Prehistoric Exploitation of Wetland Habitats in North American Boreal Forests

Thesis submitted for the
Degree of Doctor of Philosophy (Ph.D.)

by

Roberta Robin Dods

Institute of Archaeology
University College London
University of London

September 1998

Robert James Dunn and Annie Ruth McPhail Dunn at Great Slave Lake, 1917, with their infant daughter Elva Lillian Roberta Dunn.

ABSTRACT

The thesis begins with an overview of hunter-gatherers from an historical perspective and insights from the ethnographic and ethno-ecological literature. Then the prehistoric cultural sequence of the northern boreal forest is examined against the environmental contexts of the research area, specifically a number of Initial Woodland through Terminal Woodland archaeological sites in Northwestern Ontario. Faunal data from the study sites, along with published data from other archaeological sites in NE Ontario and observations from the ethnographic literature, contribute to this section. Analysis and interpretation includes the logistics of site location and observations on possible indications of fire in prehistoric sites from NW Ontario. The faunal data from these sites is in microfiche in the Appendix A.

Within the context of TEK (Traditional Ecological Knowledge) and WSK (Western Scientific Knowledge), fieldwork in modern boreal environments, undertaken in Saskatchewan in 1995, is reported. The assessment of sites follows from their initial selection from infra-red satellite images to their ground-based examination. Soil development, fire history of several areas and observations on fire regimes are explored. The character of patchwork habitat development, and the place of fire regimes and beaver colonisation in this development, are examined.

Taphonomic losses at various ecological and cultural levels (Taphonomies I-IV) are considered in the context of theoretical constructs, leading to an interpretative model.

Habitat utilisation by prehistoric Northern Boreal forest hunter-gatherers is considered in the final chapter. The role of Beaver as 'keystone species' and the nature of interlinked resources are explored. Fire regimes, and the subsequent development of first stage regrowth patterns as integral parts of the economic system, leads to a model for the management of resources by prehistoric boreal hunters-gatherers. The philosophical implications for the interpretation of hunter-gatherers as effective shapers of an exploited landscape, along with the problematic areas in the research, are outlined in the concluding part of the work.

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ACKNOWLEDGEMENTS

Many people and organisations have contributed to the completion of this work, some of them now far distant in time. The paradox is that the most removed in time are the people who are the most immediate to the work itself. Here I speak of the ancient and modern peoples who teach through their archaeology and ethnography. It is to them I dedicate this work.

I want to thank several people who unknowingly have acted as mentors. Dr. Tom McFeat (University of Toronto), who taught me my first anthropology course, challenged my very parochial assumptions and opened my mind to ways of being human while the palaeontologist Dr. C. Churcher (University of Toronto) taught me to look from the inside out. In south-eastern Botswana a man called Chandler taught me not only pluralisation in Tswana but, more importantly, to look at the animals and see them as beings in relationships ("two and more than two") with each other and the land. Abu Mustafa Abu Abdula Mohammed Ibriham from north-west Jordan, who lived between two worlds - the world of the nomadic herder and the world of the settled villager, taught me to look at the 'natural' world as a cultural composition, a landscape of categories and relationships that are given structure through symbolic linkages (although he would never have used these terms to describe what he saw and felt).

Material and money support have come from diverse sources. In particular thanks go to Ken Dawson of Lakehead University, who did the Nipigon Survey, and David Arthurs, who excavated the Rainy River Site, for turning over the bone material from their archaeology sites. Okanagan University College supported my sabbatical and provided modest additional funding. I want to thank the members of the Institute of Archaeology, University College London for accepting me as a student and supporting me for funding within and without the Institute that permitted the 1995 fieldwork, in particular the award from the V. Gordon Childe Research Fund, IOA, and the research grant from the Graduate School, UCL. Two UCL professors external to the Institute have been of great help. Prof. J.P. Muller, in Photogrametery and Surveying, provided support on the selection of sites in Saskatchewan for the 1995 field work and facilitated an introduction to the BOREAS Project (NASA) where Dr. Forrest Hall was of great help. Prof. Muller's Research Assistant, Timothy Wilkinson, was of great help with the infrared images. Dr. Adrian Lister, in Zoology, provided a critical ear and cogent comments. Three others exterior to UCL were of great help. Dr. Peter Andrews at the Natural History Museum of London kindly offered me access to collections, research space and assistance. Dr. Nick Fieller, Sheffield, and Dr. Trevor Ringrose, Aberdeen, gave me their time and expertise to see if more could be made of so little through the wonder of statistics. The staff of Narrow Hills Provincial Park and Prince Albert National Park were helpful during the 1995 field season. Also Darlene Newton, who ran her trapline in Narrow Hills, provided what was to become essential information.

Singular, as most important to me in this academic adventure, has been Dr. Kenneth Thomas of the Institute of Archaeology, UCL. In his capacity as my academic advisor, Ken has been a constant support. His intellectual input, detailed editing, direct manner, and unstinting patience and kindness have made the time and the work at the Institute not only challenging and interesting but enjoyable even when it had its frustrations. He has become my definition of a gentleman and a scholar. Beyond this I want to thank the members of the Institute, too many to name individually here, for their interest and assistance.

All my family has been an inspiration, in one way or another, but my maternal grandmother, as you will see, holds a special place of honour. Last but never least is my husband Wayne M. Dods. I want to thank him for his unwavering faith, hope, and love, for his financial management, and his logistical skills in the organisation of my travel arrangements, and for his invaluable assistance in the 1995 fieldwork year. Not the least of his support in the field was the fact that he guarded my back while we went on with the work. However, I must admit, he did call, from time to time, "Here bears, bears, bears". Now I am (almost) sure it was all in jest since our few encounters of the ursine kind (none being picnics) were quite by chance (I think) or fully organised by the bears themselves, who, from my experience as a beaver woman, never come when they are called anyway.

PREFACE

My maternal grandmother, Annie Ruth McPhail Dunn Robinson (1893-1979), came from a family whose European members first came to North America in the 17th Century. She was a remarkable woman and a wonderful story teller and I, as her only granddaughter, was the eager listener and dreamer of her many tales from the years she and my grandfather, Robert James Dunn (1886-1942), lived in northern Canada. A photograph of them with my mother, Elva Lillian Roberta Dunn Brocklehurst at age six months in the Summer of 1917, in front of their cabin on the south shore of Great Slave Lake, can be seen as the frontispiece of this work. Her tales, *A Ginger Bear Hunt* (the bear is never killed due mostly to its own "smarts" and the lack of same in the hunter) and *The Bear Killed With A Broom* (a story where the human comes off second best to the spirit force of a dead bear), were just two that stay with me still. And of course from her several stories of beavers *The Woman With A Beaver Husband* was better than any telling of Snow White or Cinderella (the beaver husband was a true prince among men). On finding and reading in print ***The Woman Who Married Beaver*** (Overholt and Callicott 1982: 74-75) I was stunned; my amazement was complete. I had always assumed that her stories were idiosyncratic, completely unique to her yet here was one that obviously she had learned in the ten to fifteen year period she had lived in the north. Although her rendition was in a different cadence, in content it is the same as the Overholt and Callicott Ojibwa version I have reproduced below. In the context of my work for this dissertation the narrative presages my interests and frames these interests in both a real and metaphorical way. In a very real sense it closes the circle. Indeed from my perspective, this story is perhaps one of the best metaphors for the cultural and spiritual world(s) of the northern boreal hunter, in particular those who do not rely primarily on the caribou herds but rather on a range of mammals, paramount among them being the beaver. It is an encapsulation of a world view and beyond the obvious cultural content of such things as female liminality at the time of puberty with which the story opens, it contains a statement on the ethics of the hunt and the transformational relational bond between humans and beavers (with their human mother and beaver father as a transformer capable of shape-shifting between human and beaver forms). From this story the hunted beaver emerges to feed, clothe and increase the wealth of the hunter as well as to reincarnate and thus renew the life-affirming transformational cycle.

The "forest spirituality" of Algonkian peoples is best summed up by Niezen in his review of the work of others, from Speck 1977 to Brightman 1993. He observes that such spirituality is "...situated in a number of contradictory, contextually variable qualities attributed to animals: subject to reincarnation, yet finite; powerful, yet vulnerable; capable of both friendship and almost malicious opposition" (Niezen 1998:25). In this cultural reality the woman (as wife) and her dreams are seen as immediately linked to a husband's success as a hunter. Thus the dream as "(m)etaphoric symbolism is usually found to have some connection with hunting and trapping activity in the future, sometimes in a direct way, such as a dream about the spiritually powerful bear, or more indirectly, as in dreams about animals in human form" (Niezen 1998:29).

Here are these contradictory qualities and here too we have beaver and human as both the transformer and the transformed in ***The Woman Who Married Beaver***:

> Once on a time a certain young woman went into a long fast, blackening (her face). Far off somewhere she wandered about. In the course of time she beheld a man that was standing, (and) by him she was addressed, saying: "Will you not come along with me to where I live?"
>
> Whereupon she went along with him who was in the form of a human being. And when they got to where he dwelt, **very pretty was the home of the man; every kind of thing he had in clothing and food.** Very well provided for was the man. And this she was told: "Will you not become my wife? In this place will we spend our life," she was told.
>
> Thereupon, in truth, she freely consented to marry him, whereat the woman lost the memory of her parents. **Very beautiful was the clothing given to her by him to whom she was married.** It was where there was a certain lake that they passed their life. A long while did she have the man for her husband. When they beheld their (first) young, four was the number of them. **Never of anything was the woman in want.** Of every kind of fish that was, did the man kill; besides, some small animalkind he slew; **of great abundance was their food.** Outside of where they dwelt (was) also some fire-wood. And the woman herself was continually at work making flagreed mats and bags; in very neat order was it inside of where they dwelt. Sometimes by a human being were they visited; but only roundabout out of doors would the man pass, not within would the man come. Now, the woman knew that she had married a beaver.
>
> **From time to time with the person, that had come to where they were, would the children go back home; frequently, too, would the man return home with the person. And back home would they always return again.** All sorts of things would they fetch, - kettles and bowls, knives, tobacco, and all the things that are used when a beaver is eaten; such was what they brought . **Continually were they adding to their wealth.** Very numerous were the young they had; and as often as the springs came round, then was when off went their brood two by two, one male and one female. And this they said to them: "Somewhere do you go and put up

a shelter. Do you rear a numerous offspring, to the end that greater may be the number of beavers." Save only the smaller of their young would they watch over for still another year; not till the following spring would their young go away.

Now and then by a person were they visited; **then they would go to where the person lived, whereupon the people would then slay the beavers, yet they really did not kill them; but back home would they come again.** Now, the woman never went to where the people lived; she was forbidden by her husband. That was the time when very numerous were the beavers, and the beavers were very fond of the people; in the same way as people are when visiting one another, so were (the beavers) in their mental attitude toward the people. Even though they were slain by (the people), yet **they really were not dead.** They were very fond of the tobacco that was given them by the people; at times they were also given clothing by the people.

And when they were growing old, the woman was addressed by her husband saying: "Well, it is now time, therefore, for you to go back home. I too am going away to some other land. But do you remain here in my house. Eventually, as time goes on, there will arrive some people, (and) you should speak to them."

And the woman all the while continued at her work, making twine. In very beautiful order was her home. Now, once sure enough, (she saw) a man arriving there; on top of the beaver dwelling the man sat down. Thereupon he heard the sound of some creature sawing in the beaver lodge beneath, the sound of some one pounding. When the woman picked up a piece of wood, she made a tapping-noise, so that her presence might be found out by the man. And he that was seated out on top learned that some creature was down inside the beaver-lodge. And so up he spoke, saying: "Who (are) you?"

("It is) I," came the voice of the woman speaking. "Come, do you force an opening into this beaver-dwelling! I wish to get out," was the sound of her voice as she spoke.

Now, the man was afraid of her. "It might be a manitou, " he thought. Then plainly he heard the sound of her voice saying to him: "Long ago was I taken by the beavers. I too was once a human being. Please do break into this beaver-dwelling!"

Thereupon truly then did he break into the beaver-wigwam. And when he was making the hole into it, "Be careful lest you hit me!" (she said). And when he was breaking an opening, in the man reached his hand; whereupon he found by the feel of her that she was a human being; all over did he try feeling her, - on her head; and her ears, having on numerous ear-rings, he felt. And when he had forced a wide opening, out came the woman; very white was her head. And beautiful was the whole mystic cloth that she had for a skirt; worked all over with beads was her cloak; and her moccasins too were very pretty; and her ear-rings she also had on; she was very handsomely arrayed.

Thereupon she plainly told the story of what had happened to her while she lived with the beavers. She never ate beaver. A long while afterwards lived the woman. There still lived after her one of her younger sisters; it was she who used to take care of her. And she was wont to say: **"Never speak you ill of a beaver! Should you speak ill of (a beaver), you will not (be able to) kill one.**

Therefore such was what the people always did; they never spoke ill of the beavers, especially when they intended hunting them. Such was what the people truly know. If any one regards beaver with too much contempt, speaking ill of it, one simply (will) not (be able to) kill it. Just the same as the feelings of one who is disliked, so is the feeling of the beaver. **And he who never speaks ill of a beaver is very much loved by it; in the same way as people often love one another, so is one held in the mind of the beaver; particularly lucky then is one at killing beavers.** (Overholt and Callicott 1982: 74-75)(emphasis added)

Coming, as I do, from a North American anthropological tradition where archaeology is part and parcel of this tradition, I have certain biases that undoubtedly show in this work. It is "people" orientated and in being people orientated it resonates with the aspects of analysis that are usually found in the domain of the cultural anthropologist. Indeed it will be seen that my work follows the approach that sees humans as shapers of their worlds - both cultural and natural. I may even go so far as to state that I think the concept of a natural world as it is applied to the habitat of humans is fully a cultural construct, and as such has a definition that is in each case culturally specific. This is the reason the landscapes of specific cultures are so very different, albeit at times the differences are subtle, from those of another culture. These differences are not fully founded in environmental parameters such as the geology or hydrology, the latitude or altitude or even biotic communities, to name but a few, that are specific to a certain tracts of land, but on how these parameters of the 'natural world' are turned to the marking and making of human space. In other words land becomes landscape and is symbolic and metaphorical for a culture. As such I think my work is itself turned to the attempt to un-cover, to dis-cover, to re-create the cultural categories applied to the world of nature as it functions or is caused to function as specific human habitats. Such "people" orientation is not incompatible with the application of concepts from ecology and ecological anthropology which are important to understanding the pragmatics of how such systems operate. This will be expanded on in Chapter Three.

This is not wholly an indication of how Anthropology has attempted to incorporate ecology (*oecology) **à la*** Haeckel (or even Darwin's 'web of life'). Bates discussed the early applications of ecology in anthropology and concluded that in substituting "man" for "animal" the "formulate" logical scheme of the zoological sciences was applied. He went on to argue that it would be better to see ecology as a "pervasive point of view rather than a special subject matter" and continued that he did not "...think 'ecology' can profitably be developed as a special subject matter, a special discipline within the complex of the social sciences" (Bates 1953:700-701,711). However accurate his assessment, fortunately they did not stop an attempt to incorporate the 'ecological approach' into the discipline of anthropology or the practice of archaeology whether it was considered part of anthropology or seen as a separate endeavour. The cogent point is that in the study of humans it did not become a 'stand-alone' analysis but found a somewhat fertile fit within the soil of anthropology / archaeology whether practised as social science or 'hard' science (e.g. Bennett 1976, 1993; Bettinger 1977; Butzer 1982; Cleland 1966; Feit 1973; Hardesty 1975, 1977; Lee 1976; Winterhalder 1977, 1980). However, this did not occur without continuing reassessment (e.g. Smith 1976; Luff and Rowley-Conwy 1994). Thus my theoretical bias owes much to the work of Steward (1955, 1977) with his concept of cultural ecology, an early attempt to go beyond the boundaries of ecology as zoology with the incorporation of the human element of culture. The place of humans in the 'natural' world has always caused comment and not just with the anthropologist or the human ecologist. Culture and what it entails provided a problem for Steward for he failed to address the issues of ritual and ideology, all which have affect/effect consequences for humans within nature. This is the point Von Maltzahn is making when he observes: "Humans do not have a world that is fixed for their kind; instead, there is a vital experience of space...The vital functions of a body subject are carried out within a vital space, which is not given as such but is shaped by that being's actions" (Von Maltzahn 1994:67). These actions are based in belief systems and the sentient world may be interpreted through a set of mythological constructs that give meaning to the "..animate beings in motion against the backdrop of a terrain that... (is)... itself continually in process..." (Riddington 1982:473).

Full recognition is given to the limitation of Steward's approach, in particular his concept of culture core (1955) which is in a direct intellectual line to the concepts of cultural materialism of a later date. I am not a cultural materialist in the sense of Harris (1979), with his very American response to Marxist historical materialism, although as Westen (1984:639) points out Harris does "...spell out in detail his method and theoretical assumptions...so doing he makes conscious his scientific unconscious...". Like Westen (1984:645), I do recognise that some applications or aspects of cultural materialism are of use in delineating the relationships people have with the material world but "...one must consider explanations of cultural phenomena in terms other than the rationalistic utilitarian mode of cultural materialism..." (Westen 1984:644). The positive contribution of Steward was that he saw the environment as **dynamic** and attempted to place **humans as a part of**, not apart from, **this synchronic and diachronic 'natural' tableau**. Vayda and Rappaport (1968) did early work in cultural ecology or, as it came to be called, ecological anthropology. They discussed the problems with sampling as well as "spurious" correlations resulting in inappropriate cause/effect conclusions, and insisted on a less environmentally deterministic approach. Later Rappaport (1979) was to go on to insist that the study and interpretation of human behaviour and social institution, of necessity, must be done alongside the delineation of mechanical models of cause/effect. It is interesting that Peters (1991) offers a similar, albeit a somewhat more detailed, critique of ecology itself. My approach draws too from Hardesty (1977). His approach can fall under the general rubric of ecological analysis (whether called ecological anthropology or palaeoecology) but my use of Hardesty has been modified by concepts from Clarke (1968; 1972). Of particular interest is Clarke's outline of the economic subsystems and two main categories of strategy:

- strategy of site location;
- strategy of subsistence location (1968:117).

As well, Clarke's material culture subsystem and its "coupling" with the environmental system is of interest (1968:123). This leads directly to Smith's view of objectives:

> The primary research goal of the ecological approach in faunal analysis is to explain, in the form of predictive models, **the interface that existed between prehistoric human populations and the faunal section of the biotic community.** Such models then can be integrated into more general models concerned with the overall subsistence - settlement strategy of prehistoric populations (1976:284)(emphasis added).

If we are to understand the effects of patterns on process (Turner 1989) as observed from the existing data, we must define our objectives. Through the medium of 'science' these are:

- an attempt to delineate specific past environments;
- an attempt to define past human ecology in relation to these environments;
- an attempt to frame the relation to environments in meaningful human terms.

So, although some of these objectives can be dealt with within the framework of the sciences, other objectives can only be reached through the medium of the social sciences. In this sense I think my work tries to fulfil the anthropological ideal of holism (or perhaps hermeneutics as an interpreter of the purpose of life) in the analysis of humans and their works. Thus the data and the supporting information that are the basis for this dissertation comes from various sources. These sources encompass the faunal remains from archaeological sites, an examination of the distribution of archaeological sites in a specific region, the study of modern environmental analogues, and the exploration of ethnographic literature. Ethnographic literature is very important in this context as it allows both analogies and the application of the direct historical approach as well as insight into the ideational world encompassed in key metaphors and mythic representations. These main sources are shown as to their geographical distribution in Figure P.1, found directly below.

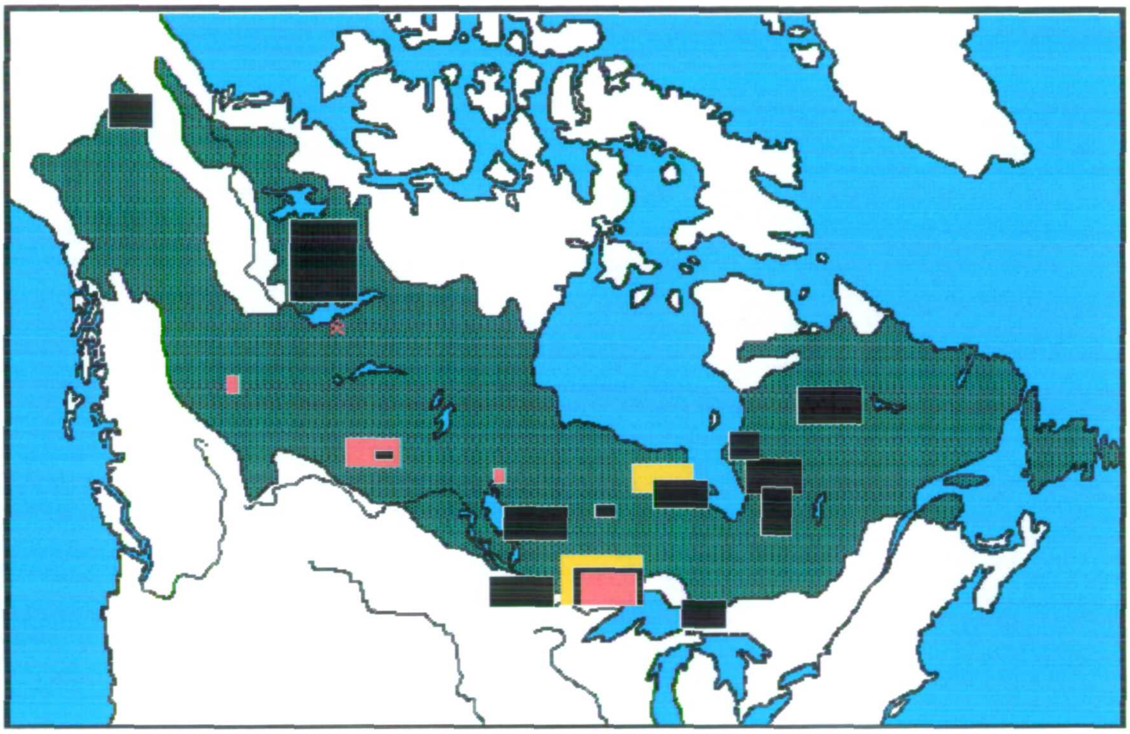

Figure P.1: Northern half of North America with the Canadian boreal forest area that is the background for this dissertation delineated in green. Marked areas are those that contributed directly to the work: black - ethnographic information; red - modern environmental information; and yellow - archaeological information. Other information used that was of a more general nature is not specifically designated by colour on this map. The red star marks the location of the cabin shown in the frontispiece.

An important factor in formulating any question or questions is that all observation "...has a subjective component by virtue of the observer's taxonomic decision to recognise certain distinctions" (Allen and Hoekstra 1991:49). The distinctions that have contributed to the selection of specific taxonomic decisions as appropriate for observation are not articulated and indeed frequently are not even recognised as distinctions that filter out information. As well, the observed comes to us through various sets of filters outside of our, either recognised or unrecognised, direct control. These are the filters (that comprise the taphonomic interval) of past cultural distinctions and 'natural' world processes that have acted upon the physical. This only compounds the problem and all the more so when these filters of the past are unrecognised and thus unaccounted for as well. And from this we are expected to produce a *story* - *"l'effect de réel"* - a denotation of reality (Mason 1990) and as such ontological, methodological and axiological issues must be addressed.

Structure and contents of the thesis

The dissertation begins with the Preface you are now reading and moves into Chapter One where an overview of hunter-gatherers from an historical perspective is presented. Data and insights from the ethnographic and ethno-ecological literature are used. An examination of group size and structure, seasonal round and scheduling, as well as the distribution and location of hunting territories, are included in this chapter.

Following in Chapter Two are the prehistoric cultural sequences of the northern boreal forest examined against an environmental overview of the research area and through a number of Initial Woodland through Terminal Woodland archaeological sites of Northwestern Ontario. Faunal data from the study sites, along with literature support from other archaeological sites in northern Ontario and observations from the ethnographic literature, contribute to this section. Analysis and interpretation includes logistics of site location and observations on possible indications of fire in prehistoric sites from Northwestern Ontario. The faunal data from these sites is in microfiche form and is found in Appendix A, at the end of this work, along with the Codebook that delineates the data encoding process.

Within the context of TEK (Traditional Ecological Knowledge) and WSK (Western Scientific Knowledge), fieldwork undertaken in 1995 in modern boreal environments in Saskatchewan is reported in Chapter Three. The assessments of the modern environmental sites are followed from their initial selection from infra-red satellite images supplied by NASA-USA to their ground-based examination encompassing soil analysis and transecting of specific locations. All work was recorded in photograph form and a portion of this record is used in the plates found in this work. Soil development, fire history of several areas and observations on fire regimes are explored. Pollen and charcoal data and reports that synthesise information on these data are reviewed. The character of patchwork habitat development in ecosystems is examined. Beaver habitats and Beaver colonisation, and the contribution of this species to wetland development are explored. Data on modern hunters' traplines are included and these are looked at in relation to a data set from the early historic period (1697-1740) for the Hudson Bay Company (HBC) posts on James and Hudson Bays.

Chapter Four opens with a discussion of the crisis in narrative experienced by aboriginal peoples with respect to their landscapes. The chapter continues with a discussion of the "known" and the "learned" (Lyotard 1987). This discussion leads directly into the examination of what is known and what can be learned from the ethnographic, archaeological, and environmental information and data discussed in the previous chapters. This is done through the use of the concept of taphonomy on both material and metaphorical levels. Taphonomic losses at various ecological and cultural levels (Taphonomies I-IV) are considered in the context of the theoretical construct of taphonomy itself. This will give us the basis for the interpretative model that will be presented in the next chapter.

In the final full chapter, wetland habitat utilisation by prehistoric Northern Boreal forest hunter-gatherers is investigated. Beaver as a 'keystone species' and the nature of interlinked resources are explored. Fire regimes and the subsequent development of first stage regrowth patterns as integral parts of the economic system lead to a model for the management of resources by prehistoric boreal hunter-gatherers. The philosophical implications for the interpretation of hunter-gatherers as effective shapers of an exploited landscape along with the problematic areas in the research are outlined in the concluding part of the work.

A final epilogue completes the work. It provides the opportunity to develop, in a brief summary form, a few parenthetical observations and possible directions for future research.

There is one central theme that runs through this work and that is the concept of 'landscape' as a perceived, constructed space. Landscape is at once cultural and natural, real and mythical, art and artifice. It is comprised of what we would consider dialectical or binary oppositions. We see these oppositions as illustrative of the difficulty humans have in composing their place in both the physical and metaphysical worlds. However, there are those who see no such oppositional constructs but rather they see these 'worlds' as one place of being. None the less, humans attempt to make sense from non-sense through devised schemas. These are the categories of relationships between 'things' that bring structure and meaning out of seemingly chaotic meaninglessness. Our landscapes become a metaphor or a set of metaphors for our concepts of cultural being-ness. We are recognised or recognise others as members of our own group by the living out of these metaphors. There is variation on this theme found in the discussion of the 'known' and the 'learned' and the different landscapes of knowledge found in different cultures. It is not an accident that these themes have been developed in the context of this work. They flow from the work itself. The dissertation begins, at the start of this Preface, in the metaphysical world of myth and metaphor. It ends in the physical world of the pragmatic, the world of living and making a living in the realm of nature through the manipulation of nature. However, the pragmatic is linked to the metaphor so the beginning and the ending are not separate entities but part of the same whole. They are *recto* and *verso* whose differences are found in the trace of the other in each. The pragmatic takes on a shape, or value only in relation to the metaphoric, and vice versa.

There is an advantage, however you may view it as slight, in working with archaeological cultures that have links into the present. Proto-historic documents, historic documentation and modern ethnographies are texts that can become pieces of evidence with an immediacy for the interpretation of the linked prehistoric past through the use of the direct historic approach. In the midst of this seeming bounty is, however, the poisoned apple that can make the advantage slight indeed. It is the problem that most, if not all, of this documentation is from the perspective of the privileged, the ones who control the *logos* and assign priority to their world view. It is from them (us) that the concept of the "other" flows. The "others" are subordinated to the *logos* of the defined and defining group. We can challenge this view of the "other" and work through to an understanding almost like working through the process of participant observation that has been the *forte* of the anthropologist. The problem in archaeology is that the informant is removed from the researcher by time and sometimes space. We can not work through the meaning of what we are observing by interaction with the informant. We do not have the conditions to work to a resulting intersubjectivity. We must work with texts. These texts are either mute, thus becoming subject to our aesthetics and/or quantification (artefacts, physical remains) (Derrida 1978), or wordy and open to literary deconstruction (written documentation) (Wood 1992). Unfortunately, neither of these 'textual' processes result in an ultimate truth, just another approximation of what has been observed.

One of the gratifying features of this research has been the things learned that at first seemed to have little or no relevance. This I call the 'fallout' from the work. In some cases it comes full circle within the work itself in very evident ways as will be seen with the discussion of cordage and territoriality, two seemingly unconnected topics that prove to be related in an intimate and revealing fashion. However, perhaps the most startling of these points of serendipity was the case of finding the printed version of the story with which this section begins. However, there are some things like the extensive readings in the other stories and myths of boreal people, not appearing in any detailed way here, that have, none the less, deeply enriched my sense of the work. Those things, albeit tantalising, that truly are fallout will have to be left to the future or to others.

CHAPTER ONE: Introduction

> ...human beings eat and drink not by direct resort to nature, nor yet in isolation, nor yet in terms of mere anatomical or physiological performance...cultural response to the particular need or needs imposed by metabolism consists of a set of institutions. (Malinowski 1960:95-97)

1.1: The Hunter-Gatherer in Interpretation

1.1.1: The concept of the "savage"

Ancient Society (1877), based in part on Lewis Henry Morgan's mid-nineteenth century in-field observations of the Iroquois peoples and cultures of up-state New York, was an attempt at an 'anthropological' synthesis of the evolutionary stages of human society. Engels in ***Origin of the Family, Private Property and the State*** (1954), originally published in 1884, was greatly influenced by and drew upon this work. Particularly Morgan's elaboration on earlier schemes of cultural evolution, seen as 'ethnical' stages (and their defining cultural traits) of 'savage', 'barbarian', and 'civilized'. In this can be found the stimulus for Engels' discussion of savagery as that "...period in which the appropriation of natural products ready for use, predominated; the things produced by man were, in the main, instruments that facilitated this appropriation" (1954:24). If we consider, along with Engels, Marx's 'relations of production', 'material forces of production' (or technologies), and the definition of the superstructure (from concepts of land relationships through to ideologies), we can see what will become embedded in the cultural ecology approach of the twentieth century.

Cultural ecology has come, in the twentieth century, to be characterised as the study of "...the mechanism...that would suit institutions to environments" (Cox 1973:12)[1]. But evolutionary concepts, still found in various guises in cultural ecology, were codified in the last part of the nineteenth century. These concepts, founded even deeper in time, became classification systems used not only to order human cultural manifestations as stages from 'savage' to 'civilised' but also order the resulting technologies of these stages.

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[1] Cox's edited volume ***Cultural Ecology: Readings on the Canadian Indians and Eskimos*** (1973) has an interesting introduction that illustrates some of the issues discussed in this section. As well, other aspects of the problem of historical context are explored. The chapters on the boreal forest peoples and the chapters on the arctic and barren ground groups can be particularly useful to students of northern hunters.

This can be seen in the earlier Three Age System of Thomsen (1848) as initially applied to the Danish prehistoric tool collections and subsequently applied to European and then Old World prehistoric tool technologies, albeit with significant refinements. Eventually these concepts were used in the discussion of humans as biological entities. Unfortunately biological determinism was one of the results. For example, various skeletal measurements became the basis for racial typologies and these became, in turn, the basis for theories of racial superiority (Gould 1981; Greene 1981). The development and impact of a model on 'savages' derived from the 'three age systems' of classification is discussed, to varying depth, in Renfrew's edited book ***The Explanation of Culture Change*** (1973). A deeper diachronic explanation for the permanence of such paradigms could be a dissertation in itself. However, here we can note the contribution of the work of Linnaeus with his scheme for ordering the natural world into hierarchical relationships tied to the view of progress as espoused during the Age of Enlightenment. Subsequently, in the 19th Century, the works of Darwin affected the paradigm for the place of humans in the natural world. Evolution as a theory was borrowed and transmuted to become the basis for new paradigms on the nature of the social world. Further distant in time and seldom looked at is the origin of the description of the lives of savages as "brutish and short" in ***Leviathan*** (Hobbes 1651 (1991 reprint)). The extent of the intellectual baggage can be seen in a careful examination of a more complete quotation:

> Whatsoever therefore is consequence to a time of Warre, where everyman is Enemy to every man; the same is consequence to the time, wherein men live without security, than what their own strength, and their own invention shall furnish them withall. In such condition, there is no place for Industry; because fruit thereof is uncertain: and consequently no Culture of Earth; no Navigation, nor use of the commodities that may be imported by Sea; no commodious Building; no Instruments of moving, and removing such things as require much force; **no Knowledge of the face of the Earth; no account of Time; no Arts**; no Letters; **no Society**; and which is worst of all, **continuous fear, and danger of violent death**; And the **life** of man, solitary, **poore, nasty, brutish, and short**. (Hobbes 1651 (1991): 89)(emphasis added)

One hundred and forty seven years later we find Malthus in ***First Essay on Population 1798*** (1926 edition) describing the life of the "savage or hunter" as "...the rudest state of mankind, ..." (Malthus 1798 (1926):39) ; and here is an early edition of "savages", "barbarians", and "civilized", the familiar tripartite division so prominent in the work of late 19th century social scientists, both Social Darwinist and Materialists. However it was Malthus who gave us one of the first 'ecological' statements on the condition of savages when he stated "...hunting is the principal occupation, and the only mode of acquiring food; the means of subsistence being scattered over a large extent of territory, the comparative population must necessarily be thin" (Malthus 1798 (1926):39).

"Savage/*sauvage*" has become an embedded concept. The deconstructionist analysis of "America" by Mason (1990) brings emphasis to this. Some of his observations, in particular on the "naming" of America and its original residents, give insight into the ethnocentric applications of terms. Mason's discussion centres on the colonial period of the Americas, most particularly the United States. He examines the concept of the 'wild man' in the European context and from this extends his analysis to its application to the indigenous peoples of the Americas.

> Any definition of the Wild Man is arbitrary and ethnocentric, for it is the very essence of this figure to articulate the relation between a specific society and that society's vision of the other. The contours of the Wild Man are thus as fluid and intangible as those of the other. (Mason 1990:44)

That this view is part of the wider Western intellectual tradition is shown by Lecouteux, who observes that "*L'homme sauvage est l'antithèse du chevalier. Par son aspect, sa pilosité, sa taille, ses moeurs et ses aimes il s'oppose à toute les valeurs de l'univers courtois*" (Lecouteux 1982:I:24). This is not surprising when we consider the impact of the writings on subsequent generations of Western scholars of such as the French philosopher Rousseau.[2] Here, too, is the tripartite division, no doubt later incorporated into the ethnical stages of Morgan. In ***Essai sur l'origine des langues*** (Rousseau 1817 Bélin edition) Rousseau, as Hobbes (1651(1991)) had outlined in some detail in Chapters IV through X, distinguishes three stages of language, or rather writing, the hallmark of the civilised:

a) the depiction of objects as done by savages;

b) the use of signs of words and of propositions as done by barbarians;

c) the use of an alphabet (phonetic) as seen with the civilised.

The unifying systems stemming from the Age of Enlightenment incorporated the concept of progress - thus ordering from primitive to advanced, simple to complex. Applied to both the natural and cultural worlds, they became embedded in the definition of the "other" (and as such implicitly and explicitly in the analysis of hunters and gatherers), becoming part of a dominant political and cultural language, and socially constructed attitude. This can be seen

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[2] An excellent brief review of French concepts of the Amerindian from the time of contact through the Age of Enlightenment can be found in the article by Jaenen (1982). For the medieval origins of templates for stereotypes used to define 'new world' peoples see Lecouteux 1993.

through our visual presentations in both words and pictures. A particularly good example of this was discussed in the paper ***Imaging and imagining primitiveness. Nineteenth century depictions of the Neanderthal skull*** presented by David Van Reybrouck at the TAG[3] Conference, 1994. Significantly, as Van Reybrouck pointed out, the use of the *camera lucida* in conjunction with the skull's orientation and shading techniques produced a drawing of the Neanderthal skull with an aspect in compliance with the existing 19th century theories on the 'primitive'. Gould has addressed this issue from the perspective of the palaeontologist. However, Gould's views easily translate to a critique of both archaeology and anthropology.

> Few scientists would view an image itself as intrinsically ideological in content...But many of our pictures are incarnations of concepts masquerading as neutral descriptions of nature. These are the most potent sources of conformity, since ideas passing as descriptions lead us to equate the tentative with the unambiguously factual. Suggestions for the organization of thought are transformed to established patterns in nature. Guesses and hunches become things (Gould 1989:28)

Although changed from 'progress' to 'process' in this century, much through the liberal response to the problem of the categorisation of others, the nineteenth century concepts of cultural stages remain with us still. Found in neo-Marxist analysis, although not explicitly in cultural ecology, they cannot be weeded from the cultural materialist approach. That this is so attests to the power of comparison we engage in between ourselves and the 'others' of distant times and places.

In the first part of this century Speck challenged the traditional view of the 'savage'. His work on boreal hunters of North America illustrated that the idea of hunters being too simple or non-rational to understand basic ideas of conservation had to be seriously reconsidered. Through his subsequent publications between 1903 and 1949 he pursued the theme of the rational application of methods of conservation by hunters and gatherers of the boreal forest. However, this work did not gain significance outside First Nation communities. In contrast to this we need think only of the later theories of Paul S. Martin and H. E. Wright (1967) on Pleistocene extinctions and the role of the hunter in such extinctions. This theory, so abhorrent to First Nation Peoples, was powerful in the North American academic context. Viewed as a continuation of the colonial process, it empowered non-native researchers at a time when native peoples, through political activism, were attempting to take control of their own histories and prehistories as well as their lives within the present political and economic contexts of the Americas.

[3] 16th Annual Conference of the Theoretical Archaeology Group, held at University of Bradford, West Yorkshire, England.

Analysis with such a theme was not applied with such vehemence to the megafauna extinctions in the Old World. The use of the term 'savage', and the concepts encoded within it, never seems to have become a central issue in the analysis of Old World prehistory. For example in the Introduction to Smith's ***Late Stone Age Hunters of The British Isles*** (1992) the developed myth of the savage and its interpretation is dismissed in two paragraphs. In all fairness this is not the main topic that book, but such seemingly benign statements as "'savage' (but noble), 'primitive' as opposed to 'advanced' and 'simple' as opposed to 'complex'" peoples who are "much 'greener' than anyone else, and, living their lives in harmony with the natural world," (Smith 1992:1) have political connotations as well as denotations that can not be missed in a colonial, ex-colonial, or neo-colonial setting. For the researcher in themes from the pre-contact Americas (or Australia or Africa or parts of Asia) the ideological content can be very different, removed as it is from the study of the **ancestry of self** to the more abstract investigation into the **ancestry of humanity**.

A seemingly politically correct way of getting around the problem of the investigation of the 'other' is to claim interest in the past of the 'other' as interest in your own past in that we are all part of humanity. First Nation peoples see this as a ploy since it is not their interpretation of this past that is accepted as 'true', or even as one version of truth, but rather that of the researcher with the 'scientific' approach or 'qualifications', and the power within the institutions of the dominant political, economic and academic systems. Alternative worldviews are thus reconstituted or annihilated in and through the language of the dominant culture. Further, racism and colonialism, tied to the economic objectives of the dominant group, can attach to the interpretation of the past of the colonised 'other' through the allocation of research resources to select groups within the dominant sector of a society.

The converse of the Martin and Wright (1967) approach can be found in the recent article on Yosemite ecosystems by Kay (1995). It illustrates the destruction to an ecosystem caused by the lack of application of integrated management objectives as practiced by the pre-contact indigenous peoples of North America. Included in Kay's integrated management system is the understood and intentional use of fire as a mechanism to maintain productive forest environments. The hostility to this article became evident to me in discussions with some park officials during fieldwork in Prince Albert National Park

(PANP), Saskatchewan in the summer of 1995. The major complaint was that following a management scheme as defined by Kay would cause PANP to be "overrun with Elk". Considering that elk would have been one of the prime economic objectives of such a system, rather than timber, this is a very telling observation.

Boas (1888) in his work on the Central Eskimo, where he emphasised the importance of the environment, had set the tone for Speck. Boas had noted:

> All depends on the distribution of food at different seasons. The migrations or the accessibility of the game compel the natives to move their habitations from time to time, and hence the distribution of the villages depends to a great extent upon that of the animals which supply them with food.(Boas 1888:419)

These views found elaboration in the work of Steward, starting in the 1930s. He set down a consistent representation of the relationship between culture and nature and demonstrated that hunters in totally unlike environments faced comparable issues and these issues, already discussed by Speck, and earlier emphasised by Boas, were those of management of resources. Survival is sustained by the decision making skills of the individual and the collective. Of course this is now called cognitive formulation and is discussed as decision theory. Keesing (1974:89) talks of the "competence" one has for solving ecological problems as a member of a society. Called *"social strategies"* they are characterised as "...dynamic individual, group or aggregate plans of action carried out over a specific time period..." (Whitten and Whitten 1972:248). However, these strategies are not necessarily observable and one cannot always infer a group's strategy from observing the activities repeatedly carried out by its members (Whitten and Whitten 1972). The inability to infer is even more the problem for the archaeologist who observes from the distance of time. Called "adaptive strategies" by Bennett (1976:272), here they have a degree of "predictability" with respect to their possible success. If predictability is possible, then retrodiction is possible also and implicit would be strategies for solutions to people's ecological problems - problems such as equilibrium with their resource base.

The counter to the view of hunters as rational managers was clearly defined in Feit's critique (1973:115) where he contrasted the **intentionality** of the keeper of animals to the **unintentionality** of the hunter of animals. The crux is the concept of **unintended ecological consequences**, emphasised below.

> It is a common assumption that the game animal hunters exercise little control over the resources on which they depend or the environments in which they live. Peoples who have domesticated animals manage the environmental side of the man/nature

relationship for they control, to varying degrees, the distribution and reproduction of some animals which they utilize. This control can be expressed by saying that they manage their resources. The lack of such management is often assumed to be virtually the *sine qua non* of hunting as opposed to other subsistence types. **What power hunters have are usually analyzed in terms of how they exercise control over themselves, and how they are affected by the unintended ecological consequences of their own actions.** Hunters regulate the man/nature relationship primarily by regulating man, by controlling the human population size, the human population density, and the distribution of goods and services, and human desire itself. Among the game hunters the very scarcity, mobility, unpredictability and difficulty of capture of the animals leave the hunter with little to hope for, except that he kills the animal he needs and adjusts himself to the results. **It has been repeated again and again, that there can be little planning, and little foresight because so much of the outcome of the hunt is chance.** (Feit 1973:115)(emphasis added)

Through the first half of this century the *culture-environment link* was being delineated. It is found in the work of Kroeber, ***Cultural and Natural Areas of Native North America*** (Kroeber 1939), a continuation and refinement of Wissler's eight culture areas (Wissler 1914). In the analysis of material culture, which would become such an important part of cultural materialism after the 1940s, Wissler, in the "Topical List Data Needed To Characterize The Material Culture..." listed food first and noted the following: "a, methods of gathering and producing vegetable foods; b, hunting; c, fishing; d, agriculture and domestication; *e*, methods of cooking; f, manufactured foods. (Details of methods and appliances in every case.)" (Wissler 1914:448). This list, too, is in the hierarchical order applied as "progress" from gathering to domestication. These works of both Kroeber and Wissler can be seen to be derived from the writings of Otis Mason, who noted:

...there may be said to have been eighteen American Indian environments or culture areas, to wit: Arctic, Athapascan, Algonquian, Iroquoian, Muskhogean, Plans of the Great West, North Pacific Coast, Columbia drainage, Interior Basin, California-Oregon, Pueblo, Middle American, Antillean, South American Cordilleran, Andean Atlantic slope, Eastern Brazilian, Central Brazilian, Argentiane-Patagonian, Fuegian.(Mason 1896:646)

For each of these eighteen environmental areas he listed eight "characteristics":

(1) Climate and physiography;
(2) Predominant minerals, vegetables, animals;
(3) Foods, drinks, narcotics, stimulants, medicines;
(4) Clothing and adornment of the body;
(5) House, fire, furniture, utensils;
(6) Arts in stone, clay, plants, animal tissues;
(7) Implements and utensils of fishing, hunting, and war;
(8) Locomotion. (Mason 1896:647)

The eighteen environments are then individually outlined through these eight characteristics (Mason 1896:647-655). He follows this with a table of these environments set against their "aboriginal industries" (Mason 1896:656-661). He also discussed the relationship of humans to animals.

> In his contact with the animal kingdom, the primitive man developed both militancy and industrialism...Savagery, barbarianism, civilisation, the three general periods into which sociologists divide the evolution of culture, may well be marked off in the progress of men in relation to animals. It is possible to follow any one animal up through the three periods, or to mark the increasing number of genera and species that have been thought necessary to human happiness at each stage of its upward career, or, finally, to note how many parts of the animal frame may be brought into industrial currents, and the multitudinous functions which a single part of the animal may come to serve. (Mason 1902:258; 260)

Most important is his observation, albeit on the "savage" with the "nearly equal" brain, that

> **It is a false notion that savage or primitive men knew little or nothing of zoology.** Inasmuch as their brains were nearly equal to ours, as their pulses beat as fast and their senses were normal, as they passed their daily lives in pursuing or escaping from the animals, their knowledge concerning them was extensive. The author has lately gone carefully over the list of the higher animals known to North American savages, and the result is astonishing. The Indians were not naturalists in the modern sense, but they had uses for all the species they knew(Mason 1902:260-261)(emphasis added).

To continue with Kroeber, Quimby observed that Kroeber focused on the "neo-Indian" a distinction that in itself made two types of Indians, 'early' (paleo-) and 'late' (neo-). It is the 'early' Indians that became the focus of the Martin and Wright (1967) Pleistocene overkill theory. Quimby set about defining the cultural and natural areas of the Paleo-Indian apropos the climate periods related to the retreating Wisconsin glaciation (Quimby 1954: 317-331). And although this was an important work in its day, it was Kroeber's work that set the tone for a generation of research in both anthropology and archaeology.

1.1.2 The link with archaeology, systems theory and ecology

With processual archaeology (New Archaeology) a redefinition of the culture-environment link resulted in a new and overt incorporation of concepts from ecology. First seen as a critique of earlier works (Vayda and Rappaport 1968; Vayda 1969), eventually it evolved to where biological ecology made a significant impact on the analysis (Hardesty 1977). The culture-environment link was replaced by *nature-culture*, as humans were included in trophic system analysis (Rappaport 1968, 1971; Lee 1968; 1976; Kemp 1971). This did not mean that influence from the social sciences was forfeited to a "scientific" point of view. Functionalist approaches can be seen in the concept of equilibrium, applied to human ecology, now extended to a cultural analysis. This seems to be analogous to the classical functionalist approach or even to the organic model as expressed by the French school of sociology. The nature-culture emphasis has been maintained in recent years regardless of the accent on 'social' or 'science'.

The early work of Hall and Fagan (1956), as well as Boulding (1956), added the concept of systems. The most provocative feature, however, was the implicit relevance of such concepts to a variety of areas of study, in particular archaeology. This was further expanded in the book ***Analytical Archaeology*** (Clarke 1968), which provided the first integrated approach of method and theory in one text as the application of an information systems model was explored. The resultant systems theory had the capacity for the development of hypotheses that allowed for further testing at a more sophisticated level. This suited the concept of culture with its subsets as behavioural information systems (Clarke 1968:88). In summation, the polythetic nature of entities and the cybernetics model for explanation were viewed, through the filter of culture, as an information system.

Flannery's work (1968) illustrated the application of systems analysis to humans and their environment where they were seen in interaction and feedback of the subsystems. He utilised first cybernetics - regularity mechanisms and negative feedback (equilibrium maintenance) and second cybernetics with positive feedback (amplification of deviations thereby causing expansion and equilibrium of the system at a higher level) as analytic tools. This provided for adaptation through the use of the mechanisms of seasonality and scheduling (Flannery 1968:386) so important in the analysis of humans in systems of nature. Two procurement systems were operational, under the above cybernetics, that of plants and that of animals. Each procurement system was regulated by:

- seasonal availability (natural systems),
- and the effective scheduling of the time of procurement (cultural systems).

Thus the cultural system was in harmony (feedback) with the natural seasonal schedule of resources considered optimal by humans. Just as Flannery was able to illustrate these two principles in operation through the Mesoamerican sites representing a period from 8,000 to 2,000 BC, these principles are also to be found in the ethnographic and, inferentially, in the archaeological data for the study areas of this thesis. So for hunter-gatherers both predictability and order, implicit in the concept the annual round, must be considered and in their consideration we come to understand the viewpoint of Speck.

The employment of systems theory in the 'social sciences', and in particular archaeology, has since become general, providing many new insights into the relationships within and between various objects (for example ecozones and ecotones in ecological systems) and groups on both an existent and abstract level. The problem was and is the fractal dimension. At what level of detail do we slip away from an accurate account of the system under analysis? (Horgan 1995:77) "Fuzziness" of a system can be a major problem as we move from the direct detailed analysis of present phenomena to the observation of the past through the lens of the taphonomic filters of time and interpretation. For the 'scientific' (or mathematical) analysis the system must have three properties: known relationships, quantifiable attributes, and given relationships to a specific mode of behaviour.

These, too, are the properties needed for analysis of ecological systems. Clarke observed that systems models, for the archaeologist, "... should be representative of cultural processes at several levels within a socio-cultural unit..." the dynamic "... interconnecting network of attributes or entities forming a complex whole" (Clarke 1968:43,44). Although any system under study is but a partial manifestation of a more inclusive system that once existed (1968:83), this should not preclude the development of statements on the nature of the past.

Binford affirmed that culture is "participated in differentially" (Binford 1965:127). Rather than being based on normative behaviour, it is multivariate on both a causal and functional level. This is accomplished through a framework of tradition (intra-societal/cultural) and interaction spheres (inter-societal/cultural). At each point in space-time the dynamics of the diachronic and the synchronic meld the surrounding social and physical environments into discernible patterns. As Binford pointed out these physical and social environments may be identical or variant on the spatial and/or temporal levels (Binford 1965:131-132). Any attempt at understanding cultural processes must work within this multivariate framework.

1.2 Concepts of Social Relations and Land Use With Northern Hunters

1.2.1 Ecological systems as cultural landscapes

In living in nature and participating in ecological systems humans transform their world, or perhaps in a philosophical sense their worlds, into cultural landscapes. There is a challenge in coming to an understanding of this relationship and its transformations. There are assumptions that can be made on the basis of existing evidence and these may be as accurate in retrodiction as any set of assumptions can be in the process of prediction. But seldom do we find, and once found seldom can we explain with certitude, those items that give access to the socio-mythic constructs of prehistoric societies, for example the importance of dreaming or the mythic aspects of predator-prey relationships. The created behavioural environment in which humans and ***selves other than human*** are expected to have social interaction was explored by Hallowell for the Ojibwa in the Berens River area of Manitoba. He collected his ethnographic data in fieldwork during the 1930s and 1940s (1992). Further, Sharp gives us a more profound understanding of this when he observes that with the Chipewyan[4]

> ...the **hunter is in a relationship** that is **simultaneously natural and supernatural** (as we think of it, not as the Chipewyan think of it) in pursuit of a **prey that is both natural and supernatural**. The relationship is simultaneously with the individual animal (physically and spiritually), the species, and supernatural creatures appearing in the form of the animal.....**Animals are killed only by their consent**. The necessity for the prey to consent to its death removes hunting solely from the realm of the natural and, more important, makes it a measure of the power/knowledge of the hunter.....a system of measurement of men....explanation for the success.....of certain men..(and)...allows a prediction of future success.(Sharp 1981: 225-226) (emphasis added)

How this relationship is made manifest in the archaeological record or, if manifest, how is it recognised is the difficulty. Perhaps it is marked by those animal foods consistently used - the ones that consistently give permission, while rarely used, although equally available, animal foods mark those that represent special power relationships or key societal metaphors.

Beyond this there are ideational concerns with humans, such as concepts of the sacred landscape or the socially determined acceptable level of work effort. Winterhalder, in an article that challenges traditional views of hunters and work, discusses rational optimising choices made by members of foraging societies (1993). Further, there is the consideration of the cultural definitions of needs as opposed to wants. It must not be assumed that needs always supersede wants in allocation of labour or resources. The term 'needs' is used in a very old

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[4] Note that Hallowell uses "Ojibwa" but, as discussed in Chapter Two, there has been a shift to the use of "Ojibwe". In Chapter Two you will find also a discussion of "Chipewyan" as a variant of the name "Ojibwe(a)".

fashion way, direct from the functionalist approach of the anthropologist Malinowski (1960: Chapter X:91-119), where needs are those things that fulfil certain basic requirements based on the biological constraints of humanness, the fulfilling of which assures the continuance of the culture [read here community, or population since Malinowski makes humans actors in a physical environment]. Needs are culturally and biologically framed. Wants are something else and are very subjective and perhaps, at the level of the individual inasmuch as the individual can ever be separate from his or her culture, ultimately unidentifiable from the archaeological record.

Although concepts of the environment may be framed in emic[5] categories of myth and tradition, the etic[6] assessment, nevertheless, illustrates a level of environmental determinism. Although environmental determinism is essentially reductionist, as an approach it is essential and central to understanding constraints founded in the availability and accessibility of natural resources. Based on diverse ethnographic evidence from modern hunter-gatherers, historic documents and accounts from the periods of first contact between oral tradition and literate peoples, a general picture of hunter-gatherer ecology in the northern boreal forest emerges. Central are the environmental constraints placed on the structure of the food economies. The inter-relationships of humans to and with the environment can be discussed in terms of population density, population distribution, permanence, nucleation, composition of population aggregates, the relationship of population aggregates to territoriality, inter-societal relationships and, ultimately, cultural values (Steward 1977:45). This is so much of what has been called cultural ecology, or the process whereby a society adapts to its environment. It is broadly similar to and inseparable from biological ecology in its method of examining interactions within and between culture and nature, or what Steward calls the ecological concept of interacting phenomena (Steward 1977:45). It is even more similar if we consider human culture as the adaptive behaviour of our species, variable in details through time and space but nonetheless directed to a single goal namely the survival of the group.

Bettinger (1977:37) discusses the general structure of adaptation being reflected by the subsistence-settlement system including types of settlement, social units, diversity of resources, and intensity of exploitation. Hunting-fishing behaviour is shaped by energetic

[5] emics: "...logico-empirical systems whose phenomenal distinctions or "things" are built up out of contrasts and discriminations significant, meaningful, real, accurate, or in some other fashion regarded as appropriate by the actors themselves" (Harris 1968 571).
[6] etics: "...phenomenal distinctions judged appropriate by the community of scientific observers. Etic statements cannot be falsified if they do not conform to the actor's notion of what is significant, real, meaningful, or appropriate. Etic statements are verified when independent observers using similar operations agree that a given event has occurred" (Harris 1968: 575). For emic/etic also see Lévi-Strauss (1985 115).

cost-benefit analysis subsuming a series of interrelated factors. For example habitat diversity, prey behaviour, and distribution of target species in time and space (Winterhalder 1977). To this we can add the concept of **species packing** based on the competitive interactions between species and the partition of a **resource** represented by a particular environmental dimension (Kitching 1986:214). But if utilisation of any one 'crop' exceeds its maximum sustained yield (MSY), then that 'crop' population will become extinct (Delany 1982:123; Caughley 1977). MSY is a significant component in the discussion in Chapter Five.

In what can only be characterised as an environmentally deterministic model, available resources impinge on social organisation. Everything from group size, based essentially on the numbers of humans sustainable per unit of space, to settlement patterns of these people is driven by the resources available for subsistence and manufacture. This goes beyond the use of the theoretical construct of hypervolume (Hutchinson 1957)[7], into an attempt to see humans in real space-time frames of reference. In actuality we are limited to addressing those certain 'real' components subsumed only in part in Hutchinson's construct of his hypothetical multi-dimensional environment since we are dealing with humans constrained in their access to such theoretical dimensions by real time and space. The additional time feature for settlement patterns is the season of use and the proximity to transportation routes with these routes, in turn, defined with respect to their seasons of use.

1.2.2 The meaning of time: seasonality

Seasonality is brought into the practical realm by both Bielawski (1989) and Dunning (1959). It is Dunning who discusses the demarcation of season used by residents of the eastern North American boreal forest. Here the four season paradigm of the temperate climate European tradition does not pertain. For the Ojibwe of this study, **six seasons** are discussed. Two very important seasons are freeze-up and break-up (refer to Figure 2.7 on the freeze-up and break-up dates for Northwestern Ontario), not unexpected with people who rely heavily on lake and river systems for economic and transportation purposes (Dunning 1959:23). This is reiterated in the work of Tanner (1979:27-29) on the Mistassini Cree and Hallowell (1992:43-44) for the Barren Ground 'Ojibwa'. Further afield Zvelebil's (1981) work on Finland expands this concept into the Old World. He notes **six seasonal divisions** as well. This then appears to be a seasonal denotation system for boreal regions that is trans-cultural and perhaps, if not the

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[7] Defined as a *n*-dimensional environmental space it encompasses a focal organism, population or species in a hypothetical referential frame or imaginary volume.

norm, significantly widespread in its application to be noteworthy. And why not when Hallowell notes:

> Native terms in the lunar calendar and for seasons of the year reflect awareness of recurrent natural changes and serve to orient activities in an annual cycle...Ojibwa terminology punctuates the consequences of these changes...the arrival and departure of migrant birds, the seasonal habits of fur bearing animals, and the yearly round of economic activities (1992:43).

Bielawski (1989) gives additional insight into the concept of time when she discusses the "timeless present" with the Aivilik Inuit. Here the 'past' is "merely an attribute of the present" and things that possess a 'past' do so not in the sense of a history or as a part of a chronology but as an "ingredient of being" (Bielawski 1989:229-230). This seamlessness of time may mean that 'season' as demarcation device used in the western sense may not impart the flow of time as perceived in traditional society. Indeed an alternative interpretation of the boreal year may be that there is open water time, closed water time. Indeed this is outlined by Tanner (1979:28) as open water (*niipin*) and frozen water (*pipun*) times. Such binary opposition is found in other classifications and can be equated with male/female distinctions such as Sun (male) and Moon (female) as reported by Alloüez as early as the mid-1600's (Thwaites, editor 1896-1901: Vol. L). Snow and ice are considered 'male'. Thus winter is a 'male' season. Economically this is so since the food acquisition falls almost exclusively to men at this time of year. Those periods when water is neither fully frozen nor fully open fit into neither the category of male nor female but do fall in another set of binary opposition that being beneficent/malevolent, being very dangerous and potentially malevolent. These times are seen as ritually unsafe, and in reality this is frequently the case. So dangerous is break-up considered the Nichicun as a group prepares "...by collecting a large stock of firewood so that women are not required to leave camp during the period of melting ice" (Tanner 1979:30).

All this is reflected in the Dunning material (and further elaborated upon by Rogers (1962)) for the Round Lake Ojibwa where he records the number of persons and date of departure for the winter camps in the winter of 1958 (Dunning 1959). In the boreal forest rivers and lakes provide these routes in both winter and summer. For remote areas, even in the age of air transport, an essential feature is a suitable adjacent lake large enough and free enough of obstacles to allow take-off and landing. Fully open or fully iced it is a landing strip. However, the times of **essential sedentism**, now and in the past, are the periods of freeze-up and break-up when these routes were and are dangerous regardless of the mode of transportation, traditional or modern. It is at these times of the year that boreal groups have periods of environmentally enforced stability. The relatively large autumn camps may have been revisited yearly or nearly yearly. Therefore at some locations a significant stratigraphy illustrating the diachronic could be developed with more diverse evidence of synchronic activities reflective of the fusion stage of group organisation. However, the winter hunting camps, being representative of the fission to the primary group of the **nuclear family**, a small **extended family**, or a small **modified extended family**, frequently are not used again the next year and this would be reflected archaeologically in the configuration of these features. These family groups have "...relative functional autonomy..." although they are actually "...part of a larger whole..." (Hallowell 1992:50). It is here with the fission part of the annual round cycle that there is the remote possibility to identify the individual from the group. The low density of winter use sustains the resource over wide expanses of geographical area, much like the conservation function of crop rotation done by farmers, and could be characterised as systematic 'cropping', or the purposeful management of 'wild' resources (Speck 1923).

Hallowell reports on the seasonal aggregates larger than those discussed above. For the Berens River Ojibwe these ranged in size between 50 to 122 individuals in the summer of 1932 with dwellings clustered by kinship affiliation (Hallowell 1992:46; 48). Large extended family segments and clan groups would make up significant portions of these communities (Hallowell 1992:50-51). Thus in the autumn and spring we can see the supra-familial group meeting at strategic locations to await the opening of their routes of communication and commerce. Such locations could sustain these denser populations because of the relatively short duration of camp use. The camps of supra-familial groups meeting in the summer became the largest population aggregates in historic times in northern North America. Even more strategic than the autumn and spring camps of the prehistoric period, they focused on the Hudson Bay Company and French trading forts. By the early 1700's the major trading fort for the Nipigon area was Fort Albany at the mouth of the Albany River on James Bay, although the Hudson Bay Company's Moose Fort to the east could be reached with some difficulty. To the distant east was the French Fort Abitibi on the same Moose River system that flowed to James Bay at the Moose Fort location. Even further to the southeast was the French Fort Timiscaminque that fed its furs down through the Ottawa River system to Montreal and Quebec City. These French forts were used, but rarely by direct contact, with the more distant peoples using middle men, the famous *coureur du bois* of French, Indian and Metis ancestry, to facilitate this trade. Fort Frances on Rainy River at Rainy Lake serviced the area from Lake of the Woods through to

Lac des Mille Lac and on to the northwest shore of Lake Superior. There is additional discussion of this topic in Chapter Two as well as the depiction, in Figure 2.14, of the drainage systems with the major routes for the study area. As the tie to economic goods from European sources became more intense this summer camp focus increased and facilitated the government initiated move of the indigenous population into permanent villages designed and controlled by federal agencies of the Canadian government. This post-contact process, dominated by the economic and territorial objectives of Euro-Canadians, altered the traditional relationships to the land and thus significantly masked the integrations of land and humans of pre-contact times.

1.2.3 Concepts of territoriality and landscape

Pivotal to Engels' analysis was the idea that hunter-gatherers owned land communally. A significant critique that redefined this view was generated by the fieldwork of Speck, first published in 1915, (1973) with the eastern Algonquian peoples. In the early part of this century he described composite family [8] hunting groups with inherited usufruct rights. This is further reinforced from the writings of Harmon when at an earlier date he noted:

> ...every tribe has its particular tract of country; and this is divided again, among the several families, which compose the tribe. Rivers, lakes, and mountains, serve them as boundaries; **and the limits of the territory which belongs to each family are as well known by the tribe**, as the lines which separate farms are, by the farmers in the civilized world. (Harmon 1903:330) (emphasis added)

The actual exploitation units average between two and four hundred square miles per family in the optimal boreal environments. However, this can be expanded by a factor of two to four on the extreme boundaries of group economic adaptation (Speck 1973:60). In particular this can be noted where the boreal forest gives way to the barren grounds. In this instance the ecotone is not the optimal environment of overlapping diverse resources (Tanner 1979). The antithesis of this is found at the southern boundary where the optimal resources of boreal-deciduous or boreal-parkland ecotones are found. The personnel utilising a specific unit is called the ***hunting group*** and from late summer to late spring in the historic period it is the "...only economic, political, social, and religious unit..." (Rogers 1972:120). This pattern would have been the same in the past except that the fall and spring camps replaced the modern summer one. The hunting group structure can be found in the domestic arrangements and the affiliations between men in co-residential groups. However, Helm describes the domestic unit of the Dogrib Athabaskians as "...the daily food-producing and sharing unit..." being often a

[8] Composite family is based on both blood and marriage relationships or consanguineal and affinal kin.

single nuclear family. But, she continues, with the observation "...the mobility of the people frequently brings related nuclear families into relatively temporary co-residence in one dwelling" (Helm 1972:74-75). Further on the issue of territory, Speck states

> The idea has always prevailed, without bringing forth much criticism, that, in harmony with other **primitive phenomena**, the American Indians had little or no interest in the matter of claims and boundaries to the land which they inhabited. This notion has, in fact, been generally presupposed for all native tribes who have followed a hunting life, **to accord with the common impression that a hunter has to range far, and wherever he may**, to find game enough to support his family.(Speck 1973 [1915]:58) (emphasis added)

Such territories Speck characterised as conservative in nature since they were ***harvested*** "...so only the increase is consumed, enough stock being left each season to insure a supply the succeeding year" (Speck 1915). This echoes the earlier observation of Harmon when he asserted "A prudent Indian whose lands are not well stocked with animals, kills only what are absolutely necessary to procure such articles as he cannot well dispense with" (Harmon 1903:331).[9] This is supported by Hickerson's work with the Rainy Lake Chippewa (1967).

The Speck analysis itself faced criticism and the concept of the prehistoric or traditional 'hunting territory' was questioned by later researchers such as Black (1970) and Tanner (1979). Knight's assessment that Algonquian peoples were unable to use territory without starving

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[9] In a quote from a prepared statement from the Montagnais of Lake St. John:

> "The Montagnais depend largely upon the beaver, as there are very few moose and caribou in their country. The beaver to them is like the **bison** to the Plains Indians, or the **reindeer** to the Arctic tribes. The meat of the beaver is delicious and substantial and **replaces pork very advantageously**. If the hunter fall sick in the forest far from aid, he finds the castoreum a beneficial remedy. Different from the other beasts **the beaver does not wander about and require to be hunted; he builds his "cabin" in plain sight upon the very path of the hunter, in the river or lake. Instinctively, the hunter understands how to operate with a natural law**, which no game commission can improve on, and to maintain the beaver there for his subsistence. He understands, moreover, that he cannot abuse his opportunity. Thus it is that the Indian obeying a natural law of conservation,.....,never destroys all the members of a beaver family. He knows enough to spare a sufficient number for the continuation of the family and the propagation of the colony. **He takes care of the beaver as well as other animals, that live in his family territory, as a farmer does of his breeders.** He can, indeed, tell at any time the number of animals which he can dispose of each year in his district without damaging his supply." (reported by Speck: 1973:61-62)(emphasis added)

Chief Aleck Paul Ojibwa chief at lake Temagami, Ontario (a first hand translation of the actual statements of an Indian authority himself)

> "In the early times the Indians owned this land, where they lived, bounded by the lakes, rivers, and hills, or determined by a certain number of day's journey in this direction or that. Those tracts formed the hunting grounds owned and used by the different families. Wherever they went the Indians took care of the game animals, **especially the beaver, just as the** government takes care of the land today. So these families of hunters would never think of damaging the abundance or the source of supply of the game, because that had come to them from their fathers and grandfathers and those behind them....
>
> We Indian families used to hunt a certain section for beaver. We would only kill the small beaver and leave the old ones to keep breeding. Then when they got too old, they too would be killed, just as a farmer kills his pigs, preserving the stock for his supply of young. The beaver was the Indians' pork; the moose, his beef; the partridge his chicken; and there was the caribou or red deer, that was his sheep. All these formed the stock on his family hunting ground, which would be parceled out among the sons when the owner died. He said to his sons, "You take this part; take care of this tract; see that it always produces enough." That was what my grandfather told us. His land was divided among two sons, my father and Pishabo (Tea Water), my uncle. We were to own this land so no other Indian could hunt on it. Other Indians could go there and travel throughout, *but could* not go there to kill the beaver. Each family had its own district where it belonged, and (p.63) owned the game. That was each one's stock for food and clothes. If another Indian hunted on our territory we, the owners, could shoot him. This division of the land started in the beginning of time and always remained unchanged. I remember about twenty years ago some Nipissing Indians came north to hunt on my father's land. He told them **not to hunt beaver.** "This is our land," he told them; "**you can fish but must not touch the fur, as that is all we have to live on.**" Sometimes an owner would give permission for strangers to hunt for a certain time in a certain tract. This was often done for friends or when neighbors had had a poor season. **Later the favor might be returned.**" (reported by Speck 1973:62)(emphasis added)

"...within a generation..." (Knight 1965:33) is cited by Nelson (1973) to support his view that the Alaskan Kutchin tribes as well as the Crow and Peel River tribes of Canada were unable to remain within territories because:

> ...the environment precluded the development of a territorial system during aboriginal times. First the resources are highly scattered and localized; and second, they are subject to marked cyclic or noncyclic variations... localized shortage is more common... (Nelson 1973:274-275).

There is no doubt that shortages could be suffered in set times and places. Indeed the historical period illustrates this as a serious problem (Dods 1994). The particular factors that can off-set the dreadful consequence of starvation are found in the kinship affiliations of peoples. These affiliations permit access to alternative resources from areas with abundant, or at least sufficient, resources. The fission - fusion patterns found with hunting group social structure is the key. However, this group fluidity does not mean a lack of group identification with and to the land. Nelson provides the ultimate rebuttal of his approach with a few lines later in his work when he states:

> ...in the boreal forest the key to success...is **knowledge of the landscape**. The Indian must know **where to find** trails, lakes, hills, valleys, forests, and meadows and the most **stable concentrations of edible plants and game**" (Nelson 1973:275-276)(emphasis added).

Further, Speck observed that:

> The whole territory claimed by each tribe was subdivided into tracts owned **from time immemorial** by the same families and handed down from generation to generation. The almost exact bounds of these territories were known and recognized, and **trespass**, which indeed, was of rare occurrence, was **summarily punishable** (Speck 1973:59)

Knowledge of this kind **from time immemorial** can only be found in an intimacy with **landscape** [10], and an identification with the land that can only be described through the concept of affiliation; such affiliation more than implies attachment to territory. It is of the order of territoriality - the affiliation of those who live in the "living whole" of nature in a specific space over extended time.

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[10]Von Maltzahn in his book ***Nature as Landscape*** (1994) discusses our view of nature and the way we have constructed landscape. His observations on ***wilderness*** are particularly cogent to the discussion of the use of the concept of the savage. "As soon as people relinquish nature, nature enters the state of the wilderness - wilderness being nature in the absence of human beings....(it) threatens us in our very existence....(and must be) replaced with a structure governed by the *logos*, our own thinking transformed into reality - rational spaces." (Von-Maltzahn 1994 126) The defining by Europeans of the North American landscape as wilderness removed the humans, who inhabited this 'new world', from the equation and left an empty landscape on which the European *logos* could be imposed. Shakespeare presented this very topic in ***The Tempest***. Here we find Caliban, described as "a savage and deformed slave" who was found on "An uninhabited island". Territory and its definition then rests in the control of the one who imposes the *logos* of the written title to land.

Another approach to this problem can be found in the analysis of art, architecture and landscape in the American context by Mugerauer (1995). That a *logos* needed to be applied is attested to by his observation that America "...did not qualify as landscape according to the reigning European conventions of the *cultivated-natural*, which were associated with the previous periods of civilization" (Mugerauer 1995:61). He further observes that "...the Native Americans' attitudes to nature as some sort of living whole were translated straightforwardly as pantheism..." and the European "...apparently obvious revelation of the American landscape as God's graceful blessing obliterated all other traditions of interpretation and possible ways of life." (Mugerauer 1995: 106)

Groups at the time of contact with Europeans **were** tied to set tracts of land they called their own and this effectively was recognised by the colonial governments during their concerted effort to convert Native land into treaty land or land recorded in the written documentation so popular to Euro-Canadian and American court systems. The territories of historic times in eastern Canada, at least, are influenced by colonial and post-colonial factors. The argument for modernity rests in the concept of **trespass** and its summary punishment based as they are on ideas of private property. The area of most alteration has been in the introduction of this concept of private property generated by the forces of the exterior market economy and the associated loss of usufruct rights with its attendant systems of balanced and delayed reciprocity. With the Déné of northwestern Canada (also known as the Cippewayan, or Caribou-eaters in English, or the *edshenn eldeli* in Déné) "...the only sign of property recognized by them was the **opening** of a trap line *(Eltssouze tronloue)*...These...are considered private property" (for fur-bearing animals). "The furs taken....as well as the pelt of moose and caribou, belonged to the one who had taken or killed the animal. The **meat, however, belonged to the whole band** and the chief [11] made distribution of it, without asking the consent of the man who had killed the animal." (Cooper and Pénard 1973 [1929]:77; 79)(emphasis added). In this we see the transition from traditional to colonial and subsequently post-colonial patterns of ownership. Exhibited are both the concept of private property for furs and communal property in the distribution of food resources. The issue of the subsititution of the "unit of management" for the "family hunting territory" during the move from susistence hunting to trapping is one of the factors discussed by Flannery and Chambers (1986). Further their assessment and analysis of the kinship and territory data as well as the territory maps published and extant in the field notes of John Cooper for the James Bay Cree illustrates the shift in individual territory shape from the 1880s through to the 1930s.

In this context it is possible that the collapse of subsistence systems in the historic period of eastern boreal North America (Dods 1994) may rest on issues that go beyond the actual economic relationships with the Hudson Bay Company. One area that perhaps needs exploration is the disruption to or the mutation of the family kinship-landbase association caused by high mortality rate from introduced diseases of the contact period (Ray 1976) which "...devastated and decimated some groups modifying social organizational features and ecological relationships.."(Bishop 1981: 45). Further, Trigger notes that "...failure to cope with

[11] Here chief means the "owner" of the trapline territory who has been joined by others because he is a successful hunter.

epidemic diseases led to a spiritual crisis.." (1981: 36). Thus the modern kin group/landbase relationships may well be different from those of prehistory because of a combination of factors in juxtaposition at a certain point of time. However, this does not mean that territory as corporate property was not found before the introduction of market economy concepts. Further any comparison between reported territories from 1923 and 1979 illustrates interesting changes as can be seen from the figures below and discussions to follow.

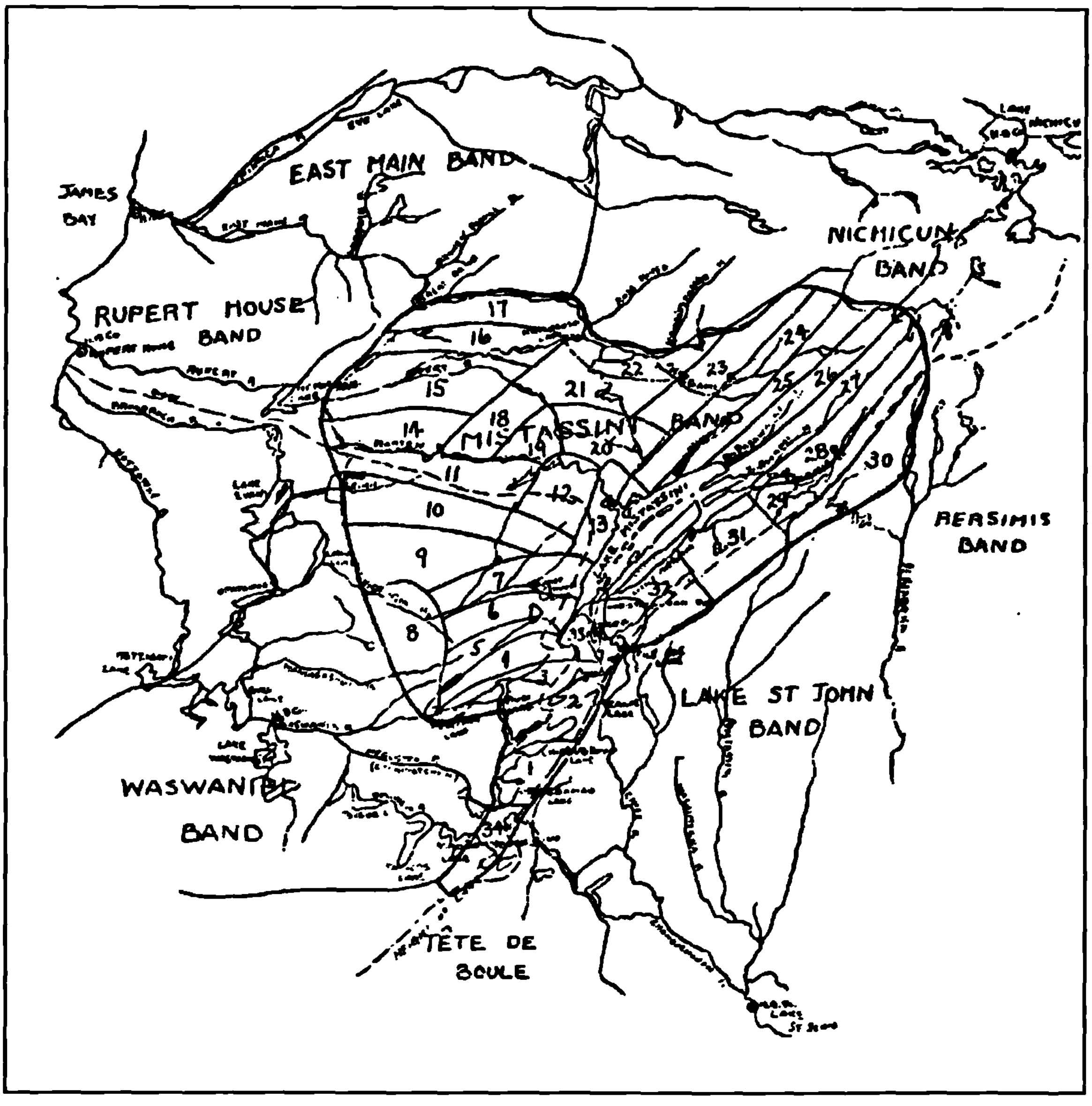


Figure 1.1: James Bay Cree hunting territory map from fieldwork of Speck (1923). Lake Mistassini is in the centre of the map. Speck collected the information for this map in the first years of this century and the above figure is a scan of the map he produced in the field at that time.

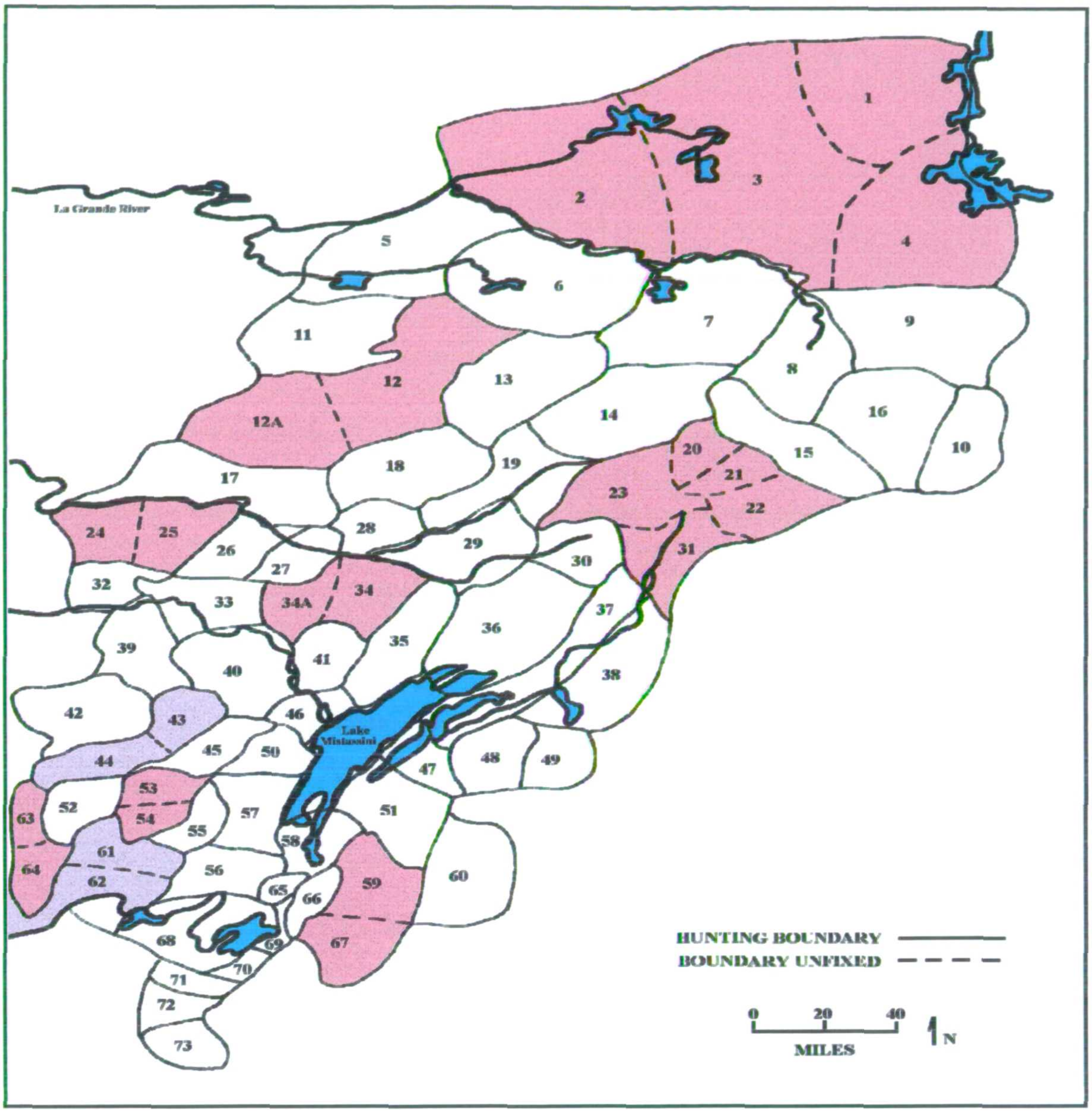


Figure 1.2: James Bay Cree hunting territory map from fieldwork of Tanner (1979). Lake Mistassini is the largest lake on the map. This map represents the same area as the Speck map but nearly seventy years later. Hunting territories with unfixed boundaries are coded with added colour to emphasise their potential linkage through kinship or hunting partner association.

The work of Dunning with the Northern Ojibwa [12] in the 1950s offers an additional insight. His kin based hunting territories are not dissimilar to those reported by Tanner in 1979. However, Dunning's map with the placement of the location of the winter camp is accompanied by kinship/co-residential (hunting partner) winter personnel charts that allow some understanding of winter camp member composition. The numbers on the co-residential chart coincide with those used on the "trapping territories" map. When viewed as interlinking

[12] With the Cree, members of the Algonkian language family, Bishop (1970; 1976) speculated they were late migrants to the northerly forests. Greenberg and Morrison (1982) claim that diffusion of the term "Ojibwa" rather than population movements occurred.

data these two pieces of information fit particularly well with the majority of the type of sites being found in the prehistoric record. The sites are small, with low density of material goods. It appears they are used for only a relatively short period of time. This length of use and the frequency of reuse is a serious issue in interpretation for the archaeologist. The telling feature is that, for the archaeologist, it allows some development of explanation based on hard data.

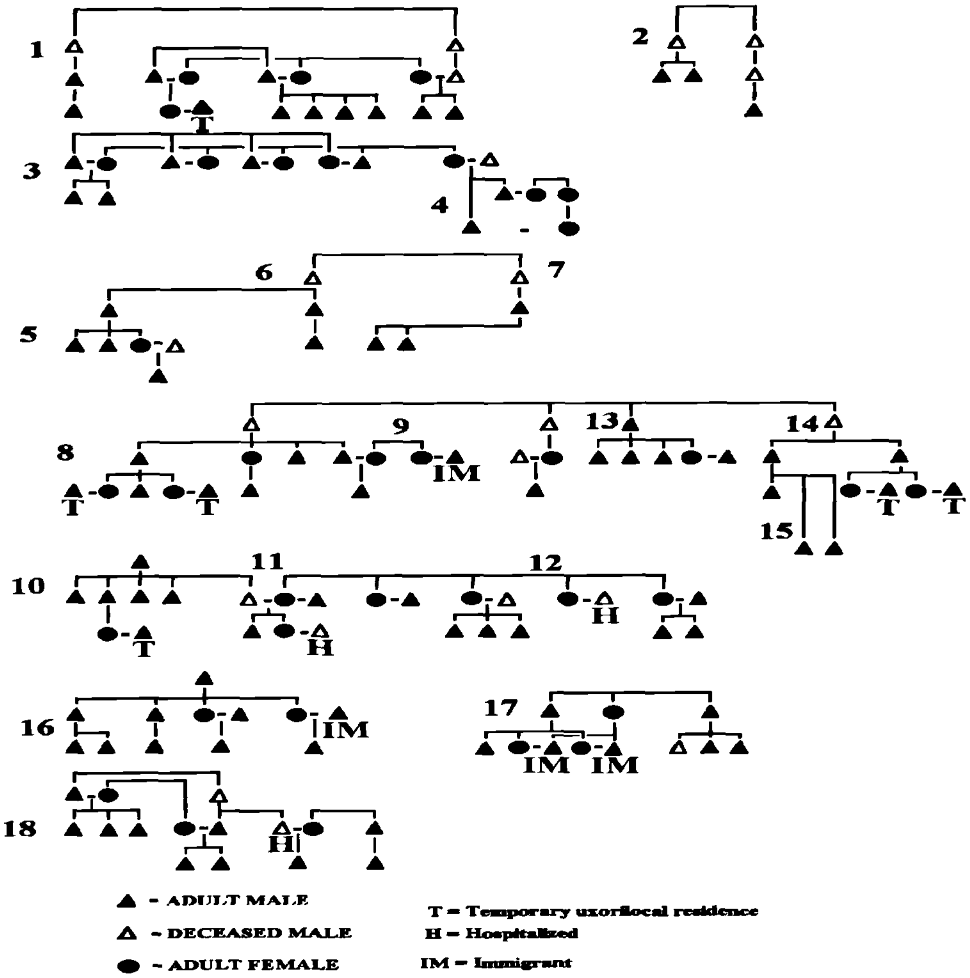


Figure 1.3: Pekangekum co-residential groups in the winter of 1955 adapted from Dunning (1959:59)

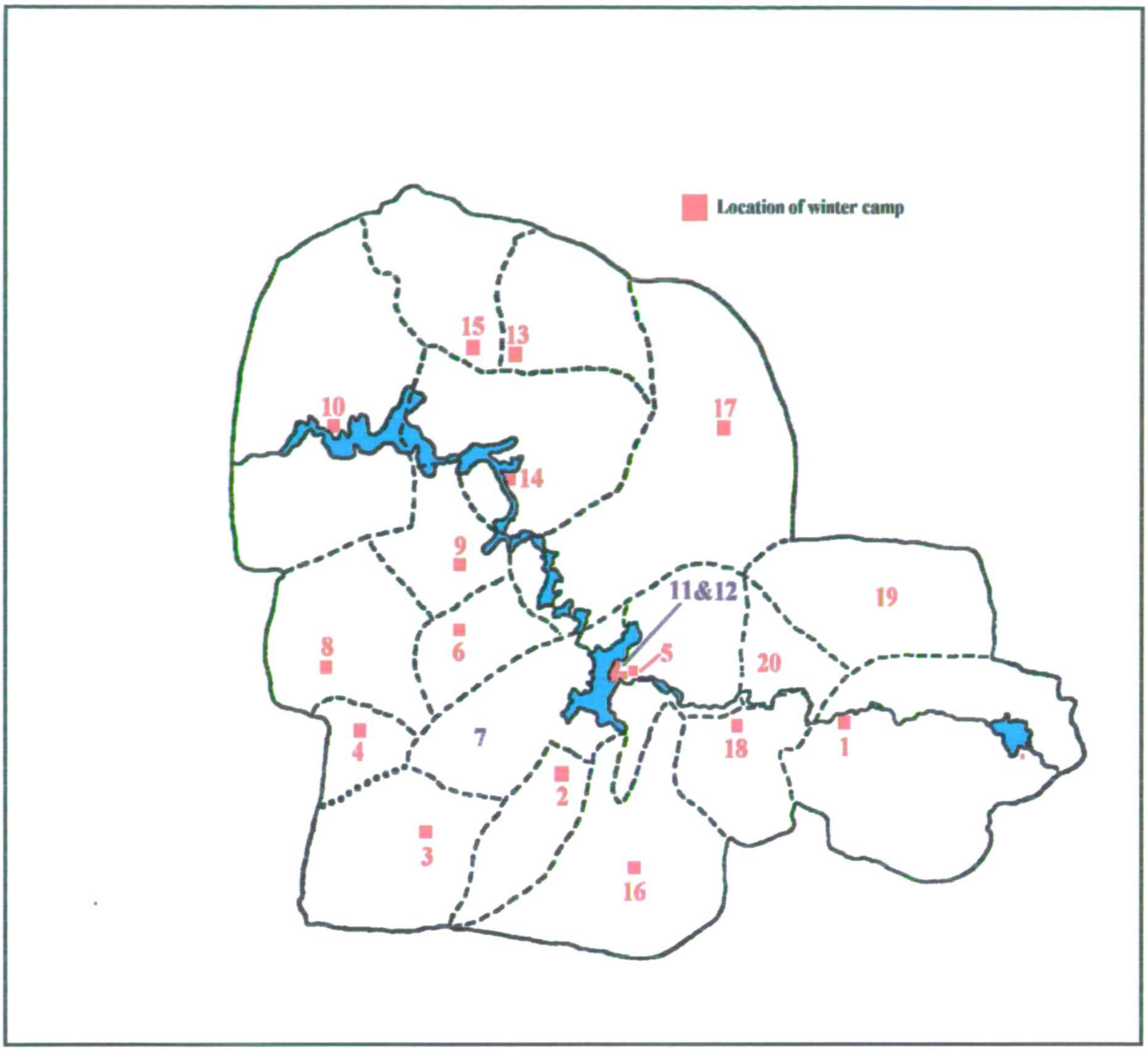


Figure 1.4: Outline map of Pekangekum Band trapping territories on the Berens River canoe route. Camps 7, 11, and 12 were not trapping units at the time of this report, but Dunning reported that their members sometimes joined other units for trapping. (Dunning 1959:28)

1.2.4: Seasonal scheduling

Seasonal scheduling or seasonal round can be seen in the fairly typical examples provided below. The BOREAS[13] scheme is devised from recent land use observations(1994) while the Rogers diagram is based on field work in the 1950s. The BOREAS map has here been colour enhanced for those species represented in the archaeological material discussed in

[13] BOREAS(Boreal Ecosystem-Atmosphere Study) was and is a group of researchers associated with various institutions including NASA, NOAA, NSF, EPA (USA), and NSERC, CCRS, NRC, CFC, ENVIRONMENT CANADA, AGRICULTURE CANADA (CANADA). Scholars from many institutions throughout the world have participated. The central 'office' is with NASA at the Goddard Space Flight Centre, Greenbelt, Maryland, USA. The research has focused on boreal forests and one of the key analytical components of this research has been the use of satellite produced infrared imagery on northern boreal forests. Two study areas are of interest: the Northern Study Area (NSA) in Manitoba, Canada, and the Southern Study Area (SSA) in Saskatchewan, Canada.

the next chapter. The seasonal 'round' in this figure, however, does not include freeze-up and break-up and thus is incomplete as to traditional seasonal designations. Certainly these patterns could have been very similar in prehistory since the pattern is dictated mostly by the actual resources themselves. I think the area of disjunction between the present and the past is found in the emphasis on fur pelts. Today this is driven by market economy and the wild fur industry. Beyond their use as food, the furs and pelts would have been needed in the past for clothing and shelter and they could have been a significant item in inter-regional trade but we have no direct evidence of that in the archaeological record except possibly for the *Bison bison* (Bison) bones discussed in the next chapter. Certainly it is assumed that the fur trade of the historic and modern period is different in kind and thus in intensity.

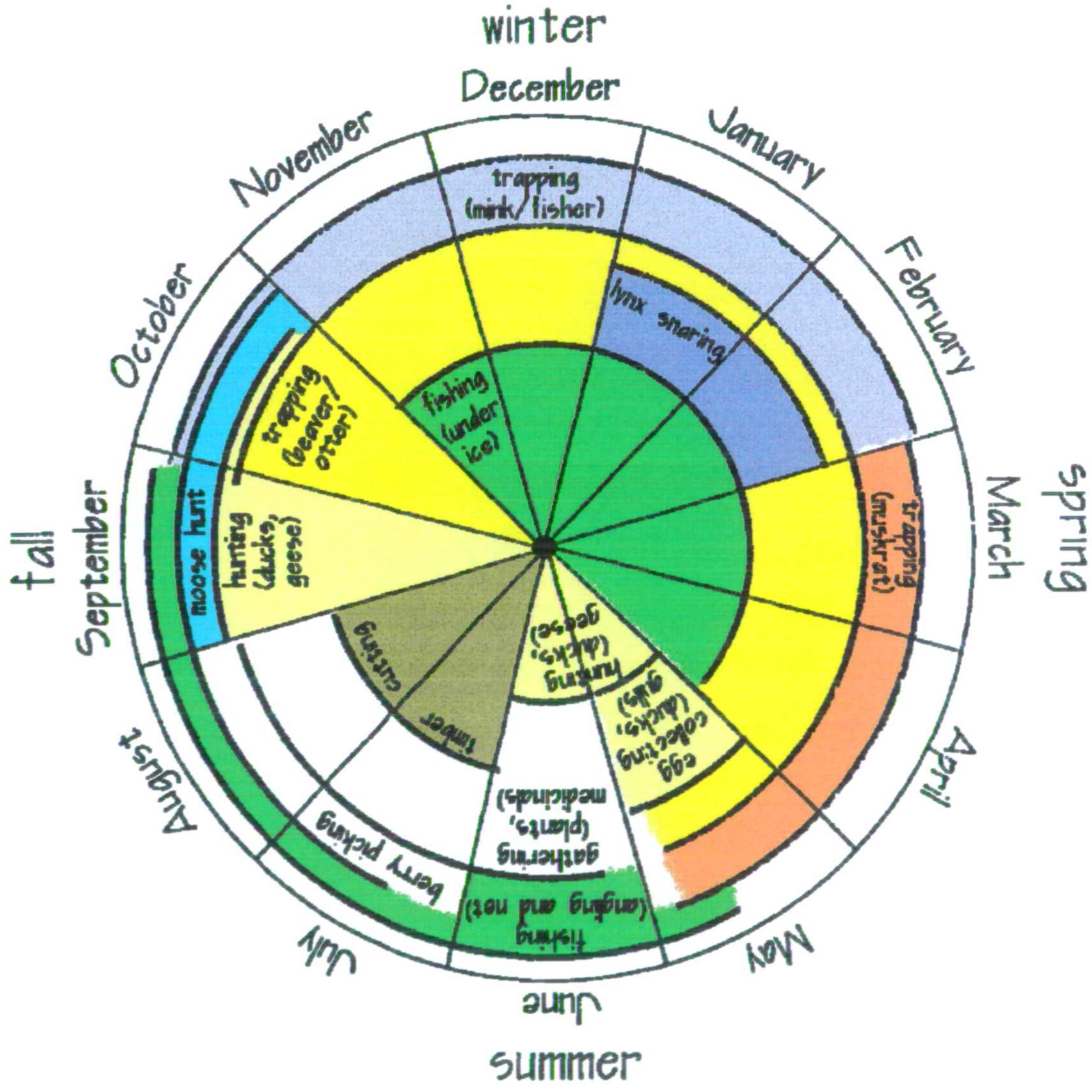


Figure 1.5: Nelson House Land Use Calendar adapted from the BOREAS Supersite (M-7:1994).

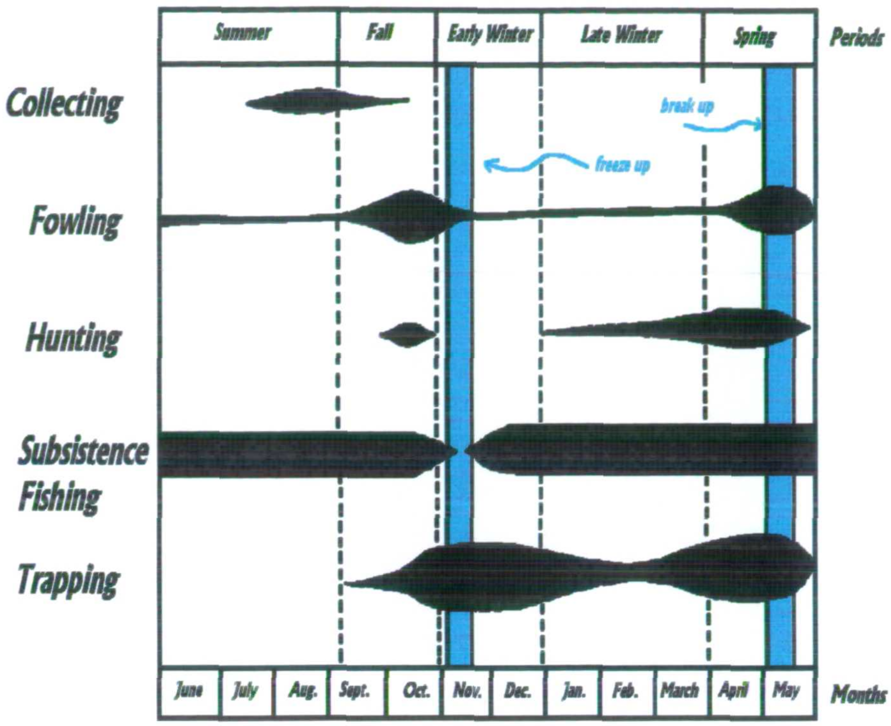


Figure 1.6: Economic activities by month and intensity for the Round Lake Ojibwe (adapted from Rogers 1962:C5).

