers; original drawing by William Singer III)

Here, Mistaken Chief comments on the *Societies*:

In the encampment of the Sundance the sacred Horns Society are the leaders. The sacred Mao'tokiiks Society / Buffalo women's society...the only woman's society in the tribe...also plays a lead role in the Sundance. Their ceremonies precede the beginning of the Brave Dogs Society who also play another important role in the encampment and all proceedings. Traditionally the Brave dogs policed the camp and helped prepare the Ookaan lodge of the Ookaan lady who sponsors the Sundance lodge. This year is also the first time in over fifty years that the Doves Society comprised of the young warriors of the tribe will be involved in the Aakokatsinni (Mistaken Chief, 2002; personal communication).

These tipis are arranged on an annual basis, to form the *Akokatsinni* (Figure 5.4). The inner region, contains the *societies* that constitute the *value system*, in turn these values (principles) guide the way of life, *Kiipatapisinoo*. The renewal and repetition of the sacred domain, i.e., tending to the sacred state (Mistaken Chief), are manifest by the Bands that make up the camp circle; or the outer region. The discussion is simplified for current contexts but corresponds to a high degree of complexity. Therefore, in many respects, while this is an attempt at a foundation for understanding the Blackfoot experience in terms of their relations to the land, it is incomplete.

In addition to the Band specific geographic locations (Wolf Leg, 2002; Russel, 2002; pers. comm.), there was also a specific location in the circle camp. For example, the Mamioyiiks, on the west side will continue to camp at this location with respect to the distribution of Bands in the camp. The Sundance figure is taken from an art piece prepared by William Singer (III), which is displayed in the Blood Chief and Council Chambers.

During the fur trade and settlement years, a significant decline in Blackfoot population occurred. According to Russell, at one time there were 48 Blood Bands. At the time of

settlement the population had decreased by approximately 70%. Figure 5.3 and 5.4 demonstrates the organization of Bands/Clans after the decline of the buffalo and desecration of their own population. George Bird Grinnell (1962) provides a depiction of the South Peigan or *Amskapi Piikunni*, in his, "Blackfoot Lodge Tales." He includes nine Societies and 24 Bands. The interested reader may consult with Grinnell's publication.

Recalling from Wolf Leg's teachings, the *values* may be centralized in the region containing the *Societies* of the Blood *Aakokatsinni* depicted in Figure 5.4, it is a demonstration of the spatial, circular encampment. According to these *spiritual laws* the *practices* or actions are carried out in the lived domain by the Clans/Bands distributed about the circumference of the encampment. The decrease in population of Band units decreased the circumference and diameter of the Nations hoop, but the event continues into the now, the twenty first century. Wolf Leg (2002) refers to these Bands as gatekeepers protecting the *Sacred Space*. Spatial and temporal parameters play a significant role in this event circumscribing the way of life of the Blackfoot people.

5.3 Context and test for Continuity

The analogy of particles and paradigms (Figure 1.1) allows us to consider the Blackfoot perspective in an autonomous fashion and make comparable (complimentary) links with science derived from the Indo-European paradigm. The exercise of analogy provides a forum that allows meaningful representation of *cultural* information.

The oral testimony conveyed that all things being equal, the Blackfoot way of life can be *categorized* into two fundamental units, *Spiritual* and *Natural* laws, and that further, these equated to “values” based on *Society Life* and the lived experience, or *practical* acts of doing on a basis of *renewal* and *repetition*. Wolf leg demonstrated the memorialization aspect of the “wheel of life” in rock formations and its link to the lived domain of the Sundance.

The equilibrium between the *spiritual* and *natural* laws of the surrounding environment conveyed by Akookaatsinnin diagram (Figure 5.4) where the societies hold the spiritual laws and the Bands reciprocate this in their daily interaction with the natural environment. Their approach to life is through *kimapiipitsin* and *aatsimaapii* (Mistaken Chief, 2002). Deploying *kimapiipitsin* and *aatsimaapii* in the affairs with the surrounding environment are what allow the process of “returning things back to their sacred state” accomplishable. The societies hold the spiritual (holy) laws (Wolf Leg, 2003) and guide the daily life of *that which is* for the Blackfoot.

It has been noted that the *oldest* society among the Blackfoot is the *Iiyohkimiiks* or the “ones that have water (Mistaken Chief)” or Beaver Bundle/Tobacco Society (Hungry Wolf, 1977). Wolf Leg comments that the cessation in big wheels occurred as a result of the transition or succession to the *lived* circles; that the *memorialization* of the wheels was manifested into *living* memorials. These living memorials belong to the *Societies*. For example, the connectivity of the circles of rocks and the circle of Bands are held in place by similar central (or centripetal) force; the *Centre Pole* of the Okaan and the *Central Cairn* of the big rock wheels.

Recall that, in the discussion regarding the particle zoo, "... *matter, therefore, is an assembly of fermions held together by forces conveyed by bosons.*" These aspects of physics and Blackfoot knowledge are echoing similar concepts. This similarity allows us to make meaningful linkages. The notion that societies are analogous to bosons and bands to fermions would have implications on ideas of supersymmetry. "Currently, an immense amount of work is being done in the attempt to unify the two broad categories of particles – fermions and bosons – by means of an idea called *supersymmetry* (Barbour 192:374 1999)".

Ultimately, the Blackfoot way/walk of life is in *harmonizing* (Mistaken Chief, 2002) the spiritual and natural laws (Wolf, Leg, 2003) of the surrounding environment. The *matter* in the surrounding flux (Littlebear, 2003) includes the self. Such that as A approaches B (Figure 1.1), the two are separated by an asymptote and never actually cross paths. That is, until A reflects B, or adopts the principles of BEK, we, as scientists will continue to miss the boat on impressing an environmental consciousness on the consumer. If scientists can be used as an analogy for societies, then we have a very important role to play. WE must be able to hold the knowledge of the laws of the universe in such a way as to guide the ways of the people or the fragmentation and the trend in the loss of biodiversity will continue.

