Mapping and documenting the First Nations traditional activities in

Grand Lake Meadows

by

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ABSTRACT

This project maps and documents the locations and types of traditional activities undertaken by First Nations groups in the Grand Lake Meadows study area. These traditional activities include: hunting, fishing, gathering of plants for food, medicinal or ceremonial purposes and trapping. Sites of ceremonial, ecological or archaeological importance such as burial grounds and those relating to Aboriginal legends and animal breeding grounds are also of interest and are included as part of this research. Grand Lake Meadows is the largest wetland in New Brunswick and is of ecological significance to the region.

The potential research benefits include: increased awareness of the traditional activities undertaken by First Nations groups (or members) in living memory in the study area and preservation of some First Nations oral history of the region, which if undocumented, progressively decreases over time with the passing of knowledgeable group members. Primary sources of data were sought through collaboration with representatives from the Union of New Brunswick Indians (UNBI) and additional information obtained from previous research initiatives undertaken in Grand Lake Meadows. At the time of completing this report, research participants were not available to provide primary data on traditional knowledge, due to ongoing improvements by First Nations bodies to the ethics protocol governing research involving their community. The

basis therefore of the information used in this research is from secondary sources. The available information will still prove useful for illustration purposes.

This research created a prototype web mapping application, using the Google Maps Application Programming Interface (API) to display the recorded traditional activities, archaeological and ecological sites, internet links to additional information on these activities and relevant multimedia data sources such as digital photographs. The concept of this project is based on the principles of a Traditional Use Study, which is a research process designed to record the experiences of a people and their connection with the land. In this case, an online mapping service is chosen as the medium for representing the mapped traditional activities and related knowledge.

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CHAPTER 1

INTRODUCTION

This project maps and documents the locations and types of traditional activities undertaken by First Nations groups in the Grand Lake Meadows (GLM) study area. These traditional activities include (but are not limited to): hunting, fishing, gathering of plants for food, medicinal or ceremonial purposes and trapping. Sites of ceremonial, ecological or archaeological importance, such as burial grounds and those relating to Aboriginal legends and animal breeding grounds, are also of interest and are included as part of this research. It is hoped that by mapping and documenting these activities that a better appreciation of the Grand Lake Meadows' ecosystem will be attained. The Grand Lake Meadows as a wetland is naturally sensitive and any decisions regarding further development in this region should be made by understanding current human activities in this area. Such knowledge will be limited in the absence of baseline information regarding current traditional activities by First Nations, historical sites and recreational uses.

Information pertaining to land use and occupancy studies (in particular maps) in some instances have played an important role in legal proceedings. This project **does not** intend to produce map data for the intent of legal purposes.

1.1 Project Objectives

Project Funding was provided through the Grand Lake Meadows Endowment Fund, with the expectation that the projects undertaken should increase the appreciation, knowledge, and interest in the GLM through research on ecological, social and historical characteristics of the study area. Bearing these considerations in mind, the objectives of this research are:

- To increase awareness of the traditional activities undertaken by First Nations groups (or members) in living memory in the GLM study area.

- To assist in preserving some aboriginal oral history of the GLM area, which if undocumented, progressively decreases over time with the passing of knowledgeable First Nations members (living repositories of knowledge).

- Provide increased accessability to oral history and archaeological or ecological sites related to the study area (through internet technology) by presenting the findings through a prototype web mapping application [Google Maps API (to be hosted on UNBI's website)].

In summary this project seeks to gather information on traditional activities and sites of archeological/ecological importance and represent this information using a web mapping application.

1.2 Description of Study area

Grand Lake Meadows (GLM) is the largest wetland in the Province of New Brunswick. The GLM study area is located approximately 40 kilometres east of the city of Fredericton (capital city of New Brunswick) and forms part of the wider Grand Lake Meadows ecoregion. It extends from McGowan's Corner in the west to the Jemseg River in the east. The Saint John River borders the area on the southwest and its northeasterly border is along the Main Thoroughfare, Maquapit Lake, Lower Thoroughfare and the Grand Lake itself. The study area covers approximately 5000 hectares [Papoulias et al., 2006, p.1].