1.2.5: Statistics on the hunt

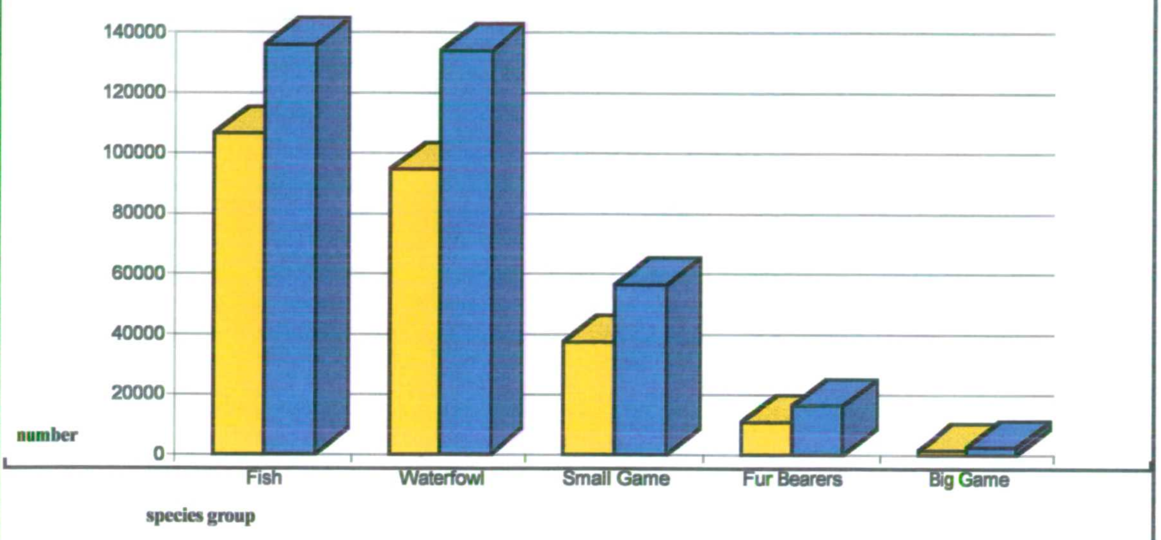
Dunning gives the hunt figures for his study of the Pekangekum winter camp with a population of about 85 persons at 50 moose, 6 deer, and 3 bear in approximately 18 months, 10 days of hunt (over 19 years of observation). The generation of statistics from reported kills by hunters is suspect. Dunning again supplies an interesting vignette on one Ojibwe group and their hunting of large game animals: "...hunters purposely report their kills inaccurately, perhaps fearing that an accurate record in the hands of government would result in a quota being established" (1959:27). This fear has a basis in fact if their quotas on fur bearing animals hold any lesson since hunting of these animals is very tightly regulated by government agents. How the biases in such government driven programs skew our perception of populations in the wild is a question that can only be partially answered here and otherwise must be noted as a problem in the use of ethnographic data on hunt numbers. Harvest reported for Hudson and James Bay Cree (Berkes, et al. 1994) fill some of this gap between reported and actual catch. This can be seen in Figure 1.7 where the 'species groups' are abstracted from the more detailed work reported by the authors. In the detail, however, can be seen that species important in the past remain relatively so today. For example in the 'fur bearers' category beaver (*Castor canadensis)* and muskrat (*Ondatra zibethicus*) are only surpassed by martin (*Martes americana*) but these two species are individually still far and away more frequent than the total number of the remaining nine species reported. In 'big game' moose (*Alces alces*) and caribou (*Rangifer tarandus*) dominate over the large cats, bears and in the coastal areas seal (*Phoca* sp.). 'Small game' has only one mammal species (all others are birds like grouse) and this is snowshoe hare (*Lepus americanus*) again a species to be found in the archaeological record in seemingly significant numbers. The 'fish' category is where there is significant discrepancy between modern and archaeological figures and the possible reasons for this are explored in some detail later in this thesis. A further look at the figures for "potential edible weights" that are supplied for eight communities in the Berkes, et al. study (1994:355) also gives us some summary totals for the same species groups seen in Table 1.7. These are here rendered in percentages to give a general picture of relative importance of the various categories in the modern diet:

- Big game 37.36%
- Waterfowl 35.23%
- Fish 19.49%
- Small game 4.26%
- Fur bearers 3.66%

The fact remains that these figures represent a human population reliant on commerce in furs, which is now tied to the 'modern' economy with all its anti-fur constraints, in exchange for 'modern' foodstuffs. The replacement value of this bush food was calculated as the equivalent of 7,846,155$CAN 1990 (Berkes, et al. 1994: 355). Fur bearers, although capable of supplying food as well as furs, perhaps cannot rightly be calculated as foodstuff in the present system but they do supply exchange for other goods, including foodstuffs such as flour, sugar, and tea to name the most obvious.

The modern data from the trap lines in Saskatchewan, discussed in Chapter Three, will add further detail.

Figure 1.7: Modern harvest figures (reported - yellow and projected - blue) for the Hudson-James Bay areas. Based on species groups reported by Berkes, et al. (1994:353).



1.3 Further analysis considerations

1.3.1 Levels of analysis

There are two levels on which the analysis must function and they are subsumed by two categories of data:

- the materials from which the theoretical reconstruction of past environments (and/or past food economies) can be made (e.g. the archaeological finds such as faunal remains);
- the information for the construction of theories on the inter-relationship of humans to and with this environment (e.g. the site size and placement in the environment).

Both categories can be augmented by associated ethnographic data that is linked to the past in an historical timeline or provides suitable analogy by nature of demonstrated responses to similar problems. Although these are presented as seemingly distinct categories of information, they are intimately related and frequently inseparable when dealing with a natural world defined by and through cultural systems, whether these systems are past or present.

1.3.2 The place of the absent or the rare in the analysis

On the abstract level, world views may present nature as non-deterministic or indeed the converse - very deterministic. Animate and inanimate may be found in different semantic realms than those we suppose through our classificatory schemas (Hallowell 1992:60-65). Regardless, on a tangible level, resources are either present or absent, used or not used. Further, it is the 'not used' or **taboo** category that may well provide our closest insight into an ideational realm. This is particularly so when missing are the things that are neither inaccessible nor unavailable and do not suffer loss in the taphonomic interval. Thus they are absent surely from lack of use. If this is consistently so over both the diachronic and synchronic for a culture then perhaps we have discovered a marker for a taboo item[14].

Rare items may be markers for items that hold deep cultural value or specific key metaphor positions in the world view. This is expanded upon in the next chapter in the discussions on dog, wolf, and fox bones as well as bear bones. Rare or common place, we can assume that those items found on the archaeological site are there because of the direct action of humans since Sharp has noted:

> .... a deep seated abhorrence of scavenging ....not obtaining food by direct action upon the environment is negatively valued in both human and animal. No matter how one views symbolic analysis, the fact it that ... (Algonquian) society places great value upon the ability to hunt... (1981: 225)

1.3.4 Resource concentration and the archaeological 'site'

Adaptive patterns generally take advantage of particular concentrations of resources with alternative strategies readily substituted if standard resources fail to materialise in a particular year (Balikci 1968: 78; 80). What archaeologists call "sites" are locales of specific cultural behaviour. Although some sites may appear to be random in their location, this seeming randomness is mitigated by the fact that animals usually are taken in their specific habitats since "In practice, animals are not distributed at random but tend to have a clumped distribution...more often the area comprises a number of plant associations, some of which

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[14] For example, during my fieldwork in the Middle East I poked in the garbage of several modern villages. Pig bones were not to be found - as expected when we know the religious prohibition on the consumption or use of the pig in any form. There were, however, feral pigs that were hunted because of the damage they did to olive groves and grape arbours but none of these made it back to these Islamic communities and indeed where possible Christians were contracted to do the killing. However, I have no information on whether these pigs ended up in the Christian communities.

contain animals at high density whereas others harbour few individuals" (Caughley 1977:25-26). So such seeming disjunction does not mean incoherence. If sufficient data can be obtained to make linkages between specific work-use units, randomness should disappear. Information management of stratification of species densities in the environment works to the advantage of hunters and gatherers. Sites may then be chosen using the criterion of proximity to high density strata or species heterogeneity rates that vary over space in relation to structural variations of the environment (Kolasa and Rollo 1991:2). Propinquity seems to be the important factor although serendipity cannot be discounted, in particular in those areas where prey are in low density strata and thereby in less than optimal concentrations from the perspective of the predator. So "...the organisation of living systems is hierarchical and the processes in nature are sensitive to the scales of time and space on which they are considered" (Blondel and Vigne 1993:141). We are reminded that delineations that place organisms, humans included, in their landscapes are of primary importance.

1.3.5: Constraints from the consequences of the contact period

In Northwestern Ontario, not unlike many other areas in North America and elsewhere, the problem of studying prehistoric species population density and distribution patterns has been exacerbated by the disruptive influence of the contact period. Traditional information management based on knowledge of animal habitats went for little as beaver became scarce in some areas as early as 1804 (Bishop 1970:8) and many other mammalian species such as elk, moose, and caribou, were drastically reduced or exterminated in certain areas by the pressure of the fur trade and the introduction of firearms (Ray 1974: 81;117;121;123). In 1815 a trader noted that Ojibwe families frequently starved for lack of beaver, moose and deer, and within the next few years, cases of cannibalism were reported amongst the indigenous peoples (Bishop 1970:8). There were also stories of Indians eating their pelts (Bishop 1970) and in the winter of 1826-1827 the deaths by starvation of caribou hunters were noted. In the following year a diet of fish and hare was resorted to by one group (Bishop 1970:9), this being strange enough to cause comment. The decline in animals was so great that by 1860 a law was introduced to control trapping of fur bearers in Ontario. Six species (beaver, muskrat, otter, mink, martin, and fisher) were regulated as to season of trapping and numbers harvested (Bice 1983:15). This law was for the conservation of these species, although an earlier Act, in 1793, "...encouraged the destruction of bears and wolves..." (Bice 1983:17). That the overall decline in mammalian species subsequently affected change in the food strategies of the native populations of Northwestern Ontario is discussed by Rogers and Black (1976). The particular focus of their investigation is the period between 1880 and 1920. They consider the adaptation to a fish and hare diet, noted above, that began "...in the Osnaburgh House area during the 1820's — and somewhat later to the north of that area — in response to certain environmental changes" (Rogers and Black 1976:13). However, as we can see from the date of government intervention to support the removal of two of the larger predators, the genesis of the problem must have dated to an earlier time because systems can sustain considerable stress before they move beyond redemption. What we see in this example is a fragile system with low resiliency (McCullough 1973:124) manifesting the problems generated by excessive cropping.

The late 1700's saw not only the fur bearing animals under stress but the large herbivores as well. The extent of this disruption to the relative stability of the human food economy has been the focus of some debate. If we are to believe Bishop (1973) it was this post-contact collapse of the food chain that led to the elaboration of the Windigo Complex. This fear of cannibals and cannibalism, first seen in documents dating from the early part of the 19th century (Bishop 1970:8), has been interpreted by modern psychologists as a psychosis. However, Bishop (1973) considers this to be the direct result of protein starvation. Bishop's interpretation is somewhat supported by work done with Arctic peoples (Lapland, Siberia, North America). Here "hysterical fits" and "periodical madness" are reported (extending to Eskimo dogs) but interpreted as a dietary lack of minerals or vitamins, in particular a low level of calcium "...which is essential for the nervous system" (Høygaard 1941:72). The 'cannibalism' interpretation of certain archaeological finds will be discussed in the next chapter.

Although the post-contact period did see considerable depletion of the mammalian stocks, there are "...any number of ways..." that the boreal ecosystem can be disrupted and, as Waisberg claims, the local human populations had experience of fluctuations in their resources, which were never "... uniformly abundant or stable" (Waisberg 1975:183-184). The truth lies somewhere between these two divergent views. Prehistoric populations cannot be characterized as noble savages living in the pristine boreal forest where every season was a season of plenty. Such a view promotes as demeaning a stereotype as any other caricature. Neither can the possibility that alternative food acquisition systems were available for those years that proved to be lean be disregarded, nor can it be discounted that the introduction of European technology driven by European economic objectives and demands led to serious, if not nearly disastrous, depletion of faunal resources. Regardless, the choices for these people were not easy ones. We have no insight into the part which ideational considerations played in the choices made or not made at this time, but we can assume that it was an exceedingly difficult decision to move away from traditional economic responses. The lesson is that those cultural decisions for tactics of amelioration may be impossible when a society is under multiple stresses. Unfortunately for Northwestern Ontario native populations, an enforced diet shift, when it occurred, did not buffer them completely from population decline through starvation, as well as disease.[15]

[15] An example of this depopulation continuing into this century can be seen in the figures from Norway House for the period of 1918-1919. This community in northern Manitoba lost 18% of their adult population (ages 20-64) in the space of six weeks. This compares with the overall rate of 3% for indigenous populations affected by the influenza during the pandemic of that year (Herring 1994: 96). "Its key position in the fur trade network and frequent contact with locations to the west, northwest, northeast, and south left it particularly vulnerable to imported micro-organisms" (1994:97). Ray notes the location of settlements with respect to active trade routes as a central factor in the infection rate for indigenous peoples in the 19th century (1976:156). A general account of the depopulation of the Americas can be found in Zubrow (1990).

CHAPTER TWO: Boreal Shield of Ontario: archaeological observations

> **...sites have frequently been subjected to destruction by water inundation, dense forest invasion, and acidic soils; consequently, they yield comparatively sparse recoveries. They tend also to be concentrated in ecologically favorable locales, with the result that they have superimposed deposits, frequently of an equivocal nature. Often hundreds of years of human activity are compacted into a depth of only a few centimetres (Dawson 1983: 55).**

2.1: Environmental Overview of The Archaeological Study Area

The Boreal Shield Ecozone, known geologically as the Canadian Shield (Figure 2.1) extends from Newfoundland in the east to northern Saskatchewan in the west and has a low rolling relief over a "...massive, crystalline, acidic, Archean[1] bedrock..." (ESWG 1996: 97) (Plates 2.1 and 2.2). During the Pleistocene this area, along with the rest of Ontario and indeed much of what is today Canada, was covered with the last of at least five major glaciers of the Ice Age in North America (although Prest (1965:7) notes four major Pleistocene glaciations and three interglacial stages) extending southward from the arctic into present day northern United States and from the Rocky Mountains on the west to the Atlantic Ocean on the east. Deglaciation began after the sixth of seven advances, the Valders sub-stage at approximately 11,800 BP, of the last glacial episode called the Wisconsin (Prest (1965:7) suggests the Wisconsin could have spanned as much as 100,000 years in total). The glacial retreat continued uninterrupted from 11,200 BP onwards except for the three minor localised advances of the seventh sub-stage, the Cochrane (Hough 1958: 103-108). The Holocene or Recent has been characterised by 'normal' to cool temperatures and precipitation except for the altithermal between 4000-6000 BP, a relatively dry, warm period (Hough 1958: 128). Because of this glaciation history, the area is covered with a extensive mantle of glacial deposits of various descriptions, mostly moraines.

The development of the Recent (10,000 BP to present) non-glacial interval soils over the Archean bedrock and its overlying glacial tills and gravel deposits has been and continues to be through the slow organic process of plant colonisation and community succession. It is during the Recent, in particular from the time of the Minong Stage (6500-6000 BP) in the Lake Superior Basin, that this area of Ontario would have been ice free

[1] The earliest eon of the Precambrian era dated to 2.5 to 1.8 billion years ago.

and available for human habitation. Present day shorelines, except for areas where hydro-electric projects have altered systems, may not naturally represent shorelines of ancient times. Depending on the post-glacial lake stage (Hough 1958: Table 22; Figures 68-75) shorelines of the past could now be either well inland or fully submerged. Thus the Boreal Shield landscape of today is the result of the complex interaction of geological history including post-Precambrian metamorphic processes, weathering, changes in climate (GHS 1996), and the biological succession followed by the intercession of humans in the Recent. The major structural changes to this landscape initiated by humans cannot be ascribed only to those cultural forces of the post-European contact period, although these have been significant. The peoples of the past, of prehistory, impacted this natural world as well.

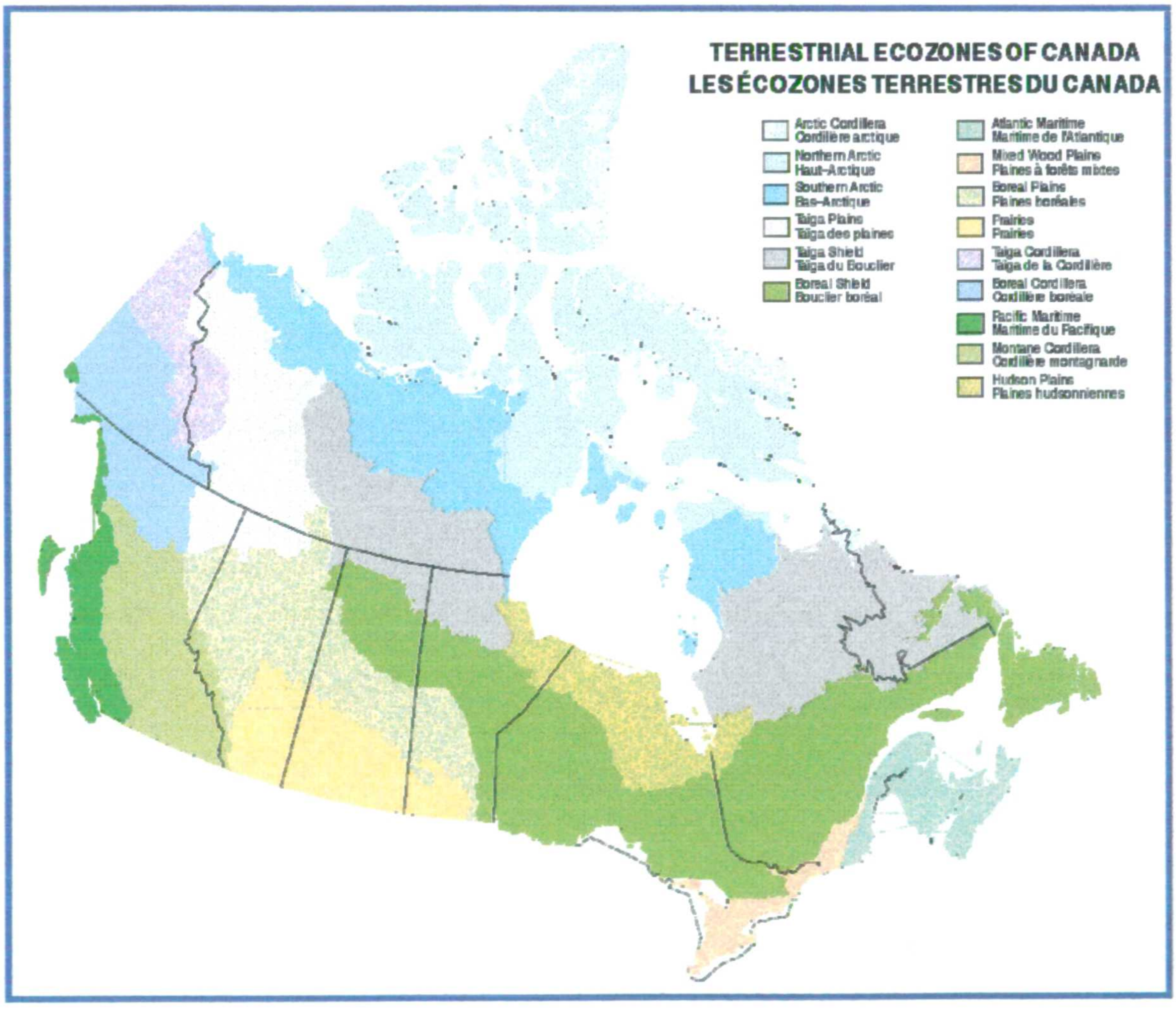

Figure 2.1: Ecozones of Canada. (ESWG 1996)

Plate 2.1: Archean bedrock outcrop of the Canadian (Boreal) Shield.

Plate 2.2: Archean bedrock outcrop of the Canadian (Boreal) Shield.

The soils of the Boreal Shield range from the tundra-like Brunisols in the north to Podzols in the south (USDA 1960). The northern Brunisols have a thin organic horizon over a light olive-brown acid silt loam (A_1), a dark grey silt loam (A_2), and a very dark grey silt loam and some peat (C). The highly leached southern Podzols typically have an organic horizon (O) over a grey-brown loam (A1), a brown loam (A2), a sandy loam of variable colour (B2), a transitional yellow sandy loam (B3), and a weathered rock and sand horizon (C) (Clapman 1973: 206-208). The soils are uniformly acidic (pH < 7). The acidic nature of the soils is explored further in the discussion of the bone taphonomy in Chapter Four.

The intermix of moraines and bedrock with pockets of soil creates a landbase mosaic that is reflected in the complexity of the floral communities. The moraine areas, when undisturbed by natural or cultural forces such as fire or logging, generally support closed stands of conifers such as white spruce (*Picea glauca*), black spruce (*Picea mariana*), balsam fir (*Abies balsamea*), and tamarack (*Larix laricina*). As one moves to the south deciduous tress such as birch (*Betula papyrifera*), trembling aspen (*Populus tremuloides*), and balsam poplar (*Populus balsamifera)* as well as various types of pine trees such as the jack pine (*Pinus banksiana*), red pine (*Pinus resinosa*), and white pine (*Pinus strobus*) (ESWG: 1996) are interspersed. However, the complexity of the environment stemming from the local soil conditions can be seen best in local distributions of shrubs, herbaceous plants, lichens, and mosses. A more detailed but concise description of this area with respect to the soils / climate produced vegetation is contained in the forest regions seen in Figure 2.2 and the detailed floral assemblages of Table 2.1, both found below.

Northwestern Ontario, in common with other North American high latitude boreal areas, has extensive paludic and telmatic wetlands, as well as riverine and lacustrine aquatic wetlands and their associated ecotones (Figure 2.3). Human use of these systems are discussed in detail in Chapter Five. Northwestern Ontario wetlands are varied in their composition and economic potential. Palustrine wetlands have the principal feature of periodically or seasonally saturated soils or substrate (Cowardin et al. 1979:5; 10) while telmatic wetland formations are saturated year-round. Besides the lakes and rivers, the most important of these habitats for economically significant plants and animals are marshes, swamps, fens and bogs incorporated in the general term of 'mire' (Wheeler 1995;12).

While the most northerly regions of this study area retain, somewhat, what is believed to be a pre-contact biological configuration, the southerly parts do not. Three types of changes have occurred in these southern parts since the beginning of the massive deforestation by cutting in the late 1800s:

- the age structure of the forest has been shifted to first and second stage regrowth, where forests have been retained at all;
- the ratios between some species have been shifted to reflect the early succession structure of the forest;
- and some areas that were previously open are now forested while the converse is also the case.

The conservative estimate for the pre-contact ratio of 'climax' to first/second stage regrowth forest is 3:1. Today the 'climax' forest has been reduced, in the southerly parts, to as little as 1% (Meeker, et al. 1984). The major deforestation activity was the 'harvesting' of trees for 'wood products'. These products were used as timber and lumber in building for the expanding Euro-North American population, railway ties as the railways of North America were pushing westward and then outward from the main lines (in some areas wood was burned to heat the boilers for the steam engines of the railway), as well as pulp for paper. Other land was simply cleared to facilitate farming. This was the case in the more southerly portions of the study area where suitable growing seasons for northern type Eurasian crops were found or hay fields were maintained to support Eurasian livestock, primarily dairy and beef cattle as well as horses. Trees were felled, roots pulled out and the resulting 'waste' burned. This process of land clearing was and is similar to the slash-and-burn method seen in horticultural cycles in other areas of the world, in particular tropical and semi-tropical environments. However, in temperate areas this becomes, with crop rotation, short fallowing, and with fertilisation regimes, a one-time only job. Thus the cleared fields were kept as open farmland except for expedient wood lots. Although such 'development' destroyed intricate forest systems it afforded expansion opportunities to species such as *Odocoileus virginianus* (White-tailed Deer).

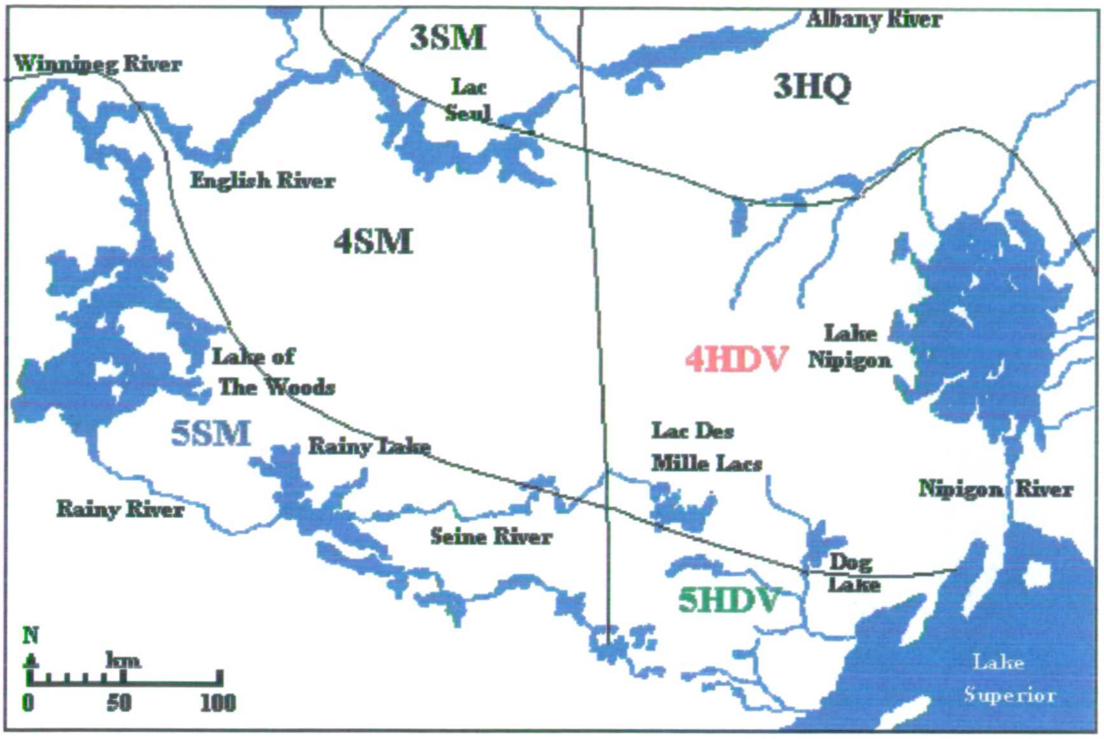

Figure 2.2: Forest Regions, Northwestern Ontario. (after Hills 1976:86)

CLIMATE→	WARMER	NORMAL	COLDER
SOIL ↓ DRYER	pine birch poplar-blueberry-heath	pine-poplar-heath-herb	fir-spruce-cedar-birch-moss-alder-bracken-heath
NORMAL	pine-spruce-poplar-birch shrub-herb	fir-spruce-birch-poplar pine-moss-herb	spruce-fir-birch-moss-squashberry
WETTER	fir-spruce-polar-cedar-moss	fir-spruce-sphagnum-alder ash	spruce-larch-alder-sphagnum
			4 Hdv
DRYER	oak-maple plum-pine birch-grass leatherwood	pine-heath-sedge	fir-birch-moss-clubmoss-heath
NORMAL	maple-birch pine-basswood hemlock-spruce herb	maple-birch-herb-bramble-(hemlock)-spruce-pine-fir	spruce-fir-birch-poplar-moss-clubmoss
WETTER	elm-ash-cedar-maple-birch herb-moss	fir-spruce-cedar-ash-moss-herb	spruce-larch-alder-sphagnum
			5 Hdv
DRYER	oak-elm-,maple-grass-sedge-poplar plum-herb	spruce-birch-poplar-pine-bracken-herb	birch-pine-moss
NORMAL	pine-poplar-herb maple-basswood-nannyberry-herb	spruce-fir-poplar-birch-forb grass	fir-spruce-moss
WETTER	ash-elm-maple-cottonwood-herb spruce-pine-cedar	spruce-poplar-fir-cedar-moss	spruce-larch-sphagnum
			5 Sm

Table 2.1: Floral assemblages of forest regions, NW Ontario. (after Hills 1976)

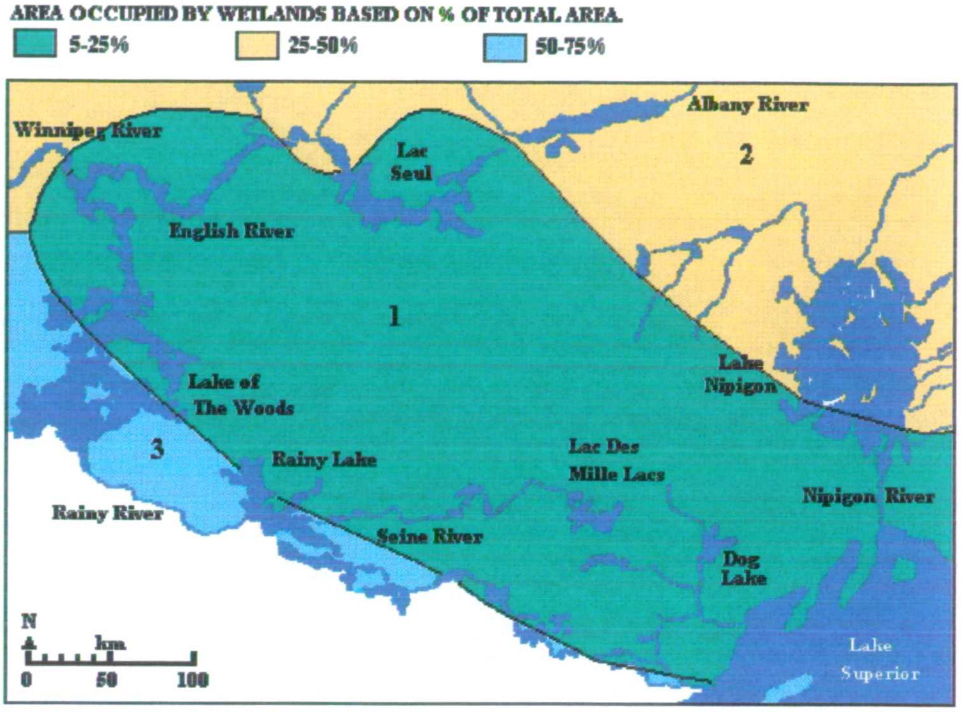

Figure 2.3: Wetland percentage map for the study area. Includes bogs, fens, swamps, ponds, creeks, streams, rivers and lakes, excluding Lake Superior. (adapted from WQRO 1984)

Draining and/or filling of marshy areas was done to increase arable land. These wetland habitats supplied the resting locations for spring and fall migrating birds, the breeding grounds for the spring through fall resident ducks and geese and year-round habitats for fish and economically important mammals such as *Castor canadensis* (American Beaver). The wider implications remain unexplored as there is no ecozone based data on the past and ongoing changes to the aquifer and groundwater systems created by deforestation and wetland loss through 'reclamation' projects in this area of North America. Thus the conversion of 'waste' land into land suitable for cultivation, therefore 'development' through either agriculture or silviculture, is the objective. The use of the term **'reclamation'**, very much a "plastic word" (Porksen 1995), disguises the transformation processes that have been imposed on 'natural' / 'wilderness' systems or economic systems composed from unrecognised or discounted alternative cultural paradigms. Other plastic words, such as **'development'**, "...marched through the language as an independent authority....a stereotype, a finished block, an object...that rewrites history, paints over controversy, and locates unpleasant happenings in nature" (Porksen 1995:18, 20). These words frame the way we think of biological and cultural worlds, particularly those defined as the worlds of 'others', human or otherwise. They are the words used by the dominant group to transform not just these worlds of others but the meaning of the dominant group's objectives and propagate "...a single vision of reality..." and create "...consensus" (1995:20).

The climate of Northwestern Ontario, for all the study area but the Rainy River area in the extreme south-west, can best be described as cold with the region dominated by Hudson Bay air masses. The average number of frost free days is 80 (range 60-100) but may be as few as 40 at some locations in some years (ESWG 1996). Temperature and precipitation information for Northwestern Ontario is summarised in Figures 2.4 through 2.9.

The landscape and the climate are the dominating features for present day researchers working in the northern boreal. This inescapable reality offers insight into the past. The constraints, and indeed the opportunities, of such habitats come into stark clarity. Today, for the outsider, the most distant areas can be reached only by bush plane. Indeed, some First Nation peoples now use such transport to reach their remote Autumn and Winter camp staging areas. The best means of access to the shores of lakes for site survey and excavation is still the traditional form of transport, the canoe (the powered inflatable, called a Zodiac in Canada, is sometimes substituted), but now with a small outboard motor as well as paddles. Once on the lake one must always be vigilant for storms that can blow up quickly from the west and north-west. However, it is the gale force conditions, following easterlies, that are most feared. Such conditions can turn a pleasant canoe trip into a fight for survival. This is particularly so if deep wave patterns stir up 'deadheads', semi-submerged tree trunks and large branches. Lurking just below the lake surface, deadheads can punch a hole in the canoe of the most experienced paddler. Further, many of the lakes are relatively shallow, this being the result of their glacio-lacustrine formation during the early Holocene. Such lakes quickly develop deep wave patterns that rebound from the lake bottoms to produce irregular secondary wave patterns making canoe navigation particularly treacherous. Sometimes these wave patterns take days to "iron out". As such, it is not surprising that some of the most powerful mythic figures of the boreal area are thosespirits, not infrequently described as underwater people, associated with thunder storms and squalls (Tanner 1979: 96). Even today a drowning can be attributed to these spirit forces and result in discussions of a theological nature between adherents to the new religion, Christianity, and those that follow the traditional spiritual path. In the late summer of 1979 just such an incident occurred. The shaman from the Rainy River Band disappeared in the waters of Lake of The Woods (although his girlfriend survived) during a particularly violent storm. His body was not recovered. The debate centred on whether he had ascended directly to heaven (as expected with a Christian holy man) or whether he was in the underwater domain with the traditional spirits[2]. This resulted in a brawl at the local tavern, the upshot of which was that the building was burned to the ground. It was on this lake during an equally vicious storm shortly thereafter that my colleague and I nearly met a similar fate, however devoid of any religious overtones, to that of the shaman. In this context the observations of Father Claude Alloüez are interesting. In his report on his 1665 journey to Lake Superior he commented:

> *On a veu pendant quelque temps, comme un gros rocher tout de cuiure, dont la pointe sortoit hor de l'eau; ce qui donnoit occasion aux passans d'en allee coupper des morceaux: Neantmoins lorsque ie passai en cet endroit, on n'y voyoit plus rien: Ie croy que les tempestes qui sont ici fort frequentes, et semblables à celles de la Mer, ont couvert de sable ce rocher: Nos Sauvages m'ont voulu persuder que c'estoit une divinitélaquelle à disparu, pour quelque raison, qu'ils ne disent pas* (Alloüez in Thawaites 1896-1901: Vol. L).

There is a unity of the sacred and the profane seen in the "..belief in forces and influences and actions which, though imperceptible to senses, are nevertheless real" (Levy-Bruhl 1966:25). This unity offers us insight into the collective representation of the world by an indigenous society (Von Maltzahn 1994:20). This will be expanded on later in the analysis of landscape. Of further note at this time is the fact that the Lake Superior area provided copper to much of eastern North America from circa 4000 BC until the historic period (Harris n.d.: Vol. 1, Plate 14). It was this copper that was important for certain functional and iconic pieces as well as items of personal adornment from the Archaic through the Woodland Periods. And in this northern part of North America copper tools of remarkable cold hammer construction have been found in Archaic burials (Griffin and Quimby 1961; Dawson 1966; Kenyon 1961; 1971). Analysis of landscape, of necessity,

[2] The Underwater Manitou "...possessed great and dangerous powers...(could) cause rapids and stormy waters...sank canoes and drowned Indians, especially children...(could cause) sudden squall waters...(and was seen by some as) a thoroughly malicious creature" (Vecsey 1983: 74).

must include some discussion on communication/transportation networks that facilitated the diffusion of ideas and the distribution of resources.

Early season and damp late season field work are never as comfortable as dry summers or the serene days of Indian Summer following the first good frost. The warmth of spring and summer promotes the breeding of mosquitoes and blackflies, which, in dense black clouds, torment humans and beasts alike. The call of a loon or a wolf at dawn, so evocative of this northern world, assuages the spirit of only the most romantic bug bitten researcher. Regardless, northern living and fieldwork can be pleasant later in the summer season, if dry conditions prevail in July and August. This can be the case even into September. The caveat, when things are dry, is that one must be careful not to start a forest fire. Fieldwork can be best and easiest in the very late summer and early autumn before the snow starts. But even with the snows, proper clothing permits an extended field season if the ground does not start to freeze or become deeply covered with snow. Still, one must never misjudge the weather and overstay. Although heralding stable winter conditions that can persist until the spring, the period of freeze-up may trap the ill-equipped researcher. Here it is sufficient to note that freeze-up and break-up, discussed later in the ethnographic section, are considered by the indigenous peoples to be the most hazardous periods for the traveller.

2.2: The Culture Sequence of Northwestern Ontario:

Northwestern Ontario and its peoples first appear in written accounts related to both French and English exploration and the subsequent fur trade in North America. The earliest and best known of these documents, the ***Jesuit Relations***, date from the 1650s to 1660s for this area of North America (Thwaites 1896-1901). Other important early materials are found in the archives of the Hudson Bay Company. These documents extend back to the discovery of Hudson Bay by Henry Hudson in 1610 and the granting, in 1670 by Charles II, of northern North American territories as Rupert's Land (defined as all lands drained by rivers flowing into Hudson Bay) to the Hudson Bay Company. In addition, the travel accounts of early explorers offer a varied picture of environments and peoples. Some of these chronicles are interesting for their fortuitous ethnographic content, while others provide bizarre and fantastic descriptions that, although capturing the imagination of Europeans, furthered misconceptions and offered little to help Europeans develop a true understanding of the complexity of cultures and peoples found in North America. Three of the many examples of exploration or travel accounts with 'ethnographic' content are ***The Works of Samuel de Champlain*** (Champlain 1922-36) written in the first half of the 17th Century, Alexander Henry the Elder's ***Travels and Adventures in Canada and the Indian Territories Between the Years 1760 and 1776*** (1969) from a century later or J. Long's ***Voyages and Travels of an Indian Interpreter and Trader*** first published in 1791 (1904) from the same period. Long's 1791 map can be seen in Figure 2.10. It is from these accounts and subsequent written documents, including modern ethnographic works of anthropologists (Bishop 1970; Cooper 1939; Hickerson 1967; Rogers 1972; 1963; 1962; Rogers and Black 1976; Speck 1973; Tanner 1979) that the direct historical approach was adopted and developed for the interpretation of the archaeological record of Northwestern Ontario. Thus there was a direct link made between the historically known First Nations (hereafter denoted as FN) and the cultural manifestations of the prehistoric period of this area (Bishop and Smith 1975; Dawson 1977; Wright 1968).

The twenty Northwestern Ontario archaeological sites that provide insight into the faunal resources of the region demonstrate two prehistoric cultural patterns, the Archaic and the Woodland. The earliest occupations of this area of North America have been attributed to Paleo to early Archaic peoples, mostly known from the Brohm Site (at circa 10,000-9000 BP the most ancient site defined for Northwestern Ontario)(MacNeish 1952) and the Cummins Quarry Site, both found on Lake Minong beach stands (Steinbring 1976:21) just north and west of Thunder Bay in the Thunder Bay District. These early people are recognised from the unique red jasper taconite used in lithic manufacture of lanceolate[3] style projectile points classified as Planview in type (Steinbring 1976:22) as well as a diverse lithic assemblage of scrapers, choppers, and knives that are inferred to illustrate the processes of both skin preparation and woodworking (Steinbring 1976). This material continues in use well into the Archaic and is seen in what has been called the Reservoir Lakes Phase (Steinbring 1974), which is certainly Shield Archaic as defined by

[3] Concave based lance-shaped points usually with parallel opposite sides for at least one half their length. In North America the earliest forms date from the Paleo-Indian Period and are represented by the unique fluted forms of Clovis and Folsom first defined in the 1920's from their name sites in New Mexico. Clovis and Clovis-like points have been identified in southern Ontario (Mason 1981.83-91) but have yet to be found north of Lakes Huron and Superior. For the most part true Folsom forms are restricted in their distribution to prairie and plains settings. The later Plainview, an unfluted Folsom-like point, generally has a wider distribution than the earlier fluted Folsom.

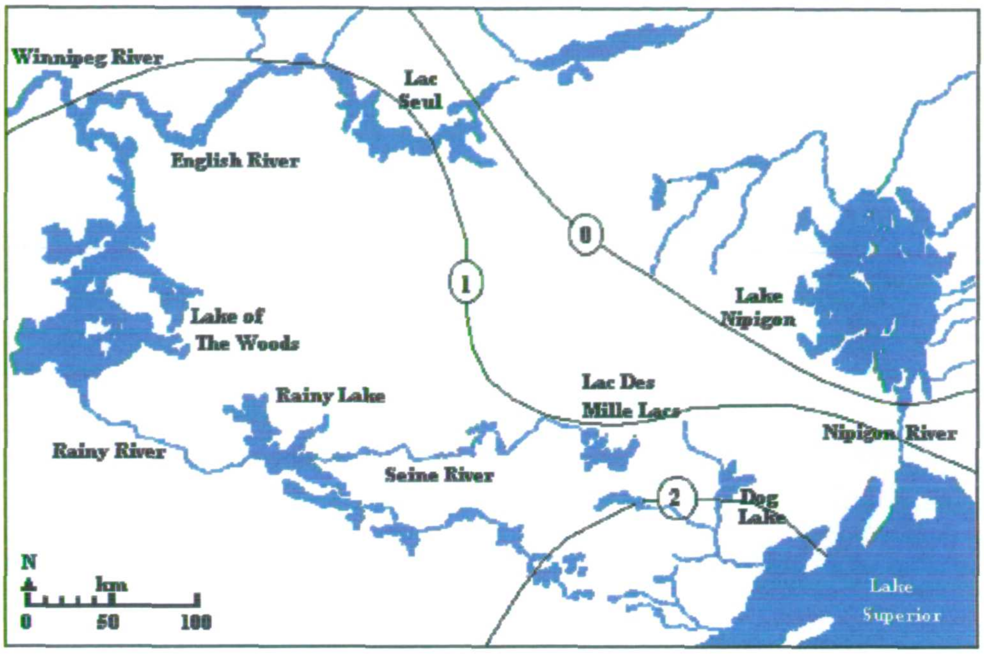

Figure 2.4: Isotherms of mean daily temperature (degrees celsius). (ORA 1958)

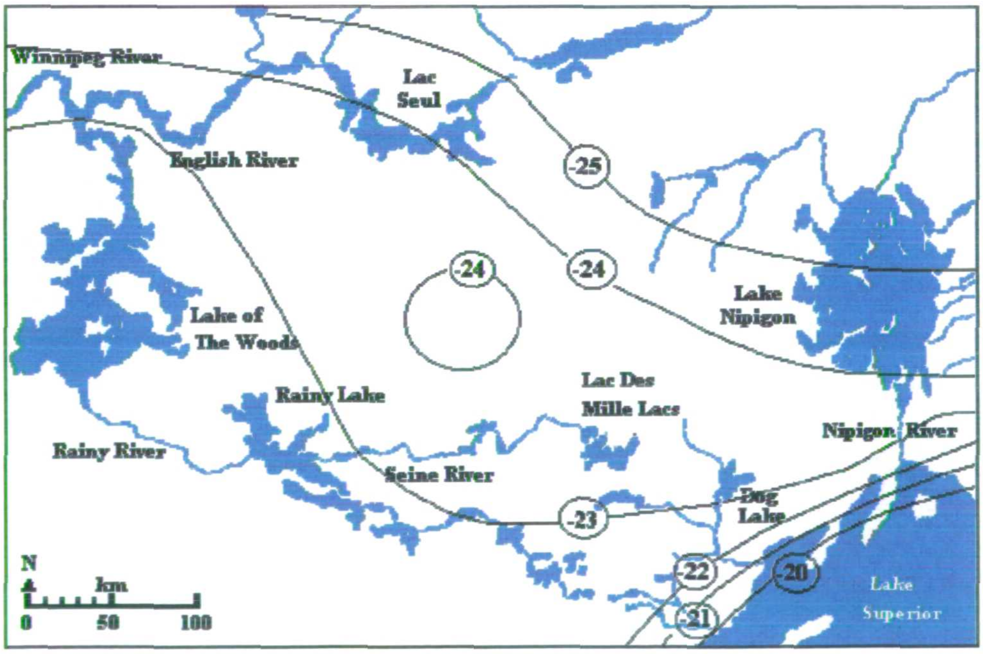

Figure 2.5: Isotherms of mean January minimum temperature (degrees celsius). (ORA 1958)

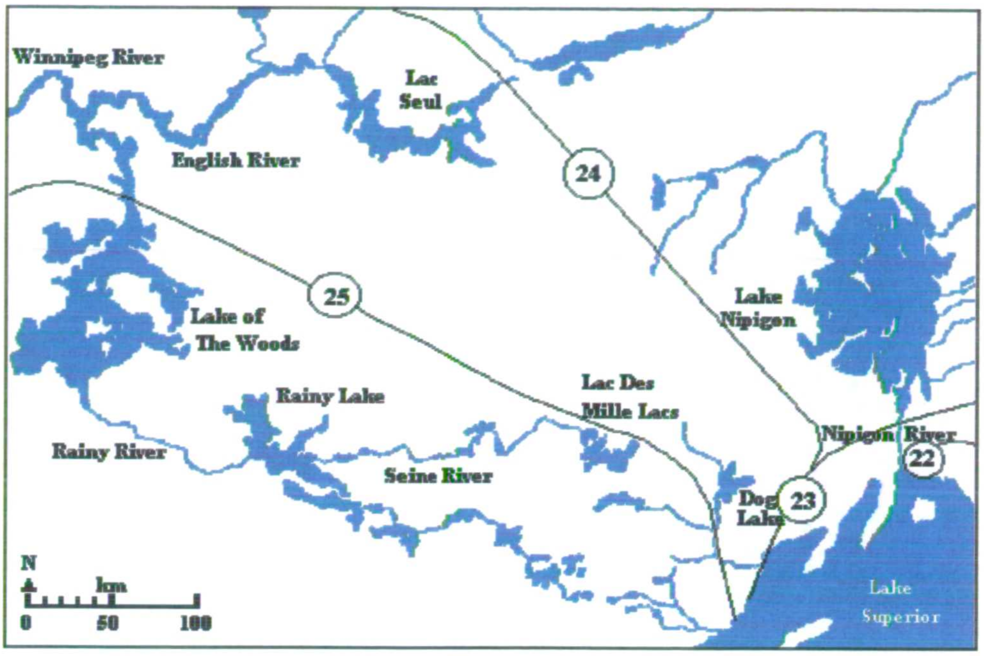

Figure 2.6: Isotherms of mean July maximum temperature (degrees celsius). (ORA 1958)

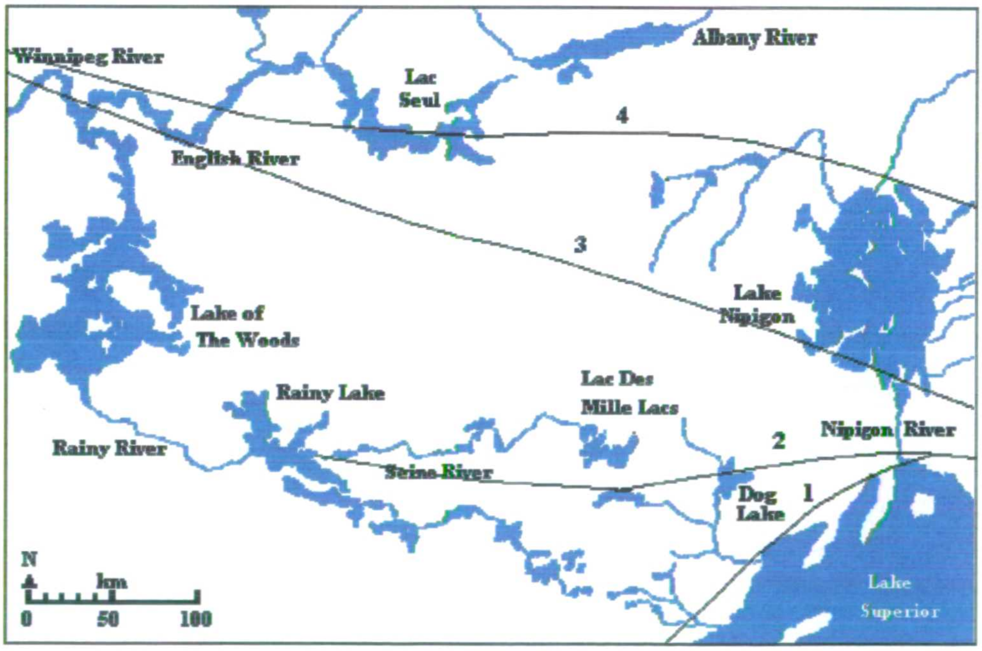

Figure 2.7: Freeze-up and break-up dates for NW Ontario. 1. Lake freeze-up Dec.1; 2. river freeze-up Dec. 1; 3. river break-up April 15; lake break-up May 1. (WQRO 1984

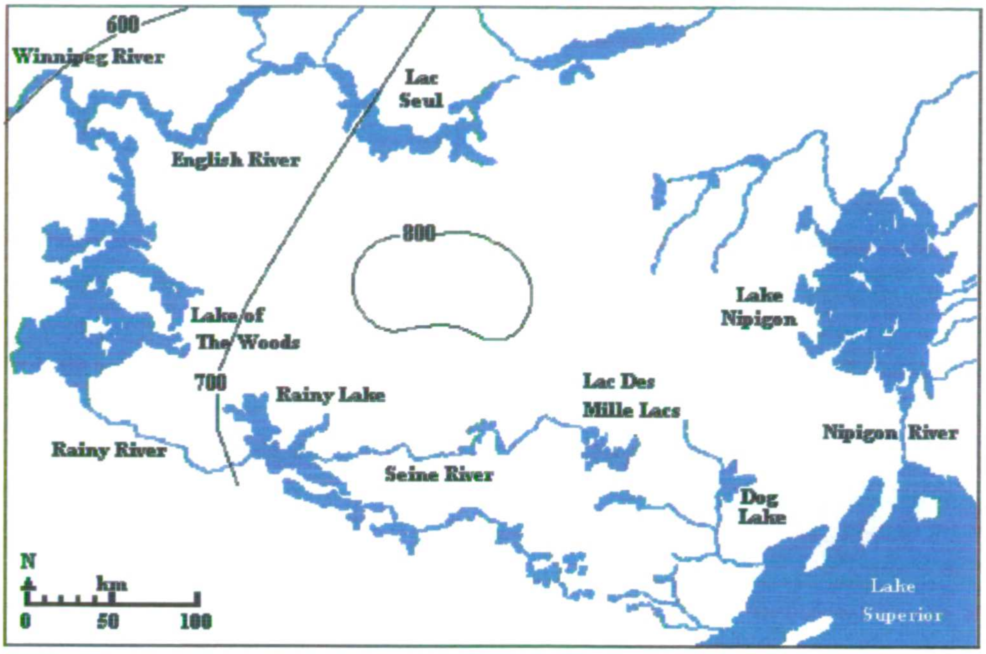

Figure 2.8: Mean annual precipitation (millimetres). (WQRO 1984)

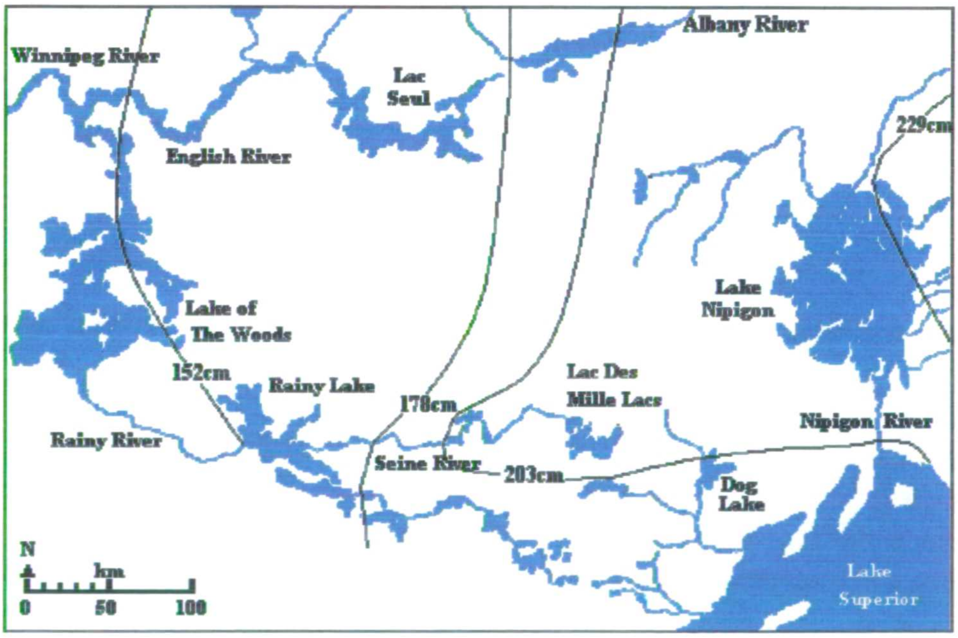

Figure 2.9: Snow depth clines (millimeters). (WQRO 1984)

Wright (1972) for this area of Ontario. However, the use of red jasper taconite subsequently was discontinued. Although this early cultural manifestation is noted here in passing, it is not found in the sample sites used in this thesis. This is probably in part a function of survey techniques. More significant, however, is the loss from historic period economic activities of the most ancient beach stands in many areas of Northwestern Ontario. These ancient beaches would have been optimal site locations in the newly emerging boreal post-glacial environment and their loss contributes to our lack of understanding of the initial peopling of this area of North America.

The designation of cultural patterns, Archaic and Woodland, which are techno-temporal regardless of the intended application, was first applied to prehistoric cultural manifestations of the Midwest and Eastern United States sixty years ago (McKern 1939). Now generalised, it is applied to the Eastern Woodlands of Canada. Although designed to make more inclusive cultural categories through space and time, the salient feature of these cultural designations is that they were, and yet are, made on the basis of typologies applied to artefacts most particularly ceramics and lithics. However, pottery typologies became especially significant since it is pottery that by definition, more or less, provides the great divide between the a-ceramic Archaic and the ceramic Woodland patterns. Certainly within the Woodland pattern, pottery provides some temporal and spatial cultural distinctions. Although the McKern terminology was devised and applied in the 20th Century, it is conceptually the outcome of 19th Century 'scientific' philosophy where 'primitives' became the analogy for the understanding of our own prehistory (Murray 1993:79). So, although pottery was invented, borrowed, added in some manner, the question remains: Did the addition of pottery significantly alter the perception of those who used it and so altered social consciousness about self and society?

How this plays out in the context of the concepts of 'tradition' and 'complex' could be a point of discussion. Sufficient to our need here is the Willey and Phillips (1958:37) definition of 'tradition' as a "...temporal continuity represented by persistent configurations in single technologies or other systems of related forms." Thus archaeological complexes ('complex' as defined by Syms (1971:71)) in a specific geographical region related through time, although exhibiting stylistic change over the time interval, are traditions. And that is the problem. In this context of denotation these groups show change in stylistic features of technology, such as projectile points and the addition of and stylistic change of pottery, but it is thought that core items such as "shared lifestyle" (Syms 1971:71) remain relatively constant. Thus cultural/temporal definitions are made mostly on the basis of stylistic criteria of pottery and lithics.

This part of North America has been characterised as a "cultural backwater" where "...innovations were incremental, the culmination of accretional improvements in technology..." (Mason 1981:138). And Hamilton has observed that these cultures "...all exhibit **similarities** in terms of **subsistence orientation, social organization, and types of tools**" that is not surprising considering the considerable temporal-spatial overlap demonstrated in the radio-carbon determinations (Hamilton 1981:23-24)(emphasis added). Here rests our answer to the question posed above. The temporo-cultural designations offer us a time line but within this time line can be seen traditional cultures stable in their social structure and economic responses to their environments. Therefore, if we accept the view of Hamilton, technological innovation and introduction enhanced but did not alter life-ways. If this is actually the case, the application of the direct historic approach is of even greater significance in this instance.

2.2.1: Prehistoric and historic cultural designation categories:

The current standard allocation of temporal / spatial designations are listed below followed by a discussion of the post-contact proto-historic and historic periods.

The **Archaic**: pre- 700 BC according to Wright (1972b). However, Pollock puts it as late as 200 BC in the northeast (1975).

It is also known as the **Archaic Pattern** (McKern 1939) and the **Archaic Stage** (Fiedel 1987:86-112) and in this area of North America the **Shield Archaic Tradition** (Meyer 1996:4; Mason 1981:133-139). It is defined on the basis of lack of pottery and the presence of ground slate implements (McKern 1939; Trigger 1989:190).

The **Woodland Stage** or **Woodland Period** or **Woodland Pattern** (McKern 1939): as early as 700 BC to as late as 200 BC running through to the Historic in the 19th Century AD in some areas.

It is defined on the basis of presence of pottery and stemmed and / or side-notched projectile points (McKern 1939; Trigger 1989:190), however, it is interesting to note the stemmed and notched points from the preceding stage, the Archaic (Mason 1981: Plate 4.8). It is divided into traditions or periods on the basis of pottery types. The Woodland as a temporal designation takes on a somewhat nebulous character when we consider its internal divisions and its relationship to the preceding temporo-cultural category. It offers, perhaps, an excellent illustration of Binford's discussion of differential participation in culture (1965:127) as outlined in the previous chapter.

a. The **Laurel Tradition (Initial [Early] Woodland Period)** dating in the north-west from circa. 700 BC to AD 1000 according to Wright (1972a:59) although Hamilton (1981: 24) puts this terminal date as late as 1200 AD, and in the north-east from circa 200 BC to AD 400 (Pollock 1975:29). However, Mason characterises Laurel peoples as the "...northernmost of the Middle Woodlanders..." (1981:284).

b. A **Transitional Period** represented by late Laurel Tradition ceramics in association with transitional Laurel ceramic forms and the later characteristic Blackduck ceramics firmly associated with the next period, the Terminal Woodland, (Dawson 1976:17). This is dated by Hamilton (1981:24) as early as 400 BC to as late as 1200 AD in some areas of the north-east.

c. The **Blackduck Tradition (Terminal [Late] Woodland Period)**: dates in some to areas as early as 400 BC and as late as the historic mid-17th century (Hamilton 1981:24)). Mason comments on an "early" (cordmarking) and "late" (fabric-impressing) phase on the basis of surface treatment of Blackduck ceramics (1981:313). To the west and north can be found the related **Selkirk Tradition** with its own ceramic types, later than Blackduck in both its initial and terminal dates of 800 AD to the 19th century AD (Hamilton 1981). It represents the prehistoric culture of the peoples in those transitional ecotones from the boreal forest to the prairies leading to the great plains in the west, and to the tundra in the north.

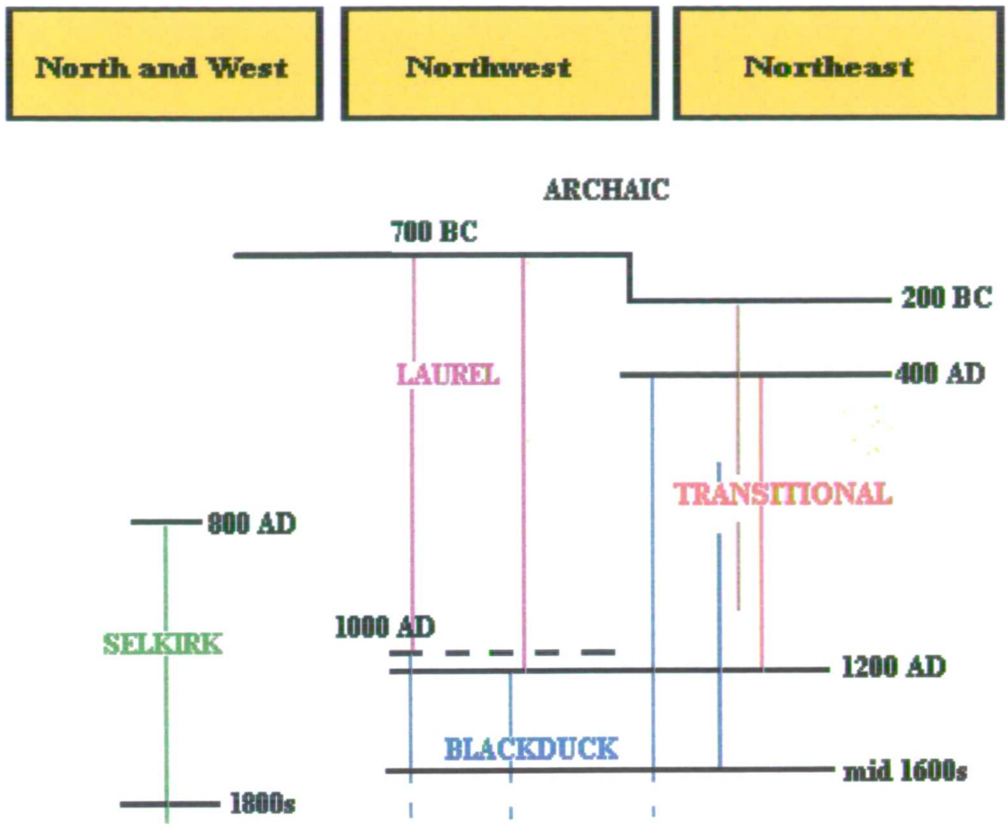

Table 2.2: NW Ontario prehistoric temporo-cultural timeline designations.

The Terminal Woodland in this area is considered to be the pre-contact manifestation of the Algonquian groups known from written documentation in the early and later contact period. Algonquian (also written as Algonkian), as the term is understood from anthropological linguistics, designates an Amerindian language family. Geographic subdivisions are used in the analysis of the early pre-contact cultures, based on spatial regions of northern, western, southern, and eastern throughout the northern part of Ontario and Quebec (and indeed Canada from the northern prairies of Alberta to the eastern seaboard of the Labrador coast). They have correspondence thought to relate to linguistic variations found in the contact period and noted by the general terms of Ojibwa (southern) and Cree (northern, western and eastern). Here we should note that Chippewa and Ojibwe (Ojibwa) are now considered to be the same, both linguistically and culturally, with the confusion stemming from the transliteration of their name to written English in the early contact period. This can be demonstrated by the addition of the letter "o" to the front

"Chippewa" to make "O'chippewa" and then comparing this to the pronunciation of "Ojibwa" (Sultzman 1997:2-3). The Ojibwe's actual name is ***Anishinabe***, meaning "original men" (1997:3). ***Anishinaabeg*** (also transliterated as *Anishinaubag* (Sultzman 1997)) is used to designate "original people" (FDLCC 1997). Both the singular and the plural are in the masculine form and reflect the close associations of men in the patrilineal - patriarchal construct of the social domain. Therefore Ojibwe' and 'Cree' are individual languages with their own dialects, and used as designations they denote two major culture groups and thus geographical distributions.

Although Hierosme Lalemant noted the Algonquian language in letters to Father Superior Paul Le Jeune as early as 1639 (Thwaites, editor 1896-1901: Vol. XVI), it was in Father Claude Alloüez's report of his 1665-1667 excursions to the area around Lake Superior (seen in French documents of this time as *Lac Tracy*) that the first comments were made on spatial-linguistic distinctions of the Algonquian language(Thwaites, 1896-1901: Vols. L and LI). Father Alloüez observed that the Ousakiouek and the Outagamiouek "*...alliée avec les precedantes* (the Pouteouatami he had discussed in another context), *et d'ailleurs elles ont mesme langage, qui est Algonquin, quoi que beaucoup different en divers Idiomes, ce qui donne bien de la peine à les entendre."* and of another group he stated "*Les Ilimoüec parlent Algonquin, mais beaucoup different de celui de tous les autres peuples"* (Thwaites, 1896-1901: Vol. LI). A brief but fairly comprehensive review of Cree dialects can be found on the World Wide Web (hereafter denoted as WWW) (Schoeneborn 1995). Beyond the discussion of the dialectical differences, Darnell (Schoeneborn 1995:4) notes that these are distinguished on the basis of their reflexes of proto-Algonquian *theta* (θ), phonemic shifts (/n/-/l/) and certain lexical variations. Regardless, the emphasis has been on regional variation even though there can be considerable differences between communities within each dialect. Indeed in recent times Algonquian communities have been studied for aspects of crossing and partial dissolution of linguistic boundaries. Such studies attempt to address the issue of ethnic identity (Wolfart 1973). Whether crossing and dissolution reflect patterns from deep time or are the result of various contributing factors from the historic period is unknown and indeed may be unknowable.

Figure 2.10: Long's 1791 map of the western countries of Canada (1904).

The **Historic Period** (post-European contact)

Certain sites have an **historic component** or what has been called, in some instances, an '**historic overburden**' (Dawson 1976).

Although there were early voyages such as Cabot (1497), Corte-Real (1500), Fagundes (1521), Cartier (1534 and 1535 with reports on Stadacona and Hochelaga) it was not until the 17th Century with the colonisation and exploration programs, initiated by Champlain from 1619 onwards, that the actual proto-historic / historic period can be dated for this area of North America. The immediate impact on the indigenous peoples varies by propinquity to the routes used by Europeans and the immediate impact of European economic demands. Further, the use of the term 'historic' does not necessarily mean that such sites have written documentation associated with them. Rather, 'historic' indicates they are post-European contact in time. This time distinction is usually made on the basis of the presence of European trade goods, regardless of direct contact with Europeans or not, the trade goods perhaps being there by the process of diffusion through a series of indigenous traders. In some instances the term 'proto-historic' is used for those sites that are post-contact and appear in the written documentation of Europeans.

2.3: The Archaeological Sample

2.3.1: Background to the development of the sample:

Sites are found to be one of two sizes: big or small. Large sites are relatively few. For example Hamilton has listed six such sites[4] for the West Patricia District an immense area of 223,500^{2}km. (1981:1; 147). The latter three of these six sites comprise 4.69% of the sixty four sites identified for Lac Seul (1981:147), and are part of the Lake of The Woods - English River waterway system noted elsewhere. Otherwise the bulk of the sites are "quite small and localized" (1981). This 'big/small' pattern is found throughout Northwestern Ontario and can be applied generally to settlement size in all the northern settings considered in this thesis. Further afield it is found in the ethnographic literature for historic groups in Manitoba. Hallowell notes a ratio of 32 winter camps (small/hunting) to five summer (big/fishing) camps (1992:46).

Excluding what is termed an '**historic overburden**' characterised by the presence of European trade goods at the Wabinosh River Site (EaJf-1)(Dawson 1976) and an 'historic' component at the Long Sault Site (DdKm-1)(Arthurs 1982), all sites considered in this thesis are culturally pre-contact. The earliest cultural manifestation represented in this sample, the Archaic, is found at the Sturgeon River Site (DjJa-2). However, Sturgeon River also has the later Laurel Tradition of the Initial Woodland period identified from pottery (Dawson 1976). The Long Sault Site (DdKm-1) on the Rainy River, providing as it does an example of an 'historic' component, may well demonstrate contact with and residency, however temporary, of Europeans or Euro-North Americans in the early historic levels. This is not surprising for the Long Sault site is situated at the primary portage spot on the Rainy River. Although the use of waterways in transportation will be discussed in more detail later, here we can note that this river between Rainy Lake and Lake of The Woods was part of a major east-west route. It ran between Grand Portage on Lake Superior west of Fort William, with Port Arthur now Thunder Bay, and was the terminus of the main route from Montreal to the top of Lake Superior during the period of the French dominated Fur Trade. It provided a staging ground for trips to the west and

[4] The sites noted by Hamilton are: EgKl-1, EiKc-1, EdKh-1, EdKh-8, EdKh-17, and EcKf-2.

north before 1670 (Ray 1974) via the Winnipeg and English Rivers, see Figure 2.14. Fort Osnaburgh on the English River, being only one portage away from the headwaters of the Albany system, allowed access to James Bay. Thought to have great antiquity, these portages were well established at the time of first contact with Europeans. These routes along with overland trails[5], are mostly unknown to us. In the historic period, as fur resources in Northwestern Ontario diminished, and access to the relatively resource rich west became important to European then Euro-Canadian traders, this route was critical to their economic objectives. Such routes were used by the European Christian missionaries as they moved to set up missions, sometimes at the forts but more frequently away from the forts in areas where First Nation peoples congregated at certain seasons such as fall camps or summer meeting grounds. Thus the historic overburden or historic component may reflect a range of European activities or merely be an indication of incidental trade items reaching a location before actual European residence.

The sites listed in Table 2.3, with the exception of Long Sault, are sites that were found in survey and sampled by Dawson of Lakehead University during the 1960s and 1970s. The bulk of the sites selected for this thesis from his work come from his survey of Lake Nipigon in 1967 (Dawson 1976). I came to the analysis of this material and that from Whitefish Lake and Lac des Mille Lac after I had completed the analysis of the material from Dawson's Albany River Survey (Dods 1976). During 1981 I completed the Fort Severn, Ontario area faunal analysis for the Ph.D. dissertation of Jean Luc Pilon (University of Toronto). As well in 1981, I gained further experience in maritime and high latitude mammalian materials with the analysis of the faunal remains from the Clachen Site, Coronation Gulf, NWT for the Ph.D. dissertation of Dave Morrison (University of Toronto). In the years immediately before this, 1979 and 1980, I was engaged in the critical review of archaeological sites in Northwestern Ontario for PARKS CANADA (Latta, Dods and Haley 1980). It was at this time that I visited and assessed many of the sites in this thesis and reviewed the information on these and many other sites from this northwestern area of Ontario. I gained access to the materials from the Long Sault Site on Rainy River. This site had been excavated and used, with only an overview of the faunal material, for the M.A. thesis of D. Arthurs in the late 1970s (University of Manitoba).

[5] Ojibwe overland trails on the south side of Lake Superior were briefly outlined by Kawbawgam and Jaques LePique to Homer H. Kidder in the late 19th century (Kawbawgam 1994:152-153). The article on place names is also interesting in as much as the names offer descriptions of locales such as *ani ah nee mitawang ong* (there is a little sandy beach river)(Kawbawgam 1994:154-157).

Arthurs, a colleague from my days in Toronto, agreed with me that synthesis of faunal material from boreal Canada could possibly offer new insights into ecological adaptations. As such he turned over to me for my detailed work the faunal remains from the Long Sault Site on the agreement that these materials would only receive a brief overview in his thesis that focused on pottery and lithics. He kept to this agreement. Through the early 1980s I completed a detailed although what I considered a preliminary analysis of these faunal remains. For a number of reasons, both intensely personal and mundanely professional, I set aside the analysis until the early 1990s. At this time I renewed my interest in the data completed and did a review of methodology and objectives. By this time I was in a position to move forward with the project. However, to my chagrin my objectives had somewhat changed. At an earlier time I would have attempted, and did attempt, to 'fit' the material into the framework of a 'traditional' faunal analysis. By this I mean an analysis that focused on MNI (minimum number of individuals), butchering, body parts, available meat, and the such. With the faunal remains from some sites this would have been fully appropriate. But the majority of sites in boreal Northwestern Ontario are 'small' not 'big', indeed even the 'big' sites of this area would seem exceedingly small to researchers that work in other areas of the world with different cultural configurations and different taphonomic constraints. Like many sites deep in time, or of ephemeral use, and/or in unfavourable taphonomic environments, and/or sites constrained by in-field sampling choices, the faunal remains are relatively scant. This results in them being somewhat unsuitable to such a traditional analysis. What does the MNI of one beaver mean in a discussion of a food economy? So the traditional analysis in a substantive sense informs us of relatively little in these cases. Does this mean that we ignore this data or do we attempt to seek alternative approaches for different but nonetheless equally valid conclusions? In an newer frame of mind I decided to seek alternative views.

2.3.2: The encoded faunal remains:

I applied the 'traditional' form of data analysis and encoding but tempered the interpretation with by my emerging 'non-traditional' approach to the materials found in this thesis. The resulting analysis permeates this work. The 'traditional' result can be seen in Appendix One, presented in microfiche form, where the analysis codebook including the faunal species list for this part of boreal Canada and all the raw data can be found. Each bone fragment is represented in a detailed data line of twenty eight entries. This will facilitate future use of this data for other, even 'traditional', research objectives.

The data line entries code:

- provenience (**site, level, feature**),
- **catalogue number,**
- taxonomic classification of **Class, Order, Family, Genus, Species,**
- **size** classification from a choice of seven categories based on the live size of the animals in the region ranging, for mammals, from *very small* (***Microtus sp.*** [Vole]) to *very large* (***Alces alces*** [Moose]),
- **skeletal region** (planned as a choice of six classification regions of *cranial, post-cranial axial, pectoral, pelvic, pectoral or pelvic,* or *region unknown* and a seventh category, *shell/exoskeleton,* for the carapace portions of turtles and the shells of invertebrates such as clams),
- **element** (designation to actual bone such as *ulna* or a specific tooth),
- **portion of element,** for example a tooth described as element 064, upper molar 2, in skeletal region 1 (cranial) would be further described as to part of that element ranging from complete to a portion - for example "62", meaning "portion of crown and root",
- **portion of portion of element,** is a designation that firmly defines the amount and orientation of the fragment defined in "portion of element", for example a tooth fragment coded as "62" , meaning "portion of crown and root" as above would further be defined by one of 8 portion of portion designations applicable to this element - 17 buccal, 18 lingual, 19 mesial, 20 distal, 21 meso-buccal, 22 meso-lingual, 23 disto-buccal, 24 disto-lingual,
- **side,**
- **age** and the **criterion for age** designation,
- **sex** and the **criterion for sex** designation,
- modifications (**heat, natural agencies, gnawing, knife marks, fracture, artefact, pathology**),
- and finally **location of modification.**
- So a data line will appear as:

EAJF1N30E153599A06050101D40017015R64U0000000000

while actually, when spaced, representing discrete categories of information:

EAJF1#N30E15#3#599#A06050101#D#4#001#70#15#R#6#4#U#0#0#0#0#0#0#0#0#00

and is read as

site: EAJF1# location: N30E15# level: 3 # catalogue number: 599 #American Beaver [actually Class, Order, Family Genus, Species: Mammalia (A), *Rodentia* (06), *Castoridae* (05), *Castor* (01), *canadensis* (01)] # medium large size # pelvic skeletal region # innominate # ileum # dorsal portion # right # adult # criterion for assigning age is robusticity # sex unknown # criterion for assigning sex not applicable # no heat modification # no modification from natural agencies # no gnawing marks # no knife marks # no spiral fracture evidence # not an artefact # no pathology or anatomical variation # location of modification not applicable.

The sites are listed in Table 2.3 with their site designation numbers, called the Borden Numbers, which place them on a military grid in geographical relation to all the known archaeological sites of Canada as catalogued in a central registry with the Archaeological Survey of Canada, Ottawa. Figure 2.11 provides an overview of their geographical setting. They have been divided into three categories for analysis purposes on the basis of their bone samples. These samples range from 3684 to less than 100 fragments per site. Although it is not intended to present the corpus of the raw data in the text of this work, significant portions of the data will be used or discussed. Table 2.4 summarises the species extant in the area differentiating those identified from all the sites. Appendix One contains the codebook with the modern species list using Class, Order, Family, Genus, Species for this area of North America. There are some minor modifications supported by the archaeological data, for example the inclusion of *Bison bison.*

The first three sites, Long Sault, Wabinosh River, and Martin Bird are primary on the basis of their size and complexity. In other words they are 'big' sites. They have, for this area of North America, significant faunal remains (+2000 fragments) and thus are considered the core sites for the specific analysis. Also, they are representative of major habitat selection strategies illustrating the use of:

- lake systems;
- river systems;
- lake/river systems.

Although a clear distinction of habitat selection is made in the above list, what eventually will be seen is that selections are interlinked in an overall system that illustrates integrated 'cultural categories' for the landscape. In the ethnographic context these categories extend well beyond the definition of the basics of the food quest into the realm of the spiritual landscape. If we choose to apply the direct historical approach we can say that these definitions pertain for prehistory as well. The next six sites on the list, from Lakes Nipigon and Whitefish and Lac des Mille Lac, although considerably less productive in faunal remains, afford some insight into the animals selected and of course are significant for their location in the landscape. Some of these sites prove to be 'big' sites with further survey and excavation work. At this juncture they must be considered as the top end of 'small' in the 'big-small' dichotomy.

However, some sites are of interest only because of their contribution to a broader understanding of site situation in this landscape. Since a very few bones were recovered from these eleven sites they were not sufficient for any profile of faunal use to be developed for each site. These are, for the most part, the truly 'small' sites, in this instance all from around Lake Nipigon, although I suspect[6] that some of these sites may be larger than their samples indicate. The criteria for survey units excavated or for 'adequate' sample size are not defined in Dawson's work. Indeed the criteria may have been under the constraint of time and money or even transportation space/weight.

It is not the overall intent in this work to provide a statement on any one cultural group or period, or even of a specific location in a geographical sense, but rather to construct a model of human ecological - economic patterns in the northern boreal forest and in particular the significance of wetland habitats in the operation of these economic systems in such relatively fragile environmental situations. However, this does not mean that the insights afforded by the Ojibwe and Cree experience, both historically and prehistorically, in this environment will not be crucial to an understanding of economics and use of habitat. It is only through their experience we can come to this model; indeed they are central to the development of any broader understanding. Although the archaeological sites are used as prototypical examples it is still important to consider them first within their specific spatial and temporal contexts. In the next section of Chapter Two

[6] Actually, on the basis of the sampling technique used by field personnel, I suspect that over 80% of these sites could yield significant additional information. The problem is to acquire financial support to 're-do' sites when so much of Canada has yet to even have rudimentary surveys completed.

the archaeological sites of Northwestern Ontario will be reviewed. These are the sites found on the following map in Figure 2.11 and in its accompanying Table.2.3. In Chapter Three further observations on boreal habitats will be developed from the fieldwork in modern northern environments conducted in 1995 in Northern Saskatchewan. Here again these sites will be considered as prototypical examples. The materials from Chapter Two and Three will be the basis for the development of the observations and models found in Chapter Five. Chapter Four will cover some of the taphonomic problems entailed in data such as these and their interpretations. Certainly these issues are not unique to the materials from the boreal Canada. All areas of research that suffer from small sites with scant remains have these problems and similar issues of significant levels of useful data. Those of us who work in areas that have a continuity into the historic have an advantage of this historic period and its documents. We also have the added advantage that the work we do is concerned with the ancestors of known groups in the present. The people of the present and the historic documentation both link us to this past. This is a gift of time and circumstances that many researchers never have the chance to realise.

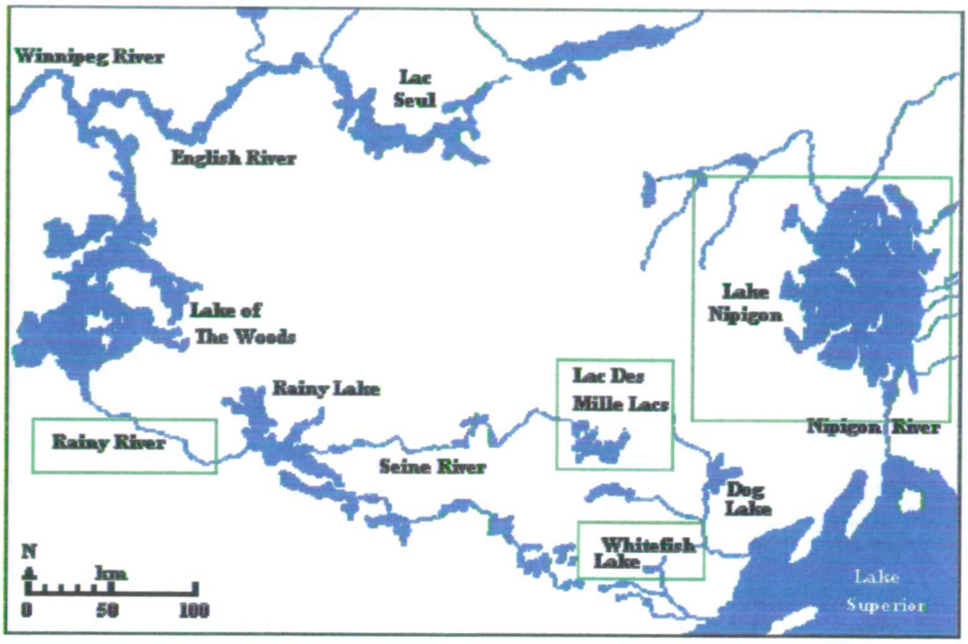

Figure 2.11: Boreal Shield Northwestern Ontario archaeological study area.

SITE NAMES	SITE NUMBERS	LOCATION*
1 WABINOSH RIVER	EaJf-1	LAKE NIPIGON
1 MARTIN BIRD	DbJm-5	WHITEFISH LAKE
1 LONG SAULT	DdKm-1	RAINY RIVER
2 NAZOTEKA POINT	DkJf-1	LAKE NIPIGON
2 PIKITIGUSHI	EbJd-1	LAKE NIPIGON
2 MACGILLVARY	DbJm-3	WHITEFISH LAKE
2 FISHERMAN POINT	DbJm-4	WHITEFISH LAKE
2 KORPI	DfJo-1	LAC DES MILLE LAC
2 CRESSMAN	DfJn-1	LAC DES MILLE LAC
3 WABINOSH BAY	EaJf-2	LAKE NIPIGON
3 WABINOSH CACHE	EaJf-3	LAKE NIPIGON
3 STURGEON RIVER	DjJa-2	LAKE NIPIGON
3 GRANT POINT	DjJa-3	LAKE NIPIGON
3 OMBABIKA	EaJa-1	LAKE NIPIGON
3 SUTHERLAND	DjJe-1	LAKE NIPIGON
3 HUMMINGBIRD	DjJd-1	LAKE NIPIGON
3 ABEKI	DkJe-1	LAKE NIPIGON
3 NORTHWIND RIVER	DkJa-1	LAKE NIPIGON
3 MARTIN	DiJe-1	LAKE NIPIGON
3 POPLAR POINT	DjJa-5	LAKE NIPIGON

Table 2.3: NW Ontario archaeological sites used for data on habitats.
***Colours used are those in Table 2.1 and Figure 2.2 where they designate environmental configurations or 'forest regions'. The numerals 1, 2, and 3 represent the analysis categories discussed in section 2.3.2, above.**

Table 2.4:
Mammal, bird, fish, reptile, amphibian and bivalve Orders with their identified species extant in the study area. Orders that do not have representation in the identified materials are listed and the number of regionally extant species in that Order is noted. Complete listings can be found in Appendix One.
Red type face indicates that the species has been identified from the analysis of the archaeological faunal collection. However, some of the bone fragments were identified only to higher taxonomic levels such as Genus, Family, Order, or Class but none of these taxonomic levels essentially added to a wider representation of the environment. Otherwise a fragment was designated as 'unknown'.

CODE NUMBER	CLASSIFICATION	COMMON NAME
	MAMMALIA	**MAMMALS**
	INSCETIVORA	
	SORICIDAE	**6 MEMBERS**
	TALPIDAE	**1 MEMBER**
	CHIROPTERA	
	VESPERTILIONIDAE	**6 MEMBERS**
	PRIMATE	
	HOMINIDAE	
A04010101	Homo sapiens	Human
	LAGOMORPHA	
	LEPORIDAE	
A05020201	Lepus americanus	Snowshoe Hare
A05020203	Lepus townsendii	White-tailed Jack Rabbit
	RODENTIA	
	SCIURIDAE	
A06020101	Tamias striatus	Eastern Chipmunk
A06020201	Eutamias minimus	Least Chipmunk
A06020301	Marmota monax	Woodchuck
A06020404	Spermophilus tridecilineatus	13-lined Ground Squirrel
A06020405	Spermophilus franklinii	Franklin's Ground Squirrel
A06020701	Tamiasciurus hudsonicus	American Red Squirrel
A06020802	Glaucomys sabrinus	Northern Flying Squirrel
	CASTORIDAE	
A06050101	Castor canadensis	American Beaver
	MURIDAE	
A06060201	Peromyscus maniculatus	Deer Mouse
A06060502	Clethrionomys gapperi	Gapper's Red-backed Vole
A06060701	Synaptomys cooperi	Southern Bog Lemming
A06060702	Synaptomys borealis	Northern Bog Lemming
A06060801	Phenacomys intermedius	Heather Vole
A06061001	Ondatra zibethicus	Muskrat
A06061304	Microtus pennsylvanicus	Meadow Vole
A06061309	Microtus chrotorrhinus	Rock Vole

Table 2.4: continued

CODE NUMBER	CLASSIFICATION	COMMON NAME
A06061501	Mus musculus	House Mouse
	DIPODIDAE	**2 MEMBERS**
	ERETHIZONTIDAE	
A06080101	Erethizon dorsatum	American Porcupine
	CARNIVORA	
	CANIDAE	
A08010101	Canis latrans	Coyote
A 8010102	Canis lupus	Wolf
A 8010103	Canis familiaris	Dog
A 8010301	Vulpes vulpes	Red Fox
A08010401	Urocyon cinereoargenteus	Grey Fox
	URSIDAE	
A08020101	Ursus americanus	American Black Bear
	PROCYONIDAE	
A08030101	Procyon lotor	Racoon
	MUSTELIDAE	
A08040101	Martes americana	American Marten
A08040102	Martes pennanti	Fisher
A08040201	Mustela erminea	Ermine or Stoat
A08040202	Mustela frenata	Long-tailed Weasel
A08040302	Mustela nivalis	Least Weasel
A08040205	Mustela vison	American Mink
A08040301	Gula gulo	Wolverine
A08040401	Taxidea taxus	American Badger
A08040601	Mephitis mephitis	Striped Skunk
A 8040701	Lutra canadensis	River Otter
	FELIDAE	**2 MEMBERS**
	ARTIODACTYLA	
	CERVIDAE	
A10010101	Rangifer tarandus	Caribou
A10010202	Odocoileus virginianus	White-tailed Deer
A10010303	Alces alces	Moose
A10010402	Cervus elaphus	Wapiti or American Elk
	BOVIDAE	
A10030101	Bison bison	American Bison
	AVES	**BIRDS**
	GAVIIFORMES	
	GAVIIDAE	
B 1010101	Gavia immer	Common Loon
B 1010104	Gavia stellata	Red Throated Loon
	PODICIPEDIFORMES	
	PODICIPEDIDAE	**3 MEMBERS**

Table 2.4: continued

CODE NUMBER	CLASSIFICATION	COMMON NAME
	PELECANIFORMES	
	PELECANIDAE	**1 MEMBER**
	PHALACRORACIDAE	**1 MEMBER**
	CICONIIFORMES	
	ARDEIDAE	**3 MEMBERS**
	ANSERIFORMES	
	CYGNINAE	**1 MEMBER**
	ANSERINAE	
B06010301	Branta canadensis	Canada Goose
B06010302	Branta bernicla	Brant
B06010501	Anser albifrons	White-fronted Goose
B06010601	Chen caerulescens	Snow Goose
B06010602	Chen rossii	Ross's Goose
	ANATINAE	
B06010801	Anas platyrhynchos	Mallard
B06010802	Anas rubripes	Black Duck
B06010804	Anas acuta	Pintail
B06010806	Anas carolinensis	Green-winged Teal
B06010810	Anas discors	Blue-winged Teal
B06010811	Anas cyanoptera	Cinnamon Teal
B06011101	Aix sponsa	Wood Duck
	AYTHINAE	
B06011202	Aythya collaris	Ring-necked Duck
B06011201	Aythya americana	Redheaded Duck
B06011204	Aythya marila	Greater Scaup
B06011205	Aythya affinis	Lesser Scaup
B06011301	Bucephala clangula	Common Goldeneye
B06011303	Bucephala albeola	Bufflehead
B06011401	Clangula hyemalis	Oldsquaw
B06011801	Somateria mollissima	Common Eider
B06011901	Melanitta deglandi	White-winged Scoter
B06012001	Oxyura jamaicensis	Ruddy Duck
	MERGINAE	
B06012101	Lophodytes cucullatus	Hooded Merganser
B06012201	Mergus merganser	Common Merganser
B06012202	Mergus serrator	Red-breasted Merganser
	FALCONIFORMES	
	CATHARTIDAE	**1 MEMBER**
	ACCIPITRIDAE	**10 MEMBERS**
	PANDIONIDAE	**1 MEMBER**
	FALCONIDAE	**4 MEMBERS**
	GALLIFORMES	
	TETRAONIDAE	
B08010201	Canachites canadens's	Spruce Grouse
B08010301	Bonasa umbellus	Ruffled Grouse

Table 2.4: continued

CODE NUMBER	CLASSIFICATION	COMMON NAME
B08010401	Lagopus lagopus	Willow Ptarmigan
B08010402	Lagopus mutus	Rock Ptarmigan
B08010601	Pedioecetes phasianellus	Sharp-tailed Grouse
	GRUIFORMES	
	GRUIDAE	**2 MEMBERS**
	RALLIDAE	**3 MEMBERS**
	CHARADRIIFORMES	
	CHARADRIIDAE	**3 MEMBERS**
	SCOLOPACIDAE	**18 MEMBERS**
	PHALAROPODIDAE	**1 MEMBER**
	STERCORARIIDAE	**1 MEMBER**
	LARIDAE	**7 MEMBERS**
	ALCIDAE	**1 MEMBER**
	COLUMBIFORMES	
	COLUMBIDAE	**2 MEMBERS**
	CUCULIFORMES	
	CUCULIDAE	**1 MEMBER**
	STRIGIFORMES	
	STRIGIDAE	**9 MEMBERS**
	CAPRIMULGIFORMES	
	CAPRIMULGIDAE	**2 MEMBERS**
	APODIFORMES	
	APODIDAE	**1 MEMBER**
	TROCHILIDAE	**1 MEMBER**
	CORACIIFORMES	
	ALCEDINIDAE	**1 MEMBER**
	PICIFORMES	
	PICIDAE	**8 MEMBERS**
	PASSERIFORMES	
	TYRANNIDAE	**8 MEMBERS**
	ALAUDIDAE	**1 MEMBER**
	HIRUNDINIDAE	**6 MEMBERS**
	CORVIDAE	**4 MEMBERS**
	PARIDAE	**4 MEMBERS**
	CERTHIIDAE	**1 MEMBER**
	TROGLODYTIDAE	**4 MEMBERS**
	MIMIDAE	**2 MEMBERS**
	TURDIDAE	**6 MEMBERS**
	SYLVIIDAE	**2 MEMBERS**
	MOTACILLIDAE	**2 MEMBERS**
	LANIIDAE	**2 MEMBERS**

Table 2.4: continued

CODE NUMBER	CLASSIFICATION	COMMON NAME
	VIREONIDAE	**4 MEMBERS**
	PARULIDAE	**25 MEMBERS**
	PLOCEIDAE	**1 MEMBER**
	ICTERIDAE	**8 MEMBERS**
	THRAUPIDAE	**1 MEMBER**
	FRINGILLIDAE	**26 MEMBERS**
	OSTEICHTHYES	**FISH**
	PETROMYZONTIFORMES	
	ICHTHYOMYZON	**2 MEMBERS**
	LAMPETRA	**1 MEMBER**
	ACIPENSERIFORMES	
	ACIPENSERIDAE	
C0201 102	Acipenser fulvescens	Lake Sturgeon
	CLUPEIFORMES	
	SALMONIDAE	
C05020302	Salvelinus fontinalis	Brook Trout
C05020304	Salvelinus namaycush	Lake Trout
C05020401	Coregonus alpenae	Longjawed Cisco
C05020402	Coregonus artedii	Lake Herring
C05020404	Coregonus hoyi	Bloater
C05020405	Coregonus johannae	Deepwater Cisco
C05020406	Coregonus kiyi	Kiyi
C05020408	Coregonus nigripinnis	Blackfin Cisco
C05020409	Coregonus reighardi	Shortnosed Cisco
C05020411	Coregonus zenithicus	Shortnosed Cisco
C05020412	Coregonus clupeaformis	Lake Whitefish
C05020502	Prosopium cylindraceum	Round Whitefish
	HIODONTIDAE	**2MEMBERS**
	UMBRIDAE	**1 MEMBER**
	ESOCIDAE	
C05060102	Esox lucius	Northern Pike
C05060103	Esox masquinongy	Muskellunge
	CYPRINIFORMES	
	CYPRINIDAE	**15 MEMBERS**
	CATOSTOMIDAE	
C06020101	Carpiodes cyprinus	Quill Back
C06020201	Catostomus catostomus	Longnose Sucker
C06020203	Catostomus commersoni	White Sucker
C0602 701	Moxostoma anisurum	Silver Redhorse
C06020706	Moxostoma macrolepidotum	Shorthead Redhorse
	ICTALURIDAE	**2 MEMBERS**

Table 2.4: continued

CODE NUMBER	CLASSIFICATION	COMMON NAME
	GADIFORMES	
	GADIDAE	
C09010101	Lota lota	Burbot
	GASTEROSTEIFORMES	
	GASTEROSTEIDAE	**2 MEMBERS**
	PERCOPSIFORMES	
	PERCOPSIDAE	**1 MEMBER**
	PERCIFORMES	
	CENTRARCHIDAE	
C13020101	Ambloplites rupestris	Rock Bass
C13020203	Lepomis gibbosus	Pumpkinseed
C13020301	Micropterus dolomieui	Smallmouth Bass
C13020302	Micropterus salmoides	Largemouth Bass
C13020402	Pomoxis nigromaculatus	Black Crappie
	PERCIDAE	
C13030101	Perca flavescens	Yellow Perch
C13030201	Stizostedion canadense	Sauger
C13030202	Stizostedion vitreum	Walleye
C13030403	Etheostoma exile	Iowa Darter
C13030406	Etheostoma nigrum	Johnny Darter
C13030504	Percina shumardi	River Darter
	COTTIDAE	**4 MEMBERS**
	REPTILIA	**REPTILES**
	CHELONIA	
	CHELYDRIDAE	**1 MEMBER**
	TESTUINIDAE	
D01050101	Clemmys guttata	Spotted Turtle
D01050102	Clemmys insculpta	Wood Turtle
D01050201	Chrysemys picta	Painted Turtle
D01050301	Emydoidea blandingi	Blansing's Turtle
	AMPHIBIA	**AMPHIBIANS**
	SALIENTIA	
	BUFONIDAE	
E01030102	Bufo americanus	American Toad
	HYLIDAE	**7 MEMBERS**
	PELECYPODA	**BIVALVES**
	EULAMELLIBRANCHIA	
	UNIONIDAE	**7 MEMBERS**
	SPHAERIIDAE	**22 MEMBERS**

2.3: The Lake Nipigon Sites

Lake Nipigon, 49°50' N latitude by 88°30' W longitude at its south-east shore, could be considered the most northerly of the Upper Great Lakes and is a remnant of a northern bay of the post glacial Lake Algonquin (Rowe 1972:25; Wilson 1910) at ca. 10,000 BC. It was separated from what became the modern Lake Superior by the Lake Minong stage at ca. 7,000 BC and was much of the structure it is today by the Nipissing Great Lakes stage at ca. 4,000 BC. The lake is south of the height of land. The elevation is 260 m above sea level at the point where it empties into the Nipigon River. It is in the Nipigon Boreal Shield Ecoregion of the Boreal Shield Ecozone and is part of the 4HDV forest region as defined by Hills (1976)(see Figure 2.2 and Table 2.1). Lac Des Mille Lac is part of this region as well. However, Lac Des Mille better 'fits' in any discussion with the Whitefish - Rainy River systems and will be dealt with there. The reasons for this "fit' will be self evident at that time.

Ontario has about 250,000 inland lakes ranging in size from less than a hectare to thousands of hectares. Lake Nipigon is one of these and is 112.5 km in length by 84 km at its greatest width. This water expanse of about 9450^2km (945,000 hectares) has a coast line of close to 1000 km excluding the many small bays. Its maximum depth is about 170 m. It has over 1000 islands ranging in size from minor Archean outcrops with a tree or two to relatively large islands as much as 12 to 15 hectares in area having their own small lake and river systems. Examples of such large islands are Kelvin Island in the northern half of the lake (49°54' N by 88°38' W) and Shakespeare Island in the southern half (49°38' N by 88°25' W). Smaller but significant islands, such as Geikie (50°01' N by 88°37' W), are also found. Seven major rivers drain into Lake Nipigon but only the Nipigon River provides an outlet; cutting through the Shield it flows south to Lake Superior, its canyon being one of the most spectacular locations for petroglyphs. The Nipigon shoreline has a varied aspect ranging from sandy shores to bare granite outcrops of Archean bedrock. This is interspersed with, at least until late in the last century, unremitting tracts of boreal forest dominated by spruce species (*Picea spp.*) (Bell 1870: 339-340). The recent forest profile can be seen below in Figure 2.12.