5.4 Eco-Region Analysis

Recall that climate is the predominant factor affecting the distribution of eco-regions (Padbury, *et al.*) and the native plant communities. In turn these affect the distribution of wildlife populations and *shape* the ecosystems. This section considers each eco-region where

there is an occurrence of significant Blackfoot sites. Again, these eco-regions are reflective of Agrasid derived coverages that were used for the pilot process.

Site occurrence exists with five eco-regions with the Mixed Grassland at 56%; Moist Mixed grassland at 27%, the Aspen Parkland at 10%, Fescue Grassland at 5%; and the Cypress Upland eco-region at 2%. These percentages are generally reflective of the areal extent of the eco-region contained in the study area. The eco-regions are generally discussed here.

5.4.1. Cypress Upland (Montane)

The Cypress Hills are generally cooler than the surrounding plains (Longley, 1977). Figure 4.8 depicts the location of the Cypress Upland eco-region with respect to the study area.

Elevation plays an important role in the temperature and precipitation gradients. The Cypress Upland (formerly Montane) receives the greatest mean precipitation (560mm) based on annual averages.

One site (#41) occurs at the Cypress Hills, or "Aiya ki'mikwi," and makes up two percent of the total sites in the analysis. Based on PFRA re-classification of eco-regions, the Agrasid delineated *Cypress Upland* eco-region, corresponds to the Montane classified by Strong (1991) who comments that the area of the Cypress Upland is too small to be classed by itself in comparison to the areal extent of Alberta. However, given the extent of the study area, this single class is good for the pilot process.

Table 5.1. Ecoregion & Site Occurrence Summary for Study Area

Ecoregion	Site Occurrence		Annual Climate Data						Environmental Conditions Reference/Modal Sites ¹		Land-use
			Temperature (°C)			Precipitation (mm)			Soil great group	Vegetation	
	#	%	Mean	Max	Min	Mean	Max	Min			
Mixed Grassland [*] / Short Grass ^{**} / Dry Mixed Grass ^{***}	23	56	4.0	5.5	2.5	340	380	260	Brown Chernozems	Needle-Grama Grass	Range for cattle on native pasture, and crop production. Sugar beets, alfalfa and vegetable crops from irrigated land; wheat, oats, and barley, irrigated and non-irrigated land; significantly altered by agriculture, at least half.
Moist Mixed grassland [*] / Mixed Grass ^{**} / Mixed Grass ^{***}	11	27	4.0	5.5	1.0	400	470	300	Dark Brown Chernozems	Needle-Wheat Grass	Small grains, common crop, both irrigated and dryland farming; cattle grazing where unsuitable for arable agriculture.
Cypress Upland [*] / Montane ^{**}	1	2	3.0	4.0	2.5	560	810	280	Gray Luvisols, Eutric Brunisols	Lodgepole Pine	Outside protected area include domestic grazing and forestry. Important winter habitat for wildlife ungulate species, and important recreation areas.
Aspen Parkland [*] / Aspen Parkland ^{**}	4	10	2.0	3.5	0	450	710	390	Black and Dark Brown Chernozems	Rough Fescue with Aspen clones	One of most productive agricultural zones in Alberta; barley, wheat, canola and oats; cattle grazing on rough terrain.
Fescue Grassland [*] / Fescue Grass ^{**}	2	5	3.5	5.0	2.0	520	870	370	Black Chernozems	Rough-Fescue Parry Oat Grass	Dominated by grazing and grain production on land suitable for arable agriculture.
Total:	41	100									

* Agrasid Derived Eco-Regions

** Strong

*** Strong & Leggat

5.4.2. Mixed Grassland Eco-Region

Located in the southeastern part of the province (Figure 4.8), the mixed grassland eco-region has the greatest occurrence of significant sites, i.e., 56% (Table 5.1). The bulk of sites occur within proximity to channels; sites 24, 25, and 34 occur at "The Inner Rainy Hills – Pist-sotah-ygh-kimi-kway," and proximal to freshwater.

The Mixed Grassland eco-region experiences the lowest precipitation (340mm) of all the eco-regions (Strong, 1992). From Strong's analysis of climate data, the summer (May through August) mean temperature was 16.2°C and in the winter (November through February) was -7.2°C (1992). Total precipitation of 272mm was recorded with 156mm occurring for summer and 42mm for the winter (Strong, 1992). The delineation of this eco-region correlates with the Brown Chernozemic soil zone (see Figure 4.7). Large tracts of salt-affected soils are common for this eco-region (Padbury *et al.*). The reference vegetation (or modal site in Strong 1992, Strong and Leggat 1981) are the Needle grasses (*Stipa comata* and *S. spartea*) and occurrences of blue grama (*Bouteloua gracilis*) (Table 5.1).

5.4.3. Moist-Mixed Grassland Eco-Region

Marking the northern extent of *open* grassland on the Great northern Plains (Padbury *et al.*, 2002) it is characterized by semiarid moisture conditions and Dark Brown Chernozems (Table 5.1). Mean summer temperature is recorded at 15.2°C in contrast to the winter mean temperature, -5.2°C. Total annual precipitation is recorded at 326mm. Eleven sites occur (27%) in the moist mixed grassland. Sites 3,4 & 8-11 are in the area Dawson recorded as "Blackfoot Wintering Area." These sites are near the "Hand-Hills – Oht tchis-tchis."

5.4.4 Fescue Grassland Eco-Region

The fescue grassland eco-region runs generally parallel to the Rocky Mountains. Black Chernozems that characterize the soils are formed in glacial till and lacustrine materials (Padbury *et al*, 2002). The influence of Chinooks characterizes this eco-region as having the warmest winter temperatures; ranging from -9.3°C -1.9°C (Strong, 1992). The summers are warm as well, with a frost-free period of about 80 d at the highest elevations (Padbury, *et al* 2002). Black Chernozems characterize the fescue grassland. Two significant sites (15 & 17) occur within this delineated eco-region and are along "Sakaimaupi-Lee's Creek".

5.4.5 Aspen Parkland

Mean summer temperatures range from 7.7°C -20.9°C (Strong, 1992). Winter temperatures vary from -14.0°C -3.7°C . Total annual precipitation is 412mm (Strong, 1992).