The ecology of GLM region consists of abundant deciduous forest, freshwater marches and streams, salt and brackish marshes and other diverse plant communities. The Meadows is approximately 20,000 hectares in size with roughly 58% of this area having been declared a Protected Area by the New Brunswick Ministry of Natural Resources and Energy in May 2000 [Great Canadian Rivers, 2007]. Recreational activities such as fishing, hunting, trapping, motorized boating, hiking and bicycling are permitted in the protected area, but forestry, mining, sand and gravel extractions, and construction of new infrastructures are not allowed [Great Canadian Rivers, 2007].

In October 2001 the Fredericton to Moncton Highway (a segment of the Trans-Canada Highway), built by the Maritime Road Development Corporation (MRDC) was officially opened. A portion of this 195 km highway corridor passed through the Grand Lake Meadows region, which directly impacted an estimated 55 hectares of its habitat [Communications New Brunswick, 2001]. A fund was created through the New

Brunswick Wildlife Trust Fund for the Grand Lake Meadows Project Management Committee which assists in overseeing the conservation of the wetland.

1.3 Research Components and Concerns

The opportunity arose through this research to focus on, and incorporate two distinct areas: Anthropology (mainly socio-cultural) and Geomatics (more specifically web mapping). The Anthropological component seeks to document and appreciate the traditional activities practiced by First Nations groups in Grand Lake Meadows while representing these activities graphically, rests on the utilization of Geomatics techniques.

Perley and O'Donnell [2005] discussed important considerations in conducting research with First Nations members. The underlining principle of respect cannot be overemphasized and issues of the past have inevitably affected the willingness (enthusiasm) of some First Nations groups to be engaged in research.

The Union of New Brunswick Indians (UNBI) is a stakeholder in this research initiative. Union representatives sought to recruit research participants to provide primary information relating to the study area. At the time of completing this report, research participants were not yet available to provide primary data on traditional knowledge, due to ongoing improvements by First Nations bodies to the ethics protocol governing research involving their community. Ethics Approval for research of this nature is an important matter. The Office of Research Services (UNB) has granted Ethics Approval for this project (from the perspective of the University) but as expressed, there is an independent Ethics Approval process that needs to be undertaken by the local First

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Nations community affiliated with the Grand Lake Meadows region. The protocol governing this approval process is currently being developed.

1.4 Report Organization

This report is organized into seven (7) chapters. This chapter (Chapter 1) introduces the research topic and outlines the objectives of the project along with the general research components and concerns. The second chapter (Chapter 2) focuses on the Literature reviewed pertaining to this research.

The Project Methodology is explained in Chapter 3. In Chapter 4 a brief history of First Nations peoples in Canada is discussed. It gives perspective to some of the issues affecting present day Native Americans. Traditional Use Studies and First Nations traditional activities are explored in Chapter 5 and screen shots of the application are included. Web mapping applications are discussed in Chapter 6, and specific details with respect to the Google Maps API are explored. Insight is also given into the creation of the GLM prototype web mapping application, the associated database design and the available application features. Chapter 7 presents the project conclusion and recommendations.

CHAPTER 2

LITERATURE REVIEW

The Grand Lake Meadows Project Management Committee (GLMPMC) in 2003 established the Grand Lake Meadows Endowment Fund at the University of New Brunswick (UNB), Fredericton, to encourage research on the ecological, social and historical characteristics of the Grand Lake Meadows. Projects undertaken by UNB researchers to date include:

1). *Prehistoric Ceramics and Human Ecology in the Grand Lake Meadows* (Susan Blair - professor of Anthropology).

2). *Potential effects of climate change on recreational activities in the Grand Lake Meadows Region* (Shawn Dalton – Research Associate with UNB's Environment and Sustainable Development Research Centre).

3). *Biodiversity assessment of dragonflies and damselflies within the complex wetland habitats of the Grand Lake Meadows* (Allen Curry – professor of Biology and Forestry and Environmental Management).

Funding has also been obtained through the Endowment Fund for this current project - "Mapping and documenting the First Nations traditional activities in Grand Lake Meadows (GLM)." The Endowment Fund is geared towards research related to a specific region of Grand Lake Meadows. Figure 2.1 shows the region that defines the Grand Lake Meadows study area.