The sites around Nipigon are found on Podzols "...developed for the most part on acidic parent materials" (Leahey 1965:154) resulting in the accumulation "of an organic surface layer" and its "acidic decomposition products" (Stobbe 1965:158; FAO 1997).

Chemically they are acid throughout their profiles with pH ranging from 3.5 to 6.0, these readings increasing slightly with depth according to Stobbe (1965:159). The issue of soil pH will be explored in detail in the discussion of taphonomy in Chapter Four.

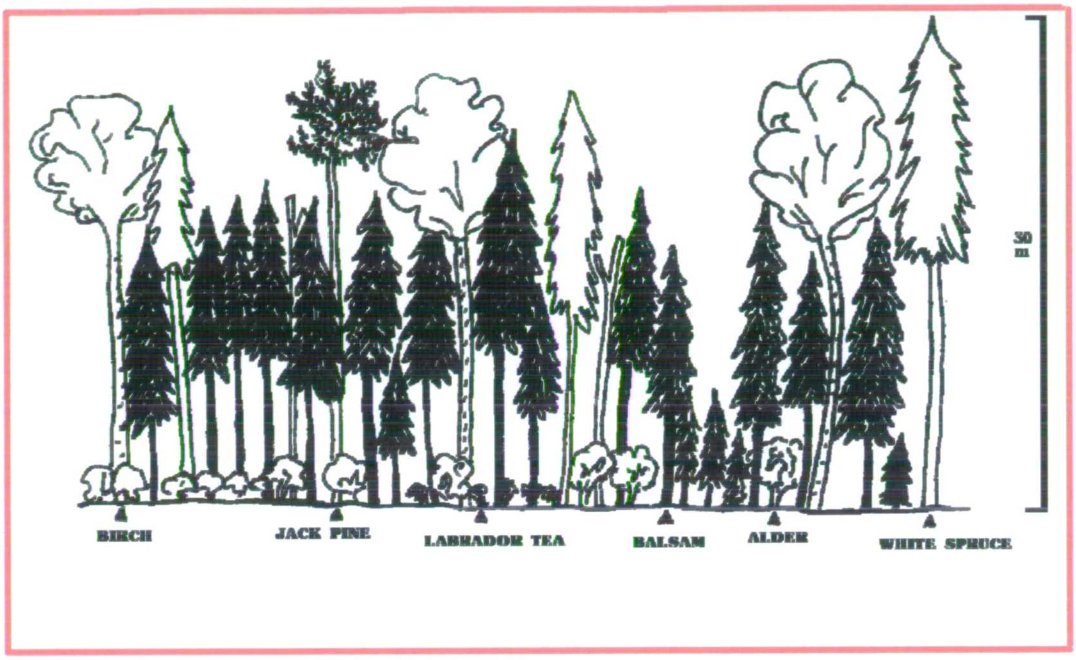

Figure 2.12: Recent Nipigon region vegetation profile (after Shelford 1963: 124)

Modern transportation into the region is relatively easy as one of the two main trans-Canada railway lines (C.N.R.) runs past Nipigon's north shore allowing access from the town of Armstrong, which has an airport as well. Built in the last century, this railway has a line coming up from its southern route at the town of Nipigon on the shore of Lake Superior to Macdiarmid on the Nipigon south-east shore at Orient Bay. From there it veers eastward to Geraldton and on to Longlac at the top of the Pic River system and thence to the northern line. This railway line now has a roadway running beside it. Along the west side of the lake, but somewhat inland, a secondary road runs up from Hurkett on Black Bay at Lake Superior, east of the city of Thunder Bay. This road runs to the town of Gull Lake on Nipigon and thence to Armstrong. Other road tracks are found in the Nipigon area, this being increasingly so as "harvesting" of these northern forests has

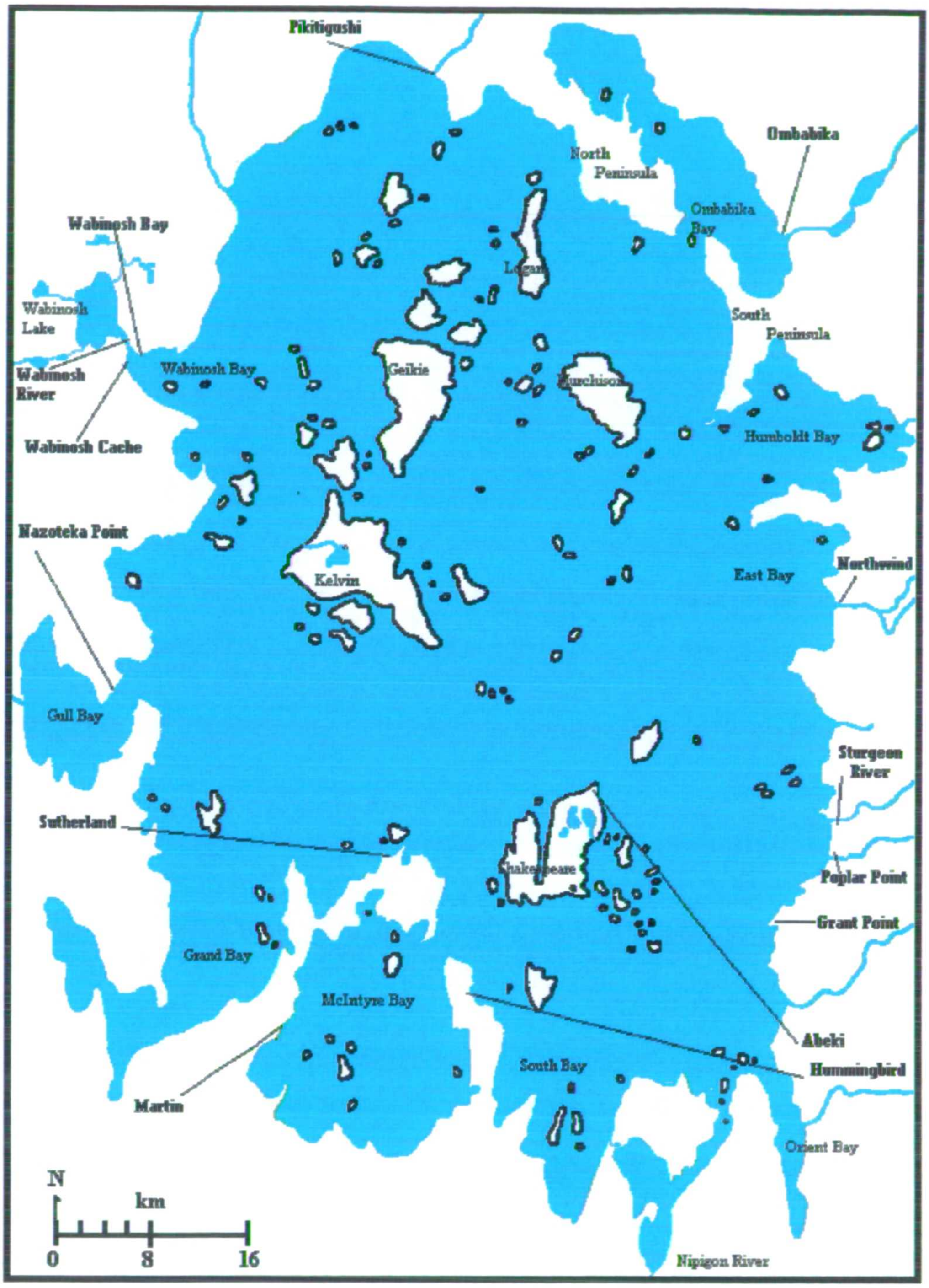

Figure 2.13: Lake Nipigon with the location of the sites from Table 2.3.

increased to take the place of the more southerly forests resources that have been depleted, in particular by the pulp and paper industry. The difficulties of survey work become apparent when one moves onto the lake and away from modern transportation routes.

The initial survey of the Lake Nipigon area was conducted between 1967 and 1970 by Dawson (1976) and resulted in the identification of thirty-two sites. As Dawson points out, this is in stark contrast to the scarcity of sites along the north shore of Lake Superior (Dawson 1976: 2-3). Done during a circumnavigation of the lake, he sought out "...Likely locations - points of land, river mouths, sand beaches, **flora discontinuities**...as well as existing hunting and fishing camps still in use by the local Indian population"(Dawson 1976:2)(emphasis added). This survey, however, may not reflect the true density of sites in the prehistoric periods. The reasons for this, found both in deep time and recent history, are:

- The early post-glacial history of the lake basins in this area of North America illustrate that there were periods of both high water and low water. The effect of this is that some sites are now either washed out or under sediment on lake bottoms while other sites, from periods of high water, may be well inland and thus not 'caught' with the survey methods currently in use.

- There was a diversion of the Ogoki River from the Hudson Bay - James Bay Basin via the Albany River to the Lake Superior - Lake Huron Basin in the 1940s. This was done to increase the volume of water through the Nipigon River for hydroelectric production. Subsequently the level of Lake Nipigon rose not only submerging immediate shore sites but eroding those that were slightly inland. This problem continues until today.

Prior to the Dawson survey the Lake Nipigon area was unknown archaeologically except for a few copper tools assigned to the Archaic (Dawson 1966), a report on one Shield Archaic burial site (DiJa-1) (Griffin and Quimby 1961), and the artefacts in the private collections of local individuals. I was able to look over several of these private collections. In particular in late 1979 I spent two days examining the collection of the sometime archaeologist Frank Ridley who had worked "...for brief periods between 1950-1953..." on Lake Nipissing at the Frank Bay site (1954:40) to the east of Nipigon but had collected from a wider area to both the east and the west. The most striking feature was the presence of red jasper taconite lithics seen as early Archaic lanceolate points of startling beauty as well as the later Archaic stemmed points. They were either made from the red jasper found in the quarries north of Thunder Bay or from the one other source for this raw material in north-central Quebec and provide concrete examples of the efficacy of the prehistoric trade contacts and the water transportation routes of this area of North America. Over time and at various locations in Ontario the presence of Knife River silica (10,000 BC until contact), Wyoming obsidian (8,500 BC - AD 500), and southern marine shells (2000 BC until contact)(Harris n.d.:Vol.1, Plate 14) further attests to the existence of extensive and effective prehistoric trade routes.

2.3.1: The Western Shore Sites

The Wabinosh Sites: EaJf-1 and the nearby EaJf-2, and EaJf-3

The Wabinosh River Site (EaJf-1), located 1.6 km upstream just below the lower rapids of the Wabinosh River but downstream from the relatively small Wabinosh Lake, was discovered in Dawson's 1967 survey. It is described as a multicomponent[7] prehistoric Woodland village occupied by Laurel Tradition peoples in the Initial Woodland period and later by Blackduck Tradition peoples in the Terminal Woodland period (Dawson 1976a: 102, 104). An "historic overburden" of randomly dispersed early contact period trade items ranging through time to recently discard items such as tin cans attests to the continuing use, however brief, of the site.

Tables 2.3, 2.4, and 2.5 summarise the identified faunal remains from Wabinosh River (as well as Martin Bird and Long Sault). Further, the data lines of those fragments identified beyond Class can be found at the end of this chapter[a]. The environmental implications of the faunal identification will be discussed in detail in Chapter Five but here is provided a brief overview.

Although the Class Mammalia comprised 89.8% (2499) of the 2784 bone specimens recovered from the Wabinosh River Site only 3.56% (89) of these were identified to the taxonomic levels of Family, Genus, or Species. However, in these 89 identified fragments twelve mammal species were recognised. On the basis of these mammals three habitats can be identified from the analysis: wetland or wetland ecotones,

[7] Dawson uses the term component in the McKern (1939) fashion as a single occupation of a site represented by an artefact assemblage. Progressively more inclusive cultural realities in time and space were termed focus (a group of identical or near identical components), aspect (foci with significant similarity in traits), phase (aspects sharing general characteristics), and pattern (phases having a few broad traits in common).

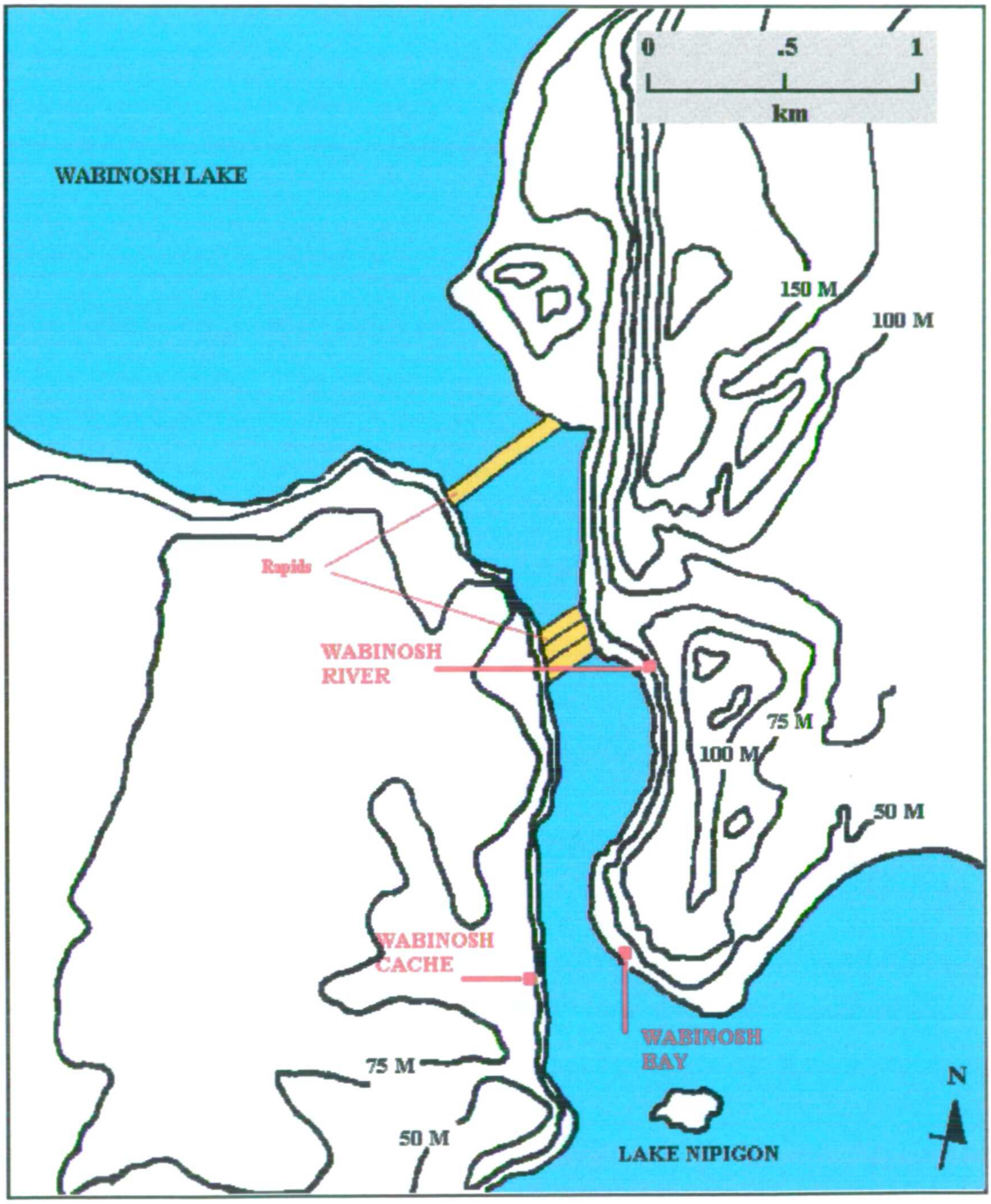

Figure 2.14: The Wabinosh Sites, Lake Nipigon survey (after Dawson 1976).

open/brush, and forest illustrating the use of resources from diverse but interlinked sources.

Only 47 specimens or 1.69% of the collection were identified as avian in origin with 13 placed at either the Genus or Species taxonomic level. All of these birds represent the water / wetland habitats, in particular the lakes above and below this site.

Although 6.68% (186) bones of the sample were fish only 44 specimens were identified to Species while 2 specimens were identified to Genus. Some of these species prefer cool, deep water of lakes or large rivers where they use rocky areas in white water for spring spawning (Scott and Crossman 1973:771). This is particularly noted for the Walleye (*Stizostedion vitreum)* found in five separate levels of this site (I, II, III, IV, and V). Today these fish range in length between 33 and 64 cm and weigh between 0.5 and 2.5 kg. The record, however, from 1960 is a 104 cm, 12 kg specimen (Sea Grant 1998[b]).

The problem of the Smallmouth Bass (*Micropterus dolomieui*) identification stems from the fact that this species is not known for Lake Nipigon in either the past or present. However, it was and is known from the Great Lakes - St. Lawrence system and from lakes and river systems north of Lake Superior and west of Lake Nipigon (Scott and Crossman 1973:729). The Wabinosh River has direct water route access to these systems west of Nipigon through Lake Wabinosh and then Lakes Wigwasan and Waweig.

Wabinosh Bay Site (EaJf-2) had a mere nine fragments in the sample. All were mammal in origin, with eight calcined from heat. One was identified as *Castor canadensis* (American Beaver), left astragalus. The seemingly ephemeral nature of this site suggests a single brief use. Little beyond this could be determined from a sample of such a size and nature. The Wabinosh Cache Site (EaJf-3) had even less material than Wabinosh Bay with only two bone fragments and both were determined to be of Class Mammalia. Beyond this nothing further could be done. Poor though the remains are from these two sites, together these three Wabinosh sites illustrate location selection patterns for both long-term and brief use.

Nazoteka Point DkJf-1

The Nazoteka Point Site DkJf-1 is located on a sandy point of land on the north-east entrance to Gull Bay (also known as Kaiashk Bay). It has two cultural levels: Initial Woodland and Terminal Woodland (1000-1600 AD) (Dawson 1976: 98). Although Laurel ceramics are found in the lowest level (IV) and Blackduck ceramics are found in the upper levels (I and II), these clear-cut distinctions are not that evident and here perhaps is the Laurel-Blackduck Transition Period in the very scant level III. Dawson has suggested a pattern of short seasonal reuse occupation in both the cultural periods because of the very thin cultural mantle (Dawson 1976). Certainly this interpretation is not incompatible with the patterns known from the ethnographic period when it has been recorded that, for some,

> ...it is proper for them to establish... a fresh campsite on new ground, which is clean (*peycuu*). This term signifies that the place is free from garbage, and clean in the sense that it is not offensive to the spirits of game animals and to the entities who aid in hunting (Tanner 1979:74).

Further, as was seen in the discussion in Chapter One, this type of refuse pattern "fits" the kin based hunting territory winter camp pattern of site use from the ethnographic present and can be seen in modern day camp use even with the adoption of the modern technology and present day concepts of refuse disposal.

There were 461 bone fragments from 43 excavation units. The fragments identified beyond Class are in the endnotes[b]. Terminal Woodland (Blackduck) levels I - upper III have the highest concentration of remains and thus inferred intensity of use, and the Initial Woodland (Laurel) from basal III through IV generally has less. However, there are some interesting clusters. For example, the fish comprised 17.8% (82) of the sample but they are very localised in:

- Test Trench I level II;
- Test Trench III levels I and III;
- Test Trench V (hearth and hearth perimeter) which provided the only firm identification to Species (*Stizostedion vitreum*), Test Pit III level I;
- and two fragments from the slump area of Test Trench II and III.

Overall level II has 45% (41) fish material and this comprises 50% of the total fish sample for the test units from this site. On the basis of modern observations of camp use we could speculate that each of these clusters represents a single event or use of the site, each the consumption of perhaps a fish or two. The walleye spawn in very early spring in the tributary streams and shoals of lakes. It, however, can be caught throughout the year in lakes and nearby rivers and is a fish still in favour for winter ice fishing.

The mammals are more ubiquitous than the fish but offer relatively little specific data when one considers that they were 81.55% (376) of the complete sample. This follows a trend for the sites in this area and with the sites in the Albany River area to the north (Dods 1976). So while level II has 45% fish, levels I, II, and IV have a consistent preponderance of mammalian material. Seven Species and two Families were identified. These are the animals that are expected for the boreal forest environment: beaver, hare, moose, muskrat, woodland caribou, with this last species being the only one identified that requires later stage forests with lichens and mosses.

The birds are represented by only 3 elements (0.65% of the sample). Two were from *Gavia immer* (Common Loon) and the other was assigned to the Family Anseridae. These too are expected for the area but offer us indications for seasonality in that they have a spring through fall availability, migrating south in winter.

2.3.2: The Northern Shore Sites

Pikitigushi River EbJd-1

The Terminal Woodland site of Pikitigushi River EbJd-1 is situated 183 metres upstream from the northern shore of Lake Nipigon on the sandy west terrace of the Pikitigushi River (Dawson 1976:111, 115). Inundated in the early 1980s it is unlikely to have new excavations in the foreseeable future. It yielded one hundred and seventy-two fragments of which ninety-five (55.23%) proved to be from a single immature (-5 months old) *Canis familiaris* (domestic dog) individual. The relative completeness of this individual, through the fifth lumbar vertebra, and the lack of any evidence for pathology, butchering, or cooking suggests one of two possibilities:

- natural death, that would not result in any alteration to the skeleton, and subsequent discarding of the carcass onto the midden with relatively rapid burial since there is no evidence for scavenging;
- or ritual death and burial of the animal, in some socially significant ceremony.

Father Alloüez reported on the use of dogs in ritual contexts in this part of North America as early as 1665 (Thwaites 1896-1901: Vol. L: 286-287). He makes no comment on these dogs being white but this would "fit" with the symbolism associated with the animals themselves. Tanner (1979) comments on the use of dogs in winter ceremonies of recent history. The use in a winter ceremony is significant as this animal is considered a "winter animal"[8] (Tanner 1979:99) and EbJd-1 is interpreted as a winter hunting camp site. However, the faunal evidence alone does not permit a choice between the two possible causes of death. Considering the completeness of the bones of this animal it would be interesting to know if the remainder (lumbar six through the back legs and tail) of this skeleton is still at the now inundated EbJd-1. Considering the modern inundation problems on this lake, I have wondered why Dawson did not adjust his sampling strategy and open the next unit over and retrieve the rest of this skeleton.

Of the 76 other bone fragments 96% (73) are mammalian. This high proportion of mammal bones follows the general trend in all the sites found in this study. Note the list of fragments identified beyond Class in the endnote[c]. Predominant in this sample are mammals that favour first stage regrowth and edge area feeding habitats, for example *Castor canadensis* (American Beaver), *Lepus americanus* (Snowshoe Hare), *Alces alces* (Moose) and *Odocoileus virginianus* (White-tailed Deer). *Rangifer tarandus* (Caribou), which favours the second stage or later regrowth forest with established lichens and mosses for its feeding pattern, is numerically insignificant in this sample.

Lake Nipigon is in an area range of overlap for a number of Cervidae species, of which three are represented at the Pikitigushi River Site, namely *Rangifer tarandus*, *Odocoileus virginianus*, and *Alces alces*. This is the northern extreme of the range for *Odocoileus virginianus* (White-tailed Deer)(Gilbert 1973:93-95), an animal that takes advantage of any environmental disturbance to increase its range. This species is also found at the Sutherland Site (DjJe-1) in the south-west area of Lake Nipigon and together these two sites provide prehistoric evidence for this northern extreme of the *Odocoileus v.* in full range in the Lake Nipigon area. Such a variety of Cervidae in one area offers an excellent source of high-grade protein and for highly valued fats[9] with a high return per technounit.[10]

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[8] Animals are divided into two semantic domains - "winter" or "summer". In part this distinction is made with respect to the control of weather through specific rites. Rites for weather control in a specific season are conducted by people born in that season. Winter animals are the animals such as caribou, lynx, and hare "not slowed down by the snow" and are the animals symbolically represented by the colour white (Tanner 1979:143) regardless of their individual whiteness, although hare are varying and lynx are quite pale as are young caribou. These animals along with dogs are used in winter rites. The reason dogs are included in this category, according to my informant KW, is that they pull the sleds in winter.

[9] Tanner (1979.155-156) discusses edible food tokens for the kill of a moose or a caribou and we could extend this to deer These include two kinds of fat: *wiis* from the rib area, and *wiikw* from around the internal organs. Further, medapodials contain the highly valued fat called *wiin*, and there is the fat (*wiikuw*) associated with muscles (*wiiyaas*). The significance of the linguistic distinctions of fat in Algonkian languages, in this instance Cree, and the importance of fat in the northern diet are made startlingly clear when we consider the years in the last century leading up to the "Fish and Hare Period" (1880-1920) (Rogers and Black 1976). FN peoples of Northwestern Ontario died from protein poisoning when they were forced, by depletion of traditional food resource, into a new dietary pattern severely deficient in fats (Bishop 1974).

[1] I use the term technounit to indicate tasks that involve both tool(s) and labour. It is a term that encompasses the cost-benefit assessment of 'jobs' that are needed and/or wanted within a society. Some tasks have no technology involved, such as berry picking for immediate consumption. But if berry picking is for later consumption a container, such as a basket, would be involved and therefore the task is a technounit where work decisions and use of resources have wider implications.

The one specimen identified to as bird was *Anas rubripes* (Black Duck), one of the commonest breeding ducks of Eastern Canada. It winters from the Sault to Southern Ontario (Godfrey 1966:55-56). From break-up to freeze-up it would be found in shallow bodies of water, in marshes and wet fields (Godfrey 1966) and provides an excellent indicator of wetland habitats.

One *Castor canadensis* specimen was immature at the time of death and this suggests late summer through early to mid-fall as the time of death. The lower right M_3 of the *Odocolieus virginianus* was aged at 2.5^+ years at the time of death and this provided nothing in addition to what was known from the *Castor canadensis* and *Anas rubripes* specimens as to the season of use for this site.

2.3.3: The Eastside Sites

Sturgeon River DjJa-2

The Sturgeon River Site (DjJa-2), not surprisingly located at the mouth of the Sturgeon River , is an Initial Woodland site of approximately 0.8 hectares ($8090m^2$) (Dawson 1976:42-43) and thus fits in the "big" site category. On the basis of the analysis of the lithics, both tools and waste, and the abundance of Laurel pottery Dawson concluded that this site was more than a "seasonal camp" (1976:44). It is noteworthy that Dawson infers "winter" when he speaks of seasonal camp. Certainly from the historic period we know that there were camp sites of macro-band activity that illustrate the fusion portion of the fission / fusion social structure patterns discussed in the previous chapter. And although some of these sites focused on the forts of the European trading period and are presently communities of year-round activity, others, no longer in existence, were reported to be of long standing and continuing from deep time. In particular we can note large summer meeting areas, as well as large fall / spring camps - the sites in strategic situations for portage routes, where extended kin groups met on their way to and from the small winter camps of the fission portion of the social pattern. This is supported by the ethnographic work done in this century (Tanner 1979; Rogers 1963 and 1962; Rogers and Black 1976 ; Dunning 1959; Speck 1973). So such fission / fusion social patterns reported from the historic period perhaps can be identified in the archaeological record. This sample alone can neither support nor refute such a view although it does have some tantalising clues. Although the mammals identified (*Castor canadensis, Alces alces,* and *Ursus americanus*) are available throughout the year there is a possible cultural exception to this lack of specific season of use. On a number of occasions hunters have expressed to me the view that it is not "proper" to break into beaver lodges or to kill bears while they are denning. I think this is a cultural pattern of long standing and not merely a pose for the "modern" situation of the presentation of self as the keeper of the natural world, in other words the adoption of the noble savage stereotype or the politically correct position. Beaver are an important winter food and it is at this time that their pelts are considered prime. They are caught in winter by the strategic placement of traps. Moose are killed throughout the year with the hunting strategies varying by the season of the hunt. However, bears are quite another issue. Tanner (1979:31) discusses the hibernation of bears along with the migration of birds as "models" for "...a seasonal symbiotic parallel between the social life of men and animals". Based on my field experience and the review of literature on hunting I think this is well beyond a mere 'symbiotic' model and is rather a socially significant and critical key metaphor. Further, Tanner (1979:153-157) makes no reference to bear foetuses from the killing of the denned sow, although he comments on the foetuses of moose and caribou when he discusses the "respect" that must be afforded animals in the symbolic shift from the "reciprocal" relationship between two "persons" [11] of the hunt-kill to "...food, offerings and sacred remains". Thus it is possible that the bear bones from this site represent a kill at a time between spring and autumn. Other exceptions to a lack of discrete seasonal pattern are found with the bird identifications of *Gavia immer* (Common Loon) and Order Anseriformes. These are migrating birds, part of the key metaphor, and generally fit the spring through fall pattern of hunt.

The sample consisted of four units designated as "Bags" (3, 6, 7, and 8). In total they contained fifty six (56) bone fragments (one proved to be a copper bead) from four areas. The first two, Bag 3 and Bag 6, were from areas on the bank of the river described as hearth remnants while the last two, Bags 7 and 8, were simply designated as shore areas. The bulk of the material, 45 bone fragments, came from Bag 3 and 71% of the total sample was heat calcined to the white stage, not surprising considering the hearths. The relatively high percentage (85%) of mammals from this site is similar to the finding for

[11] This aspect is discussed elsewhere in this work, the main point being the view that there is a relationship between two 'equal' partners in the hunt - the hunter and the hunted. The animal is seen to purposely relinquish its life to feed the human. With proper respect from the human the animal reincarnates to feed the human once more.

other sites in this region. The one specimen identified as Common Loon (*Gavia immer*), a left ulna, had been worked into an awl. It was broken and subsequently burned to the white calcined stage. The significance of this can not be missed since this is the species noted above as a seasonal indicator. Thus it could just as easily be an import to the site having been manufactured at another time and place then used here to be broken, burned, and discarded. The fragments identified beyond Class are in the chapter endnote[d].

Grant Point DjJa-3

The Terminal Woodland (Dawson 1976:44) site of Grant Point (DjJa-3) is on the south side of High Hill Creek at Eight Mile Harbour. Fifty five (55) bone fragment specimens contained in a single sample bag were all mammal in origin. Seven specimens were identified to three Species. These can be seen in their endnote[e]. The rest (48) were listed as 'mammal unknown' fragments. Identified were *Castor canadensis* (American Beaver), *Canis lupus* (Wolf), *Rangifer tarandus* (Caribou).

Of special note were the skull and right and left mandibles of an adult *Canis lupus* (Wolf) individual found on the surface of the site. In March of 1978 I had a long discussion with Dr. E.S. Rogers of the Royal Ontario Museum on just such a find. He indicated that the presence of skulls on sites is a feature of specific weather/hunting ritual activity. The rite, which appears to involve members of the Family Canidae, is still found to the east of James Bay but not found, to Roger's knowledge, in the Round Lake area at the present time. He indicated that to the south of Round Lake, in the Nipigon area and through to a northern portion of Michigan, there seems to be a greater retention of traditional lifeways. The Pikitigushi River Site (EbJd-1) *Canis* material, as discussed above, could be an example of the prehistoric practice of this ritual. However, the *Vulpes vulpes* material from the Martin Site (DiJe-1), discussed below, along with this *Canis* example from Grant Point could be an indication of the retention of this traditional practice. This is particularly supported by the fact that both the Grant Point and Martin specimens appear to be recent in origin on the basis of their generally excellent cortical condition. Further, in the case of the Grant Point examples, they are the only specimens from this site not heat calcined.

Poplar Point DjJa-5

Poplar Point Site (DjJa-5) directly south of Sturgeon River and the Sturgeon River Site (DjJa-2) is interesting only for its contribution to an understanding of site location, since only one bone fragment was available for analysis. The *Alces alces* (Moose) right innominate fragment had alterations to a section from the iliac to the acetabulum thus forming an awl shaped tool. So here, at what is probably a Terminal Woodland site (Dawson 1976), is indication of Moose use but as a tool that could just as easily been an import rather than the result of local hunting.

Northwind River DkJa-1

Northwind River (DkJa-1) yielded only five (5) bone fragments from what was termed the "lower refuse area" (Dawson 1976:55). They were identified as:

- 1 *Alces alces* (Moose) metatarsal fragment;
- 2 Mammalia sp. with one of these being a possible *Homo sapiens* specimen;
- 2 Osteichthyes specimens of very fragmentary nature.

The longbone fragment identified as a possible example of *Homo sapiens* is problematic in that it shows indication of spiral fracturing and has distinct cut marks as well as puncture marks from the canine teeth of some fairly large carnivore (e.g. a large dog). The Windego phenomena, found in this part of boreal North America, was a belief in the cannibal spirit (Waisberg 1975). and a 'psychotic' fear of cannibal spirit possession, at least in the post-contact period (Bishop 1973). Thus this one bone raises an issue of whether this fear was based on the occasional fact of life in an environment that could prove fickle in the supply of food resources[12]. Certainly, as noted elsewhere in this work, cannibalism was recorded, if rarely, in the literature of the 19th Century during the post-contact collapse of the environment in Northern Ontario. The alternative explanation is that this is an indication of defleshing of a corpse at or subsequent to the bundle treatment of the dead and "...not necessarily a sign of cannibalism..." (Mason 1981:291). However, there is no support in the literature for defleshing and, indeed, Vecsey describes the cleaning, dressing, and painting of the dead body and continues with a description of the ceremony that emphasised the humanness of the dead person while still placing them firmly in the afterworld (1983:65-67). Bundle 'burials' in the "crotches or branches of trees" as described by Vecsey for the Ojibwe (1983:65) could have been tenuous for the long-term protection of the remains and this may be part of what we are seeing here.

[12] In ***Ojibwa Narratives*** two of these narratives discuss famine while several others address issues around food (Kawbawgam 1994). These narratives were told in the late 19th century by Ojibwe from south of Lake Superior, well removed from the harshest conditions of the boreal forest but none the less concerned about lack of food.

Ombabika EaJa-1

The Ombabika Site (EaJa-1) is 90 meters upstream on the river of the same name. Ombabika Bay first appears in documents in the late 17th Century when Daniel de Greysolon Dulhut travelled in from the Albany River in 1683-1684 in an attempt to expand the French fur trade (Harris n.d.: Vol.1, Plate 36). This river, entering Lake Nipigon's Ombabika Bay at its south-eastern arm, provides access to the land to the north and the east. Beyond this the river is part of a water route that links to the Albany River system that, in turn, reaches to James Bay. Fort Albany was constructed at the mouth of the Albany in 1684. However, the direct influence of this fort reached 250 km inland via the shipping system that was developed on the navigable lower two thirds portion of the Albany. Its indirect influence reached to Nipigon and beyond. The Ombabika Site was occupied in the Terminal Woodland Period through into the Historic Period (Dawson 1976: 116; 120). It is thought to be in the area of the historic period Fort Maune or La Tourette (Dawson 1976:117). Certainly there were early historic items on the site but this association with the fort has yet to be substantiated. Regardless, the prehistoric components indicate that the selection of the location of the fort may well have been made on the basis of existing settlement patterns at the time of contact. Only one sample of bones were available for analysis. It consisted of twenty four (24) fragments representing five Species and one Family.

The fragments identified beyond Class are found in an endnote[f]. Of interest are *Castor canadensis* (American Beaver - 6), *Ursus americanus* (American Black Bear - 1), *Rangifer tarandus* (Caribou - 1) and *Alces alces* (Moose - 1) all mammals that would have been available throughout the year. However as previously noted, current presentation of traditional views is that winter den raiding of bears is not the "right" way to hunt. It is the present view with FN peoples that this was not done in the past and on the basis of the discussion of ritual content and key metaphors, above, this may well have been the case with these northern societies. As discussed previously, we are left with the acceptance of their view of their "ways" and any questions on how much this view is a result of the acquisition of a political posture of environmental awareness and how much this is the result of actual TK perhaps are unanswerable[13]. The positive aspects of traditional

[13] TK or "traditional knowledge" can be invoked for any situation and to what ever political advantage. It is difficult to argue against since one's PC ("political correctness") is always open to question or doubt. The challenge of TK can result in accusations of racism and even in the face of "facts", the facts themselves can be said to be the result of racist interpretation. Indeed, from the perspective of history this view has much basis in fact itself.

knowledge will be investigated more thoroughly in Chapter Three. However, all this may only be a matter of speculation in the face of a lack of irrefutable data on this issue. Eight fragments were identified as 'mammal unknown'. Two bird and one fish fragments were also in the 'unknown' category.

The *Cottus* species identified could be one of three freshwater Sculpins found in this area of North America (*Cottus bairdi,* Mottled Sculpin; *Cottus cognatus,* Slimy Sculpin; *Cottus ricei,* Spoonhead Sculpin). They range in length from 51 to 76 mm in length. All are bottom living, benthic feeding fish subsisting for the most part on aquatic insect larvae and nymphs. Their habitats overlap and range from sandy bottoms of streams and lake shallows (*Cottus bairdi*) to rocky gravely bottoms of rivers and lakes (*Cottus cognatus*). Some of the lake habitats are at great depths (>114 m for *Cottus ricei*). *Cottus bairdi* is considered to be an indicator for the presence of Brook Trout while *Cottus ricei* is one of the principle foods of Burbot.(Scott and Crossman 1973:817; 826-830; 832-834; 839-842) Presently none of the Sculpins are considered important in the food economy but this does not mean that it would not have been used in the past. However, Rogers commented to me (March of 1978) that fish were considered 'dog food' before the Fish and Hare Period.

Lota lota (Burbot) is a deep water lake fish frequently caught when ice fishing for the preferred Lake Trout (*Salvelinus namaycush*). It is a night feeder in the hypolimnion preying on aquatic insects, crayfish, and deepwater invertebrates. In Canada, Burbot spawns from January to March and at this time it can be found in areas of sand and gravel in the shallows (Scott and Crossman 1973:641-644). Burbot is now considered a 'course' fish and has never become part of the modern commercial fishery. It has been subject to removal programs in the modern era since it is thought to prey on and deplete the food resources of economically important fish. It seems that this negative view was held by FN peoples in the past as well. Richardson (1836) noted that it was eaten by Indians only in periods of "great scarcity". This is what would be expected from the comments of Rogers and from the work done by Rogers and Black (1976) on the subsequent Fish and Hare Period, when the ecosystem went into very serious decline.

2.3.4: The Southern Shore

Abeki (Point) DkJe-1

The Abeki Site (DkJe-1) is on the most northerly point of Shakespeare Island. It is a Terminal Woodland hunting camp site the extent of which still needs to be determined. However, the faunal material was found only in the surface collection and these eleven (11) specimens were all very fragmentary although heat altered. All were mammalian in origin. Animals used and season of use are therefore indistinguishable. Presently this site is the only indication we have of the use of islands in Lake Nipigon. Whether this is a true indication of site selection showing a cultural bias against island camps or an artefact of the archaeological survey remains open to investigation.

Hummingbird (Harbor) DjJd-1

Hummingbird Site (DjJd-1) is on the peninsula between McIntyre Bay and South Bay. When tested this site produced ten (10) fragmentary specimens from a hearth. Another Terminal Woodland (Dawson 1976) occupation much like that of Abeki, the current data is insufficient beyond the fact that all specimens are mammalian in origin and all are heat altered.

Martin DiJe-1

The Martin Site (DiJe-1), like the others at the third level of analysis, had very little material. Only three bones were retrieved. All were from *Vulpes vulpes* (Red Fox) and their data lines can be seen in their endnote[8]. Two of these were a left and right mandible that, although disarticulated, exactly matched so there can be no mistake that they come from the same individual. The third specimen was an upper incisor. The excellent preservation of the mandibles and the fact that they were found near the surface can only lead to the conclusion that they represent modern, indeed recent, activity at this site. The use of Canidae species in ritual activities has been discussed earlier, note the sections on the Pikitgushi (EbJd-1) and Grant Point (DjJa-3) Sites. And of course we cannot overlook the fact that Red Fox is one of the important fur animals of this area.

The Martin Site is on the west shore of southern McIntyre Bay. This bay is quite large and is defined on this western side by a peninsula that narrowly separates it from Grand Bay. Portage across this peninsula allows access from the south to the west and north and saves considerable travel distance.

Sutherland DjJe-1

The Sutherland Site (DjJe-1) is found on Gros Cap in the south-west section of Lake Nipigon at the eastern approach to Grand Bay. It is Terminal Woodland in cultural designation (Dawson 1976:86). There were fourteen (14) bone specimens available. These were from what was described as a "pit-like" feature approximately 1.2 meters across and extending to a depth of 60.1 centimetres. The distinguishing aspects of this feature were the black ash and red discoloration lenses in the pit (Dawson 1976:82). All the specimens were mammalian with six of them identified to three species:

- *Castor canadensis* (American Beaver) - 3
- *Odocoileus virginianus* (White-tailed Deer) - 2
- *Alces alces* (Moose) - 1

These identifications are found in the endnote[h]. Distinct butchering marks, in the form of deep cuts, were evident on both the Moose metapodial and the Beaver tibia specimens. The right calcaneus of the White-tailed Deer placed the time of death at 5 years 6 months on the basis of the mean fusion age for the distal epiphysis of this element (Gilbert 1980:100-103). Thus the kill time would have been late fall or early winter. Three of the mammal fragments showed alteration from heat and four specimens showed poor preservation resulting from exposure to the elements suggesting some period of time when they had remained unburied. At the time of analysis I commented in my work notes that the lack of fish specimens from an archaeological site in such close proximity to lacustrine resources was interesting. I wondered if this was an artefact of the in-field sampling choices, retrieval techniques, or if this truly is an indication of a bias towards the use of mammalian resources at this site. Of course what became evident was that this is a pattern repeated at other sites in Northwestern Ontario.

2.4: The East-west River-lake Systems: Whitefish, Lac des Mille Lac, Rainy

These lakes and rivers are part of a number of great east-west routes recorded in early historic times by Europeans and known from time immemorial by the original peoples. As can be seen from Figure 2.14, directly below, these routes linked the great forest peoples of the east with the peoples of the prairies and plains as well as peoples to the north of these areas. Such routes allowed the exchange of various goods and resources. That transport of items was done in prehistoric times can be seen in the, albeit rare, *Bison bison* bones appearing on northern Ontario sites (Dods 1976) and the wide

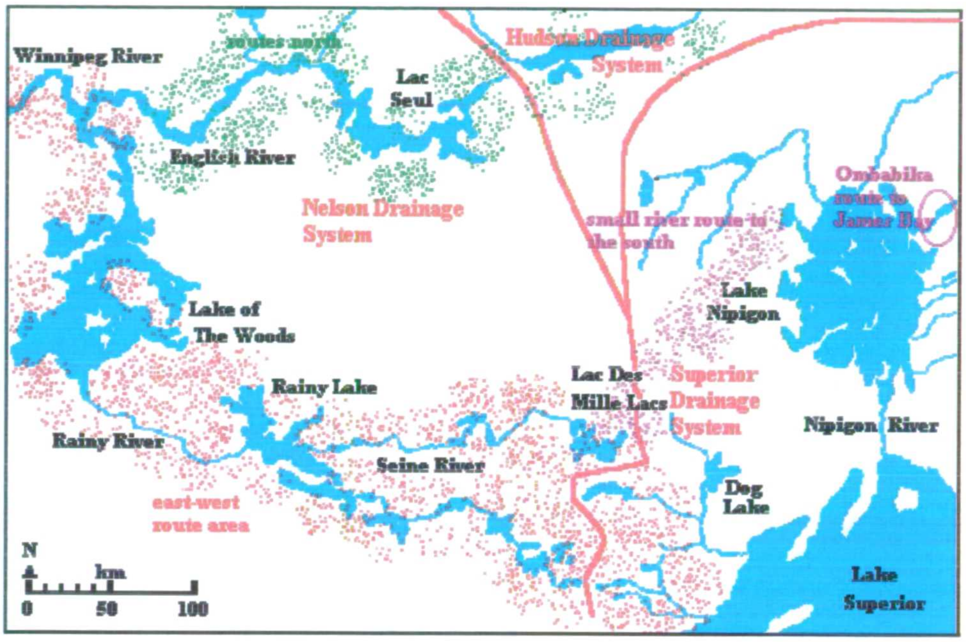

Figure 2.15: Drainage systems with major route areas indicated. In part adapted from WQRO 1984.

distribution of resources of value such as Superior copper, commented on previously. I do not want to leave the impression that the sites in the Nipigon area are not part of extensive communication systems. In my view nothing could be further from the truth. However, it is this Superior - Lake of The Woods corridor that has been extensively documented in the historic period. However, we need only remember that Nipigon, both river and lake, afforded passage to the northeast. After European contact and the subsequent advent of the Hudson Bay Company this meant access to their fort at the mouth of the Albany on James Bay.

2.4.1: Whitefish Lake

Whitefish Lake is approximately 64 kilometres south-west of the Northwestern Ontario city of Thunder Bay. The lake is about 9.7 km (E-W) by 3.2 km (N-S) with a small island, Macgillvary Island, at its southwest end. It rests in an east-west running shallow depression at approximately 405 meters above sea level. This shallow lake has a placid surface with murky, muddy waters since it has no major rivers entering it, being fed only by the surrounding small creeks and streams. Such a lake supports a wide range of aquatic plants but the most important of these aquatic plants is the annual *Zizania palustris*

Figure 2.16: Whitefish Lake, Northwestern Ontario.

var. *palustris* (Northern Wild-rice). It is found in extensive beds along its north and west shores. It is believed that the stands of this grain found in this area of Ontario were "...**initiated** by ancient Indian tribes" otherwise "...the original distribution of this important native cereal has become greatly obscured" because of "...the widespread and often secretive planting in remote areas by sportsmen and by conservationists..." (Dore and McNeill 1980:409. Emphasis added).

Whitefish drains to Lake Superior from its southeast end via Little Whitefish River, a tributary of the Arrow River that in turn empties into the Pigeon. Most of the discussion of the Boreal Shield Ecozone, found above, pertains to this lake system as well. However, the Boreal Shield Ecoregion is Thunder Bay-Quetico while the Hills' forest classification is 5HDV as seen in Figure 2.2 and Table 2.1. Further, the site is just south of the height of land and this along with its situation in a sheltered depression causes a localised moderation to the normal continental climate regime. Presently there is a patchy secondary regrowth mixed forest of white birch *Betula papyrifera* (White Birch) and *Alnus rugosa* (Alder) as well as conifers such as *Picea mariana* (Black Spruce), *Thuja occidentalis* (Cedar), *Abies balsamea* (Fir), *Pinus strobus* (White Pine), and *Larix laricina* (Tamarack). The major problem with any work conducted here is the constant and intense use of the area since it was taken over by Euro-Canadians in the last part of the last century. Buildings, roadways, picnic areas, and gardens of both flowers and foodstuffs abound.

This small lake supported eight sites in the Blackduck Period, including McCluskey (DbJm-2) on the lake's north shore. McCluskey, at about two acres (Dawson 1974:1-2), was perhaps one of those rare 'big' sites discussed earlier. Its Laurel component dates to circa 40 BC (Mason 1981:290). Unfortunately, in this century, it has also suffered the greatest destruction of the Whitefish sites since a ranger station and fire watch tower were situated here. This northern shore line also has a small park area frequented by picnickers stopping from the adjacent road that continues westward to Northern Light Lake, which has had a similar fate to Whitefish. Further, this shore was, at least in the early 1980s a boat rental location for those who wished to fish on this lake. Three of the smaller sites from this lake system are included in this thesis. They were excavated during survey work in the 1960s (Dawson 1964; Dawson 1966[b]; Dawson 1970).

The Westend Sites

Macgillvary Site (DbJm-3) is on the south-west shore Whitefish Lake while the Martin Bird Site (DbJm-5) is on the south-west end of Macgillvary Island, named after the most recent owners. Previously it was called Bishop Island after the first official owners to file with a land claims office at the end of the last century. This island offers some insight into the disruption created to the natural habitat by the introduction of non-native varieties of plants such as grape, black raspberry, lily, rose, black currant, plum, apple, Maltese cross, and verbena[14], all escapees from the Macgillvary family gardens that were developed adjacent to their summer cottage.

Martin Bird DbJm-5

The site was first recorded by Dawson in 1964, further surveyed in 1966 (Dawson 1966[b]) and then excavated in 1970. The material reported on here dates from the 1970 excavation. The main component of the site is Blackduck with some "...affinities with Selkirk Ware" in the upper levels where there are historic goods in the upper 15 cm and are considered to be from the period between 1760 to 1820 (Dawson 1970:2). There were a few Laurel pottery shards recovered from the bottom of Level II, the basal Blackduck level, to a depth of 50 cm at the bottom of a few pits. Some of these are considered to be from the Transitional Period. A habitation floor and a burial pit with small covering mound containing a flexed burial with grave goods were excavated (Dawson 1970:4).There was a large cooking or meat smoking pit lined with heavy stones and hearths at two distinct levels

> ...suggesting varying time periods of occupation" (so that) "beginning with the Laurel period and perhaps earlier, Macgillvary Island has seen a significant series of human occupations. Notwithstanding the relative thinness of the deposits the empirical evidence indicates that it was rather intensively occupied from an early period to the late historic period with a sequence of occupations some of which over-lapped in time (Dawson 1970:2; 5).

There were a total of 2556 bone fragments from the two excavation years, one being the 1966 National Museum of Canada survey Test Pit 1. Only 4% (108) of the total material came from the test pits. The bulk of the fragments came from a variety of excavation units, most with recorded stratigraphy that illustrate the cultural sequence discussed above. The fragments identified beyond the level of Class can be found at the end of this chapter[i]. They were 17.4% (445) of the collection. However, twenty seven of these identifications were *Homo sapiens* (Human) and are believed to be scatter from the burial mound. The detailed identifications are with those from Wabinosh River and Long Sault in Tables 2.5, 2.6 and 2.7.

[14] This survey was conducted July 16, 1970 by Walter and Margaret Hartley and is found as a typed report attached to the field notes of K. C. A. Dawson (1970) at the National Museum of Man (now the Museum of Civilization), Ottawa. The list also includes native species they identified and they note that a more accurate picture could be developed if the island was surveyed in each season from spring through fall. They also omitted the shore grasses, rushes and sedges from their list.

Again there is a preponderance of mammals numerically. However, this does not give us an understanding of the complexity of this site with respect to species. Martin Bird, of all the sites considered in this work, had the widest range of species represented. Twelve species of birds were identified and although they will be the focus of extensive discussion in Chapter 5 we can note them here: *Gavia immer* (Common Loon)(2); *Branta canadensis* (Canada Goose)(3); *Chen caerulescens* (Snow Goose)(4); *Anas platyrhynchos* (Mallard)(2); *Anas rubripes* (Black Duck)(2); *Aythya americana* (Redhead)(1); *Aythya collaris* (Ring-necked Duck)(5); *Somateria mollissima* (Common Eider)(4); *Lophodytes cucullatus* (Hooded Merganser)(1); *Mergus merganser* (Common Merganser)(5); *Mergus serator* (Red-breasted Merganser)(1); *Canachites canadensis* (Spruce Grouse)(1). They are significant in their variety although low in individual numbers. Beside the human remains there were twelve species of mammals identified. Most of these species are associated with either wetlands or early stage forest regrowth habitats. For example we have: *Castor canadensis* (American Beaver)(175 or 39.33% of the identified fragments); *Ondatra zibethicus* (Muskrat) (35 at 7.9%); *Lepus americanus* (Snowshoe Hare)(49 at 11%); and *Alces alces* (Moose)(37 at 8.3%). As well there are species that, although few in number, are important for an understanding of these habitats: *Marmota monax* (Woodchuck)(2); *Martes americana* (American Marten)(1); *Martes pennanti* (Fisher)(2); *Odocoileus virginianus* (White-tailed Deer)(4); *Cervus elaphus* (Wapiti)(5). Late forest growth is seen directly only in *Rangifer tarandus* (Caribou)(10). Large predators are represented by one *Canis lupus* (Wolf) and nineteen (4.3%) *Ursus americanus* (American Black Bear). Low numbers of fish were found and these were identified to four species: *Salvelinus namaycush* (Lake Trout)(1); *Esox lucius* (Northern Pike)(4); *Catostomus catostomus* (Longnose Sucker)(1); and *Stizostedion vitreum* (Walleye)(3). One Painted Turtle *(Chrysemys picta)* fragment was identified from the two reptile fragments and although turtle is considered sacred with some groups I have no direct evidence that it functioned as such here.

Macgillvary DbJm-3

Both Laurel and Blackduck components were found at this site (Dawson 1966[b]). The Laurel component dates to AD 20 (Mason 1981:290). Six "bags" of bone fragments came from this site (although some of the bags were marked MacGilvern their Borden designation was DbJm-3). All were from the Terminal Woodland Blackduck component.

One of the bags was returned to Lakehead University as it contained only human material and this was to be done by a Physical Anthropologist. The five remaining bags contained 192 bone fragments with 15% (28) charred. Three of the bags had very little material:

- Bag E - a single bone fragment from *Alces alces* (Moose);
- Bag I - eight mammal fragments;
- Bag J - four mammal and one bird fragments from species unknown and one fragment identified as *Lepus americanus* (Snowshoe Hare).

Bag H had three specimens identified as Cervidae, 54 fragments assigned to "mammal species unknown", and one *Mergus merganser* (Common Merganser) fragment. Twenty two of the charred fragments came from this unit. Only Bag M contained fish material, eight fragments, all from "species unknown". This unit also had the bulk of the material with ninety nine "mammal species unknown" fragments, seven Cervidae fragments, two fragments identified as *Lepus americanus* (Snowshoe Hare), as well as two further bird identifications - *Anas acuta* (Pintail) and *Chen caerulescens* (Snow Goose). These identifications can be found in the endnote [j].

Both the Pintail and the Snow Goose use marsh lands, wet fields, and lakes (Godfrey 1966: 58; 53). However, the Common Merganser prefers clear water, which is "...probably necessary for feeding...", adjacent to or near woodland (Godfrey 1966: 83).

The Eastend Site

Fisherman Point DbJm-4

Fisherman Point is a small Terminal Woodland camp on a point of land at the southeast end of Whitefish Lake (Dawson 1964). It is an example of the second general pattern of site location discussed later in this chapter and seen in Figure 2.20. Two sample bags numbered "9" and "17" contained a total of 121 bone fragments. All the fragments but two from Bag 9, listed as "species unknown", were mammal in origin. Of the 71 bone fragments in bag 9, seven were Cervidae (see the endnote[k]) and sixty two were "mammal unknown". While 22.5% were calcined and 66% were charred none of these were the Cervidae. One mammal longbone fragment with juvenile cortex was cut through at one end and had the tooth marks of a carnivore. All the Cervidae fragments were from molar teeth (cheek teeth) but it was impossible to discern the exact tooth or teeth or the exact Cervidae species from these fragments. Bag 17 only contained "mammal unknown" fragments with these fifty fragments all altered - 52% charred, 22% calcined, and 26% weathered.

2.4.2: Lac des Mille Lac

Lac des Mille Lac, found at 48° 53' latitude 90° 22' longitude (at the NE corner), is part of the same forest region as Lake Nipigon, 4Hdv. Regardless this and

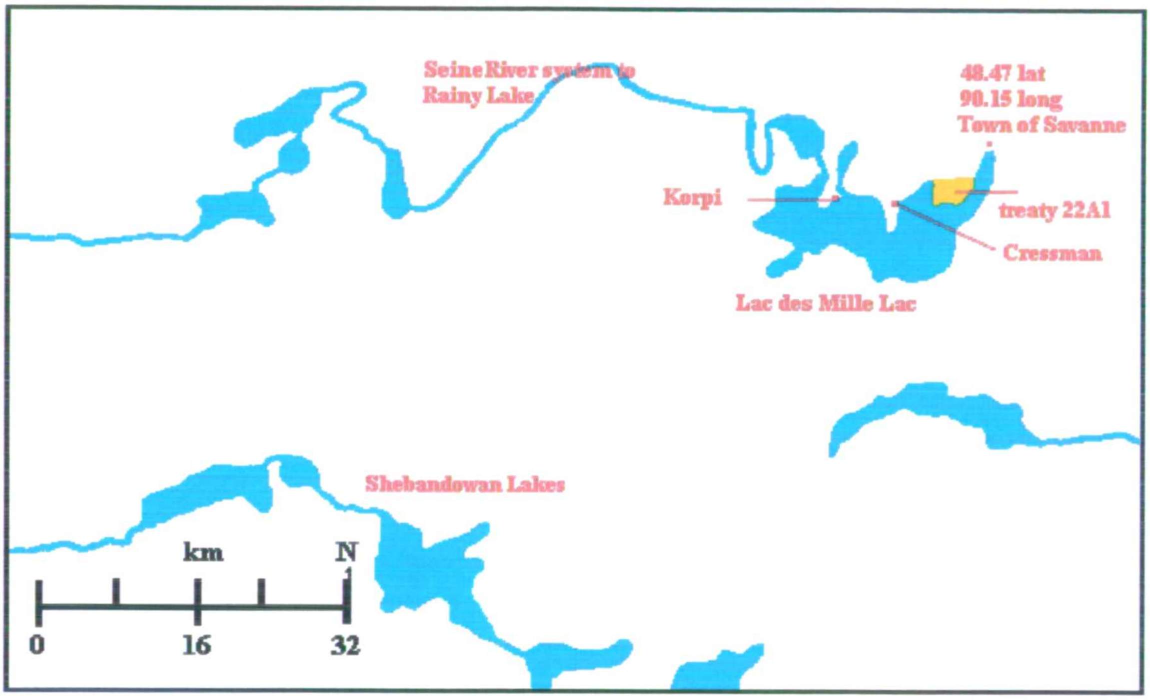

Figure 2.17: Lac des Mille Lac, Northwestern Ontario.

in spite of the fact that you can reach this smaller lake from Nipigon without having to resort to a route through Lake Superior, in many ways Lac des Mille Lac has a better landscape "fit" with the sites to the south and west. The reason for this is quite straight forward. Lac des Mille Lac is found in the extreme southwest corner of the 4Hdv forest region and abuts the northern boundary of forest region 5Hdv where Whitefish Lake is found. Its ecotone-like setting is further enhanced by the fact that it is part of the Seine River, Rainy Lake, Rainy River, Lake of The Woods system immediately to the west.

Cressman Site DfJn-1

The Terminal Woodland site of Cressman (DfJn-1) is on the north-west shore of Lac des Mille Lac. The site has recently suffered much from the changing water levels since it is on a narrow spit of land at the mouth of a small bay. When I returned to this site in 1979 and 1980, on a site review for the Federal archaeological authorities, the eastern part of the site was reduced to a sand spit of no more than a meter or two. The site had initially been found during Dawson's survey in the early 1960s (Dawson 1964).

Seven unit samples totalling two hundred and twenty nine (229) bone fragments, were available for analysis from this site. The fragments identified to taxonomic levels beyond Class are found in the endnote[1]. Overall, 23% of the specimens were either charred and/or heat clacined and two specimens were canine chewed while two had butchering marks.

Four units, Test Pits 7.3, 7.9, 7.11 and 'Survey', each had one fragment. But here in DFJN1.SRVY.70 was an example of *Alces alces* (Moose) and in DFJN1.TP7.9.68 the one bird identified to species for the site, *Anas platyrhynchos* (Mallard). The unit designated as 'South Pit' (SP) contained six mammalian fragments and one fragment from 'Class unknown'. All were calcined. Therefore the bulk of the fragments were in two units - Unit 1 (59) and the unit labelled 'CC' (159).

In Unit 1 four *Alces alces* (moose), six Cervidae, one *Castor canadensis* (American Beaver) comprised the fragments identified beyond the level of Class. The remainder were 45 mammalian fragments, one fish and one bird. Only about 12% of this unit was calcined. In 'CC' were found two *Ondatra zibethicus* (Muskrat), three Cervidae, and two *Stizostedion vitreum* (Walleye). Otherwise there were 130 mammalian, 18 fish, 3 bird, and one 'Class unknown' fragments. Only 26 fragments were calcined but 64% (102) were weathered.

Again species, such as *Alces alces* (Moose), *Castor canadensis* (American Beaver), and *Ondatra zibethicus* (Muskrat), associated with wetland habitats and wetland ecotones can be seen as represented in this particular set of identifications. *Anas platyrhynchos* (Mallard), like the Black Duck found on the Pikitigushi River Site (EbJd-1) on Lake Nipigon, is found from break-up until freeze-up. It prefers the shoreline shallows and marshy, reedy habitats for nesting and food although it can be found in open water.

The *Stizostedion vitreum* (Walleye) is discussed above in the section on the Wabinosh Site (EaJf-1).

Korpi DfJo-1

To the south of the Cressman Site on the west shore of Lac des Mille Lac is the Terminal Woodland site of Korpi found and excavated by Dawson in the early 1960s (Dawson 1965). The two samples had a total of four hundred and seventy three (473) bone fragments. The data lines for the fragments identified to Order or better can be found in the endnote[iii]. *Rangifer tarandus* (Caribou), *Castor canadensis* (Beaver), and *Alces alces* (Moose) are as expected. Heat alteration was evident on 75% of the fragments from Bag A (275 of 366) and 80% of Bag B (86 of 107). No other alterations were noted. We again see the preponderance of material of mammal origin, indeed all the bone fragments are mammalian. The materials of the Albany River survey illustrated the same pattern (Dods 1976).

2.4.3: Rainy River

Rainy River, although in 5Sm, has many of the structural characteristics of the Wabinosh River discussed in the Lake Nipigon section above. As a water course between the relatively small Rainy Lake and the larger Lake of The Woods, it has areas of rapids that provide spawning grounds for fish. Johnston's fieldwork for the Geological Survey of Canada (1915) gives some early environmental insights from the time before the area was opened to the logging companies that "harvested" large areas for pulp and lumber. He commented that generally the climate had greater temperature extremes than usually found in Northwestern Ontario (1915:10-11). Winters were cold and summers warm. Equalising and moderating trends came in the form of summer winds from the two large bodies of water in the area - Lake of the Wood to the west and Rainy Lake to the east. Rainy River, being in the direct path of low pressure fronts that move across the continent from east to west, suffered frequent storms "...generally preceded by southerly winds and high temperatures followed by northerly winds and lower temperatures..." (Johnston 1915:13). He further noted that the "...Wooded character of a large portion of the district favours evaporation during the summer months for much of the rainfall is transpired by the trees..." and that "...The large swampy areas also present broad surfaces of water to the sun's rays" (Johnston 1915). For the most part these wetlands are treed bowl bogs with peat swamp margins. Today the wooded areas are depleted, the wetlands are under siege as over 30%

of the area is now devoted to mixed farming or grazing of cattle. But the storm patterns remain.

The river is the present international boundary between Canada and the United States. But it is and was a boundary area in other, more intrinsic ways, as well. An ecotone between the prairie grasslands and the boreal forest, the modern mixed oak parkland setting offers relief from the dense northern forests. However it is thought that this is a recent development in the area. Grasslands pertained between about 5500 and 4000 BC. This was followed by a pine forest at about 1000 BC (Arthurs 1982:112). Pollen studies on materials from Minnesota dating to the first millennium BC "...produced hints of climatic amelioration which may have encouraged a northward expansion of wild rice and with it some southern cultural practices" (Mason 1981:286). The discovery of *Bison bison* bones (Arthurs 1982:114) in this area early in this century attests to the grassland environment in periods of the past. We need only note the discussion of Wood Bison in the present aspen parkland forests of Prince Albert National Park in the chapter on modern environments to understand that ecotone areas offer suitable settings for a wide range of species. Bison bones are part of the sample from the Long Sault site (catalogue numbers 348, 461, and 462).

Long Sault Site DdKm-1

This 'big' (12 hectares) site, overlooking rapids in the Rainy River, is associated with what is thought to be the largest example of burial mounds found in Canada (Arthurs 1982:iii). These burial mounds date from Laurel times and have later intrusive Blackduck period burials. The site, on the basis of the excavations in 1975, is believed to have five components spanning cultural periods from the Archaic to the Historic. The story is not one of continuous occupation in the earliest periods but it is one of repeated and increasing use through time. Arthurs attributes this reuse to the fact that the site sits in a ecologically divers region and at "...the hub of a radiating network of major waterways allowing access to and interchange with other areas across mid-continental North America" (1982:iii). It is this 'central place' location that perhaps accounts for the development of such a large mound site with some Hopewellian features. But we must not forget that Lake Nipigon has similar, although smaller, burial mounds dating from Laurel times (Mason 1981:286). It is likely that mound building and pottery making "...were borrowed by these northerners and immediately adapted to their native endowment" (Mason 1981:286) and it is not beyond the realm of belief that this area around Long Sault was one of the important conduits for the transmission of these cultural traits to more northerly environs.

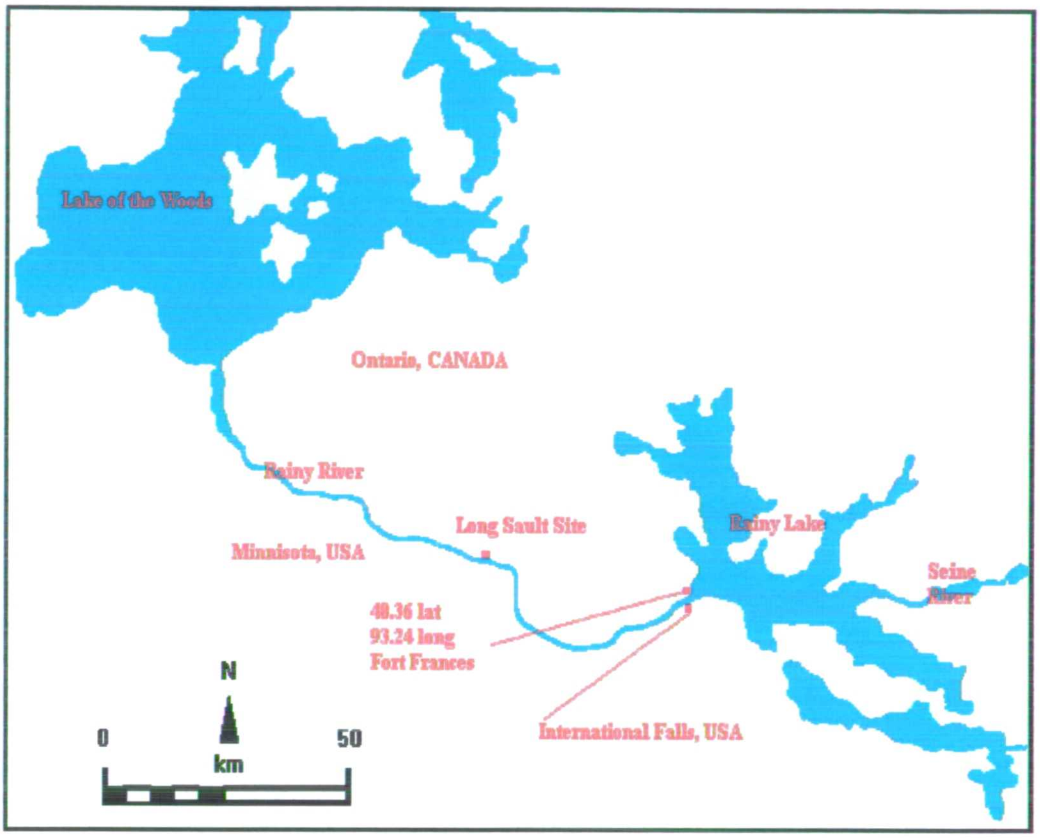

Figure 2.18: The Long Sault site on the Rainy River, NW Ontario.

Thirteen units with an average of nine levels each (range 4 - 12) yielded a total of 3585 bone fragments for analysis. The predominant alteration was heat with 24.29% calcined and 7.89% charred. The data lines of the identified fragments are at the end of this chapter[n].

Although fish have periods of more importance, the dominating resource base is mammalian. The figures for the identified species are found in Tables 2.5, 2.6, and 2.7, directly below. Of these, mammals made up 70.4% (2591) of the total while fish were 11.9% (436). A brief look at the data in Appendix One will show that all other Classes represented were under 1% each. The 'Class unknowns' at 16.5% (606) were relatively a small percentage for a northern collection in acidic soil environments that Mason has claimed "...frequently obliterated all traces of organic remains" (1981:285). The issue of pH will be explored in a later chapter but here I only comment that Mason's view is a facile explanation for the structure of the faunal collections from this part of the world. This can all be seen in a different and more realistic light when one notes that only 241 of the mammal bones were identified to a more detailed taxonomic level than Class and that the predominant number of these bones were represented by *Castor canadensis* (American Beaver) fragments (143), which were far and away more abundant than their nearest mammalian rival *Alces alces* (Moose) (33).

I suppose the startling thing about this site is the fact that *Acipenser fluvescens* (Lake Sturgeon) at 103 fragments seems so very low considering the ecological setting of the site at one of the most productive fish spawning grounds (May - June in temperatures between 13°C and 18°C) noted in the historic period for North America. I commented on this pattern in section 2.3.4 (Sutherland Site (DjJe-1)).

Today sturgeon range between 92 and 143 cm in length and between 5 to 36 kg in weight (Scott and Crossman 1973:82; 86). These are rather puny in size by the standard of the recent record fish that are believed to better represent the prehistoric fish populations. For example:

- 1927, Batchewana Bay, Lake Superior: 141 kg at 241 cm;
- 1953, Lake of the Woods: 154 year old sturgeon weighing 94 kg (hatched 1801);
- 1965, Lake of the Woods: 106 kg (Scott and Crossman 1973:86).

We have a fairly comprehensive picture of the historic fishery in Lake of the Woods at the west end of Rainy River[15]. However, we have no comparable figures for Rainy Lake at the east end of Rainy River.

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[15] Before the 1860s Europeans used sturgeon for everything from fertiliser and pig feed to fuel in river boat boilers and the production of isinglass (Sea Grant 1998[a]). The Indians, however, were reported to consider sturgeon good food (Scott and Crossman 1973:88). So the decline in the sturgeon fishery in this area of North America dates from the 1860s and the inception of caviar (1855) and smoked sturgeon (1860) industries in Sandusky, Ohio. During its most productive period the fishery out of Sandusky exported 4,540,000 kg annually of Great Lakes fish or fish products (Sandusky Maritime Museum 1998). The figures on Lake of the Woods "...once known as the largest sturgeon hole in the world..." (Scott and Crossman 1973:88) offer sobering insight into the loss of this natural resource. The fishery intensified in the United States and then moved into Canadian waters where the catch numbers from between 1885 and 1895 illustrate "...*the classic course of events often associated with the intense fishery on a slow-growing fish" (Scott* and Crossman 1973) (Cod dreams?). Females require up to twenty years to reach sexual maturity and then spawn only, on the average, six times during the remaining 30 years of their 50 year lifespan (Sea Grant 1998[a]). The decline was most severe in Lake of the Woods over the seven year period between 1893 and 1900. In 1895 this lake produced 39% of the Ontario catch (318,700 kg of 817,200 kg)(Scott and Crossman 1973:88) and this two years into its most serious period of decline. By 1957 it was estimated that Lake of the Woods produced about 2000 kg, a mere 0.005% of its 1893 catch (Scott and Crossman 1973).

In this century it has been observed that for northern native communities generally "fishing is the most reliable source of food both in terms of the relative ease of catch, and in terms of the length of time throughout the year that the supply is available" (Dunning 1959:31). Why then is a resource so abundant in prehistory and so relatively productive in available high quality protein and nutritious fish fats per unit so "under" represented in comparison to the beaver...a resource, at least from the modern point of view, less desirable from the perspective of ease of availability and unit weight of food? Does the answer rest in the seasonal nature of the intense availability of this fish resource (May - June) and the inability to effectively store it for use at other times?

Table 2.5: Simpson Index applied to gross numbers at the taxonomic level of Order* for mammals from the core sites.

	Martin Bird			Long Sault			Wabinosh River		
IDENTIFICATIONS (NISP) totals	445#	17.41%		382#	10.37%		159#	5.68%	
MAMMALS	DbJm-5	DbJm-5	Simpson	DdKm-1	DdKm-1	Simpson	EaJf-1	EaJf-1	Simpson
Homo sapiens (Humans)	27	6.07		2	0.52		0	0	
Lepus americanus (Snowshoe Hare)	49	11.01	0.25	10	2.62	0.25	7	4.4	0.25
Marmmota monax (Woodchuck)	2	0.45	0.0204	0	0	0.0204	0	0	0.0566
Castor canadensis (American Beaver)	175	39.33		143	37.43		28	17.61	0.0204
Peromyscus maniculatus (Deer Mouse)	0	0		0	0		1	0.63	
Ondatra zibethicus (Muskrat)	35	7.87		7	1.83		4	2.52	
Microtus pennsylvanicus (Meadow Vole)	0	0		0	0		1	0.63	
Erethizon dorsatum (Porcupine)	0	0		5	1.31		1	0.63	
Canis sp.	1	0.22	0.0462	0	0	0.0462	9	5.66	0.0462
Canis lupus (Wolf)	1	0.22		0	0		2	1.26	
Canis familiaris (Dog)	0	0		4	1.05		0	0	
Vulpes vulpes (Red Fox)	0	0		0	0		1	0.63	
Ursus americanus (American Black Bear)	19	4.27		0	0		4	2.52	
Martes americanus (American Marten)	1	0.22		8	2.09		0	0	
Martes pennanti (Fisher)	2	0.45		0	0		0	0	
Mustela vison (American Mink)	0	0		0	0		1	0.63	
Lutra canadensis (River Otter)	0	0		5	1.31		0	0	

Table 2.5: mammals continued

	#	%		#	%		#	%	
	DbJm-5	DbJm-5	Simpson	DdKm-1	DdKm-1	Simpson	EaJf-1	EaJf-1	Simpson
Artiodactyla	1	0.22	0.25	5	1.31	1	0	0	0.25
Cervidae	30	6.74		14	3.67		17	10 69	
Rangifer tarandus (Woodland Caribou)	10	2.26		0	0		13	8 18	
Odocoileus virginianus (White-tailed Deer)	4	0.9		0	0		0	0	
Alces alces (Moose)	37	8.31		33	8 64		8	5 03	
Cervus elephus (Elk)	5	1.12		0	0		0	0	
Bison bison (American Bison)	0	0		6	1.57		0	0	

* The animals of Northwestern Ontario are listed in Table 2.4 and the Taxonomic Classification section of the faunal analysis Codebook found in microfiche form as Appendix One at the end of this thesis.

Table 2.6: Simpson Index applied to gross numbers at the taxonomic level of Order for birds from the core sites.

	#	%	#	%		#	°o		
BIRDS	DbJm-5	DbJm-5	Simpson	DdKm-1	DdKm-1	Simpson	EaJf-1	EaJf-1	Simpson
Gavia immer (Common Loon)	2	0.45	0.25	0	0	0	1	0.63	0.25
Branta sp.	0	0	0.1372	0	0	0.0014	1	0.63	0.0124
Branta canadensis (Canada Goose)	3	0.67		0	0		0	0	
Branta bernicla (Brant)	0	0		0	0		5	3.14	
Chen caerulescens (Snow Goose)	4	0.9		0	0		0	0	
Anas sp	1	0.22		0	0		0	0	
Anas platyrhynchos (Mallard)	2	0.45		0	0		0	0	
Anas rubripes (Black Duck)	2	0.45		1	0.26		0	0	
Aythya americana (Redhead Duck)	1	0.22		0	0		0	0	
Aythya collaris (Ring-necked Duck)	5	1.12		0	0		0	0	
Somateria mollissima (Common Eider)	4	0.9		0	0		0	0	
Melanitta deglandi (White-winged Scoter)	0	0		0	0		2	1.26	
Lophodytes cucullatus (Hooded Merganser)	1	0.22		0	0		0	0	
Mergus merganser (Common Merganser)	5	1.12		0	0		4	2.52	
Mergus serrator (Red-breasted Merganser)	1	0.22		0	0		0	0	
Canachites canadensis (Spruce Grouse)	1	0.22	0.04	0	0	0	0	0	0
Charadriidae ?	1	0.22		0	0		0	0	

Table 2.7: Simpson Index applied to gross numbers at the taxonomic level of Order for fish, reptiles and, amphibians from the core sites.

	#	%		#	%		#	%	
FISH	**DbJm-5**	**DbJm-5**	**Simpson**	**DdKm-1**	**DdKm-1**	**Simpson**	**EaJf-1**	**EaJf-1**	**Simpson**
Acipenser fulvescens (Lake Sturgeon)	0	0	0	103	26.96	1	0	0	0
Salvelinus namaycush (Lake Trout)	1	0.22	0.0178	0	0	0.0044	2	1.26	0.0044
Esox sp.	0	0		1	0.26		0	0	
Esox lucius (Northern Pike)	4	0.9		1	0.26		0	0	
Catostomus sp.	2	0.45	0.0021	25	6.54	0.0021	2	1.26	0.0021
Catostomus catostomus (Longnose Sucker)	1	0.22		0	0		0	0	
Lota lota (Burbot)	0	0	0	0	0	0	12	7.55	1
Micropterus dolomieui (Smallmouth Bass)	0	0	0.0044	0	0	0.0044	2	1.26	0.0178
Stizostedion vitreum (Walleye)	3	0.67		7	1.83		28	17.61	
REPTILES									
Chelonia	1	0.22	/	1	0.26	/	1	0.63	/
Chrysemys picta (Painted Turtle)	1	0.22		0	0		0	0	
AMPHIBIANS									
Bufo americanus (American Toad)	0	0	/	0	0	/	2	1.26	/

Table 2.8:

Preferred Habitats for identified mammal species (excluding ***Homo sapiens*** and ***Canis familiaris***) from the Primary Level Sites.

CB=climax boreal; C=conifer; D=deciduous; SR=secondary regrowth; PK=parkland; EE1=ecotone one (MB;C;D;SR;B / MD); MD=meadows (open areas); EE2= ecotone two (shorelines); SW=swamps; M=marshlands; P=ponds; SG=sloughs; ST=streams; R=rivers; SL=shallow lakes; L=lakes. The colour density indicates intensity of use.

2.5: Summary Observations

2.5.1: Location of Sites In The Landscape

The location of sites can be summarised by two major patterns. One of the patterns, which could be called 'just up the creek' (or 'just down the creek' as your political orientation dictates), finds sites placed on the shores of rivers or streams that run between two lakes. See Figure 2.19. These lakes being quite different in their makeup, are dissimilar in their production potential. This locational pattern is found, to a slightly varying degree for thirteen of thirty two sites in the Nipigon Survey done by Dawson (1976). The main examples from the Nipigon survey discussed here are the three Wabinosh River sites, Pikitigushi, Ombabika, Northwind, Sturgeon River, and Poplar Point. These sites are in optimal environmental locations in relation to numerous types of ecozones as well as the associated ecotones. Such a boreal forest human use site is placed in close proximity to a large lake, a main river, tributary streams and creeks, shoreline areas of all available water environments as well as the forest edge and the forest area as one moves inland from the water courses or expanses. These are the obvious available environments. Less obvious are the possible bog, swamp, meadow areas that may have been interspersed throughout the adjacent forest. Utilisation of such a setting would offer year long advantages not to be found in environmental specialisation into one habitat. Such diversification, I think, is to be expected when one considers that the boreal forest, for all its greenness, is an unforgiving environment in which to make a living. In Northwestern Ontario this pattern is not limited to boreal forest sites but in the parkland environment that comprises the area between the boreal forest and the prairie biotic provinces an excellent example is presented by the Long Sault site on the Rainy River. Further, these sites command important waterways near or at the portage area on the river.

There is a second pattern of site selection. Lake shore sites, either on the mainland or the islands of major lakes, frequently utilise bays, some with islands and some of these islands have sites 'facing' the shore. Some of these bays have creeks or streams, with varying production potential, bisecting their shorelines. Like the river sites these sites have the advantage, not afforded to sites on exposed lake shores, of shelter from severe weather conditions in an area where storms may be abrupt and violent in any season of the year. Examples of this type of site location are Sutherland, Grant Point, and Hummingbird on Lake Nipigon and the sites on Whitefish Lake and Lac des Mille Lac.

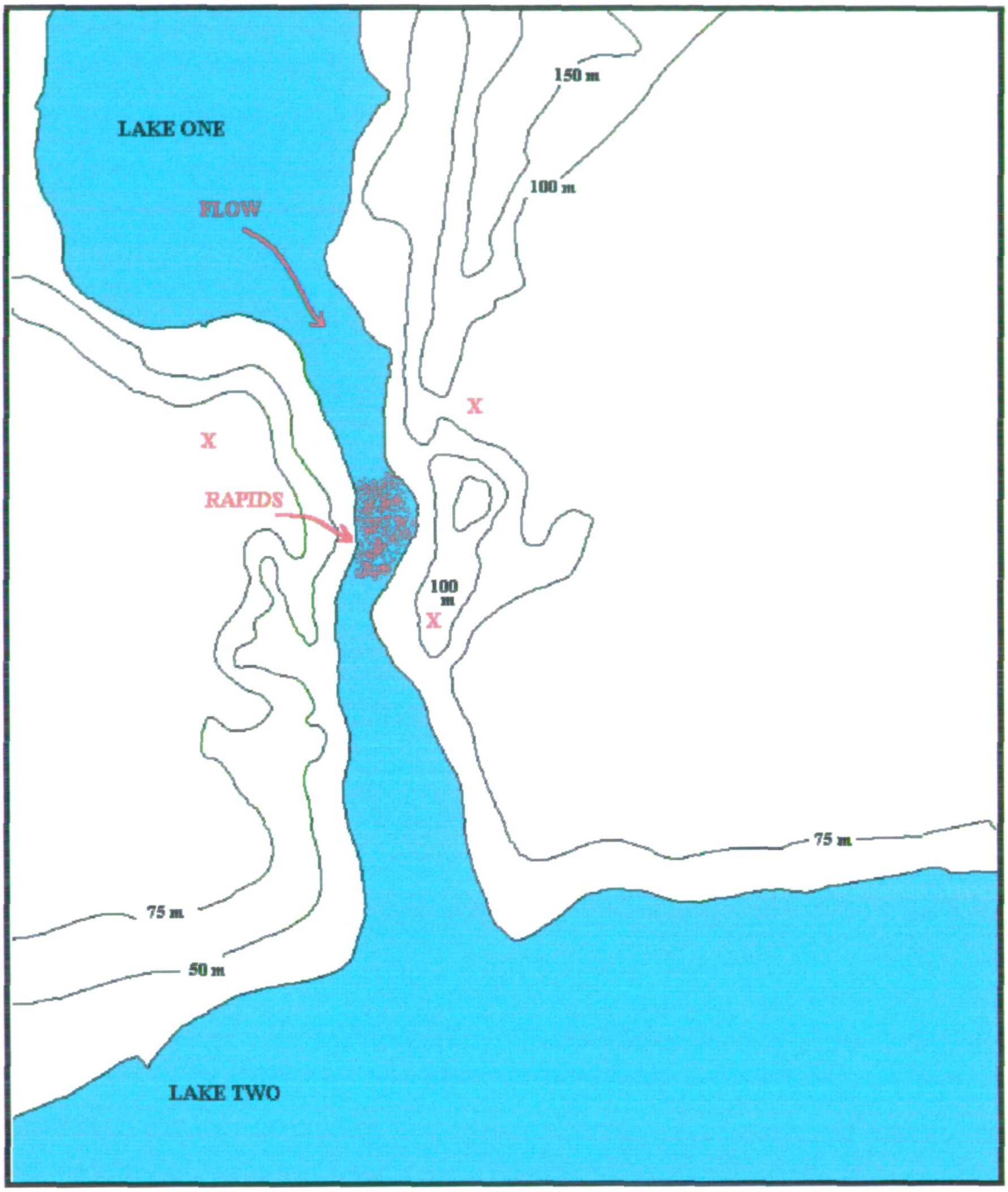

Figure 2.19: River locations for sites in the 'just up the creek' pattern. Examples of optimal site locations marked by a red 'X'. Map based on the Wabinosh map, Figure 2.14 after Dawson 1976 and augmented by field observations at Long Sault in the field seasons of 1979 and 1980.

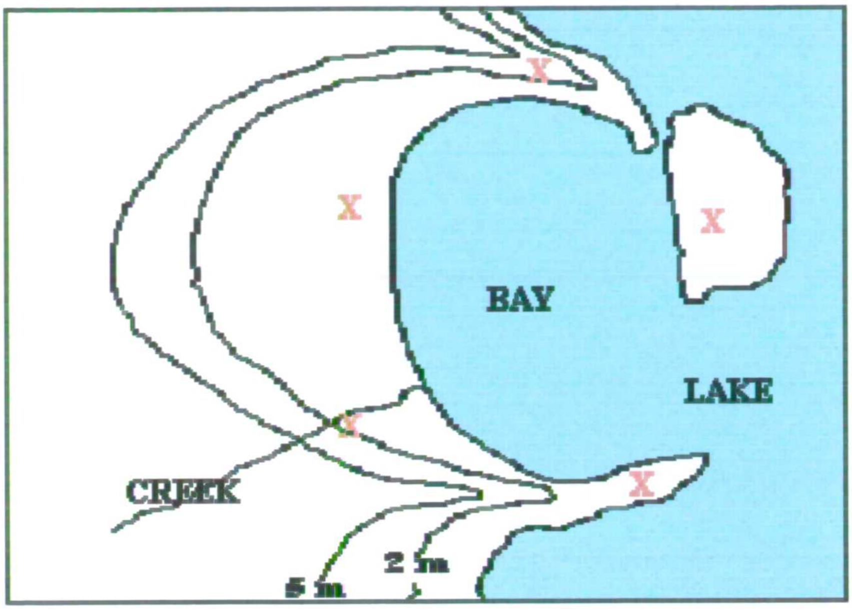

Figure 2.20: The bay locations for site placement. Optimal site locations marked by red 'X'. Based in part on the Sturgeon River and Grant Point figures in Dawson 1976 and field observations in 1979-1980.

2.5.2: Indications of Prehistoric Fire in Study Area Sites

The radiocarbon date of 1900 +/- 90 (40 BC)(GaK-1282) from the McCluskey Site (DbJm-2), on Whitefish Lake, is considered an excessively early date for Blackduck shards but it was obtained from associated charcoal (Wilmeth 1971:106). Dawson attributes this date to the preceding Laurel Tradition (1974:87). However, Wilmeth states that it may represent an "...underlying charcoal layer left by early forest fire..." (1971). Indeed, the wall profile of S5-W100/S5-W110 does show three lenses of black ash, one directly above the subsoil of Zone 4 and two within Zone 3, a dark sandy refuse layer. The uppermost of these latter two ash lenses runs throughout the site (Dawson 1974:6). Regardless, all cultural evidence from the Whitefish Lake area indicates that Laurel peoples would have been the ones affected by such a fire.

Evidence from the Pikitigushi River site (EbJd-1) on the north shore of Lake Nipigon, just upstream from Windigo Bay, further supports these observations. The material culture stratum overlays and is capped by a black ash strata. In all there are four black ash layers, two above and two below the material culture layer. A radiocarbon date on charcoal (GSC-1245) yielded a date of 4380 $\pm$ 180 BP and was rejected by Dawson as too early (1976:111-112). This date may represent one of the underlying black ash layers and thus be associated with a natural forest fire. If all the ash layers at this site represent forest fires, then the area would have been burned over four times in approximately 4000 years. At both the McClusky and the Pikitigushi Sites, material culture rests directly on ash layers. The Poplar Point Lodge Site (DjJa-5) has a charcoal lens overlaying the Laurel layer (1976:51; 53). The Sutherland Site (DjJe-1), on a test cut profile of a length of 9 m to a depth of 60 cm, has a "black ash historic, cultural refuse [2-6"] Stratum I" (1976:84). The Abeki Point Site (DkJc-1) has three questionable layers with two "black discoloration" layers at 66-71 cm and 74-79 cm respectively, and a "black deposit" at 12.5-15 cm running throughout the 3 m cut (1976). The question to be explored in Chapter Five is whether fire was merely an incidental, cyclical component of the habitat or actually a significant "affordance" in the set of affordances that comprise the niche (Gibson 1977:67-82) in the hunter-gatherer's integrated construction of surrounding space (Von Maltzahn 1994:55). And if it was a significant affordance was it manipulated to create a specific landscape?

2.5.3: The 'Fish Problem'

The 'fish problem' has consistently plagued researchers in this area of North America. Cleland commented on this in a letter in November 1980. He noted

> The low percentages of fish bone on some sites has been a real concern to me. A good example would be Anne Rick's report on the fauna Thor Conway excavated at Whitefish Island in the St. Mary's River. This site is located in the midst of one of the best (perhaps THE best) freshwater fishery in the aboriginal world. In addition, there are impressive numbers of excellent descriptions of the fishery. While whitefish bones, etc., were well represented at this site, they were not overwhelming in abundance. This simply does not add up.

Besides the Long Sault Site (DdKm-1) at *Acipenser fulvescens* (Lake Sturgeon) spawning grounds (11.86% fish) there is the Wabinosh River Site (EaJf-1) at a fish spawning location (6.65% fish), and Nazoteka Point Site (DkJf-1) with the highest percentage of fish (17.8%) in the sites considered in this work. There could be a number of reasons for this perceived discrepancy. For example:

- the subsistence patterns and strategies of the early historic period and/or the ethnographic period may NOT represent the patterns and strategies of the past in all details;

- fish were a major part of the prehistoric diet but there were culturally significant patterns of preparation and/or disposal of fish remains that we are unaware of from either the historic or ethnographic documents;
- the faunal assemblages are the result of taphonomic processes that have produced a record that is neither representative of the original fauna nor the resource utilisation patterns of the prehistoric period;
- the faunal collections from these sites may themselves be artefacts of the archaeological collection techniques employed or not employed by the excavator.

Each of these may offer a facile solution. It is probably much more complex - a combination of any or all of these possible answers or even ones yet to be articulated. These, along with the earlier observations, will be examined in more detail in subsequent chapters.

ENDNOTES

a. Wabinosh River Site EaJf-1, Lake Nipigon: Summary of identified fragments. Sorted by unit and by Class: A:Mammal - dark blue; B:Bird - red; C:Fish - dark green; D:Reptiles - dark red; E:Amphibians - dark cyan; F:Bivalves - dark magenta. Table 2.4 provides the taxonomic code, species names and common names, Chapter 2.3.2 discusses the data line structure, Table 2.3 lists the site names and their designation codes and location, Figure 2.11 maps the general site locations. For more data line detail refer to the Codebook in the microfiche appendix. Ordered by unit, catalogue number, and identification. Arranged diachronically from upper to lower levels within a unit.

N30E215 A06061001C150600U00U000000000
N30E216 A06061001C150600U00U000000000
N30E217 A06061001C150600U00U000000000
N30E211 A10010101F2113533R64U0002200010
N30E212 A10010101F39130R64U000020008
N30E213 A10010101F510130U00U000000000
N30E214 A10010000F21005010U00U0000200022
N30E2111 B06011901D420106L64U000000000
N30E2112 C13030202D132130R64U000000000
N30E2113 C13030202D132130L64U000000000
N30E2114 C13030202D1103130L64U000000000
N30E2115 C13030202D137130L64U000000000

N30E5220 A05020201C35107L74U000000000
N30E5221 A05020201C425130R74U000000000
N30E5232 B06011901D260130N64U000000000
N30E5233 C09010101D16130R64U000000000
N30E5234 C09010101D113130R64U000000000
N30E5235 C09010101D1101130R64U000000000
N30E5236 C09010101D1101130L64U000000000
N30E5237 C09010101D11229125L64U000000000
N30E5238 C09010101D1120130R64U000000000
N30E5239 C09010101D1120130L64U000000000
N30E5240 C09010101D1105130R64U000000000
N30E5241 C09010101D1105130L64U000000000
N30E5242 C09010101D1106130R64U000000000
N30E5243 C09010101D1108130R64U000000000
N30E5244 C09010101D1111130L64U000000000

N30E5381 A06080101D310300U00U0300000099
N30E5377 A10010101F440610U64U0300000099
N30E5378 A10010101F440610U64U0300000099
N30E5379 A10010000F52610U64U0300000099
N30E5380 A10010000F52610U64U0300000099
N30E53308 D01000000X770000U00U0300000099

N30E5NWL459 A08010102E2310130N64U000000000
N30E5NWL445 A10010000F54610U64U000000000

N30E104BSE494 A06050101X3782R64U000000000

N30E105B535 C13030202X1121130U00U000000000

N30E106B539 A10010303X510124U00U0300000099
N30E106B540 A10010000X55148U00U0300000099

N30E10 B449F1000000X699900U00U000000000
N30E10 B550F1000000X699900U00U000000000

N30E152B558 A06050101D417015R64U0000200099
N30E152B553 A08010100E510130U64U0300000099
N30E152B554 A08010100E511130U64U000000000
N30E152B555 A08010100E511130U64U000000000
N30E152B556 A08010100E511130U64U000000000
N30E152B557 A08010100E54168U64U000000000
N30E152B551 A10010101F315130R64U000000000
N30E152B552 A10010101F43100R64U0300000099

N30E153599 A06050101D417015R64U000000000
N30E153600 A06050101D417015L47U000000000

N30E153598 A10010101F312130R64U000000000
N30E153607 B06012201D3400L64U000000000
N30E153608 B06012201D3500R64U000000000

N30E154638 A06050101D1516017U00U0000040099

N30E15WWL642 A05020201C1328130B64U000000000
N30E15WWL643 A05020201C1328130B64U000000000
N30E15WWL641 A10010000F52610U41U0000200021

N30E202649 A06050101D35610U00U000000000

N35E52661 A05020201C35610U00U000000000

N35E53B671 C05020304E132130R64U000000000

N35E54B676 A06050101D20400N00U0300000099
N35E54B677 A06050101D20400N00U0300000099
N35E54B739 A10010000F52610U00U0300000099

N35E101B778 A05020201C417330L64U000000000
N35E101B777 A10010303H52610U64U0002000010

N35E103783 A06050101D321830L22U000000000
N35E103784 A06050101D42900L24U0300000099
N35E103785 A06050101D5101030U22U000000000
N35E103786 A06050101D5101030U22U000000000
N35E103787 A06050101D5101030U22U000000000
N35E103963 C13030202D119130L64U000000000

N35E104966 A06050101D55148U00U0300000099
N35E1041047 A10010101F366130R64U000000000
N35E1041048 A10010101F510123U64U000000000
N35E1041049 A10010303H431130R64U000000000
N35E104964 A10010000F54138U00U0300000099
N35E104965 A10010000F55168U00U0300000099
N35E1041050 A10010000F55148U64U000000000
N35E1041051 A10010000F55148U64U000000000
N35E1041035 C13231X112100U00U000000000
N35E1041033 C13030202X13200L64U000000000
N35E1041034 C13030202X13700L64U000000000
N35E1041042 E01030102B3500U42U000000000

N35E104B1586 A06050101D20400N42U000000000
N35E104B1587 A06050101D3211530U42U000000000
N35E104B1588 A06050101D4541030L42U000000000
N35E104B1589 A06050101D511148U44U000000000
N35E104B1579 A10010303H432130R64F300000000
N35E104B1580 A10010303H432130R64F300000000
N35E104B1581 A10010303H432130R64F300000000
N35E104B1582 A10010303H432130R64F300000000
N35E104B1583 A10010000F55138U26U000000000
N35E104B1584 A10010000F55148U00U000000000
N35E104B1585 A10010000F55148U00U000000000

N35E1521947 A10010101F42500L64U0100000099
N35E1521978 B6130E36610U64U000000000
N35E1521976 B06012201D35106R64U000000000
N35E1521977 B06012201D421610R64U000000000
N35E1521980 C13030202D11900U64U000000000

N35E1521981 C13030202D13200R64U000000000

N35E1552044 A08010100E365130L64U000000000
N35E2022052 A06050101D3683L64U0300000099

N155E45TP122075 A10010000F37610U00U0060000099

N170E5SWTP32083 A08040205B410105R64U000000000
N170E5SWTP32082 A10010101F221130N64U0000200015
N170E5SWTP32086B01010101D42062U00U000000000

N175E9012117 A08010301D417330R64U000000000
N175E9012114 A08020101F5484U00U0004000099
N175E9012115 A08020101F55130U47U001000108
N175E9012116 A08020101F55610U00U000000000
N175E9012112 A10010000F52610U00U000000000
N175E9012113 A10010000F55148U00U0300000099

AUPTR692247 A06050101D37108R64U000000000

N175E952430 A08010100E551530U00U000000000

N175E9512448 A08010100E5973U00U000000000

N220E60122477 A08010100E290130N00U0300000099

S20W052501 C13030202D16130L64U000000000
S20W052502 C13030202D1600R64U000000000
S20W052503 C13030202D17130L64U000000000
S20W052504 C13030202D122130R64U000000000

S20W52B22529 A05020201C1328130U00U000000000

S20W5B32541 A08020101F158130L65U000000000
S20W5B32550 F1000000X699900U00U000000000

S20W542B42551 A06050101D417010U64U000000000
S20W103B22581 A06050101D15200U00U000000000
S20W103B22582 A06050101D15200U00U000000000
S20W103B22583 A06050101D15200U00U000000000
S20W103B22584 A06050101D15200U00U000000000
S20W1043B42595 C10322D119130L64U000000000
S20W10137B2598 A06061001C438830R52U0010000099
S20W10137B2597 A10010303H51000U64U0010000099
S20W10137B2642 C06020200D1101130L64U0010000099

S20W10-15WL2649 A06060201A130130L64U000000000
S20W10-15WL2675 E01030100A3500U00U000000000

S20W15?52677 A06050101D3572R42U0012210030
S20W15?52676 A10010101F42500L64U0300000099
S20W15?52687 B06010302F35106R64U0002000099
S20W15?52688 B06010302F3662L64U000000000
S20W15?52689 B06010302F3662L64U000000000
S20W15?52690 B06010302F36610U64U0000005030
S20W15?52691 B06010302F36610U64U000000000
S20W15?52695 C13030202D17630L64U000000000
S20W15?52696 C13030202D1700L64U000000000
S20W15?52697 C13030202D119130R64U000000000
S20W15?52698 C13030202D132130R64U000000000
S20W15?52699 C13030202D1121130L64U000000000

S20W1510-24...l2706 A06050101D420610U64U0060000099
S20W1510-24...l2707 A06050101D420610U64U0060000099
S20W1510-24...l2721 C05020304E137130R64U000000000
S20W1510-24...l2728 C06020200D1122130L64U000000000
S20W1510-24...l2722 C13030202D16130L64U000000000
S20W1510-24...l2723 C13030202D17130R64U000000000
S20W1510-24...l2724 C13030202D17130L64U000000000
S20W1510-24...l2725 C13030202D112130R64U000000000
S20W1510-24...l2726 C13030202D122130U64U000000000
S20W1510-24...l2727 C13030202D1122130L64U000000000

SRF2750 A66134A130130L64U000000000
SRF2749 A08010102E1308130L64U000000000

B22761 C13030202D132130R64U000000000
B22762 C13030202D137130R64U000000000

120B?2800 C13020301C123130N00U000000000

b. Nazoteka Point DkJf-1, Lake Nipigon: Summary of identified fragments. Sorted by unit and by Class: A:Mammal - dark blue; B:Bird - red; C:Fish - dark green; D:Reptiles - dark red; E:Amphibians - dark cyan; F:Bivalves - dark magenta. Table 2.4 provides the taxonomic code, species names and common names, Chapter 2.3.2 discusses the data line structure, Table 2.3 lists the site names and their designation codes and location, Figure 2.11 maps the general site locations. For more data line detail refer to the Codebook in the microfiche appendix. Ordered by unit, catalogue number, and identification. Arranged diachronically from upper to lower levels within a unit.