Characterized by Dark Brown and Black Chernozems, as the name implies, the Eco-Region is constituted by a mosaic of aspen groves and fescue grasslands (Padbury *et al*, 2002).

Four significant sites (10%) fall within the aspen parkland eco-region. The Porcupine Hills, or "Kai-skop-o-soi-us," contains the Aki-piskan (Woman's Pound) site that was referenced in some of the interviews (oral testimony). North of this site and within the aspen parkland is the area Dawson recorded as the *Blood Wintering Area*; it contains the area referred to earlier as the site where the *Stokan* (Figure 5.2) took place; it also contains Sheep Creek or "Okotokxi-etaghty," and reference here in Blackfoot is made to the big rock that Okotoks was named for (Wolf Leg 2003, Littlbear 2003, Wolf Child 2003, Mistaken Chief 2002, and Russell 2002).

5.5 Blackfoot Environmental Geographic Information System – [BEGIS]

The Blackfoot spatial memory is inferred by Wolf Leg's comments, recall "we are walking GIS's." We see from the Bands and their spatial association as it relates to the study area and the territory in general. We also see how this relates to the *Akokaatsinni*. The information contained in the Blackfoot experience is necessarily spatial and GIS provides a mechanism for conveying these concepts. As a technical tool, it is a vehicle, but it is not the real thing. "Niitsitaapi" (Blackfoot, lit. Real People) references the *lived* and *living* knowledge.

Bringing together ecological databases and Blackfoot environmental information is a unique approach to cross-cultural and cross-disciplinary endeavors. Based on the available digital ecological information, a table was constructed that joins significant sites with environmental attributes. The archaeological or Blackfoot sites are spatially connected/joined to ecological layers in the ArcView project. Table 5.2 is a summary of ecological attributes for each site in the study area. It is a value added database based on GIS analysis. As noted in chapter four, Brumley's (1988) compilation and categorization of medicine wheels have not been incorporated into the database. The digital attribute information would thus be a significant addition if acquired in the future. The table here is merely a demonstration of the capability for information management based on the Blackfoot criteria for significant sites.

Table 5.2 and Figure 5.2 are linked via the GIS. Together they provide a working base map and dataset for the Blackfoot Environmental Geographic Information System (BEGIS). It provides spatial attribute information for each site with the ability to view the spatial

Table 5.2. Value Added Database: Blackfoot Environmental Geographic Information System

ID	Elevation	ECO REG	ECOD NAME	MORPHOL	SOIL_ZONE	LMODEL_D	SURFTEXT	WS MAJ33	WS MAJ12
1	834	Aspen Parkland	Castor	Plain	Dark Brown	Undulating, high relief	L	Red Deer River	South Saskatchewan River
2	825	Moist Mixed Grassland	Castor	Plain	Dark Brown	Level and closed basin (depression with raised edges)	CL-L-SICL	Red Deer River	South Saskatchewan River
3	842	Moist Mixed Grassland	Wintering Hills	Upland	Dark Brown	Hummocky, low relief	L-SL	Red Deer River	South Saskatchewan River
4	858	Moist Mixed Grassland	Drumheller	Valley	Dark Brown	Inclined and undulated, high relief	HC-L	Red Deer River	South Saskatchewan River
5	1164	Aspen Parkland	n/a	Valley	Black	n/a	n/a	Bow River	South Saskatchewan River
6	1097	Aspen Parkland	n/a	Valley	Black	Disturbed land	U	Bow River	South Saskatchewan River
7	1354	Aspen Parkland	n/a	Upland	Black	n/a	n/a	Bow River	South Saskatchewan River
8	876	Moist Mixed Grassland	Drumheller	Plain	Dark Brown	Inclined and undulated, high relief	CL-L	Red Deer River	South Saskatchewan River
9	769	Moist Mixed Grassland	Drumheller	Valley	Dark Brown	Hummocky and ridged, moderate relief	L	Red Deer River	South Saskatchewan River
10	825	Moist Mixed Grassland	Wintering Hills	Upland	Dark Brown	Undulating, high relief	L	Red Deer River	South Saskatchewan River
11	833	Moist Mixed Grassland	Drumheller	Plain	Dark Brown	Inclined and undulated, low relief	HC	Red Deer River	South Saskatchewan River
12	1019	Moist Mixed Grassland	Wintering Hills	Upland	Dark Brown	Hummocky and ridged, high relief	L	Red Deer River	South Saskatchewan River
13	950	Moist Mixed Grassland	Lethbridge	Plain	Dark Brown	Undulating, low relief	CL-L	Bow River	South Saskatchewan River
15	1203	Fescue Grassland	Cardston	Bench	Thin Black	Hummocky, low relief	L	Oldman River	South Saskatchewan River
17	1328	Fescue Grassland	Twin Butte	Plain	Black	Ridged (Includes fluted terrain), High relief	CL-SCL	Oldman River	South Saskatchewan River
18	1248	Moist Mixed Grassland	n/a	Plain	Dark Brown	Hummocky, low relief	CL-L	Milk River	Missouri River
19	1207	Moist Mixed Grassland	n/a	Plain	Dark Brown	Hummocky, moderate relief	CL	Milk River	Missouri River
20	860	Mixed Grassland	Foremost	Plain	Brown	Undulating, low relief	CL-SIL	Seven Persons Creek – Bigstick Lake – Swift Current Creek	South Saskatchewan River
21	765	Mixed Grassland	Foremost	Plain	Brown	Hummocky, moderate relief	CL	South Saskatchewan River	South Saskatchewan River
22	795	Mixed Grassland	Foremost	Upland	Brown	Hummocky, low relief	CL	South Saskatchewan River	South Saskatchewan River
23	783	Mixed Grassland	Foremost	Upland	Brown	Valley with confined floodplain, high relief	CL-L	South Saskatchewan River	South Saskatchewan River