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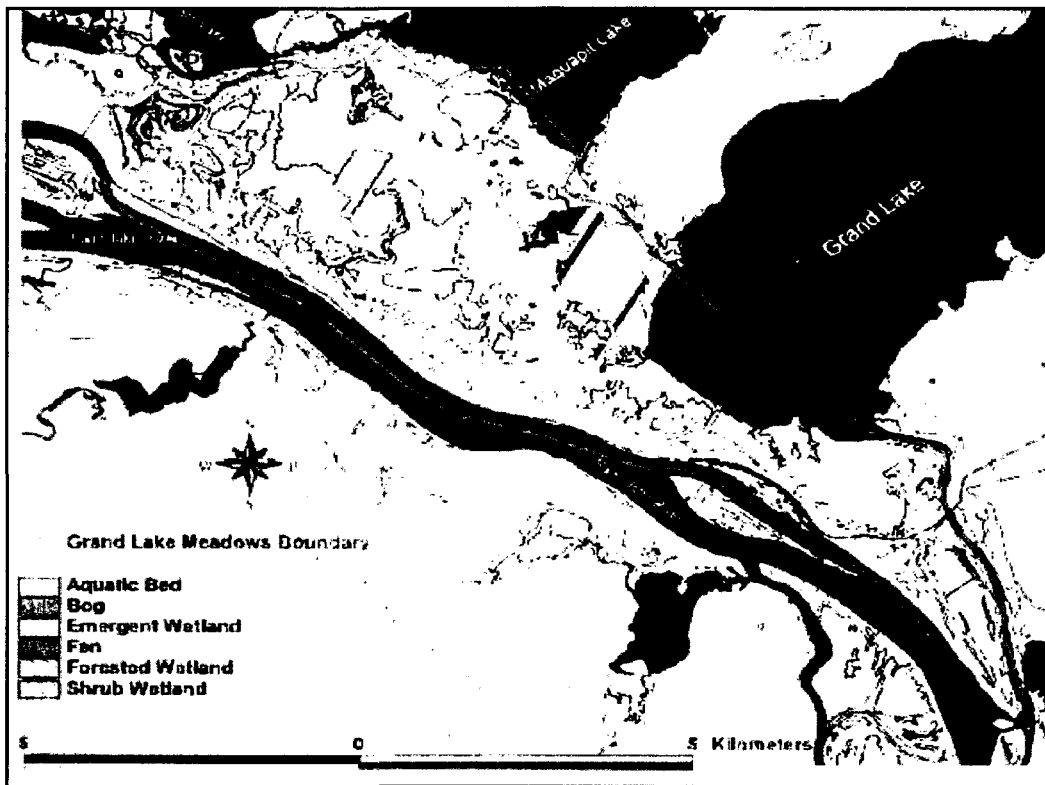
Source: *http://www.unb.ca/research/ors/grants_contracts/GLMProjectCriteria.pdf*

Figure 2.1 Grand Lake Meadows study area boundary

The process of land use and occupancy mapping has become an important tool for recording Aboriginal oral history and proving Aboriginal title to land. As development spreads across the Canadian landscape, territories traditionally used or occupied by Aboriginal groups eventually become affected. These groups use mapping projects as a means of highlighting their connection with the land, by graphically representing their oral history. These maps in some cases have formed part of the evidence submitted in legal proceedings by First Nations groups involved in land disputes.

Tobias [2000] presented a useful guidebook for conducting Land Use and Occupancy Mapping studies. Insight is given in formulating proper research design and data

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collection techniques for the research process. Critical questions (which at first may appear quite simple) to consider in designing a project are put forward and discussed, including:

- Why are you doing this project?

- Who are you going to interview?

- When is the period of time for which you want to collect data?

- Core principles to consider in research design and implementation are stressed [Tobias, 2000, p.38] such as:

- Respect;

- Confidentiality;

- Informed Consent;

- Consistency;

- Organisation;

- Integrity.

Perley and O'Donnell [2005] through their publication, "Engaging New Brunswick First Nations in Research," expressed ethical concerns in conducting research with First Nations groups. The importance of respect for Aboriginal peoples is again highlighted as a means of relationship building and fostering partnerships between researchers and New Brunswick Indian populations. Emergence of a "new research paradigm" whereby First Nations play a more active role in developing and conducting research pertaining to themselves, is presented by Perley and O'Donnell.

The concerns shared by several First Nations scholars dealing with the research on, and portrayal of First Nations peoples by non-First Nation scholars are presented. The western research approach has been accused of portraying First Nations in sometimes negative and inaccurate ways through literature, media and movies. Policies that have been formulated to guide the research process and safeguard the intellectual and other rights of First Nations are explained.