TT1211 A06050101D36105L64U000000000

TT1359 A06050101D37124L64U000000000
TT1360 A06061001C35130R64M100000000
TT1358 A10010000F420610U00U000000000

TT2A287 A06050101D42098L00U000000000

TP+SUR138 A05020201C420130L62U000000000
TP+SUR137 A06050101D1516017U00U000000000
TP+SUR136 A08010100E55610U00U0300000099
TP+SUR135 A10010202F44069L61U000000000
TP+SUR168 B01010101D35230L64U000000000

EW550SECOR188 A10010303H325610R64U0100000099

TPNS40E90204 A10010101F59148U00U000000000

TT14205 A08010100E35108L64U000000000

TT2SL222 A06050101D174130L65U000000000
TT2SL223 A06050101D176130L65U000000000
TT2SL224 A06050101D290400U42U000000000
TT2SL221 A10010303H420610U64U0100000099

TT2A1301 B06010000X35610U00U000000000

TT2A2302 A10010101F51074U00U000000000

TT2B2338 A06020301C420610U00U0300000099

TT31363 A10010303H54168U00U000000000
TT31364 A10010303H510130U67U000000000

TT33392 A10010303H54168U00U000000000
TT33393 A10010000F54148U00U000000000

TT33428 A08010000D420610U00U000000000

TT3SL439 C06020200D137130R00U000000000

TT5HETH444 A10010000F250400N00U0000200199
TT5HETH446 C13030202D13713L00U000000000

TT5XHETH457 A08020101F59130U67U000000000
TT5XHETH458 A08020101F510130U67U0010000099

TP31482 B01010101D434610U00U000000000

TT5XHETH456 A10010303H59106U67U0010000099

CIRDEPRES478 A08010102E238130N97M300000000

TP2479 A06050101D152600U00U0010000099

c. Pikitigushi Site EbJd-1, Lake Nipigon: Summary of identified fragments. Sorted by unit and by Class: A:Mammal - dark blue; B:Bird - red; C:Fish - dark green; D:Reptiles - dark red; E:Amphibians - dark cyan; F:Bivalves - dark magenta. Table 2.4 provides the taxonomic code, species names and common names, Chapter 2.3.2 discusses the data line structure, Table 2.3 lists the site names and their designation codes and location, Figure 2.11 maps the general site locations. For more data line detail refer to the Codebook in the microfiche appendix. Ordered by unit, catalogue number, and identification.

SRVY142 A05020101C417410L67U000000000
SRVY143 A05020101C420610R67U000000000
SRVY131 A06050101D152600U00U000000000
SRVY132 A06050101D152600U00U000000000
SRVY133 A06050101D290230N52U000000000
SRVY134 A06050101D31370L00U000000000
SRVY135 A06050101D31380R00U000000000
SRVY136 A06050101D35330R56U000020008
SRVY137 A06050101D351830R56U000000000
SRVY138 A06050101D351830R56U000000000
SRVY139 A06050101D4101920L00U000000000
SRVY140 A06050101D41083L67U000020004
SRVY141 A06050101D41083L67U000020004
SRVY13 A08010103E11810B35U000000000
SRVY14 A08010103E18130R37U000000000
SRVY15 A08010103E18130L37U000000000
SRVY16 A08010103E111130R37U000000000
SRVY17 A08010103E121130N37U000000000
SRVY18 A08010103E122130L37U000000000
SRVY19 A08010103E12200R37U000000000
SRVY20 A08010103E126130R37U000000000
SRVY21 A08010103E130130L35U000000000
SRVY22 A08010103E21130N36U000000000
SRVY23 A08010103E22330N36U000000000
SRVY24 A08010103E23130N36U000000000
SRVY25 A08010103E23130N36U000000000
SRVY26 A08010103E23130N36U000000000
SRVY27 A08010103E24230N36U000000000
SRVY28 A08010103E25430N36U000000000
SRVY29 A08010103E25430N36U000000000
SRVY30 A08010103E26230N36U000000000
SRVY31 A08010103E27430N36U000000000
SRVY32 A08010103E27430N36U000000000
SRVY33 A08010103E231430N36U000000000
SRVY34 A08010103E231430N36U000000000
SRVY35 A08010103E232430N36U000000000
SRVY36 A08010103E232430N36U000000000
SRVY37 A08010103E233430N36U000000000
SRVY38 A08010103E233430N36U000000000
SRVY39 A08010103E234230N36U000000000
SRVY40 A08010103E235330N36U000000000
SRVY41 A08010103E235330N36U000000000
SRVY42 A08010103E236330N36U000000000
SRVY43 A08010103E236330N36U000000000
SRVY44 A08010103E237330N36U000000000
SRVY45 A08010103E237330N36U000000000
SRVY46 A08010103E238330N36U000000000
SRVY47 A08010103E238330N36U000000000
SRVY48 A08010103E239330N36U000000000
SRVY49 A08010103E239330N36U000000000
SRVY50 A08010103E240430N36U000000000
SRVY51 A08010103E240430N36U000000000
SRVY52 A08010103E241430N36U000000000
SRVY53 A08010103E251130N36U000000000
SRVY54 A08010103E251130N36U000000000
SRVY55 A08010103E251130N36U000000000
SRVY56 A08010103E252130N36U000000000
SRVY57 A08010103E252130N36U000000000
SRVY58 A08010103E252130N36U000000000
SRVY59 A08010103E253130N36U000000000
SRVY60 A08010103E253130N36U000000000
SRVY61 A08010103E253130N36U000000000
SRVY62 A08010103E254330N36U000000000
SRVY63 A08010103E254330N36U000000000
SRVY64 A08010103E255330N36U000000000
SRVY65 A08010103E255330N36U000000000
SRVY66 A08010103E290130N36U000000000
SRVY67 A08010103E297115N36U000000000
SRVY68 A08010103E297116N36U000000000
SRVY69 A08010103E2101230L36U000000000
SRVY70 A08010103E2102230L36U000000000
SRVY71 A08010103E2103230L36U000000000
SRVY72 A08010103E2104230L36U000000000
SRVY73 A08010103E2105230L36U000000000
SRVY74 A08010103E2106230L36U000000000
SRVY75 A08010103E2107230L36U000000000
SRVY76 A08010103E2108230L36U000000000
SRVY77 A08010103E2109230L36U000000000
SRVY78 A08010103E2110230L36U000000000
SRVY79 A08010103E2111230L36U000000000
SRVY80 A08010103E2112230L36U000000000
SRVY81 A08010103E2113230L36U000000000
SRVY82 A08010103E2102230R36U000000000
SRVY83 A08010103E2103230R36U000000000
SRVY84 A08010103E2104230R36U000000000
SRVY85 A08010103E2105230R36U000000000
SRVY86 A08010103E2106230R36U000000000
SRVY87 A08010103E2107230R36U000000000
SRVY88 A08010103E2108230R36U000000000
SRVY89 A08010103E2109230R36U000000000
SRVY90 A08010103E2110230R36U000000000
SRVY91 A08010103E2111230R36U000000000
SRVY92 A08010103E2112230R36U000000000
SRVY93 A08010103E2113230R36U000000000
SRVY94 A08010103E31230L36U000000000
SRVY95 A08010103E31230R36U000000000
SRVY96 A08010103E35230L36U000000000
SRVY97 A08010103E351530L36U000000000
SRVY98 A08010103E351630L36U000000000
SRVY99 A08010103E35230R36U000000000
SRVY100 A08010103E351530R36U000000000
SRVY101 A08010103E36330L36U000000000
SRVY102 A08010103E361630L36U000000000
SRVY103 A08010103E36230R36U000000000
SRVY104 A08010103E37230L36U000000000
SRVY105 A08010103E371530L36U000000000
SRVY106 A08010103E371630L36U000000000
SRVY107 A08010103E37230R36U000000000
SRVY108 A08010103E371530R36U000000000
SRVY109 A08010103E371630R36U000000000

SRVY110 A08010103E38130R37U000000000
SRVY111 A08010103E314130L37U000000000
SRVY112 A08010103E318130L37U000000000
SRVY113 A08010103E318130R37U000000000
SRVY114 A08010103E321130L36U000000000
SRVY115 A08010103E321130L36U000000000
SRVY116 A08010103E321130R36U000000000
SRVY117 A08010103E321130R36U000000000
SRVY118 A08010103E322130L36U000000000
SRVY119 A08010103E322130L36U000000000
SRVY120 A08010103E322130R36U000000000
SRVY121 A08010103E322130R36U000000000
SRVY122 A08010103E323330L36U000000000
SRVY123 A08010103E323330R36U000000000
SRVY124 A08010103E324130L36U000000000
SRVY125 A08010103E324130L36U000000000
SRVY126 A08010103E324130R36U000000000
SRVY127 A08010103E324130R36U000000000
SRVY128 A08010103E352130R37U000000000
SRVY129 A08010103E355130L37U000000000
SRVY130 A08010103E355130R37U000000000
SRVY1 A10010303H51000U00U000000000
SRVY2 A10010303H51100U00U000000000
SRVY4 A10010101F37610L61U000000000
SRVY5 A10010101F37610L61U000000000
SRVY6 A10010202F180130R65U000000000
SRVY7 A10010000F195850U69U000000000
SRVY8 A10010000F52610U00U000000009
SRVY10 A10010000F55610U00U000000000
SRVY11 A10010000F5900U00U0002000021
SRVY12 A10010000F51100U00U000000000
SRVY190 B06010802D346911R64U000000000

d. Sturgeon River Site DjJa-2, Lake Nipigon: Summary of identified fragments. Sorted by unit and by Class: A:Mammal - dark blue; B:Bird - red; C:Fish - dark green; D:Reptiles - dark red; E:Amphibians - dark cyan; F:Bivalves - dark magenta. Table 2.4 provides the taxonomic code, species names and common names, Chapter 2.3.2 discusses the data line structure, Table 2.3 lists the site names and their designation codes and location, Figure 2.11 maps the general site locations. For more data line detail refer to the Codebook in the microfiche appendix. Ordered by catalogue number and identification.

2 A06050101D1308110R65U000000000
3 A06050101D410610L67U000000000
4 A06050101D440610U67U0000200021
51 A06050101D1308030R44U000000000
1 A08020101F3782L66U0300000099
50 A10010303H431168R64U000000000
38 B01010101D36106L64U000000000

e. Grant Point Site DjJa-3, Lake Nipigon: Summary of identified fragments. Sorted by unit and by Class: A:Mammal - dark blue; B:Bird - red; C:Fish - dark green; D:Reptiles - dark red; E:Amphibians - dark cyan; F:Bivalves - dark magenta. Table 2.4 provides the taxonomic code, species names and common names, Chapter 2.3.2 discusses the data line structure, Table 2.3 lists the site names and their designation codes and location, Figure 2.11 maps the general site locations. For more data line detail refer to the Codebook in the microfiche appendix. Ordered by catalogue number and identification.

7 A06050101D11200L64U0300000099
4 A08010102E118130B67U0050000099
5 A08010102E1308130R67U0050000099
6 A08010102E1308130L67U0050000099
1 A10010101F43000L64U0300000099
2 A10010101F43100R64U0300000099
3 A10010101F43100R64U0300000099

f. Ombabika Site EaJa-1, Lake Nipigon: Summary of identified fragments. Sorted by unit and by Class: A:Mammal - dark blue; B:Bird - red; C:Fish - dark green; D:Reptiles - dark red; E:Amphibians - dark cyan; F:Bivalves - dark magenta. Table 2.4 provides the taxonomic code, species names and common names, Chapter 2.3.2 discusses the data line structure, Table 2.3 lists the site names and their designation codes and location, Figure 2.11 maps the general site locations. For more data line detail refer to the Codebook in the microfiche appendix. Ordered by catalogue number and identification.

4 A06050101D1308130L65U000000000
5 A06050101D1308130L65U000000000
6 A06050101D176130L65U000000000
7 A06050101D17000L00U000000000
8 A06050101D417430R64U000000000
9 A06050101D417030L64U0060000099
3 A08020101F1308130L65U000000000
2 A10010101F1328130L65U000000000
1 A10010303H326130U64U000000000
20 C09010101D119130L00U000000000
21 C13500X1135130L00U000000000

g. Martin Site DiJe-1, Lake Nipigon: Summary of identified fragments. Sorted by unit and by Class: A:Mammal - dark blue; B:Bird - red; C:Fish - dark green; D:Reptiles - dark red; E:Amphibians - dark cyan; F:Bivalves - dark magenta. Table 2.4 provides the taxonomic code, species names and common names, Chapter 2.3.2 discusses the data line structure, Table 2.3 lists the site names and their designation codes and location, Figure 2.11 maps the general site locations. For more data line detail refer to the Codebook in the microfiche appendix. Ordered by catalogue number, and identification

1 A08010301D1308130R65U000000000
2 A08010301D1308130L65U000000000
3 A08010301D157130R65U000000000

h. Sutherland Site DjJe-1, Lake Nipigon: Summary of identified fragments. Sorted by unit and by Class: A:Mammal - dark blue; B:Bird - red; C:Fish - dark green; D:Reptiles - dark red; E:Amphibians - dark cyan; F:Bivalves - dark magenta. Table 2.4 provides the taxonomic code, species names and common names, Chapter 2.3.2 discusses the data line structure, Table 2.3 lists the site names and their designation codes and location, Figure 2.11 maps the general site locations. For more data line detail refer to the Codebook in the microfiche appendix. Ordered by catalogue number and identification

4 A06050101D41700R64U000000000
5 A06050101D41730R64U000000000
6 A06050101D42000L64U000000000
1 A10010303H54168U00U000010008
2 A10010202F350907L64U0060000099
3 A10010202F425105R62U000000000

`i. Martin Bird Site DbJm-5, Whitefish Lake: Summary of identified fragments. Sorted by unit and by Class: A:Mammal - dark blue; B:Bird - red; C:Fish - dark green; D:Reptiles - dark red; E:Amphibians - dark cyan; F:Bivalves - dark magenta. Table 2.4 provides the taxonomic code, species names and common names, Chapter 2.3.2 discusses the data line structure, Table 2.3 lists the site names and their designation codes and location, Figure 2.11 maps the general site locations. For more data line detail refer to the Codebook in the microfiche appendix. Ordered by unit, catalogue number, and identification. Arranged diachronically from upper to lower levels within a unit.

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C3IIPBB2418 A04010101F2319930N00U000000000
C3IIPBB2419 A04010101F232459N00U000000000
C3IIPBB2420 A04010101F248400N00U000000000
C3IIPBB2421 A04010101F248400N00U000000000
C3IIPBB2422 A04010101F248400N00U000000000
C3IIPBB2423 A04010101F248459N00U000000000
C3IIPBB2424 A04010101F2484511N00U000000000
C3IIPBB2425 A04010101F32610U00U000000000

C4IP00-362441 A05050101D410610L64U0060000099
C4IP00-362440 A06050101D41700R64U0060000099
C4IP00-362434 A10010303H36643L64U0060000099
C4IP00-362435 A10010303H440611R64U0060000099
C4IP00-362436 A10010303H45083U64U0060000099
C4IP00-362437 A10010303H460130U64U0060000099
C4IP00-362438 A10010303H54160U64U0062000099
C4IP00-362439 A10010303H55168U00U0060000099

C4IID06-362457 A08020101F362530L94U000000000
C4IID06-362456 A10010303H172130R55U000000000

C4IIIP36-602488 A04010101F36610R00U000000000
C4IIIP36-602489 A04010101F36240R00U000000000
C4IIIP36-602490 A04010101F4104610U00U000000000
C4IIIP36-602491 A06050101D1328030L64U000000000
C4IIIP36-602492 A06050101D17000U00U000000000
C4IIIP36-602493 A06050101D17000U00U000000000
C4IIIP36-602494 A06050101D17000U00U000000000
C4IIIP36-602495 A06050101D17000U00U000000000
C4IIIP36-602496 A06050101D17000U00U000000000
C4IIIP36-602497 A06050101D17000U00U000000000
C4IIIP36-602498 A06050101D17000U00U000000000

C6IIPIIDII2508 A06050101D2113230L54U000000000
C6IIPIIDII2507 A10010303H5101050U00U0010000099

C7ITWEND2521 A10142H350130U66U000200008
C7ITWEND2522 A10142H420641U00U000000000
C8ITWEND2541 C05060102D19130R00U000000000

j. Macgillvary Site DbJm-3, Whitefish Lake: Summary of identified fragments. Sorted by unit and by Class: A:Mammal - dark blue; B:Bird - red; C:Fish - dark green; D:Reptiles - dark red; E:Amphibians - dark cyan; F:Bivalves - dark magenta. Table 2.4 provides the taxonomic code, species names and common names, Chapter 2.3.2 discusses the data line structure, Table 2.3 lists the site names and their designation codes and location, Figure 2.11 maps the general site locations. For more data line detail refer to the Codebook in the microfiche appendix. Ordered by unit, catalogue number, and identification. Arranged diachronically from upper to lower levels within a unit.

151 A10010303H3799U64U0200000099
152 A10010303H3799U64U0200000099
153 A10010303H44069U64U0200000099
154 A10010000F420610U64U000000000
155 A10010000F420610U64U000000000
1560 B06012201D31782R67U000000000

2569 A05020201C420610R67U000000000
2570 A05020201C420610L67U000000000
2571 A10010000F126590U00U0060000099
2572 A10010000F3568U64U000000000
2573 A10010000F42064U64U000000000
2574 A10010000F440154U00U000000000
2575 A10010000F54610U00U000000000
2576 A10010000F54610U00U000000000
2577 A10010000F55154U00U000000000
25177 B06010601F35107L67U000000000
25178 B6184D34130R67U000000000

36187 A05020201C410610L67U000000000

k. Fisherman Point Site DbJm-4, Whitefish Lake: Summary of identified fragments. Sorted by unit and by Class: A:Mammal - dark blue; B:Bird - red; C:Fish - dark green; D:Reptiles - dark red; E:Amphibians - dark cyan; F:Bivalves - dark magenta. Table 2.4 provides the taxonomic code, species names and common names, Chapter 2.3.2 discusses the data line structure, Table 2.3 lists the site names and their designation codes and location, Figure 2.11 maps the general site locations. For more data line detail refer to the Codebook in the microfiche appendix. Ordered by catalogue number and identification

91 A10010000F153600U00U000000000
92 A10010000F153600U00U000000000
93 A10010000F153600U00U000000000
94 A10010000F153600U00U000000000

95 A10010000F153600U00U000000000
96 A10010000F153600U00U000000000
97 A10010000F153600U00U000000000

l. Cressman Site DfJn-1, Lac des Mille Lac: Summary of identified fragments. Sorted by unit and by Class: A:Mammal - dark blue; B:Bird - red; C:Fish - dark green; D:Reptiles - dark red; E:Amphibians - dark cyan; F:Bivalves - dark magenta. Table 2.4 provides the taxonomic code, species names and common names, Chapter 2.3.2 discusses the data line structure, Table 2.3 lists the site names and their designation codes and location, Figure 2.11 maps the general site locations. For more data line detail refer to the Codebook in the microfiche appendix. Ordered by unit, catalogue number, and identification

111 A06050101D151600U00U000000000
11 A10010303H12600U64U000000000
12 A10010303H165130R67U000000000
13 A10010303H315130L54F300000000
14 A10010303H420610L64U000210004
15 A10010000F01020000U00U000000000
16 A10010000F231100U00U000000000
17 A10010000F4100U00U000000000
18 A10010000F420610U00U000000000
19 A10010000F510124U00U0100000099
110 A10010000F511124U00U0100000099

TP7968 B06010801D3581R64U000000000

SRVY70 A10010303H313030L64F300000000

CC74 A06061001C35180U56U0260000099
CC75 A06061001C410123L56U0300000099
CC71 A10010000F150600U00U000000000
CC72 A10010000F150600U00U000000000
CC73 A10010000F150600U00U000000000
CC209 C13030202D132130L00U000000000
CC210 C13030202D137130L00U000000000

m. Korpi Site DfJo-1, Lac dec Mille Lac: Summary of identified fragments. Sorted by unit and by Class: A:Mammal - dark blue; B:Bird - red; C:Fish - dark green; D:Reptiles - dark red; E:Amphibians - dark cyan; F:Bivalves - dark magenta. Table 2.4 provides the taxonomic code, species names and common names, Chapter 2.3.2 discusses the data line structure, Table 2.3 lists the site names and their designation codes and location, Figure 2.11 maps the general site locations. For more data line detail refer to the Codebook in the microfiche appendix. Ordered by unit, catalogue number, and identification

42.15 A06050101D35130L64U000000000
42.16 A06050101D37168U64U000000000
42.2 A10010101F126590U00U0300000099
42.3 A10010101F126590U00U0300000099
42.4 A10010101F43000U00U000000000
42.5 A10010101F440804U00U0300000099
42.6 A10010101F440108U00U0010000099
42.1 A10010303H43100U64U000000000
42.7 A10010000F126590U00U0300000099
42.8 A10010000F126590U00U0300000099
42.9 A10010000F126590U00U0300000099
42.10 A10010000F126590U00U0300000099
42.11 A10010000F410168U00U000000000
42.12 A10010000F55168U00U0300000099

42.13 A10010000F510154U00U000000000
42.14 A10010000F511154U00U000000000

263.71 A06050101D321612L64U0300000099
263.72 A06050101D321813L64U0300000099
263.73 A06050101D362310R64U0300000099
263.74 A06050101D3784R64U0300000099
263.75 A06050101D350230U64U0300000099
263.76 A06050101D350124L64U0300000099
263.79 A06050101D3103910U64U0300000099
263.70 A08010102E37610U00U0200000099
263.67 A10010303H59148U00U000000000
263.68 A10010303H510124U00U000000000
263.69 A10010000F21005015U00U0300000099

n. Long Sault Site DdKm-1, Rainy River: Summary of identified fragments. Sorted by unit and by Class: A:Mammal - dark blue; B:Bird - red; C:Fish - dark green; D:Reptiles - dark red; E:Amphibians - dark cyan; F:Bivalves - dark magenta. Table 2.4 provides the taxonomic code, species names and common names, Chapter 2.3.2 discusses the data line structure, Table 2.3 lists the site names and their designation codes and location, Figure 2.11 maps the general site locations. For more data line detail refer to the Codebook in the microfiche appendix. Ordered by unit, catalogue number, and identification. Arranged diachronically from upper to lower levels within a unit.

F137 A06050101D126130L00U000000000
F138 A06050101D126130L00U000000000
F139 A06080101D2797R36U000000000
F1310 A06080101D464130R00U000000000
F1311 A08040205C1328118U00U0060000099
F1312 A10000000F5200U00U0060000099
F1313 A10000000F5200U00U0060000099
F1314 A10000000F5200U00U0060000099
F1315 A10000000F5200U00U0060000099
F1316 A10000000F5200U00U0060000099
F1317 A10000000F5200U00U0060000099
F1318 A10000000F5200U00U0060000099
F1319 A10000000F5200U00U0060000099

F1451 A06050101D151620U00U000000000

F1452 A06050101D151620U00U000000000
F1453 A06050101D36106L62U000000000
F1454 A06050101D322330L42U000000000

F1599 A06050101D36610R00U000000000
F15100 A06050101D36610R00U000000000
F15101 A06050101D151610U00U000000000
F15102 A06050101D35154R00U000000000
F15103 A06050101D363430L42U0300000099
F15104 A06050101D463130R00U0100000099
F1598 A10010000F4100U00U000000000
F15199 C06020200D2000N00U000000000
F15200 C06020200D2000N00U000000000
F15201 C06020200D2000N00U000000000
F15202 C06020200D2000N00U000000000

F15203 C06020200D2000N00U000000000
F15204 C06020200D1100R00U000000000

F16220 A06050101D46000U67U0060000099
F16221 A06050101D47000U00U0060000099
F16222 A06050101D417330R67U0060000099
F16223 A06050101D21055330R00U0300000099
F16224 A06050101D3660U00U000000000
F16225 A06050101D417330L41U000000000
F16226 A06050101D161130L65U000000000
F16227 A08040101C15200U65U000000000
F16228 A08040101C15200U65U000000000
F16229 A08040101C1636017R65U000000000
F16230 A08040101C180130L65U000000000
F16231 A08040101C150600U65U000000000
F16232 A08040101C1328230R67U000000000
F16233 A08040101C1328130L67U000000000
F16279 C13030202D688900U00U000000000
F16280 C13030202D20130U00U010000000

F17297 A06050101D45183R00U000000000
F17296 A10010303G324107U0U000000000

F18348 A10030101G410107L67U000000000
F18349 A10030101G410107L67U00000000
F18350 A10000000000G6500U00U000000000
F18351 A10000000000G6500U00U000000000
F18352 A10000000G6500U00U000000000
F18353 A10000000X6500U00U000000000

F19377 A06050101D111463R67U000000000
F19378 A06050101D111463R67U00000000
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F19389 C13030202D110200R00U000000000

F111415 C13030202D132829R00U000000000

F112434 C13030202D110300U00U000000000

F113454 A06050101D51141U00U0300000099

F22459 A10000000G37154U00U000000000

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F23462 A10030201G51084U67U000000000
F23463 A10030201G51084U67U00000000
F23464 A10030201G51084U67U00000000

F24470 A06050101D151610U00U000000000
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F24472 A06050101D35230L67U00000000
F24473 A06050101D351630L67U000000000
F24474 A06050101D351530U67U000000000
F24475 A06050101D351930L67U000000000
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F24478 A06050101D159130R66U000000000
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F24505 C02010102F1100U00U000000000
F24506 C02010102F1100U00U0300000099
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F26552 B06010802D34130R64U000000000

F27553 A10010000G41060U00U000000000
F27554 A10010000G41060U00U00000000

F28573 A06050101D47584U66U000000000
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F28606 C06020200D20130N00U000000000
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F28608 C06020200D20130N00U000000000
F28609 C06020200D20130N00U000000000
F28610 C06020200D20130N00U000000000
F28611 C06020200D20130N00U000000000
F28612 C06020200D20130N00U000000000

F210643 C06020200D2000N00U0300000099

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F34695 A06050101D13200U00U000000000
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F34698 A06050101D13200U00U000000000
F34699 A06050101D13200U00U000000000
F34700 A06050101D13200U00U000000000
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F34707 A06050101D176130R65U000000000
F34708 A06050101D177130R65U000000000
F34709 A06050101D4100U00U000000000
F34710 A08040701C158130R28U000000000
F34711 A08040701C160130L28U000000000
F34712 A08040701C160130R28U000000000
F34713 A08040701C161130L28U000000000
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F37804 A06050101D46300R67U000000000
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F482968 C02010102F688800N00N000000000
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F482970 C02010102F1100U00U000000000

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F504010101074 A06050101D454130R67U000000000
F504010101075 A06050101D454130R67U000000000
F504010101076 A06050101D315130L67U0300000099
F504010101077 A06050101D324130R67U0300000099
F504010101078 A06050101D324130L67U0300000099
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F504010101080 A06050101D322130L67U0300000099
F504010101081 A06050101D354130L67U0300000099
F504010101082 A06050101D365130R67U0300000099
F504010101083 A06050101D355130R67U0300000099
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F504010101089 A06050101D422124L67U0300000099
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F504010101187 C02010102F1100U00U0300000099
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F661208 A10010303H511154U00U000000000

F711209 A10010000F6500U00U000000000

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F751219 A04010101F178210R64U000000000
F751220 A04010101F158130L65U000000000

F841230 A10010303H510154U67U0300000099

F1031246 A05020201C313830R67U000000000
F1031247 A05020201C1328118R67U000000000
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F104A11278 A06050101D139820R67U000000000
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F1091800 A10010303H376130L67U000000000
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F101172025 C02010102F1100U00U000000000
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F1132080 C06020200D2000N00U000000000

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CHAPTER THREE: Observations From the Modern Environment

> For both the archaeologist and the native dweller, the landscape tells - or rather *is* - a story. It enfolds the lives and times of predecessors who, over the generations, have moved around in it and played their part in its formation. To perceive the landscape is therefore to carry out an act of remembrance, and remembering is not so much a matter of calling up an internal image, stored in the mind, as of engaging perceptually with an environment that is itself pregnant with the past (Ingold 1993:152-153).

3.1: Western Scientific Knowledge and Traditional Ecological Knowledge

It must be evident from the discussion in the Preface and the integration of ethnographic materials in Chapters One and Two, that I consider traditional ecological knowledge (TEK) to be an integral component in the analysis of the archaeological remains of prehistoric, protohistoric, and historic peoples and their cultures, where appropriate materials to support such an analysis are available. This is particularly the case for the peoples of northern Canada. This methodological and philosophical bent on my part is further reflected in my choice of quote to head this chapter. In the northern Canadian instance .we are fortunate to have written records ranging from incidental documents, to documents of exploration, trade and government, to structured ethnographic records, variously dating from the early contact period until late in this century. Increasingly, as well, there is being gathered into printed form (although video tape is being substituted in some cases) the oral traditions and memories of the elders, if not directly (because of their loss to us through death), then through the memories of those who knew them (e.g. Behne 1997 on traditional canoe building). In some cases the eccessive detail of these collections is reminiscent of the relentlessness of the Boasian approach to the problem of continued culture loss or mutation. A considerable amount of such material is being collected specifically for court cases on land-claims issues. Since the Delgamuukw ruling on aboriginal title to land in the Supreme Court of Canada five months ago the urgency and immediacy of this process has increased. As such, significant components of the recording of the past deal with possession and use of traditional territory, rights of occupation, rights of use of habitats, and other relationships to the land. It must be admitted that not all of these materials, past and present, are of excellent quality. None the less, a great deal of it is indispensable to an understanding of the past.

We do know that the early materials speak directly of the peoples of the past who lived in these areas of Canada at the time of European contact. It is, rightly, assumed that these same early documents also provide an insight into the lives of the indigenous peoples before the advent of European contact and colonisation. The archaeological and historical records document a physical and cultural continuity to present day indigenous populations, the people of the First Nations. Thus the direct historical approach, if anywhere, is applicable here (see earlier applications in Dawson 1977; Wright 1968a). In this case metaphor, analogy and homology[1] do not suffer from the problem of being thrice removed - removed by time, removed by space, and removed by cultural tradition, which is the case when they are used to illuminate another culture altogether.

Most importantly, we have the people themselves, who can tell us directly how things are (or were) and why they are (or were) that way. Even if you want to engage in an emic - etic discussion on the merits of this knowledge, it does not detract from the fact that some, indeed sometimes much, of such information is invaluable to the modern researcher. It is true that this direct contact information may have been transmuted by the colonial experience and the coming of mass communication[2], but still there are compelling instances and pieces of information that are vital to the "ah-ha" process - that moment when the researcher has insight into the workings of the mind of another and thus into the culture that shaped that mind. This makes traditional ecological knowledge (TEK) immediate to our looking for an interpretation of the past since TEK is a "...cumulative body of knowledge and beliefs handed down...by cultural transmission..." that illuminates "...the relationship of living beings (including humans) with one another and with their environment" (Berkes et al. 1992:3).

Also it is integral to such an analysis to understand that TEK "...differs substantially from Western scientific knowledge (WSK) in terms of the nature of the data collected, the approach to the acquisition of knowledge, and the areas of primary concern or focus" (Berkes et al. 1992:3-4). See Table 3.1 on page 152. When the components to

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[1] Metaphor is the transfer of value assumptions between two domains; analogy addresses similarities in function; homology implies comparison of form and structure (Cohen 1994a:5).

[2] The advent of television, then the satellite dish in remote areas, has changed the perceptions of all who have seen it. To a child living in, say, the northern community of Moose Factory, what meaning is found in programmes designed for the urban child? Natural history programmes, however, are immensely popular although sometimes greatly amusing, from the perspective of the hunter, for their seemingly ridiculous content. Such programmes do not touch the core of the knowledge these northern peoples have about their 'natural' world because they are compiled by outsiders. Further, many programmes deliver material on things these people in remote areas, in all probability, never have done and never will experience directly. The vicarious has become the norm in such instances and although it informs it does not teach by direct experience.

the development of TEK are understood it becomes immediately apparent that it is not incompatible with the objectives of WSK. This can be seen in some of the research used to develop sections of this work. Important to this understanding is the work of Robin Riddington with the Athapaskan of Northwest Canada and his article on indigenous technology and world view (1982). Riddington argues that the Beaver Indians (*Dunne-za*)[3] value technical knowledge over material artefacts: "possession of information was far more important than physical possessions" (1982:473). He goes on to note that

> [t]he Beaver people viewed human experience as a life-sustaining network of relationships between all components of a sentient world. They experienced their world as a mosaic of passages and interactions between animate beings in motion against the backdrop of a terrain that was itself continually in process, through the cyclical transformations of changing seasons (Riddington 1982:473).

For the hunter, knowledge of the environment, exploitative strategies and technology is vitally important. Nelson (1973) reinforces this view with his study of Alaskan hunters (Kutchin), and from this we can generalise to others. He notes hunters and gatherers are "***uncommonly knowledgeable about their environment and intelligent in their approach to exploiting it***" (Nelson 1973:301) (see Chapter One and the discussion of Speck's work). This knowledge he characterises as having a number of "essential contributing aspects": knowledge; objectivity and empiricism; curiosity; communication; understanding of the environment; and access to a number of exploitative techniques (Nelson 1973:301). To this I would add the benefit of the social group(s) of kin and non-kin associations that through their flexibility are contributing factors to successful exploitation strategies (this is also discussed in Chapter One). Nelson (1973:305) goes on to note that the best hunters are the ones with "**intense scientific curiosity** about their environment and the ways of exploiting it" (emphasis added).

I want now to review some of the components of TEK and comment on them and their usefulness to the archaeologist when attempting the "...act of remembrance..." and the process "....of engaging perceptually..." with a world "...pregnant with the past..." (Ingold 1993:152-153).

TEK or native science is a

> ...combination of religious belief and technological thought...[that]....refers to a body of knowledge that is ideally a holistic, religious perspective, grounded in information that is observed with a method that may be called moral empiricism.

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[3] The Beaver Indians, who traditionally lived between Lake Athabaska and the Rocky Mountains in the Peace River valley, have an adaptation similar to that which is the focus of this study. This is because their territory was composed of several biomes and varied resources were available. The big game (Mountain Sheep, Mountain Goats, Moose, Wood Bison, Deer, Caribou, Black Bear, Grizzly Bear), small game (Beaver, Hares, Porcupine, Marmot), and fish (Whitefish, Pike, Trout, Greylind) (Riddington 1982:472) components are similar, except for the detail of available species, to those exploited further to the east in a similarly mosaic-structured environment.

> That is, the cosmos has a unity and integrity that is creator-given, and it is the task of humans to discipline their minds and actions to recognize and understand the workings of the natural processes that we may see around us. (Berkes, et al. 1992:22)

In this respect four aspects of TEK will be considered: i. the diachronic; ii. the qualitative; iii. the spiritual; and iv. the holistic. They have their counterparts in WSK in the synchronic, the quantitative, the mechanistic, and the reductionist modes of inquiry.

i. **Diachronic versus synchronic**: Since indigenous people must know their territory with deep intimacy, they develop diachronic information. This is crucial if the short and long rhythms of nature are to be understood, used, or planned around. The conflict between the diachronic and the synchronic views of time is detailed in Lewis (1989) when he discusses the Australian Aboriginal view of fire. The Euro-Australian with the synchronic approach sees fire as a dangerous event bounded by the concerns of the moment while the indigenous diachronic viewer sees fire as part of the long-term process that is a part of care for the land. Of course the nature of the data collected from any archaeological site is such that it is a compilation of the events of the people who lived there and at times this stretches over many years and gives us insight into the diachronic process as well as the synchronic events. It reflects the decisions made in the diachronic interval by the peoples who lived there. This idea of time as both synchronic and diachronic is not anathema to the archaeologist who is trained to recognise both and deal with both. So here there should be no incompatibility between the two approaches.

ii. **Qualitative versus quantitative:** The archaeologist, somewhat from necessity, works in the quantitative. How can we help but deal with the numbers of, or the measurement of, items that are considered data? In TEK it is suggested that quantification creates a detachment from the item that is an object of study thus detracting from developing an "intimacy" with natural systems. This does not mean that indigenous populations do not quantify. It is just that quantification is not the end, but the means - but then again that, too, is a WSK objective. They know the relationship of animal population sizes to environmental parameters that are needed to support these populations and harvesting decisions are contingent on these numbers. Although, as has been noted earlier, numbers supplied to government agents may not be actual numbers (of course this is a political issue), still there is within the indigenous communities themselves an accurate understanding of the biomass they must rely upon. So accurate are their numbers for the actual populations that in 1861 the first estimate ever done of Canada and Lesser Snow Geese numbers in the Hudson Bay and James Bay regions was based on the figures supplied by TEK of harvesting limits in relation to actual goose population size. Cree hunters had a 1:20 ratio of killed to live geese as their working model of harvesting while maintaining a viable migrating / breeding population. From this an estimate of 1,200,000 geese was made (Barnston 1861). It is believed that this estimate was fairly accurate when compared with the figures used for this population today.

iii. **Spiritual versus mechanistic:** The understanding of systems is produced by the people who are most affected by this knowledge, the ones who live the life, in the most basic way, that is dependent on this very knowledge. So the information is quite subjective and very life specific. It is not the objective, removed data used by a "cadre of...detached researchers" (Berkes 1992:4). For the researcher, such as an anthropologist, working directly in another culture, the nature of this detachment becomes clear. No matter what happens, barring death, the researcher, as an outsider, eventually will be returning home. The people amongst whom he or she lived and worked would be continuing with what they had always done. The experience of the study group was a moment out of the researcher's time while the experience of the researcher was merely a moment in the group's time, a time that pre-dated the arrival and post-dated the leaving of the outsider. Further, the group's experience of the "now" of the researcher being there was interpreted through a schema that on the part of the researcher was never fully recognised or comprehended in the diachronic continuance of the group's life. So we are, as archaeologists, looking at the minutiae. They become the moments out of time. Without the rights or privileges of the insider to the direct knowledge of the meaning, we separate things into categories that arise from our own schema. Sometimes we forget or lose sight of the fact that there was an integrated whole and that this whole may have had an interpretation counter to the mundane, verging on or completely in the spiritual, within its own time and place.

iv. **Holism versus reductionism:** Basically this is a continuation of the observations offered directly above. To expand on this theme we need to think of the cognitive styles that have produced the way observation is done. Perhaps useful here would be the analysis of **global cognitive style** (the

	WSK	TEK
Nature of data	Synchronic Quantitative	Diachronic Qualitative
Nature of approach	Mechanistic, objective Predominantly reductionist Systematic experimentation	Spiritual, subjective Holistic Trial-and error
Primary concern or focus	Accumulation of facts Verification of predictions General principles and theory building	Building of collective wisdom Symbolic meaning Principles which are personal and moral

Table 3.1: Adaptation of Table 1 in Berkes, et al. (1992) showing some of the major distinctions between Western Science (WSK) and Indigenous Knowledge (TEK). The discussion of this is found on pages 4-6 in Berkes, et al. (1992).

holistic approach or field dependent style [TEK]) and **articulated cognitive style** (the field independent style [WSK]) (Cole and Scribner 1974). In the former instance people have a tendency to see interlocking relationships in which they are a part - or... "the relationship of living beings (including humans)...", cited above. In the latter instance people seem to make firmly defined distinctions between self and the world. They also tend to do the analyses of their world on smaller and smaller bits of information about this world, which they tend to then organise and reorganise in diverse ways in the search for meaning. Understanding that these are learned styles of cognition teaches us that both views of the world are valid, although different. The use of one style over the other does not preclude the use of the other style in specific cases. We can do this if we recognise these styles and how they are different organising principles. Such recognition gives us the freedom to "try on" the other style to see if it gives us a better "fit" in the interpretation of the phenomena we are observing. We achieve this better fit when we are able to access categories of information unnoticed before or additional information in those categories already delineated for investigation.

For the anthropologist and the archaeologist none of these four distinctions should be oppositional statements as *either / or* rigid categories as somewhat framed and discussed by Berkes, et al. (1992)[4]. Rather, the distinctions should be seen as complementary forms of inquiry (or as Pam Colorado calls it, the utilisation of an intercultural [bi-cultural] research model that she points out is in tune with UNESCO's new international order concept (1988:49; 62-66)) that function inclusively as *both / and.* They are not incompatible if they can be seen as this complementary process, a process that will provide insight into the categories, distinctions, classifications, choices, schemas, metaphors, world views or whatever of the lives of those of the past (e.g. Overholt et al. 1982; Vecsey 1983). Further, coming to this understanding of TEK we can transcend the Western view of the *primitive other* by looking "...at technology as being knowledge, *the knowledge that people use for practical purposes*, then there is much more than just...[stone tools]...or the ways hunters can locate and kill game..." (Lewis 1989:955).

I think some anthropologists have been doing this more or less explicitly (e.g. Tanner 1979) while some archaeologists have been engaging in this process in perhaps a more implicit way (e.g. Cleland 1966; Stoltman 1978). Regardless, it has been part of our interpretative process and as such we need to understand how these forms of knowledge allow us to know and what it is that they allow us to know. By coming to this understanding we can effectively use TEK with confidence and further, we can apply the

[4] Although, to give Berkes, et al. credit, they do make the point that TEK can be used to develop policy on the environment in conjunction with WSK. But this does not detract from their main theme of two distinct and separate forms of understanding and inquiry

insights we gain in this use to the development of general principles and then the general models that WSK so values. These general models can then be used to interpret aspects of other cultures where we have no indigenous knowledge to use for this interpretation. This then can be done without the tripartite problems of metaphor, analogy and homology, outlined above, of displacement in time, displacement in space, and displacement in cultural tradition. Duden (1991) *à la* Hartley, observes in her book *The Woman Beneath The Skin: a Doctor's Patients in Eighteenth-Century Germany*, that the past is a different country even within the same cultural tradition, that people there did things differently. None the less we want to assume that we share a commonality with those who came before us. This assumption, Duden (1991) contends, is false. We may have nothing in common with those of the past but this should not deter us from attempting theory building on the nature of the unknown cultural processes. The unknown does not ultimately and irrevocably always mean the unknowable.

We have the potential to proceed from two perspectives founded in two different organising principles for the understanding of the natural, cultural, social, and spiritual worlds. Perhaps this is the ultimate for the solving of any emic-etic debate on the nature of meaning. Indeed this is exactly what Rappaport (1979:97) suggested in his discussion of the cognized model (emic; TEK) and the operational model (etic; WSK). What is important, according to Cohen (1994a:6), is that the inquiry have its own integrity, internal coherence, and results that can be "tested". Both WSK and TEK meet these criteria. He further states "[t]he intellectual climate...includes standards of knowledge and a system of values that constitute a set of metaphors which determine a style of doing science acceptable to the members..." (Cohen 1994a:13). This, too, is the case for both WSK and TEK.

In summary, I suppose this can be likened to Popper's (1979:39) view of an infinite number of "logically possible worlds" and the problem of demarcation between those things investigated by empirical sciences (WSK) and those things considered part of "metaphysical" systems (TEK). Such demarcation does not necessarily occur in other cultures and certainly this is the point for the Algonkian peoples of northern Canada. The demarcation of the physical from the metaphysical does not occur and yet Algonkian peoples are able to give very pragmatic descriptions of their physical world or as Winterhalder (1993:322) observes "[h]unters-gatherers may find no great disparity between their means and ends because they are rational *creatures* who, to the *extent possible*, make optimizing choices" (emphasis added[1]). It is their interpretation of what these pragmatic observations mean, or do not mean, that causes the problem for the researcher from the WSK tradition. Thus our demarcation, as applied, can possibly shift boundaries over a field of greater or lesser breadth than we may assume (see Figure 3.1). In this way we can generate the problem of subsuming more, or including less, than was involved in the original system. The integration of the TEK and WSK approaches can move us a distance from this problem; we can move towards a model where there is as little as possible discrepancy between the boundary of the original system and the boundary of our interpretation of that real system. From my perspective, the objective is to create an interpretation that would resonate for the people who we are discussing.

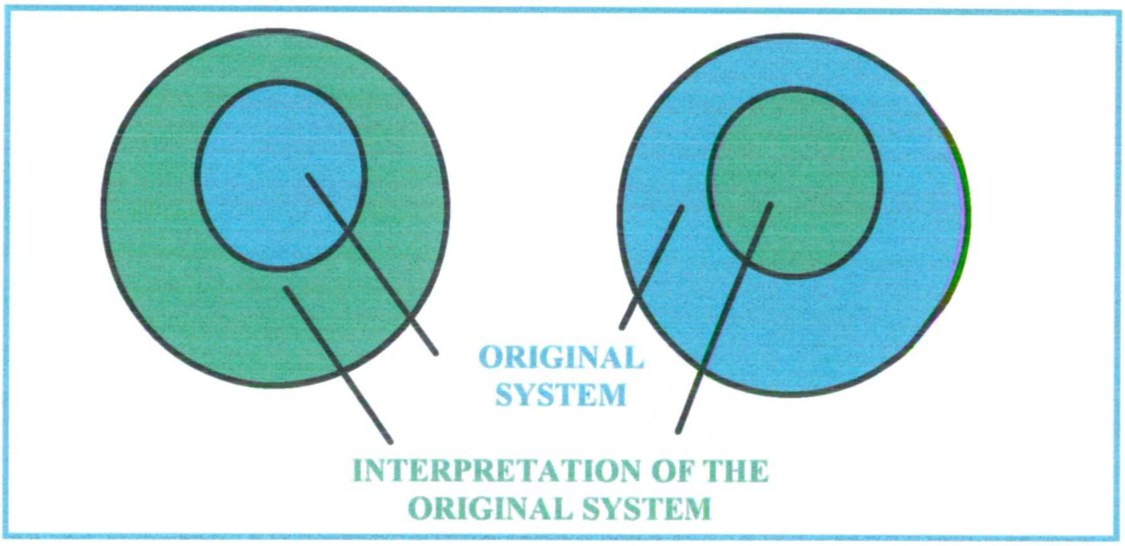


Figure 3.1: Field of original system in relation to the interpretation of the original system with boundaries in place.

The results of the application of the two forms of inquiry discussed above, TEK and WSK, are intertwined in the text of this chapter. In this there is a similarity in their application and contextualisation to the dynamic balance between thinking and values, and between self-assertion and integration Capra has proposed (1996:29-30; 9-10). TEK can be seen in the ethnographic and interview materials, in particular the information supplied by Darlene Newton. WSK is found in the data generated on the environment in the fieldwork conducted in the boreal forest of Saskatchewan in 1995.

[1] In the context of my discussion of the interpretation of hunters-gatherers in Chapter One and the work of Lewis (1989), I find it striking that such terms as "creatures" and "extent possible" can presently go unchallenged. "Creature" in this context conjures up something other than human. I do not think that this is Winterhalder's intent, but if it does not have denotation it certainly has connotation.

Plate 3.1: East test area, Saskatchewan BOREAS Southern Study Area (B-SSA) view to the southeast from the Narrow Hills esker in Narrow Hills Provincial Park, the summer of 1995. Lakes interspersed with various stages of regrowth. Areas where wetlands are being 'developed' can be found in the middle ground of the image where stands of dead trees can be seen. Edge areas along the shorelines can be distinguished. Catalogue number 1SKs7.

3.2: Modern forests as analogues for prehistoric observations

3.2.1: Ecosystems as mosaics

Ecosystems are mosaics of successional sequences. Because of the nature of repeated disturbances elaborate and unique patchworks are created and recreated (see Plate 3.1). Not always, indeed seldom, in symphony, they provide a multitude of habitats in various stages of development thereby affecting species composition and distribution. An ecosystem, therefore, cannot be viewed as static; as Lee (1976:95) emphasised for the !Kung, that is to say, analysis must not be conducted from a "short-time" perspective. However, in any space-time analysis dealing with humans in an archaeological context, rather than a palæontological context focused on problems of species evolution, we must strive to frame this analysis in what I call 'relevant' time, the time of consequence to the lives of those who lived that time. And just as we can only perceive motion relative to some other object (Wheeler 1990:2), we can only perceive time within the cognitive framework of a specific group. Concepts of time are cultural as I have shown in Chapter One. For humans responding through the medium of culture to their environments, and indeed for the ecosystems themselves, the diachronic-dynamic process must be recognised along with the variation in the synchronic. Thus the dominant time-space paradigms of TEK (the diachronic) and WSK (the synchronic) can be unified in the analysis. In the study of human ecology, when we consider boundaries of space and time, we address the issue that "...physical phenomena must at bottom be local" (Wheeler 1990:12). The question then arises: Do the space-time regimes of the biological world help or inform and / or define specific culturally derived responses? If so how so?

3.2.2: Fire regimes and the forest mosaic

Modern reforestation of large cut-areas (Børset 1976) and burn-areas does not reproduce equivalent environments as found in a natural successional regime. The principle of community is violated by artificial reforestation that encourages a "levelling out" of the characteristic vertical mosaic of the boreal forest as it does not sustain the diversity of undergrowth plant species that associate with certain tree species complexes (Heinselman 1981). Such undergrowth provides the food and shelter for a number of smaller mammalian and avian species that, in their turn, are the prey for larger carnivores.

Besides, this undergrowth affords browse for the herbivores, large and small. Even under 'natural' conditions there may be subsequent drastic environmental changes brought with regrowth. Noted here is the 1770 fire in the Lake Nipigon area where the white pine pre-fire forest was eventually replaced with a post-fire forest of birch, aspen, and jack pine, later followed by white spruce and balsam fir (Shelford 1963:138). When this forest reached late subclimax, some 175 years later, it was composed of:

> balsam fir, 59%; black spruce, 2; white spruce, 10; jack pine, 4; paper birch, 17; and quaking aspen, 8. There were two tree strata, the upper one averaging 101 feet (30m) high. The lower tree stratum, chiefly invading balsam fir, averaged 65 feet (20m) high, and the age of the larger trees was between 90 and 100 years. One jack pine in the upper stratum was 140 years old. Birch and aspen were represented mostly by over-mature and dying trees. Black spruce occurred in low moist areas. Speckled alder formed a high shrub layer and Labrador-tea a low one. There was thick moss over most of the surface (Shelford 1963:138).

Yet such natural shifts offer more diversity than we find with today's industry-based programs of reforestation, better called plantings, for a forest is a sum of many parts not a monocultural statement. In this 'modern' system undergrowth becomes 'weeds' while many animals are defined as 'pests' and dealt with as such. Baltensweiler and Fischlin (1987) discuss forest "pest" in the context of the analysis of ecosystems. They review the "suboptimal results" with respect to this "problem" when "...simple but basic questions are hardly ever asked, only because of the prevailing paradigms", in this case a paradigm defined and driven by political and economic objectives. An incidental critique of Canadian forest practices and the failure to understand the place of the "pest" in the system, the main thrust is the critique of methodology in ecology. In a more detailed explanation than I can abridge here, they point out that to resolve a particular scientific problem both empirical as well as theoretical knowledge is required. The available amount of each is "...usually determined by some uncontrolled properties of the real system to be studied" (Baltensweiler and Fischlin 1987:401-415). The point of this will become self-evident with a discussion of Beaver (*Castor canadensis*) as observed during fieldwork in the Narrow Hills areas of Saskatchewan in 1995, later in this chapter.

The immediate devastation caused by cyclical fire regimes can not be discounted, but the long term effects on the habitat can be crucial to the overall carrying capacity of that environment. A question arises: are some prehistoric fires the artefacts of human manipulation of the forest environment? In our modern angst over the loss of 'the natural world', we have assumed that the worlds of the past were primeval greens, commons, essentially unaltered by prehistoric hunter-gatherer use. Of course this fit with our 'noble savage' depiction of the 'red indian' living in the **natural world.** This natural world was conceptualised as very different from the **cultured** (civilised) **world** we assumed we inhabited (see the discussion in Chapter One). "Yet data from botanical, archaeological, and anthropological studies...have shown that anthropgenic effects are ubiquitous and that the 'virgin' habitat so sought after by ecologists may not exist" (Jorgenson and Redford 1993:368).

Just as found in the great grasslands of the interior of North America (Collins and Wallace 1990), the great northern forests are a pale reflection of their previous glory and what remains is constantly under threat from various lumber / pulp companies who view 'wild' ecological systems as detrimental to the 'proper' management of 'resources' — namely trees of a few commercially viable species. But to assume from this that peoples of the past were not into management, within the context of their own definitions, is rather ethnocentric on our part. Delcourt and Delcourt (1987:16) discuss this for eastern North American temperate forests in the mid- and late- Holocene intervals and include use of fire by expanding populations as a factor. Just such fire events are suggested for a number of sites in Northwestern Ontario (see Chapters Two and Five).

"In the north most natural forests are either maturing following the last fire or being instantly recycled by the next" (Heinselman 1981:386). Nevertheless, and notwithstanding the 1770 Nipigon fire, forests may recycle with composition fidelity to the pre-burn stand state. This will depend on a number of factors including the type of fire (crown, surface, or ground), the season of burn, the survival of seed beds, the predominant species composition of the initial stand (e.g. canopy-storage pines or black spruce versus white spruce, balsam, cedar, or aspen), percentage of shrubs / herbs / grasses adapted for vegetative reproduction, rainfall, percentage of destruction of incipient growth by Moose (*Alces alces*), Snowshoe Hare (*Lepus americanus*), and / or Beaver (*Castor canadensis*) (Heinselman 1981:377;387;390-391). With respect to fire intensity, to the above list can be added the abundance of fire fuels such as needles, small twigs, resinous products, small bark flakes, and lichens / mosses common on the floors stratum of such forests. The shape of the crown itself will amplify or retard the fire intensity. Further, the evergreens of the boreal forest retain more dead branches of all sizes than are found with deciduous

Plate 3.2: East test area, Saskatchewan, B-SSA, Makie Lake, an excellent example of the post-glacial development of a lake from the collapse of an ice kettle. Edge areas suitable for both moose and deer can be seen ringing this small but ecologically significant lake. It would provide a yarding area in winter for deer. Second stage regrowth seen in the summer of 1995. Catalogue number 1SKs10.

trees. (Johnson 1992: 35). Fires are the result of dry fuels being ignited when winds are occurring to drive the fire to new fuels (1992:11). These combined conditions are found, optimally, at certain times of the year. In the study area, during a normal season for moisture and temperature fire season would be expected to begin at the end of June and continue until the end of September or the first snow. In recent years these fire seasons have expanded usually by earlier first fire dates. In recent years these are being seen in significant numbers as early as end of April or the start of May. This was the case in 1995 for the modern study area in Saskatchewan, discussed below, and is the case this year (1998) in Northwestern Ontario (Nipigon the area where the 1770 fire was situated is burning once more) and Western Canada (in particular boreal Alberta, although there are extensive grassland fires as well). This has been attributed to the unseasonably warm, dry weather caused by *el nino*. A more complete discussion of fire and climate - season can be found in Johnson (1992), in particular his Chapter 2, and Simard (1973). A discussion of modern fire frequency (number of fires per unit of time in a given area), fire interval (fire-free interval or fire return interval and number of years between two successive fires in a given area) and the calculation of the mean in natural fire regime systems [boreal North America] I refer the reader to Payette (1992: 146-152). Also of interest is Payette's Table 5.1 on fire rotation at various locations. Heinselman (1981:375) discusses fire cycle variations with respect to latitude, showing that closed forests have more frequent and more intense fires than open forests at tree-line localities. A general review of long term northern broadleaf and needleleaf forest dynamics can be found in Delcourt and Delcourt (1987).

If there is not extensive damage to the organic layer of the soil; the post-fire establishment period takes approximately ten years. "Fire herbs" (*Coryclalis, Geraminum, Aralia,* and *Polygonum*) rapidly germinate from seed banks only to disappear as obvious species between four to eight years post-fire. Fire liverworts and mosses regenerate in the first year to disappear in the fifth or sixth year. However, *Dicranum* and *Sphagnum* as well as lichens are eliminated, not to return for twenty to forty years (Heinselman 1981:387;390). This could have considerable impact on the availability of Woodland Caribou (*Rangifer tarandus*). Those shrubs, herbs, and grasses adapted for vegetative reproduction, with proper conditions of temperature and moisture, will re-sprout in the first season. Eastern white pine (*Pinus strobus*), red pine (*Pinus* *resinosa*), and jack pine (*Pinus banksiana*) will re-establish within two years and white spruce (*Picea glauca*) and black spruce (*Picea mariana*) will filter in for the first five years. Without rainfall, aspen (*Populus tremuloides*) and birch (*Betula papyrifera*) "...are likely to increase at their [pine/spruce] expense"(Heinselman 1981:387). As well, "...decreases or near elimination..." of white spruce, balsam, sub-alpine fir (*Abies balsamea*) and northern white cedar (*Thuja occidentalis*) frequently occur (Heinselman 1981:387).

The extent of the damage will be dependent on the depth and composition of the duff mull. Older forests will have more fuel in deeper litter and thus fires will not be localised to the crown stratum but will burn the surface and subsurface strata with intensity of some duration. Seed banks are destroyed and those species that rely on vegetative reproduction will be reduced greatly in number, if not eliminated. Black spruce and jack pine "...usually maintain or increase their numbers relative to the pre-burn stand. Dense monotypes often result..." (Heinselman 1981:387). White spruce, balsam or northern white cedar may eventually seed in, while aspen and birch will only become abundant again if there is sufficient rainfall in the first post-fire season. *Alnus*, *Vacciniums*, and *Ledum* are much reduced while *Marchantia*, *Funaria*, *Ceratodon*, and *Epilobium* (see Plate 3.26 and Plate 3.27 for Fireweed in flower) invade and become abundant (Heinselman 1981:387). The canopy development period can last from eleven to fifty years with mature stands developing between fifty and one hundred and twenty years (Heinselman 1981:390-391). Even if fidelity does not occur, it is obvious that new stands generally would have more diversity than that found in single species artificial reforestation regimes where selection of species is made solely on the basis of the forest industry's economic criteria. This observation is supported by the 1770 Nipigon post-fire example where a number of things become obvious. One hundred and seventy-five years post-fire, there is one tree 140 years old. The other trees are between 90-100 years old. Therefore the post-fire development period took from 35 to 85 years. What can account for this seemingly long reforestation interval? Here we need to link the response of the fauna to the reproduction of the habitat.

Although faunal recolonisation studies have not been conducted for boreal burn-out areas in Ontario, one may consider that long-term disruptions would be less severe and of shorter duration in a naturally recycling environment within the parameters delineated above. That regrowth areas are significant can be attested to by looking at the preferred habitats of a few of the important economic species from the prehistoric record. Here I will look at one such species, Beaver. A few other animals that perhaps should be looked at in the light of this type of analysis are:

- ***Alces alces* (Moose):** Although Moose require diverse habitats, during late summer, fall, and early winter they do most of their feeding in early successional plant communities. As long as snow depths do not exceed 50-75 cm, cutovers and burn areas are most important during this time. Snow depths in late winter would probably exceed this, particularly in the area from Lac des Mille Lac through to Lake Nipigon. Open areas would not be suitable at this time of year when mature stands of conifers would be used for browse and shelter (Euler 1979:17). Balsam fir is sometimes heavily browsed in the depths of winter (Pastor and Mladenoff 1992: 233).

- ***Odocoileus virginianus* (White-tailed Deer):** The northward extension of White-tailed Deer has been attributed to the use of the areas of burn-out as long as these areas were rimmed by shelter stands of trees for winter protection (Shelford 1963:127; Euler 1979:19). Euler estimates that 30-60% of Deer habitat consists of early stages of forest succession (1979:21) although, like Moose, they use late successional stands for yarding and protection from weather conditions during the depths of winter. These observation pertain as well for the Mule Deer (***Odocoileus** hemionus*) seen in the Saskatchewan portion of the study. The best northern range areas are considered to be openings that support a good growth of grasses and herbaceous plants.

- ***Rangifer tarandus* (Woodland Caribou):** While regrowth works to the advantage of the above species it would not be suitable for caribou, whose diet consists of large amounts of mosses and lichens (*Dicranum*, *Sphagnum*, and *Cladonia* species). These plants are of particular dietary importance during winter with this Woodland Caribou. Also, *Usnea barbata* and *Sticla pulmonaria* are major sources of nutrition (Shelford 1963:125). It is in the period 20 - 40 years post-fire that boreal forests start to produce these needed plants. However, it is the subsequent second stage and late stage (third stage or old forest) post-fire regrowth habitats that are optimal for this species. Eriksson (1976) notes this pattern for northern Europe as well where the lichen-rich pine post-fire regeneration takes forty years in Mudduus National Park. There is an offset here though with *Deschampsia flesnosa*, which increases its growth and is used by reindeer (Eriksson 1976: 61).

- ***Lepus americanus*** **(Snowshoe Hare):** Snowshoe Hare feeding patterns are similar to Moose in that their ideal habitat is one that exhibits a mixture of early successional areas interspersed with cedar - spruce swamps. Slash and edge conditions are most productive for this species (Euler 1979:37). Shelford (1963:131) breaks their habitat into percentage distributions:

  willow-alder 40%
  poplar-birch and cutovers.........25%
  upland spruce...........................14%
  jackpine...................................12%

- ***Castor canadensis*** **(Beaver):** The environmental requirements of Beaver are more complicated. They are closely tied to water levels of sufficient depth as to discourage the growth of bacteria that causes the disease Tularemia ("Beaver fever", which can infect humans as well). Slow, meandering streams and creeks bordered by secondary regrowth aspen and birch, as well as lakes that are fed by or feed into streams, are the preferred habitat (Bice 1983:101-102). An example of such a lake is Whitefish Lake with the McCluskey and Martin Bird sites. Further observations conducted between 1978 and 1980 indicated that the environs of this lake supported three Beaver dam locations. Observations from Minnesota suggest that Beaver ponds can cover as much as **13% of the land area in this part of the world**. Wetland to non-wetland landbase percentages for Northwestern Ontario can be seen in Figure 2.3. The breakdown of various land classes for the study area used in this chapter can be seen in Table 3.2. In addition, there are the heavily browsed zone that surrounds the ponds (Pastor and Mladenoff 1992:232). This is not random behaviour. The selection by Beaver of early-successional hardwoods such as birch and aspen is to be expected "...because these species contain lower concentrations of carbon-based, secondary compounds than do conifers, or produce these compounds only during juvenile phases" (Pastor and Mladenoff 1992). These carbon-based compounds act as defences against herbivore predation. How these anti-predation compounds contribute to the C:N ratio in the forest could be the topic of another paper but sufficient to this presentation is the fact that selective browsing "...shifts competitive balance further toward conifers..." (Pastor and Mladenoff 1992:233). Thus the landscape may be shaped by herbivore selection of prey plant species and the developing spatial patterns in nutrient cycles (Pastor and Mladenoff 1992), for example the pre-fire pine to post-fire birch/aspen/jack pine and the ultimate spruce/balsam forest in the Nipigon example cited above.

- ***Canis lupus*** **(Wolf):** Wolf closely associate with the subclimax forest for it is here that the bulk of its prey can be found (Shelford 1963:129).

Additional observations on these and other animals will be found subsequently in this chapter, in particular in the section that discuses the hunt data from my informant Darlene Newton. Some of these animals have also been discussed in relation to the archaeological data in Chapter Two.

It is the **impression** from such studies of habitat preferences of various animals that selected species would be more abundant in incipient regrowth areas because of altered parameters for optimal populations. How abundant, in exact population numbers, we do not know. Here, then, is an important issue if understanding of the past is to be developed by application of observations from today. The species that feed on early successional regrowth can retard the eventual development of the climax forest situation. Therefore the system is self-perpetuating once in operation. Thus Beaver, Moose, Hare, Deer and other animals that are early successional herbivores can, by their feeding patterns, recycle the early stages of boreal climax development and influence the eventual species composition of the emerging post-fire conifer forest. Such retardation of forest development would lengthen the cycles of the natural fire regimes and incidentally, or perhaps purposely, suit the prey acquisition needs of humans. And since "food chain disruption at any point has effects felt both up and down the chain" (Andrewartha and Birch 1954:503) humans would be no less affected by this than any other species. Prehistoric fire regimes, then, may have had both negative and positive consequences for human populations. It is possible that, in terms of human environmental utilisation, the initial period of negative ecosystem disruption would have been offset by the subsequent period when colonising plants afforded suitable environments for those animals favouring regrowth areas. In turn the stability of the animal species populations caused by their contribution to the recycling of the early successional regrowths would have enhanced human habitat. However, we need to try to move beyond the impressionistic and to do this environmental parameters and interactions, both past and present, need to be more fully understood and documented.

I postulate that patterns of today in fire regimes offer us the opportunity to develop models to interpret tantalising evidence from the prehistoric hunter-gatherer time in one part of boreal North America and I suspect, from some readings (e.g Welinder 1985; Tamm 1976;), that models developed from the study of boreal North America may have wider application to such times and areas as the late Upper Palaeolithic and Mesolithic in Eurasia.

3.2.2: Selection of the analogue study area

The fieldwork in modern boreal environments for the development of analogues was conducted in Saskatchewan in the summer of 1995. I made the selection of the modern forest sample sites from the infrared images provided by the Boreal Ecosystem-Atmosphere Study (BOREAS, outlined in Chapter One) for their Southern Study Area (SSA). Access to this material was facilitated by Prof. Peter Muller, and his research assistant Tim Wilkinson of Photogrametry and Surveying, University College London and by Dr. Forrest Hall of National Aeronautical and Space Agency (NASA).

Two research areas within the Southern Study Area (SSA) of BOREAS were designated, East (1) and West (2), and in each of these three sites were selected. Selection criteria were based on the 'Image Value' of the classes of ground cover seen in the SSA infrared images (Table 3.2, below). However, it must be remembered that the BOREAS images were, in themselves, several years out of date when site selection was occurring and this proved to be important as will become clear. Sites were chosen for infrared **Image Value 9 - Regeneration (Younger)** or those sites that potentially would be in first

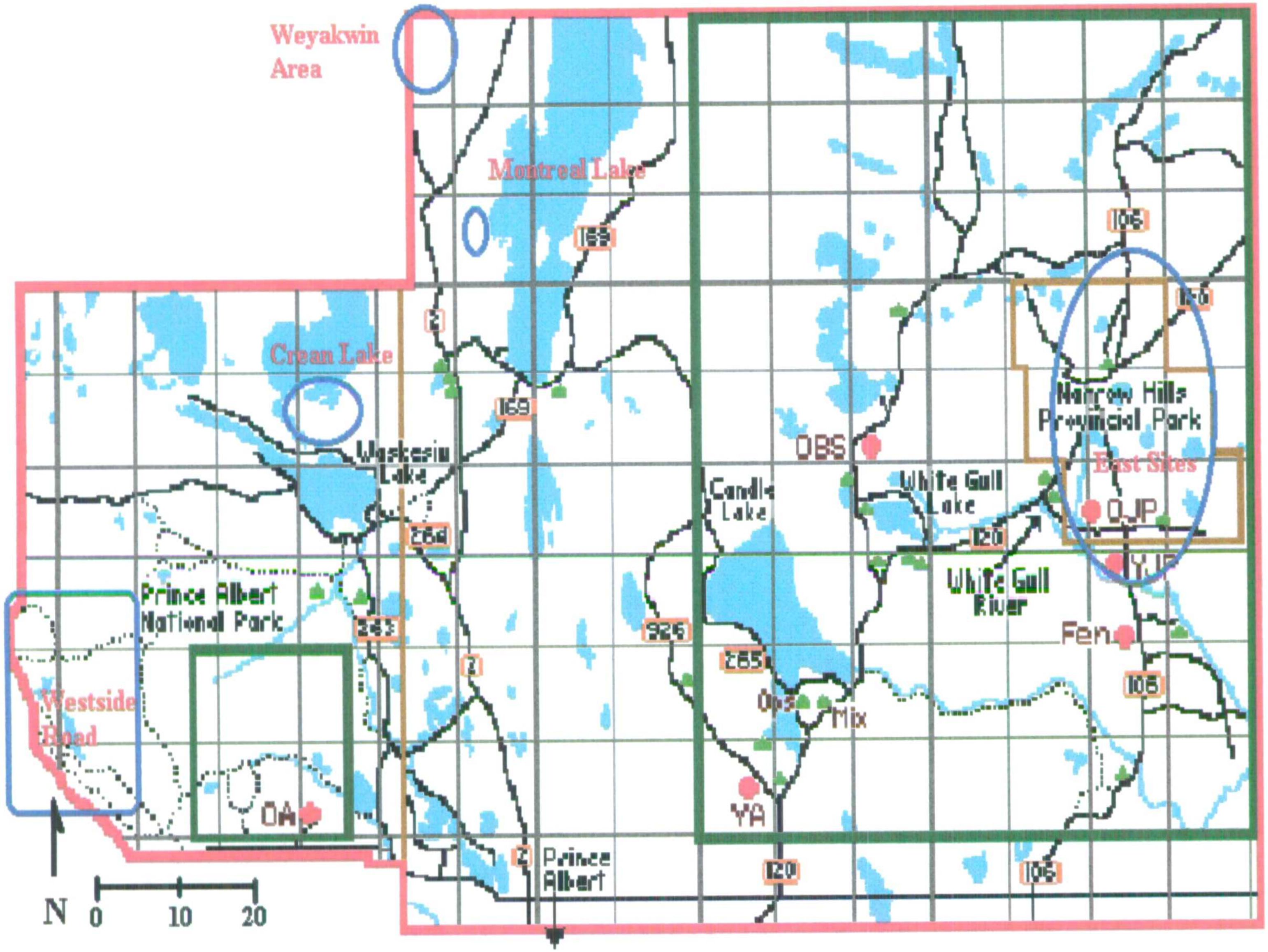


Figure 3.2
Modern analogue study area in Saskatchewan. Developed from a BOREAS map. Selected study areas are encircled in blue. The East Study Area is in Narrow Hills Provincial Park region while the majority of the West Study Area is in Prince Albert National Park. One study site is near Weyakwin, to the north of Prince Albert National Park region.

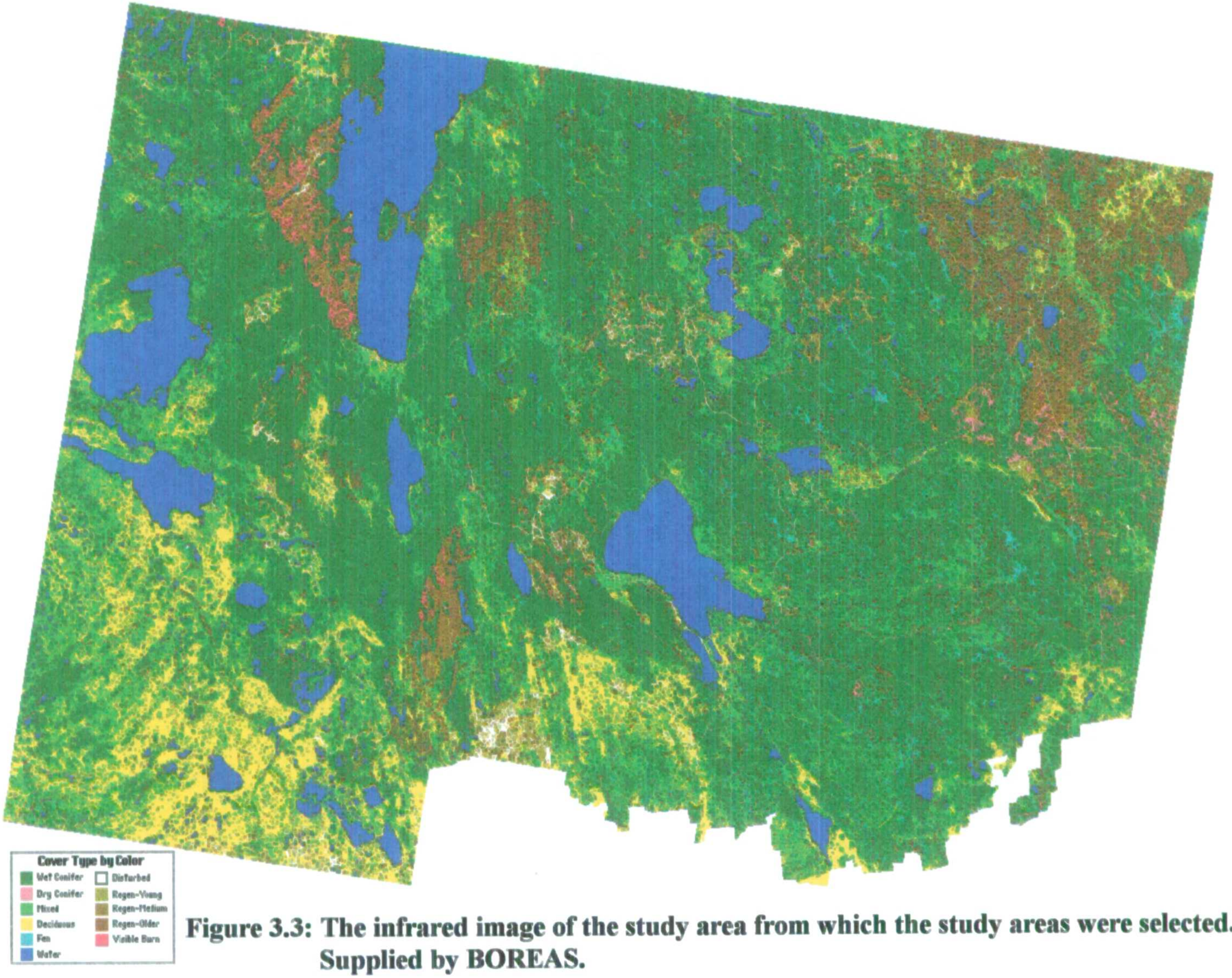


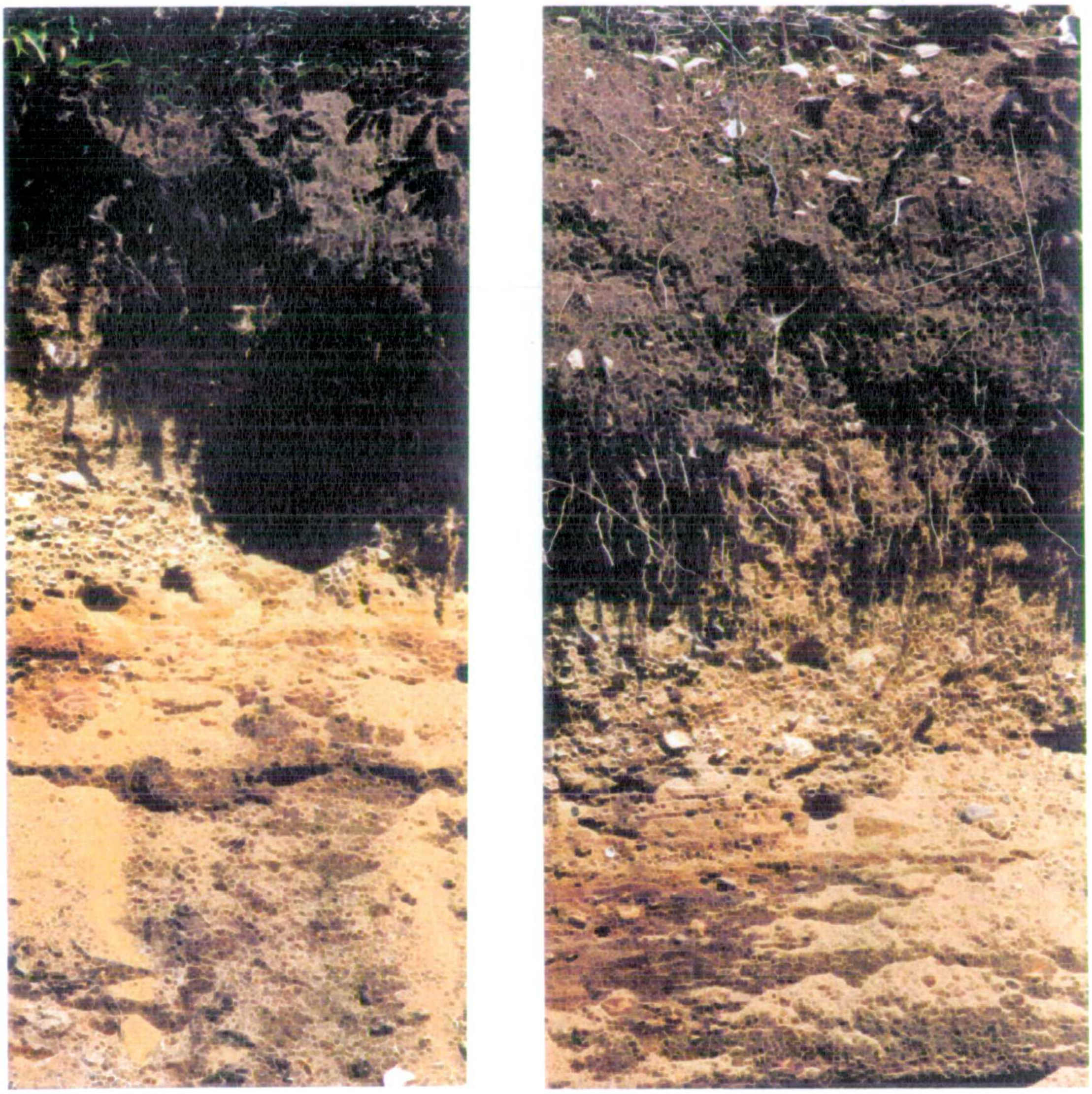
Figure 3.3: The infrared image of the study area from which the study areas were selected. Supplied by BOREAS.

IMAGE VALUE	CLASS	AREA m2
1	Conifer (Wet)	5351030
2	Conifer (Dry)	87031
3	Mixed (Coniferous and Deciduous)	1938822
4	Deciduous	1085214
5	Disturbed	130461
6	Fen	417206
7	Water	1086167
8	Regeneration (Medium)	315947
9	Regeneration (Younger)	149492
10	Regeneration (Older)	716549
11	Visible Burn	41718

Table 3.2: Example of "Image Values" numbers assigned for the results of the infrared satellite images and their classes of ground cover for the SSA 129 km by 86 km north of Prince Albert Saskatchewan (BOREAS 1995). See the infrared map in Figure 3.3, above.

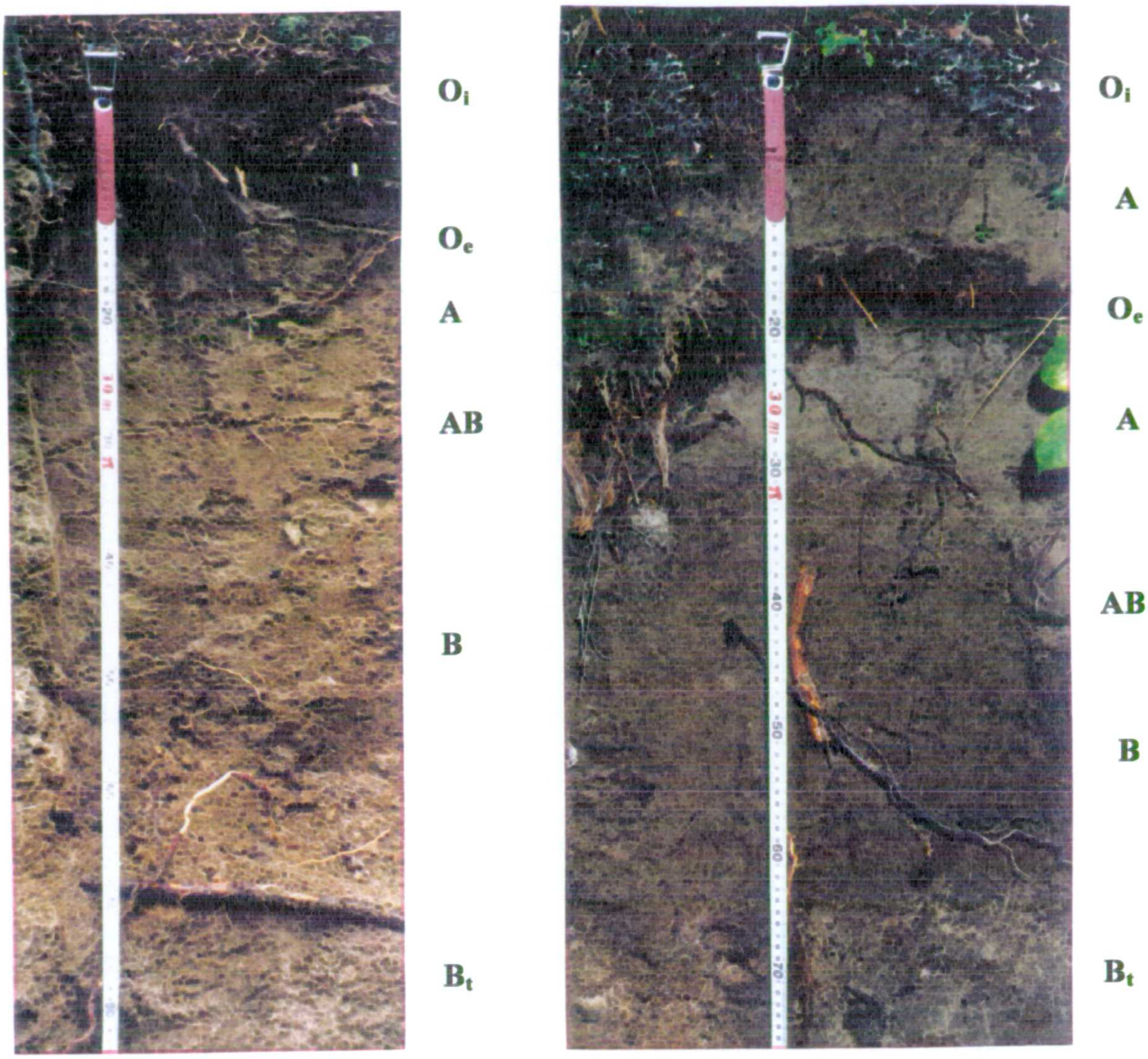
stage regrowth. Sites with adjacent wetland or water sources were considered optimal. These water sources could be open water (Image Value 7) and/or fen (Image Value 6) areas. Also, it was hoped that very recent fire locations (Image Value 11) would be observed near these areas. Considered ideal for observations were fire areas in regrowth of absolute known age. As a matter of course 1995 turned out to be one of the worst fire seasons in recent years so the immediate aftermath of fire could be seen. Over seventy fires of the year were either recently extinguished or still burning in Saskatchewan when we left for the field at the beginning of July. Further, the areas chosen for fieldwork had excellent documentation on the forest fires of past years (see Figures 3.4, 3.6, and 3.7). The map of the Saskatchewan study area, and the reproduction of the infrared image and its key can be seen in Figures 3.2 and 3.3 respectively, directly above.

Plate 3.3: East test area, Saskatchewan, B-SSA, Narrow Hills Provincial Park. Soil profile example from the Narrow Hills Esker road lower east section, in the summer of 1995. The image shows lacustrine post-glacial deposits with a top soil developed during the last 8000-9000 years. These sandy deposits rest on differentiated gravels, not seen in this picture. Catalogue number 7SKs144.



a. b.

Plate 3.4: West test area, Saskatchewan, B-SSA, north of La Ronge. Typical profile of fluvial-lacustrine post-glacial deposits in Northern Boreal Shield area of Canada. Summer of 1995.
Catalogue numbers: (a) 23SKp541 and (b) 23SKp542.



a. b.

Plate 3.5: West test area, Saskatchewan, B-SSA, Crean Lake Road, Prince Albert National Park (PANP). Typical soil profiles of post-glacial deposits in Southern Boreal area of Canada. Summer of 1995.
Catalogue numbers: (a) 18SKs415 and (b) 18SKs416.

Plate 3.6: East test area, Saskatchewan, B-SSA, in forest cover of alder regrowth at Test Site 1A, 'No name' Lake (an unnamed lake) near Narrow Hills Provincial Park. Soil sample collection in Southern Boreal area of Canada. Summer of 1995.
Catalogue number 13SKs298.

Plate 3.7: East test area, Saskatchewan, B-SSA, at Test Site 1A, 'No name' Lake (an unnamed lake) near Narrow Hills Provincial Park. Soil sample collection with collection tube in ground awaiting removal. Summer of 1995. Catalogue number 12SKp274.

Plate 3.8: Example of plastic soil collection tube with resulting soil core shown. Cores can be seen in the soil profile drawings accompanying this chapter. Photograph taken in the photography lab, Institute of Archaeology, UCL.

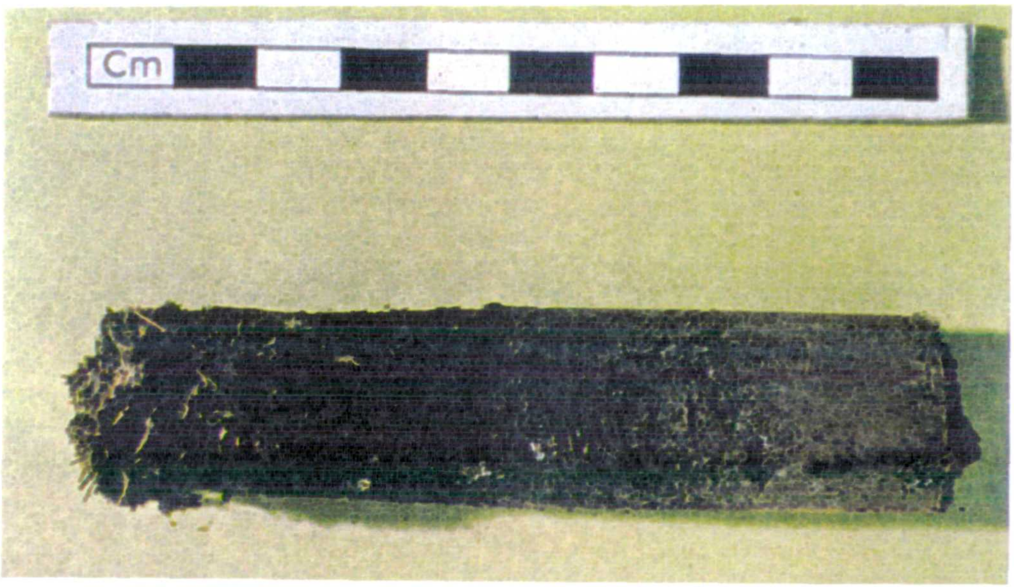


Plate 3.9: Detail of collected soil sample seen in Plate 3.9 above. Photograph taken in the photography lab, Institute of Archaeology, UCL.

3.2.3: Description of the SSA Area as analogue area

The BOREAS - SSA north of Prince Albert, Saskatchewan is an area of gentle relief with altitudes ranging from 500 to 730 metres above sea level. In general the SSA, in its southern extremity is composed of forest areas of aspen (*Populus* sp.) and spruce (*Picea* species). Black spruce (*Picea* mariana) and tamarack (*Larix laricina*) are found in bog-fen areas and jack pine (*Pinus banksiana*) runs along the drier ridges. Interspersed are sedge (*Cyperaceae* sp.) meadows and fescue (*Festuca* sp.) grassland some the direct result of ancient beaver ponds having developed into drier environments.

Unlike the eastern portion of the SSA, as will be seen below, the western section found in Prince Albert National Park (PANP) has not had a major forest fire since the 1940s, although there have been small local fires that have been promptly extinguished. The Canadian Forestry Service has developed and implemented a forest fire suppression program in the mistaken belief that this sustains 'original' environments. Thus the majority of the youngest trees are a mere fifty years old, in second stage regrowth. Older trees can be over one hundred years old but mostly they represent the regrowth from the major cuttings during the time of the western expansion of the Canadian railway system in the 1890s when the trees of the area were used for the railway ties and the adjacent telegraph line. Since there were, quite literally, thousands of miles of these lines, there was a wide east-west swath cut through the forests of Canada as the railway progressed westward. In PANP there are a few rare areas where the last fire was in the 18th Century and the trees escaped the lumbering of the last century Two examples of areas of old growth and long ago fires can be seen in the field map for the Crean Lake area reproduced as Figure 3.9. In this section of the park there was a fire in 1760 and another in 1772. The large trees seen in the plates for the Crean Lake area are those that are part of the regrowth from this period of the 18th Century. All logging in PANP ceased in the early 1950s. These conditions do not pertain for the Narrow Hills Provincial Park (also called the Provincial Forest) to the east of PANP. There are parts of the Narrow Hills that are under lumber - pulp license and of course burn tracts picked over by the companies that hold concessions in the area.

The southern portion of the SSA has significant edge areas where aspen forest and aspen parkland abuts the great grasslands, providing remarkable ecotone effects of aspen -

grassland on the south and aspen - boreal forest on the north. These grasslands, spreading away to the south, into what is today the United States, and west, to the Rocky Mountains, formed the prairies and plains heartland of North America. Not unlike the savannah of Africa, the pampas of South America or the steppes of Eurasia, these grasslands supported various types of herbivores. Deer, Antelope abounded. However, most characteristic of the North American grasslands were the great herds of bison left to us now in history and myth but not living memory. Small herds of Wood Bison, are still found in the aspen ecotone and the aspen-conifer forest just to the north.

To the north this aspen ecozone is in swift transition to the dense boreal forest one usually associates with this latitude in northern North America. As such, this aspen ecozone and its accompanying ecotones are not dissimilar to the environment found in the Rainy River area discussed for the Long Sault Site in the previous chapter. The significant ecotoning into the northern full conifer forests has characteristics similar to those around Lac des Mille Lac and Whitefish Lake and the SSA at its northern extreme is very like the area around Lake Nipigon.

Narrow Hills is named for the long narrow hills that provide upland areas between lakes, rivers and the expanses of muskeg[6] found in this part of Saskatchewan. These hills are in fact push moraines of gravels, usually called eskers, the result of glacial processes during the late Pleistocene. The hills are covered with jack pine and white spruce as is found on drier locations in the boreal forest. The larger animals in these areas are Moose, Elk, Deer, Caribou, Bear, Wolf, and Lynx. They vary in density depending on the exact make-up of the vegetation or their target prey.

Although the SSA has Cretaceous Age bedrock there are reasons for the similarity between these two geographical areas of the SSA and Northwestern Ontario. These similarities are not only found in their latitudinal situation but in the glacial history that dominated the last two million years of topological development (SGH 1997). "As the ice retreated northward about 10,000 years ago, water became ponded in front of the glacier, and large lakes formed in which clays were deposited" (CRS 1997). The bodies of water, along with the emerging drainage systems, created fluvio-lacustrine sand and gravel deposits of undifferentiated outwash glacial drift materials that can reach a thickness of 100 to 400m that can be seen in some of the plates accompanying this chapter. Further,

[6] Muskeg, from the Algonkian word for grassy swamp, is a vast area of undrained boggy land characterised by sphagnum moss vegetation.

lakes such as those found in Narrow Hills were formed by glacial action in particular by the formation of kettle holes, as seen in Plate 3.2. The SSA was selected as it provided a number of significant types of environments in a relatively restricted area in close proximity to each other for on-ground observations of features that are common to the general issues of human ecology in northern forest settings.

3.2.4: The six selected sites

Area One, in the eastern section of the SSA, consisted of three sites (1A, 1B, and 1C) within or just outside Narrow Hills Provincial Park. Area Two, to the west of Narrow Hills, was more dispersed with:

- site 2A, on the south shore of Crean Lake just above the Hanging Heart Lakes, within Prince Albert National Park (PANP);
- site 2B on the west side of Montreal Lake on the north of the relatively small O'Connor Lake north again of MacLennan River;
- site 2C to the south-west of Weyakwin Provincial Park in the Crown Land leased to the Weyerhaeuser Company, the logging company that dominates the 'forest harvesting' industry in this part of Canada.

The BOREAS locational data for these sites are listed in a note[a] at the end of this chapter.

Of these six sites, I was able to sample only five for soil and only four for the vegetation directly applicable to the modern environmental analogues. One site was inaccessible due to high water and the washout of the bridge (site 2A on the west side of Montreal Lake). A second site had been clear-cut since the time the images had been taken two years before (site 2C on Crown Land near Weyakwin) and although useless for the direct purposes of this dissertation it did provide painful proof of the destruction of habitats and any associated archaeological materials. Further to these two disappointments was added a third site that was neither first nor second stage regrowth as expected, but rather old growth (2B at Crean Lake). Such errors can be accounted for in a number of ways.

> In many cases, the spectral signature of one feature could be similar to the spectral signature of another feature, resulting in confusion. The similarity in spectral signatures could be the result of similar background components and variations in tree density. Error could also be the result of spectral mixing of various features that fall within a 30 meter pixel (BOREAS 1995: 10-1).

However, this discrepancy between the spectral signature and the actual forest composition and/or age is believed to be the result of the need to calibrate signatures in relation to temperature / moisture conditions at the time images are taken. In the summer of 1995 data for these parameters of moisture and temperature for the recalibration of spectral signatures were being collected at PANP.

None the less, the Crean Lake area did have interesting old growth examples, fen associations, and edge areas that illustrated ecotoning. These were observed and soil samples were taken. As well, the restricted Crean Lake road provided the opportunity to investigate deep soil profiles (Plate 3.5) in a number of road cuts. Since we were prohibited in PANP, as in Narrow Hills (Plate 3.3), from opening any areas by digging but were permitted to clean any existing open face, these road cuts were fortuitous. Plate 3.4 is a third example from a more northerly location near La Ronge. Other in-field opportunities arose to observe the exact types of environments that I had hoped to select from the infrared map and these opportunities were taken. Samples for old growth were found in Weyakwin Provincial Park and a side trip to the area around La Ronge provided observations on certain newly extinguished fires in an area with soils directly on the Precambrian bedrock. There were numerous other examples of boreal forest fires during this field season. These fire areas ranged from those still hot to those from the spring season that were in lush understory regrowth by August (e.g. Plate 3.27). Some fires were ground burns while others were crown burns. Here, again, the opportunity was taken to observe and in some cases to sample.

Narrow Hills Provincial Park area is in various stages of regrowth from a series of fires over the recent past:

- Fishing Lakes Fire 1977;
- Elan Fire 1987;
- Coffee Fire 1988;
- The 1995 Fire.

In the 1977 fire some 200,000 acres of forest were destroyed. In this century there have been two other severe fire episodes in the Narrow Hills region. These were in 1929 and 1937. Earlier smaller fires were not recorded but are remembered by some elderly informants. An important fact is that Narrow Hills Park has been burned completely through a series of specific episodes in various areas over the last 20 years. There is some fire edge overlap between fire areas where first stage regrowth from a pervious fire is lost to a later fire. The significance here is that a recent fire zone provides very little fuel for a subsequent fire and thus may act as a fire-break zone. Such a zone can operate if it is of a significant area (width) and if the present fire is not driven by high winds during very dry, hot weather. Further, the area north of Weyakwin and site 2C, as well as an extensive area north of La Ronge, burned in 1995, and here three major fire areas, recently extinguished, were observed.

The Lofthouse area on the west road of Prince Albert National Park had a May-June 1995 ground fire in late first stage aspen and was by August in extensive regrowth with a beautiful fireweed bloom in some patches. It provided excellent browse for the wood bison (*Bison bison*) herd we were fortunate to observe. Soil samples in this area were not taken because of danger from the animals, in particular bears who were, as the accompanying plate testifies, very evident.