24	752	Mixed Grassland	Berry Creek	Plain	Brown	Hummocky, low relief	CL	Bow River	South Saskatchewan River
25	767	Mixed Grassland	Berry Creek	Plain	Brown	Undulating, high relief	CL-L-SIL	Bow River	South Saskatchewan River
26	684	Mixed Grassland	Berry Creek	Plain	Brown	Valley with confined floodplain, high relief	L	Red Deer River	South Saskatchewan River
27	721	Mixed Grassland	Rainy Hills	Plain	Brown	Hummocky, low relief	L	Red Deer River	South Saskatchewan River
28	728	Mixed Grassland	Acadia	Plain	Brown	Undulating, high relief	HC	Red Deer River	South Saskatchewan River
29	743	Mixed Grassland	Oyen	Plain	Brown	Hummocky, low relief	CL	Red Deer River	South Saskatchewan River
30	718	Mixed Grassland	Acadia	Plain	Brown	Undulating, low relief	HC	Red Deer River	South Saskatchewan River
31	719	Mixed Grassland	Oyen	Plain	Brown	Undulating, high relief	L	Red Deer River	South Saskatchewan River
32	702	Mixed Grassland	Acadia	Plain	Brown	Undulating, low relief	HC	Red Deer River	South Saskatchewan River
33	776	Mixed Grassland	Oyen	Upland	Brown	Hummocky, moderate relief	CL	Red Deer River	South Saskatchewan River
34	798	Mixed Grassland	Rainy Hills	Plain	Brown	Hummocky, low relief	CL-L-SIL	South Saskatchewan River	South Saskatchewan River
35	687	Mixed Grassland	Bindloss	Dunefield	Brown	Parabolic or u-shaped dunes. moderate relief	S	South Saskatchewan River	South Saskatchewan River
36	754	Mixed Grassland	Bindloss	Dunefield	Brown	Hummocky, low relief	SL	South Saskatchewan River	South Saskatchewan River
37	721	Mixed Grassland	Bindloss	Dunefield	Brown	Parabolic or u-shaped dunes. moderate relief	S	South Saskatchewan River	South Saskatchewan River
38	671	Mixed Grassland	Bindloss	Plain	Brown	Undulating, high relief	L-SL	South Saskatchewan River	South Saskatchewan River
39	791	Mixed Grassland	Schuler	Plain	Brown	Hummocky, low relief	L-SIL	Seven Persons Creek – Bigstick Lake – Swift Current Creek	South Saskatchewan River
40	791	Mixed Grassland	Schuler	Plain	Brown	Hummocky, high relief	CL-L	Seven Persons Creek – Bigstick Lake – Swift Current Creek	South Saskatchewan River
41	1071	Cypress Upland	Cypress	Upland	Dark Brown	Inclined to steep, single slope landforms with (ex. fans, aprons), high relief	U	Lodge Creek - Battle Creek – Frenchman River	Missouri River
42	914	Mixed Grassland	Undifferentiated	Valley	Brown	Inclined to steep, single slope landforms with >10% exposed bedrock, high relief	U	Milk River	Missouri River
43	892	Mixed Grassland	Undifferentiated	Lowland	Brown	Undulating, high relief	CL	Milk River	Missouri River

distribution throughout the study area. In addition, the place names provide a sense of the Blackfoot experience, viz a viz, paradigm context.

In any case, the database is a starting point in capturing Blackfoot environmental information. The file format makes it transferable for use in various software that would provide end user query based interactive multi-media. In addition, three dimensional viewing and animation capabilities make further use of the data available for various educational based materials, *inter alia*.

Specifically, BEGIS (Table 5.2) contains the following attributes; "ID" (arbitrary unique identification), "Elevation" (approximate site elevation), "ECO_REG" (Eco-Region), "ECOD_NAME" (Ecodistrict) "MORPHOL" (Morphology), "SOIL_ZONE" (soil zone), "LMODEL_D" (Landscape), "SURFTEXT" (Surface Texture), "WS_MAJ33" (Watershed), and "WS_MAJ12" (watershed-major drainage systems).

5.6 Linkages and Missing Links

Are there linkages between the ecological constructs of Indo-European scientific frameworks and information regarding the environment, subject to the Blackfoot experiential memory?

The information is site specific but the knowledge itself is contained in the Blackfoot tacit infrastructure. The same can be said of the scientific knowledge. Both in this manner get interpreted and communicated via the language. The syntax of *English* and *Blackfoot* reflect the *logic* inherent to the paradigms.

The discussion has dealt with a great deal of culturally specific information. This is because while there may be a significant level of Blackfoot information in the literature, there is little in the way of context specific to (Indo-European) science. If attribute information is inserted into a context without regard for the internal partitions or tacit infrastructure of the Blackfoot paradigm, misappropriation of the Indigenous Knowledge inherent to the Blackfoot may occur.

Now that the *foundational premises* of Blackfoot environmental knowledge have been laid the focus now shifts to the Iiyohkimiiks (referred to as the "Water Society" for discussion purposes); keeping in mind that the intricacies of *society life* in general, includes a tacit link to the water society. From oral testimony, recall that the Water Society was the responsible authority for construction of the archaeolgocial/significant sites (other than basic tipi rings or directional markings). Considering that, as a society, *water* and *weather* are significant aspects (Mistaken Chief, 2002) and that the delineation of Eco-Regions is in terms of climate and moisture regimes (Strong, 1992), we are coming close to making linkages. Again we are reminded of the language barrier.

Pilot analysis of Eco-Regions and rock formations that are constructed by the Iiyohkimiiks demonstrates a unique parallel. The primary *parameter* of both is dependent on water. Recall that Eco-Regions are dependent on antecedent climatic patterns. The Eco-Regions in the study area are influenced by Pacific and Arctic air masses, *inter alia*, that are uique derivatives of the overall global water balance.

According to oral history, the Iiyohkimiiks are the oldest Society among the Blackfoot peoples' heritage. Going back several generations, the concern of the Society has been maintaining the sacred alliance with the Beaver in return the *water people* were provided with embedded alliances of the beaver. The number of songs recorded by Wilson who attended three at the time of his writing was over 100 (Hungry Wolf, 1977). The song/dance associations were linked to an equal number in diversity among water fowl, ungulates, and reptiles. The habitats, rituals, and rhythms of non-human species are sacredly celebrated and remembered in the ceremonies.

Provided by oral testimony, the *Society* responsible for constructing the *major* wheels, vs. territorial markings, would be the *Iiyohkimmiks*, or "the ones that have water (Mistaken Chief, 2002)". The Society was also responsible for and is noted in some cases to be synonymous with the Tobacco Bundle (Hungry Wolf, 1977). The Iiyohkimiiks are/were the responsible authority for seeding the tobacco plant; the only agronomically grown plant among the Blackfoot people. Of particular note, the tobacco was used as an offering when harvesting native plant species throughout the area of interest.

Through the use of analogy and ideas of occupation and continuity, the Blackfoot perspective of the landscape is transposable such that, by considering the Blackfoot perspective of the landscape in a GIS framework, we can conversely gain insight via the GIS into the linkages or neurological networks of the Blackfoot people. The pictorial depiction of the landscape provides the Blackfoot *evolution* of thought.

The Akokaatsinni (Figure 5.4) is not unlike the functionality of a cell. The inner region contains the nucleus or code that instructs *Kiipaitapiisin*-The Blackfoot Way of Life. So in this case, the particle is the fundamental substance that matters while the nucleus, or inner region guides the processes carried out by the organism. Since every living cell contains this code or DNA, we can say that, one cell represents the whole *system*. Thus, the Akookaatsinni fundamentally links the bands that make up the circumference to the regions occupied by the tribe as a whole nation and together each nation makes up the Blackfoot confederacy. Thus, the intellectual property, by definition is knowledge that is inherently referenced to *Niitoahsinaan* (Figure 5.1).

We can also say that each Band's knowledge is significant in that in the totality or integral of all the information, the territory or regions occupied by the Bands is reflected in the Akokaatsinni. The continuity of the sacred//holy relationships via ceremony can be extended to include the natural connection to *Niitoahsinaan* (Blackfoot Country); given that the spiritual laws hold the natural laws of the Blackfoot way of life.

In the aftermath of the relations between the Blackfoot and the settlers, today that information is distorted to the extent that it can be said that among the academic world, little emphasis and recognition is given to the original holders of the ancient wisdom of the Blackfoot. However, without an appropriate analogy or link with the Dream dimension so critical to the Society way of life, the *integration* to an IES model collapses. The Blackfoot landscape and, by extension, the Blackfoot mindscape provide a *way* to look at the

information. But, in terms of perception, there is 180° of separation between looking and seeing. Seeing comes from a participant experience.

Another significant aspect of Society life involves the *songs* or associated rhythms and movements belonging to each ceremony. There is no apparent linkage. This further impedes on an integration of IES and BEK. Any attempts to adapt a Society based model or other information provided in this document and elsewhere would thus be characterized as an act of *marginalization* of the Blackfoot Culture. After all, we are not only considering rocks or locations, we are considering the lived domain, i.e., we are considering the Blackfoot way of life – “Kiipatapiisin”.

Change and adaptability are inherent characteristics of survival and evolution, and those who have weathered the ages demonstrate that aspect which Darwin first referenced; i.e., natural selection (1881). These ideas/theories are insights that inform us of the ways of the *natural* world. These natural processes according to Niitsitaapii Patapiisin (Blackfoot way of life), are honored and held in place via a sacred protocol; a holy way of celebrating through ceremony, the gifts inherent to the biodiversity from the land and the surroundings. The protocol of the societies is necessarily the *holding structure*, or *tacit infrastructure* of *Kiipatapiisin*. So that, we begin to see that the adaptability is embedded in the society lifestyle. Its continuity today speaks to intelligence of *Akookatsinni* and *Kiipatapissin*. Decoding the intelligence is for anyone who will humble themselves via the process of *Kimmapipitsin* (see Mistaken Chief summary, section 2.2.1.4).

Does this mean that the two paradigms are irreconcilable? There are conditions that must be met in order to move closer to an eclipse of paradigms; certain cosmological shifts must occur before this event can take place. Not unforeseeable in the near future, Constanza *et al* (1992) see it as "unavoidable." By focusing on a "coherent philosophical framework" compatible for the restoration and re-alignment of cultures and ecosystems, it may come close.

5.7. Summary

This chapter focused on the results of the GIS analysis of IES and BEK and the associated overlay of the ecological and archaeological databases. The information presented provided a scope of the potential links and missing links. Providing a reference for recommendations, future considerations are the primary topic of the final chapter.

The antecedent climate conditions dictate the distribution of plant and animal communities. The environmental changes overtime dictate distribution of parent material and formations on the landscape. The characteristics of each eco-region provide insight into the dynamics inherent to the delineated areas; important for agricultural purposes as well for planning and decision making. The resources and their subsequent use are subject to the dominant climatic regime. The regional climate or eco-region affects the dynamic equilibrium, or steady-state equilibrium. Climate change evidenced by the glaciers, *inter alia*, speak to the environmental conditions and determine the resources and use be it traditional or present. Knowledge of the

influence that climate has on the region assists in planning for concepts such as climate change. The ability to adapt is based on the present state of knowledge.

The sites provided in the archaeological geo-referenced database are summarized per Eco-region in Table 5.1. The table provides spatial attribute information for the broad categories of *Eco-Regions*. It should be noted if not mentioned previously, that the distribution of delineated Eco-Regions depicted in this report are based on Agrasid data, and these vary slightly from those delineated by Strong (1992) and Strong and Leggat (1981).

Included are *annual* climate data. The annual data are included here as a quick reference. As well, present land use is summarized. The meaningful incorporation and utilization of Blackfoot knowledge and significant sites will take place through dialogue. The process will be rewarding but will take time and patience. An arduous process, it will likely be a humbling one.

Information from the linkage table could be extracted for further analysis and/or discussion. Given the diversity in knowledge among Bands/Clans of each Blackfoot nation, a more significant analysis may be determining linkages with *Ecodistricts*.