In unburned areas, where lumbering has not affected the natural regrowth cycle, the pattern seems to approach what we could expect to have been there before the forest industry had any impact. Other areas, however, were and are being logged after fires, as would have been the case with many of the 1995 fires. Over the first two post-fire years the burned wood is harvested. In the year of the fire the tree tops are taken for pulp and the bottoms for timber. In the second post-fire year post and rail trees are removed. After this the burned trees are considered useless by companies and the forest is, more or less, left to recover. Although this economic activity may seem to be an adequate response from corporations, such as Weyerhaeuser, to the "problem" of fire, the fact is easily demonstrated that the disruption to the soils caused by the lumbering activities may be an actual hindrance to regeneration in some areas and prove to be most destructive to both the environment and the archaeology that rests in this environment. Although short term economic needs are met, long term regeneration and cultural conservation may be the cost.

The loss of these trees to the natural system means that their captured nutrients are removed forever from the cycle of generation - degeneration- regeneration. This is particularly destructive to the cycle of soil development in areas that have shallow, fragile top soils as is the case in much of boreal North America. An additional reason for loss in the regeneration part of the cycle in the modern landscape is the nature of the soils themselves. An examination of their profiles, found later in this chapter, illustrates that in the boreal north of Canada thin top soils, of at most 6 to 15 centimetres, cover various geomorphological features such as the ancient bedrocks found both in Northern Saskatchewan and Northwestern Ontario as discussed in the last chapter, the slightly younger bedrocks of the southern boreal, periglacial or post-glacial fluvial-lacustrine deposits as seen in the modern research area of SSA, or push moraines (eskers) that are generally found in these post-glacial environments. Depending on the parent material, and the nature of the glaciofluvial and glaciolacustrine conditions some locations have stratified sediments of sands, silts, and/or clays while other locations are unstratified glacial drift. Areas of fully exposed bedrock are common. The exposure of these deposits, such as found in the lower part of the Narrow Hills esker (NE from site 1C) have created desert-like environments. In another example from an area on the east side of site 2C the clays and sands are turned over from logging activities and even such opportunistic plants as fireweed have not been able to find purchase (Plates 3.16 and 3.17).

The fragility of the soils in the boreal environment cannot be over emphasised. These areas are, in terms of their soils and in reference to geological time, relatively young. Further, there are inherent problems with top soil development and maintenance because of the long-term capture of nutrients in old growth forests and the latitudinal constraints on vegetation production generally found with needle leaf forests. Prehistoric fire regimes would not have engaged the 'modern' economic response that challenge the natural regeneration cycles. Nutrients would have been recycled and soils would have been maintained, and perhaps enhanced, regardless of how relatively thin they were.

There are areas of peat formation that fall outside the above description. The McDougal fen-water meadow on the south side of McDougal Creek in Narrow Hills being a prime example of several observed this summer. This particular meadow area is the result of beaver activity some time in the distant past. As the water-soaked environment has dried out and infilled with vegetation these types of meadows have developed. During wet season they display their wetland origins by becoming boggy. In dry seasons they are semi-firm to firm meadows with various species of grasses, depending on the amount of ground water. The response of vegetation to amount of water can be seen in the McDougal illustration, Plate 3.15. Others examples can be seen in Plates 3.60, and 3.63. Large herbivores were observed using the McDougal meadow as a summer grazing area.

3.3: Present investigations for the interpretation of the past

3.3.1: Introductory comment

The purpose of the multi-pronged approach presented below was and is to facilitate the development of a deeper understanding of human ecology in the boreal forest of the northern hemisphere during prehistory. What I am saying is that some of the lessons learned here in the Canadian context can be applied to a wider area in both space and time. It will become obvious, when this material is seen in its totality, that both WSK and TEK have been invaluable to making some of the observations and reaching some of the conclusions that I think are necessary for this understanding.

3.3.2: Research objectives

Since vegetation may be shaped by herbivore selection of prey plant species and the resulting spatial patterns of nutrient cycles caused by this selection, early successional herbivores feeding patterns cause the initial stages of boreal forest climax development to recycle. Thereby herbivores influence the eventual species composition of the emerging post-fire conifer forest and the relationship of open areas to closed areas. Concomitant, based on their habitat preferences, various species of mammals would be more abundant in post-fire incipient regrowth areas because of the altered parameters for optimal populations, for example Snowshoe Hare, Deer species (*Odocoileus virginianus* and / or *hemionus*), and Moose. Other species, such as Woodland Caribou, that rely on the old growth understory of lichens and mosses, would be rare or absent. Further, the specific example of Beaver is important for the analysis of cultural activity in prehistoric boreal North America. This animal participates in the shaping of early stage landscape and the development of wetland habitats that cycle through to open grassland areas. It is these grassland areas that, in turn, support additional economically useful species listed in the first instance, above (Hare, Deer, Moose). "Feedback" systems between habitat and specific animals would have suited the prey acquisition needs of humans and humans could have encouraged such systems by use of certain strategies, including fire, to create the "start-up" and maintenance of such productive areas. An additional benefit would be an increase in production of certain berry bearing plants such as blueberry (*Vaccinium* sp.) (Gottesfeld 1994; Veijalainen 1976).

In this context I wanted to identify and observe in a boreal setting·

- proportion of burn-out to various stages of post-fire regrowth in a specific area (ecosystem mosaic of successional sequences);
- proportion of area with post-fire recolonisation by Beaver and/ or Hare (optimal herbivore areas);
- development of edge areas that support specific large herbivores such as Moose and Deer (in the area eventually selected for study two species of Deer are found) in relation to old growth stands whose lichen and moss dominated ground cover support Woodland Caribou.

As well I wanted to do a literature search and analysis of existing pollen profiles for boreal North America. This was to identify:

- possible shifts in tree species composition from pre-fire to post-fire forests that are perhaps indicative of soil nutrient shifts caused by herbivore selection of specific plant species in the early succession regrowth period.

Further, the Saskatchewan field season (1995) provided an excellent opportunity to gather two forms of additional data. The first was planned while the second was merely serendipitous.

- Firstly, was the data from soil testing. This took two forms. The primary one was the extensive testing of soil pH from collected soil samples. These pH scores added significantly to the pH work from the Northwestern Ontario archaeological sites and expanded observations on the examination of pH variation at specific archaeological locations. The pH data from both areas, the testing for variation in pH at a specific location, and a discussion of the issue of pH testing of archaeological soils, are to be found in the next chapter. The secondary objective was the examination of possible soil chemical composition shifts indicative of the vegetation composition shifts resulting from herbivore predation.

- Secondly, and in its own way much more important, was the meeting with Darlene Newton who runs an animal trapline in the first study area of Narrow Hills Provincial Park. The data from Mrs. Newton is firmly time (by specific season) and space (a specific trapline in a series of trap lines) delineated, a luxury we do not have with our prehistoric materials.

3.3.3: General introductory observations on plants and animals

The structure of various sites visited was recorded in terms of canopy, understory and ground cover. Plants that could not be identified were sampled and checked through reference books back at base camp. The locations (when undisturbed by logging) were typical of forest, bog or meadow settings at this latitude for Canada. Some areas that had been logged were now mono-culture tree plantations while other logged areas were deeply damaged, as noted above. Recent fire areas were regenerating and two fire areas of the year (1995) illustrated the immediacy of this process. Older fire areas were supporting various types of ecosystems of interest to this study, in particular beaver meadows and water areas, grass meadows and significant edge areas. There were two examples of the encroachment of introduced plant species. One a shrub found in Weyakwin that even Kew Gardens was unable to identify but thought perhaps it was Asian in origin. This is not impossible since the main work force on the construction in the 1890s of both of the trans-continental railways (the Canadian Pacific [CPR] and the Canadian National [CNR]) was Chinese and some settled in Canada after main lines for the railways were completed. They had familial contact back to Asia and were the impetus for subsequent migration, first for family members then for non-related Chinese, a migration pattern that continues today. The second specimen was a *Tanacetum vulgare* (tansy), originally brought by European settlers as part of the medicinal herbs traditionally found in an European herb garden. It was very well established on a side road leading to the Route 916 study area north of PANP and south-west of Weyakwin (Plate 3.21). The problem of introduced species was discussed briefly in Chapter Two in the section on the Whitefish Lake archaeological sites.

The animal populations were , for direct observation, of course mobile and elusive. We did see bison (Plates 3.31 and 3.32), moose, elk, deer (Plates 3.34 and 3.35), bear (Plates 3.38 and 3.39), beaver, muskrat (Plate 3.40), hare, squirrel, coyote, fox and diverse birds, in particular ducks (both dabbling and diving), herons, cranes, pelicans, geese, numerous ravens, and song birds. Some of these animals can be seen in the plates accompanying this chapter. Indirect observation also provided evidence of habitat use, the most productive evidence being the scats. Caribou, deer, elk and moose left recognisable indicators. Caribou scats were found only in old growth areas, as to be expected. The rabbit scats were quite ubiquitous, also expected, since although they like grassy areas they will resort to wooded areas for specific plants and bark on trees. Bark damage was noted, in particular on the trees that abutted edge areas and this appeared to represent both large and small herbivores since some of it was at a height beyond the reach of hare. Deciduous trees and shrubs showed winter "pruning" from herbivores in their browse mode. The hoof prints of the deer family members were seen frequently as were paw prints of bears. Indicators for unsighted beaver abounded (Plates 3.41 - 3.63). This ranged from flooded areas, to beaver dams and lodges, to beaver harvesting areas where trees of substantial size were in the process of being downed and dismantled. Abandoned beaver areas were also very evident as they were in various stages of drying out and returning to grass lands and then forests. This beaver world is documented pictorially in plates accompanying this chapter. Further to all of these indicators of animals could be added the data collected on traplines in the Narrow Hills area. One owl pellet was found near "No Name" lake but this has yet to undergo analysis. Wallows added to the bison observations (Plate 3.33).

3.3.4: Observations on specific areas

Narrow Hills

The Narrow Hills area proved to be of major interest not only because of the samples taken from the designated sites but because of the subsidiary information gained from other areas, incidents, and ethnographic sources:

- the recent fire of the season (1995) and the fire history over the last twenty years allowed sampling of such areas and illustrated the early stages of regrowth leading through first stage regeneration;
- the McDougal fen-water meadow that is the result of a post-beaver pond re-establishment of a sedge-grassland open area was particularly important in seeing optimal edge area development in boreal wetland regions;

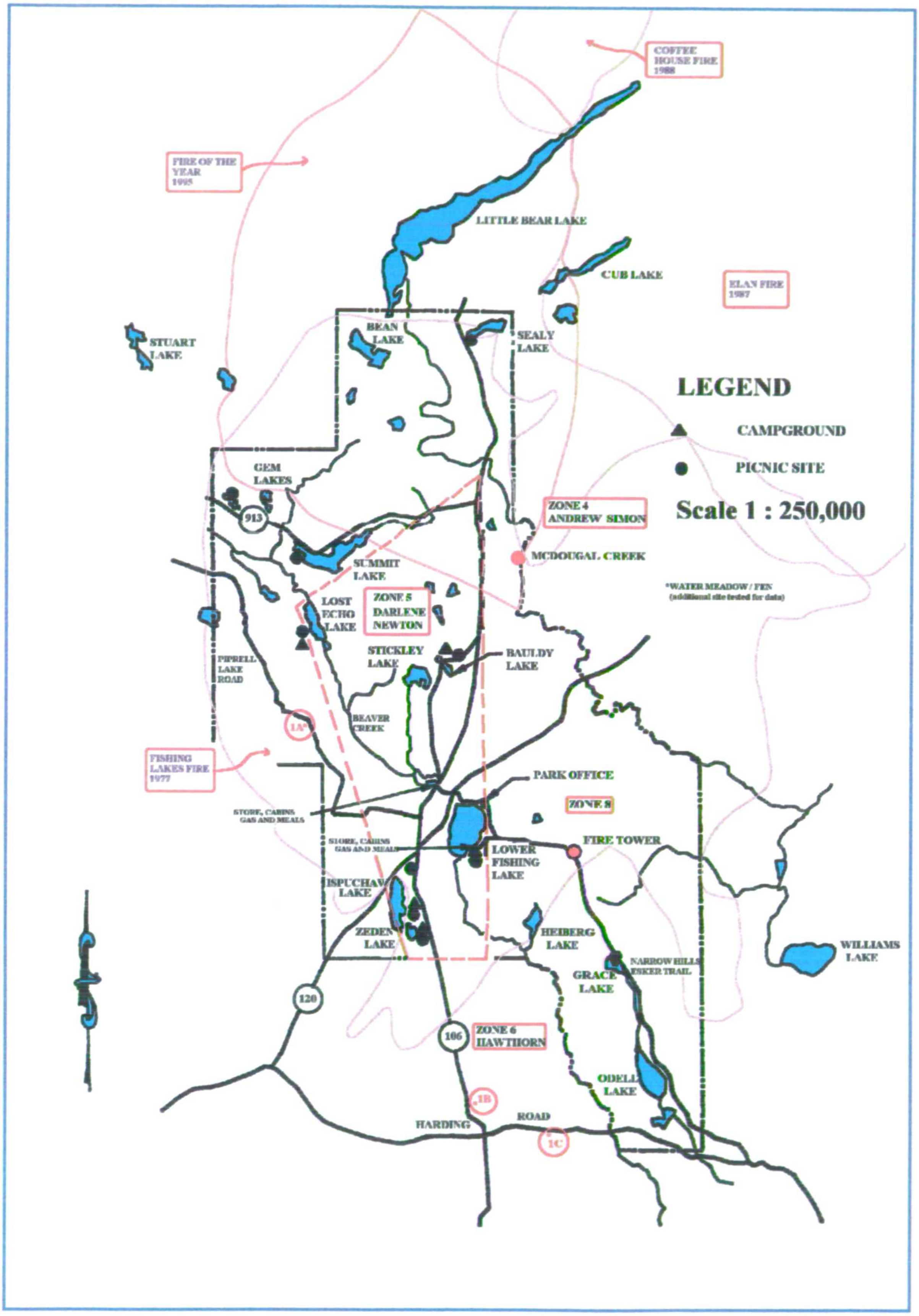


Figure 3.4: Narrow Hills area Saskatchewan. Summer 1995. Location of forest fires, test sites, and fur traplines are indicated. Based in part on a map from the Saskatchewan government for use in the Narrow Hills Provincial Park.

- environmental indicators, observations of scats and markings such as prints as well as direct sightings illustrated that the area provided more than adequate environments for such species as moose, woodland caribou, mule deer and white-tailed deer, hare, beaver, and bear. Squirrels consistently raided our camp;
- the species packing of the birds, mostly in the beaver developed wetlands, was very evident. Ducks and geese were seen and in the duck populations both dabbling and diving ducks were evident;
- and contacts were made with local individuals who supplied figures and observations on the current species densities.

Contact was made with Darlene Newton who runs a trap line in Narrow Hills Provincial Park. The line is actually licensed out to her husband but he is busy running a small sawmill so she does it for "extra money" and an "interest" of her own. Not only did she supply me with her map (seen below) of her first year on the line but data from the trappers' organisation and her figures for three years (1992-1995 seen in Table 3.4). It is true that this is not a subsistence trap line but I am struck by how similar it is in structure to that reported by Nelson (1973:157) for Kutchin trappers in Alaska. The Newtons are engaged in subsistence hunting as well. They hunt deer and moose in the region and in the past they went south to the prairies to hunt antelope. Indigenous hunts in the early historic period "...for fur were always mentioned in a different category than hunting for subsistence: to a great degree they were mutually exclusive pursuits" (Hickerson 1967:50). This remains the case today.

Mrs. Newton discards the carcasses of the trapped animals on to the mill tip where they are burned. The exceptions to this are those that are used to bait traps for predator mammals. I have often wondered since what a future archaeologist will make of this pile of burned bones. The mill and its immediate area will be returning to a 'natural' landscape in the near future as the Newton's permit to operate in Narrow Hills Park will not be renewed.

Regardless of the reasons why the animals are trapped, whether for pelts or subsistence, they are dead and do come from a specific population and area. Important in her account is her impression that there has been a growth in abundance of lynx. However, this impression is counter to the actual figures where the numbers seem stable over those three years. None the less, her assumed growth in the population of one of the three large

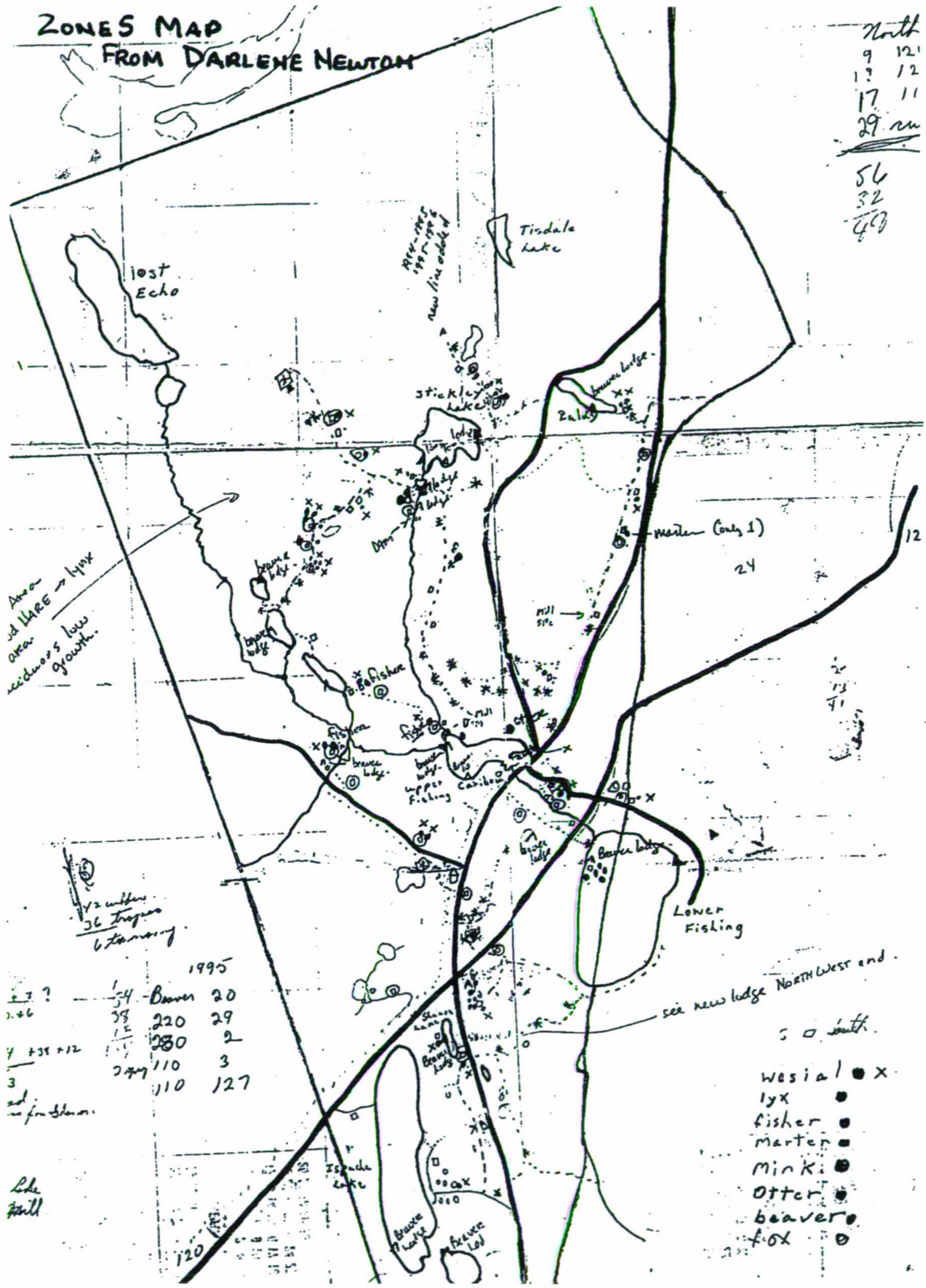


Figure 3.5: Direct scan of the map collected from Darlene Newton in the field in 1995. It shows her trapline territory in the year 1992-1993. Her zone (5) and zones 4, 6, and 8 appear on the previous map. Note her remarks and her key in the lower right hand side of the document.

predators of the area she attributes, rightly, to the rise in the hare population, which she estimates has a "few more year's" growth potential before there is a crash in numbers. She keeps no figures on hares and rabbits since they have no economic value to her. All the lynx are "incidentals" since they are not trapped for specifically and as such may be considered a random sample since they are caught by their heads in traps set for other animals. The number of weasels has been increasing as well. This is firmly documented.

	1992-1993	1993-1994	1994-1995
beaver	14	14	35
otter	3	2	6
squirrel	83	180	370
marten	1	1	0
fisher	7	4	2
fox	6	2	2
lynx	5	4	4
coyote	2	0	1
weasel	25	36	43
wolf	0	0	1
bear	0	0	1

Table 3.3: Darlene Newton's hunt figures for the years 1992-1995.

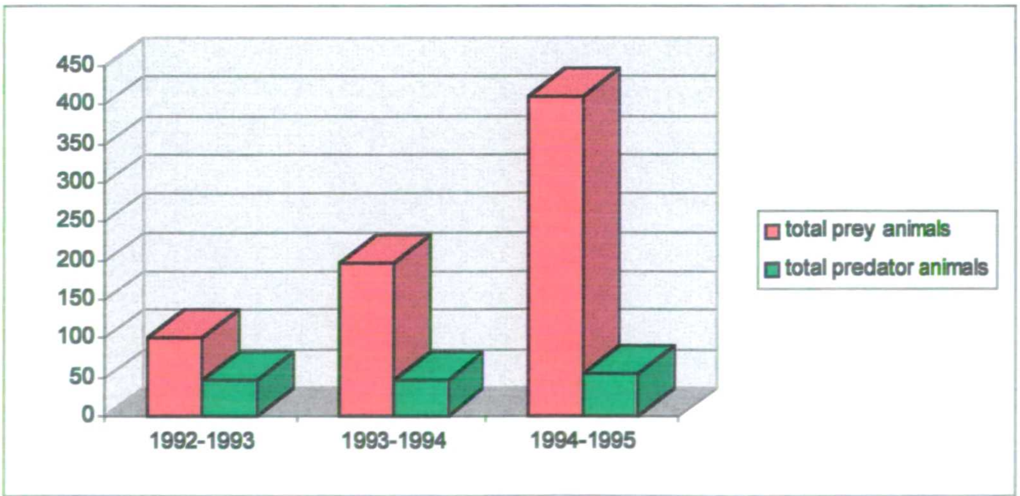


Figure 3.6 : Predator prey numbers for the years 1992-1995 based on the figures supplied by Darlene Newton for her trapline. Not found in the prey totals are the numbers for Hares and Rabbits, which Mrs. Newton does not count.

These are small but persistent and vicious predators that can easily kill a much larger animal. Their increase also may be due to hare increases, or be attributed to the four fold increase in the squirrels over the years 1992 to 1995. The relationship of this predator to the squirrel population as enumerated in the data on fur (Table 3.3 and Table 3.4) can be seen in Figure 3.7 and Figure 3.8. As well, if we examine the relationship of predators to species prey over the three years of data supplied by Mrs. Newton, we can see that there is a time lag in population response of "wild" predators to the increasing numbers of prey. This time lag leaves a "window" of opportunity for increased human predation on these same prey. Significant human predation could be sustained as long as the basic breeding populations of the prey species were maintained. At the same time increased human predation on target species has the potential of keeping competing predator populations from maximising their own reproduction. Otter have increased in numbers and beaver have more than doubled. This is not unexpected if one considers that Mrs. Newton's zone (5) encompasses an area that in 1995 was eighteen years into regrowth and that it has quite adequate resources for increased and increasing species packing. She commented on the "new growth" in the year 1994 that helped the 1994-1995 hunt. This she attributes to the "pruning" done by "rabbits". Her zone, however, she considers only moderately impacted by the burgeoning beaver population since it is, overall, a drier area. None the less, as explored below, Mrs. Newton still has significant beaver resources in her area. They merely seem less significant in relation to other zones with overall wetter habitats. The squirrels in Mrs. Newton's catch do indicate the developing forest cover and its attendant food resources of seeds from their preferred conifers.

Darlene Newton's general observations can be substantiated by the density of beaver activity in many of the areas of the Narrow Hills region. Although her Zone 5 trapline area is relatively 'dry', a brief review of her map shows she has indicated 29 active beaver lodges and 4 dams. Two of these dams support at least nine lodges between them. The one at Stickley Lake she made particular comment on as it supported five of these nine lodges. She also attributed to rabbit pruning the increased and increasing beaver numbers in the Stickley Lake population. She once more noted the pruning effect and that it extended to Lake Bauldy. Mrs. Newton's straight forward view, once more, was that "new growth helps". In saying this it must be remembered that Newton's trapline was not the one that produced the most beaver. The beaver densities in Narrow Hills, and those subsequently viewed in PANP, belie Hickerson's (1967:50) view that beaver were insufficient in numbers in prehistory to support a significant portion of a subsistence hunting economy of an extended family. This view is the result of a superficial understanding of an environment much altered during the historic period and was written from the perspective of a period when species such as *Castor canadensis* were being reintroduced, or newly re-established populations had yet to show significant increases, in Northwestern Ontario. Although he writes about food shortages in the 1800s, he lacks any analysis on why this is the case beyond such generalities as deer were "not a common animal" in the boreal forest and that the woodland caribou and moose were present but scarce since "...the large game had been depleted or driven away..." (Hickerson 1967:49).

Patterns of beaver use in the environment are such that in some locations beaver are being designated as "nuisance beaver" and eliminated by park officials. This *need* to hunt out 'nuisance beaver' is the case despite the fact that beaver are consistently hunted by the members of the trappers' association. Therefore populations are maintained and indeed grow even in the face of persistent predation. Even a cursory look at the environment would give one the reason for such a designation. Extensive areas of wetlands are being developed and other wetlands of longer standing are being extended. These areas do not support the types of fish populations suitable for sport fishing that is currently one of the recreational focuses of the Narrow Hills Provincial Park. However, such wetlands support game birds, but then again so do other parts of the province where the 'conservation' group *Birds Unlimited* has encouraged wetland preservation and development for the sport birder. Further, beaver wetland development kills new and old growth trees. These are the trees, that if they survive forest fires to live into second and third stage will be licensed out to a forest company. In some areas beaver flooding is undermining the road beds or flooding roadways altogether. Beaver, then, are not seen as wealth in such a system but merely as bothersome rodents. In some instances the killing of complete family groups in a lake system is undertaken under special license. This is seen as the only way to ease the problem until immigrant beaver re-colonise the area. Some of these removals were in Darlene Newton's zone on Lower Fishing Lake while others were in Zone 8. The culled animals are seldom counted since they do not go to the fur exchange as usually they are summer pelts and of no value as wild fur. The beaver counted and calculated in the graph following are, therefore, winter catches.

Unfortunately for our purposes hare and rabbits were not counted. This is simply because they are discarded promptly or used as bait for the traps for the predators that are preferred since hare themselves return no money from the fur exchange. However, Darlene Newton observed that their numbers were up and she thought that the "the cycle may still go up". What is interesting in her figures is that while there are documented increases in the squirrels, mentioned earlier, as suitable forest cover emerges at seventeen years post fire (Fishing Lakes Fire of 1977), and she indicated that hares and rabbits were increasing as well, there was not a significant increase in her catch of three prey sensitive species, namely coyote, fox, and lynx. Why this is so she was unable to say. Of the 798 animals reported on in the FCA fur statistics in Table 3.4, 44 (6% of the total) were these predator species. Of these 11, or fully 25% of the 44, were lynx. About 28% (223) of all the animals were squirrels. If Darlene Newton's views on the hare and rabbit numbers are correct then they would have supplied twice the number, or about 450, as squirrels. Most of the predators in the FCA figures are animals with single litters per year with relatively few young per litter. Perhaps their response to the rising prey numbers was not yet noticeable. Weasels, which are faster to respond through breeding, did show a slight upward trend in the Newton figures and were, by themselves about 14% (110) of the catch reported in Table 3.4. The alternative explanation is that predators are, generally, held in check by competition with humans, as discussed above.

The final consideration is that the figures presented here are for winter traplines. The best beaver for food, other mammals, and migratory birds as well, are those of the early to middle autumn. These are the ones that are plump and meaty with enriched marrow in their bones after the warm months. Best pelt beaver are winter with thick undercoat beneath the abundant guard hairs. However, as Hickerson (1967:50) points out beaver are "...extremely difficult to hunt in winter time...". These are the animals that the fur trapper wants and these are the animals that the Hudson Bay Company wanted from the native trapper as well. What was the emphasis in the prehistoric period? I think it was a combination of both of these uses. It is, however, interesting that my informants say that winter beaver are not always preferred pelts for personal use. The new summer beaver skin after the spring moult and regrowth is frequently favoured. It is sleek and shiny and satin smooth. For food, late summer and early autumn are still the best periods for a good sized beaver with a good ratio of fat to meat. This is also the season when the knowledgeable

Plate 3.10: Site 1C. View to the southwest with maturing aspen stand in background fronted by small regrowth area and an edge area with numerous deer indications. Summer 1995. Catalogue number 4SKs70.

Plate 3.11: Site 1C. View to the south with maturing aspen stand in background fronted by replant area and edge area with numerous deer indications. Summer 1995. Catalogue number 5SKs98.

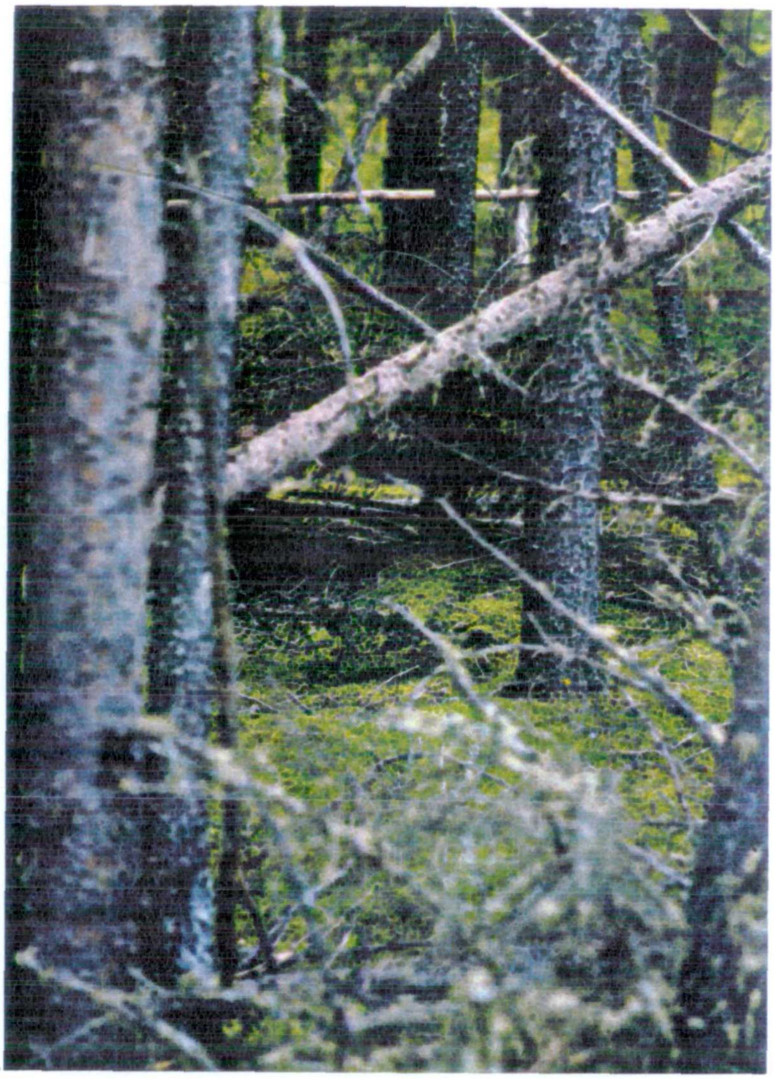


Plate 3.12: Site 1B. View to the east with mature stand and lichen understory with numerous caribou indications. Summer 1995. Catalogue number 7SKs149.

Plate 3.13: Site 1B. Understory in old growth. Summer 1995. Catalogue number 7SKs158.

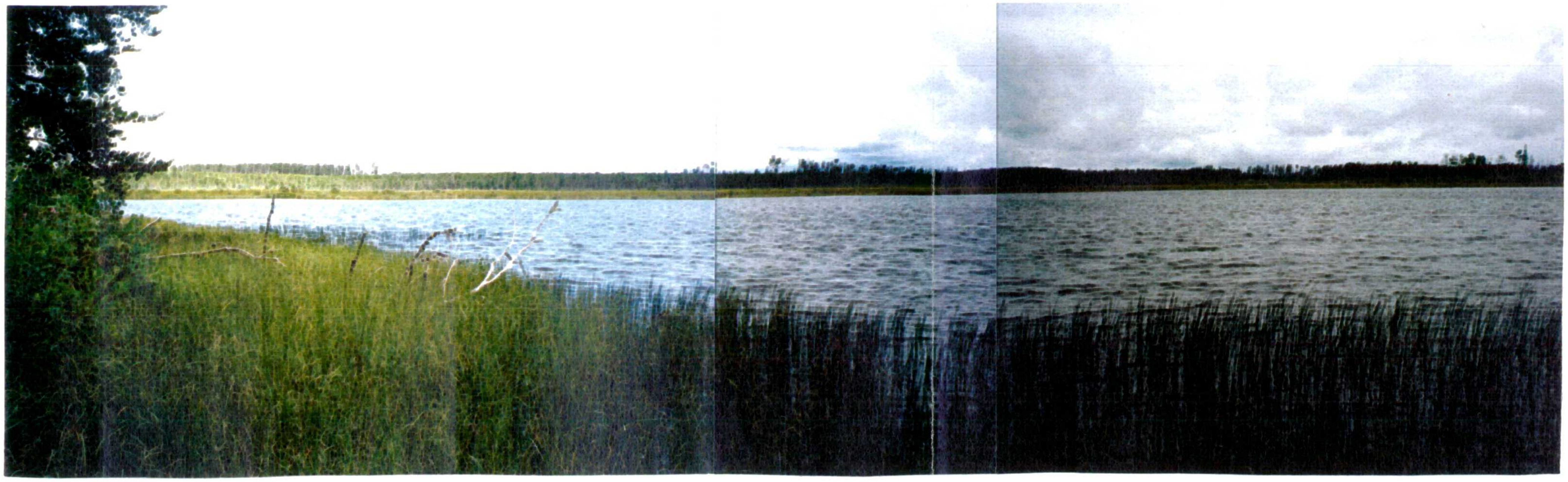


Plate 3.14: Site 1A. Image is a two part composed panorama formed from a composite of a series of individual photographs. View to the west over the lake. Upper image shows the southern half of the lake while the lower image is the northern half. The far shore (west) has extensive water meadow development. Indications of beaver, moose and bear as well as water birds were found. Summer 1995.

Plate 3.15: East test area, Saskatchewan, B-SSA, water meadow adjacent to McDougal Creek looking north by northwest. Composite image composed of two photographs. Summer 1995. Catalogue numbers 6SKp119 and 6SKp120.

hunter would have a sense of his prey population potential for the next year. Beaver kits of the year would be out and about, second year 'bachelor' stragglers still would be looking for mates, moving out of their bankside dens and migrating into new areas to set up dams, ponds, and lodges. The downed trees and altered vegetation, too, would be indicative of numbers and the potential for hunting through subsequent seasons.

Table 3.4: Wild fur harvest northern individual trappers report. Narrow Hills members of the FCA. Date: September 12, 1994.

LICENCE	NAME	SPECIES	QUANTITY	PRICE OF PELTS
84-00041	Nelson A kerman and Alvin Tatlow			
		Beaver	3	$90.00
		Fisher	5	$175.00
		Fox - Red	2	$38.00
		Fox - Cross	2	$50.00
		Marten	5	$250.00
		Otter	1	$90.00
		Weasel	9	$45.00
		Wolf	1	$150.00
		TOTALS	28	$888.00
84-00042	Marshall Hawthorne			
		Beaver	8	$240.00
		Fisher	3	$105.00
		Mink	1	$20.00
		Muskrat	8	$18.00
		Otter	3	$270.00
		Weasel	1	$5.00
		TOTALS	24	$658.00
84-00044	Scott Silvertson			
		Beaver	28	$610.00
		Coyote	1	$25.00
		Squirrel	13	$16.00
		Weasel	4	$11.00
		TOTALS	46	$662.00
84-00045	Andrew Ealey			
		Beaver	61	$1,830.00
		Coyote	1	$30.00
		Fisher	1	$35.00
		Otter	12	$1,080.00
		Squirrel	25	$15.00
		Weasel	15	$75.00
		TOTALS	115	$3,065.00
84-00046	Robert McNichol			
		Beaver	9	$150.00
		Coyote	7	$210.00
		Fox - Red	4	$76.00
		Mink	1	$20.00
		Muskrat	3	$6.75
		Otter	2	$180.00
		Squirrel	1	$0.60
		Weasel	4	$20.00
		TOTALS	31	$663.35

Table 3.4 continued

84-00048 Marvin Peterson			
	Fisher	2	$70.00
	Fox - Red	1	$19.00
	Marten	1	$50.00
	Mink	4	$80.00
	Weasel	1	$5.00
	TOTALS	9	$224.00
84-00049 David Brown			
	Beaver	65	$1,555.00
	Coyote	3	$90.00
	Fisher	1	$35.00
	Fox - Red	3	$44.00
	Marten	6	$300.00
	Mink	1	$20.00
	Otter	2	$180.00
	Squirrel	28	$16.80
	Weasel	10	$46.00
	TOTALS	119	$2,286.80
84-00050 Andrew Simon (Wolf Man)			
	Beaver	26	$660.00
	Coyote	3	$90.00
	Fisher	7	$245.00
	Fox - Red	1	$19.00
	Lynx	7	$7.00
	Marten	6	$300.00
	Muskrat	3	$6.75
	Otter	2	$160.00
	Racoon	1	$12.00
	Squirrel	48	$28.80
	Weasel	20	$100.00
	TOTALS	124	$1,628.55
84-00051 Garry Newton (Darlene Newton)			
	Beaver	14	$395.00
	Fisher	3	$105.00
	Fox - Red	2	$38.00
	Lynx	4	$340.00
	Marten	1	$50.00
	Mink	1	$20.00
	Otter	2	$180.00
	Squirrel	180	$115.00
	Weasel	36	$172.00
	TOTALS	243	$1,415.20
84-00053 Dennis Trueman			
	Beaver	8	$240.00
	Coyote	3	$90.00
	Fisher	2	$70.00
	Fox - Red	1	$19.00
	Marten	6	$300.00
	Mink	1	$20.00
	Squirrel	28	$16.80
	Weasel	10	$50.00
	TOTALS	59	$805.80
Fur Co-op Association (FCA)	TOTALS	798	$12,296.70

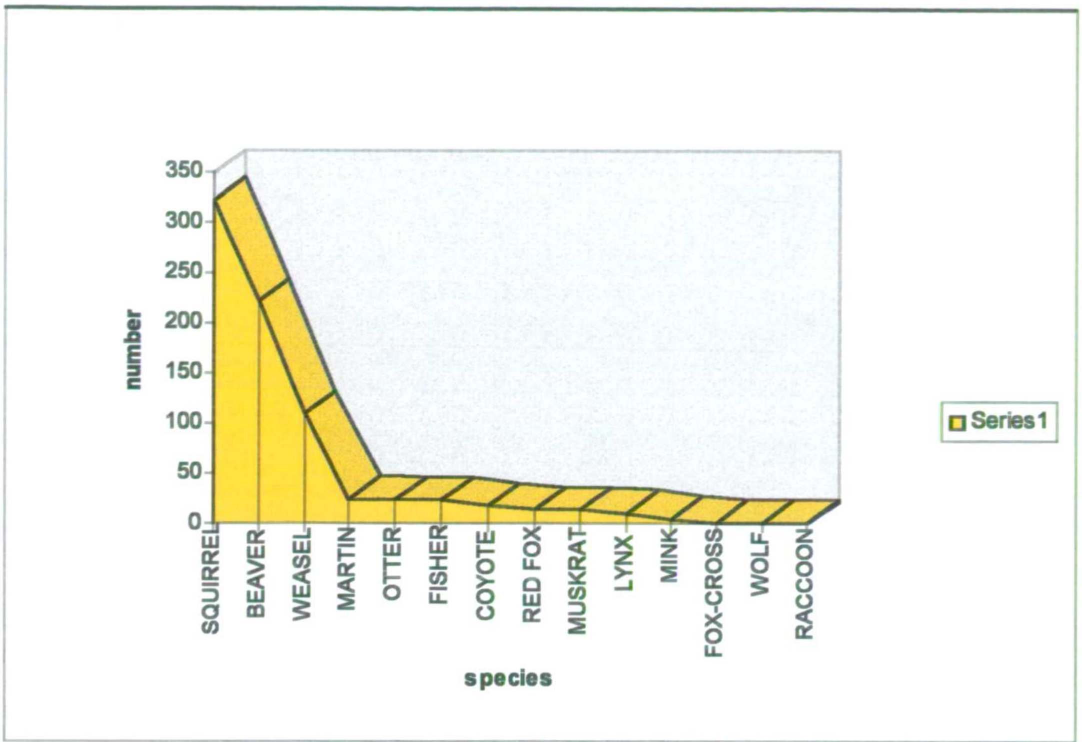


Figure 3.7: Wild fur harvest totals for the year 1993-1994 from Narrow Hills, Saskatchewan. FCA figures.

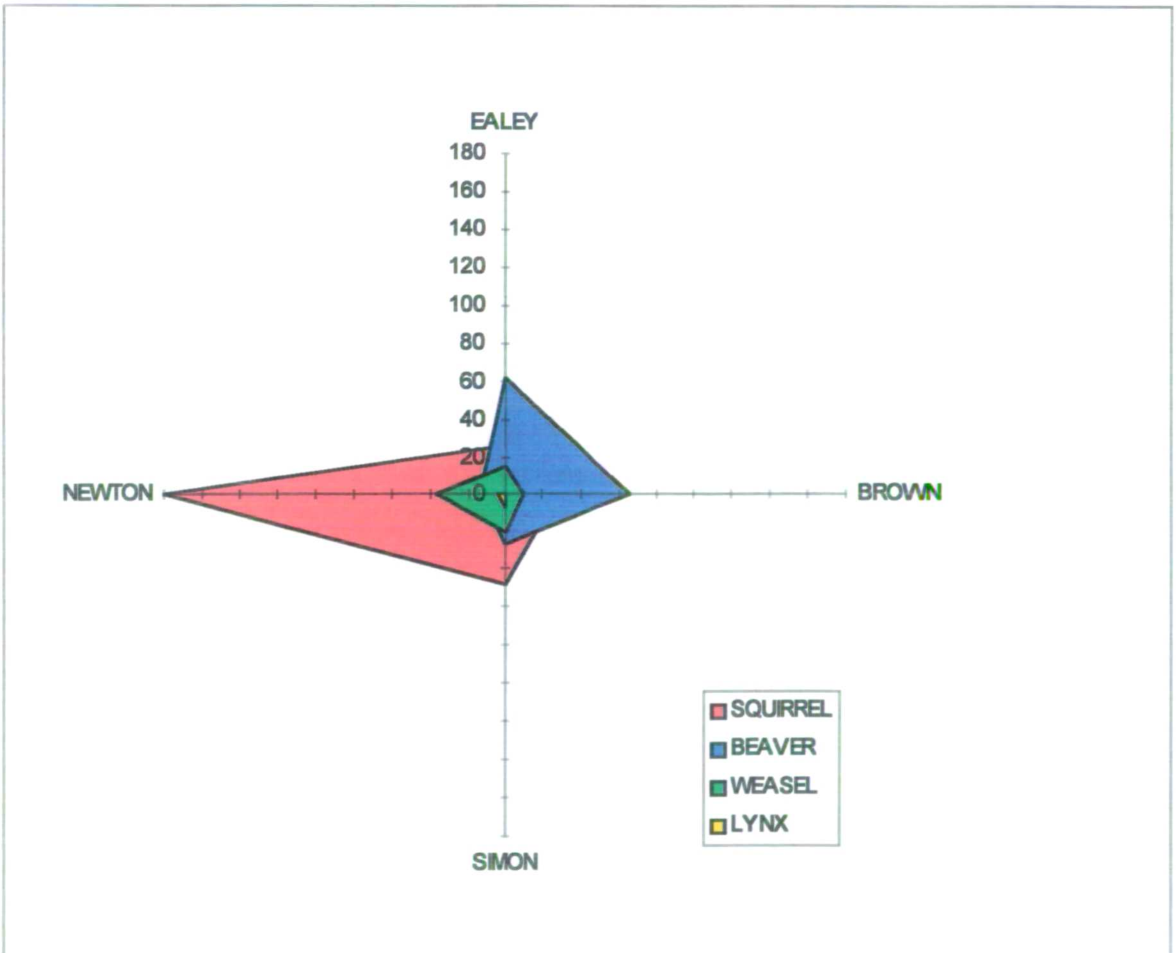


Figure 3.8: Distribution of squirrels and beaver in relation to weasels and lynx. Based on the numbers of the four top producers in the FCA figures.

3.4: Prince Albert National Park

Access to site 2A in Prince Albert National Park (Figure 3.9) was gained only by permission from the national agencies for the park and for federal environment protection. The road into this section of the park is closed to the public. The infrared satellite images, which had suggested second stage regrowth at the most, were completely inaccurate for this area. The reasons for this are discussed at the beginning of this chapter. It was comprised of an old growth aspen-conifer forest unburned since the period from 1772-1890. This can be seen in Figure 3.9, a reproduction of my field notebook map on this area and the fire regimes mapped by the federal government. Like the recent pattern in the Narrow Hills region today, seen in Figure 3.4, this area burned in patches over a number of years with the first fire date for this section of the park recorded at 1772 and the most recent at 1928. Since the 1940s the park has had a strict fire management policy. By "management" they do not mean allowing fires to clean and start the regrowth portion of the boreal cycle but rather they mean "detect early and put out fast". Controlled burns are sometimes used in very specific circumstances but these do not cover extensive areas. My cynical analysis of this is that the objective of this policy is to keep the forest in a structure that "fits" the landscape image Euro-Canadians have of the wilderness, the forest primeval, the virgin forest, the land of Grey Owl; indeed his cabin in the park is a major tourist attraction. This goes back to the comment I reported earlier. A self renewing fire-cleaned forest would cause the "problem" of too many elk; "we'd be over-run by elk" was the exact comment. But in traditional systems would not "too many" animals be the goal?

Today, at first glance, the Crean Lake (Plate 3.18) environs seem to present a unremitting mix of aspen and conifers (Plates 3.19 and 3.20). There are some small stands of mature birch and fen areas do abound adjacent to the water courses in particular to the west along the Hanging Heart Lakes. Ecotones to lake and river are found as well as to the fen-bogs themselves. Although the site was not as expected, it was interesting for older aspen and birch areas as well as older mixed stands. Observations of terrestrial mammals did not occur in this area in part due to the thickness of the tree stands. Like site 1A in Narrow Hills, the trees, upright and fallen, made it almost impossible to move through the growth. In the Narrow Hills example we had to machete two small trees out of the way to reach a fallen tree to use as a path to reach the lake shore seen in Plate 3.14. Even then we marked the trees we passed with flagging tape so we could find our way out again. We had similar problems at Weyakwin, north of PANP. We used Weyakwin as a base camp from which we went out to the site on Route 916, where so much damage was found (Plates 3.16 and 3.17), north to the fire areas around La Ronge (Plate 3.28)[7], and unsuccessfully attempted to reach the site near Montreal Lake. These older forest are almost impenetrable and for two reasons have minimum use to the hunter - gatherer: first, from the logistics of just getting around; and second, from the pragmatics of food, they are low producers, so much energy being captured in the old growth.

It was in the river in front of the Crean Lake ranger's cabin that we observed river otter. The very large birch trees in the front yard of this cabin showed damage from beaver and behind the cabin, along the north facing shore (Plate 3.18), many small aspen and birch trees were completely gone, except for their characteristic stumps, from beaver action. These trees and tree parts would have been taken out through the lake to some distant location. From my observation of this process at other locations, it is not unknown to have a beaver tow materials for a kilometre or more through open water. They are determined and strong and can take down and begin to dismantle a substantial tree in a night.

The PANP environment officer was kind enough to offer us the opportunity to access the Lofthouse area of the park. An extension to my work permit was arranged. The Lofthouse area is up the West Road which starts in the south-west corner of the federally owned park. This is an area strictly off-limits to the public. Sections of the road are like country lanes in many parts of the world. However, other sections can only be accessed with a four-wheel drive vehicle.

Although the additional work along the West Road and the Lofthouse fire area (Figure 3.10) became the last component of the field season, it was far from the least. The recent regrowth of aspen was spectacular. The regrowth of an understory after a low temperature ground fire that had occurred that May can be seen in Plate 3.29 and Plate 3.30. It was here that we first encountered the bison browsing the lush, new growth (Plate 3.31). Further, the density of species was beyond our highest expectations. It is here that we directly observed a free ranging wood bison herd, mule and white tailed deer, elk, the many sightings of recent and heavy beaver activity (the majority of the significant Plates on

[7] A "smoke eater" (forest fire-fighter) was practically in tears when he recounted the fire just south of La Ronge earlier that summer (1995). They struggled to save a small island of green only to be told by the forest company that it really didn't matter since that little piece of green was in their permit area for that year and would be logged anyway.

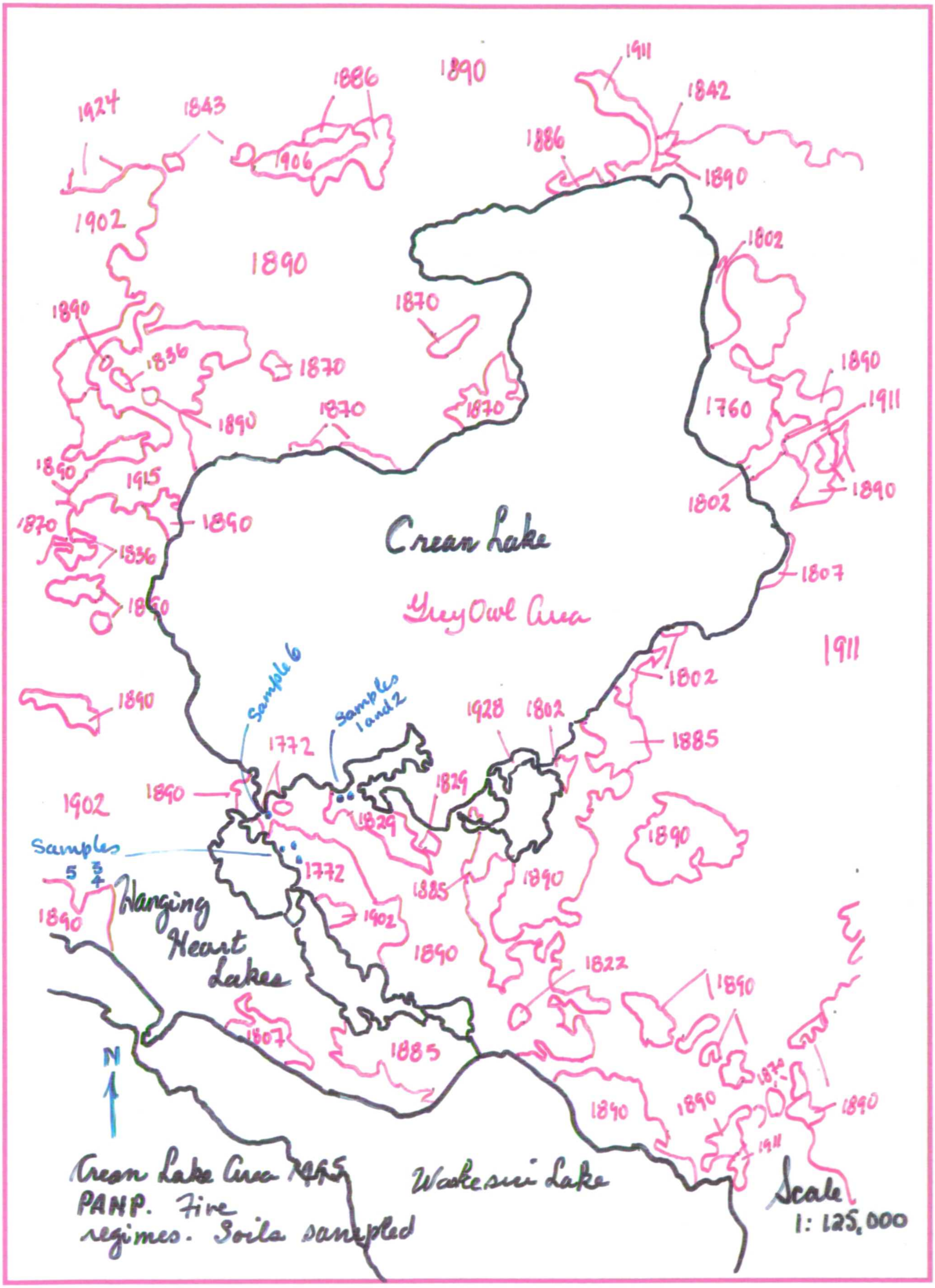


Figure 3.9: Page from field notes, PANP. Summer 1995. Crean Lake area, with fire dates.

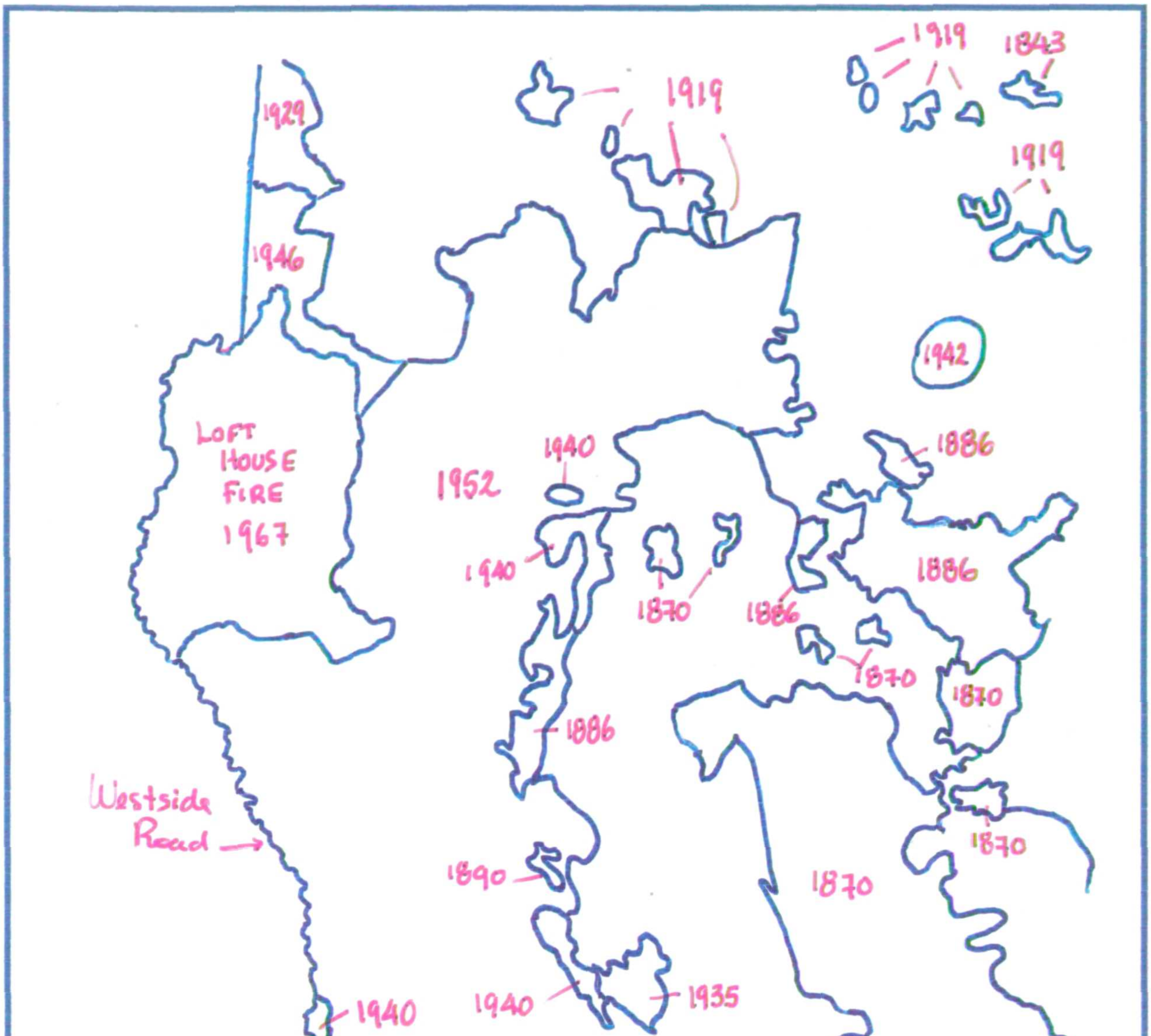


Figure 3.10: Page from field notes, PANP. Summer 1995. Lofthouse area, with fire dates.

beaver areas, directly following, come from this part of PANP), birds such as crane, and a sighting of a bear sow with cub. Samples from this area included those from the older aspen, the fired aspen of the year (1995), and edge areas. Additional discussion of the materials from this area will be found in the summary observations on fire at the end of this chapter and, of course, in Chapter Five.

3.3.5: The collection of soils

The collection of soils was done for two purposes. The first objective was to address the issue of pH levels in boreal forests and the assumed impact that assumed low pH soil has on the taphonomy of bone material in archaeological contexts in boreal Canada. Low pH has been used as the explanation for the structure, in number and composition, of zooarchaeological assemblages found in boreal Canada. The validity of this explanation has never been questioned. Until recently archaeologists have dismissed the "pH problem" by noting that boreal forests generally have acidic soils, period. They have not conducted any systematic pH analyses on the various strata, or areas of their sites and so do not know the conditions specific to their individual cases. They have relied on "common knowledge" or general figures on pH done by foresters in non-related areas of research. Further, they have not looked, to any extent, to cultural contingencies for any component of the explanation of the structure of the collections they have found, for example the ritual handling of bear carcasses after a successful hunt (Niezen 1998:28) or the *Canis* species interpretations as seen in Chapter Two. Some of this problem rests in the nature of the analysis, as discussed in Chapter Two, where the focus has been on the artefactual evidence of pottery and lithics.

The soil samples reported on here provide an expanded data base when considered with the soil samples done on a number of the archaeological sites of Northwestern Ontario and the testing done on site variability for pH that I conducted subsequent to the Ontario work. These three lines of evidence constitute the most extensive set of data to address the issue of pH in Canadian archaeological contexts.

The soil sample cores were taken by a "micro-core" method. The plastic (pvc) tube and in-field collection technique can be seen in Plates 3.6, 3.7, 3.8, and 3.9. The choice of this technique was purely pragmatic and its efficacy, beyond the production of sufficiently large samples for pH testing, was found in the fact that it required the minimum of field equipment. The equipment consisted of the plastic tubes, a small sledge hammer, labels, a marker pen, aluminium foil and a soil note book. All of this was easily handled and as many samples as could fit in a backpack with the daily field needs of cameras, binoculars, a general observations field notebook, measuring tapes and survey chains, collection bags for plant samples, Munsell Soil Color Chart, and other diverse gear needed for a specific observation tour, as well as food and water, could be managed and transported back to base camp. The method entailed the selection of a location for the micro-core to be taken. This was done on the basis of what was considered, after a site reconnaissance, to be most representative of the vegetative cover at the site or in the case where more than one sample was taken from a site, which was usually the case, those locations that would best represent site variability. The cores can be seen in the core drawings accompanying this chapter. They are at a scale of 1:1 and, for the most part, every soil stratum identified had its pH measured in the Geoarchaeology Laboratory at the Institute of Archaeology, University College London. Munsells were done on these strata as well and the soil classification was based on the criteria outlined in *The System of Soil Classification For Canada* (SSCC)(Clayton et al. 1977). Supporting technical information came from Brady (1990) and McBride (1994).

The second objective was to look for variations in soil chemistry as possible indicators of fire episodes and subsequent vegetation shifts. The lack of data generated here can be summed up in two observations. The first is the salient feature about these soils. They are remarkable for the very thinness of depth over deposits of rocks and sand that date from late in the last glacial episode and the time immediately after (Late Wisconsin and early Holocene). The generations of life, death and bio-degradation are summed up in a mere few centimetres representing thousands of years of soil production. These generations do not even whisper to us, so relatively fine are their individual impacts on the soil record. Although these areas must have experienced fire episodes at significant intervals in these thousands of years[8], such episodes are not discernible either by the naked eye or by microscopic examination, so narrow and compact are the soils representing such time depth. The events that caused forest destruction in the past, if biosystem uniformitarianism can be applied, must have been similar to what we know from the modern record and our understanding of fire regimes and forest regeneration dynamics.

[8] 8,000 - 10,000 years with an extensive fire on the average of once every 200 years would have meant 40 to 50 major fires in that period of time.

However, with only two exceptions, not one fire level was discernible in these profiles. These two examples were unique cases and will be examined in detail later in this chapter in the section that discusses the pattern of the fire regimes.

The second problem rests in the chemical testing of the soil itself. It was hoped that variation in readings in soil chemistry for the elements N (nitrogen), P (phosphorus), and K (potassium) would be evident between various locations with different types of plant cover and / or different stages of regrowth. These results did not materialise and at best could be described as exceedingly patchy. For example:

- All N readings were in the Index 0 range (>5 - 15 mg/l), which, on consideration, is indicative of an environment with low numbers of nitrogen fixing plants but high microbe activity for wood fibre decay;
- All K readings went from surface readings in the Index 1 - 2 range (Medium 150 - 200 mg/l) or the Index 2 - 3 range (Medium-high at 200 - 400 mg/l) to readings in the Index 0 - 1 range (Low 0 - 150 mg/l) for lower strata. So, consistently the K readings dropped from the surface as one moved down the soil column;
- A few variations in the P readings with the South Harding, Narrow Hills samples could be detected. Generally these showed very slight variation with respect to the vegetation cover with the highest readings coming from the edge area (High 70 - 100 mg/l) and the old growth area showing an internal consistency within its column (Medium-high 50 - 70 mg/l).

Unfortunately, at the other sites there were no results that could even provide this much information. I think one of the problems with this section of the soil testing was the lack of sophistication in the **Rapidtest pH NPK Soil Test Kit** that was used. It was selected for its compact size and range of tests as appropriate equipment for in-field testing of soils for N, P, and K. Perhaps the **Rapidtest** is sufficient if one only needs N, P, or K readings that cluster possible scores into gross categories of "low", "medium", or "high. ". However, the test did not discriminate changes at a fine enough fractal dimension that could show minute changes. But then it was assumed that any changes from herbivore restructuring of the post-fire environment would be marked in their magnitude. Certainly if this is the case these samples were insufficient to prove it with the category ranges that lumped what perhaps could be, with finer units of discrimination, statistically significant results.

Plate 3.16: West test site 2C, in part, off Warner Lake Road east of Route 916 near Weyakwin, Saskatchewan. Destruction from logging practices. Summer 1995. Catalogue number 21SKp496.

Plate 3.17: West test site 2C, in part, off Warner Lake Road east of Route 916 near Weyakwin, Saskatchewan. Destruction from logging practices. Summer 1995. Catalogue number 21SKp497.

Plate 3.18: South shore of Crean Lake, PANP, Saskatchewan. Summer 1995. Catalogue number 16SKs382.

Plate 3.19: Crean Lake Road, PANP, Saskatchewan. Catalogue number 16SKs 386

Plate 3.20: Crean Lake Road, PANP, Saskatchewan. Catalogue number 16SKs 387

Plate 3.21: *Tanacetum vulgare* (tansy) Warner Road near Weyakwin, Saskatchewan, an example of the introduced flora found in various parts of what have been considered remote sections of Canada. Catalogue number 15SKs360

Plates 3.22-26: Views to a fire, Narrow Hills, Saskatchewan, first week of August 1995. Fire began at the end of May and was completely extinguished by the second week of July. From top, left to right: Catalogue numbers 2SKp32a; 2SKp33a 2SKp34a; 2SKp35a; 2SKp36a.

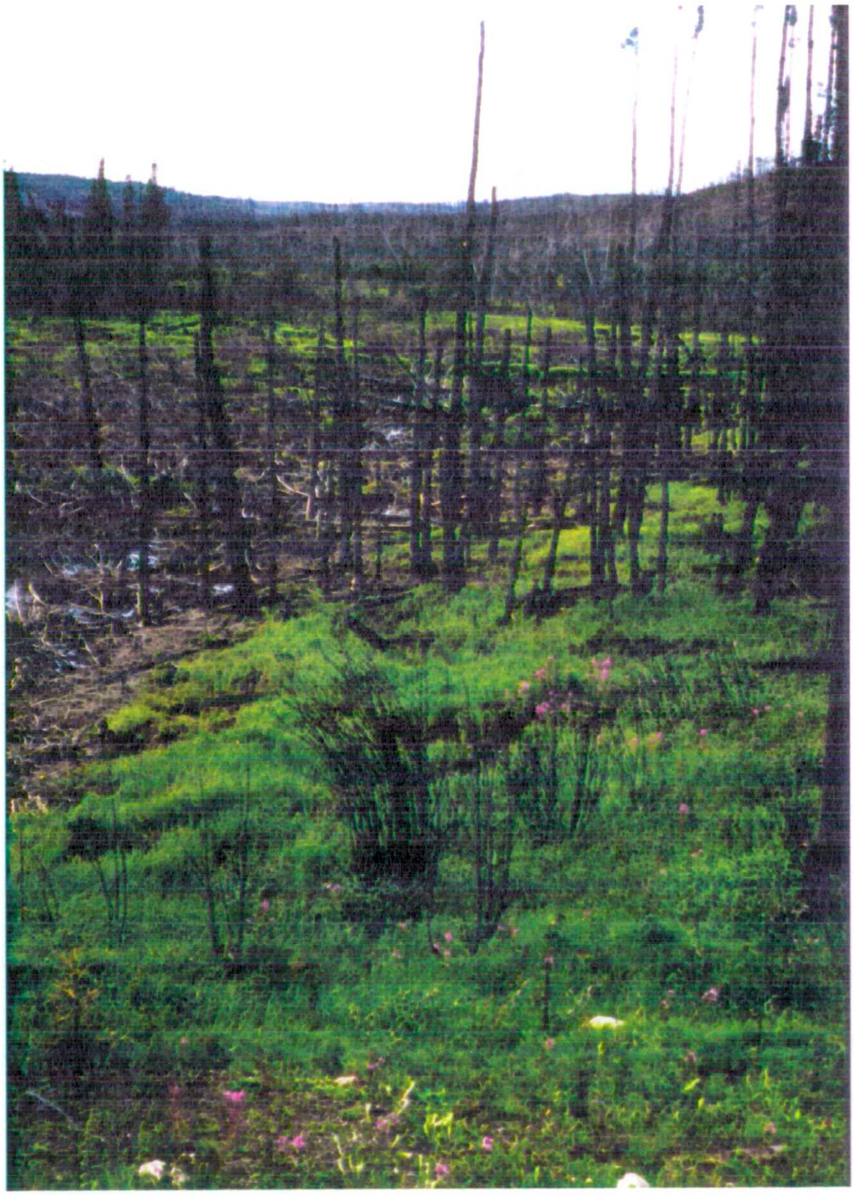


Plate 3.27: Fire and regrowth north of Caribou Creek, Narrow Hills, Saskatchewan August 1995. Catalogue number 1SKs21.

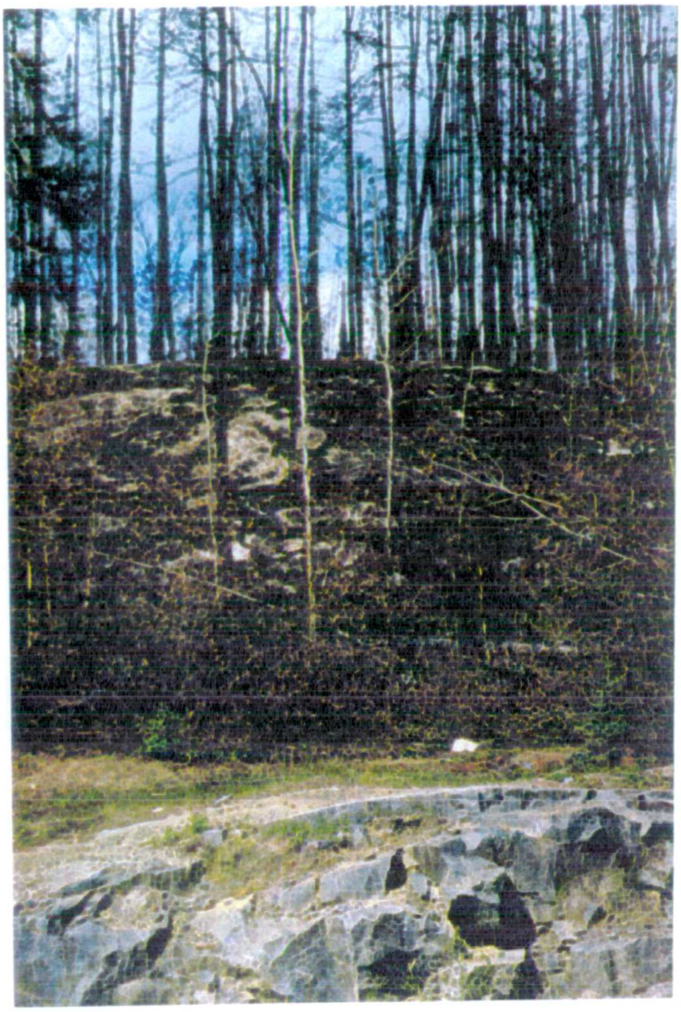


Plate 3.28: Summer of 1995 burn area near La Ronge, Saskatchewan. Surface outcrops of Precambrian bedrock with shallow topsoils burned by ground fire. Some canopy thinning from flames.
Catalogue number 16SKs375.

Plates 3.29 and 3.30: Aspen grove in August after May ground burn, 1995. West side road, PANP, Saskatchewan. 3.29, above, heavy ground burn with significant canopy damage; 3.30, left, light ground burn area with less canopy damage. Catalogue numbers (3.29) 19SKs461 and (3.30) 19SKs 460.

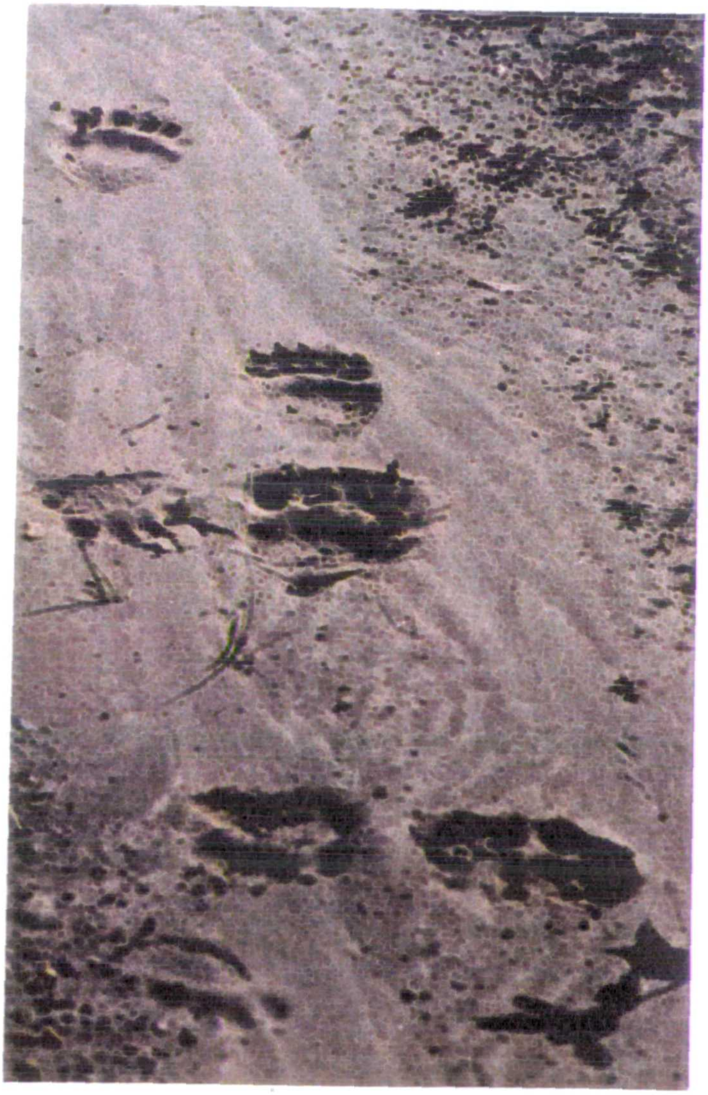
Plate 3.31: Bison feeding on regrowth of the understory and ground cover in August 1995. Aspen area fire was in May of that Spring (see Plates 3.29 and 3.30). West side road PANP, Saskatchewan.
Catalogue number 18SKs436.

Plate 3.32: Bison (wood bison) feeding in ecotone area along the southern boreal boundary, Summer 1995. Restricted zone on the west side, PANP, Saskatchewan. Catalogue numbers 24SKp565 and 24SKp566.

Plate 3.33: 'Buffalo' wallow on side of slight rise. Restricted west side, PANP, Saskatchewan, 1995. Bison use these areas to rub mineral rich and salt rich soils into their hides. They then lick these soils out as they groom. Path in foreground is part of the trail they have created between these wallow locations. Catalogue number 24SKp567.

Plate 3.34: Grace Lakes (facing south-east from the Esker Road), Narrow Hills, Saskatchewan, Summer 1995. Deer edge feeding in the shore ecotone between lake and forest. Catalogue number 3SKs41

Plates 3.35, 3.36, and 3.37: *Odocoileus hemionus* (Mule Deer, a western North American species recognisable by their large ears). PANP restricted west area, Summer 1995. 3.35 and 3.36 adults. 3.37 fawns of the year edge grazing. Catalogue numbers 12skp286a; 19sks442; 17SKs394.



Plates 3.38, and 3.39: *Ursus americanus* (American Black Bear). PANP restricted west area, and off Route 916 near site 2C, Summer 1995. 3.38 sow with cub, 3.39 coming and going footprints, second year cub or small female. Catalogue numbers 19SKs457; 15SKs344.

Plate 3.40: Small mammals. *Ondatra zibethicus* (Muskrat) in pond near entrance to Crean Lake Road; *Lepus americanus* (Snowshoe Hare) edge feeding in Narrow Hills; *Tamiasciurus hudsonicus preblei* (American Red Squirrel) at seed bed in PANP. Summer 1995. Catalogue numbers 18SKs433; 9SKs200; 20SKs486.

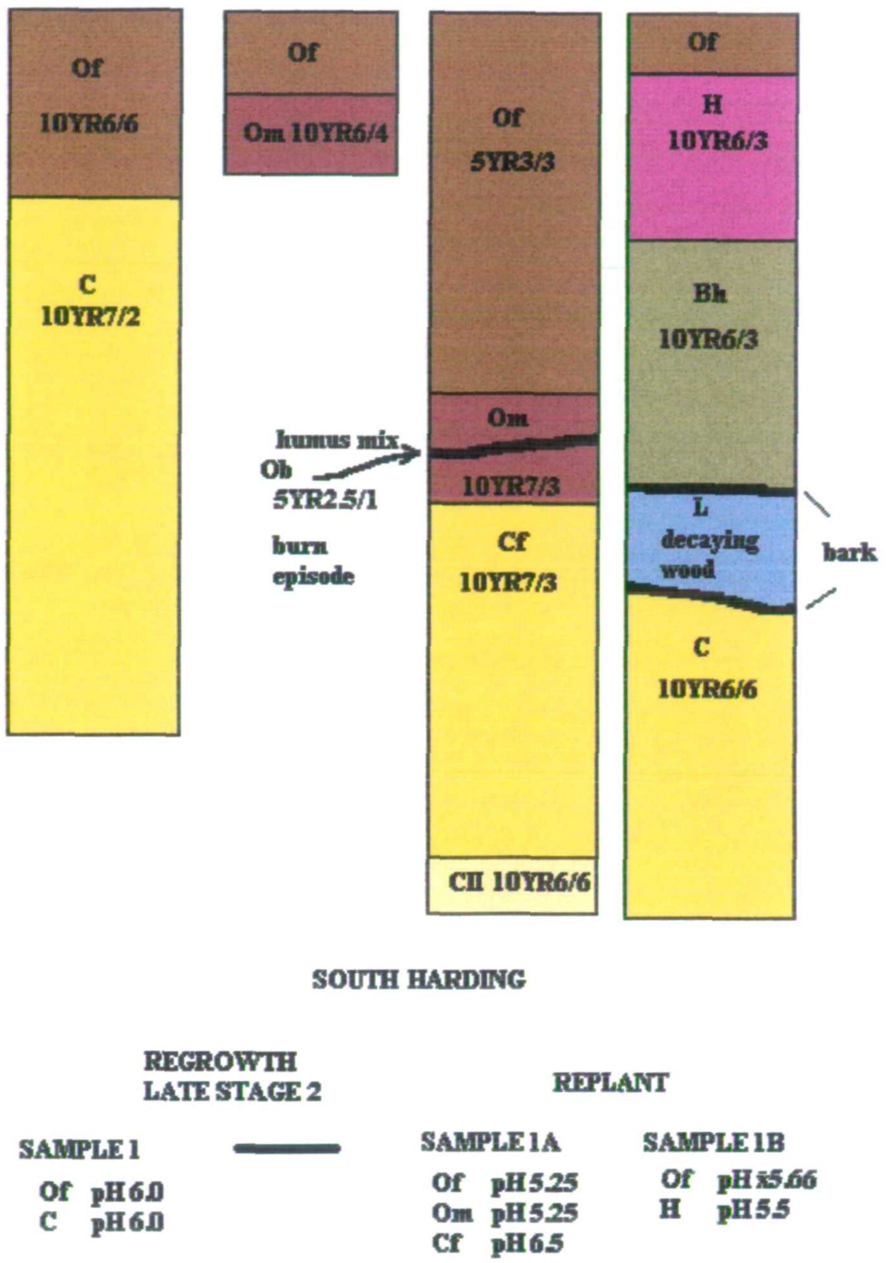


Figure 3.11: Soil cores from the Narrow Hills area of Saskatchewan. Summer, 1995. South Harding Road, Site 1C.

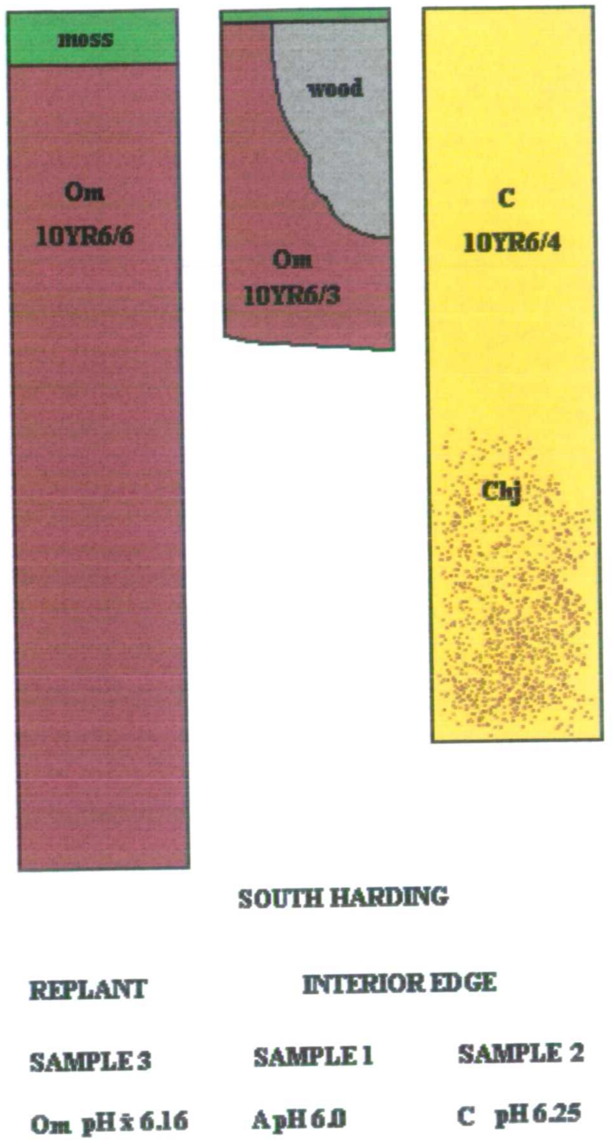
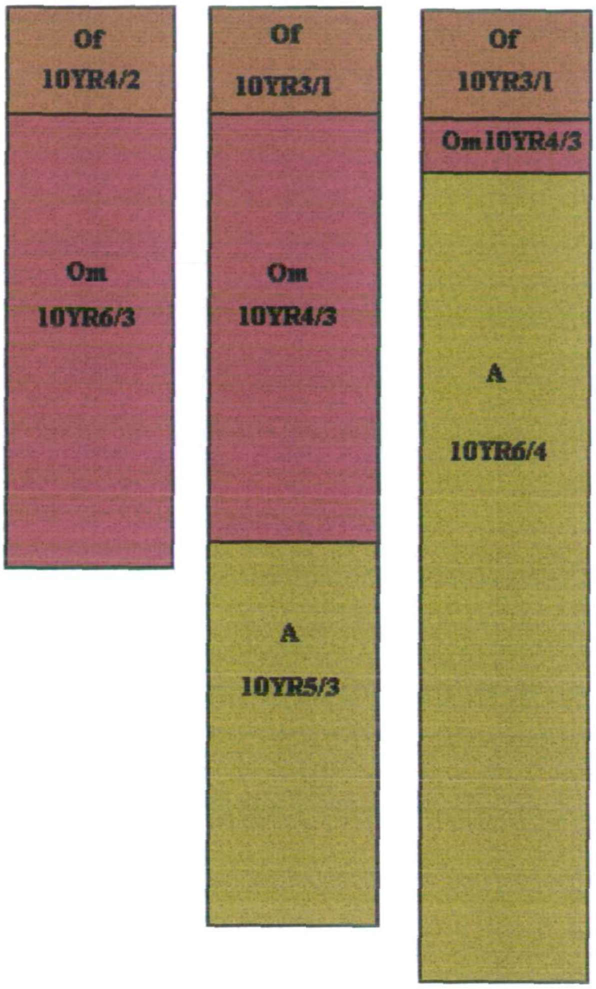


Figure 3.12: Soil cores from the Narrow Hills area of Saskatchewan. Summer, 1995. South Harding Road, Site 1C.



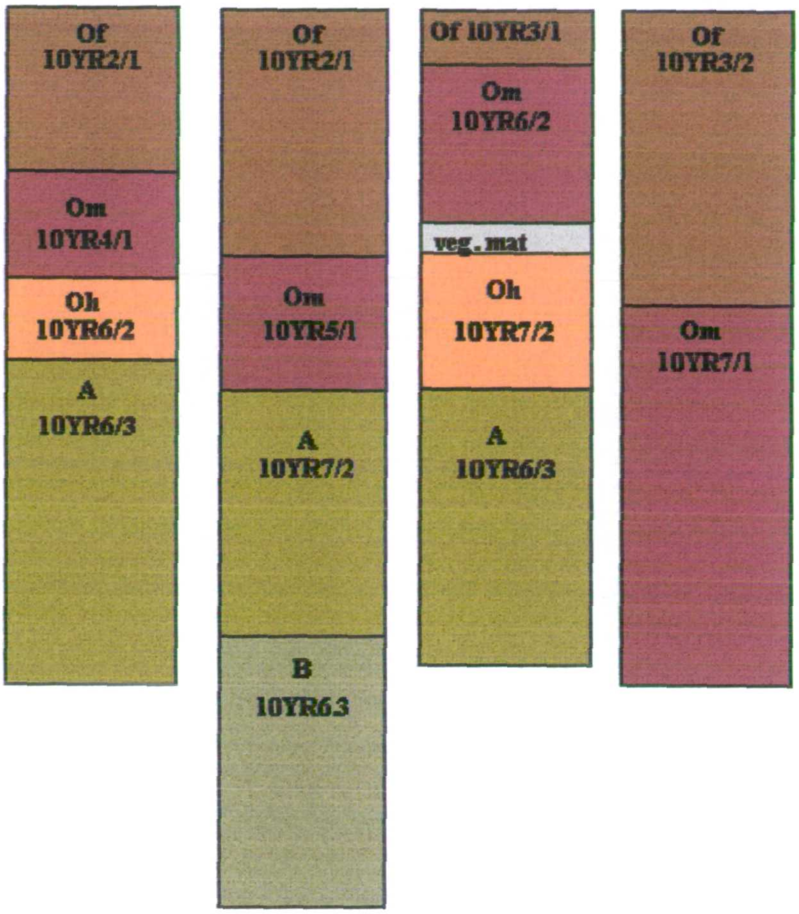
NARROW HILLS
SITE B

SAMPLE 1
Of pH 6.85
Om pH 6.15

SAMPLE 2
Of pH 6.70
Om pH 6.33
A pH 5.98

SAMPLE 3
Of pH 6.2
Om pH 5.91
A pH 5.56

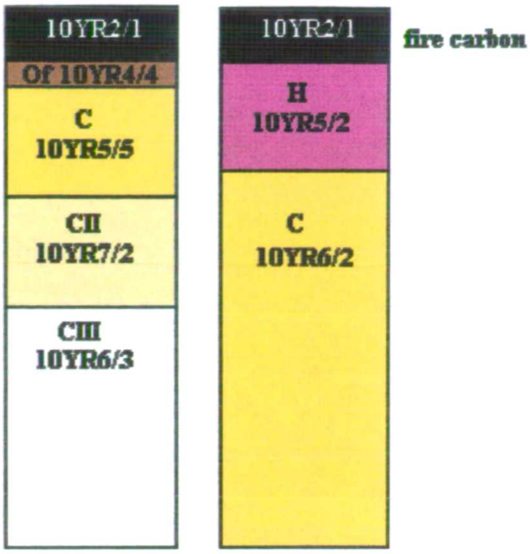
Figure 3.13: Soil cores from the Narrow Hills area of Saskatchewan. Summer, 1995. East side of Highway 106, Site 1B.



NARROW HILLS
SITE A

SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4
Of pH 7.03	Of pH 5.51	Of pH 6.16	Of pH $\bar{x}$ 4.65
Om pH 6.80	Om pH 5.12	Om pH $\bar{x}$ 5.60	Om pH 5.34
Oh pH 6.54	A pH $\bar{x}$ 5.44	Oh pH 5.40	
A pH 7.71	B pH 5.67	A pH 5.12	

Figure 3.14: Soil cores from the Narrow Hills area of Saskatchewan. Summer, 1995. "No Name" Lake, Site 1A.



NARROW HILLS
1995 FIRE AREA
106/913 NE CORNER

SAMPLE 1	SAMPLE 2
A pH 6.26	A pH 6.96
B pH 6.09	B pH 6.20
C pH 5.95	C pH 5.45
D pH 5.63	
E pH 4.45	

Figure 3.15: Soil cores from the Narrow Hills 1995 forest fire area. Off Route 106 north of Sealy Lake.

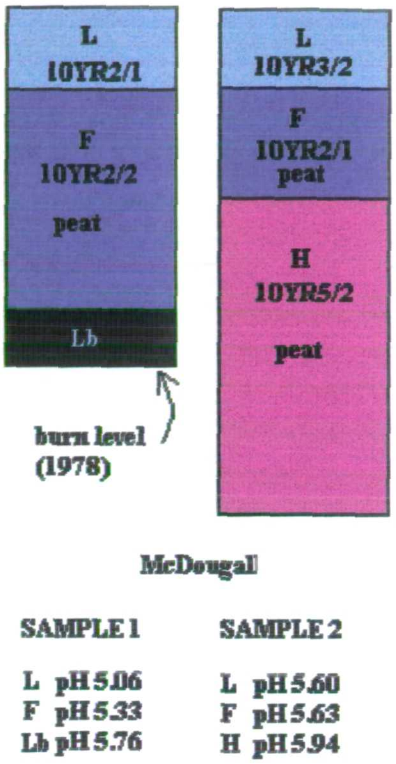


Figure 3.16: Soil cores from McDougal Creek water meadow, Narrow Hills, Saskatchewan. Summer, 1995. Micro-habitat developed from previous beaver pond. Profile shows indication of the 'recent' forest fire in the area (1977).

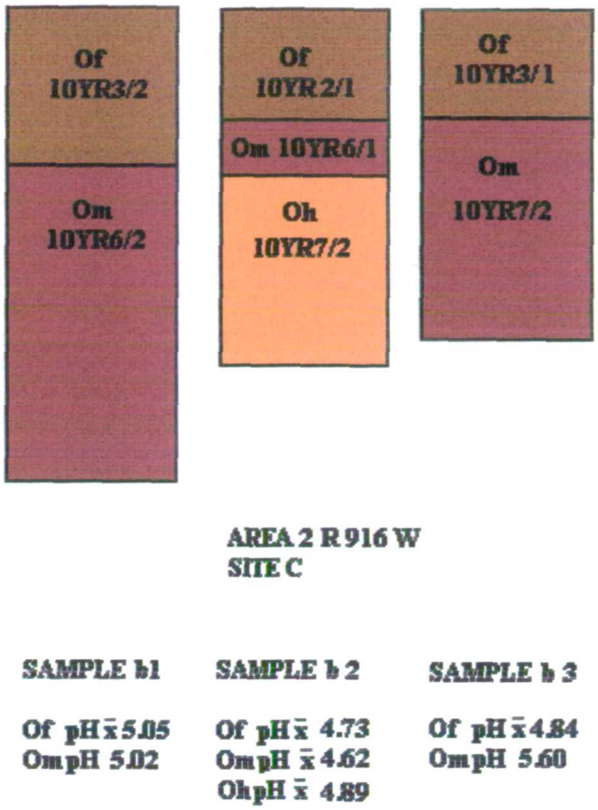


Figure 3.17: Soil cores from area near Weyakwin, Saskatchewan. Summer 1995. Route 916, Site 2C.

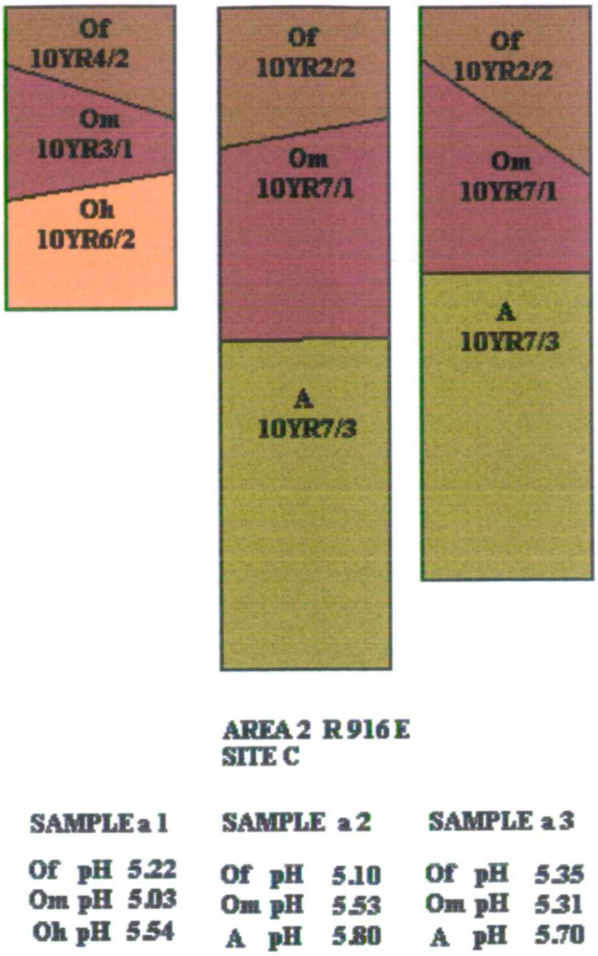
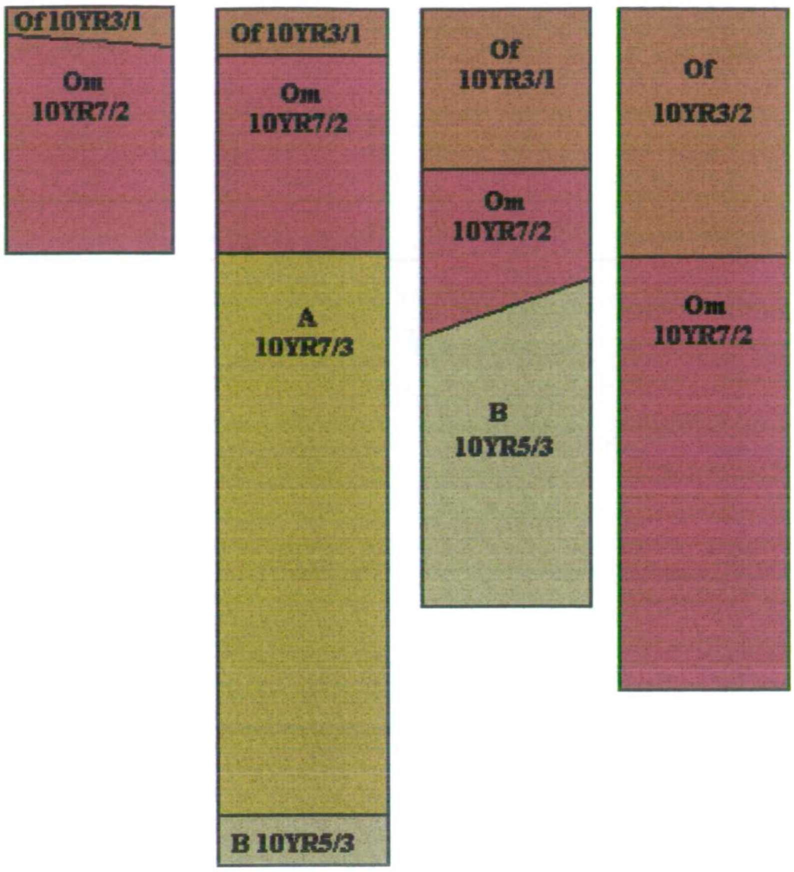


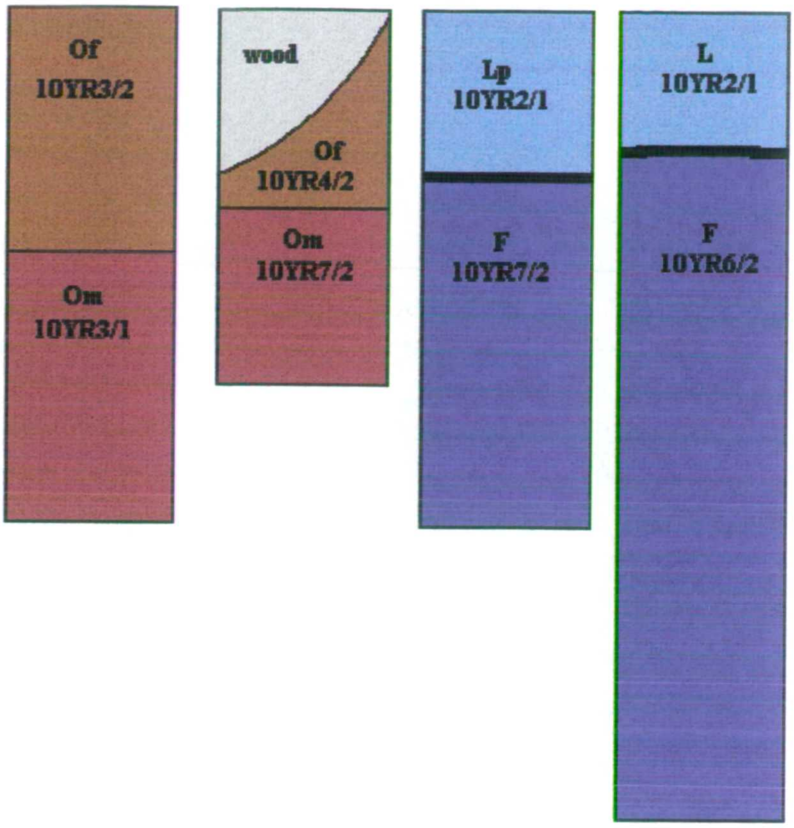
Figure 3.18: Soil cores from area near Weyakwin, Saskatchewan. Summer 1995. Route 916, Site 2C.



AREA 2 R 916 E

SITE C BEAR PAW 1 ASPEN AREA	**SITE C BEAR PAW 2 ASPEN AREA**	**EAST OF SITE C REGROWTH AREA SAMPLE 1**	**EAST OF SITE C REGROWTH AREA SAMPLE 2**
Of pH 6.61 Om pH 6.24	**Of pH 6.47 Om pH 6.43 A pH 5.98 B pH 5.80**	**Of pH 5.03 Om pH 5.64 B pH 5.87**	**Of pH 5.83 Om pH 5.41**

Figure 3.19: Soil cores from area near Weyakwin, Saskatchewan. Summer 1995. Route 916, Site 2C.