Chapter 6

SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS FOR FUTURE RESEARCH

6.1 Introduction

The purpose and intent of the research was to document spatial attribute/information from two knowledge/paradigms (Figure 1.1). It was acknowledged that, in order to depict Blackfoot *environmental* knowledge, there needed to be proper contexts in place. Part of the process entailed establishing a *common ground*, or in this case, *common ancestral* point of reference. The de-colonization of thought is a pre-requisite for considering a Blackfoot perspective of the surrounding environment. An attempt to accomplish this was through the depiction of the collision of cultures and the cumulative impacts to linkages that existed pre-settlement, i.e., tacit cultural links between *Iiniiks* (buffalo) and *Aakiiks* (Blackfoot women). The perspective of these aspects and their links in Blackfoot way of life were juxtaposed with post-settlement realities and perceptions thereof. If nothing else, one gets a sense for the extreme positions of the tacit knowledge basis on the paradigm spectrum.

In any case, the thesis is a framework of lineages and linkages. In order to speak about a specific paradigm, brief historical synopses needed to be explicated to provide the frame of reference with which the *tacit infrastructure* derives its sustenance. The oral testimony in the summary section (2.2) as well as the information that was brought into the remainder of the text provides background information to suggest the framework of the Blackfoot *tacit*

knowledge base. In addition, the Indo-European scientific model was provided in the context of the lineage, or *Revolutions of Physics*; based on Peat's inference that all *science* can be deduced to physics. It was extended to depict a quantum perception of the surroundings.

With these *foundational premises* and *tacit infrastructures* in mind, the scope of linkages is engendered with a unique configuration. The Blackfoot people's way of life is land (environment) based. Ways of remembering specific events, from creation to coup stories, the oral history encompasses a broad delineation of tribal rites and affiliations. Without a deconstruction of barriers, these inherent characteristics and environmental attributes of the Blackfoot paradigm will continue to go unacknowledged as an autonomous body of knowledge. Its applications and attributes will continue to be integrated or assimilated into the mainstream scientific *modus operandi*.

This final chapter provides a summary of the resultant information arising from a spatial GIS overlay analysis of Eco-Regions and Blackfoot significant sites, conveyed by an archaeological geo-referenced database. Conclusions regarding linkages and missing links provide the basis for future research considerations. Final remarks will close the chapter and text.

6.2 Summary of Findings

GIS as an Observer:

The GIS as measuring or capture device proved to be of significant utility in conveying the Blackfoot experience. The Sundance, a sacred event can be considered in terms of its spatial attributes. The outer rim of the *Akokaatsinni* (Figure 5.4) is comprised of Tribal division Bands and are said to be *walking files*. Embarking on notions such as that of the *map in the mind* (Cajete, 2000; Peat 2002), the Blackfoot paradigm can be rendered in terms of its spatial information. Thus, in terms of spatial networks, the Blackfoot experiential/environmental knowledge is a network of associations carried and transferred to succeeding generations in *story* and renewal form, i.e., ceremonial continuity, *inter alia*.

The stories record and teach; they act both as transmitters of knowledge and in the construction of new experiences, act as receivers of information. The stories are alive with the spirit and/or memory of the event. The direct association of the Blackfoot *mindscape* with the surrounding *landscape* becomes less abstract with the utility of a spatial (digital) medium.

The raw, processed, and joined data and the associated file networks comprise approximately 7.5 gigabytes of memory. Just a few short years ago, this type of analysis would not have been *doable* from a technological perspective. The IES paradigm is *temporally* based, whereas, the Indigenous perspective is land or *spatially* based. The rendering of spatial-temporal events is an inherent paradox from the classical perspective, that is, for particles to

jump to excited states, crashes into the linear perspective of time; continuity is replaced with its conjugate, *discontinuity*.

From a metadata perspective, the data represent the methodological procedures of the associated *culture* or paradigm. The extraction of information can then be said to be inextricably linked to the type or *method* of extraction. From the opening remarks of Neils Bohr via Jan Faye, *the difficulty of distinguishing between subject and object* brings the pursuit of knowledge, viz a viz, science into an infinite loop of conjectures and refutations. The known will always be added to, in time, with the unknown (Littlebear, pers. comm.. 2002). Extracting information from an infinite universe, the process will never come to an end. The extracted data conforms to a spatial context and therefore, we can bypass the grammatical constraints which by definition conform to a linear logic for the noun-based English language, and take both sets of geo-referenced objects, i.e., eco-regions and significant sites to determine the link between the two.

Eco-Regions and Iiyohkimiiks

By percent occurrence, the suggested preference of the *Iiyohkimmiks* (as responsible authorities for constructing the wheels) would be the mixed-grass ecoregion, at 56%. As a ranking, the next order or preference would be the moist-mixed grass (11%) and Aspen Parkland (4%). The remainder of significant sites includes the Cypress hills (montane) (1%) and Fescue range (2%).

For the Iiyohkimiiks, the songs and artifacts transferred in the original Beaver Bundle are the gifts of the *beaver*. As valued ecosystem components, the resultant relationship is what Mistaken Chief refers to as *alliances*, or in this case, an alliance with the *beaver*. These alliances or ecological linkages are memorialized (spatially) within Blackfoot culture and are also resonant with the Buffalo, the Mosquitoes, the Dogs, as well as entities such as the Moon, the Thunder, the Sun, and *water*, among other things.

My great-great grandfather, *Kiisoum*, whose name indicates the Blackfoot word for *Sun*, was the last *great beaver man* (Hungry Wolf, A. 1975). But it is the old way of saying sun, the more common present day term is *Natoosi*. The significance of sun, in all aspects of the Blackfoot way of life is explicitly important in the life of this *Beaver man*. His name implies an inextricable link in his role as a beaver man and the role of the sun, *in the really old way*.

The significance of sun to scientists is equally important. Recall from the revolutions in Physics, the foundation of physics is rooted in this universal truth, that our universe is helio, vs. geo-centric. In addition, climate is governed a great deal by the influence of the sun. How other celestial bodies impart their influence on the natural flux of the surrounding environment is important as well. We know that the moon's influence affects the gravitational pull on tides. In turn we see weather patterns also affect by lunar cycles. This is mirrored as well in the Beaver Bundle. The counting sticks, thirteen of them refer to annual lunar cycles.