AREA 2
PANP
CREAN LAKE

SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4
OLDGROWTH	OLDGROWTH	OLDGROWTH	OLDGROWTH
MIXED BIRCH	ECOTONE	ASPEN	ASPEN
ECOTONE LAKE	LAKE		
Of pH $\bar{x}$ 7.31	Of pH 6.65	Lp pH 6.01	L pH 6.59
Om pH 5.93	Om pH $\bar{x}$ 9.07	F pH 5.81	F pH 5.85
		▬ burn pH 5.90	▬ burn pH 5.96

Figure 3.20: Soil cores from PANP, Saskatchewan. Summer 1995. Crean Lake - Hanging Heart Lakes area, Site 2A.

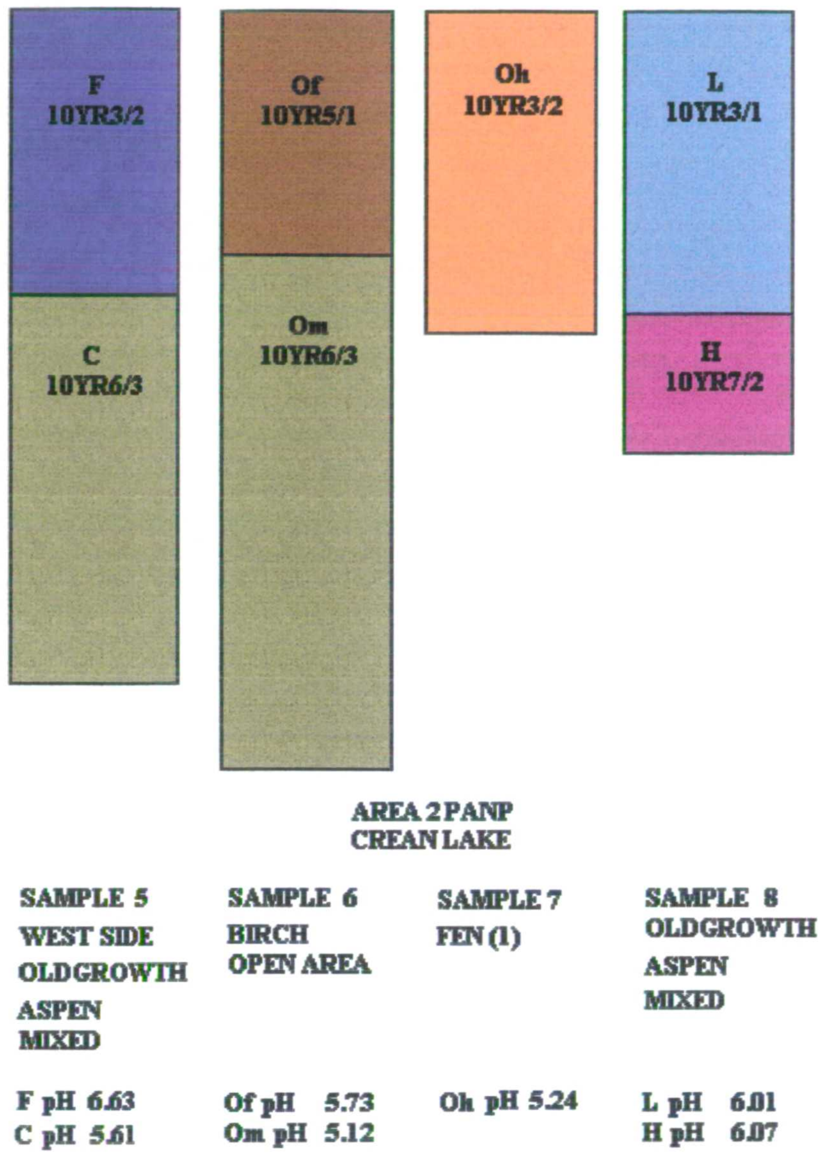


Figure 3.21: Soil cores from PANP, Saskatchewan. Summer 1995. Crean Lake - Hanging Heart Lakes area, Site 2A.

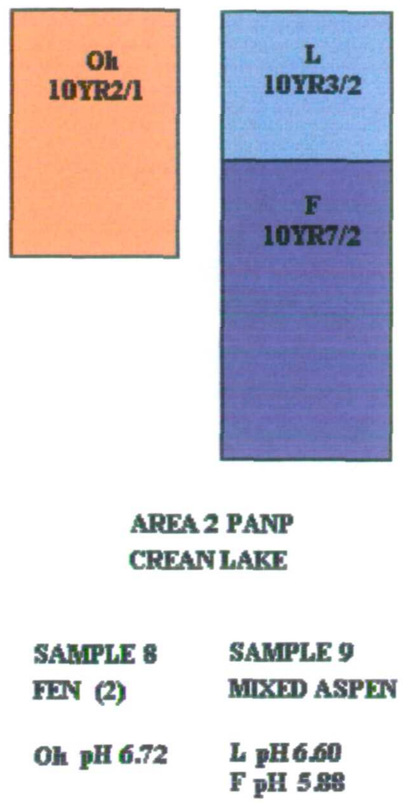


Figure 3.22: Soil cores from PANP, Saskatchewan. Summer 1995. Crean Lake - Hanging Heart Lakes area, Site 2A.

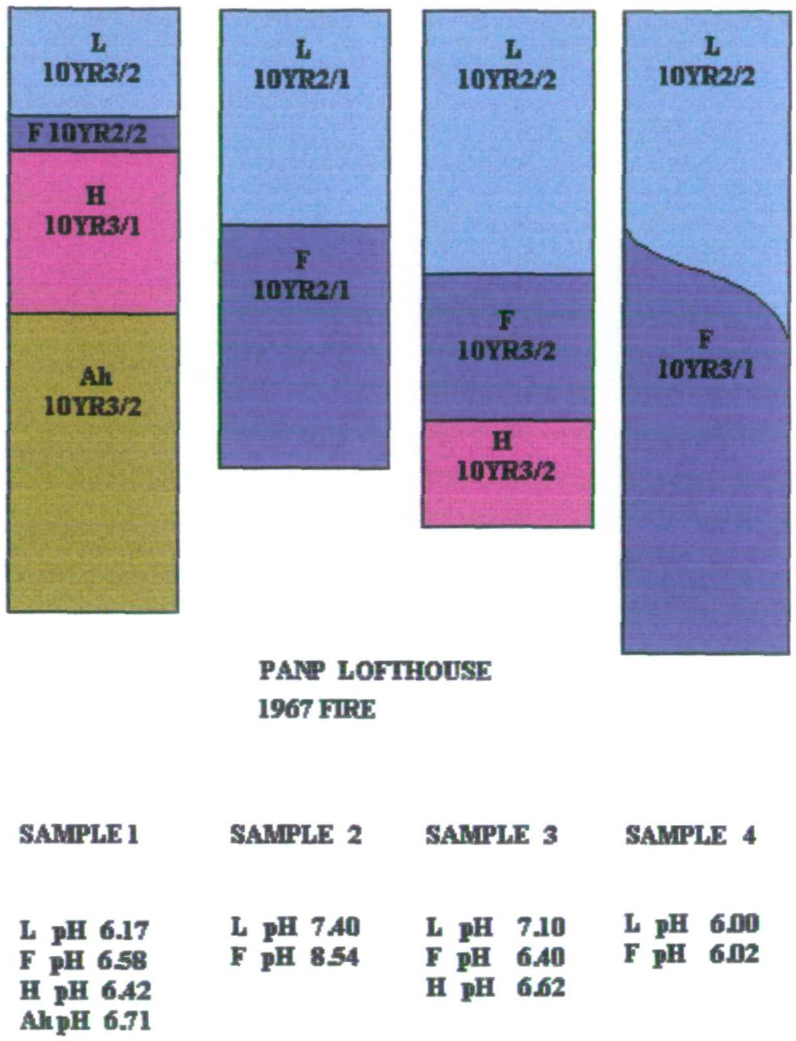


Figure 3.23: Soil cores from the Westside area of PANP, Saskatchewan. Summer 1995. Area of the Lofthouse fire of 1967.

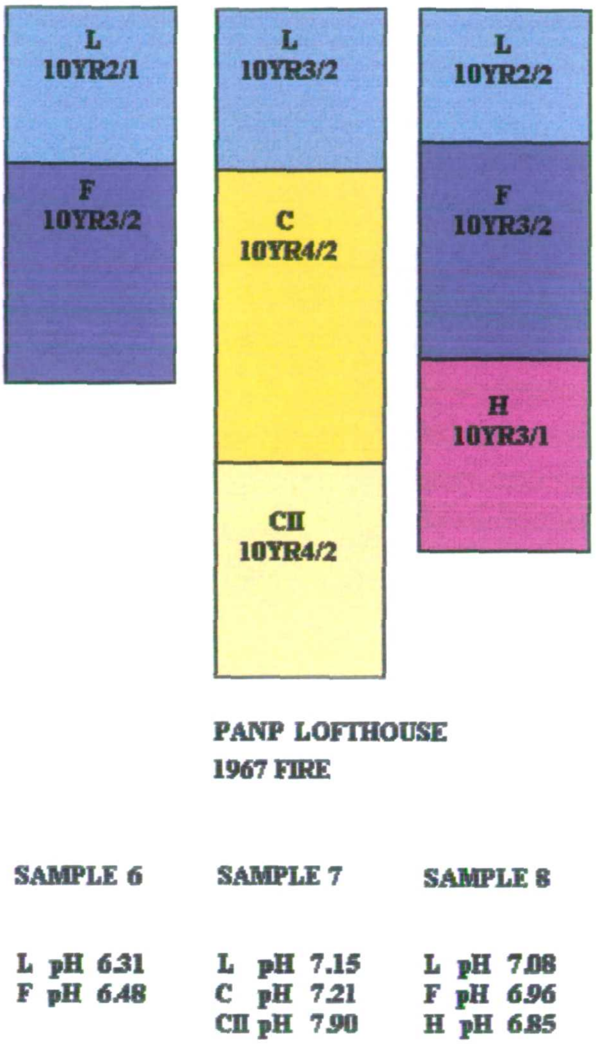
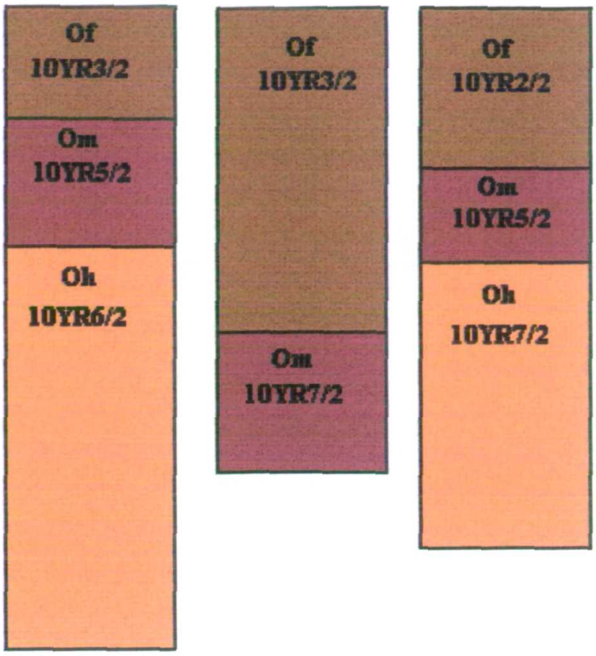


Figure 3.24: Soil cores from the Westside area of PANP, Saskatchewan. Summer 1995. Area of the Lofthouse fire of 1967.



WEYAKWIN
OLD GROWTH

SAMPLE 1	SAMPLE 2	SAMPLE 3
OfpH 6.22	OfpH 6.30	OfpH 6.78
OmpH 5.62	OmpH 4.70	OmpH 6.50
OhpH 5.58		OhpH 6.87

Figure 3.25: Soil cores from Weyakwin, Saskatchewan. Summer 1995. Old growth forest.

3.3.6: Review of pollen and evidence of fire for selected areas of Canada

Two approaches were used in trying to come to a more complete understanding of human impact on the environment through use of pollen and charcoal information. Pollen indicates, to a certain extent, vegetation structure and change in this structure while charcoal indicates biomass-burning activity. This burning may take the forms of wild fire, anthropogenic fire over extensive or restricted areas for alteration of the environment, or anthropogenic domestic (household) fires. The first approach was to review articles where the evidence from pollen and / or charcoal is discussed and the use of this data is assessed. Included in this category, and like charcoal indicative of biomass-burning activity, is one report on ammonium concentrations in the Greenland ice sheet (Taylor, et al. 1996). The second approach was to look at pollen data reports directly. Seventy of these types of reports were reviewed.

Approach One: Published reports on pollen, charcoal, and ice core analysis

Pollen

An example of pollen analysis used in conjunction with archaeological information can be found in the reports on the eastern Canadian Iroquoian site of Crawford Lake on the Niagara escarpment in south-western Ontario. Environmental changes tied to agriculture and the changes in agriculture itself are the focus of these studies where prehistoric through proto-historic maize agriculture and then the historic European cultigens, as well as the pollen from the non-domesticated vegetation, are distinguished and discussed (Finlayson, et al. 1973; McAndrews, et al. 1989). An European example of the linking of pollen to human alteration of the environment can be seen in the article by Lowe, et al. (1994) where three episodes of possible human interference in vegetation (excessive grazing by herd animals) are identified for a period between 6300 BP and 1400 BP in northern Italy. In this article humans and animals are linked in a relationship resulting in the alteration of significant portions of the pattern and structure of the habitat. That such relationships and their resulting processes can be identified from the pollen record should be of interest to all who work in archaeology in the boreal forest. In the hunter-gatherer world of the boreal forest there are certain species that are in close association with humans in patterns that may alter habitats and show in pollen cores even though domesticated plants and animals are not a part of their pattern of economic activity. Some reports look at disturbances of the forests and more particularly the grasslands of North America (McAndrews 1988) or at continent-wide tree distributions (Latham and Ricklefs 1993) but not in the detail we need to distinguish the micro-management patterns that I believe are the scale of landscape alteration in the hunter-gatherer way of life.

Admittedly the problems of understanding such processes in the boreal forest are more elusive than addressing issues like the introduction of crop plants or the study of massive yearly grassland burns. I believe the patterns of burn initiated by humans in the boreal forest were such that their effects, although important to individual small groups of people possibly no larger than an extended family or a few extended families in hunting partnerships, and even key to the development of needed habitats over both small and large areas, were not of the magnitude in size or frequency or scheduling to make significantly large enough statistical blips or spikes to show in the data. Therefore it is not easy, indeed it may be impossible, to definitively illustrate the presence of fire as an environmental manipulation tool in the boreal forest from the pollen record alone. The indicators will be, for the most part, swamped by the bulk of the data in the type of analysis that puts the emphasis on trends such as looking at vegetation patterns over wide expanses for the period since the last glacial episode (Nichols 1967a; b; 1975). A further problem that can be found even in analyses that focus on the event is that indicators may be swamped by other indicators, such as extra-local pollen inputs from adjacent or even spatially distant events.

However, archaeologists have a responsibility to attempt an analysis. First, we have to frame the questions in appropriate ways. This may require the concerted effort of a range of researchers working through the problems to be addressed from different perspectives. The answers may not be found in traditional forms of research on pollen and charcoal but in the relationships of species, both plant and animal, within environments. Here the faunal remains from archaeology sites will prove to be invaluable. We may be able to identify suites of species of plants and animals that are 'fire adapted' as we do when we talk about specific trees that require fire for the release of their seeds. Second, we need to select appropriate testing strategies and appropriate sites for the collection of the data we need. The criteria for the selection of sites for pollen data (and charcoal data) are outlined by Jacobson and Bradshaw (1981) where they, too, say we must attempt to move to the fine scale. Sites such as the McDougal water meadow (Plate 3.15; Figure 3.16) from Narrow Hills, where the modern fire (1978) can be distinguished in the soil micro-core, or that small "no name" lake (Plate 3.14), in Narrow Hills, with its westside fen - water meadow area, may be very good places to start "paired small basin" investigations to define fire and "... small-scale local interactions among forest species...(the) moving front of interaction between different taxa..." (Jacobson and Bradshaw 1981:84). However, the variables at work in the natural world are a significant problem. The main variables for lakes (watershed characteristics, sedimentation process, local environment, and local climate), and small hollows, humus and soils (basin characteristics, sedimentation process, local environment) are found in detail in Jacobson and Bradshaw (1981.88; 91). It is interesting to note that it is just such variables that are at the centre of the criticisms of the reconstruction of the history of boreal forest fires found in the work of MacDonald, et al. (1991) and are part of the focus of Millspaugh and Whitlock (1995) and Whitlock and Millspaugh (1996) in their work on the fire history of Yellowstone National Park, USA. It means that there can be a frustrating inability to control for the variables or even to quantify them. This is because they are variable in and of themselves and / or in their response to other variables we may or may not have recognised. This inability to control for variability in calculations makes the outcome of analysis somewhat unpredictable and frequently makes retrodictable completely impossible. This is at the heart of the criticism by Clark and Royall (1995:7) of the Campbell and McAndrews (1993) analysis of Crawford Lake pollen and their proposed model of forest disequilibrium caused by the Little Ice Age effect starting circa AD 1200. Therefore things such as local climate or sedimentation process in the distant past tend to escape us in the fine detail (see MacDonald 1991: Figure 1).

The MacDonald team (1991:69) go on to note four reasons for lack of definitive support in the fossil palynological record for forest change initiated by natural and / or cultural causes (e.g. fire):

> 1. under-representation of vascular plants and no representation of lichens, thus the lack of indicators for species richness and evenness;
>
> 2. pollen catchment area of a specific lake varies for different species of plants. Thus some pollens represent local changes while other pollens make extra-local additions to the count. Therefore: "The vegetation change caused by the fire must be spatially extensive and severe enough to be

detectable above the 'noise' introduced by the extra-local component of the pollen rain if it is to be detectable in the fossil pollen record" (MacDonald, et al. 1991:69)(this is the issue if we have small, low intensity fires to keep vegetation at a certain early successional level);

3. pollen records developed from short chronological intervals may be dominated by species that are "even-aged" populations of long-lived trees with age dependent pollen production (as expected for trees that are the result of uninterrupted regrowth subsequent to a fire episode);

4. "the areal extent and intensity of individual burns is **impossible to resolve** in anything but the most relative terms using pollen data" (emphasis added)(MacDonald, et al. 1991:69)(see comment after point two, above).

Charcoal

With data from charcoal there are other problems. While the microscopic charcoal "appears to be strongly influenced by regional fire activity" in particular when fires were 40 to 120 km removed from the test site, the macroscopic charcoal "does not appear to be correlated with regional fire activity" (MacDonald, et al. 1991:60). Of course the charcoal depositional problems are the crux of the issue for Bennett, et al. (1990) in their attempt to study anthropogenic burning in post glacial England (last 10,000 years). Their results, along with the discussion in MacDonald et al. (1991) offer a cautionary tale. In the examination of the data from eastern England it was found that the fossil burn record could be explained best by the sedimentation of charcoal from domestic fires (household) burning over long periods of time. This they consider "...may be a better model for much of the English post-glacial charcoal record" (Bennett, et al. 1990:640) rather than massive forest fires of relatively short duration, albeit over extensive areas. There is, then, the problem of 'sorting' domestic fires from purposeful fires to alter the forest cover and both of these from wild (lightning induced) fires that burn areas of any size. These wild fires are more likely to be 'fire season' specific, with fire seasons varying from region to region based on available fuel, ground moisture, duration and intensity of rainfall, winds (direction and velocity) and ambient air temperatures. It is this fire season specificity that may be of help in sorting fire types in detailed fire records that may show up in cores. The pollen of season specific plants that have very short flowering periods may help to sort patterns from the noise.

The appreciation of the spatial and temporal scales of fires is required to attempt any reconstruction of fire history. The fire history of Yellowstone park has been more fully defined by Millspaugh and Whitlock (1995) through the linking of charcoal analysis to the unpublished dendrochronologic data supplied by Romme and Despain. Major fires in the years c. 1440, c. 1560, c. 1700, and AD 1988 were identified. However, between the years from c. 1220 to 1440[9] and the years from c. 1700[10] to 1987[11] there were multiple fires that covered smaller areas (Millspaugh and Whitlock 1995: 285-286). It is interesting that the second period, which is well within the era of European hegemony, has fewer of these small fires recorded in the charcoal data than the earlier period that pre-dates the 'discovery' of the Americas.

Mallard Lake in Yellowstone provides one of the charcoal sequences that illustrate these smaller fires in the prehistoric period discussed by Millspaugh and Whitlock (1995). In one hundred and twenty six years there were five fires in the catchment area for this lake in 1703, 1650, 1620, 1593, 1577. However, the authors of this report on the Yellowstone fires admit that "...the dendrochronologic record suggests that they (the fires) may have been more frequent than that" (Millspaugh and Whitlock 1995: 290). The percentage of burn in the catchment of the lake is provided for each fire (based on the charcoal in the sample core). Four of the five fires, the 1650 fire being the exception, were under 20% for catchment area of the study (indeed three of these four fires were in areas that comprised less than 5% of the catchment with the 1620 fire at 18%). The 1650 fire burned 75% of the catchment (Millspaugh and Whitlock 1995: Table 1: 285). The 1620 and 1650 fires, at these percentages of 18 and 75 respectively, indicate that the optimal variables for extensive burns came into juxtaposition at these times. These conditions would be **fuel** (as found in late successional situations), **season** (summer heat and wind patterns), **weather** (low rainfall but high percentage of thunder storms) and an **ignition source** (if not anthropogenic, then lightning). I think that any fire map produced for the

[9] the date for the first identified major 'prehistoric period' fire.
[10] the date for the last major 'prehistoric period' fire.
[11] the year before the first major 'historic period' fire.

Mallard Lake data would look somewhat like the fire maps for Narrow Hills and PANP, reproduced in this chapter from my field notes. These mosaic environments have a pattern that becomes recognisable with the developing familiarity of a landscape. They have a significant portion of their landscape in early stage regrowth. But interestingly, these regrowth areas have their own internal patchiness since they may have different, although close, years of origin or because of the nature of the predation on the plants in their earliest stage of regrowth. By the end of the first decade of the 18th Century "the place would have been overrun with elk" (and other edge browsers and early stage feeders). However, the next fire does not occur until 1879, some 176 years later. I offer four possible explanations for this rather protracted fire-free period:

- lightning did not strike, or if it did, it was accompanied by heavy rainfall;
- weather patterns for this period were cool and damp;
- the area was 'retarded' in its post-fire forest succession for some reason and old growth, and the concomitant fuel build-up, was delayed;
- anthropogenic fires had decreased after the first waves of diseases of Eurasian origin had swept forward ahead of European in-migration.

The data from Dryad Lake in Yellowstone is slightly different but not incompatible with the observations above. In 200 years there were four fires - 1544 (1%), 1600 (5%), 1712 (54%), 1744 (27%) - somewhat evenly spaced. There is then a period of 127 years (until 1871) without a fire recorded (Millspaugh and Whitlock 1995: Table 1: 285).

Whitlock and Millspaugh (1996), using lake cores from Yellowstone that contained charcoal from the 1988 Yellowstone fire, examined assumptions on patterns of charcoal accumulation, source area of charcoal, and timing of charcoal incorporation into the lake deposit following a fire. These issues are at the centre of the MacDonald, et al. (1991) and the Bennett, et al. (1990) arguments on source, extent, and time components to the charcoal samples they were examining. Whitlock and Millspaugh suggests several things that must be kept in mind when examining charcoal records:

- deep lakes with steep watersheds and minimum stream inflow/outflow provided better samples for local fire history;
- shallow lakes were more likely to have accumulations of charcoal in downwind locations from wind-driven water action;
- size of charcoal particle is not as critical as was once assumed;
- most of the charcoal was secondary (from burned slopes, water transportation) rather than primary airborne fallout;
- fire size, intensity, and proximity to a test site is difficult to sort from the data that comes from the fire and then from the post-fire conditions that add charcoal to the record. These post-fire mechanisms "...obscure the primary signal...and make it difficult to infer the original fire characteristics" (Whitlock and Millspaugh 1996: 14).

Combustion by-products

Taylor, et al. (1996) report on their studies of the Greenland ice sheet. The ice core GISP2 with a "...continual annually layered sampling of Holocene precipitation" was compared to modern source regions for ice core sites of DYE-2 and DYE-3 (Taylor , et al. 1996:1). They studied the differences between total ammonium concentration and the time-varying background of ammonium. They found that in the "...Holocene portion of the GISP2 core, abrupt, short-duration reductions in ECM are closely associated with alkaline ice caused by increased levels of ammonium from biomass burning" (Taylor, et al. 1996:2). In some years no biomass burning is seen while in other years there may be indications of several burning episodes in the ice record. Although biomass burning can be identified and the possible general location pin-pointed (eastern North America) they note that it is impossible "...to accurately determine the magnitude of individual fires" (Taylor, et al. 1996:3). However, they go on to indicate that "...it is possible to determine when biomass burning occurred. There are time periods when a greater-than-average number of episodes of biomass burning are preserved in the core" (Taylor, et al. 1996:3). The comparison of the biomass burning record from the ice core to fire histories based on charcoal studies for various areas of eastern Canada illustrate that there is an excellent correlation between the

GISP2 DATE (BP)	CHARCOAL DATE (BP)	GISP2	CHARCOAL	INTENSITY
0 - 150		YES	NO	HIGH
350 - 750		YES		HIGH
	390 - 750		YES	HIGH
1150 - 3250		YES		MODERATE
	~1200 - ~1800	YES	YES	MODERATE
	~1350 - ~1900	YES	YES	MODERATE
	2000 -3200	YES	NO	MODERATE
5000 - >6000		YES	NO	HIGH

Table 3.5: Correlation of ice core and charcoal indicators for biomass burning in eastern Canada over the last 6000 years based on data in Taylor, et al. (1996:3-5).

two forms of information but only for periods of large fire episodes. Episodes of high fire activity for the last 6000 years have been identified from the Greenland ice core. Some of these are found, as well, in the charcoal record of eastern Canada. This is outlined in Table 3.5, above.

The link between climate / weather conditions and biomass burning episodes is made (Taylor, et al. 1996:5) but in a very practical sense this is a major problem in interpretation. It is difficult to generalise "...about the effects of wildfire in boreal ecosystems; because weather largely dictates fire severity and recovery, fires are rarely alike" (Schaefer and Pruitt 1991:26). In all of this it becomes evident that the distinction of anthropogenic fires of what ever size will be near to impossible from the current data. The only hope rests in the region by region defining of local fire regimes and then sorting the episodes that appear to have too short periods between fire intervals. This data will need to be checked against the climate / weather records. When we move beyond viewing fires "...as a binary event: an area burned or it did not" (Alexander 1982: 355) we may have a pattern of burn emerge from the 'noise' and this pattern may illustrate the hand of the human.

Approach Two: pollen reports

Pollen reports for Canada published on the WWW (World Wide Web) were selected representing the provinces of Ontario, Manitoba, Saskatchewan, and Alberta as well as the North West Territories. The criteria for selection within these areas was based on latitude. This was done so that sites situated either on the northern (taiga) or southern (deciduous forest or prairie) ecotone areas of the boreal forest would be represented along with the forest dominated by needleleaf trees. They also represent a range of environments as some are from lakes while others are from ponds, bogs, or fens. The search for representative data resulted in seventy pollen reports that met the selection criteria. These are listed by their WWW addresses in the Endnotes[b] for this chapter.

Each report included the exact location (longitude, latitude, elevation), "reliable age bounds" (e.g. 0 - 6000 BP for the Clearwater Lake[12] sample). The basis for the assumption of reliability in the assigned ages was not indicated. No radiocarbon dates were included. A list of the top seventeen genera (e.g. *Alnus, Pinus*), or undifferentiated (e.g. "herbs undifferentiated"), or "other" categories (e.g. "other trees and shrubs", and "other herbs") was supplied. The figures supplied for these categories were in percentages of each in each unit. No raw counts were supplied so relative pollen density from unit to unit could not be discerned. The actual unit interval (depth / width or thickness) used for the analysis was designated. Some reports, like the one for Cummins Pond, indicated the use of analysis intervals of 5 or 10 centimetres while others like Clearwater Lake[13] used much more variable unit widths such as 10 centimetres for the very recent portion of the profile, to ranges between 10 centimetres to 80 centimetres for the remainder. However, in this latter case it seems, from the apparent random distribution of these unit variations, that there has been an attempt to use natural strata as the analysis unit designators, although I question why wider strata appear to be located, for the most part, deeper in the column in the section representative of distant times. In the Cummins Pond example the divisions seem to be strictly artificial units selected for easy partitioning of the column for the purposes of analysis. In such a case this, of course, means that units are probably mixed, resulting in a blurring or smoothing out of any abrupt or short term changes through time.

[12] <ftp://ftp.ngdc.noaa.gov/paleo/pollen/asciifiles/fossil/p15files/napd/clearwtr.p15

[13] <ftp· /ftp.ngdc.noaa.gov/paleo/pollen/asciifiles/fossil/p15files/napd/cumminsa.p15>

The 'trend' is represented at the cost of the possible recognition of any relatively abrupt alterations, the blips that mark past 'events' which end up masked.

Further, in the pollen reports, the time intervals used are a problem for the archaeologist who wants to focus on time spans that represent periods that could conceivably either be the lifetimes of individuals or brief periods in the life of a human society (see Figure 3.26). Archaeologists may be seeking 'events', in an historical sense (e.g. forest fires, open areas or stage one regrowths for a few years, etc.), while the rationale behind much of the collection and analysis of these pollen profiles is based not on the event but on the 'trend', in other words the broad picture over deep time, such as the Holocene. Examples of this can be seen in the Cummins Pond and Clearwater reports noted earlier, as well as the figures developed from five sites: two sites[14] from Ontario used in Figure 3.26 and the three sites[15] from Saskatchewan used in Figure 3.27. The Ontario sites are very near each other but come from different type of sites: lake and bog. The three Saskatchewan sites are all from lakes: the adjacent bodies of water of Lake A and Lake B, near Prince Albert, which are on the edge of the southern boreal in the ecotone to the prairie; and Cycloid Lake, near La Ronge, which is more northerly and fully in the boreal ecozone and situated on the Precambrian Shield of Canada. What is obvious is that whether near to each other in space or time, or site type makes no difference for the spotting of the glitch that definitively shows the direct action of humans on their environment.

The emphasis on 'trends' is not the 'fault' of anyone. It is merely a fact that there are two different sets of objectives and with the present collection methods the two objectives are mutually exclusive. The 'trend' perspective is, of course, of interest to the archaeologist since trends can push humans to adjust to changing conditions over time and certainly this is recognisable from the archaeological record. However, the 'moment' in time may offer us insights into daily life or the momentous moment, the moment of bifurcation, when the pattern and structure of a society is changed. However, intervals in the pollen reports reviewed for this section are such that hundreds of years are represented and as such the human is lost as a possible actor in any 'trends' that may be displayed.

[14] <ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/jocklake.p15>
<ftp://ftp ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/alderdal p15>

[15] <ftp://ftp.ngdc.noaa.gov paleol/pollen/asciifiles/fossil/p15files/napd/cycloid.p15>
<ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/lakea.p15>
<ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/lakeb.p15>

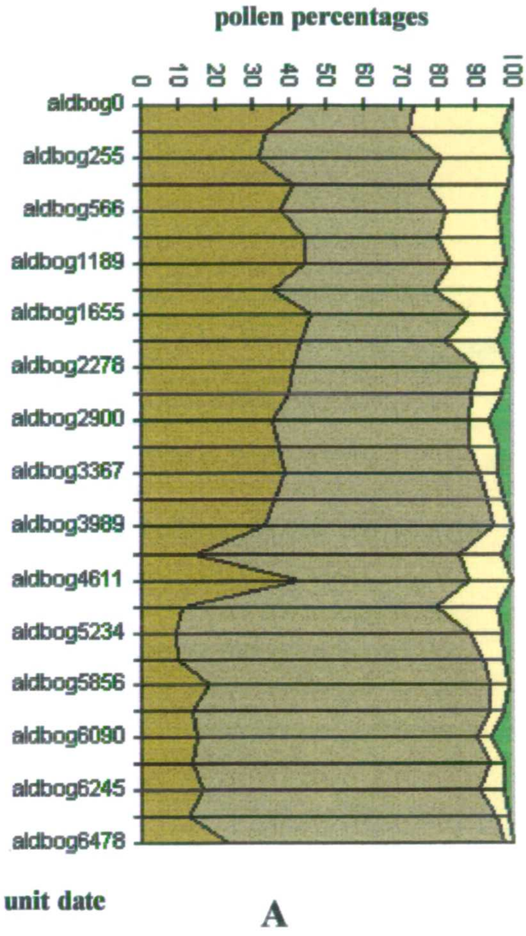
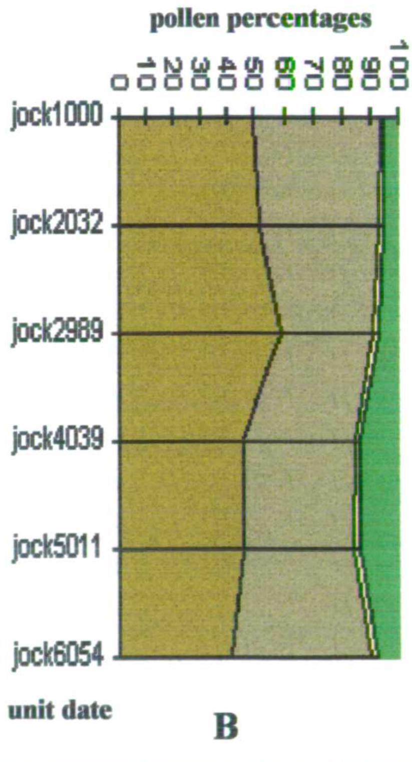


Figure 3.26: Two pollen diagrams each representing, from left to right, four categories of pollen (deciduous trees, conifer trees, herbs, and other) from two pollen core sites in Ontario: (A) Alder Bog, and (B). Jock Lake. Easily recognised are 'trends' but 'events' are, if they occurred, masked by the unit widths that represent time.



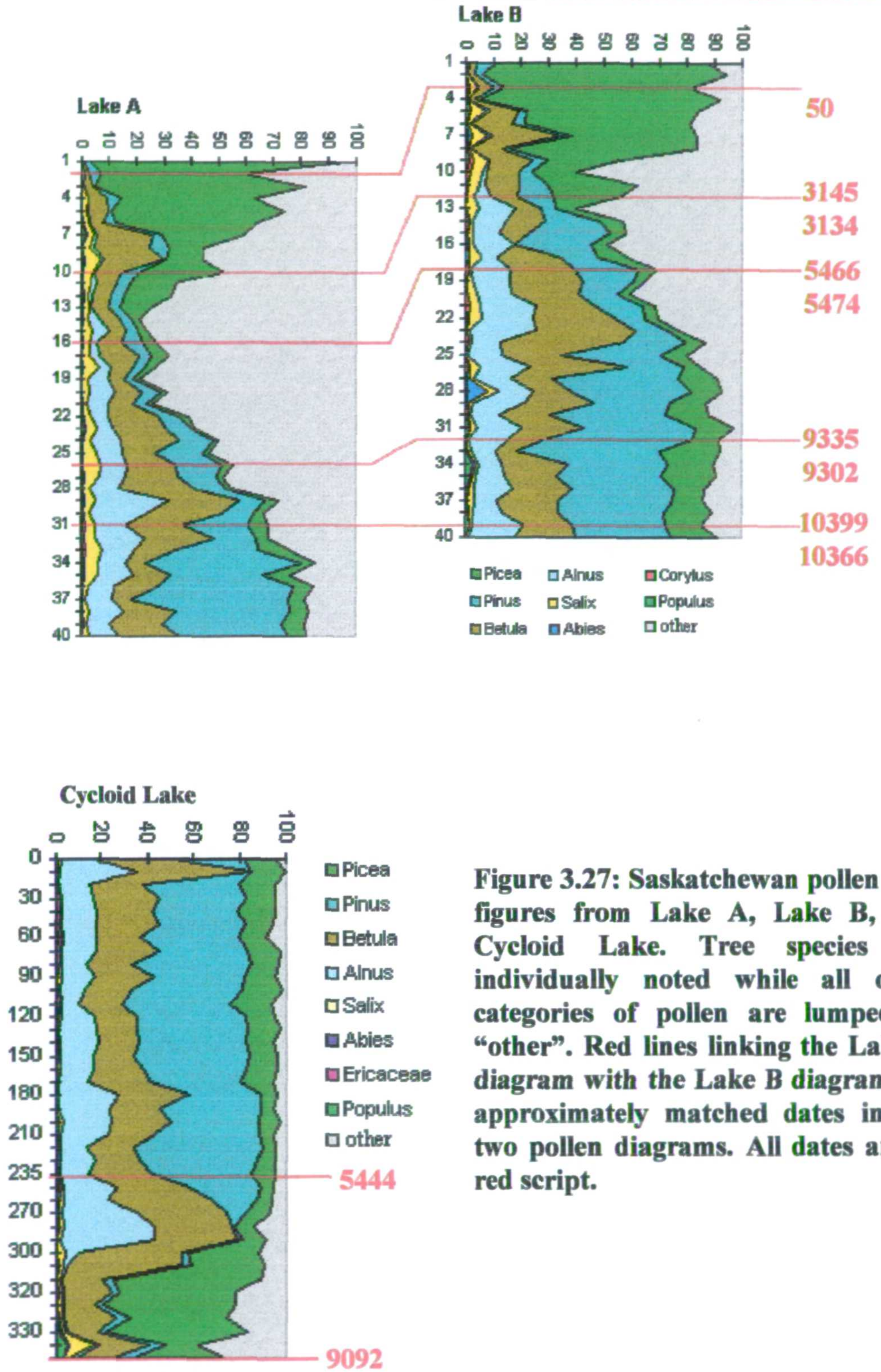


Figure 3.27: Saskatchewan pollen core figures from Lake A, Lake B, and Cycloid Lake. Tree species are individually noted while all other categories of pollen are lumped as "other". Red lines linking the Lake A diagram with the Lake B diagram are approximately matched dates in the two pollen diagrams. All dates are in red script.

There is the problem, beyond the fact, noted earlier, that we do not have the actual pollen counts, that some reports appear to be presenting percentages that show a lack of randomness. Two possible explanations can be suggested. Either the number of actual pollen grains in each sample was exceedingly low or the count was 'rounded' or manipulated in some way. The presentation of the actual pollen counts as well as the percentages would help in the interpretation of these scores by other researchers with or without other questions. Even if the time intervals were of a significant structure (closer together) for the archaeologist to pick out the 'event', there is still the problem of such actual scores themselves and what they mean in the context of the analysis of 'events', and indeed even of 'trends'.

This is not to say I believe pollen analysis to be useless for our purposes. Much to the contrary, I think that proper selection of sampling (Jacobson and Bradshaw 1981)and the firm delineation of the actual stratigraphy displayed in the pollen core, tied to firm dates, will yield the data we need to begin to understand specific areas and / or problems in greater detail. The main objective and rationale for the collection and analysis of pollen in northern North America was, and remains, the understanding of trends in the development of vegetation since the last glaciation. In recent years this data has been turned to the laudable service of understanding the threat of global warming[16]. 'Trend' analysis has given us insight into the colonisation by plants and the development of environments in the post-glacial period. These objectives can still be reached even with a suitable portion of the focus re-directed to questions about the interaction of humans through time in specific environments. Such studies can place the emphasis on the analysis of environmental shifts caused by both human and non-human actions (e.g. climate change). I think we will find that they are linked in surprisingly direct as well as subtle ways. Besides deepening our understanding of the past, such studies can enrich our understanding of modern environmental problems where direct human action and / or inaction appear to be altering significantly the global environment. The two forms of inquiry are merely two perspectives on the same set of problems. The only difference between them is the fractal dimension at which they are being observed.

[16] The most effective wake-up call came from James Lovelock with his Gaia Hypothesis (1979).

3.4: Forest composition

This section will summarise some observations from the Saskatchewan fieldwork on the ecozone / ecotone relationship, burn sequence, proportion of burn, regrowth stages and the ecosystem mosaic created by the successional sequence.

An important aspect of the development and maintenance of a rich and diverse biomass is the multiplicity of habitats in close proximity to each other. This may happen in a macro format with ecozones, for example the areas represented by primary colours in

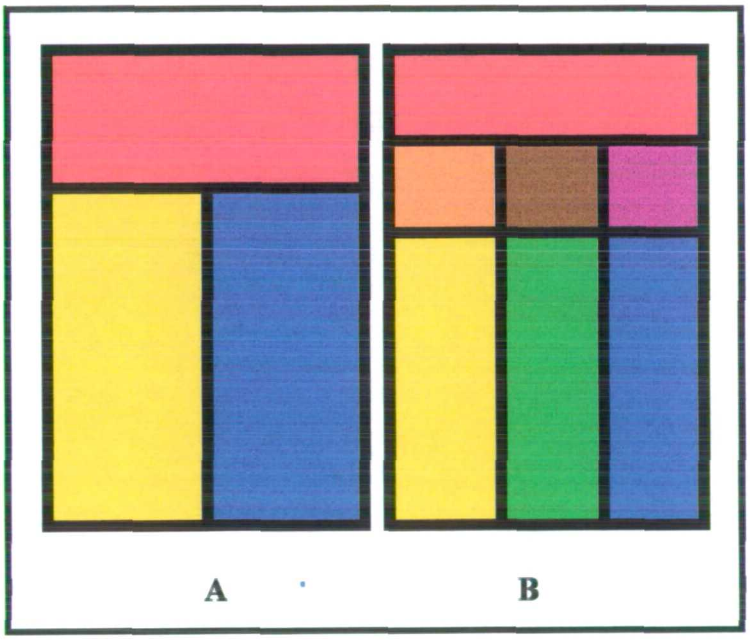


Figure 3.28: Simplified schematics of the patterning of ecozone to ecozone and ecozone to ecotone relationships in macro- or micro-systems. A: ecozones; B: ecozones with ecotones added.

Figure 3.28:A, which are in close proximity to each other creating the multiple ecotone effects, here represented in Figure 3.28:B, by the colours resulting from the blending of the primary colours of red, yellow, and blue. This results in the blending of the qualities of the ecozones where the environmental conditions of one are in transition to another, or others. The brown square in Figure 3.28:B has the qualities of all three of the "primary" zones. It is theoretically the most diverse (or rich) patch in the system. The orange, purple, and

green areas represent the transition areas between two "primary" zones, each. In a micro-system there is the development of an tight internal mosaic pattern. This is because its patchiness is accompanied by significant edge areas that emerge at the interface between or abutment of patches within the mosaic structure of the system. This is the same pattern found in the macro-system of ecozones and ecotones but merely at a different fractal dimension. These areas of interface between ecozones, or even micro-habitats, where sets of conditions overlap and provide 'edges', can support the biomass of both of the singular areas. Additionally, ecotone areas can exhibit internal ecozone-like qualities. Here, then, may be found species unique to the ecotone, not being found in any of the contributing ecozones. The ecotone, as a unique blend of habitat parameters, can become a refuge for species that require combinations of the parameters of the contributing ecozones but can not survive in the singularity of any of them[17]

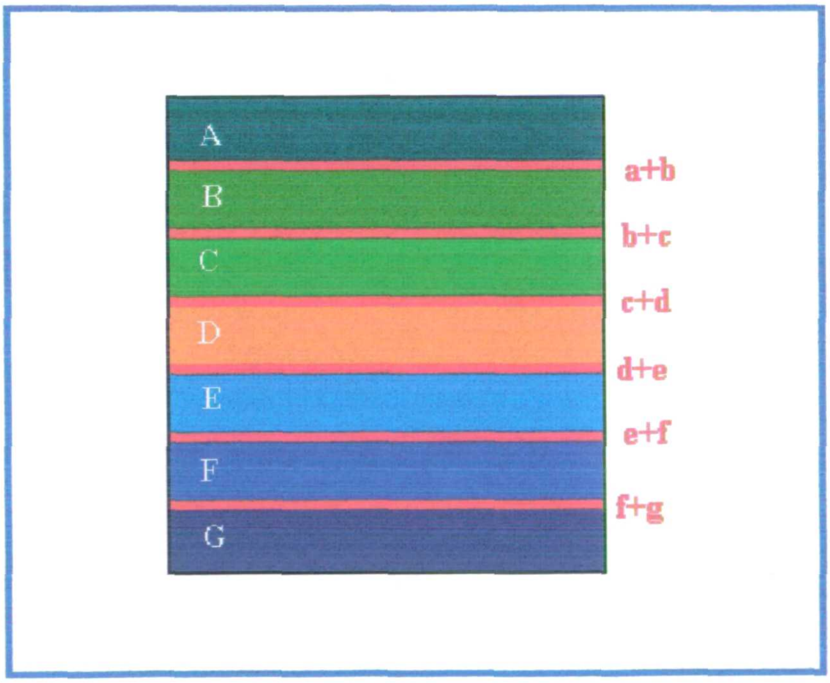


Figure 3.29 : Schematic example of an optimal location for human use created by the close juxtaposition of multiple ecozones or multiple patches within an ecozone and thus the development of extensive "edge" effect environments.

[17] An example of such an area would be the lower reaches of rivers such as the Columbia River in Washington State, USA or the Fraser River in British Columbia, Canada. These sections of such rivers have qualities of both the river and the ocean and thus fluctuating salinity values is a dominant parameter of such an ecotone. This ecotone is never as salty as the ocean but never as sweet as the fresh water of the river. In this area exists unique flora and fauna that prefer salty, but not too much so, over sweet.

Multiple mosaic interface areas may occur within very close proximity to each other. If such is the case then optimal locations for human settlement are found. The diagram above in Figure 3.29 is a simplified schematic of just such a situation. It could represent one of the shorelines of either the Wabinosh or the Rainy Rivers (except for the fact that the rapids, which would add additional dimensions of ecotoning, are not included in the schematic) or the shoreline of Lake Nipigon, Whitefish Lake, or Lac des Mille Lac, as discussed for Northwestern Ontario in Chapter Two. It is representative also of many of the water-to-land interfaces seen for streams and lakes in Narrow Hills and Prince Albert National Park, Saskatchewan. Not only will "A" (e.g. conifer forest), "B" (e.g shrub border), "C" (e.g grasses/sedges), "D" (e.g beach), "E" (e.g. the shallows), "F" (e.g intermediate depths), and "G" (e.g. for lakes the *profundo*) patches be available in and of themselves, but so too will be the ecotone areas of "A+B", "B+C", "C+D", "D+E", "E+F", and "F+G". Therefore, with the edge area effect seven specific patches become thirteen with the addition of the six 'edges'. The biomass density of such areas is increased significantly for this very reason. This interesting edge effect can be seen in great detail in Plate 3.15 showing the McDougal water meadow in Narrow Hills. Here the forest gives way to a shrub / herbaceous border, then there are grasses followed by sedges that become species that are increasingly water tolerant towards the centre of the water meadow. The centre of this meadow, as expected from viewing its vegetation, is pond-like in the spring or after very heavy rainfall and remains water logged below the surface at other times of the year, such as late summer. This sustained moisture benefits the surrounding vegetation during relatively dry spells. The basic fact of this moisture means that there is a diverse and abundant cover of vegetation maintained throughout the growing season. Therefore, the area is an attraction for and is well used from spring through fall by edge feeders, grazers, and browsers such as deer, hare, and moose, who come up from the nearby McDougal Creek. Winter browsing does not greatly affect the trees and shrubs since they are not under stress in the growing season. This meadow was burned in the Fishing Lakes Fire seen on the Narrow Hills map in Figure 3.4 and in the soil core in Figure 3.16.

The SSA-BOREAS images values / classes of ground cover area (m^2) for the infrared map, seen in Table 3.2 and shown in Figure 3.3, gives us data for the complete SSA for the year 1990. This allows us to develop a general overview of this environment structure as to age categories of vegetation, land to water relationships, and burn -

TYPE	m^2	%
Mixed	1938822	19
Regrowth 1	149492	1.5
Regrowth 2	315947	3.2
Regrowth 3	716549	7
Burn	41718	0.42
Deciduous	1085214	10.6
Conifer dry	87031	0.85
Conifer wet	5351030	52
fen	417206	4.1
disturbed	130461	1.3
TOTAL	10233470	99.97

Table 3.6: Class of ground cover, area in m^2, and percentage of ground cover for each class. Based on data from Table 3.2 and visually represented in Figure 3.3, the infrared map, for the SSA-BOREAS in Saskatchewan.

successional cycle. The figures from Table 3.2 are summarised in Table 3.6, directly above, using only land mass classes; the water area is not included in this specific calculation.

The year the BOREAS infrared image was taken was a relatively low (number) fire year, unlike the research year of 1995. In Figure 3.30 the proportion of the sequence in visible burn (4%) would be, by the next year, part of the RG1 class, making this 7% like the RG2 class. Subsequent visible burn percentages would be based on the area recently burned at the time of observation. The question that is unanswerable from these figures is whether RG2 and RG3 are relatively stable classes at 7% and 16%, respectively, or do they show great variation over the long-term? Further, what would be the mechanisms to cause fluctuation in this relationship? I think the answer to the problem of fluctuation would rest in the fire regimes themselves (fire frequency, interval, rotation, intensity, severity, size, type (Payette 1992:146-148)), whether natural or induced by humans, and the graze-browse patterns of the species that would use such a habitat (Pastor and Mladenoff 1992:232). However, "whatever the methods used in this type of paleoecological study, it is virtually impossible to determine all the elements of the fire regime..." (Payette 1992: 160-161). Of course models can be constructed for specific purposes and these will "...guide the selection of...(the) factors to include, and the level of abstraction and realism" (Solomon 1992:291). A level of "realism", perhaps founded in TEK, should be kept in mind since there are problems in looking to the modern, managed forests as analogues for the past. Certainly, in the modern context of 'fire fighting', the number, duration, extent, and intensity of fire as an agent of change in the forest has been truncated. It is only in the last few years that government agencies, such as Parks Canada, have come to question the policy of fighting fires in the forests of our National Parks. This most definitely was not under question with the people I interviewed in PANP in 1995. However, Parks Canada recently opened a Web site[18] which offers us a view to their changing ideology concerning "fire management" in the national forests[19]. *Fire in Canada's National Parks* openly discusses fire as a positive factor in the maintenance of a healthy, rich and diverse ecosystem.

The growth - regrowth patterns after a low to medium intensity burn are quite remarkable. As long as the fire occurs early enough in the season and sufficient moisture and elevated soil temperatures are available, then vegetation benefits from the fire-released nutrients and rebounds or re-establishes itself quite quickly. Of course this is never a problem in the 'conifer wet' class where vegetation can burn to the waterline and easily meet the regeneration condition of moisture and undamaged root stock. In drier locations herbaceous plants, shrubs, and trees that re-sprout from roots or stems and those plants that need fire for their seeds to germinate take their fire-provided opportunity. On the severely burned sites there will be the sprouting of seeds from more extra-site locations (introduced by wind, and animal transport) rather than vegetative shoots; these seedlings will dominate the regrowth biomass in this case. The important point about this vegetation is that "[T]he bulk of the boreal flora is made up of robust, generalist species able to withstand recurrent, dramatic changes..." (Payette 1992:145). Therefore, counter to our image of the primeval green, the boreal forest environment could not be comprised of such adaptive species had it been one that maintained steady-state equilibrium for long periods of time (MacCleery 1994:3).

The regrowth, regardless of its species (seedlings and / or herbaceous regrowth) composition, provides abundant graze and browse for herbivores of all sizes. From vegetative regeneration this could occur within a very short period of time, under the right conditions - possibly no more than ten days to three weeks. The plates for the 1995 fire season, included earlier in this chapter, provide examples of the fire / regrowth cycle. The Narrow Hills fire, extinguished two weeks before the pictures were taken, can be seen in

[18] <http.//parkscanada.pch.gc.ca/library/fire/firee.htm>

[19] I think this change in perspective has been generated, in part, by the data emerging from the study of the recent (eleven year) post -fire history of Yellowstone National Park, USA.

Plates 3.22 through 3.27. This fire was of moderate intensity although it covered a significant area, as can be seen in the Narrow Hills map in Figure 3.4. The Westside Road (PANP) Plate 3.31 shows Bison feeding in the regrowth of August, 1995 after a spring fire in the same year of low to moderate intensity. The tops of the trees were singed but still provided a sparse leaf cover and were expected to achieve a full leaf cover the next year. In the meantime, the plants on the forest floor had a season of slightly filtered sunlight to establish / re-establish themselves.

The chart in Figure 3.31 is calculated from the SSA-BOREAS data using the BOREAS classes of ground cover that are equivalent to the categories of preferred habitats used in Table 2.8. The comparison of Figure 3.31 to Figure 3.30 makes it clear that the addition of the "wet" portion of the ecosystem (C{onifer} wet, fen (and bog), H_2O (rivers, creeks, lakes, ponds, etc.) in the calculations for the chart in Figure 3.31 brings this chart more in line with the habitats calculated for the mammals identified from the bones in the archaeological sites discussed in Chapter Two.

Like the burn sequences for Mallard and Dryad Lakes in Yellowstone National Park, USA (Millspaugh and Whitlock 1995), discussed earlier in this chapter, those from Narrow Hills Provincial Park and Prince Albert National Park, Canada, seen in Figures 3.4, 3.9, and 3.10, offer us some slight insight into fire regimes and fire intervals.

The Narrow Hills Provincial Park has been burned over completely in the last twenty years with the few exceptions of small 'islands' of older tress that survived the flames. For the most part these fires have burned forests that were from thirty to fifty years in age and, in some instances of fire overlap, parts of the forest burned were considerably younger than this. These were not old growth forests but rather forests with relatively low fuel build-up in the second to third stage (RG2 - RG3) of the successional sequence. If Payette (1992:159-160) is right about the pattern of fire cycles during the last six hundred years, then the fire interval seen recently in Narrow Hills, is more like that found in the 15th and 16th Centuries with its estimated 44 year cycle. This is different from the 18th and 19th Centuries where the intervals are thought to have doubled to approximately an 80 to 95 year cycle. For the shift in cycle length there could be a cultural explanation as well as the climatological one offered by Payette (1992:160). European cultural ideas about the economic use of forests could have started to make some impact on the indigenous worldview. The boreal forest as the world of animals became, instead, increasingly the world of 'trees', the identified important resource for 'development' of everything from

Plate 3.41: Beaver lodge on lake in midst of the 1995 Narrow Hills forest fire region to the west of Route 106, Summer 1995. Note the survival of aspen stands along the edge of the water backed by trees dried by the heat of the fire but unburned then behind this trees completely charred. Trees in the immediate foreground are charred. Catalogue number 1SKs23.

Plate 3.42: Large aspen tree taken down by *Castor canadensis* (American Beaver) - circumference 110 centimetres. One of the numerous (three are shown in these plates - see also Plates 3.43 and 3.44) examples observed of this process in the 1995 field season. Restricted area, west side PANP, Saskatchewan. Catalogue number 19SKs451.

Plates 3.43 and 3.44:
Large aspen newly felled by *Castor canadensis* (American Beaver) - circumference 105 centimetres and examples of smaller trees either felled or in the process of being felled. Two of the numerous (three are shown in these plates - see also Plate 3.42) examples observed of this process in the 1995 field season. Restricted area, west side PANP, Saskatchewan.
Catalogue numbers 19SKs450 and 18SKs438.

Plate 3.45: The large felled aspen can be seen in the upper right hand corner of this plate (same tree as seen in Plate 3.43). From it is the first section of the drag path and canal used by *Castor canadensis* (American Beaver) to move the dismantled tree to the water. The path is smoothed mud covered in the upper sections with wood chips. The next two sections can be seen in Plates 3.46 and 3.47. The 1995 field season, restricted area, west side PANP, Saskatchewan.
Catalogue number 19SKs454.

Plate 3.46: The middle section of the drag path and canal used by *Castor canadensis* (American Beaver) to move the dismantled tree to the ponding area. In this section the path is replaced by a canal that widens as it proceeds to the open water. The sides of the canal show indications of paw prints where the mud has been excavated out of the canal and patted into place along the sides. The upper and lower sections of the drag path - canal system can be seen in Plates 3.45 and 3.47. The 1995 field season, restricted area, west side PANP, Saskatchewan.
Catalogue number 19SKs453.

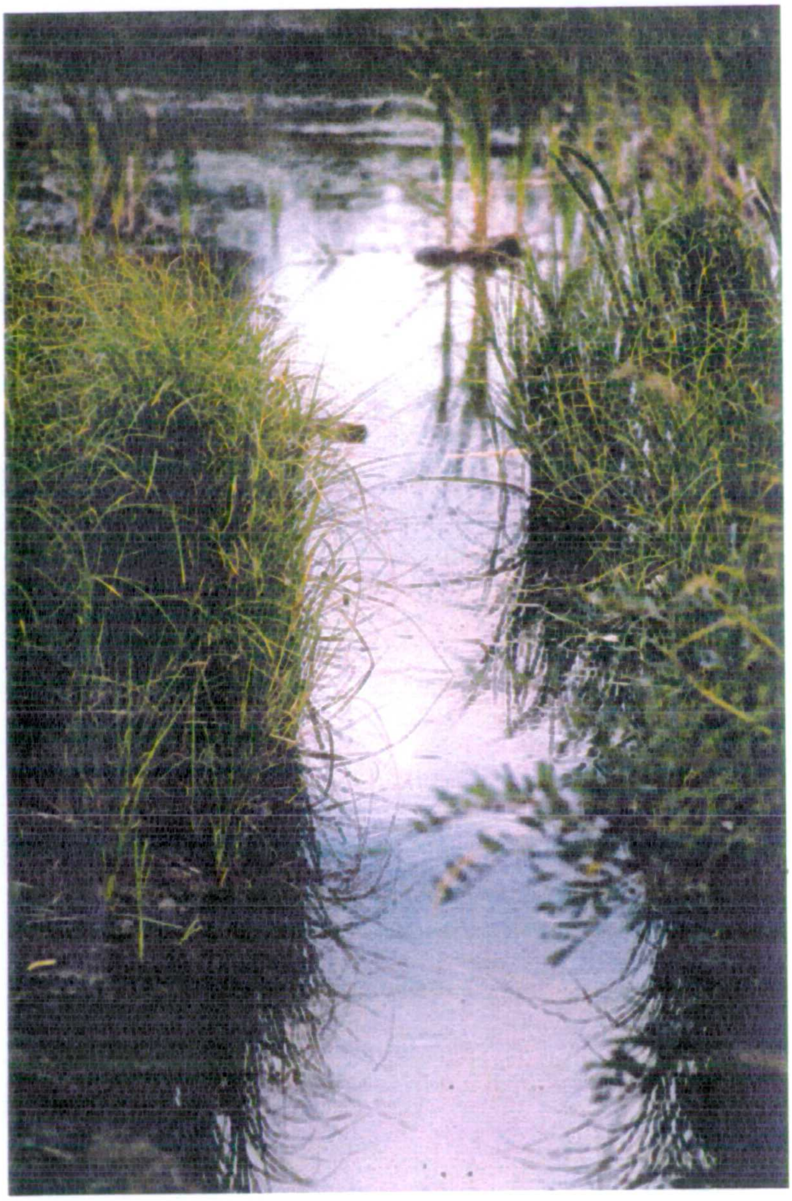


Plate 3.47: The lower section of the drag path and canal used by *Castor canadensis* (American Beaver) to move the dismantled tree to the ponding area. In this section the path and middle section is replaced by a wide canal that proceeds directly into open water. In this section the canal was 70 to 80 centimetres wide while at the mouth it was estimated to exceeded a meter in width. The sides of the canal show indications of paw prints where the mud has been excavated out of the canal and patted into place along the sides. The upper and middle sections of the drag path - canal system can be seen in Plates 3.45 and 3.46. The 1995 field season, restricted area, west side PANP, Saskatchewan.
Catalogue number 19SKs455.

Plates 3.48 and 3.49:
Two views of dams built by *Castor canadensis* (the American Beaver) to stop the flow of water downstream and thus develop a ponding area of deep water upstream. Plate 3.48, above, shows a dam in cross section, it having been broken by humans to relieve upstream flooding. The lower image, Plate 3.49, is of an active dam in the process of beaver 'upkeep' as seen by the addition of new tree branches and a small tree trunk. The trunk in the foreground is now in the wood collection at the IOA, UCL.
Near Weyakwin and in Narrow Hills Provincial Park, Saskatchewan, 1995.
Catalogue numbers 23SKp553, 10SKs237.

Plates 3.50, 3.51 and 3.52:
Views above and below a dam built by *Castor canadensis* (American Beaver). Upstream is the pond surrounded by extensive areas of marsh and water meadows extending over a kilometre either side of the back of the pond, in the background of the image. Down stream is created a bog area from an area previously flooded. Fairy Glen Road, Narrow Hills, Saskatchewan, 1995.
Catalogue numbers 10SKs237, 10SKs233, and 10SKs234.

Plates 3.53, 3.54 and 3.55:
Below a dam built by *Castor canadensis* (American Beaver). The water meadow effect is wetter or drier contingent on dam over-flowing (controlled by rainfall in watershed). These areas are significant edge areas for the larger herbivores. NH Saskatchewan, 1995. Catalogue numbers 8SKp184, 8SKp183, and 8SKp182.

Plate 3.56: Lodge built by *Castor canadensis* (American Beaver) in an open water area. Narrow Hills, Saskatchewan, 1995. Catalogue number 14SKs317.

Plate 3.57: Lodge built by *Castor canadensis* (American Beaver) in a newly flooded area with overgrowth. If the area remains flooded the area will become increasingly open as the shrubs and trees die. Narrow Hills, Saskatchewan, 1995. Catalogue number 14SKs327.

Plate 3.58: Abandoned beaver lodge in overgrowth. Water meadow in the background suggests that the area dried for a period then was recolonised and flooded once more since the abandonment that created this tree topped lodge. PANP, West side Road. Summer 1995. Catalogue number 19SKs463.

Plate 3.59: Near Weyakwin. Summer 1995. Although the dam recently had been broken to release water, the beaver were actively working on rebuilding and had brought the water level up in the few days this lodge was observed Catalogue number 23SKp553.

Plate 3.60: Old beaver ponding area with two abandoned lodges, the one in the foreground overgrown. PANP, West side Road. Summer 1995. Catalogue number 19SKs448.

Plate 3.61: Beaver lodge, in overgrowth. PANP, Westside Road. Summer 1995. Catalogue number 19SKp449.

Plate 3.62: Dried out old beaver ponding area with an overgrown abandoned lodge. PANP, West side Road. Summer 1995. Catalogue number 19SKs462.

Plate 3.63: Long abandoned, disintegrating beaver lodge in, now dead, tree overgrowth. Water meadow was dry in August and appears to have been quite dry for a period of time. However, the vegetation illustrates that the area is wet in the spring. This vegetation and the spring moisture may be the reasons that trees have yet to encroach. PANP, Crean Lake area. Summer 1995. Catalogue number 17SKs405.

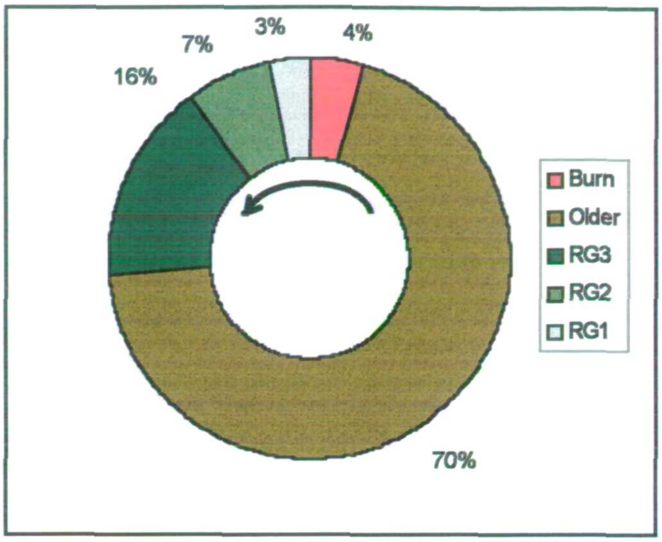


Figure 3.30:
Successional sequence, initiated by a fire, with early regrowth in three stages followed by the 'mature' older forest then back to the next burn, and so on. Based on the data for SSA-BOREAS 1990 in Tables 3.2 and 3.6.

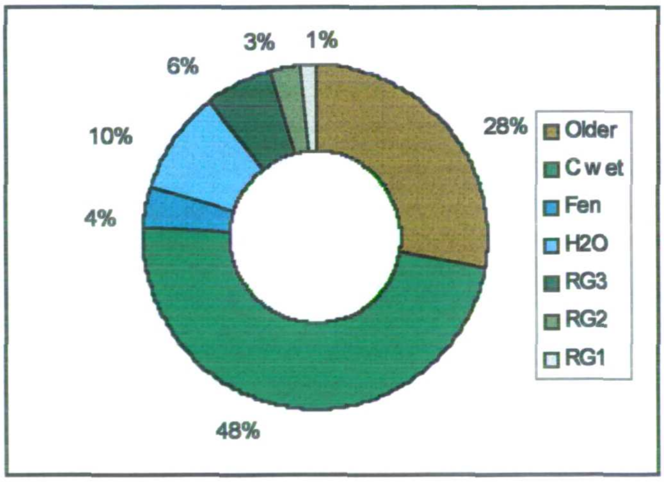


Figure 3.31:
Potential boreal forest habitat useful for traditional food economy activities. Included are the data on the water portion of the environment missing from the calculations used in Figure 3.30. Developed from selected data for SSA-BOREAS 1990 in Table 3.2.

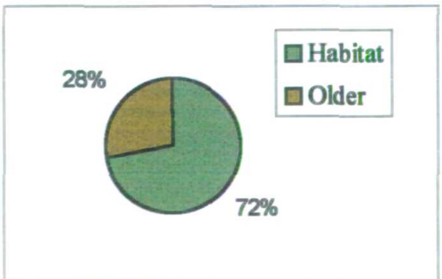


Figure 3.32:
Summary of habitat to older forest from data used in Figure 3.31. Older forest, which are less productive, comprise 28% to the 72% 'habitat' with the denser biomass.

communications (paper / newsprint) to transportation (railway ties) and housing for a growing population. I think it is possible the fire cycle in the 18th and 19th Centuries was, in part, the result of a shift in economic objectives for native peoples in trade relationships with European enterprises such as the Hudson Bay Company (Bishop 1981; Morantz 1980; Snow 1981). The fire regime reverted to the earlier short cycle but only when the park became increasingly recreational in focus. The fires over the last twenty plus years in Narrow Hills have been attributed to human, except for the 1995 fire that is thought to have been started by lightning. Could the 15th and 16th Century fires of shorter cycle be of human origin as well? The question, of course, is fully rhetorical since we have no way of knowing directly that this was the case. Edge areas abound in the present Narrow Hills ecosystem. I think we can safely assume that this system of edge area (ecotoning) created by the mosaic initiated and maintained by relatively close fire cycles in patchy patterns, pertained in the earlier period of shorter cycles as well. In such an environment Beaver and other early successional grazers and browses abound. In the present Narrow Hills system Beaver are considered by the park authorities a pest species, little more than vermin, and they are hunted out of season with studied discrimination - indeed to the point of temporary elimination[20] in some lake systems. None the less, traplines, generally, have the potential to be very productive in the park as a direct result of the early successional stages. This is demonstrated in the trapline figures from the fur association reported on in Table 3.4 and more specifically in the figures supplied by Darlene Newton discussed earlier. This observation on productivity is made remembering that figures for *Lepus* sp. were not kept by the trappers of Narrow Hills. If we can consider Mrs. Newton's general statements on the abundance of these animals and look to the squirrel figures as somewhat analogous, we can see that the productivity is significantly more than the actual figures would indicate.

[20] The ability of Beaver to re-colonise a water habitat is the theme of a report by Hartman (1996). Although the study was done in Sweden, it offers us, generally, an insight into the process and the possible patterns of beaver re-colonisation. More specifically, from this article we can reach a better understanding of what occurred in Northwestern Ontario after the beaver were reintroduced earlier in this century.

YEAR	CREAN BURN%	LOFT BURN%
1760	2.5	~
1772	2	~
1802	1.6	~
1807	<1	~
1822	1	~
1829	1.6	~
1836	<1	~
1842	<1	~
1843	<1	3
1870	1.9	9
1885	3.3	~
1886	1.2	2.63
1890	80	<1
1902	20	~
1906	<1	~
1911	35	~
1915	1	~
1919	~	1.5
1924	1	<1
1928	<1	~
1929	~	<1
1931	~	<1
1935	~	<1
1940	~	1.5
1941	~	<1
1942	~	<1
1946	~	3
1948	~	3
1952	~	45
1967	~	<1

Table 3.7: Fire years and estimated percent of burn for those years for the Crean Lake and Lofthouse (Westside Road) areas of Prince Albert National Park, Saskatchewan. (SSA-BOREAS). Based on Figures 3.9 and 3.10, maps from the notes on fieldwork in the summer of 1995.

The Crean Lake area, seen in Figure 3.9, is comprised of 62.5% land surface to 37.5% water. The fen, bog, and marsh portions of the landscape are included in the calculations, made from this field map, for land surface. The percentage figures for wet to dry actually are 60 / 40 when these figures are re-calculated using the classes in the infrared image. For the Lofthouse area, seen in Figure 3.10, the ratio of dry land to wet land is approximately 1:1. The landscape found on the west side of PANP is dominated by neither large lakes nor by rivers as is the case with the Crean landscape. Rather, in the Lofthouse area are streams, creeks, ponds, and small lakes as well as extensive areas of wetlands where Beaver have been at work. The action of Beaver on the landscape is more directly evident in the western area of PANP than in the Crean Lake example, as will be obvious from the plates accompanying the next section of this chapter. On the higher elevations along the Westside Road of PANP can be seen substantial stands of aspen. These are the deciduous trees along the edge of the southern boreal. Here the forest becomes the ecotone area to the open prairies that are some one hundred kilometres to the south. Not surprisingly this is the area where Bison are found.

Table 3.7, above, summarises the fire years for the Crean Lake and Lofthouse areas of Prince Albert National Park. From these figures several observations follow.

The 1890 Crean Lake fire burned circa 80% of the land area displayed in the map. The remaining 20% were 'islands' of regrowth from earlier fires such as the 1836, and 1843 fires. In 1890 these islands were 54 and 47 years, respectively, recovered from their last burns. The growth in these remaining portions would have been stage two in development. This pattern of overburn was repeated in the 1902 and 1911 fires which overburned areas from the 1890 fire. The post-1890 trees would have been in first stage regrowth. The park increasingly became recreational in focus subsequent to this time. The policy of fire suppression was developed, implemented, and then, by the 1940s, fully enforced by what is now called Parks Canada. This has remained the case regardless of Parks Canada's recent policy review and critique of fire suppression as sound forest management practice (see footnote 16, above).

The Lofthouse fires had a mean fire interval of 7.7 years before 1919. However, after this date this mean decreased to 4.3 years. What needs to be noted in this case is that many of these fires did not overburn as seen in the Crean Lake example. They were generally smaller in their extent; only one fire exceeded 40% of the area while seven fires covered less than 10% of the area. This means that the Lofthouse area appears to be rather more 'patchy' than the Crean Lake area. Certainly this impression is fostered by the infrared image where, on the macro-level, the size of the patches are evident. Moreover, the transects on the ground reinforced this view. Here we could see the internal micro-level diversity within the patches themselves - the patches within the patches in effect, and again the Lofthouse area was richer in its overall diversity. In part, this difference in patchiness between the two areas is the result of the very great differences in the patterns of their hydrology, as discussed above. Although the Crean Lake area has a higher percentage of water to land, the Lofthouse area has more fen and small bodies of water so favoured by Beaver. Further, since the Lofthouse area was removed from use by the general public, the park officials allowed smaller burns to self-extinguish. This then is the combination needed for maximum patch development in the boreal forest: small fires, fairly close together in time and space (thus low fuel load and low fire intensity) in areas where water resources are such that Beaver can colonise or re-colonise. The Lofthouse area shows <u>all</u> stages of landscape alteration from Beaver action, as do parts of Narrow Hills. To see examples of this I refer you to the Plates 3.41 - 3.63. When wetlands are produced, diverse hydrophytic vegetation comes to dominate. The wet adapted plant communities will vary depending on whether they are growing in bogs (wet, acidic peat strata is the growth surface), fens (more alkaline conditions on a wet peat) (Elliott-Fisk 1988:45) or marshland areas, or if they are found on the margins of streams, lakes or ponds. Regardless of, they will not be replaced by upland species unless the areas are drained and even then their plant communities will remain, for a great part, site specific. This is due, in part, to the acidity (pH) of the original wetland soils. As Elliott-Fisk noted for wetlands, "Many of them are apparently long-lived, whereas others are ephemeral in sites that are frequently disturbed" (1988:46). They may be areas of long-standing refuge in times of fire (Plate 3.27) in the surrounding upland species or they may be maintained only through the fate of a strategic beaver dam (Plate 3.62).

Rowe (1961; 1972; also briefly noted in Rowe, et al. 1975) was quite correct in his general observations on the nature of the boreal forest. They are fire adapted, disturbance forests maintained in stages one through three regrowth by frequent fires. If we adopt this view then old growth is not the norm but merely an aberration caused by missing the latest rejuvenating fire. In this model of northern forest renewal; the phoenix could well be the modern metaphor[21]. The agency of humans in this is the only matter for debate[22]. I like to keep in mind the fact that as the boreal forest plant and animal species colonised the opening landscape of the northern portion of the northern hemisphere after the last glacial

[21] I think of various bird symbols such as Thunderbird (The Americas), Firebird (Eurasian), Eagle (general), and Raven who became black because he stole fire to give us light (North American and Greek).
[22] We recognise this in our classification of fire incidents today: wild fire [lightning]; accident[camp fire that escapes]; arson; carelessness [discarded cigarette butt]; etc.

episode, a culture bearing species was not only in their midst but part of the process. These humans came toting fire, fire they used as a tool, and they came with a mind that could be turned to purposeful intent. I think these modern forests are fire adapted, at least in part, because of a complex interaction between them and the humans who lived in them for the last ten thousand years or so.

3.5: Beaver habitats and colonisation - recolonisation patterns

Beaver activity shapes and moulds the environment in more evident ways than the subtle effects of Hare activity (Plates 3.41-3.63) (Naiman, et al. 1986; Beier and Barrett 1987). Never the less, both seem to be important actors in the shaping of the economic landscape of the hunter. The economic benefit is at once both subtle and profoundly obvious. The density of browsers and edge feeding mammals and the abundant bird populations are the most obvious result of early successional regrowth patterns. However, the pattern can only be maintained if the rejuvenation of the resources needed by these species is accomplished in some fashion[23]. The process may not be obvious to the casual observer; but being less obvious does not mean that it is also less important to early successional feeders and their success. It is here that the inherent subtlety of the system comes into play.

Further, beaver by their presence and then lack of presence cause to be created certain features in the environment. These features are hummock like and found in late stages in meadow like settings or in regrowth areas (Plates 3.62 and 3.63). These hummocks are the remains of beaver lodge structures. The abandonment of pond areas, the breaking or release of the dams to drain areas causes subsequent drying and the eventual overgrowth of the lodges (Plates 3.58, 3.59, 3.60, and 3.61). Such overgrowth begins quite soon after abandonment. These features may offer us indications of beaver resources in the past as they could be dated from their wood contents and perhaps associated with certain catchments. Further, their bio-degradation could cause features that mimic structures of other origin (wooden constructions, irrigation canal features). This needs detailed investigation. I think subsequent research in this area may be of significance in the interpretation of late Palaeolithic and Mesolithic sites in Europe.

[23] The work of Meeker, Elias and Heim (1993) gives extensive lists of plants and trees in various habitats. Of particular interest are the habitat categories AB (Aspen Birch), AQ (Aquatic), SB (Sphagnum Bog), SM (Sedge Meadow).

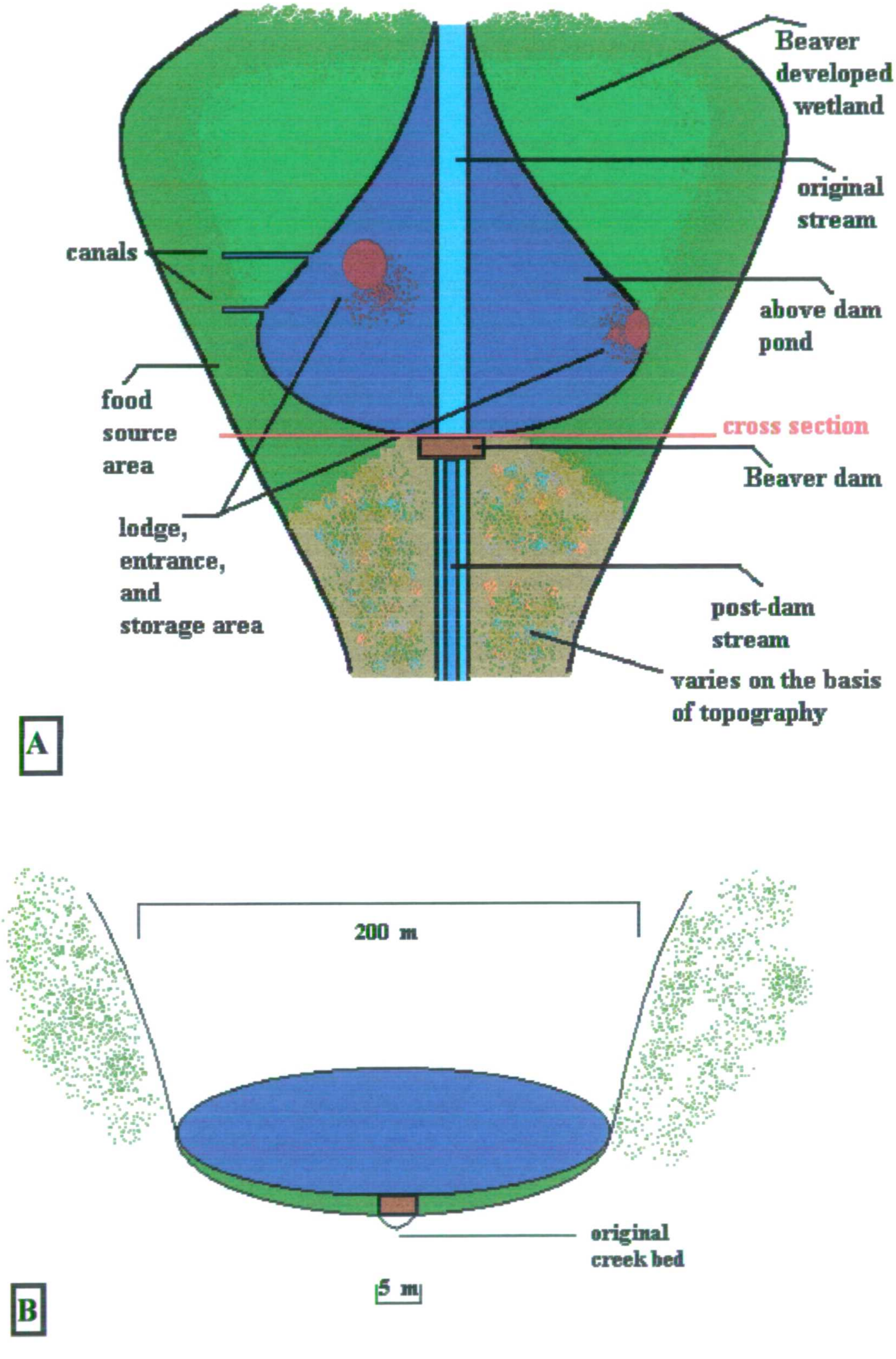


Figure 3.33: A. Schematic of Beaver dam location and upstream environment based on observations in the Narrow Hills region of Saskatchewan, Summer 1995. Typical of locations with some elevation and constriction in location where dam is built. B. Cross-section with elevations.

Beaver have some rather specific habitat requirements. Water depth is important, not only to prevent disease as mentioned earlier, but to secure food in storage areas and to keep the entrances of lodges below the water surface (Hartman 1996:323). This prevents some predators from gaining entrance. Watershed size, gradient, drainage, soil class (they prefer softer soils), deciduous trees, grasses and sedges, as well as nearby abandoned fields are also important (Hartman 1996:320; Howard and Larson 1985:22). Of these Beier and Barrett (1987) consider gradient most important and observe:

> Low stream gradients are probably important because they allow beavers to greatly increase their safe foraging area by dam-building, because steep topography hinders the establishment of a food transportation system and because flood damage to dams and food caches is more likely on higher gradient streams (1987:797).

A mix of trees and grasses suit their feeding patterns. They live in a fission/fusion seasonal pattern with summer dispersal (deciduous plant diet) and winter family life (stored woody vegetation diet). Habitat selection is dictated also by territoriality with new optimal locations occupied first by family members spreading out form their core area. Out migrating 'foreign' Beaver, usually young males, will have to settle in marginal habitats.[24] Optimal habitats consist of about 2 km of shoreline (Hartman 1996:319). This figure is not incompatible with the distribution of lodges recorded by Darlene Newton. Beaver in optimal habitats can maintain lodge and territory stability over decades. Howard and Larson's (1985) study of 19 lodges between 1952 and 1980 showed 12 lodges occupied for the whole of the twenty eight years, 5 lodges for over ten years, and 2 lodges for eight and nine years respectively. The lodges built in less than optimal locations after 1971 were occupied for only 1 to 2 years (Howard and Larson 1985:24). Abandonment of sites usually occurs in locations with marginal resources rather than at optimal locations where material resources have been depleted (Beier and Barrett 1987:798).Beaver moving into completly new drainage systems or recolonising depleted drainage systems are capable of saturating the drainages very quickly. In the Beier and Barrett (1987:794) study of the Truckee River basin in California it was found that the complete watershed back into Nevada was saturated within 40 years of re-introduction.

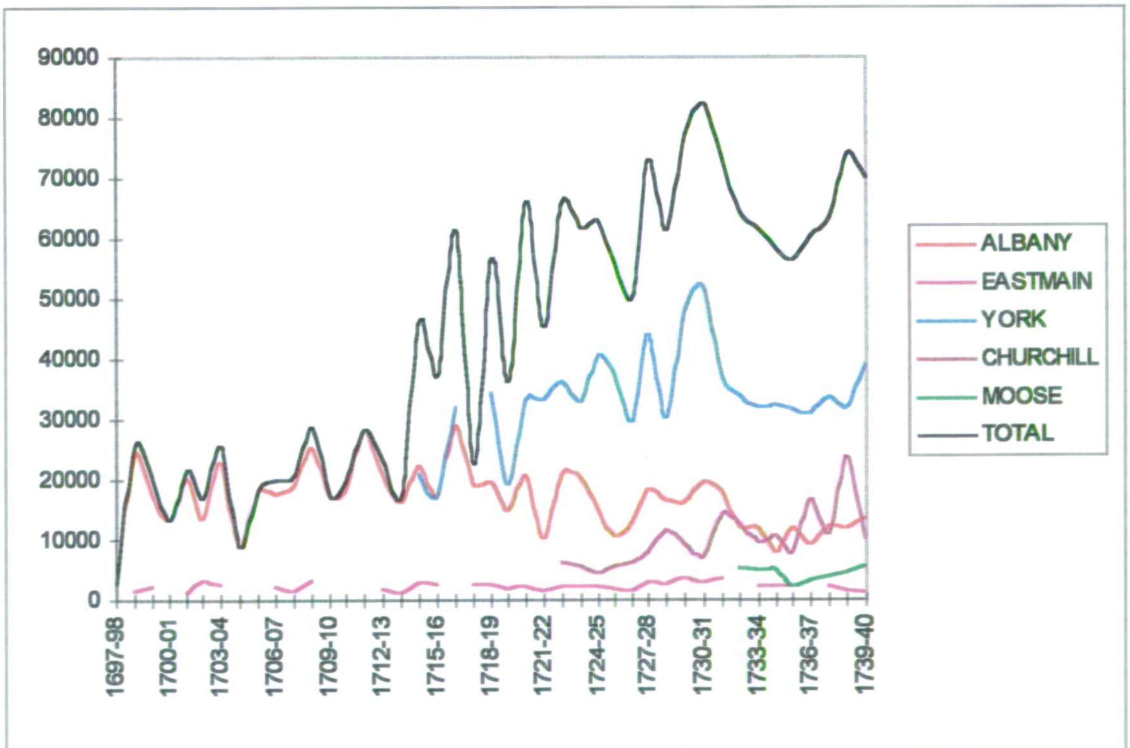
Any disruption to their system is dealt with promptly. Broken dams will be repaired in the matter of hours (overnight) to a few short days or a new dam will be constructed

[24] The fission / fusion patter is a mirror image of the human fission /fusion pattern by season discussed in Chapter One. As well the social pattern is similar to that found with the Algonquian hunting society. Related men are in lifelong associations and work together in their economic activities, although non -related hunting alliances also can be formed on occasion (Morantz 1983).

nearby in seven or eight days. In this latter case they will reuse wood and loose mud from the damaged dam (Plates 3.48 and 3.49). Usually it is built slightly downstream to take advantage of the current to float into place the wood being reused. This use of the stream direction and flow rate seems quite remarkable until one observes the actual canal systems (see Plates 3.45, 3.46, and 3.47) devised by them to facilitate the transport of food and building materials. Beaver prefer late stage streams; young rivers acquire a "false senility" from the landscape shaping of Beavers (Hartman 1996:324; Howard and Larson 1985:22). The importance of Beaver in human economic systems will be explored in the next chapter as part of the model developed in the synthesis.

The Hudson Bay Company's (HBC) Fort Albany, on James Bay at the mouth of the Albany River, was part of the historic trade / transportation system discussed in Chapter Two for the Ombabika Site (EaJa-1). This site, on the bay and river of the same name, is in the northeast quadrant of Lake Nipigon (see Figure 2.13 and the discussion on page 107).

Figure 3.34: HBC forts on James and Hudson Bays. 'Made beaver' figures.



Of course Nipigon and its environs were and are considered part of this Fort Albany's hinterland by the HBC. Ray (1974) makes this point clear in his discussion of the fur trade.

The graph illustrating the returns for five of the HBC forts shows that the company increased its acquisition of furs only by opening new trading locations. Four of the five forts show an initial growth in their production only to have this production start to decline as the years progressed. The economic strategy of the HBC was not to foster sustainable production but to open more forts and trade into more extensive territories. Interestingly this has been the pattern in forest harvesting until quite recently.

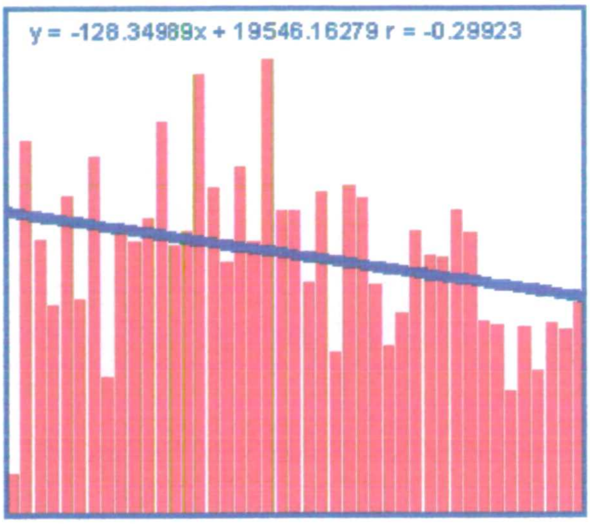


Figure 3.35: Linear regression of data on 'made beaver' at the Albany fort between 1697 and 1740.

A linear regression on the 'made beaver' pelts[25] from the figures for the years 1697-1698 to 1739-1740 for Fort Albany was done (Figure 3.35, above). It illustrates that the problem of environmental collapse was evident in the figures for this fort nearly a century before the reports of starvation in Northwestern Ontario in the 1820s (see Chapter One). Even though the graph gives the overall visual impression of increasing returns, the trend for individual forts is downward. The projection of the Albany trendline forward in time would put the collapse around the time discussed in Chapter One (1820s). These problems in subsistence increased in the 19th Century and continued into the 20th Century. This came to be called the "fish and hare period" by Rogers and Black (1976) (also note the late 18th Century law on predator elimination discussed in Chapter One).

The interlinking of the lives of the hunter and the hunted reverberate through these figures from the Hudson Bay Company. It is through these types of historic data linked to modern information that we can gain insight into the structure of the prehistoric predator-prey relationships that are patterned through the concepts of culture. Some interesting observations on beaver populations and their relationship to hunting territories and human

[25] A 'made' beaver pelt is a winter collected fur that has been prepared over a stretcher after the skinning process. It has been carefully scraped on the reverse side to remove all fat and flesh particles and then air dried (technically it is freeze-dried). Traditionally this is women's work.

populations in the past can be calculated from the integration of diverse forms of data. The sources of these data are:

- the Newton figures for Beaver pelts for the years 1992-3, 1993-4, and 1994-5;
- Beaver lodge numbers in the Newton territory (earlier in this chapter);
- Hudson Bay Company figures for five trading posts (Albany[26], Eastmain, York, Churchill, Moose) between the years 1697-1740 (Bice 1983:349-350);
- Bice's estimates for sustainable yield in Beaver hunting (Bice 1983:102);
- Bice's figures for Beaver kit loss in first year of life (Bice 1983:102);
- Beaver population density patterns from the Howard and Larson study (1985);
- Human population estimates based on men (and canoes) trading into Hudson Bay for the year 1684 (Ray 1974:13).

From these data a hypothetical reconstruction for Beaver and Human populations was developed. Taking the year of maximum production we can see an estimated 2362 family territories in trade relationships with five trading posts. The results are summarised in the following Table 3.8.

[26] The Albany post was noted in Chapter Two as the terminus of a trade route from Lake Nipigon.

	Made Beaver Pelts[1]	Winter 30% Hunt[1/2]	Summer Minimum[1/2] Beaver	Summer Maximum[1/2] Beaver	Lodges Winter From Winter Kill[3]	Hunt Territories[3]	Human Population Low (x4)[1/2/3]	Human Population High (x7)[1/2/3]
1730-1731 High Year	82,199	273,996.66	547,993.32	684,991.65	68,499.17	2362.00	9448	16,534
1697-1698 Low Year	2,664	8,880.00	17,760.00	22,200.00	2220.00	77.00	308	539

Table 3.8: Estimates on beaver and human population developed from multiple sources: 1. Bice (1983); 2. Ray (1974); and 3. Newton hunt figures.

Endnotes:

a. The locational data for the six sites selected for sampling from the infrared BOREAS SSA map. Developed by Tim Wilkinson in the Photogrametry and Surveying Department of University College, London 1994-1995 for use in the environmental research conducted by Roberta Robin Dods in Saskatchewan in the summer of 1995. This gives the exact location of the site based on GPS data.

Site 1A						
X: 3687.59	**Y: 1088.21**					
NAD83:	**BOREAS X =**	**408.335**	**BOREAS Y =**	**360.35**		
NAD83	**LONGITUDE =**	**-104.7473**	**LATITUDE =**	**54.0736**		
NAD83	**EASTING =**	**516535.3**	**NORTHING =**	**5991740.3**	**ZONE=13**	
NAD27	**LONGITUDE =**	**-104.7469**	**LATITUDE =**	**54.07355**		
NAD27	**EASTING =**	**516564.3**	**NORTHING =**	**5991518.3**	**ZONE=13**	
Site 1B						
X: 1978.58	**Y: 796.34**					
NAD83:	**BOREAS X =**	**357.105**	**BOREAS Y =**	**369.169**		
NAD83	**LONGITUDE =**	**-105.5177**	**LATITUDE =**	**54.19118**		
NAD83	**EASTING =**	**466221.4**	**NORTHING =**	**6004916.2**	**ZONE=13**	
NAD27	**LONGITUDE =**	**-105.5172**	**LATITUDE =**	**54.19113**		
NAD27	**EASTING =**	**466251.1**	**NORTHING =**	**6004694**	**ZONE=13**	
Site 1C						
X: 2048.03	**Y: 851.02**					
NAD83:	**BOREAS X =**	**359.19**	**BOREAS Y =**	**367.529**		
NAD83	**LONGITUDE =**	**-105.4878**	**LATITUDE =**	**54.17503**		
NAD83	**EASTING =**	**468159.1**	**NORTHING =**	**6003105.6**	**ZONE=13**	
NAD27	**LONGITUDE =**	**-105.4873**	**LATITUDE =**	**54.17498**		
NAD27	**EASTING =**	**468188.7**	**NORTHING =**	**6002883.5**	**ZONE=13**	
Site 2A						
X: 1114.23	**Y: 731.64**					
NAD83:	**BOREAS X =**	**331.176**	**BOREAS Y =**	**371.11**		
NAD83	**LONGITUDE =**	**-105.9121**	**LATITUDE =**	**54.22619**		
NAD83	**EASTING =**	**440536.9**	**NORTHING =**	**6009072.6**	**ZONE=13**	
NAD27	**LONGITUDE =**	**-105.9116**	**LATITUDE =**	**54.22613**		
NAD27	**EASTING =**	**440568.9**	**NORTHING =**	**6008849.1**	**ZONE=13**	
Site 2B						
X: 229.31	**Y: 760.30**					
NAD83:	**BOREAS X =**	**311.523**	**BOREAS Y =**	**347.427**		
NAD83	**LONGITUDE =**	**-106.2379**	**LATITUDE =**	**54.02664**		
NAD83	**EASTING =**	**4189.09**	**NORTHING =**	**59871.95**	**ZONE=13**	
NAD27	**LONGITUDE =**	**-106.2374**	**LATITUDE =**	**54.02659**		
NAD27	**EASTING =**	**418939.7**	**NORTHING =**	**5986971.9**	**ZONE=13**	
Site 2C						
X: 883.2	**Y:120.12**					
NAD83:	**BOREAS X =**	**324.245**	**BOREAS Y =**	**389.456**		
NAD83	**LOGITUDE =**	**-105.998**	**LOGITUDE =**	**54.3949**		
NAD83	**EASTING =**	**435202.8**	**NORTHING =**	**6027918.6**	**ZONE=13**	
NAD27	**LONGITUDE =**	**-105.9975**	**LATITUDE =**	**54.39483**		
NAD27	**EASTING =**	**435235.2**	**NORTHING =**	**6027694.8**	**ZONE=13**	

b. Pollen report WWW addresses for th sites selected for examination for pattern in vegetation change in boreal Canada

WWW ADDRESS FOR POLLEN REPORTS REVIEWED

ftp:/ ftp.ngdc.noaa gov paleol/pollen/asciifiles fossil/p15files/napd/oliver p15

ftp://ftp.ngdc.noaa.gov paleol/pollen/asciifiles fossil p15files/napd furnival.p 5

ftp·//ftp ngdc noaa.gov/paleol/pollen asciifiles/fossil/p15files/napd/passlake.p15

ftp://ftp ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/blackntn p15

ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/antoine.p15

ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/lastlake.p15

ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/alfies.p15

ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/crozier.p15

ftp://ftp ngdc.noaa.gov/paleol/pollen asciifiles/fossil/p15files/napd/cumminsa p15

ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/jocklake.p15

ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/sioux.p15

ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/peggy.p15

ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/rattle.p15 O t

ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/tublake.p15 O t

ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/jb1004.p15

ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/indian.p15

ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/nungessr.p15

ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/mordsger p15

ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/cristal.p15

ftp://ftp.ngdc.noaa.gov/paleol/pollen asciifiles/fossil/p15files/napd/attawaps.p15

ftp://ftp ngdc.noaa.gov/paleol/pollen asciifiles/fossil/p15files/napd/riley.p15

ftp://ftp ngdc.noaa.gov/paleol/pollen asciifiles/fossil/p15files/napd/yelle.p15

ftp: ftp.ngdc.noaa.gov/paleol/pollen asciifiles/fossil/p15files napd/lakesix.p15

ftp://ftp.ngdc.noaa.gov/paleol/pollen asciifiles/fossil/p15files/napd/crates.p15

ftp://ftp ngdc.noaa.gov/paleol/pollen asciifiles/fossil/p15files/napd/alderdal.p15

ftp://ftp ngdc.noaa.gov paleol pollen/asciifiles/fossil/p15files/napd bastien.p15

ftp: /ftp ngdc.noaa.gov paleol pollen asciifiles fossil/p15files napd northbay p15

ftp:/ ftp ngdc.noaa gov paleol pollen asciifiles/fossil p15files napd/nina.p15

ftp: ftp ngdc.noaa.gov paleol/pollen/asciifiles fossil p15files napd lakeqc.p15

ftp: ftp.ngdc.noaa.gov paleol pollen asciifiles/fossil/p15files napd upmallot.p15

ftp: ftp ngdc.noaa.gov paleol pollen asciifiles fossil p15files napd jacklake. 15

ftp: ftp.ngdc.noaa.gov paleol/pollen asciifiles fossil/p15files napd/upprtwin p15

ftp: ftp.ngdc.noaa.gov paleol/pollen asciifiles fossil/p15files napd prince.p15

ftp: ftp.ngdc.noaa.gov paleol/pollen/asciifiles fossil/p15files napd 3pines.p15

ftp:/ ftp.ngdc.noaa.gov paleol/pollen/asciifiles/fossil/p15files napd bearbog.p15

ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/baseball.p15	Ontario
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/perch.p15	Ontario
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/lynnlake.p15	Manitoba
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/glenboro.p15	Manitoba
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/grandrap.p15	Manitoba
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/elake68.p15	Manitoba
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/clearwtr.p15	Saskatchewan
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/kenosee.p15	Saskatchewan
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/pasqua.p15	Saskatchewan
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/cycloid.p15	Saskatchewan
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/lakea.p15	Saskatchewan
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/lakeb.p15	Saskatchewan
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/eaglenes.p15	Alberta
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/january.p15	Alberta
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/lonefox.p15	Alberta
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/toboggan.p15	Alberta
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/wilcox.p15	Alberta
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/wldspead.p15	Alberta
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/yesterdy.p15	Alberta
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/beach.p15	NWT
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/copper.p15	NWT
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/ennadai.p15	NWT
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/ennada72.p15	NWT
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/grant.p15	NWT
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/iglutalk.p15	NWT
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/demain.p15	NWT
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/meleze.p15	NWT
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/long.p15	NWT
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/mcmaster.p15	NWT
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/nicol.p15	NWT
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/patbay.p15	NWT
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/queens.p15	NWT
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/ratlake.p15	NWT
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/slow.p15	NWT
ftp://ftp.ngdc.noaa.gov/paleol/pollen/asciifiles/fossil/p15files/napd/tlanding.p15	NWT

CHAPTER FOUR: Information Loss and Taphonomic Filters

> ...the 'facts' that enter our knowledge are already viewed in a certain way and are, therefore, essentially ideational (Feyerabend 1988:11).

4.1: Taphonomy - literal and metaphorical

4.1.1: Introduction

In the previous chapters we have been looking at information from diverse sources on aboriginal peoples of the northern boreal of North America. These sources have included ethnographic, ethnohistorical, historical, archaeological, and environmental materials and observations. The generally accepted point of view has been that indigenous boreal forest peoples lived in a relatively pristine natural world and they engaged in economic activities that altered very little of their landscape. Their visions of their worlds and landscapes and their places in these landscapes were, and to a great extent still are, discounted by the dominant sector of society. As I have pointed out, this discounting worked very nicely with ideological and economic objectives of certain members of this dominant sector. The Europeans came from a world with another vision of place and intent. For example the British fur trader "...strove ...to render terrain into psychologically comforting landscapes by invoking the aesthetics of English landscape appreciation, especially the Picturesque and the Sublime" (MacLaren 1985:567). This can be illustrated in the Mackenzie (Lamb 1970) description[1] of Clearwater River from Methye Portage (northern Saskatchewan), on which MacLaren[2] comments:

> ...the pervasive deployment of the Picturesque at a time of British imperial commercial expansion resulted in a conflation of landscapes on every continent into similarly prescribed views of foregrounds animated by docile people or animals[3], sunken middle grounds intersected by a gently meandering river and shaded by generic foliage, and backgrounds of distant blue hills that closed the space in a mood of repose (MacLaren 1985.568).

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[1] Actually penned by William Combe, "the great satirist of landscape touring and never himself a North American traveller" (MacLaren 1985: 568).

[2] Interestingly this author notes, in discussing the writings of the Samuel Black on his 1824 canoe trip up the Finlay River, that in the writing of landscape description "...the Canadian landscape bursts the bounds...(since)...almost a complete abandonment of grammar is needed for the narrative depiction to capture a mood of titanic and indomitable natural power" (MacLaren 1985.575)

[3] Blakey (1990) would point out that the presentation of the "other" in terms of docility (powerful versus passive) is a political act and part of the definition of a national-natural dichotomy used by the coloniser to distinguish the coloniser from the colonised (1990 44).

This vision was neither inherently good nor inherently evil[4], it was just different. The differences that gave rise to conflict came, and still come from, the different visions of economic activity in relationship to these culturally specific landscapes.

What this means is that there has arisen for aboriginal peoples what has been called, in a parallel context of the analysis of post modernism in Western society, the "crisis of narratives" (Lyotard 1987:73). Traditional cultures work in worlds of "knowledge (*savoir*)"[a] as opposed to the world of "learning (*connaissance*)"[b] (Lyotard 1987:78). There is the

> ...pre-eminence of the narrative form in the formation of traditional knowledge...It is impossible ...to judge the existence of validity of narrative knowledge on the basis of scientific knowledge and vice versa: the relevant criteria are different. All we can do is gaze in wonderment at the diversity of discursive species, just as we do at the diversity of plant or animal species[c] (1987: 79-80)[5].

Feyerabend (1988:29) challenges us to accept that "...the invention of alternatives to the view at the centre of discussion constitutes an essential part of the empirical method.... A scientist who is interested in maximum empirical content...will adopt a pluralistic methodology". However much this pluralistic approach is vaunted, the practitioners of "science" can have difficulty embracing narrative knowledge, the discourse of the traditional world, as we have seen at the start of Chapter Three.

In this part of the work I want to take on the issue of that which is known and that which is learned through the use of the concept of **taphonomy** both in a literal and a figurative sense. I think that this is informative and will help in the move to the final synthesis of what has been gleaned from the known and the learned. The loss of "information" (both the known and the learned) will be investigated from four perspectives. These perspectives will be expanded through a discussion of systemic contexts and filters, while natural and cultural systems will be examined through the use of a specific set of examples. The impact of the loss of this information on the interpretation of the world of the prehistoric human will be looked at from both a practical and a theoretical perspective.

[4] This may be difficult to keep in mind when instances can be and are cited of the 'evil intent' of those who applied the vision to 'others'. What needs to be sorted here is true evil from the actions of those who were the captives of their time. This does not make it easier in retrospect, but it does allow contextualisation of the events. In this way fact is sorted from fiction and social justice can be actualised in the now. An excellent book that sums it up from the Native American perspective is ***Native Time*** by Lee Francis (1995).

[5] This is reminiscent of the Lévi-Strauss discussion of mythical thought as "an intellectual form of *bricolage*" while science "is based on the distinction between the contingent and the necessary" (1966 21). Mythic thought.. "although it is imprisoned in the events and experiences"... "acts as a liberator by its protest against the idea anything can be meaningless with which science at first resigned itself to a compromise" (1966:22).

4.1.2: Loss of information in physical systems

Studies in the literature on the disintegration of bone remains, for instance the edited volume of Behrensmyer et al. (1980), the more recent volume by Lyman (1994), or the work of Andrews (1990), discuss the processes of natural taphonomic filters. There one can see cause and effect that explains, somewhat, the "severe losses of biological information.....during the taphonomic interval" (Olsen 1980:5). For the archaeologist, unlike the palaeontologist, data that encompass the biological and physical aspects of the world are only part of the retrievable information. This notion diminishes neither the importance, nor indeed the absolute need, for data on the biological and physical environment, nor does it discount their crucial contribution to an understanding of human ecology. One of the important issues is the use of these data in an epiphenomenal way when they may be both inadequate and incomplete. Use of such data as though they represent a whole cloth, rather than a patch in an elaborate quilt, contributes to neither an accurate depiction of past life-ways nor an incentive to push beyond the epistemological boundaries delineated by current methodological practices. Further, this is exacerbated by the borrowing of theory, methodology, and data from other disciplines, in particular ecology, without absorbing their self-critical practice. For example the problems that beset ecology have been inherited by palaeoecology and ecological anthropology but these can easily be missed by returning to the books such as *Ecological Anthropology* by Hardesty (1977), following his plan of study and then assuming that we have addressed the issue of humans in their environments. One of the important problems is the nature of the questions being asked and the answers being generated within the context of the definition of what constitutes science and the practice thereof (e.g. Downing 1991; Dunnell 1989; Embree 1989; Feyerabend 1994; Hanen, et al. 1980; Heal and Grime 1991 Osler 1980; Peters 1991; Popper 1983; Bartley 1987; Smith 1976). Another feature is that a particular theory or methodology may catch our fancy, to be used with apparent success then continue in use without any returning for 'catch-up' on its subsequent development within the parent discipline. Thus loss of immediacy is perpetuated. In a wider perspective we may ask the question: "What is the form of the investigation and is it driven by the quest for knowledge (TEK) and/or learning (WSK)?". Of course the answer will drive the agenda of future theory and methodology and their application.

4.1.3 Analogues and homologues and contextualisation

From my perspective the furthering of an acceptance of different points of view on the same "facts" and the ability to work on a synthesis of the TEK and WSK forms of inquiry will add greatly to our ability to work out a "story" that remains as true as possible to the material and meaning we are addressing. This will be a somewhat straight forward process where we have historical, proto-historical, ethnographic, and/or direct interview materials to work from. However, when moving beyond the boundary of written documents and oral tradition into the realm of deep time and very different traditions the analogues (same function, different origins) and the homologues (same origins, different functions) will have to be carefully worked out. The choice of the analogous material will have to be carefully considered. Then we will not have to ask "Whose facts?" because they all would have a place in the inquiry and its resolution. In my mind I keep coming back to the concept of contextualisation. The context of what is being done is the context of archaeology, of anthropology, of a "social science". In the academy they have pattern and structure. That which is being observed happened in the context of the life of individuals, of a society, of a culture other than the one from which the observations are being made. This place that can never be visited or observed directly, this place that can never be completely re-tested, also had a pattern and a structure - one that operated within the constructs of that society for those people. This was their context. Now to some indefinable extent that context as pattern and structure is there to be un-covered, dis-covered, re-constituted, re-constructed although the details are obscured by distance and time. The peoples of this other place had the knowledge that made them members of that group. The archaeologist is attempting to gain membership in a group where there may be no teachers to bring him or her through intellectual 'childhood' to an 'adult' understanding. The intersubjective relationship of participant observer and informant is turned into a one-sided conversation with the self. This is the 'culture shock' of the archaeologist. This is Duden's (1991) angst about history, discussed earlier. Then there is the context of who benefits from the research - for whom is it being done? Is this for the self-satisfaction of the researcher, for the demands of the academy, for the interest of members of the researcher's own society or culture? Or is it for the society of the "others", if they are yet represented by an identified or identifiable culture group in the present? Is it accessible to them or their descendants or the public in general; does it resonate with meaning or will it be viewed as an archaeologist making a living? Is there political content and for what purpose? These are questions that can not be answered here but need to be kept in mind when we do our work. They will drive the agenda regardless of our recognition or lack of recognition of them in an overt, conscious way.

4.1.4: Loss of information in ideational systems

Ideational data also comprise information for interpretation since humans live within a mental landscape as well as an environmental landscape (Balikci 1968; Bielawski 1989; Bishop 1970; Cooper 1939; Gould and Cohen 1994; Hickerson 1967; Lévi-Strauss 1964; Morantz 1980; Rogers and Black 1976). Aspects of cultural information are superimposed on elements from the natural realm. For example a bone projectile point includes not only the material from the natural realm on which it is manufactured but the cultural realm as well. It is manufactured to a specific type and it may be used for a precise purpose. The acquisition of the bone material as a resource may have been incidental to the hunt for food or it may have been specifically for the production of non-food items such as skins, sinew, and bone. Even more deeply embedded may be the fact that this bone may be from a specific animal and even a specific element in the skeleton of this animal (e.g. the ulna) (Bonnichsen and Will 1980). Further it may have been ritually required to make this specific point for a specific hunt activity. An additional example, which will have relevance later in this work, is the manufacture of twine for diverse purposes. Indian "string" made from cedar, or of basswood in some southern areas (Vennum 1988:83; 86), is easily biodegradable in the soils of the northern forest. Knowledge in the historic period comes to us through ethnographic reports (Vennum 1988). However, knowledge of twine in the prehistoric context comes to us only indirectly through the external decoration of pottery such as the various wares in the Laurel and Blackduck series, discussed in Chapter Two, that have cord-wrapped stick and cord-wrapped paddle impressions on the body, shoulder or neck area of pots (Dawson 1976; Dawson 1975; Lugenbeal 1978; McLeod 1978; Wright 1968b; Wright 1967a). Historic evidence tells us that the manufacture of twine was women's work, and that twine was used for diverse applications including netting (also seen on the exterior of some pottery wares and also assumed to be for fish nets although there is no direct evidence of this in prehistory), and bundle binding of wild rice in the weeks leading up to the late summer-early autumn harvest period (Vennum 1988:82). There is then, embedded in the object from the past specific elements of information.

Those elements from the natural world, if they survive the taphonomic interval, like the bone in the bone point or the clay in the pottery vessel, yield their information to us in a rather direct fashion. Here we can think of the survival of the pottery but the loss of the twine itself, although in this we have information on the twine as well in the imprint it made on the plastic medium of clay that eventually became the non-plastic medium of the fired pot. This fits into the traditional definition of taphonomy in that the loss of information result from forces or filters in nature that are mechanical, chemical, or biological processes of destruction.

Elements of information from the cultural domain, such as the selection of a specific animal for a specific bone for the manufacture of a specific type of point, are from the realm of 'knowing'. In the 'knowing', these elements belong to and use sets of assumptions that cause the maker of the object to be recognised as a member of their own group and the object to be recognised as of domestic origin. The choices for the execution of a particular action will fit purposes defined in terms of categories of task, or gender, or age, or categories of the sacred versus the profane or in terms yet unimagined by us. These choices are part of the meaning of the object just as much as the facts of object's shape, size, colour, or any other characteristic that can be quantified. The ideational system is subject to the loss of information just as the aspect of concrete-ness may be diminished by the filters of the natural taphonomic process. However, here the forces or filters are cultural. The cultural instructions on how things were done, who did them, or a myriad of other 'facts' are subject to the loss of individual and cultural memory. Of all the associated fact and fiction, truth and fancy embedded or surrounding an 'object', without the instruction manual we end up with the artefact - all hardware, no software. This is the breakdown in the transmission of cultural information through the generations. It can be complete or partial and, using the analogy of a biological mutation, it can be just as effective in implementing change in cultural and societal systems as biological mutation is in effecting change in species over time. One of the problems is to pin-point the place at which the information code changed, like looking for the missing link in the evolution of humans. The information embedded in the object itself comes to us in encoded form. Some of the code is not decipherable by present members of the culture or members of the academy since the encoding is much like the children's game of telephone: in one end of the 'telephone' line goes the message along to the ear of another who in turn passes it down the line; the resulting message is NEVER exactly the same and if the 'line' breaks there will be no message. Like the taphonomy of the concrete there is a historical component to the process, bound as it is in time and circumstances. The cultural filters, through which all biological and non-biological concrete items used by humans move, also leach away significant information on the original attributes of the concrete itself and its place in the culture under investigation. These cultural filters will discriminate what initially will be selected for use from the environment. They filter the use system itself from concepts of processing through to concepts of discarding 'spent' items. The partial or complete loss of this information affects the outcome of the 'story'.

Finally, cultural filters will determine how the researcher will discriminate in the retrieval process and, in the final analysis, how the recovered materials will be interpreted. This will be based on the skills of the researcher which will be informed by the current concepts of method, and theory, and ideology within the academy itself. This can be the level of most information loss, with improper field techniques being the instance of greatest immediate danger. Properly gathered, catalogued, and stored materials can always be subjected to subsequent re-analysis, but re-excavation of the same field unit is impossible. As well the **explicit, detailed** reporting of field techniques, application of these techniques, and the subsequent successes and problems within the fieldwork itself would be of assistance to the eventual evaluative interpretation of the materials. This is most particularly needed in the case of biological materials since they are not chemically inert like stone and properly fired pottery. The counter argument is the lack of funds and time to do reporting of this nature; but then all science must be explicit or its validity will be questioned. The foregoing criticism fully recognises the fact that field techniques and concepts of what comprise data have changed through the years. Nonetheless, there is a 'taphonomy' of information and information systems brought about by the move from the natural to the manipulated, synthetic level.

The taphonomy of the ideational occurs at two points, as will be seen in the model presented below. The taphonomy of the ideational is beyond the boundary of the existing definition of taphonomy that is examined for the loss in biological/physical systems. In this sense then this is an expansion of the concept of taphonomy, perhaps to a metaphorical use of the term. None the less, it imparts what the process is and the outcome of this process - the loss of information.

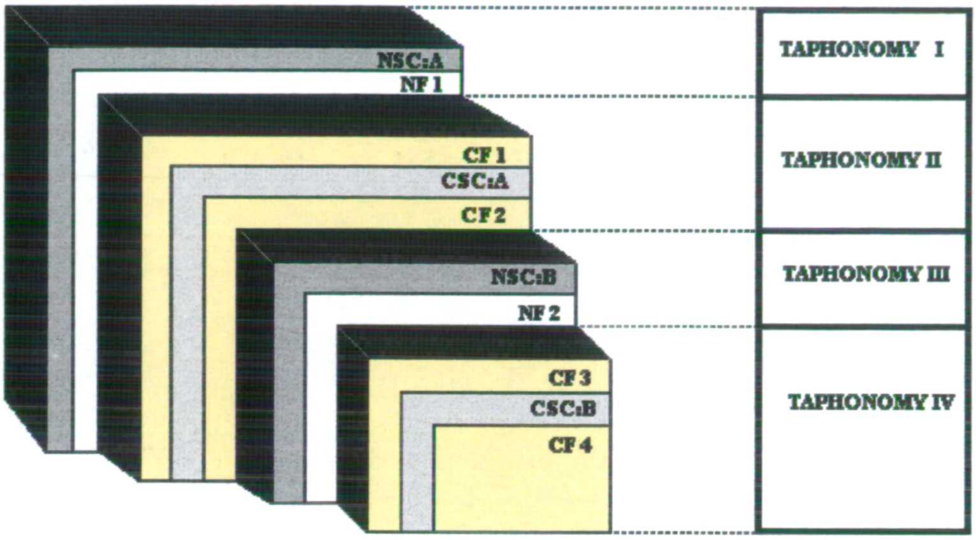
4.2: A Model For The Consideration of The Taphonomic Process

In this section I want to present a model that illustrates the process of the loss of information on the substantive and ideational levels. The purpose of this exercise is to have a framework in which to access the information used for the synthesis in the Chapter Five.

Difficult though it is to present a dynamic four dimensional process[6] (Baltensweiler and Fischlin 1987; Krebs 1985; Loeschcke 1987; Turner and Gardner 1991(a); (b); Wheeler 1990; Wheeler 1954) in a two dimensional format, I think Figure 4.1 captures, somewhat, the concept and spirit of information loss in systems (Clarke 1968; Schultz and Zwolfer 1987) that integrate the natural and cultural realms in which humans live. It incorporates both the synchronic and diachronic in the structure of the model as a diagram because of the representation of the four dimensions. As such, the diminishing volume of the 'black boxes' and their coloured "filters", seen in the diagram, represents the diminishing volume of data, both concrete and ideational, with the elapse of time. In this instance the boxes operate both as a convenient way to construct the diagram and as a representation of the 'black box' process in systems analysis - the hidden, the unknown, for which you may know or learn the input and the output but perhaps never the complete process (systems operation) between the two. However, in this instance the individual contexts (or units of information seen as "boxes" only because of the constraints of graphics) can be 'opened' and, much like Russian dolls, can be studied in more detail in a flow diagram (or have alternative flow diagrams 'tried out') for specific processes at various levels of integration. The separate and unique problems of each context thus can be expanded in additional diagrams befitting each set of circumstances. Flow diagrams function well in such detailed cases as they give us the opportunity to play out different scenarios. What becomes evident is that this process of 'opening' can become almost endless as finer and finer detail is sought.

To begin, there is a list of the terms to be used and a brief explanation of their meaning in this context. This is to facilitate in the understanding of the visual presentation of the model. This will be followed by the model in diagram form. Finally, various aspects of the model will be explored in detail and certain applications will be developed.

[6] Three dimensions of space (in the diagram represented by the cube) and the dimension of time (represented by the movement into the visual foreground of the model on the page).



THE TAPHONOMIES AND THEIR CONTEXTS

TAPHONOMY I: NATURAL SYSTEMIC CONTEXT A

- what can we reconstruct of the original biotic community?
- can we speak of populations or only individuals?
- can we discuss human niches?
- what level of functional integration can we achieve?
- what about properties, forces, flow pathways, interactions?
- can we talk of fluctuations, perturbations?

TAPHONOMY II: CULTURAL SYSTEMIC CONTEXT A

- what can we say about the cultural system of
  - -acquisition?
  - -use/consumption?
  - recycling/discard?
  - discard itself?

TAPHONOMY III: NATURAL SYSTEMIC CONTEXT B

- what do we know of the depositional / dispositional history?
- what can we say about the processes that are
  - biological?
  - chemical?
  - mechanical?

TAPHONOMY IV: CULTURAL SYSTEMIC CONTEXT B

- what are the critical practices (choices) in
  - acquisition?
  - use/consumption?
  - recycling/discard?
  - interpretation?
- what have we learned, think we learned, pretend we learned, etc...?
- what do we know, think we know, pretend we know, etc...?
- what are the ramifications for the discipline (and beyond)?

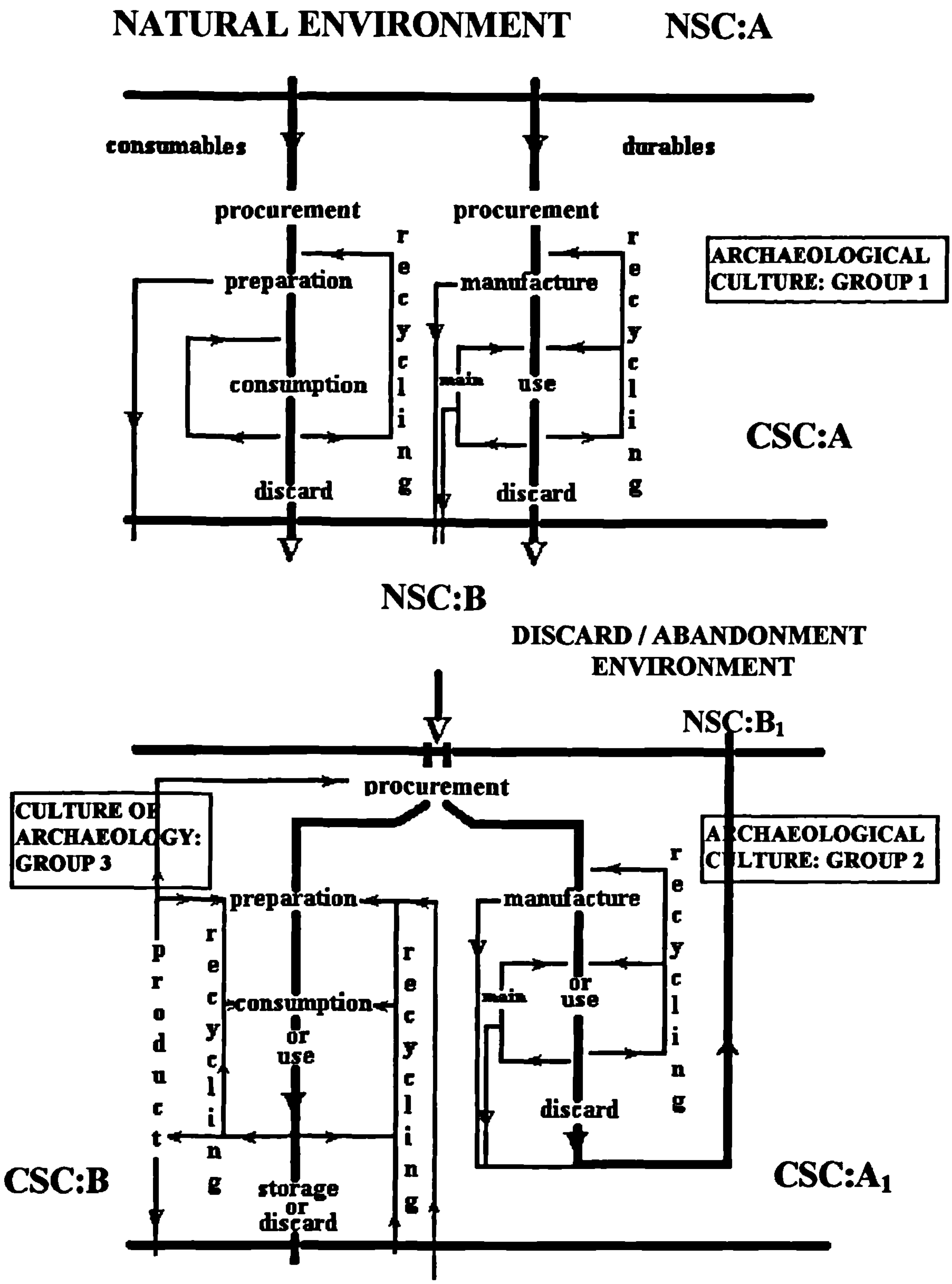


Figure 4.2: Flow model for archaeological materials adapted and expanded from Schiffer (1972:158-159), Lange and Rydberg (1972), and Clarke (1968:36). GROUP 1: cultural group under study; GROUP 2: artefacts of GROUP 1 in use by subsequent culture in systemic context like Group 1 (everyday use and discard); GROUP III: researchers studying GROUP 1 and/or GROUP 2.

In my initial thoughts on the process of information loss I had envisioned three taphonomic levels. Traditional definitions and applications of taphonomy were in the category now labelled **Taphonomy III in Figure 4.1**. This is the process of information loss found in a **Natural Systemic Context** (NSC). This traditional application of taphonomy was sandwiched between two categories that were a new application of the concept of taphonomy, namely the taphonomy of the ideational where the non-biological and the non-physical, as a notable part of the information for cultural interpretation, are lost as well. This is found in relation to **Cultural Systemic Context** (CSC). These 'new' taphonomies I saw applying to two groups of people: the archaeological culture(s) **(CSC:A, A_1, A_n,)** and the culture of archaeology **(CSA:B)**. These are **Taphonomy II** and **Taphonomy IV** in the model in Figure 4.1.

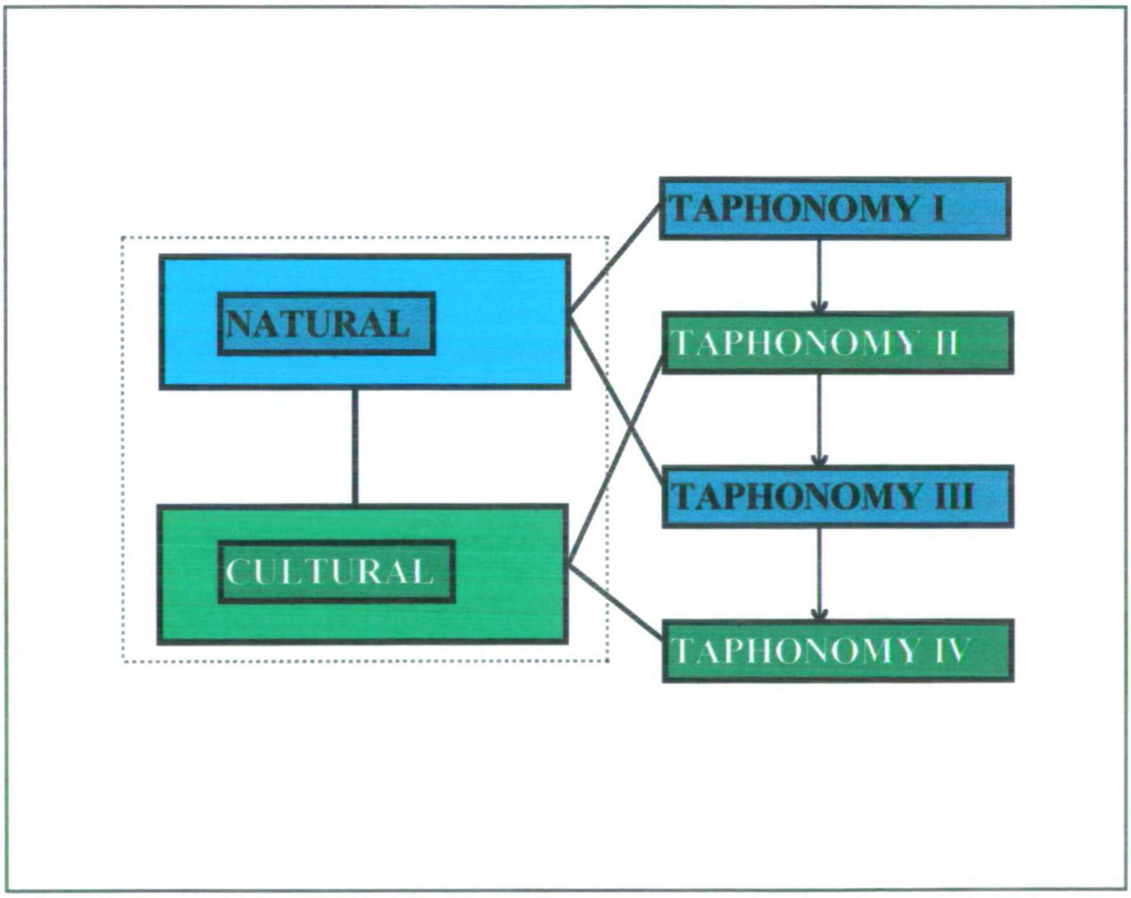
In the initial restructuring of the research and the working through of problems of interpretation it became clear to me that an expansion of the model was necessary. This expansion occurs with the addition to the model of **Taphonomy I**. This accounts for the loss of information in the natural system before or as it comes into articulation with the cultural world of humans. Technically the articulation point also is within THE traditional taphonomy in the sense of its use by palaeontologists particularly if humans are seen as having culture as species specific behavioural adaptation. Perhaps this is more the case than for Taphonomy III where the configuration of what happens in the archaeological midden is tinged by the cultural events preceding deposition. Taphonomy I adds a missing symmetry to the investigation, a symmetry needed if we are to deal with both the natural and cultural worlds and their articulation with each other through the agency of humans.

The two central themes on taphonomy, **natural** and **cultural**, seen in Figures 4.1 and 4.2 as systemic contexts (NSC; CSC) and their associated filters (NF; CF), are **linked** (Figure 4.3) but have different causes although their effects are essentially the same - information loss. This linking occurs because, for the archaeologist, the subject is human adaptations. Indeed perhaps culture, as human behaviour, is only another aspect of nature as humans experience it, as I have commented on above. Nonetheless, there has developed a dialectic of 'nature / culture' as discussed in Chapter One. Both need to be addressed and their interlinkage need to be recognised if we are to make sense of the human condition through time. This was recognised by Steward when he noted:

> The interaction of physical, biological, and cultural features within a locale or unit of territory is usually the ultimate objective of study.... If human or social ecology is considered an operational tool rather than an end in itself, two quite different objectives are suggested: first, an understanding of the organic functions and genetic variations of man as a purely biological species; second, a determination of how culture is affected by its adaptation to environment (Steward 1955:31).

This is illustrated in Figure 4.3 where the natural and cultural are linked and their interlinked taphonomies are shown. The natural and the cultural spheres are also connected to larger systems, both in time and space, that expand beyond the scope of the diagram in the illustration used here.

Figure 4.3: Diagrammatic representation of the interlinkage of Natural and Cultural Systemic Contexts and their associated taphonomies.



4.3: Natural Systemic Contexts (NSC)

The **Natural Filters (NF)** of **NSC A** and **B** are the filters of the concrete. In the loss of the concrete in **NSC:B** (for example in an archaeological midden) the ideational of the archaeological culture (**CSC:A**) is diminished as well[7]. This may be considered to be incidental to the central processes of bone loss since in this context these processes are the result of the actions of natural filters of the traditional application of the concept of taphonomy (mechanical, chemical, and/or biological destructive processes). However, two types of information are lost: information on the object as object, and information on the object as symbol. The two natural contexts, **NSC-A** and **NSC-B**, can be investigated best under the rubric of 'traditional taphonomy'. However, the term taphonomy as first posited refers best to the actions in **NSC:B** and it is an extension of the concept when it is applied to other contexts within this research. Certainly it works on a metaphorical level but I think it has validity beyond that into the operational level as well.

4.3.1: Taphonomy I

In this case the specific illustrative environment is the boreal forests of Northern Canada in the period since the last glacial sequence. Since this is a large and diverse specific area, the examples will perhaps pertain to the circumpolar northern hemisphere generally (Barbour and Billings 1988; Collins and Wallace 1990; Delcourt and Delcourt 1981, 1987; Hills 1959a & b, 1976; Laford 1958; MacDonald 1987a, 1987b, 1984; Potzger 1946; Reichle 1973; Shugart, et al. 1992; Tamm 1976).

Krebs's breakdown (to be seen below in Figure 4.4) of the biosphere in effect outlines the various levels of analysis for the archaeologist as well as the ecologist. It serves, also, to indicate the levels of integration being addressed in this dissertation.

Some of the questions we can attempt to answer for the information in this part of the analysis are:

- What can one say about properties, forces, flow pathways, interactions?
- Can one talk of fluctuations, perturbations?

[7] For example this could be the surface decoration of a bone harpoon point that is leached away by the action of percolating water in acidic soil

- Can one use the natural filters such as seasonality and periodicity as part of a catchment analysis and thus develop realistic models of fundamental and realised niches used by humans?

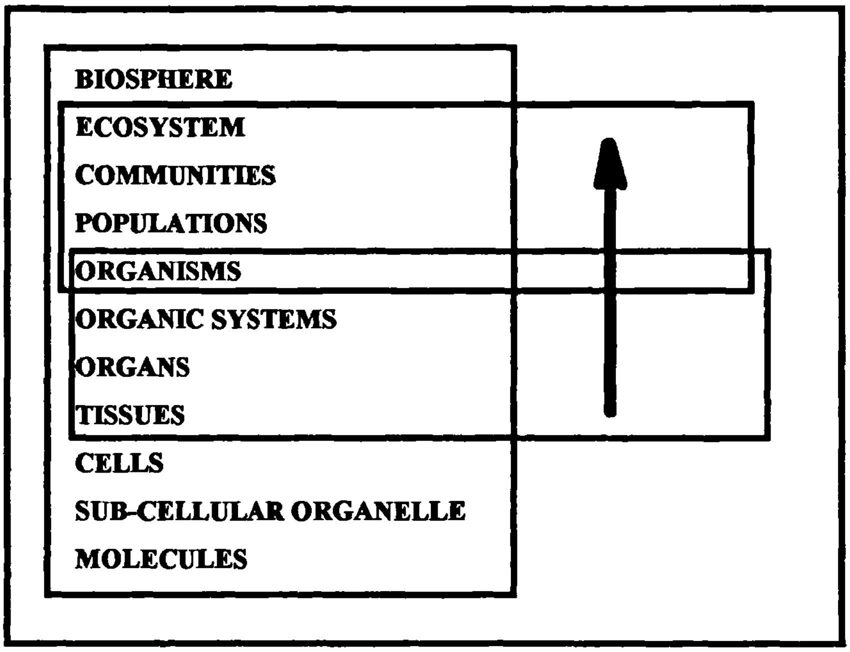


Figure 4.4: Levels of Analysis in a biological system (Krebs 1985:11) with the levels discussed in this work delineated for the materials from the sites (green) and the levels of integration in the analysis (red).

For the most part the answer to each of these questions is a qualified "yes". The qualification comes from the detail that can be developed for these answers. The fractal dimension at which the pattern emerges from the background noise may be such that, for example, fundamental niches may be theoretically constructed but their actualisation in realised niches may not be completely discernible. As an additional example, in studying perturbations we have already seen in Chapter Three the problems in the use of pollen and charcoal to distinguish wild fires from fires of anthropogenic form. Further, there is the problem of defining the frequency, extent, and intensity of all fires that occurred in deep time. Although a process for fire use can be, and indeed will be, proposed, and although the proposed processes seems to offer an explanation of how a system "worked", the absolute, empirical evidence for the process eludes us. This has to do with the loss of detail in the information about the past environment. Some of this will be loss of biological materials such as the trees themselves, while some of it will be simply that we can not go back and do the testing while certain events are taking place. In this latter instance the example would be the ability to study pre-fire, fire, and post -fire conditions for the long past event.

Fluctuations can give insight into the natural cycles of the boreal forest. There are essentially two fairly short cycles, although each has considerable variation depending on environmental conditions such as rainfall, hours of sunlight, length of winter and hardness of winter, among others. These cycles are the four year cycle, and the ten year cycle. The ten year cycle is the most problematic for the hunter since it may range from five to fifteen years, ten being the mean. The short cycle is found in certain insect and small mammal populations. In the case of insects this impacts on such species as insect eating birds. With the longer cycle of ten years we find variations in mammal populations. Mammals, such as Rabbits and Hares, have population increases and declines in these longer rhythmic patterns; some of the declines result in a complete population collapse if disease is involved (Banfield 1974; Kaufman, et al. 1990). The result of a drastic drop in Hare and Rabbit populations is a shift downward in the associated predator mammal population. An excellent example is the response of the large cats, such as Lynx, to the variations in the Hare population, a condition known by any hunter who relies on these populations either as a resource or as an indicator of other potential resources (see comments of Darlene Newton in Chapter Three). But all cycles are cycles precisely because they have their upswings as well and the Rabbits and Hares are noted for their reproductive ability. Deer, after serious declines in bad years through winter kill and re-absorption or loss of foetuses or embryos, are also known to replenish their populations in good years and to rebound through the reproductive process of twining (some triplets are also produced)[d]. This is a factor recognised by any hunter familiar with his territory and knowledgeable about animals and is discussed by Darlene Newton with respect to her trapline, as reported in the last chapter. Longer cycles are found in the regrowth regimes after serious perturbations such as fire or flood (extended periods of flood are usually provided by Beaver with their landscape alteration through dam building; this process can be seen in the plates on Beaver in Chapter Three and will be part of the model developed in Chapter Five). Here cycles can be counted in decades, sometimes centuries. In this last example the patterns of fluctuation are written in the modern landscape itself. Although we may not have the exact same landscape to look at for the past, we can understand the process from the modern example. In this case the cores from specific locations, if there are suitable sites for the taking of such cores, could offer us localised pictures of changes through periods of time. They may even indicate the presence of fire although the type of fire it was will not be discernible (wild, purposely set, accidental, household) as can be seen in the South Harding Sample 1A, Narrow Hills Fire Samples 1 and 2, McDougal Creek Sample 1 soil cores reproduced in figures in the previous chapter. The warning here is that not all known fire areas produce indications of burn in the profile of their cores. The example of this can be seen in the cores from the Lofthouse area. An historically (recent) known fire area, it shows no indication of a charcoal lens.

On another front, the life history of plants and animals offer us excellent information through the use of biological uniformitarianism. From these types of life histories we can talk of seasonality and periodicity. The use of such information, tied to the species lists seen in Chapter Two, will be seen in Chapter Five when we look at the details of Whitefish Lake as an example of small lake use in prehistory.

In the application of theory and methodology from ecology:

- What can one reconstruct of the original biotic community?
- Within this environment can the catchment for a specific population as a subset of a community be defined or can one speak only of individuals?
- What level of functional integration can be achieved and what are the limiting factors on this integration?

We can make a theoretical reconstruction of the original biotic community. This can be achieved in part through the insights provided by the species selected for use by humans (from the faunal assemblage in archaeological sites as seen in Chapter Two). The interrelation of species can be discussed. However, we do not know population densities for either the animals chosen for food or the humans themselves. Estimates can be made here. For example, figures from present or near-present day hunters in temperate and boreal forests can be invoked as analogous figures for the past. These same type of figures may be developed for the population of animals, birds, and fish. In my view this is a rather questionable approach. It is my contention that we are only starting to acquire an inkling of how the boreal system worked before the fur trade changed the nature of the game. We know that for such places as Northwestern Ontario there was an ecosystem collapse that gained momentum in the last century and peaked at the turn of this century to linger in its after effects practically until mid- 20th century (see Chapter One). The environment has been 'reconstructed' (Beaver were reintroduced). The fidelity of this reconstruction is the problem. The factors for this failure are found in the 'new' economic objectives applied to this modern day 'new' world. This means that estimated figures of population size for humans as well as all the other life forms (even trees) from this environment may not offer us an adequate picture of the forest and the dynamics of prehistory. Our best hope to develop figures for prehistoric populations may rest with the early historic numbers in association with modern estimations worked through to plausible reconstructions, as was attempted in the final section on Beaver in Chapter Three.

The forests of the past were managed forests but with some different outcomes. Why I make this distinction of "some different outcomes" is that the management of the temperate forest for the purposes of agriculture (whether you call it slash and burn or swidden agriculture) has little to recommend it as being different from the clearing of temperate and boreal forests for tree products. The outcome is the same - forest loss or loss of species diversity in the farmed forests. The management of the forests for the living in the forests is qualitatively (forest structure) and quantitatively (species diversity and numbers) different. It is this difference we will explore and how this difference can be put into operational and sustainable form that will be the theme of the synthesis in Chapter Five.

Theoretical catchment for a specific population can be suggested from understanding the structure of boreal forests and the environmental needs of the species in these environments. From this flows statements of functional integration and limiting factors. To do this one has to be clear on the levels of integration in biological systems and the exact ones that are the focus of specific studies. In this work, archaeological materials at the level of "tissue" (bone)(see Figure 4.4) are one of the parts of the investigation. From this level I have chosen to move upward in the integration to the organism then to the ecosystem in which the organism lived. An equally valid study could have moved down the levels of integration to study the cellular structure of the organism, going on to the molecules that made up the cells themselves (say the DNA in the cells). The resulting reports would be very different in focus and intent. Each would offer a view of the animals of the past, but these views would be very different. Indeed, the second approach would be couched in more "scientific" methodology (empirical facts and repeatable experiments); it could offer possible real insights on, say, the evolution of a species. Regardless of the level(s) one chooses to work at, the animal is not a cultural item in this portion of the discussion. Here we come to an understanding of the animal or plant within the constructs of its own life and place in its habitat but as a representative of the life history of a member of a species, not the individual. However it will be as an individual that it will move into the cultural realm when one considers its selection, use, and eventual discard by humans. Subsequently, it will once more become part of the natural process of taphonomy (Taphonomy III) in the sites of human settlements.

4.3.2: Taphonomy III

NSC:B, the refuse of a past culture or cultures, can be affected by **CF2** where midden development and discard regimes are conditional on site size, site type (camp, village, etc.), duration of site use, amount, type, and choice of refuse discarded in relation to the site as a whole. Depositional history will affect the preservation potential of a specific deposit. The fact that depositional history can be very complex is attested to by the debate on the interpretation of redeposited material from the Old Crow Basin in the Yukon (Morlan 1980). To paraphrase Behrensmeyer's observations on fossilised material (1978:150), the survival probability of a bone depends on the intensity and rate of a host of interacting destructive processes and the prospect for permanent burial before total destruction has occurred. For archaeological bone the same parameters pertain as for palaeontological materials. However, because of the nature of cultural activity, some of the processes of destruction have broader consequences. So there is a need to develop an understanding of **NF2**, the destructive processes (diagenesis) that consists of the chemical, biological, and mechanical activities which diminish organisms and organic systems from tissues to cells to molecule until the 'star dust' of Hawking's description (1988) is re-achieved. This is the loss of the integrative information of the concrete (see in part: Binford and Bertram 1977; Casteel 1971; Gifford 1978, 1980; Hill 1976; Lyman 1985,1994; Lyon 1970; Morlan 1980; Payne 1972 a & b; Piepenbrink 1986; Schiffer 1972, 1987; Speth 1983; Williams 1992).

Cultural/Natural: mechanical, chemical, biological processes

Cultural decisions (occurring in Taphonomy II to be discussed below) have repercussions on the process in the natural system and outcomes for the deposited materials. Within this context, culture is indeed part of nature. Culture and nature, or Taphonomy II and Taphonomy III, have similar processes in the mechanical, biological, and chemical diminishment of the original items from time of acquisition until discard and then recovery. This is the loss of information from these materials (see Figure 4.5). For example, a specific society may have rules about how food is cooked. A butchered chicken bones end up in a soup pot in a liquid environment that is acidic (say lemon was added) to be boiled for hours. Calcium will be leached from the bones into the resulting broth - all good for the nutrition of the human who will drink the soup. However, it is not so good for the bones as items of information for the archaeologist. So this is a cultural decision on how chicken soup is made but it also has repercussions for the physical preservation of biological materials, the bones of a bird in this case.

I was concerned that in the original analysis of the archaeological bone, reported on in Chapter Two, I may have been missed important taphonomic indicators. For this reason I consulted the taphonomy collections in the Palaeontology Department of the Natural History Museum (NHM), London. An examination of the materials there caused me to review the bones from the Martin Bird Site (DbJm-5). This re-examination was done as a 'check' on the original analysis. The values assigned for the alteration to the bones during this original analysis were confirmed. The small fragments, the relatively low percentages of identifications, and the designation of the culturally founded destruction factors were also reaffirmed. The indication, for example, of burning on bone (from black [charred] through blue to white [calcined]) and the presence of butchering marks remained virtually the same in number and extent, although I will admit that there were a few instances of self-debate on the stage of charring of a bone or two. All of this did nothing to change the fact that for collections such as these[8] the number of bones are relatively low. But this must be put in the perspective that low numbers are better than no numbers.

[8] Small collections (low numbers and low percentages of identifiables) are not unique to the boreal sites of North America. They can also be found in certain types of sites such as ephemeral kill sites, or other sites of very short duration of use or exceedingly low density of human population in that use. Sites of this type are probably more the norm for humans over their expanse of time as a species than the flamboyantly large site such as Tikal. They are probably the sites more difficult to locate and more difficult to place in a cultural landscape since artefacts usually have low density as well.

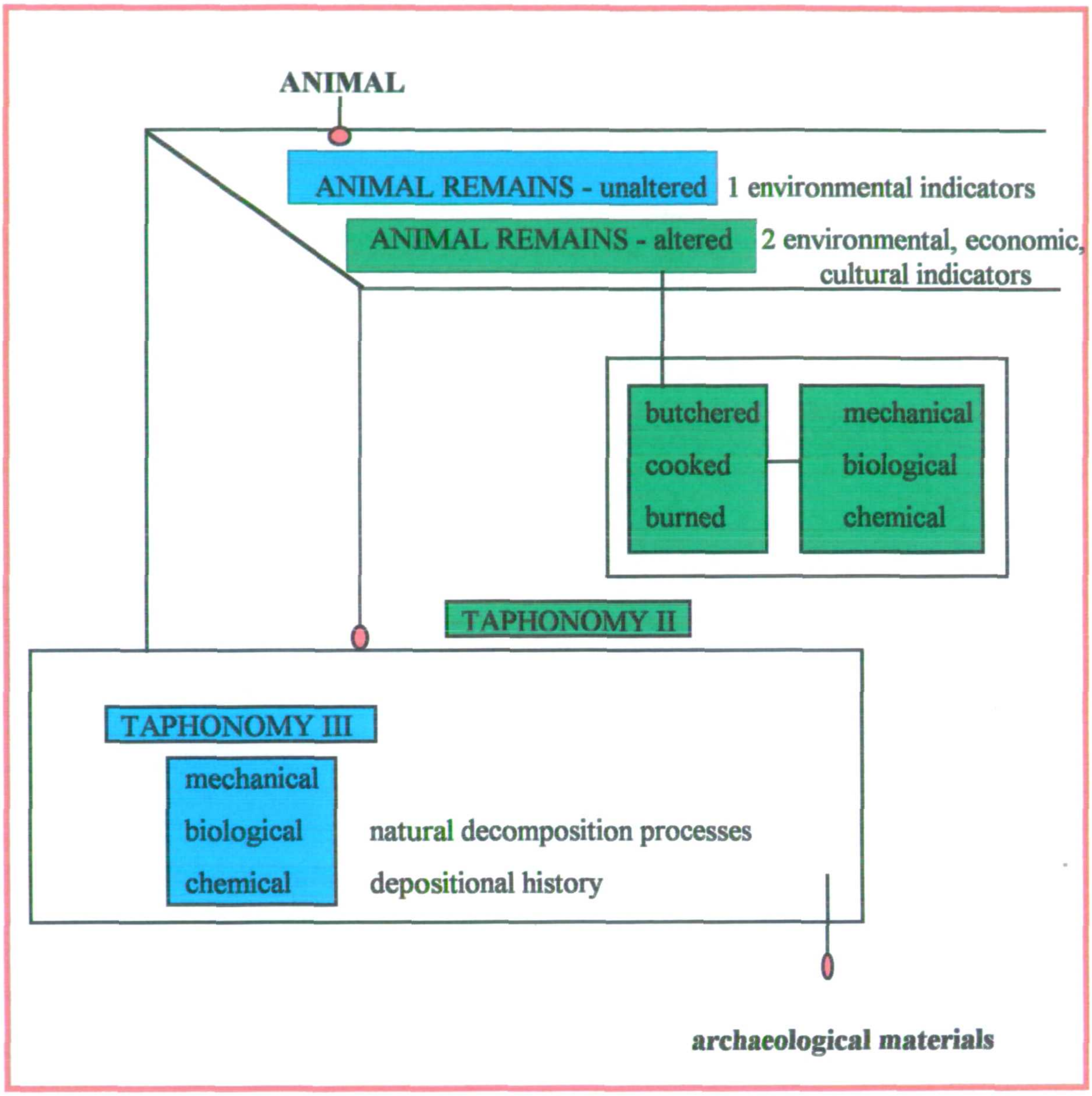


Figure 4.5: Cultural and natural process of information loss from animal remains.

Generally, Behrensmeyer's six categories of bone weathering (1978: 151) are not applicable to the material from Northwestern Ontario. Things appear, except in the few examples such as the *Canis* sp. skull noted in Chapter Two, to have ended up in deposits fairly quickly. This makes sense since a clean camp does not invite scavengers such as Bears that can become very dangerous. Behrensmeyer lumps together physical and chemical agents in the category of "processes of weathering" (1978: 153). These are, in my opinion, quite separate processes although there may be consequences for each from the other. In this case I like to use the term "mechanical" thus separating them out from this lumping.

Although Behrensmeyer observes (1978: 150) that the decomposition of bones on subaerial surfaces "...can be viewed as part of the normal process of nutrient recycling..." this offers little comfort to the archaeologist when the survival probability of a bone in an archaeological context depends on the intensity and rate of a host of interacting destructive processes and the prospect for permanent burial before total destruction has occurred (Behrensmeyer 1978: 150). A combination of processes can effectively narrow the data to uselessness. However, because of the nature of cultural activity, some of these factors have broader application in the destruction of bone in the archaeological context then would apply for materials from palaeontological sites. For example, mechanical destruction will now include butchering and fragmentation of bone, and cooking processes may be added to the chemical destruction processes, particularly if there is the use of acidic fluids for a cooking environment[9] (see further comments on this below). Therefore to the traditional categories of destructive regimes of hot/cold, thawing/freezing, moisture/desiccation, transportation by natural agencies, and the effect of wind exfoliation (Behrensmeyer 1978: 150) can be added all the alteration agencies directed toward biological materials by humans as a result of their culturally prescribed concepts of acquisition, preparation, use and consumption. Of course what comes to mind here is food, even some exotic cuisine, but beyond this and perhaps before this are feathers and fur, bone and sinew, antler and teeth, skin and fat. These are the items from which housing and garments, weapons and tools, binding and storage, decoration and medicine, warmth and symbol are composed and constructed. Biological material need specific conditions to survive. Some only remain in desert conditions, while others require either high pH (bone) or low pH (pollen) for an optimal survival potential.

Northwestern Ontario and archaeological bone taphonomy

In the archaeological circles involved with the research in Northwestern Ontario, the prevailing attitude has been to view archaeological bone as peripheral to the main issue of artefacts. This resulted in reports with faunal data being briefly cited in the body of the work which focused on these artefacts (or settlement patterns assumed from artefact

[9] We recognise this today by adding lemon or tomatoes to the stock pot. This pulls into solution calcium from the bone - good for us but not good for the survival potential of the bone itself.

distributions). Some examples of this can be found in Pollock (1975), Dawson (1974), McLeod (1978). Other reports were published with vague comments on the fauna without benefit of even an inadequate appendix of the species recovered. Without belabouring the point, one example can be found in Koezur and Wright where environmental utilisation was dealt with in one line: "Faunal evidence suggests that a significant portion of the occupation of the Potato Island site was in the spring to early summer as suggested by the presence of juvenile and migratory water fowl" (1976:39). However, to give Wright his due, the problem rests in the low density of archaeological remains in general in Northwestern Ontario (a problem also alluded to by Zvelebil for northern European materials (1981)). Moreover Wright notes:

> As a direct result of the low artifact yield the analyst is continually plagued with the problem of drawing conclusions from inadequate samples. However, if progress is to be made in the understanding of Ojibwa prehistory **low samples must be relied upon and assumed valid until circumstances indicate otherwise.** (emphasis added) (Wright 1965:191).

In Chapter Two I noted that basically there were two sizes of sites - 'big' and 'small'. Archaeological work continues but the problem of sample size remains. Small sites only give up small collections. Big sites are never excavated in total, rather they are sampled. This is done for what I consider two reasons:

- first is the fact that the archaeology of this part of North America has no *élan*, no *cachet*. By this I mean that it is neither the archaeology of the large and spectacular as much as this can be the case in the Canadian context, nor is it the archaeology of people who farmed (e.g. the Iroquois) or people who had or have a high profile from their affiliations with various European peoples (e.g. the Huron with the French) in the early historic period nor is it the archaeology of the visually intriguing and symbolically challenging (e.g. West Coast native groups with totemic house and mortuary poles, masks, and coppers). So in the minds of members of the public it does not exist;
- second is the lack of sufficient research funds from public sources.

It is tough work in the northern forest and the work costs considerable amounts of money and for this money there are relatively low returns compared with, say, a village site in Egypt or a Mayan town in highland Mexico. The archaeological materials from the boreal north are interesting to those of us motivated by the difficulty of understanding low density populations in prehistoric contexts; but to be truthful these materials do not make scintillating museum displays (as canon-makers see Hein 1994). To get money you have to have potential for "results" and the results you achieve frequently are theoretical and tentative because of the sizes of the collections. They do not "show" well to the uninitiated. It is all so circular. Results are achieved only by a systematic plan for the retrieval of data and this requires consistent funding. Both these factors, the overall plan and the money, are missing. For the most part this is because public funds are ephemeral. Further, the expansion of survey work needs to be done. We have no information about sites that may be inland from water courses; we do not even know if sites of any description (hunt camps, butchering sites, quarry sites, etc.) exist in any number away from water routes.

In the collections from Northwestern Ontario, because of the problem of fragmentation, very few of the archaeological bones are identifiable to element[10] let alone to species (see lists of the identified in the endnotes of Chapter Two, where it becomes obvious that the most frequent MNI[11] is 1 per unit of analysis). In some cases a designation of possible size range for the animal is assigned. This is based on cortex thickness, in particular of longbone fragments. The species lists for the study area were developed from known extant species and from data from previous studies, seen in the Codebook in the Appendix. Each species was assigned to a certain size category. It is with those animals that are in the "H" ("very large", e.g. *Alces alces* A10010303, *Cervus elaphus* A10010402, and *Bison bison* A10030101[12]) category (in data line column 34) that this process proved most successful. With these animals, that are significantly larger than the next nearest mammals in size, the fragments are easily discriminated. Time consuming procedures such as fragmentation analysis and carcass sectioning analysis, and similar procedures (Bonnichsen 1973; Chaplin 1971; Grayson 1973, 1984; Hill 1979; Jones 1980; Lyman 1979; Speth 1983) are interesting and do provide insights into cultural practices of processing, tool use and off- site butchering, operational processes of butchering, and such. This, however, has not been the focus of this study, although alterations to the bones that may be indicative of these processes were noted in the analysis and coded into the data lines.

Tied to the attitude on faunal materials, mentioned above, has been the promotion of the general view that the pH of boreal soils causes significant loss of bone from these

[10] The most frequent identification is mammal unk. nown, fragment unknown.
[11] Minimum number of individuals.
[12] In this study Bison fragments were found only on the site from Rainy River; see DdKm-1 items 348, 349 of F1, VIII; 461, 462, 463, 464 of F2, III)

sites. The importance of this issue is emphasised by Schiffer when he states the pivotal point that "...the exact modes and rates of chemical dissolution of bone under varying conditions are not well known" (1987:184); this remains so today (see also the work of Gordon and Buikstra 1981). Indeed, calcined bone is frequent, if not dominant, in the collections I have observed or analysed from acidic environments. This is as true for the Northwestern Ontario collections as it was for the collections I did for Fitzhugh from the Maritime Archaic sites of Rattler's Bight and Ali's Head in Labrador (Dods 1977). But the pH values for excavation units in archaeological sites in North western Ontario, as a general course, have not been done by many of the researchers in the past. The recognition of pH problems with respect to bone preservation has been given lip service but has not, in general, led to a significant change in attitude about the recording of actual pH levels on sites. This is a problem not isolated to North America. It can be seen in reports on European work, for example when Zvelibil notes "...it is clear that in a situation such as in Finland, where due to acidic soils only fragments of burned bones are normally preserved, only a very incomplete picture can emerge..." (Zvelibil 1981:59); but there is no discussion for each site of the formation processes, actual pH or the hydrology, all elements that need to be explored. Indeed, he cites another source for the information on Finish pH but provides no actual figures (Zvelibil 1981:29). Now the sad commentary is that for the Northwestern Ontario bones used in this thesis, I am no further ahead, since such things as the investigation of site formation and hydrology have seldom, if ever, been part of the research design objectives in the archaeological survey work conducted in these remote locations in Canada. The few pH readings from Northwestern Ontario, reported on below, were all incidental to the work on the bones. They were achieved only because some small soils samples were included in some of the artefact bags from some of the excavation units from some of the sites.

Now it is true that the collections from Northwestern Ontario, besides having a relatively low density of bones, have only a very few tooth fragments and only the odd small piece of antler. It is also true that bone requires soil conditions to be within an acceptable pH range - the more towards the alkaline the better since the lower (more acidic) the pH reading the less likely any non-calcined (chemically altered from heat) bone will survive. Optimal conditions, generally, are not to be found in boreal forest situations. Further, my research indicates there is some variation in pH in the boreal and near-boreal forests soils that may, in certain conditions, provide better preservation environments. There is also an indication that there is a range in pH readings from north to south and east to west in Northwestern Ontario. This means that there could be significantly different depositional regimes between sites. Therefore, pH readings must be taken so that collections and sub-sets of collections can be studied taking into account the fact that their depositional histories, strictly from a traditional taphonomic point of view, may have been significantly different. When this is sorted then perhaps we will have a better opportunity to distinguish culture from nature in the process.

In the archaeological materials from Northwestern Ontario I consider the heat alteration of the bone to be an incidental result of disarticulation and/or fragmentation near a heat source such as a cooking pit (although these now altered fragments may have been cleaned away to another location at a subsequent time). In other words, heat alteration seems neither purposeful nor directed toward a specific preparation (beyond the mundane job of the making of meals) or use process. Further, there is a second category of bone that in shape and size is not dissimilar to the calcined fragments but appears not to have been altered in fire pits. If pH is a problem, why do these fragments remain? It is my impression from observations made at the Natural History Museum, London that some of these bones may have been altered as well, not in the fire environment of the calcined examples but perhaps in a cooking pot environment. Although Pearce and Luff (1994) look at cooked bone, they are interested in the subsequent breakage of these bones because of heat alteration, a discussion of use to the issues of fragmentation. However, they have not addressed the issue of the chemical composition in relation to the structure of the bone itself and the possible alterations that may facilitate the preservation of bone in low pH environments. Despite this, heat alteration as seen in these collections is the result of cultural activity. Also there are a few bones and bone fragments from very small mammals and relatively fragile bones from fish that have not been calcined and do not appear to have been cooked in any fashion. These seem to have had no problem with acidic midden environments. I think that it is possible that there is a range of pH values within archaeological environments. Variation in pH is context derived and context driven. As a last observation here on burned bone, there is no indication that any of it was burned in natural forest fires of any sort.

pH variation in boreal forests

Three lines of investigation were undertaken:

- pH readings from the soil samples with the archaeological materials from Northwestern Ontario (Table 4.1) commented on above;
- experiments done on the variation of pH in relation to stands of needleleaf trees in Northwestern Ontario (Table 4.2);
- pH readings from the soils in boreal and boreal / aspen ecotone areas of northern Saskatchewan.

The first two are summarised each in their own table. Each table of these two tables is followed by a brief summary statement.

Table 4.1: pH readings from sites in Northwestern Ontario.

SITE	% ID	AREA	pH READING
DbJm-5 Martin Bird	17.41	Area A sq.5 17-18"	5.9 5.9
DbJm-5		Area B Lev.II top .5 of 4-5"	5.5 5.5
DbJm-5		Area B Lev.III 6-8"	5.5 5.5
DdKm-1 Long Sault	10.37	F13 VIII 18-21cm	6.2 6.2
DdKm-1		F10 IV 9-12cm	6.2
EaJf-1 Wabinosh	5.68	N175 - E90	5.0 5.0

pH and the archaeological sites of Northwestern Ontario

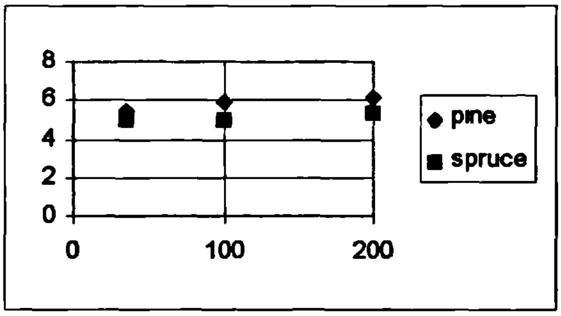
There are two main observations that can be made for the soil samples associated with the archaeological materials. Firstly, there is a demonstrable shift in the pH from lower readings to higher readings, albeit still in the acidic range, as one moves from north to south then to the west. The Wabinosh Site is, of course, northerly on the west side of Lake Nipigon in forest region 4HDV (see Figure 2.2 and Table 2.1) , the Martin Bird Site is on Whitefish Lake in forest region 5HDV (see Figure 2.2 and Table 2.1), while the Long Sault Site is on Rainy River, to the west in forest region 5SM (see Figure 2.2 and Table 2.1).Firstly, there is an indication that there is variation between these areas in the pH values for their soils. Of course this should be expected because of the different configurations of plant species that compose the vegetation of these areas as shown in Table 2.1. Secondly, there is a difference in percentages of identifiable bone fragments from these three sites. The northern Wabinosh Site has a distinctly lower percentage (5.58) when compared to the two sites to the south. However, the assumption that this is pH related can not be sustained when one compares the Wabinosh percentage to the figures for the Martin Bird (17.41%) and Long Sault (10.37%) Sites. The latter two sites do have higher identification percentages than the Wabinosh Site but their pH values, although higher than Wabinosh as well, do not correlate with the rise in their respective percentages. In other words, the expected trend should have been, on the basis of rising pH values at these sites, that the percentage of identified fragments at the Long Sault Site would have been greater than at the Martin Bird Site. The converse is the case.

Some other factor is at play here. Working back in time there could have been differences between the two excavations in the skill of each crew (the Long Sault excavation crew returning a higher percentage of very small fragments), to taphonomic conditions on the sites themselves that have yet to be identified, to different disposal practices between the two populations at these two different sites. For example there may be differences in pH between and within sites generated by the types of locations chosen for the sites (e.g. drainage patterns), intensity of use of the site (discontinuous / continuous), and configuration of discard to non-discard areas of the settlement. However, the reports on these sites do not make these distinctions. Finally, there may be a certain low pH reading below which there is a significant drop in bone preservation. So, there would be some point in soil pH readings between 5.0 (Wabinosh) and 5.5 (Martin Bird) where the destruction process accelerates beyond the incremental loss expected in a gradual decrease in pH and its effect of increased bone loss. This needs to be investigated in controlled experiments.

Table 4.2: pH for the F horizon from test locations in forest stands

TREE TYPE reading from F horizon*	DISTANCE	pH** $\bar{x}$
PINE N=20	36cm	5.5
	100cm	5.9
	200cm	6.2
SPRUCE / BALSAM N=15	36cm	5.0
	100cm	5.0
	200cm	5.3

***partially decomposed surface material (Armson 1977:80-81)**
****cummulative $\bar{x}$ 5.483; mode 5.6**



Tree stand samples

It can be seen with the pH samples collected in tree stands that pH readings rise as one moves away from the stands (Table 4.2 and Figure 4.6). This is seen to a greater extent with the pine stands than with the spruce/balsam stands. Overall, the spruce/balsam stands produce soils with lower pH readings and significantly less elevation in readings as one moves outward. What does this mean for the archaeologist? I think the best advice is: "Look up and look around". The trees in the immediate vicinity, although not necessarily the trees species of the period when the site was occupied, still affect the survival potential for the bone materials in the archaeological site. Site catchment analyses based on the modern examples found around the site may not tell us much about site use in the past if there has been a significant shift in the vegetation. However, it will tell us something about the nature of the taphonomic processes happening and ongoing in the site.

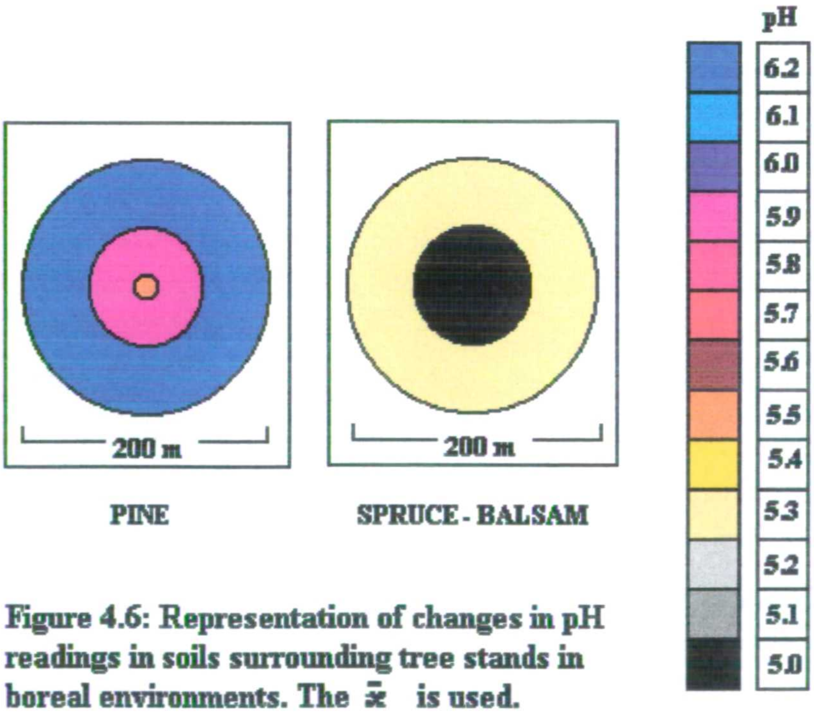


Figure 4.6: Representation of changes in pH readings in soils surrounding tree stands in boreal environments. The $\bar{x}$ is used.

Modern soils in Saskatchewan

The third line of investigation, more recent in time, was done on the soils from the micro-cores collected during my 1995 field season in Saskatchewan. These cores can be seen in figures in Chapter Three. The pH scores are compiled on a spread sheet and then shown in a large graph that contains all the scores for the cores displayed beneath each in their figure representation in Chapter Three. These scores are entered on the graph so that the soil type they come from is evident.

There are a few general observations that can be made for these pH readings. These are:

- first, the northern sites, such as 2C (badly disturbed by logging) and Weyakwin (old growth), generally have lower pH scores. Fully five of the seven scores falling below a reading of 5 came from the 2C site; a sixth such score was from Weyakwin and the seventh was from the most northerly sample taken in the Narrow Hills area. These low readings are, for the most part found in Of, Om, and Oh soils;

- second, the highest pH score of 9.07 was from old growth at Crean Lake. This was followed by the next highest score of 8.54 from the Lofthouse area. For the most part both the Crean Lake and Lofthouse areas had the highest pH readings (see Figure 4.8). Like the observation made for the Northwestern Ontario sites, here too these are southern sites with the higher readings. In particular, the Lofthouse area is ecotoning into parkland then prairie similar to the Rainy River area. Both showed the highest readings for their respective areas;

- third and last, for the scores that are [7 ≤ 8 pH], 66% come from F, H, L or CII soil horizons. These are the Lofthouse soils in the southern ecotone area.

In summary, it must not be assumed that all boreal forest soils have low pH. For the most part this may be true, specifically in the more northern situations and in full needleleaf tree cover areas. The type of tree cover, its proximity, and density will affect the pH readings. Southern sites may have high pH values (≥ 7) or values approaching 7 in the low acidic range. However, there can be exceptions in all instances as demonstrated here.

Table 4.3

soil		Of	Om	Oh	A	B	L	Lp	Lb	F	burn	C	H	Ah	CII	CIII	Cf
Site 2C	1b	5 1	5														
	2b	4.7	4 6	4 9													
	3b	4 8	4.6														
	1a	5.2	5	5.5													
	2a	5.1	5.5		5.8												
	3a	5.4	5.3		5.7												
	BP1	6.6	6.2														
	BP2	6.5	6.4		6	5.8											
	RG1	5	5.6			5.9											
	RG2	5.8	5.4														
CREAN	OG1	7 3	5.9														
	OG2	6.7	9 1														
	OG3							6		5.8	5.9						
	OG4						6.6			5.9	6						
	OG5									6.6		5.6					
	OA6	5.7	5.1														
	FEN7			5.2													
	OG8									6			6.1				
	FEN8	6.7															
	MA9						6.6			5.9							
LOFT	1						6.2			6.6			6.4	6.7			
	2						7.4			8.5							
	3						7.1			6.4			6.6				
	4						6			6							
	6						6.3			6.5							
	7						7.2					7.2			7.9		
	8						7.1			7			6.9				
WEYAK	1	6.2	5.6	5.6													
	2	6.3	4.7														
	3	6.8	6.5	6.9													
McDoug	1						5.1		5.8	5.3							

soil		Of	Om	Oh	A	B	L	Lp	Lb	F	burn	C	H	Ah	CII	CIII	Cf
	2						5.6			5.6			5.9				
NH98FIRE	1										6.3	6	6.1		5.6	4.5	
	2										7	5.5	6.2				
NHA	1	7	6.8	6.5	7.7												
	2	5.5	5.1	5 4		5.7											
	3	6.2	5 6	5.4	5.1												
	4	4.7	5.3														
NHB	1	6.9	6 2														
	2	6.7	6.3		6												
	3	6.2	5.9		5.6												
NHSH	IE1				6												
	IE2											6.3					
	RP3		6 2														
NHSH	RG1	6										6					
	PR1A	5.3	5.3														6.5
	PR1B	5 7											5.5				

Table 4.3
continued

Table 4. 3: pH scores for the soils from the samples collected during field work in Saskatchewan, Summer 1995. Any score highlighted in blue is a mean of three scores on the same soil (done as a check on scores that appeared to be out of the range with respect to the others). These pH scores are displayed in the following graphs.

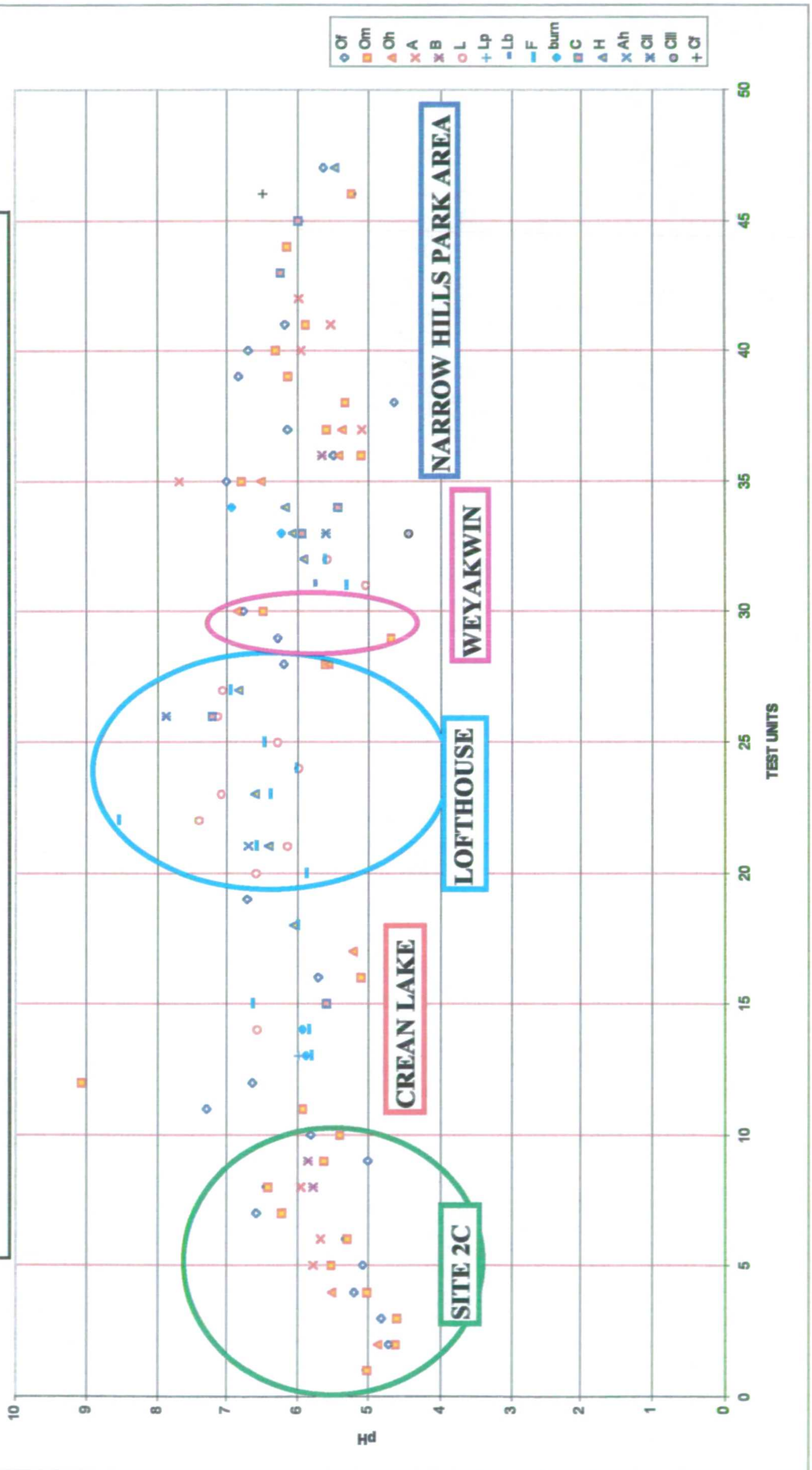


Figure 4.7: Graph of the pH scores from the Saskatchewan field work of the Summer of 1995.

The adaptation of the peoples of the northern boreal area of North America has been described as nomadic thus resulting in scattered archaeological sites with low densities of cultural remains. The fact is that there are a range of sites that fall into two basic categories in size : big and small albeit the big sites are small in comparison to large sites of different cultures and different areas. Some of the sites of the area have been subjected to destruction by inundation and all have had dense forest cover at various times (Dawson 1983:55). The forest cover seems to be related to pre- and post-depositional history of sites. Forest structure (species) and configuration (density, shape) could be part of the decision process for the selection of locations for habitation sites. This is probably a salient feature for materials from boreal Eurasia as well. These structural constraints tied to the availability of economic resources further addresses issues of low density sites. A contrasting pattern is described for coastal southern Sweden by Larsson (1993). There the postglacial adaptations were habitations of "...long occupations of the same location..." with "...Late Mesolithic kitchen middens ...internationally known..." (1993:33)(a similar pattern is found along the Northwest coast of North America). Of course the focus is marine rather than terrestrial/riverine, and thus there was a level of resource stability generally not found in the sites of the interior boreal areas.

The late Dr. Howard Savage of the University of Toronto observed (personal communication) that five hundred specimens from a site is the minimum number for the development of statements on the use of faunal resources. From large sites this number may well be too small, particularly if there is spatial segregation of particular food preparation and consumption activities. Five hundred specimens may well be adequate for sites of restricted area but in boreal North America sites that yield this 'magic' number are few and far between in collections developed from survey/testing programs.

Small sites can not be ignored. As noted earlier such sites comprise most of the living history of our species. Nine of the sites discussed in Chapter Two have samples ranging from n=123 to n=3684. Only three sites exceed n=1000. The remaining eleven had less than 100 specimens each and were used as subsidiary data for site situation and distribution. Although these sites had low numbers a few had culturally interesting remains, particularly of *Canis* species. It is my view that small yield sites can not be 'stand alone' examples. However, when seen as part of a comprehensive jigsaw picture they are important components of the whole and have their use in such an interpretation of the prehistoric record.

4.4: Cultural Systemic Contexts (CSC)

Taphonomy II and **Taphonomy IV** specifically address the issue of cultural systemic contexts (**CSC:A; CSC:B**) and their associated filters (**CF1, CF2; CF3, CF4**). Material items move through these systemic contexts. The forces diminishing information are not only the biological, chemical, and mechanical but the forces at play in ideational systems. Ideational forces can cause changes to occur in the physical world. For example an animal lives or dies in its encounter with the hunter perhaps on the basis of food taboos or some edifice is constructed because of concern for the proper recognition of a deity or a universal force. Through time ideational constructs themselves also change. This change in the ideational may change the boundaries, content, and shape of the physical / metaphysical world(s). It may alter the tone of discourse; change world views. The process may be subtle and / or it may be cataclysmic. Many of the forces that cause change, and the direction and outcome of change are difficult to determine from physical remains. Most of the remains archaeologists work with, in particular in small scale social settings, do not inform on the non-physical construct, do not tell us 'why' and frequently do not even let us know 'how'.

4.4.1: Taphonomy II

CSC:A, with its associated filters of **CF1** and **CF2**, is the context through which the processes within an archaeological culture can be explored. I have called these Culture I and Culture II in the attempt to incorporate the possibility that discarded items may be recycled by a subsequent culture (Lange and Rydberg 1972); indeed this may be expanded to include traded-in items or even be used to follow traded-out items. Thus Culture I is the specific target group of the archaeological investigation while Culture II is a more general category and includes all other cultures that interacted with the target culture or acted upon the 'refuse' of the target culture, excluding the culture of archaeological which is dealt with under **Taphonomy IV**. The processes occurring here can be viewed from a cultural perspective **and** a biological - ecological perspective[13]. There are two very basic things that all societies must work through: the process of energy production (tools); and the process of energy maintenance (food, clothing, shelter). From primary procurement onward there is

[13] See Odum's model for predator / prey relationships (1975 9).

the potential for the production of varying types of refuse depending on the use decisions made at specific points. These types of refuse may have their specific patterns of discard.

The progress of foodstuffs (consumables in the model)[14] can be followed from acquisition and transport through to processing and storage then on to use (reuse) and then to eventual discarding of what the culture considers the detritus[15] of all stages of preparation and use[16]. The constituents of both consumables and durables will move from the natural realm to the cultural realm because of concepts of use. Procurement, processing, reprocessing and use have culture specific locals for these operations.

The questions

With food one may ask what was available as food, an inquiry that flows directly from the work on NSC:A. From available resources what evidence do we have for food choices? What food appears to have been ignored? In other words 'What was consumed or not consumed as food?' What is the impact on diet? (Barnes 1976; Chaney and Ross 1971; Dennell 1979; Farkas 1979; Hegsted 1976; Høygaard 1941; Lyman 1979; Price 1985; Wing and Brown 1979) To what extent can operational chains for consumables be defined [e] ? What 'products' of these processes or 'links' in the chain can one distinguish in the archaeological record? Can one speculate on the ideational categories, as seen in ***Le cru et le cuit*** (Lévi-Strauss 1964), of the natural world from the fragments of such processes? What is the role of analogy as seen in the direct historical approach or the application of what can be termed cultural uniformitarianism, in the reconstruction of the past? What categories of information are lost? What categories of information are retrievable? Can one deduce the ideational systems that dictated the choices seen or are the frames of reference so different that such speculation results in artful, albeit unintentional, deception?

Some answers

1. Our evidence for food choices is good. Tables 2.4, 2.5, 2.6, 2.7 delineate the species identified from certain archaeological sites in Northwestern Ontario The actual data lines for the identified bones are found in an endnote for Chapter Two. Beaver, Hare,

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[14] The progress of durables can be examined within the same model. Durables are things that are not consumed in the way of food and have a lasting quality to them. An excellent example is pottery. Pottery can only come into existence by the acquisition of materials from the 'natural' world (clays, minerals, etc...) being processed in a manufacturing model that works under certain cultural constraints such as division of labour, specific pottery forms for specific functions, ownership of designs, etc...It is then used, traded, abandoned, broken, discarded...recycled as grit for temper for future pottery and on to the discard environment and then the hands of the archaeologist who studies it for all these aspects and more.

[5] Detritus includes faeces and excreta.

[16] For models of this process see Schiffer (1972.162); for a broad discussion see Clarke (1968); for site formation processes see Gifford (1978.80); and for the biological aspects of this process see the diagram found in Delany (1982·99).

and Muskrat are very evident. There is some evidence for large mammals such as Deer, and Bison and there are a few indicators for Bear. There are various representative of *Canis* species individuals but these, like the Bear and Bison, are few and site specific rather than diffuse over many sites.

2. We have a very good understanding of the environmental requirements of the species of choice (NSC:A), in particular Beaver. It has also been seen in the figures from the HBC and from modern hunt figures from Darlene Newton. All this is delineated in Chapter Three. From this we can work to an economic model for human use of these resources.

3. There are a few birds, in particular water fowl, in the archaeological materials. However, the Martin Bird Site stands alone in giving us an understanding of the use of this resource. It is reported on in Chapter Two and is an important part of the model developed in Chapter Five.

4. There is the problem of the fish on which Cleland (1980) comments (see section 2.5.3 on page 132)[17]. Sites such as Wabinosh and Long Sault are in excellent locations for the acquisition of fish (Holzkamm, et al. 1988), in particular fish that migrate for spawning purposes at a specific season of the year. However, as a food resource it has relatively low numbers in the prehistoric sites of this part of Canada. The answer here could be one (or all) of many.

- These sites were excavated with minimum (if any) screening and no flotation was done (Taphonomy IV). So the fish remains may not be indicative of the actual intensity of use.
- Relatively fragile fish bones may have been discarded in areas that had serious pH problems and thus they suffered proportionally greater loss than the hardier mammal bones (Taphonomy III).
- Fish could have had special discard requirements that we have yet to fully recognise in the archaeological record (Taphonomy II). Certainly, as I indicated in Chapter Two, the early historical and ethnographic documents show us that the world of water held special place in the lives of boreal peoples. It was a place of mystery, a place of danger, and potentially a place of death. Large fish

[7] For a comprehensive discussion prehistoric of fishing in North America Rostlund's book (1952) is still the place to begin.

came from this realm and may have required special consideration because of this.

- Or fish may have not been the food of choice as it was in the post environmental collapse period (mid- to late Century 19th through 20th Century see Rogers and Black (1976) and as previously cited in Chapter One) in Northwestern Ontario (Taphonomy I - II). Rogers once commented *en passant* to me that it was his belief that fish were regarded as "dog food" in the distant past. If it is the case that fish were food for dogs or used in starvation situations by humans, then we may have indications of either or both of these uses in prehistory.

The answer to this problem awaits analysis based firstly on materials retrieved under tight excavation controls and secondly on a more specific, extensive search of all historic documents and ethnographic records on this subject alone.

5. The archaeological record does not give us any indication of division of labour on the basis of sex or gender with respect to food acquisition. The ethnographic materials do tell us that, generally, men hunted (and this is particularly so for large game) and then women became responsible for the in-camp processing. However, I do know women who hunt and fish. Some run traplines like Darlene Newton. In this area of the analysis I think the use of the direct historic approach is fully indicated and this being the case we can assume that in hunting men predominated and that women hunted of necessity and then only small game. This is supported by the figures compiled by Wing and Brown (1979:12) (see Table 4.4, below) and their observation that the protein : carbohydrate ratio continued to increase to the benefit of the protein portion of the diet as one moved into the higher latitudes (1979:48). Further, the outlines of the traditional diet can be seen in modern research work. Høygaard (1941) outlined the protein rich northern diet, and Farkas (1979) reviewed modern diet in the north. In both these reports meat is shown as important. This also is the case in the work of George, et al. (1992) for the James Bay Cree, although both this work and the Farkas report (1979) do show the serious shift in diet to 'western' style foodstuffs (e.g. sugar, white bread, processed foods, etc.). Traditional diet is better covered by Tanner (1979) and Feit in his ethno-ecology study of 1973.

There is plenty of food in the boreal north. The problem is that much of it is in forms not directly available to humans as food. Further, there is a sharp division of seasons that makes for a rather restricted growing season for plants. This means that humans must eat at higher trophic levels than just plants to be able to sustain themselves in this environment during cool and cold months (September to May). So meat (and fat) is a high energy food that comes from animals that, for the most part, convert vegetative matter into convenient food form that is useful to humans. Not only do they convert the leaves, bark, and twigs into flesh but they store those converted resources into the season of want, winter, in the northern habitat. In this sense they are walking larders for predators, including humans. Such animals are indicated as important components of the diet in the data discussed in Chapter Two.

Table 4.4: Division of Labour in Subsistence Activities from Ethnographic Sources (Wing and Brown 1979:12)

activity	predom. male No.	predom. male %	predom. female No.	predom. female %	equal No.	equal %	Total
gathering	6	3	191	88	21	10	218
hunting	304	100	0	0	0	0	304
fishing	201	93	1	tr.	14	7	216 (217)

6. We have no direct indication of plant use from the twenty archaeological sites. From ethnographies we know about the use of plants generally (Meeker, et al. 1993), and we have excellent information on the use of wild rice (Vennum 1988; Jenks 1900). Certainly my reading of Ingold (1988) reinforced my view that women's role in the construction of symbolic landscapes is very important. The gathering activity of the growing season is dictated more by the logistic needs of women in the work of procuring floral materials for foods, medicinals, infusions, decoctions, and other uses (e.g. twine material, basket reeds, etc...) than it is by the pattern of the hunt. It is evident that hunt patterns configure the landscape of winter (or the cooler periods) while the gathering patterns configure the landscape of summer. Conceptually they may appear to us to be two different worlds and certainly they seem to function in that fashion. However, this is not the case. Rather they are two aspects of the same world and Janus-like these two aspects cause different 'things' to become important within the schema of a specific time - summer has a different configuration from winter. This is reflected in the social arrangements of the people at these times as well (fission / fusion). As we will see in the next chapter this

ethnographic information on women and plants provides some interesting, and I think important, information in relation to territoriality.

7. We have the location of the sites discussed individually but also synthesised for pattern of choice of location in Chapter Two. Figures 2.19 and 2.20 illustrate two key site location patterns: "just up the creek", and "on the bay" patterns. These were referred to in Chapter Three in the discussion of ecozone / ecotone structure of the boreal forest with habitat patchiness (see Figures 3.28 and 3.29). Specific catchments were not done during the field work on these sites. In some instances this would have been fruitless since the areas have had serious disruption to their biomass structure in the historic period (see discussions of dams and water levels, forest company activities, incursion of European style farms and settlements discussed in Chapter Two and Three).

8. We have a few indications of seasonality but they are not definitive. These come from the birds (spring through fall) (Bellrose 1980)[18] [19] and the spawning patterns of fish (Scott and Crossman 1973). As well, mammals have seasons that could be termed 'better' for the acquisition of items for specific uses (fall for high fat, winter for heavier fur, spring for when you really need food, etc...). But we have no firm indication that any one of the twenty archaeological sites was season specific (except perhaps for the Martin Bird Site on Whitefish Lake), such as a winter hunt camp (fission social pattern), or a summer gathering place (fusion social pattern). So, although we know these patterns pertained from the ethnographic literature, it can not be shown absolutely in the archaeological record from these specific sites.

Therefore, it can be seen that certain categories of physical evidence are available. Further, certain categories of social / cultural data are also available from the historic documents and ethnographic materials. Speculation on the ideational components and concepts of the metaphysical[20] benefit from the fact that the prehistoric peoples of this area of Canada have direct and demonstrable links into the historic period. Analogy, cultural uniformatarianism, and the direct historic approach can all be used with some level of

[18] Grigson (1985) discusses a specific portion of the season as optimal for hunting water birds. She suggests the period of moulting would be productive.

[19] As Bellrose notes moult patterns are one of the major criteria for taxonomic groupings of waterfowl (1980 37). For the Anserinae (whistling ducks, geese, and swans) he notes that there is one plumage per year and a single complete annual moult that occurs during breeding period for the non-breeders and after breeding period for the breeders (1980:37) while for the Anatinae (typical ducks) he says there is considerable variation on the basis of subgroups and geographic areas. Generally they moult twice a year with the males displaying seasonal dichromatism and females have a pre-nesting moult that replaces down with a new, thicker, darker down to facilitate incubation of eggs. The second moult for females occurs later in the year after the young are sufficiently large. It replaces flight feathers (1980 37).

[20] In his book *Meditations on Hunting* (1972) Ortega y Gasset discusses hunting as a mystical union where the hunter experiences a sacred world "from the point of view of the prey, without abandoning his own point of view" (1972 142). The field of 'play' of the hunt is then a scared landscape.

comfort that in the analysis we have not strayed too far from what could have been past reality. What we can hope to do is identify the processes whereby nature is transformed into culture (Bennett 1993:13).

> This position is confused by some anthropologists with the notion of causation, that is that human relationships to the environment are 'caused by Culture', thus excluding causal factors emanating from environmental constraints. This is a misunderstanding of the environmentalist position, which views humans as responsible for their own fate but also dependent on Nature and therefore subject to destructive feedbacks from the degraded environment (Bennett 1993:13).

The model to be developed in the next chapter illustrates that feedbacks between culture and nature in the human physical and metaphysical landscape are key to an understanding of the economy of these boreal people. It also gives new and broader insights into the environmental collapse in the historic period.

4.4.2; Taphonomy IV

There are at least two sets of ideological constructs interfacing in the archaeological process. There is the culture of the past - the archaeological culture (the 'object' of investigation, the 'subject' of the report) and there is the culture of the present - the culture of archaeology (the 'investigator' and the 'reporter'). As I noted in the Preface, there is the problem of the development of the intersubject when the culture of archaeology acts on the archaeological culture. It is not my intent to go into great detail for this section of the model. Indeed, I think that this topic could be a study in itself. However, there are a few points made earlier I want to summarise here.

Cultural Systemic Context B (CSC:B) and its filters, **CF3**, and **CF4** like CSC:A deals with acquisition, use / consumption and discard cycles. However, here the culture being examined is the culture of archaeology itself (Culture III). Thus the culture of archaeology and parameters encoded by existing institutions and practices are the focus in this section of the model of information loss. Such parameters affect the procurement (survey and selection of sites for excavation; decisions on the extent of the investigation; retrieval techniques to be employed, concepts of what constitute data; recording of the procedures), preparation and 'consumption' (cataloguing; analysis; literature support; *etc.*), discard (storage or actual discard), and synthesis of the data (contribution to the discipline and to knowledge in general). To sum up, cultural filters determine how the researcher discriminates in the retrieval process, and in the final analysis (no pun intended) how the material will be interpreted, used and discarded. The ideational component engaged in this is, at times, as nebulous as that for the target culture, the archaeological culture. Perhaps this section of the model represents the one component most removed from the traditional use of the term 'taphonomy'. There are still physical 'things' that can happen to the archaeological remains. They may be damaged in the excavation, they may be destroyed in the analysis process such as with the process of radiocarbon dating. They may be lost in transit, or improperly stored, or any or a myriad of things that can purposely or inadvertently happen to the physical structure of the "finds". In this sense the taphonomic process discussed in Taphonomy II is continued.

The loss of information (taphonomy used in a metaphorical sense) may be greater here than anywhere else in the model and this has little to do with the bumps and knocks that physically diminish the artefact. Rather it has to do with the skill of the interpreter and the intellectual, ideological, and/or political atmosphere of the environment in which he or she works. There are certain points of disarticulation between the community of the past and the community of the present. These are the discontinuities of space / time normally thought of as being between peoples of the present and peoples of the past. But there are also those discontinuities that transcend the physical. I have discussed the different models of knowing (TEK and WSK) and I have noted the crisis of narrative on landscape experienced by aboriginal peoples. The economic and political discontinuities between the present representatives of the prehistoric peoples and the archaeologist as representative of a dominant sector of society have also been noted. I have also commented on the economic and political constraints of doing archaeology in the boreal north. The choices made by the archaeologist in this atmosphere will affect the 'story' being *produced*. Now, if we want to diminish these influences on the 'story' then we have to recognise that there are such factors and that they overtly and covertly impinge on the process of interpretation.

Endnotes

a. Lyotard says about knowledge:

> ..cannot be reduced to science, nor even to learning...what is meant...is not a set of denotative statements; far from it. It also includes notions of "know-how," "knowing how to live," "how to listen" [*savoir-faire, savoir-vivre, savoir-écouter*], etc. Knowledge, then is a question of competence that goes beyond the simple determination and application of the criterion of truth, extending to the determination and application of criteria of efficiency (technological qualification), of justice and/or happiness (ethical wisdom), of the beauty of a sound or color (auditory and visual sensibility), etc....it coincides with an extensive array of competence-building measures and is the only form embodied in a subject constituted by the various areas of competence composing it ....The consensus that permits such knowledge to be circumscribed and makes it possible to distinguish one who knows from one ho doesn't (the foreigner, the child) is what constitutes the culture of a people (1987:78-79).

b. On learning he says this:

> Learning is a set of statements that, to the exclusion of all other statements, denote or describe objects and may be declared true or false. Science is a subset of learning. It is also composed of denotative statements, but imposes two supplementary conditions on their acceptability: the objects to which they refer must be available for repeated access, in other words, they must be accessible in explicit conditions for observation; and it must be possible to decide whether or not a given statement pertains to the language judged relevant by the experts (1987: 78).

c. On the relationship between the two he goes on to say:

> ...narrative knowledge does not give priority to the question of its own legitimation and that it certifies itself in the pragmatics of its own transmission without having recourse to argumentation and proof. This is why its incomprehension of the problems of scientific discourse is accompanied by a certain tolerance: it approaches such discourse primarily as a variant in the family of narrative cultures. The opposite is not true. The scientist questions the validity of narrative statements and concludes that they are never subject to argumentation or proof. He classifies then as belonging to a different mentality: savage, primitive, under-developed, backward, alienated, composed of opinions, customs, authority, prejudice, ignorance, ideology. Narratives are fables, myths, legends, fit only for women and children. At best, attempts are made to throw some rays of light into this obscurantism, to civilize, educate, develop(1987:80).

d. Peterson (1955) in his book *North American Moose* made these observations on White-tailed Deer:

> ...Working with white-tailed deer in Pennsylvania, Gerstell (1943) concluded that a decrease in fawn production was correlated with a depletion of food supply. Morton and Cheatum (1946) studied the breeding potential of white-tailed deer in New York and found a great disparity between the northern Adirondack region and southern New York region in the occurrence of barren does and the ratio of single, twin, and triplet embryos. They found that 20.1 percent of specimens examined from the Adirondack region were barren, whereas only 7.7 percent were barren from the southern region. The ratio of single, twin, and triplet embryos was 8:2:1 in the Adirondack region and 3:6:1 in the southern region. The authors attribute the difference to the bad effects of poor winter feeding and a deficiency of particular dietary elements in the case of the northern deer...(1955:60-61).

e. In my ethnographic notes from my field work in Botswana in 1978 (Dods 1979) I came across what I considered an interesting example of the allocation of food resources on the basis of gender and status. The head of the hunted animals went to the headman along with the kidneys and liver. It was his obligation to give the kidneys and liver to widows and orphans. The head was his and he could share it with other men if he wanted. The headman would sit in what we would consider his front yard (actually the low walled space in front of his house is a private space that he can make public if he so chooses). Passing men could be (public), or could not be (private) recognised by the headman. On recognition the passing male would be invited to share the eating of the head and of course the brain. The fragments of bone from the skulls were in high concentration in a rectangular area enclosed by the small wall in front of the house. Concentrations of skull fragments in specific locations in an archaeological context, in a southern African setting could be interpreted as a prehistoric record of this social activity so recently observed.

CHAPTER FIVE: LANDSCAPE AND THE BOREAL HUNTER

> **Hunters, then, are not simply fighters in the side of humanity against the wilderness. Their loyalties are divided. Because hunting takes place at the boundary between the human domain and the wilderness, the hunter stands with one foot on each side of the boundary, and swears no perpetual allegiance to either side. He is a liminal and ambiguous figure... (Cartmill 1993:31).**

5.1: Introduction

The modern First Nation populations of the research area of northern boreal Canada, like all other American aboriginal populations, have been through social, cultural, and environmental disruptions with appalling consequences in the historic past. It has been a journey of both immense tragedy and tremendous courage and along the way many compromises had to be made. Of these compromises, some mask the legacy from the prehistoric past because they reflect significant changes which were a direct and needed response to changed circumstances in the historic period. These disruptions have been addressed in various instances in Chapters One, Two, and Three.

The consequences of these disruptions can be seen in the modern circumstances of northern peoples. Some of these are listed and discussed below in preparation for the development of the model on prehistoric subsistence.

5.1.1: Enforced restructuring of dietary patterns

The collapse in the faunal resources was outlined in Chapter One and the "restructuring" of the narrative on the boreal forest for new economic objectives has been commented on in Chapters Two, Three, and Four. One of the consequences of this was that certain aboriginal populations did not have access to particular food resources in sufficient quantity to continue in their traditional dietary pattern during the 19th and early 20th Century. However, some elements of this prehistoric dietary pattern can still be seen in modern examples from the Mistassini (Cree). Because of their location in northern Quebec (east of James Bay), the Mistassini were somewhat removed from the environmental problems experienced by the Cree and Ojibwe in Northwestern Ontario.