Climate and its influence on the Eco-Regions with respect to their general spatial distribution is a critical component of the make-up of the ecosystem. *Iiyohkimmiks* sing songs for the fauna that are represented in the bundle. Not only is there a relationship with the fauna, but also the flora that these animals and birds derive their sustenance from. Explicitly, the *Iiyohkimiiks* are honoring the inhabitants of Niitoahsinaan through the ceremony and the way of life that is dictated by the ceremonial protocol. They are honoring the biodiversity of which is physically apart of them. The surrounding environment and specifically the mineral makeup of the flora (and fauna) are similar to the Blackfoot people as a consequence of their way of life (Dormaar, 2002). As Russell (2002) states, "we are products of our environment." The steady state equilibrium of the surroundings was also mirrored in the internal constituent equilibria of the Blackfoot person. For Dormaar, these attributes influence the way decisions are made.

When the Sundance and sun lodge came to be critical components of the Blackfoot way of life (~2000 ybp; Wolf Leg, 2003), the *Iiyohkimiiks* played a central role. The shift from the *old way* to the new (which is old today) did not make the *Water Society* obsolete, in fact it was embraced. The manifestation or shift carries with it the honoring of the life that surrounds them, as well as the life that is referenced in the *Blackfoot Way of Life*.

The interaction of the Blackfoot self and the surroundings takes place at the *human-human* level. By extension of the self to the surroundings, the unit of the self constitutes the surroundings and is at the same time a constituent of the surroundings. Therefore, from a

Blackfoot perspective, human interaction with the environment is parallel to the human *qua* human interaction (Ingold, 1996).

In terms of *water* and *weather*, according to Mistaken Chief, “these are important matters” to the Blackfoot people, and specifically to the *ones that have water (Iiyohkimiiks)*. The global water cycle significantly influences the weather patterns based on the influence of solar energy. These long term influences of climate characterize the plant communities that become established. A schemata of the water-cycle is depicted in Figure 6.1. The influence of water on a day to day level appears to be of central importance to the *Iiyohkimiiks*.

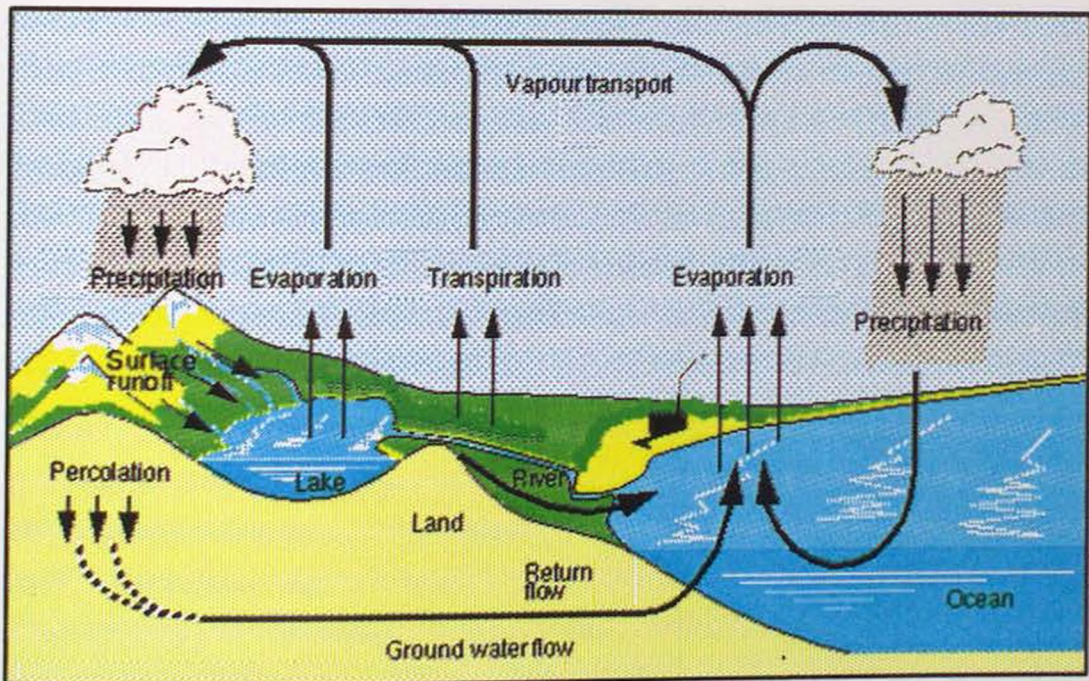


Figure 6.1. The Water Cycle

(Source: <http://www.educ.uvic.ca/faculty/mroth/438/WEATHER/watercycle.html>)

The steady state equilibrium of the surrounding flux can be expressed in terms of the association of water to the life on the land. The importance of water to both paradigmatic spatial attributes, at a metadata level, suggests that the two are derivatives of the same

qualities in the *surroundings*. That is, the variables considered by Iiyohkimiiks and Eco-Regions are relative in their association to climate, water, and weather. Other dominant factors are also apparent but these are highlighted in this thesis as linkages and provide seeds for dialogue.

Blackfoot Environmental Geographic Information System-BEGIS:

BEGIS or the *value added database* provides ecological parameters for each site in the archaeological database. The information provided is key in delineating the environmental attributes in the immediate vicinity of the sites. Future considerations on the enhancement of the database would be to include archaeological attributes and classifications based on Brumley, in addition to other archaeological and site specific information. The information management of spatial attributes for the Blackfoot significant sites, together with an appreciation and awareness of the paradigm can be useful for notions of *Risk Assessment*, *Strategic Environmental Assessment*, and *Environmental Impact Assessment*, *inter alia*. Compiling the data on the one hand is good, it is better if the paradigm principles are complimented and mirrored in the use of the data.

6.3 Conclusions

Based on the concept of missing links, it is evident that there is no basis for a synthesis of information. However, based on the link of eco-regions classifications and Iiyohkimii constructions on the landscape, as in their associations to *water*, it is suggestive of a common point of reference. Again the separation of the self and the surroundings, however, makes this

association somewhat of an abstract idea. Therefore, coming to terms with the earth as feminine entity inside the scientific domain would be a critical step. Leads on how this can be accomplished bring the discussion to a re-visitation of the logic inherent to the IES *modus operandi*; no doubt that a rendering of such falls outside the scope of this research. A good start however, is found in Peter Kingsley's (2003) "Reality".

The main difference between the two paradigms lies in the perception of the partition of the subject and object. That is, the Blackfoot perspective does not *separate* the self from the surroundings, but it is based on an interaction of the two. The *separation* is thus a characteristic of the dichotomous noun based nature of the English language. The *action* oriented nature of the Blackfoot language (Littlebear, 2002) is not engendered with the same attributes. It however, does consider a paradoxical or *absurd* view of the nature of life (Wolf Leg, 2003).

The separation is clear in the pilot analysis of Eco-regions. Review and refinement of *eco-regions* would include a consideration of the Blackfoot culture or *culturalised* space. Further analysis and dialogue has the potential to reveal a sustainable model for the 21st century for the Great Plains. Taken together, as though they were separate, the eco-regional landscapes of the Great Plains and the Blackfoot mindscape embark on a Plains model for sustainability.

6.4 Recommendations for Future Research

The current research was an attempt to link the ways of viewing/classifying/experiencing the landscape between BEK and IES. In effect, the end result was an emergence of gaps in

information or missing links. Like a two-sided coin toss, the probability of making linkages results in an equal probability of revealing missing links. The benefit of this method is that with an awareness of the *gaps* an attempt can be made to bring the two closer together, if it is desirable.

The need for collaboration and consultation must take place in a *framework* that recognizes the Blackfoot, *Indigenous* perspective of the surrounding environment. The following are key benchmarks in achieving a common goal, that of environmental sustainability in the area known as *Niitooahsinaan*. Classified as *unavoidable* (Spangenburg, *et al.* 2002), the following bullets provide suggestions on improving and enhancing the model adopted here in hopes that when it is desirable, collaboration and consultation will be rendered with efficiency:

1. Extend the study area to include multi-jurisdictional ecological data that would include *Saskatchewan, Montana, and Wyoming*. Acknowledging that the Area of Interest includes minimal portions of Wyoming, it would be meaningful to include the information.
2. Extend the value added database as above, and link BEGIS with appropriate archaeological attributes and update information based on provincial/federal/international records. John Brumley's research includes an extensive amount of attribute information and thus would be an excellent starting point. In addition, collaboration with the work compiled by Padbury (*et al.*, 2002) and work on the Northern Great Plains Agroecosystems would be a meaningful step.
3. The next step would be a dialogue process with those individuals who conducted the archaeological surveys in the first place. This ought to be done in the appropriate *open space* as a facilitated dialogue with *Iiyohkimitiks* among other *Omahkitapiiks* of the Blackfoot Confederacy. In addition, depth may be added to the dialogue in the presence of *Anthropologists, Environmental Scientists, Neuroscientists, inter alia*, at the site locations in a tipi.

4. Based on the subject-object interaction, an extension of the Landscape/mindscape model to include the Dreamscape as a more in depth representation of the Blackfoot experience.
5. Based on the additions/deletions to BEGIS, the resultant dialogues and the extrapolated model of the Blackfoot perspective on the surroundings, appropriate *protection* protocols and measures for the sites as a co-management model/agreement between the Blackfoot Confederacy, the Canadian federal government and the United States ought to be formulated and integrated into the sustainable ecosystems model.

We all have the right to inherit the earth; we all need to understand our heritage and lineage that connects us with the earth, as well, those characteristics that inhibit us from connecting to the earth, as *Mother*. The matrilineal heritage of the Blackfoot is not conceivable as is evident by early manipulations of the feminine as a cultural image (Carter, 1992). Beyond these misconceptions, the Earth comes alive as Mother, in the Blackfoot way of thinking and knowing. In terms of sustainability, *Niitoahsinaan*, specifically captures the essence, "where we derive our sustenance," that which is a source of life. The BEK model provides a *way* to live, a *way* of knowing. The process of life/knowledge is embedded with death.

Without a centripal force, we, in effect, will go off on tangential planes...to infinity, never reaching our greatest potential. However, if we are no more than a combination of particles/waves/forces/fields, then we have spin characteristics as well. We jump from one state to the next, but do so with such ease afforded by evolution that the transitions are smooth and subtle. If we allow the tacit knowledge to de-fragment like a computer hard drive, to de-colonize, to die, if you will, there may be a birth of some new order.

If we take a quantum leap and consider that particle behavior from the IES perspective is *complimentary* (refer to discussion on Bohr) to the Blackfoot paradigm, that based on empirical evidence the two are analogous notions, then, let us use this as a reference point for dialogue purposes. If we slow down the accelerated collision of cultures, and allow the process to be slightly more intimate, then perhaps the greatest potential of humanity, among other things will become manifest.

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APPENDIX I

ARTICLE 8(j) UNITED NATIONS CONVENTION ON BIOLOGICAL DIVERSITY

Traditional Knowledge and the Convention on Biological Diversity

What is traditional knowledge?

Traditional knowledge refers to the knowledge, innovations and practices of indigenous and local communities around the world. Developed from experience gained over the centuries and adapted to the local culture and environment, traditional knowledge is transmitted orally from generation to generation. It tends to be collectively owned and takes the form of stories, songs, folklore, proverbs, cultural values, beliefs, rituals, community laws, local language, and agricultural practices, including the development of plant species and animal breeds. Traditional knowledge is mainly of a practical nature, particularly in such fields as agriculture, fisheries, health, horticulture, and forestry.

The following text was excerpted from the following site:
<http://www.biodiv.org/convention/articles.asp?a=cbd-08>

Article 8. In-situ Conservation

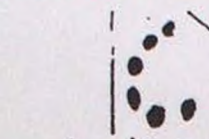
Each Contracting Party shall, as far as possible and as appropriate

(j) Subject to its national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices;

APPENDIX II
BLACKFOOT TIPI
IMAGE COURTESY
STAN KNOWLTON

T SIDE THE TIPI

Bunch stars



mi-oh-po-koi-ksi

7 stars (Big dipper)



ih-kii-tsi-kom-miksi

Wolf Trail (Milky Way)

mah-ko-yoh-sokoyi

Butterfly

a-pa-nii-wa

Tipi nii-toyis

Mountains

mi-sta-kiistsi

Sun (representing bottom of tipi)

isks-koo-mahn