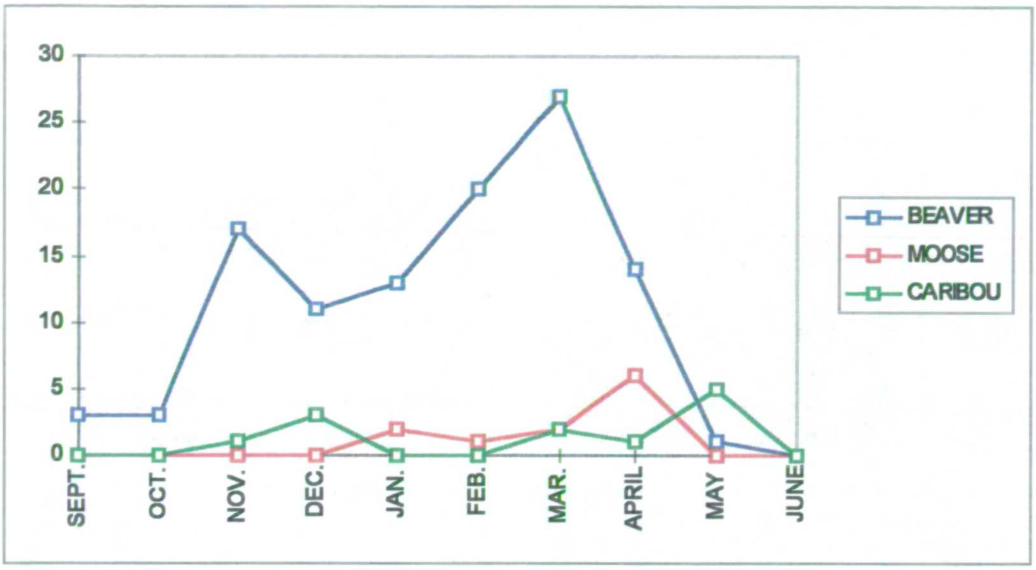

Figure 5.1: Jimiken Group, Mistassini, monthly production counts of Beaver, Moose and Caribou for 1969-1970 (counts of individuals)(Tanner 1979: 53, Table 6, in part).

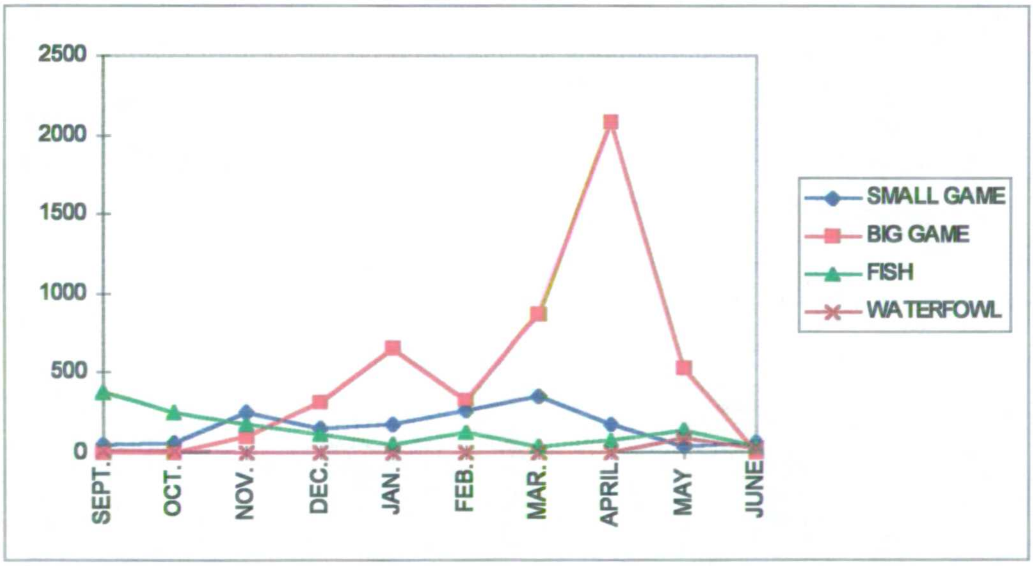

Figure 5.2: Jimiken Group, Mistassini, monthly production of meat by weight (in lbs.) for 1969-1970 (Tanner 1979: 53, Table 6, in part).

Moreover, their involvement in the fur trade through the Eastmain Hudson Bay Company post (see Figure 3.34) was more sporadic and less productive (at least from the Company's perspective) than the trade at the other posts. This, also, ameliorated the potential ecological problems for them. Therefore ethnographic data for prehistoric diet from this area of the north is particularly useful. Tanner (1979:53) provides such ethnographic evidence for the use of Beaver as an important food source with the Mistassini as recently as thirty years ago.

In addition, Rogers (1972a), in reviewing the weight of edible food acquired from game, showed that Beaver were second only to Moose[1], and well ahead of the meat weight yielded by the12 Caribou (1500 lbs.), in the mammal category of game for the Alfie Matoush hunting group (winter 1953-1954) of the Mistassini (1972a: 104). Indeed, of the eleven mammals listed, the 55 Beaver accounted for 25% (2,120 lbs.) of the weight of edible meat and the 10 Moose about 50% (4000 lbs.)[2]. As Rogers (1972a) notes, Moose are a recent major addition to the Mistassini diet and in the past Beaver, Caribou, and Bear were the important triad as "...they supplied a substantial proportion of the food..." (Rogers 1972a:105). The major dietary shift since prehistoric times can be seen in the relative significance of fish in the diet (3165 lbs). This dietary proportion of fish is not supported in the archaeological record but then again there is the problem of the preservation and/or recovery of fish remains in the archaeological sites of boreal Ontario which was discussed in Chapters Two and Four. In general, the stability of the traditional diet pattern over time is supported by the work of Farkas (1979). In her survey of the northern aboriginal diet she discussed traditional foods and the "parts eaten" (1979:22-27) (see Figure 5.3, below). This illustrates the continuing traditional cultural content in the composition of diet regardless of the introduction of Euro-Canadian foodstuffs and exposure to different concepts about food.

When systems collapse there are possible alternative responses available to human populations. These may be put in the context of Odum's (1975) model for omnivore response to disruption in food systems. To this model, with its 'threshold switch' (Figure 5.4), I specifically propose the addition of the 'cultural response switch' for human populations (Figure 5.5).

Diet options offer survival advantages to the omnivore over carnivore; so the diversified predator or the omnivore has more opportunity to survive serious environmental collapse than the focused predator or even the focused herbivore. In a four level trophic system, humans as omnivores can choose to define the categories of

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[1] The hunting of Moose and Caribou are more 'active' pursuits. By this I mean that you can set traps for game such as Beaver, go on with other tasks, then return to collect the catch. With large, mobile game much more time and energy needs to be 'invested' in their acquisition.
[2] Rogers goes on to note "...70% of the food was derived from the land. Accordingly, the Mistassini remain primarily hunters and, to a certain extent, fishermen. The gathering of vegetal foods is minimal....Securing food is a constant problem and a never ending concern. Times of starvation are vividly remembered and countless tales are told concerning such events. It is perhaps because of this that so much of Mistassini religion revolves about the quest of food" (1972a:104).

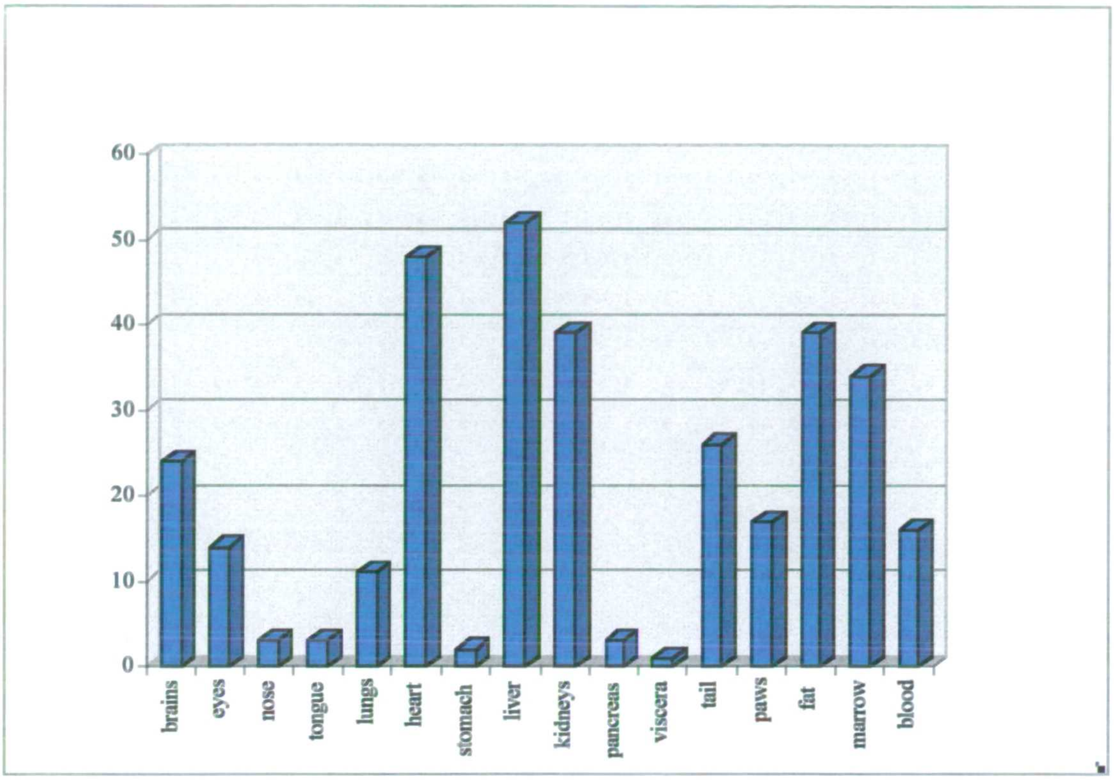

Figure 5.3: Parts of game used for food, besides meat, by Northern First Nation peoples based on 77 surveys returned from ten provinces of Canada (after Farkas 1979:23)

consumption and then choose to use various options interchangeably (options 1-4). They may also choose to focus within one category of food and change the percentages of various species chosen within that category (option 5). This fifth option results in the alteration of acquisition strategies because the focus for survival may be a species that has been peripheral to the core diet in the past. Therefore the decision to change trophic level of consumption can ameliorate, somewhat, the effects of the shifts in the natural environment and move humans up or down the trophic levels as conditions dictate or allow.

The fifth option is to stay within your primary trophic level of food adaptation and merely make a horizontal shift within that level to other resources within that category. This pattern of response, the horizontal shift within a trophic level in the vertical pattern presented by Odum, is found, for the most part, with human populations and fits our pattern as generalised omnivores. Such horizontal shifts, although within the same trophic

OPTION ONE
no preference
-eating either plants or animals-

OPTION TWO
a constant percentage value
-e.g. 80% plants; 20% animals-

OPTION THREE
seasonal use
-plants in one part of the year;
animals in another-

OPTION FOUR
"threshold switch"
-if animals are preferred food
a switch to plants occurs when
animals are reduced to a low level-

(Odum 1975:9)

Figure 5.4: Strategies of adjustment for an omnivore species when environmental shifts occur. After Odum (1975:9).

OPTION FIVE
"cultural choice switch"
-a shift between species within a preferred food category (animals)

1. shift to fish dominated diet from mammal dominated diet later followed by 2. a shift to large mammals from small mammals then 3. reincorporating of small mammals (Beaver).

Figure 5.5: Addition of "cultural choice switch" in the strategies of adjustment when environmental shifts occur.

level, can entail, or even require, changes in acquisition patterns and concomitant adjustments in technology. Also, there may be modified cultural ideas about division of labour and what constitutes 'food' or what are the components of an 'adequate' diet. This horizontal shift can be seen in the 19th Century move to fish and hare resources discussed by Rogers and Black (1976)(see also Berkes, et al. 1992 and Berkes, et al. 1994 for a more recent discussion of diet) and then later to the reincorporating of large game animals (mostly Moose inland and Caribou along with some Moose along the coasts of James and Hudson Bays). The historic development of the hunting of some large game was no doubt greatly facilitated by the introduction and spread of firearms.

It must be noted, however, that Kay (1995) insists that large game animals were not a significant component of past diets, at least for the Intermountain West. Citing early historic documents on the exploration of the interior of North America, he notes a lack of browse damage for trees and shrubs, high yields of bush berry, and reported low density of game animals[3]. This pattern certainly is supported by the relatively low numbers of bones from large game animals identified to species in the archaeological data for the twenty sites of Northwestern Ontario as well. The compositions of the faunal collections from these sites have been discussed in Chapter Two (see Table 2.5 for Wabinosh River, Martin Bird, and Long Sault figures and the Chapter Two Endnotes ***a*** to ***n*** for the listing of the identification data on Deer, Moose, Elk, Woodland Caribou, and Bison). The complete data are to be found in the microfiche files of the Appendix. So in the Kay (1995) model, the relatively high numbers of large game reported in recent times, and seen in some instances in the figures above, are the result of changed circumstances in the forests and changing hunt patterns as practised by present day aboriginal populations. It is Kay's contention that "...Native American preferences for prime age females runs (*sic*) counter to any conservation strategy...(and since they)...saw no connection between their hunting and game numbers, their system of beliefs[4] actually fostered the over-exploitation of ungulate populations" (Kay 1995). Such a world view would put the emphasis on short term costs and benefits rather than consideration for the sustainability of the harvest (Alvard 1993:382).

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[3] Simkin (1965.742) notes the difference between Woodland Caribou and the Caribou of the large herds of the tundra. The rather solitary boreal forest sub-species can be expected to produce 0 02 kg per ha. while the northern herd animal of the barren ground will produce 0.79 kg per ha. See also Spiess (1979) on the cultural adaptation of the northern hunters who rely on these herd animals.

[4] Feit (1973) Krech (1981), and Berkes, et al. (1992), among others listed in the bibliography, offer insight into the belief system with respect to resources.

Beaver and muskrat, as discussed on page 53, came back into usage as a food resource in this century while remaining in their historical category of 'pelt' animals in relation to the, by then, much-diminished fur trade. Beaver seem to have retained their cultural, symbolic content (Tanner 1979) and I believe that these symbolic concepts predate the fur trade era and go deep in time. In prehistory all these animals discussed above are found in the archaeological record. However, it is in their seeming relationship to each other in the economic system that there appears to be a structural/temporal shift between prehistory and the historic / modern periods.

5.1.2: Territory expansion:

The second possible option for any population under the types of stresses experienced by the Algonkian peoples in the historic period is to increase the territorial base of the group. Along the Upper Great Lakes the Ojibwe appear to have been able to make territorial gains northward, and somewhat westward, at the expense of their Cree cousins (MacNeish 1958; Wright 1965; Fitting 1969; Pollock 1975; Bishop 1976; Dawson 1983; Hallowell 1992) while the Cree to the east of James Bay appear to have made incursions into Inuit (Eskimo) territory to the north and east (Speck 1931). Certainly there appears to be cultural 'ecotoning' in various areas of this part of North America. Of course two of the salient features of this northward movement of peoples in the proto-historic and early historic periods would have been the pressure to produce pelts for the expanding fur trade and the drop in population caused by introduced diseases. These two features are linked. Expanded and expanding communications would have been part of the vector dynamics in the spread of disease and the diseases would have de-populated areas that others could have colonised for the exploitation of resources that now had a value in a developing and expanding market economy.

5.1.3: Population decline:

A third option, noted in another context above, is for the group to go into numeric decline thus achieving an equilibrium at a lower level (Andrewartha and Birch 1954). Both Ojibwe and Cree experienced population decline. However, this was mostly from a range of introduced diseases (smallpox, measles, whooping cough, diphtheria, influenza and other diseases such as TB (Herring 1994; Ray 1976)). Starvation (Bishop

1973; Rogers and Black 1976) became a factor in the third decade of the 19th Century [5]. Unfortunately the population decline due to starvation experienced by First Nation peoples in the historic period has never been completely quantified. In part this is because the records are not available and much of our understanding is based on anecdotal information or partial or spurious statistics dating from the 19th Century. Starvation did occur and was widespread in the boreal area of eastern North America but the numbers or percentages of people lost can not be calculated with any accuracy. Generally it is believed, by people in both the native and non-native communities, to have been a very serious problem well into this century.

The major problem for modern researchers is whether the knowledge preserved by oral traditions has been deeply eroded by the loss of significant members of the various communities (the elders) before they could impart fully this traditional knowledge. These are the people, along with the very young, who are the most vulnerable in times of starvation and disease. In the absence of statistics for population structure over the historic period, there is no way of coming to a firm understanding of the nature of the potential loss in this part of the system.

5.1.4: Prehistoric environmental adaptations

These then are the patterns of dispossession, displacement, and devastation to population and place, culture and content faced by all native American groups in the period of contact and colonisation by Europeans and others. These patterns of loss continued into this century. But still there are questions that can be asked and answered about the prehistoric past using diverse forms of information as outlined earlier in this thesis. The answers to these question are the focus of this chapter. They will comprise the synthesis and model of prehistoric adaptation in the boreal north and the economic pattern that sustained people with self-directed control over their fate in a landscape they defined. The questions framed for this synthesis are:

- **What was the adaptation in the past?**
- **What was the economic pattern that emerged from this adaptation?**
- **How did it operate to provide stability over generations?**
- **Why did it cease to work in the historic period?**

[5] The linear regression displayed in Figure 3.35, if projected forward in time, intersects the horizontal axis (time) in the 1850s as well. However, the collapse of the Beaver population predates this by many years.

5.2: Habitat and the importance of fresh water environments

For the purposes of this section I want to make a distinction between two types of aquatic environments: "open" water environments of the lakes and streams and "closed" or bounded water environments of wetlands (ponds, marshes, swamps, and peatbogs). This distinction is made on the nature of the free flow of water through these two systems.

5.2.1: Interlinked indicators: water fowl and fish in open water systems

The types of data and the questions they engage can be illustrated by looking at three principal sites of this study, namely Martin Bird Site on Whitefish Lake, Wabinosh River Site on the Wabinosh River off Lake Nipigon, and Long Sault Site on Rainy River between Lake of The Woods and Rainy Lake (see the maps in Chapter Two). The major difference between these sites is that the latter two are situated on banks above rivers and overlook either the only rapids (Wabinosh River), or one of the main rapid areas, in the river (Rainy River), while the former is found on a small island in a small reedy lake. These types of locations are, of course, the very patterns discussed in Chapter Two (see Figures 2.19 and 2.20). These sites, with their various bird and fish bone remains and their placement at specific locations on open water systems, when seen in relation to the discussion of ecozone and ecotone in Chapter Three illustrate what I call **interlinked indicators** of past economic systems. I contend that the mark of the boreal economic system is the interlinkage of various kinds of resources and their planned use and manipulation. The best example of interlinkage of birds, fish, and wild rice is found with the Whitefish Lake (Martin Bird) archaeological materials although the two river sites offer some additional supporting evidence.

The north and north-west shores of Whitefish Lake support extensive stands of *Zizania aquatica* (wild rice). These stands are now harvested by the Fort Francis Band. This wild rice stand and others like it found throughout Northwestern Ontario are, by oral tradition and historic treaties that include usufruct rights[6], considered to be of deep prehistoric origin (Jenks 1900). An excellent source of nutrition for humans, the stands offered and continue to offer food and / or shelter for many species of water birds. Wild rice is a tall annual grass that grows partially submerged along lake margins and usually

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Treaty No 60, 7th September, 1850, for example, cedes this end of Lake Superior to "Her Majesty the Queen" (Queen Victoria) and "Government of this Province" (Canada) but the tribes have the "full and free privilege to hunt over the territory now ceded by them and to fish the waters thereof as they have heretofore been in the habit of doing,..." (ITS:1891). Generally this became extended to 'traditional' stands of wild rice.

starts to reach the harvesting stage by September. The panicles, which may be up to 60 cm. long, ripen from the top down with the grain falling off as it reaches full maturity. Such a resource would be an attraction for seed eating water fowl during their fall migration. At other times of the year nesting areas would be sheltered by the growing wild rice. The birds from the Martin Bird Site reflect the nature of the prehistoric wetland/water habitat. This list of identified birds is interpreted through modern data on water fowl including their dietary, and migration, moulting patterns. This is augmented by field observations of the birds, fish, and rice of Whitefish Lake over a number of years (1978-1982).

Two distinct feeding patterns can be seen: the **herbivore pattern**; and the **carnivore pattern.** Both of these patterns offer excellent examples of the "option four" of the "threshold switch" energy capture strategy discussed by Odum (1975) and outlined above. The birds utilising the herbivore pattern focus on aquatic plants using their roots, stems, leaves, and <u>seeds</u>. Predominant in the diet are bulrushes, duckweed, pondweeds, sedges, smartweeds, and <u>wild rice</u>. A few of these bird species have the dietary capacity to switch over to the carnivore pattern and supplement their diet with snails, clams, and insects (see Table 5.1 below) (Bellrose 1980:334; Godfrey 1966), although such animal foods will never dominate their diet. Other species can switch to eating land plants. Canada Goose and Mallard, among other species, illustrate this well. Observations on the recent patterns of feeding by Canada Goose have shown increasing abandonment of aquatic feeding environments and natural seed beds in favour of agricultural and park lands with their attendant domesticated greens and seeds (Bellrose 1980:164). Mallard and Black Duck as well as Ring-necked Duck will eat acorns (Bellrose 1980:260-261; 242-243; 334). Interestingly, Black Duck was identified among the bones from the Long Sault Site, which is located in an area where the remnants of the primeval oak parklands can still be seen today (datum reference: DdKm 1:F2.6:552).

The carnivore feeding pattern centres on frogs (*Rana sp.*), insects, snails[7], bivalved molluscs (Eulamellibranchia and Sphaeriidae), and more importantly, fish. As with the herbivore pattern some species of birds are able to switch to a plant-feeding pattern (see again Table 5.1). The fish, not considered economically important by modern fishermen (but found in Whitefish Lake in recent times), common to the carnivore dietary pattern are

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[7] The lack of screening and flotation has had a marked effect on the retrieval of insect and snail remains. As environmental indicators they are, for the fine detail, perhaps unrivalled, but unfortunately were not available to this analysis.

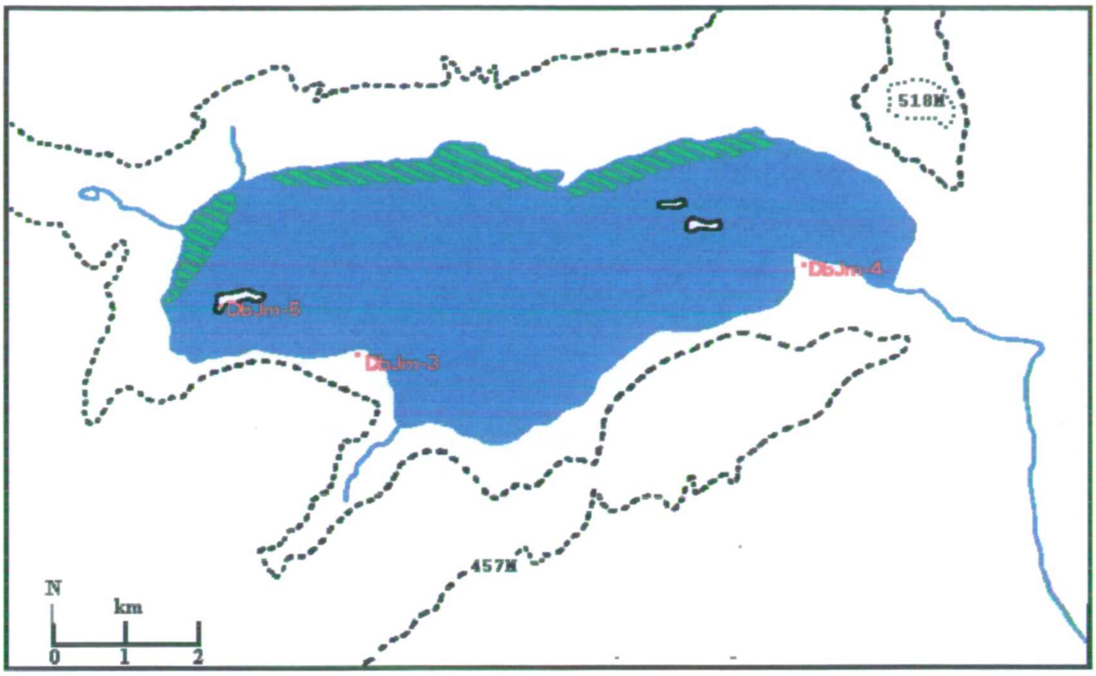

Figure 5.6: Whitefish Lake rice beds (green banded area) from field observations between 1978 and 1982. This area was revisited in July 1995 and the beds were found to have remained intact.

Table 5.1: Birds identified from the Martin Bird Site (DbJm-5) with their feeding pattern indicated.

TAXONOMIC CLASSIFICATION	COMMON NAME
Gavia immer	Common Loon ⊗⊗⊗⊕
Branta canadensis	Canada Goose ⊕⊕⊕⊕
Chen caerulescens	Snow Goose ⊕⊕⊕⊕
Anas platyrhynchos	Mallard ⊕⊕⊕⊗
Anas rubripes	Black Duck ⊕⊕⊕⊗
Aythya americana	Redhead ⊕⊕⊕⊗
Aythya collaris	Ring-necked Duck ⊕⊕⊕⊗
Somateria mollissima	Common Eider ⊗⊗⊗⊕
Lophodytes cucullatus	Hooded Merganser ⊗⊗⊗⊕
Mergus merganser	Common Merganser ⊗⊗⊗⊗
Mergus serrator	Red-breasted Merganser ⊗⊗⊗⊗

predominant food pattern: herbivore ⊕
carnivore ⊗

crappie, dace, darters, minnow, pumpkinseed, shiners, and sucker (Bellrose 1980:445-446;453;462-463). None of these fish, except the suckers (*Catostomus sp.*), appear, on the basis of archaeologically recovered specimens from Whitefish Lake, to have had any economic significance for humans in the prehistory of the peoples who lived on the shores and islands this lake, or for that matter, in a wider perspective, any of the study sites in this area of boreal North America. All these species are excellent indicators of the health and productivity of a lake and they are found in none of the archaeozoological collections used in this thesis nor are they in the materials from the Albany River Survey (Dods 1976).

There may be taphonomic processes that have distorted this impression and I refer you to Chapter Four for the discussion of this problem. However, here I want to note that many of these fish are small, so much so that they are used today as live bait. Small fish with such friable bones would seldom, if ever, survive in low pH soils. Further, the excavation techniques, devoid of flotation and screening, mitigated against their retrieval if they had survived. Thus the lack of consultation with or incorporation of a faunal expert into the planning or execution stages of excavation contributed to the problem (Gamble and Bailey 1994; Maltby 1985). Here then we see both Taphonomy II and III in operation to diminish the amount of information available on this specific lake system.

Our awareness of the past biodiversity of Whitefish Lake comes to us only inferentially from the known diets of the birds recovered archaeologically and from modern observations (1978-1982) of fish species. Further, the problem of the relative absence of fish bones remains for the interpretation of both the Long Sault and the Wabinosh River Sites - both sites to be found on rapids in rivers with significant spawning migrations of fish (see Chapter Two).

The identified bird species from the archaeology sites are almost exclusively migratory waterfowl[8]. Of these species a number would be expected to be present from Spring through Autumn with the obvious exceptions of Snow Goose and Common Eider. The former are seen in Spring and Autumn migration while the latter would be, from modern indicators, a winter visitor of very rare occurrence. There remains the problem of Canada Goose. During this century the year-round residency pattern for this bird has shifted greatly although there still are large populations that seasonally migrate. Present

[8] The one exception is the single bone identified as Spruce Grouse (*Canachites canadensis*) from the Martin Bird Site. The habitat of this Grouse is "Usually coniferous and mixedwood forests, muskeg, forest edges, and openings; also older burntlands and blueberry barrens" (Godfrey 1966: 107) (emphasis added).

sedentary Canada Goose densities are probably tied to the increased use of agricultural lands and urban area parklands. However, we cannot assume that these patterns extended into the prehistory of the boreal study area although they may be of great antiquity in any area that experienced clearing for whatever purpose. The prehistoric population drawn on in the study area of Northwestern Ontario would have been, as it is now, the birds of the water sheds of west James and Hudson Bays using the Mississippi flight corridor for their migrations. These populations have their highest density within 15.5 to 37.3 km of the coast between the Albany and Severn Rivers (Bellrose 1980:149). Spring migration occurs through March and April basically timed to the northward movement of the 1.67°C isotherm. Starting in September their Autumn migration peak is reached in October with numbers declining through November (Bellrose 1980:155-158). Although Canada Geese are few in number with respect to the overall archaeological data base, they do offer an indication of minimum seasonality for the Martin Bird Site since the other migrating birds migrate within the dates for Canada Goose (data references: DbJm-5: TP 1NMC66A:80; TP NMC66A:81; A5?13 Wall:758).

In all of this the important factor for effective utilisation of migratory water fowl as a resource is the period of moult. Grigson (1985) discussed the importance of the moult period for bird acquisition systems in Mesolithic Europe. Her insights into the use of moult period as an effective 'window' of time and opportunity to capture bird prey are of use to us in this study. The significant part of the analysis of moult is to note the period when flight feathers are being replaced. Generally there are two patterns with Anserinae having one plumage per year and a single annual complete moult and Anatinae having more complex generally two moults per year (e.g. males with dichromatism for breeding / non-breeding seasons as well as females replacing underbelly down with denser down feathers for the period of incubation of the eggs, as well as wing moults) (Bellrose 1980: 34-38).
For example:

- **Canada Goose** - moult can be divided into two patterns on the basis of age and nesting status. Unmated young going into their second summer and the non-nesting adult members (this can include single adults and those who lost their nests for this season and have not set up a second nest) have specific traditional moult grounds away from the traditional breeding areas. Birds in such areas can be successfully harvested by humans. Nesting birds (male and female) moult at the breeding grounds at approximately the time the young are three weeks old. In this part of Northwestern Ontario this is about June 20th. They are capable of flight approximately 32 days after flight feather moult so the optimal period to hunt nesting Canada Geese is the month of July. Taking one parent per nest would ensure that the young still survive, but even the loss of both parents does not mean that the goslings will not make it to adulthood. Orphaned young will fly with the group that is their extended family thus learning their migration patterns. The next Spring they will return with this family and eventually they will nest in their natal areas. (Bellrose 1980:141-164)

- **Snow Goose** - the pattern is very similar to that of the Canada Goose. The first and second year, non-nesting, and failed-nest individuals move to a moulting ground while the nesting pairs moult 13-18 days after young hatch and regain the ability to fly 24 days later (Bellrose 1980: 123). This makes the period for optimal use in Whitefish Lake, which would be a breeding rather than a moulting area, from approximately the last week of July through the third week of August.
- **Mallard** - females moult after young can fly (52-60 days post-hatch) while nesting can be variable on the basis of latitude and range from April 10th to 30th in the southern and mid-latitude of territory to May 5th to 20th in the northern latitudes. Males and non-breeding females moult in late June with three to four weeks of flightlessness (Bellrose 1980 240-242).
- **Black Duck**- females moult in mid-July and mid-September while males and non-breeders have a single moult in late June (Bellrose 1980:260).
- **Redhead**- males and non-breeders moult late June into July and females have a pattern similar to mallards (Bellrose 1980:324).
- **Ring-necked Duck**- males and non -breeders moult between July and September with a wide range of variation while females have a pattern similar to mallards (Bellrose 1980:333).
- **Common Eider** - males and non-breeders moult July through August in moult areas while females moult August through September as the young are increasingly independent (Bellrose 19980:364).
- **Hooded Merganser** - these tree nesting birds are known to start earlier in the season (February - March). However, there is no firm data on these patterns with this species (Bellrose 1980:444-445).

- **Common Merganser** - males moult in late June into July (later in the north) and regain flight about a month later. Females moult in mid-August through early September and regain the ability to fly mid-September to early October (Bellrose 1980:462).
- **Red-breasted Merganser** - males moult July - August and females moult several weeks later (Bellrose 1980:453).

The seasonal pattern for the hunting of birds is narrowed considerably with the understanding of the moulting patterns of water fowl identified for the Martin Bird Site. Also, I think Whitefish Lake is a nesting, rather than a moulting, territory from my observations of this lake over a number of years. This is said keeping in mind that nesting and moulting territories are areas reused by the same birds year in and year out and down through their generations - they are traditional territories even in the sense that we use this concept for humans.

From the perspective of bird species, wetlands are in some ways ecotones between the terrestrial ecosystem and the limnic ecosystem. Hills (1976) deals with these two systems separately but does not lose the holistic concept he has developed. For those faunal species, in particular fish, that have their complete life cycle in the limnic physiosystem, the diversity of habitats offered is as important as those for mammals and birds in the terrestrial physiosystem.

The surface of a lake gives the impression that this particular lake varies from others only in size and we assume depth. For the scientist interested in the lake as an interrelating dynamic of physio- and biosystems there are so many other determinants that have to be considered. And in effect the biosystem will be greatly affected by the nature of the physiosystem. As Lagler, et al. (1977:430-431) point out in their chapter on the freshwater ecosystem, fish carrying capacity will be determined, in part, by such factors as:

- the underlying geology that defines the lake basin;
- the stage of lake successional development;
- the stability of its supporting watershed;
- the land uses that may affect the watershed;
- circulation patterns of the in-flow/out-flow system;
- temperature and its stratification within the water column (this affects the water density thus the amount of oxygen - lower temperature/higher density), with critical thresholds triggering feeding, growth, migration, and spawning behaviours as well as embryonic

development. For example *Esox lucius* spring spawn when temperatures are between 4.4°-11.1°C but *Acipenser fulvescens* have critical spawning temperatures between 13.0°-18.0°C while 18.0°C is only 0.3° below the upper lethal temperature for *Lota lota* who spend the warm months in the depths of lakes below the hypolimnion (Scott and Crossman 1973:357; 84; 643);

- the nutrients (crucial is oxygen) available in the water to support both plant and animal communities;
- and a myriad of other components tied to such things as precipitation, evaporation, hours of sunlight, turbidity, and even the predator/prey relationships between the fish themselves.

For the purposes of this thesis these parameters are part of the complete ecosystem utilised by humans. The inherent fragility and complexity of water environments are only now coming within our intellectual grasp because our limnic systems are in jeopardy. To simplify we will look at two factors: successional development, and zonation.

Lakes age by the process called **eutrophication.** This successional process is usually much slower than the process in the terrestrial physiosystem that is examined under the discussion of boreal forests. Some lakes remain at various steps in the eutrophication process for indefinite periods while others proceed through their cycle in a relatively short time. The process can be seen as the shift in ecosystem make-up so that lakes move from **oligotrophic** to being **eutrophic** and eventually evolve into either ponds, swamps, marshes, or peat bogs through **mesotrophic** and **dystrophic** stages (Lagler et al. 1977:431-432). The characteristics of the two lake types are outlined below:

Oligotrophic Lakes

- variety in water column composition;
- water depth often deep;
- low organic nutrients;
- water temperature cold;
- low plant population densities;
- high number of plant species varieties;
- mostly deepwater fish such as salmon, lake trout, whitefish.

Eutrophic Lakes

- water column somewhat uniform;
- water depth shallow;
- more highly organic;
- water temperature warmer;
- high plant population;
- low number of plant species varieties;
- mostly warmer, shallower water fish like walleyes, pikes, perch, with some catfish. (Lagler, et al. 1977)

These two lake types are not either / or selections but two points on a scale that *may* evolve into wetlands of various types. Not all lakes will evolve eventually into wetlands. A lake such as Superior will remain oligotrophic indefinitely.

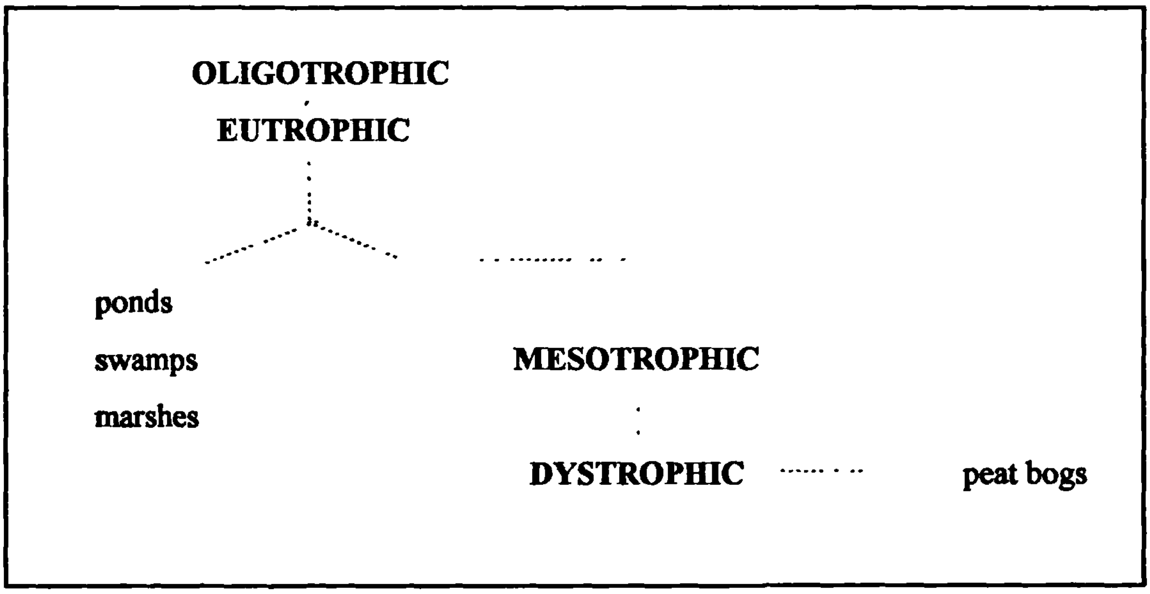

Figure 5. 7: Evolution or the 'ageing' of lake systems.

The placement of the permanent lakes in the Northwestern Ontario study area in a hierarchical list from oligotrophic to eutrophic gives an example:

1. **SUPERIOR** (oligotrophic)
2. **NIPIGON**
3. **LAKE OF THE WOODS**
4. **LAC DES MILLE LAC**
5. **RAINY LAKE**
6. **WABINOSH**
7. **WHITEFISH** (eutrophic)

The only site of the three major sites to be on a lake is Martin Bird (although many of the small sites on Nipigon and Lac des Mille Lac are on lakeshores). Whitefish provides an excellent example of the ability to consider the limnic system from the fish recovered from an archaeological context. All the species from this lake, except *Salvelinus namaycush,* reflect the eutrophic nature of this system. This one exception, Lake Trout, identified from one skull bone (datum reference: DbJm-5 A5 III 554), could have been brought in from another lake (or from a river favoured by this species) where they find environments in the epilimnion, above the hypolimnion but below the thermocline, since they prefer somewhat cooler water with optimal temperatures of 10°C (Scott and Crossman 1973:225). However, any alternative explanation that the lake may not have progressed this far (eutrophic) in its successional development, at the point of prehistoric use represented by the archaeological materials considered here, is not supported by the range of bird species found in the faunal assemblages. The environmental requirements for the birds are discussed above. Whitefish Lake may have been stable at the eutrophic stage for considerable time, evolving quickly in the post-glacial period because of its shallow basin but not progressing to wetlands. Further evidence for the classification of the lake as eutrophic in prehistory comes from two other fish species. The turbid nature of this lake is supported by the presence of *Stizostedion vitreum* (Walleye), which reach "...greatest abundance in ...shallow, turbid lakes..." (Scott and Crossman 1973:772). In addition, a narrow range of temperature stratification is supported by the presence of *Catostomus sp.*(Suckers) whose summer temperature preferendum is between 20.3°/21.3°C to 28.0°C, which they find on the bottom where they feed (Scott and Crossman 1973:732). Several of the identified bird species support this view on the shallow nature of Whitefish Lake.

Mallards, Redhead Ducks, Ring-necked Ducks, and young Hooded Mergansers prefer shallow water for feeding (Bellrose 1980: 242; 324; 333-334; 445-446).

Although the other two major sites, Wabinosh River and Long Sault[9]., are on rivers, these rivers are part of the river-lake systems where the lakes are in relatively close proximity to the habitation sites. The rivers are used as spawning grounds for the fish species that frequent the adjacent lakes such as Walleye and *Acipenser fulvescens* (Sturgeon). They use white water or rapids of rivers for their spring spawning and are found at these river sites. Walleye is the primary fish resource at the Wabinosh Site and Sturgeon at the Long Sault Site.

Zonation within any lake can provide expanded habitat options for fish species. Three zones will be considered here:

Littoral Zone

- from shoreline lakeward to limit of rooted aquatic plants: 1. *Scirpus* (bulrushes), *Typha* (cattail); 2. floating-leaf plants, *Nymphaea, Nuphar* (waterlilies), *Brasenia* (watershield), *Potamogeton* (pondweeds); 3. *Potamogeton* submergent pondweeds, *Myriophyllum* (watermilfoil); *Ceratophyllum* (hornwort); and *Anacharis* (waterweed);
- well illuminated by sunlight;
- zone of maximum fluctuation of temperature;
- maximum turbulence and turbidity;
- important as feeding and spawning ground for many fish and home to those species that require higher temperatures such as the Lepomis (sunfish) and Pomoxis (crappie).

Limnetic Zone

- lakeward openwater extension of littoral zone;
- upper level well lit and subject to daily physical fluctuations;
- lower level or *profundal* waters (below limit of effective light penetration) are stable and change slowly and usually only seasonally;

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[9] See Table 2 7

Martin Bird Site	Wabinosh River Site	Long Sault Site
Lake Trout	Lake Trout	Lake Sturgeon
Northern Pike	*Catostomus sp.*	*Esox sp.*
Longnose Sucker	Burbot	Northern Pike
Walleye	Smallmouth Bass	*Catostomus sp.*
	Walleye	Walleye

- nursery for many open water spawners such as Clupeidae (Herring) and Atherinidae (Silversides), and area for plankton feeders;
- deep waters below the thermocline are poor in light, and are inhabited entirely by heterotrophic organisms.

Benthic Zone

- slopes from shore of lake beneath the littoral zone to the depths of the lake in the profundal region;
- region of highest nutrients also but of most likely oxygen deficiency;
- zone used by Cottidade (Sculpin), *Lota* (Burbot), some Ictaluridae (Catfish), Catostomidae (Suckers) and *Acipenser* (Sturgeon) and for feeding, nest-building as well as spawning by other species. (Lagler et al. 1977:432-433)

The archaeological sample consists mainly of those species that use the limnetic and benthic zones in non-spawning seasons. The use of fish from the limnetic and benthic zones could be explained as an artefact of the taphonomy problem. However, I believe the more likely explanation is that this is an indication of fishing practices such as line or net fishing with the use of some sinkers. Unfortunately we have little direct evidence of fishing practices in prehistory beyond the location of sites and the archaeological remains of the fish themselves. It is some years since Johnston (1980) reported on fishweirs but these were found outside our study area, at Atherly Narrows in southern Ontario. They offer little hope that, in the vast expanses of Northwestern Ontario, this form of fishing will become widely identified because to do so, streams would have to be intensively surveyed for stone clusters that seem 'un-natural'. Of course there is the further problem of the biodegradability of the wood and fibre components of any weir structure. Also, Rogers discussed historic Ojibwa fishing practices, in particular winter fishing through the ice in "peep hole" fashion (1972:7). This form of fishing is not for the feeding of the masses, since it is a long, cold process of obtaining one fish by one fish rather than a catch of many fish afforded by netting or the use of weirs. Long (1904) discussed fishing in the historic period in his 1791 book. He discussed the use of hook and line with the hook made from the thigh bone of a Hare and lines made of willow bark twisted into twine (Long 1904:62). He also commented on the use of "fire bark" torches, made from the bark of the birch, that were placed on long poles at the head of a canoe to lure fish to the spear at night (Long 1904:79). He goes on to note that a set of nets placed for fishing were found "...almost rotten...[with]...not a single fish..." (Long 1904: 85). Although he refers to fishing for his own survival in a severe winter he not infrequently notes that the Indians were "obliged" to hunt far back in the woods and could not give assistance with the fishing enterprise (Long 1904:85-86). He continues by noting that Indians came to trade and brought " ten slay loads of meat (Bear, Racoon, Moose) and furs (mostly Beaver)..." and later he notes a Dog-feast with Bears' grease and huckleberries (Long 1904:118-119; 145). Not once are fish mentioned as feast food. Long does say that fish heads are used as bait for Marten (*Martes americana*) traps[10] (Long 1904:95). So the 'problem' of the relative lack of fish remains on prehistoric boreal forest sites persists and what this lack means is still open to investigation and consideration.

Streams offer the greatest diversity of water habitats and, along with the wetland developed from the evolution of lake systems, they offer the habitat of one of the most important animals in the economic and spiritual life of boreal peoples, namely the Beaver. Streams are subject to the most sudden and abrupt changes in conditions. This is because of the characteristics that in combination cause not only differences between streams but within streams. Variations in depth, width, gradient, regularity of shore, bottom type, volume of flow, and temperature occur. Streams can be divided into zones or *reaches;* these zones can also be seen as evolutionary stages in a stream's development.

Upper Reaches

- steepest gradient;
- fast current, pools few;
- most "V" shaped valleys;
- coldest waters.

Middle Reaches

- less gradient;
- slower current, equal number of riffles and pools;
- moderate "V" shaped valleys;
- water cold but warming;
- seasonal flooding confined to stream channel.

[10] This is a rather curious observation since Marten are not known as preying on fish. Rather, their diet primarily consists of Mice and Voles(up to 66%), Squirrels (10.2%), Hares (3 to 40% based on abundance), birds (up to 12.3 %). Berry fruit can comprise as much as 17% of the diet in summer and insects up to 5% are also a summer food. Carrion of Deer and Elk has been noted as a food as well (Banfield 1974:316-317)

Lower Reaches

- little gradient;
- slow current, riffles gone, while pools are extended into quietly moving flows, backwaters develop that can evolve into adjacent wetlands in old river channels;
- shaped to the valleys with wide floodplains that may be marshy;
- waters seasonally warm;
- flooding may be extensive over complete floodplain. (Lagner, et al. 1977:434-435)

It is in the middle and lower reaches that we find the greatest diversity in habitats and therefore of fish species. Because the river systems of this area of North America have been stabilising only since the retreat of the last glacier, they have not had sufficient time to evolve wide floodplains and the meanders and backwaters so characteristic of mature and ageing river systems (e.g. the Mississippi). Those archaeological sites not at mouths of rivers are found overlooking rivers in their middle reaches or are on streams in the middle reach stage of development. The list of fish species from the two major sites on rivers illustrates the "middle reach" character of these rivers. Fish that spend the bulk of their time in lakes either use the rivers as migration routes between lakes or as spawning grounds (e.g. Walleye and Sturgeon). The other explanation for the presence of these species on these sites is fishing in the adjacent lakes themselves. This is probably more practical for the Wabinosh River Site because it is on a shorter river and thus is much closer to its two lakes.

Availability of fish resources is also dictated by the season. Freeze-up of lakes and rivers not only influence the acquisition techniques used by fishers but also put the resources out of reach for varying periods in the fall and spring. The length of the freeze-up and break-up process with respect to safe ice is a critical factor. There are periods when ice fishing (the "peep hole" method noted above) and open-water fishing techniques would not be safe or useful. For the safety margin, a conservative estimate of four weeks prior to the dates given on the map, generally would eliminate fishing as a food acquisition strategy in the months of November and April as well as at least the last two weeks of March. This would vary from year to year based on the severity of the winter onset, the depth of the winter chill, the longevity of the winter season, the latitude of the body of water, and the circulation patterns of the water itself.

5.2.2: Interlinked indicators: mammals and open to closed aquatic systems

At the beginning of this section I made a distinction between two types of aquatic environments: "open" water environments of the lakes and streams and "closed" or bounded water environments of wetlands (ponds[11], swamps[12], marshes[13], peatbogs[14]). Of the mammals to be considered in this section two, Muskrat and Beaver, use both open (see Plate 3.41) and closed (see Plate 3.59) aquatic environments for a major portion of their individual habitats. Muskrat and Beaver are, based on the archaeological data, resources used in the prehistoric economy of boreal North America. Muskrat, however, has its best showing (7.87%) at the Martin Bird Site on Whitefish Lake (Long Sault Site 1.83%; Wabinosh Site 2.52%. See Table 2.5). This is to be expected if propinquity is the rationale for acquisition. Whitefish Lake currently supports this species and on the basis of the discussion of this lake, above, it is assumed that Whitefish would have been one of their habitats in prehistory as well. However, they use streams, swamps, and ponds as well and Bice (1983:103) notes that they favour marshes. Muskrat is prime both for fur and flesh in the late Autumn and through the Winter months. As a food it is best "...when the musk glands are reduced..." according to Banfield (1974:199), although this may be a culture bound observation and musky meat may have been preferred by other peoples at other times. It is a relatively small animal even in comparison to Beaver (females average 1.5 kg and males 1.13 kg (Banfield 1974:198)) but reproductively it is very productive with two litters per year in the northern forests with upwards to eleven young per litter. When populations become dense they are prone to hemorragic disease and they are affected, like Beaver, by Tularemia when water is low (Bice 1983:105). Thus they can have population cycles like those found with the Hare, discussed below, but never with their amplitude. A few Muskrat are noted in the modern hunt figures in Table 3.4. What the low numbers in

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[11] PONDS: Completely bounded shallow bodies of stagnant water. Replenishment is through rainfall and snow melt. Water loss occurs through seepage, evaporation, or through the transpiration process of the vegetation (edge plants using the seepage as a water source or pondweeds, milfoils, water lilies within the pond). Since ponds are situated in shallow basins some can dry to mud flats in the summer in areas where summer temperatures are high and rainfall is low (CWS 1996).

[12] MARSHES: Areas overgrown with sedges, certain water tolerant coarse grasses, and rushes like the McDougal water meadow next to McDougal Creek, in Saskatchewan (see Chapter Three) tell us that areas such as this are wetlands at least part of the year This is because marsh areas found adjacent to a stream or a lake are subject to seasonal flooding but may dry to meadow conditions towards the end of Summer (CWS 1996).

[13] SWAMPS: In wet seasons the swamp is covered by either gently running water or still water. It is seasonally dry like the marsh but the vegetation includes trees, shrubs, mosses and herbaceous plants (CWS 1996).

[14] PEATBOGS: Bogs have poor drainage and are composed of mats of moss (usually sphagnum) and plants, such as sedges, decomposing into layers of peat. Other plants are heath family shrubs and spruce trees. On the other hand fens seldom have sphagnum moss. Sedges, reeds, coarse grasses and shrubs are found. The trees are tamarack or cedar and certain species of mosses that prefer soils and water with a higher pH (although still acidic) than bogs. Fens progress in to peat bogs as well but they are not as far along in the process as bogs (CWS 1996).

Table 3.4 reflect can not be stated with certainty but they may be an indication of a number of different things:

- hunting practices directed towards more economically viable fur species;
- low population numbers;
- types of traps used in aquatic environments;
- or, like Darlene Newton with the Hare, Muskrat may have been discarded and generally not counted as either food or fur.

The figures for the modern hunts shown in Figure 3.7 and Figure 5.2 are not helpful either. Muskrat cannot be sorted from the categories that lump either "small game" and / or "fur bearers".

However, of these two species it is the Beaver (*Castor canadensis*), which is central to the analysis of prehistoric economic patterns. Beåver have been demonstrated to be a keystone species[15] (Naiman, et al. 1986) and it is this fact along with their own reproductive capacity that made them central to the organisational structure of the prehistoric subsistence system. They are effective and significant shapers of both open and bounded aquatic systems (see Plates 3.50, 3.51, and 3.52 and Figure 3.33). This in turn impacts upon the landbased portion of the environment. As such they generate diverse habitats that support other species that are also part of the prehistoric food economy.

It is the Beaver who turns open aquatic systems into extensive bounded systems such as marshes and swamps (see Plates 3.53 and 3.54). These in turn provide more wetland habitats for the water fowl discussed above and generate more edge areas for the edge feeders such as Moose (*Alces alces*), and Deer (*Odocoileus virginianus*)(see Plate 3.50). The removal of Beaver and the elimination of their landscape modification effects cause these bounded systems to dry out. Typically these desiccated wetlands then become (see Plates 3.63) extensive open areas that provide feeding meadows and extensive edge areas for landbased mammals such as Hare (*Lepus americanus*) and Deer. Eventually some of these areas will evolve to closed forest systems that have their own ageing processes through to the old growth stage (see discussion in Chapter Three).

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[15] The concept of 'keystone-species' was first introduced in 1966 by R.T. Paine's study of intertidal systems' food web complexity and species diversity. However it was not until 1969 that the Paine actually applied the term of 'keystone' in a short article on trophic complexity that appeared in *American Naturalist*. There are "...two hallmarks of keystone species. First, their presence is crucial in maintaining the organization and diversity of their ecological communities. Second, it is implicit that these species are exceptional, relative to the rest of the community, in their importance..." (Mills, et al. 1993:219) (emphasis added). The authors also state an interesting fact with respect to the management of keystone species noting that they "...could be used to support populations of other species..." (Mills, et al. 1993:219). A classification of keystone species was eventually developed. Eventually five categories of keystone species were suggested: keystone predator; keystone prey; keystone mutualists; keystone hosts; and keystone modifiers (Mills, et al. 1993:220). It is to the final category of keystone modifier that *Castor canadensis* (Beaver) belong.

Both water and land areas, as well as their ecotones, are important for Cervidae such as Deer and Moose. Water of depth is used by both (they are excellent swimmers) to escape insects during the Summer (Banfield 1974:392). Water is also an effective medium in which to hunt these animals from a canoe. They can be pursued until they drown or easily approached and dispatched with a weapon.

Deer require approximately 2 kg of forage per day per 50 kg of body weight (Banfield 1974:393) and Moose require about 25 kg per day although they are thought to consume more during the summer "...while they are putting on considerable weight" (Peterson 1955:114). Such relatively large amounts of available biomass can not be found in old stand forests. Thus Deer and Moose require very diverse habitats consisting of meadows and parklands, swamps and marshes and ecotone areas abutting first and second stage forests. Deer use foods from eight basic categories: forbs; grasses; sedges; browse (leaves and twigs from shrubs and trees); fallen leaves; bark; horsetails; mosses and lichens (Renecker and Hudson 1993: 151; 161-163). The Moose diet is similar except for the seasonal proportions of the various categories (Renecker and Hudson 1993:160; 161-163) and a tendency to favour the water portion of the habitat during the Summer. Available biomass is not a problem during the warm months. Browse is predominately found in forested areas which take on a major importance in Winter when the diet consists almost entirely of twigs and buds of shrubs and trees as well as bark and small saplings for both animals. For Deer, cedar swamps and meadows are preferred areas for Winter yarding activities. Intermixed patches of conifer old growth would supply wind breaks and sheltered spots for yarding areas. Such complex habitats can be initiated and maintained by Beaver damming activity and, to a point, the various stages of landscape ageing of open aquatic systems. Looking at the numbers in Table 2.5, I was struck with the relatively poor showing of the Cervidae in relation to the Beaver.

Beaver are consistently number one in the mammals at Martin Bird, Long Sault and Wabinosh, although Beaver are very much the smaller animal. This is the case even in the face of the low pH (acidic) readings discussed in Chapter Four and the expectation that smaller bones and bones from smaller animals would be more vulnerable to loss in acidic soils than larger bones and bones from larger animals. I think these figures are significant and indicate a tendency to rely on smaller game rather than larger game. However, being the smaller animal does not mean that it is less productive per unit of space than the larger animal, as will become evident below.

The meadow and edge areas that are the spin off of the habitat alteration of Beaver (or are the result of re-established environments after a fire) offer habitat to the Hare as well. Like the Muskrat this is a relatively small animal (females 1.55 kg, males 1.43 kg) but one that has "...tremendous breeding potential of 10.30 young per doe per year; or, since the normal adult sex ratio is 1:1, 5.2 young per hare per year" (Banfield 1974:83)(emphasis added). They appear in small numbers at all three major sites but again have a better showing at the Martin Bird Site (see Table 2.5). Historically this is an animal noted for wide population fluctuations, a point commented on in Chapter Three. The swings between peaks and troughs of population amplitude, which are of the order of 3400:1 in northern Canada, are spaced six to thirteen years apart (mode 9-10 years). The peaks do not appear simultaneously and neither do the troughs in all areas of an ecosystem or over wide expanses of territory. Further, the variations in population are not of equal measure across wide geographical areas (Banfield 1974:82). This means that humans have the opportunity to use resources in adjacent areas when that area maintains longer or rebounds sooner. In this case kinship relationships and marriage alliances (e.g. cross-cousin marriages that link over patrilineages) would allow access to abundant resources found in the territory of others (Strong 1929).

Hare are modifiers of environments although generally not to the extent of Beaver. They prune back emerging forest and maintain open areas of longer duration than would be found otherwise. Thus forest succession to old growth is delayed by their actions. Newly emerging forest in recently dried out areas or areas cleared by forest fire can be maintained at the first stage regrowth for extended periods and eventually the forest will be structurally (species and spacing) different than the previous forest. This is simply because of the stress placed on the system by consistent browsing of the emerging plants and trees. Such areas support not only Hare but are also important graze and browse areas for Deer and Moose and even the Beaver, as they rely to a great part on specific broadleaf species of trees along the water courses. It is this aspect of Hare as well as their reproductive potential (like Beaver and Muskrat) that cause them to be a integral part of the subsistence system of humans. In the 19th Century, as noted earlier, this animal became an important part of the survival diet when the ecosystems of Northwestern Ontario went into serious decline.

The Beaver as a keystone species modifies the habitat of humans either directly or indirectly through the prey species humans seek. Further, Beaver have certain reproductive traits that group them with the Muskrat, Hare, and even Deer in their ability to adjust reproduction up or down in response to the conditions they experience in their own portion of the environment. Beaver, although monoestrous, can adjust the litter size through embryonic absorption; this can account for as much as 27% of prenatal mortality (Banfield 1974:161). It is the result of stress on the female at a specific time of gestation. This stress can be the result of poor physical condition of the female or the scarcity of food since impregnation occurs between mid-January and mid-March, the period when Beaver primarily rely on their caches of stored food. Size of litter ranges from one to eight (average 3.9); larger litters are usually found with older mothers (Banfield 1974:161; Bice 1983:102). As McCullough notes:

> Because resources are finite, the relationship between rate of production and standing crop biomass of most bird and mammal populations operates in a density-dependent manner...At low population densities there is a low standing crop biomass but a high rate of production. This, in turn, results in a build-up of standing crop biomass and eventually a decrease in the rate of production as the environmental capacity to support the population is approached (McCullough 1973:119).

This is understood by the boreal hunter. It is part of TEK and as such can be incorporated into management decisions on standing crops and hunting practices.

The number of Beaver for North America at the time of contact has been estimated at 60×10^6 to 400×10^6 (Naiman, et al. 1986:1254). This is calculated as being the reduced figure of 6×10^6 to 12×10^6 for recent times (Naiman, et al. 1986:1254). Using these figures, the area of North America[16] in hectares (24×10^8), and the weight of Beaver as being 20 kg[17] (1974:158) we can estimate standing crop biomass for these periods of time:

	60×10^6	400×10^6	6×10^6	12×10^6
animals per ha	.025	.166	.0025	.006
kg per ha	.5	3.32	.05	.120

Table 5.2: Estimated standing crop biomass for Beaver.

16 24,000,000 sq km times 100 (number of ha per sq km).

17 Banfield notes that weight is highly variable and depends on "age, sex, and season" and adult weight ranges from 15 to 35 kg or the average of 20 kg (1974:158)

If the figures for Beaver are compared to those for Caribou (see page 333, footnote 3) we see that Beaver at 60 x 10^6 (0.5 kg per ha) and at the astonishingly productive figure of 400 x 10^6 (3.32 kg per ha), although the smaller animal, is much more productive per unit of land than Caribou at 0.02 kg per ha (Simkin 1965:742). Beaver would similarly compare favourably against Deer who are at their northern limits in this area of Northwestern Ontario. Taking the figures supplied by Peterson (1955: 75-77; 202-203) for Moose weights and population densities, Moose would produce approximately 0.56 kg per ha. since Moose populations "...require comparatively large minimum area per animal, and the population does not normally increase beyond this density in spite of optimal habitat conditions...(or they increase)...as temporary response to particularly favourable habitats" (Peterson 1955:196). Again Beaver compare favourably against the very large mammals of the region.

5.3.: Boundary markers and the cultural division of habitat

The choice of location on rapids for the placement of habitation sites is, I believe, only partially dictated by the presence of seasonally migrating fish and the availability of other resources. It is my contention that these locations, which provide two examples of the 'big' sites with Wabinosh and Long Sault in this study[18], are examples of control 'gates' on transportation networks since they are either the points where <u>portage must be made</u> around white water or they are at narrows in lake systems. They would also provide locations for the organisation of seasonal movement between winter / summer camps if we remember the patterns of fission and fusion in the social organisation of the northern hunter-gatherer. Rapids are also the first locations to become ice free and the last locations to freeze-up. The importance of such camps located at rapids is further illustrated by the fact that these river systems afford access to other extensive routes and areas. This is the

[18] Two other geographical areas of Northwestern Ontario further illustrate the two generalised patterns of site location discussed in Chapter Two. These are:

- <u>Attawapiskat Lake</u> (Riddle 1982): Of the 58 sites identified in the survey of the shores of this lake the two location patterns I have distinguished are the only patterns found. However, in the second pattern (bay / island placements) a number of these sites are in positions of 'control' on the lake where narrows are found. One site, FbIx-14 (a 'big' site) Riddle specifically notes as being at a portage area (1982:31). Fifteen percent of the sites are near "swampy areas" and thus are in proximity to the closed aquatic systems defined above;
- <u>West Lac Seul</u> (Lambert 1982): This area has severe flood damage to its sites. None the less, some of the patterns can be discerned. Of the 64 sites found in the survey a number were at what Lambert calls "bottleneck" areas. Of particular interest here are EdKg-1, EdKg-13, and EdKg-14 a set of sites placed in close proximity to each other at a rapids of a river emptying into Lac Seul (1982 156). The whole situation is very similar to that found with the three Wabinosh sites on the Wabinosh River off Lake Nipigon. 'Big' sites were noted as well. 'Big" EdKh-8 was found with EdKh-9, and EdKh-1 at the Wenasaga Rapids (1982:161-162) and again the Wabinosh pattern is repeated. The use of bay locations at narrows in the lake is found with the 'big' site EcKf-2 and its opposite number on the eastern shore of Shanty Narrows EcKf-3 (1982 174). Here too are EcKf-4 on an island facing EcKf-2 (1982·175) in an arrangement similar to that found with the sites on Whitefish Lake. Ghost Narrows with the sites of EcKe-1, EcKe-2, EcKe-3, and EcKe-4 repeats the pattern of Shanty Narrows (1982:176-178). One other interesting observation is that EdKg-3 showed indications of fire with a "thin band of carbonized wood suggesting a forest fire" (1982:154).

case for both of the sites of Long Sault and Wabinosh River. The former on Rainy River, as discussed earlier, is at a pivotal point in a transportation system that moved people and goods east / west and north / south and *vice versa*. Further, the Wabinosh River Site on the Wabinosh River connects through to a system that allows the use of the hypotenuse

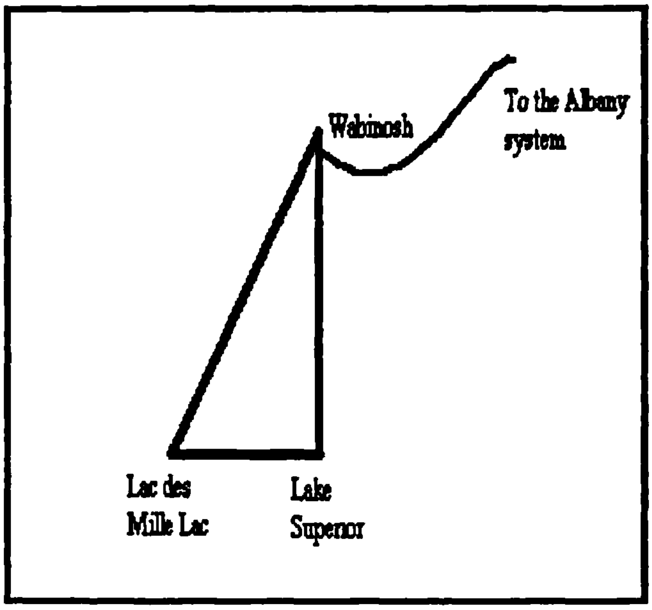

Figure 5.8: The hypotenuse principle applied to portaging.

principle of a geographical right angle triangle topped by Lake Nipigon, a perpendicular line to Lake Superior, and the base formed by a line between Lake Superior and Lac des Mille Lac. Coming north-east along this system from Lac des Mille Lac one could easily cut across the top of Nipigon and reach the Ombabika system on the east side of Lake Nipigon and thus to James Bay via the Albany River and the location of the eventual Fort Albany in the historic period (see Figure 2.15).

The importance of these locations as either private or corporate (kin-group owned) property can not be supported directly by the archaeological data. Well defined territories have been noted in the historic period. It has been observed that "Each territory is conceived as a series of interlocking lakes, streams, and rivers" (Rogers 1972a:105). However, these well defined territories were believed to be the result of the constraints imposed by the fur trade on the prehistoric economic systems (Bishop 1970). In this paradigm of things past, these prehistoric economic systems were not seen as sophisticated and certainly were not characterised as being the result of considered management strategies.

Water systems indeed are the markers of territory boundaries - the dividing lines between family territories as I noted in Chapter One. Further, Speck claims that the

> ...tribes of eastern and northern North America did have quite definite claims to their habitat...these claims existed even within family groups[19]...There is considerable significance in the fact that these tracts were remotely inherited in the families...were well known...(and)...In many cases were associated with certain social clan groupings within the tribe (Speck 1973:58).

Speck went on to say that he found the territorial bounds "...so well established and definite..." that it was possible to map the specific territories (1973:59). This map appears in Chapter One as Figure 1.1. On the basis of early writings, Speck believed that these concepts of corporate and private ownership were prehistoric in origin (1973:60). I subscribe to this view and think that there may have been some changes in response to the fur trade and the pressures from the emerging central government of the Euro-Canadians but that the basic outline of territoriality was founded deep in time.

There is some flexibility in boundary maintenance with some groups either amalgamating territories for specific seasons or certain subsets of a kin-line not using their territory for a period and relying on other kin owned territory for support as shown in Figure 1.2.

Mention has been made of rice beds, in particular the beds on Whitefish Lake. In the historic period there was a reliance on wild rice because of a decrease in game (Hickerson 1967:49). Crop failures were and are known to occur. They result from low water or high water levels as well as wind and / or hail damage. On the average, poor returns can be expected in one out of four years (Ray 1974:30). Crop failure occurred in 1825-1826 (Hickerson 1967:49-50), just when this wild rice was so important to the survival of many, as discussed in Chapter One and earlier in this chapter (see Figure 5.9). Beyond the nutritional contribution to the diet, wild rice and its management illustrate further the concept of territory.

> Binding together bundles of wild rice stalks a few weeks before harvest, when the fruit is in its milk state, was a widespread practice now abandoned but reported in nearly all the oldest sources....Jonathan Carver observed in 1767 an entire rice field marked off in <u>different styles of binding</u>: "About the latter end of September they return to the river, when each family having its separate allotment, and being able to distinguish their own property by the manner of fastening the sheaves, gather in the portion that belongs to them"....they establish family rice turf by tying the sheaves in mid-summer with binding "trade-marks". Each woman thereby silently announced her intention...each woman had her own way of doing it: "each woman knew her own by some peculiarity of the twist." Community members easily recognized particular techniques of binding, so "property" was generally respected (Vennum 1988:82-83)(emphasis added).

Women made the necessary twine, or what has been called Indian "string", by tearing long narrow strips from the inner bark of the cedar tree (Vennum 1988:83-84). There is the

[19] This would mean private property instead of corporate property of the kin group.

possibility that this marking of territory by the use of cordage made by women has a wider application then we suspect. For example Wright (1967b:70) comments on the cord wrapped stick Manitoba Horizontal shard in the Blackduck Stratum II of the Pic River Site (north shore of Lake Superior half-way between Thunder Bay and Sault Ste. Marie). Further, Dawson (1974:27) in discussing the McCluskey Site (on Whitefish Lake) noted a "cord wrapped object" was used to mark bodies of mode 1-7 Blackduck series pottery. Riddle (1982:18) talks of fabric impressed and "cord malleated body sherds" in the Attawapiskat Lake survey materials.[20] Here, as with the Iroquois and the Pueblo peoples, the production of pottery was women's work. It is the optimal storage vessel for crops such as wild rice. It is porous but water resistant so it breathes but does not allow the contents to become water logged. I think it is possible that the wild rice beds, the wild rice, the pottery, and the twine are interlinked in symbolic as well as utilitarian ways. The use of twine as a marker of property may continue into the cord marking of the pottery with pots "trade-marked" as belonging to a specific woman just as are the wild rice beds. Hurley (1979) investigated cordage using Wisconsin Late Woodland cord impressed pottery. He demonstrated some clusters and distributions but concluded "The incompleteness of the inventories of cords may affect the outcome...(but)... the results are potentially significant..." (Hurley 1979:145). I think individual women's cord marked pottery will supply the details in inventories and through this the movement of women within and between patri-lines may be discernible.

5.4: Habitat as a managed subsistence system - the economic landscape

Hunting practices of humans have the capacity to affect standing crop, production potential, yield, population age / sex structure and population health and size parameters.

> It is possible to anticipate the consequences of given hunting or harvesting patterns and it is therefore possible for hunters to control some of the critical parameters of the harvested population through their choice of resource utilization strategies. Hunters can then, at least theoretically, exercise some control over the distribution and reproduction of the animal populations which they harvest (Feit 1973:16).

So habitat diversity and the distribution of target species in time and space are, as I have noted elsewhere, important to the hunter (also see Winterhalder 1977). To this we can add the concept of 'species packing' based on the competitive interactions between species and the partition of a 'resource' represented by a particular environmental dimension (Kitching

[20] Similar observation can be found in Wright (1963; 1968b), McPherron (1967), Dawson (1971), Conway (1975), and Arthurs (1982) to name but a few.

1986:214). These are all dimensions of habitat that can be affected by decisions made and actions taken by hunters operating as conscious managers and effective predators. The management objectives of northern boreal hunters had two interrelated components:

- the direct management of the animal populations for optimal sustained yield;
- the managment of habitat to achieve the first objective.

5.4.1: Direct management for optimal sustained yield

An investigation of a number of genera that display decreased litter size with increased population density raised certain interesting questions about human predation or cropping patterns[21]. For example Hare produce smaller litters as population density rises (Delany 1982:28) and larger litters in environments where food resources are abundant but population density is low. This pattern is also found with Muskrat, Beaver and Deer as noted in the discussion of these mammals earlier in this chapter. Thus standing crop varies in accordance with the resources available to specific species. Human hunting practices can 'trick' a species into the production of more individuals than the environment will sustain over the annual cycle. This can be consistently done as long as the additional standing crop is 'harvested' through the reproductive season and before the consequences of wintering over seriously affect the reproduction for the next year. The following diagram illustrates how such hunting practices would affect the standing crop.

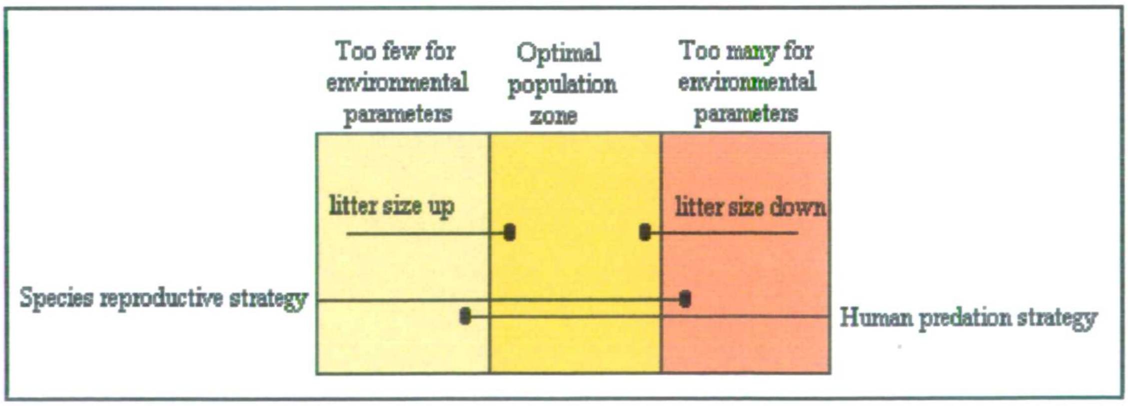

Figure 5.9: Hunting practices and standing crop relationship.

[21] Pianka's paper (1970) on trends is a discussion of a dichotomy (either / or) of what is now widely accepted by ecologists as being essentially a continuum (r- and K-selection). Some species have somewhat fixed positions along this continuum others employ the strategy of flexibility and move their position in response to their circumstances. Why this is actually the case is that the two alternatives, r-selection and K-selection, are not unambiguous and independent from the suite of characteristics that the continuum is said to have (Peters 1991:202). Here the concept is applied to reproductive strategies but with the addition of the idea that some species can move between strategies, just as some species can move between strategies of adjustment in subsistence systems as seen in the model on page 332 in Figures 5.4 and 5.5.

In such a model human predation behaviour actually 'drives' reproductive strategy. The animal 'over produces' for the actual resources available and their own population optimal. But human harvesting patterns keep the prey species on the 'too few' side of the optimal population zone. This is a purposeful strategy applied by prehistoric hunters to the problem of adequate resources but it is also a strategy used in modern management for the stewardship of wildlife resources (Stelfox and Wasel 1993: 91). What needs to be balanced through the use of TEK are potential population size and population stability (see Figures 5.9 and 5.10). It is in this way that a dynamic tension, between re-production and harvesting, is created. This permits higher standing crops at certain times (Spring through Fall) than would generally exist in the complete annual cycle and the ability to maintain a maximum sustained yield (MSY) sufficient to needs in a subsistence economy. "Despite the continued killing...each year the supply is always replenished by animals allowed to breed there...the killing is definitely regulated so that only the increase is consumed...the hunter understands how to operate with a natural law, which no game commission can improve on..." (Speck 1973:61). This is the exact point of Berkes, et al. (1994) in their discussion of sustainable indigenous economies. Also, Berkes, et al. (1992), in their discussion of indigenous views (TEK) on the use of land and resources, illustrate how these forms of knowledge are functional in the 'modern' world.

Of course humans were and are in competition with other predators for the same prey species. The response of these competing predators will be either functional (number of prey eaten per predator fluctuates in direct relation to the number of prey available) or numerical (predator populations fluctuate in response to available food) (Gunson, et al. 1993:70). What humans choose to do about this competition varies from culture to culture. In Chapter Two I discussed the ideational place of members of Ursidae (Bear) and Canidae (mostly Wolves but Dogs too) in the cultures of this part of the world. These animals are found in myth and ceremony. I think it is not only their size and potential danger to humans that situates them in this category but their position of equality with humans as predators in the food quest.

The strategy chosen by Euro-Canadians was very different[22]. The direct control of competing predators (in particular Bears, Wolves, and Cougars) was the first line of

[22] The place of the predator in the mythology of the Euro-Canadian centres on two types of narratives. The first type has to do with the predator in a heroic position in the wilds of North America (usually somewhere northerly) and it shows up in stories like *Call of The Wild* by Jack London (1963) and movies like *Dances With Wolves*. This theme is also found in the writings of authors such as the Canadian Farley Mowat (1963). These narratives have a 'frontier' quality to them or they place humans at the frontier of their souls. The second set of narratives are those that came from Europe as 'nursery rhymes' - the Mother Goose bedtime stories and such (sort of like the song *Teddy Bears' Picnic*). I can think of a number such as *Little Red Riding Hood* (Hyman 1983), and *The Three Little Pigs* (Marshall 1989)- both

action in the historic period when it became obvious that something was going very wrong in what had been the seemingly limitless, resource filled 'wilderness'. The government, in 1793, responded with legislation for predator control (see discussion on page 58 and timeline in Figure 5.11). The collapse of the environmental system came anyway. Of course problems will arise when the utilization of any one 'crop' exceeds its maximum sustained yield (MSY), then that 'crop' population will become extinct (Delany 1982:123; Caughley 1977:3).

The problem in the Northern Ontario context was that Beaver was pushed to and then over the brink into local extinction through over hunting. Beaver loomed with a significance that is telling to this analysis because:

- as a keystone species Beaver was strategic to the survival of the ecological relationships in this area of North America;
- it was one of the species with a malleable reproductive strategy. This caused it to be central to the traditional subsistence economy through its position in a managed system (see weight per unit of territory earlier in this chapter);
- it became central to the post-contact economy through an accident of history and was the species of survival in the newly emerging commodity market economy with the Hudson Bay Company;
- it was, literally and figuratively, central in the life of these people - Beaver was the key metaphor.

Beaver was the species central to the functioning of the ecological system, the cultural system, and the economic system. The commodity market of the Hudson Bay Company required 'money' for 'things'. The money in the context of northern Canadian trade through the Hudson Bay Company Posts was the beaver pelt and the things these pelts bought were increasingly items (trade goods) that replaced traditional technology and traditional relationships to the environment (guns, metal traps, etc.). Money itself is a commodity and can become scarce in market economies; just so with the Beaver. Once on the road to the market economy future it was impossible to turn back. Elders who were the repositories of traditional knowledge were dead or dying, or they and the young were choosing to look to new technologies instead of old ones. The young were losing their

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having as the central villain 'The Wolf'. Then there are the Bear stories like *Goldilocks and The Three Bears* (Marshall 1988). A subset of these European narratives are the were-animal stories (e.g. werewolves) that have a little resonance in the transformer myths of the indigenous populations of the 'new world'. I have wondered if the European werewolf and even the vampire a shape shifter as well) are not the remnants of a time when animals and humans were more intimately linked.

guides and / or their own knowledge to traditional technologies and thereby they were losing the route to a completely traditional future. In this transition from the traditional subsistence economy past to the market driven commodity future, the Beaver became increasingly needed as the medium of exchange for the trade goods required back at the villages or camps. Eventually the trade included non-traditional foodstuffs as well (tea, sugar, white flour; however, alcohol had been a component from early times). This shift in diet, albeit some of it was enforced by the consequences of the demise of the game animals in the region, has been the broken link to the traditional past that has had the widest ranging consequences to the continued health of northern peoples (Farkas 1979).

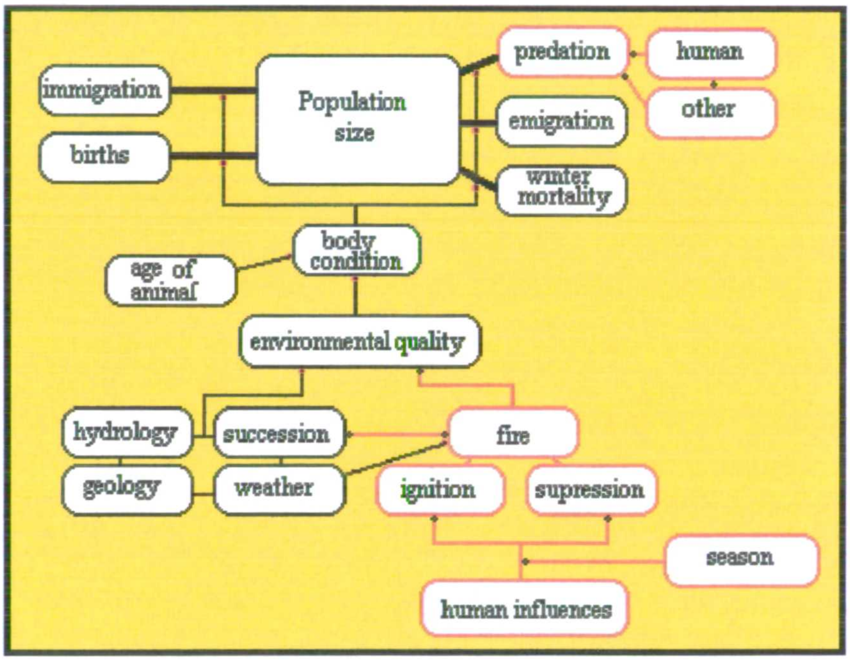

Figure 5.10: Population dynamics model for species with the ability to modify their reproductive strategy (the r-K-r-selection or the K-r-K-selection shift).This includes animals such as Beaver, Muskrat, Hare, and Deer (see page 359 and footnote 21). Diagram adapted in part from Stelfox and Stelfox (1993:67). Red indicates areas of the model where humans can have direct influence on the system in the prehistoric period.

The summary of the period from 1492 onwards and the main points covered in the discussion above can be seen in Figure 5.11, found directly below.

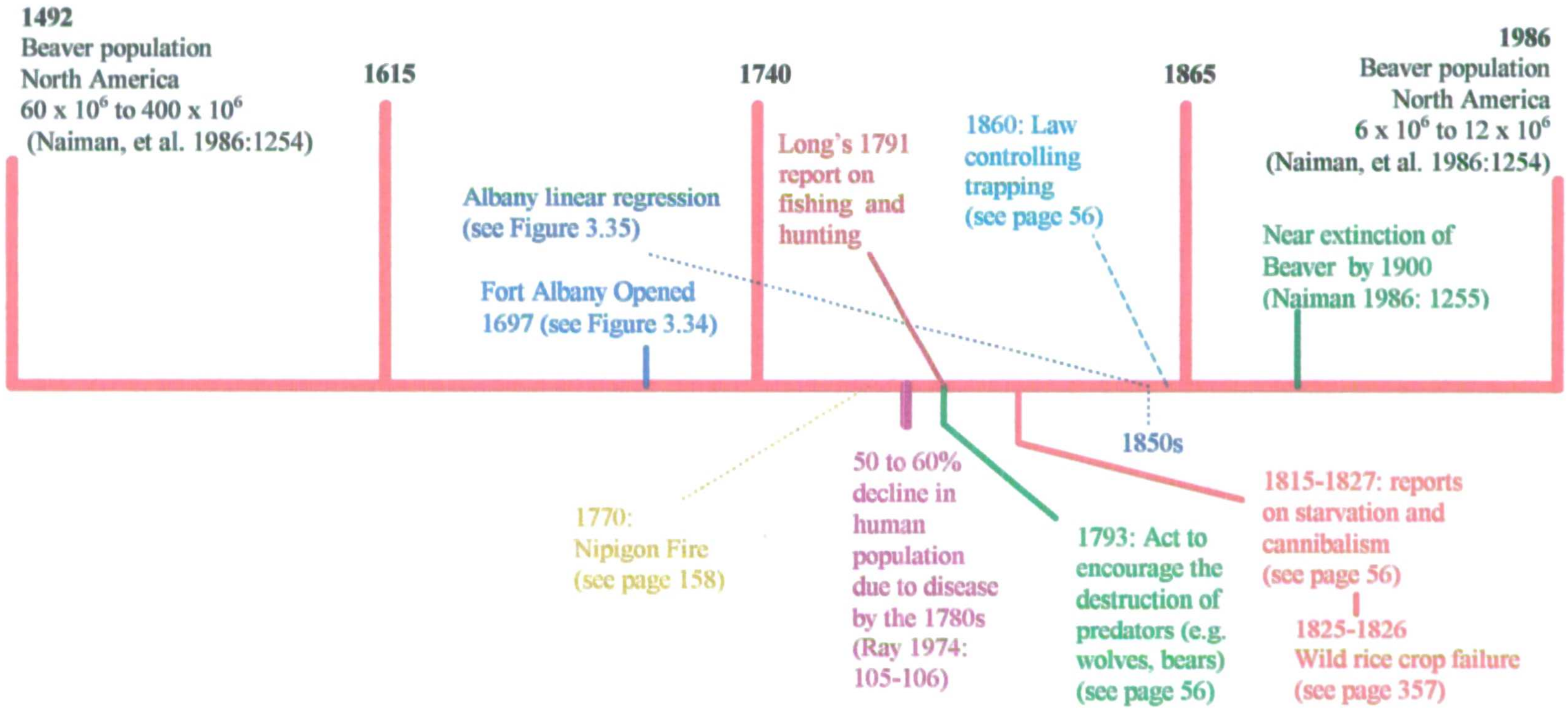

Figure 5.11: Timeline for Human / Beaver interaction from 1492 onward.

5.4.2: Management of habitat

The age structure of boreal forests has changed through the disruption of the traditional land-human relationships of indigenous cultures and with the implementation of fire suppression strategies in the historic period (see Lewis and Ferguson 1988; Kay 1995; MacCleery 1994). The forest, as I noted earlier, has come to be seen as the resource rather than as the sustainer of resources (other plants and animals). Presently about 17% of the total ecosystem nitrogen in needleleaf forests of North America is stored in the above-ground biomass of old growth and downed trees. "Nutrients such as nitrogen, phosphorus, and sulphur are now concentrated in foliage, small branches, and other debris - where they are vulnerable to volatilization..." (Langston 1995:261). Hot fires such from heavy 'fuel loads' burn too much of the soil and truncate the regeneration process; this a feature of the modern forest. The deep duff layers form insulating mats over the soils so that "Even very light fires may burrow beneath and smoulder without dissipating heat into the air.." (Langston 1995:262). This means that modern fires in old growth areas can be prolonged and can concentrate heat in the soil so that seed beds and roots for regeneration are destroyed. Small selective burns in first and second stage regrowth areas keep fuel loads down and keep nutrients recycling at shorter intervals than are found in the pattern of old growth forest. This is the pattern of fire discussed by Lewis and Ferguson for the Peace River region of northern Alberta (1988:67-72)[23, 24]. They note the use of *fire yards* (openings or clearings such as meadows, swales, and lakeshores) and *fire corridors* (grass fringes of streams, sloughs, ridges, and trails) (Lewis and Ferguson 1988:60-61). They go on to say:

> ...both yards and corridors can be created by selected uses of fire if plant and edaphic conditions are appropriate, and both types of areas are places in which animals alternatively collect or traverse. For foraging peoples, the existence of fire yards and fire corridors provide both a greater abundance of plant-animal resources and a higher measure of hunting predictability (Lewis and Ferguson 1988:61).

Pyrotechnology as a management tool expanded edge areas, encouraged plant communities that flourish under frequent fire regimes and developed habitats for animal

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[23] For an extensive bibliography on the use of fire by indigenous peoples of the Americas see Williams (1994). MacCleery's (1994) discussion cited at the start of this section has an interesting reference list on the problems of modern forests and their relationship to the forests of the past. Mellars (1976) discusses fire ecology and prehistoric economic relationships in a comprehensive article.

[24] Landscape alteration also occurred to the east and south of this part of North America. Delcourt and Delcourt (1987·16-17) discuss the "...longterm transformation from natural to progressively managed landscapes. .". Although Northwestern Ontario and indeed all of northern boreal North America seems remote from all of this, we need only remember the discussion of the trade routes, in particular the Long Sault Site as a "port" of call, and know that ideas as well as goods moved along these transportation routes.

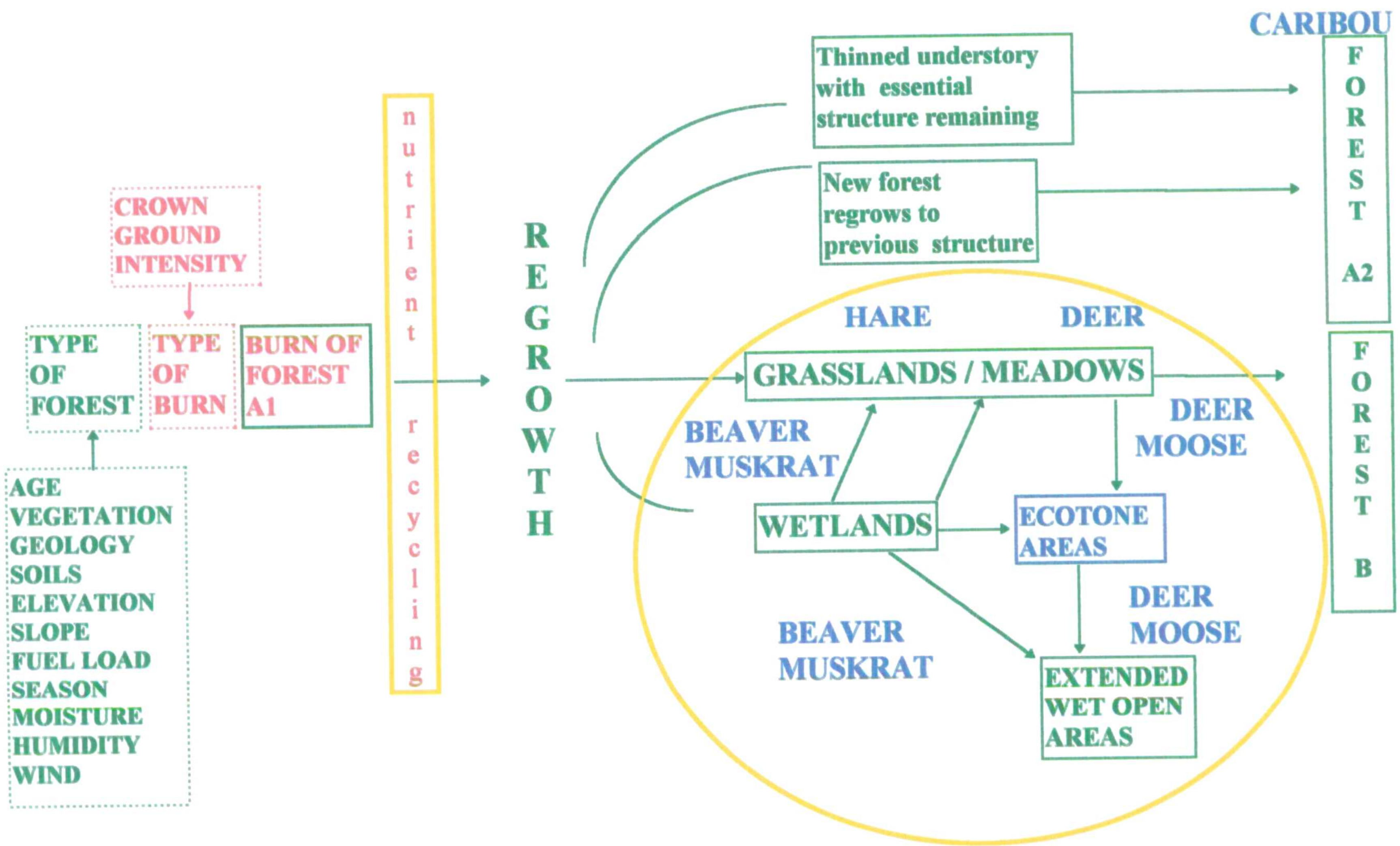

Figure 5.12: Management of the environment through the use of fire. Yellow enclosed area is optimal habitat.

communities that associate with early successional environments (MacCleery 1994:4) (see Figure 5.12 on the previous page). The additional benefit of having areas that are early successional is that they are fire resistant. In the advent of wildfire from a lightning strike or campfire accident they confer a survival advantage. Such areas could be sanctuary in the managed forest from the dangers of a unplanned and extensive forest fire.

The decision to burn a tract of land would entail making choices about the type of burn and the outcome desired. Summer - Fall burns would be avoided since this is the most dangerous 'fire season' of the boreal forest. For old, deep forests of great extent the danger of an out-of-control fire would have been too great in the heat of the warm months. Such areas could be set afire late in the fall and left to burn at a time a group left an area for another camp location. The coming cold weather and snow would limit such fires to restricted localities. However, this was probably not needed that frequently in the managed landscape of the prehistoric boreal world. With consideration to the structure and the development of yards and corridors, even wildfires could have been limited in their potential scope and danger.

The main objective in the management system being considered here would be a low intensity, easily controlled fire that would clear out the dead and encourage new growth. Two seasons would be suitable for this, Spring and Fall. The burns in each of these seasons would have slightly different outcomes:

- the Spring burn has advantages, as demonstrated by my field observations at the Prince Albert National Park on the Westside Road (see Chapter Three). It was low intensity burn that cleaned out the old undergrowth while thinning, but not destroying, the leaf cover. The result was the generation of new lush undergrowth in which Bison were found browsing and grazing. Such locations would encourage populations of Hare and Deer (both these animals were seen in the vicinity as well as Bison);
- the Fall burn has more danger than the Spring burn when things are still moist and new growth is lush with moisture. Fall is a dryer season and follows directly on the usual fire season of the boreal area. At this time fires are more intense since the living biomass is dryer itself and contributes to the fuel load. Fires are more likely to be crown fires that cause serious damage to the trees. There will be very little regrowth since winter is so near and food resources for certain animals may be destroyed or seriously decreased by burning in the late Fall (e.g. browse for large herbivores such as Deer and Moose). It

can be used to clear a large section for the development of extended open areas that will be productive in the future. However, it is not the strategy for immediate returns.

In summary, this second form of management is not an alternative to the first. In other words, there is no choice to be made between conflicting strategies. Rather the two strategies are complementary and the choice must be both / and for it all to work to the longterm benefit of the manager. Through the use of pyrotechnology habitat can be generated to support the very species that are the prey targets in the hunting strategies of humans in this part of boreal North America. The harvesting techniques that drive reproductive strategies and seasonally enhance standing crop have their ultimate outcome in the herbivore predation patterns that support the open habitats initiated and enhanced by the firing practices of humans.

So the objective would have been low intensity, early season, localised fires (the patch fire) similar in time and space to the concept of the crop rotation used in some agricultural systems. A portion of a territory would be temporarily 'down'. However, it is important to note that patterns of territoriality and intra- as well as inter-kin associations found in such communities (fission / fusion patterns) would ameliorate against significant resource problems for a hunting group in the midst of an extensive resetting of the successional 'clock' in their part of a boreal forest. Otherwise, the fires would be small and controlled and the need to move in with the relatives would be used only when serious lack of game was experienced in a specific territory (see the discussion and figures in Chapter One).

Why did the concept of resetting of the successional clock lose its currency in the historic period? I think the answers are complex and, in part, include the following:

- resetting no longer worked to push up numbers of Beaver since Beaver were too depleted to fulfil their part of the management equation. Firing then was abandoned;
- not understanding the complexity of the prehistoric management system, the Europeans discouraged burning and the practice was, if not abandoned, at least drastically reduced;
- small patch fires could not keep pace with the encroaching forest when all the herbivore species became few in number;
- patch burning may have been one of the traditional knowledge items that suffered greatly during the period of economic restructuring in this area of North America;

- with economic restructuring the worldview of the peoples of these forests was modified to see trees as resource items. In other words, there was some shift from field dependent to field independent cognitive styles in the changing categories used for the environment. Certainly this is part of the economic reality of today and is part of the crisis in narrative discussed earlier.

5.5: Concluding comments

I have attempted to weave together various strands of information on past relationships of boreal peoples to and with their habitat and defined landscape. The work has looked at diachronic and synchronic forms of data and used both on-site and off-site contexts. Since diverse forms of data have been considered (biological, environmental, ecological, cultural) the work meets the fundamental criteria set out by Harris and Thomas (1991:93) for ecological modelling of past environments and the economic and social relationships humans had with and within these settings.

I think that the range of species seen consistently on the archaeological sites of Northwestern Ontario, tied to an understanding of the place of these animals in their own habitats leads to the conclusion that the peoples of this part of the world did not just sit back and wait for what came their way. They were the authors of both their cultural and physical landscape. Thus the main theme of this work has been this: Native Americans were active shapers of their environment and this is seen in both their economic relationships and their metaphysical responses as exemplified by the story with which we began.

> Native Americans were the ultimate keystone species, and their removal has completely altered ecosystems,...the Americas as first seen by Europeans were not as they had been crafted by God, but as they had been created by native peoples...(Kay 1995).

EPILOGUE

Of course there are still things that need to be done: the pottery, its relationship to ownership and territory; further explorations of Beaver environments need to be initiated; and then there are the analogues that can be developed from North American examples for the interpretation of humans in the forest areas of prehistoric Eurasia.

The patterns of disruption discussed in this thesis are not unique to North America. Zhukov (1976) tells us to discard our "popular notion" that the Siberian forests are yet untouched by the economic activities of humans. It is the reserve forests, found for the most part in the north of the Asiatic Siberian mainland and mountain areas, that can be regarded as "virgin" territory. However, he notes that their "assortment composition is extremely specific" (1976:41). The loss of forests and / or their species diversity he attributes to forest fires (90% from carelessness), woodcutting / logging, felling to promote regeneration, the use of herbicides /arborcides /insecticides by forest cultures, and destruction from insects (1976:42). This theme is continued in the work of Pastor and Mladenoff (1992) when they note"Europe has not had a similar diversity of species as present in North America...since the Pleistocene..." and "...there is the appearance of greater simplicity and clearer divisions between zones because of the *long history of human impact* ..." (Pastor and Mladenoff 1992:218-219) (emphasis added). The issue here is not the longevity of use (similar time to North America) but rather the type of use and what this means for the developing differences in forest structure between the two hemispheres. Further, the place of keystone species like Beaver in the Eurasian habitats and their possible place in the economic systems of prehistoric humans still has to be researched.

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