Approximately 500 vascular plant species have been identified within the Grand Lake Meadows Project Boundary Area (GLMPBA), through a vascular plant inventory and community ecology study conducted between 2004 - 2005 [Papoulias et al., 2006]. Wild Rice (*Zizania aquatica*) and Fiddleheads (*Matteuccia struthiopteris*), plants important to First Nations peoples, were among those species identified by this study. Wild Rice was found along some creeks, channels, ponds and along the River margin areas of the GLMPBA. Zizania aquatica is listed among the "Provincially rare vascular plants of the Grand Lake Meadows PBA" [Papoulias et al., 2006, p.76] and is also described as "widely distributed" [Papoulias et al., 2006, p.89] across the GLMPBA. *Matteuccia struthiopteris*, have been identified by Papoulias et al. [2006] along the St. John River margin in the PBA, including in the Silver Maple flood plains and on agricultural lands.

Through this plant study an appreciation was gained not only for the Flora of the GLM study area, but also for the geology and general geography of the region and possible methodological considerations for data collection.

The proposed project incorporates both technical (Google Maps Application Programming Interface [API] and related development software) and non-technical

aspects. The Google Maps API technology itself is fairly new (launched in 2005) but its application to various fields of interest has increased steadily. One Google Maps API project (NB Sport Spots website) hosted at http://nbsportspots.googlepages.com/home, shows sporting facilities spread across the province of New Brunswick [Bernie, 2007]. Further information can be obtained on these facilities through hyper-linking from the main webpage.

Another Google Maps application located at http://gis.uta.edu/afghan/Default.aspx, is hosted on the website of the University of Texas at Arlington Library. The application titled, "Mapping the Afghan experience in the U.S.," illustrates through maps, certain sociological aspects of the Afghan experience in the United States [The University of Texas at Arlington Library, 2006]. Map information, including the distribution of the Afghan population across the country, the distribution of persons with first degrees and the locations of Islamic Mosques, are displayed. This website appears to be extensive and illustrates very useful possibilities with Google Maps. It also has documentation (under the "help" link), which gives an overview of the website and how it is used.

The Aboriginal Canada Portal is a website (resulting from a partnership between the Canadian government and Aboriginal peoples) that provides information on online resources and government programs and services available to Aboriginal peoples [Aboriginal Canada Portal, 2001]. This site provides a link to the Aboriginal Communities in New Brunswick. A Google Maps link is provided for each community, which shows a standard map image of the area. This image is useful for general illustration but does not offer any map customization.

Information relating to Mapping Resources and Initiatives is also available from the

Aboriginal Mapping Network (AMN) at http://www.nativemaps.org [Aboriginal

Mapping Network, 1998]. Several useful publications are available and links to websites

relating to spatial technology and resources are listed. One such website, Gisuser.com

(www.gisuser.com) provides several examples of Google Maps API developments,

through an article written by Glenn Letham [Letham, 2005]. One site of interest at

http://www.housingmaps.com provides Real Estate Listings for several United States

based cities. Existing websites were used to guide the creation of the GLM web

application.

The primary reference material used for developing the GLM prototype web

application is the book, *Beginning Google Maps Applications with Rails and Ajax* [Lewis

et al., 2007]. A systematic approach is taken in this text to guide the development and

enhancement processes for the Google Maps Application. Supplemental information in

the form of articles and spatial technologies websites on Google Maps development,

proved useful throughout the development process.

The Google Maps API is being utilized for various online web development

initiatives and its popularity should continue to increase as more refinements are added

and the user base for internet mapping services expands. The literature reviewed

provides:

- useful considerations in research design and implementation with First
  Nations;
- anthropological information on First Nation peoples;

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- examples of the functionality available through the Google Maps API;

- guidance in the development of a Google Maps API web application.

CHAPTER 3

PROJECT METHODOLOGY

This chapter explains the methodology behind the project. Section 3.1 discusses the methodology along with associated constraints and sub-section 3.1.1 lists providers of secondary sources of data that formed part of the web application. The Google Maps API is introduced in section 3.2 and a summary of the project concept is given in section 3.3. The concept of this project is based on the principles of a Traditional Use Study, which is a research process designed to record the experiences of a people and their connection with the land. In this case, an online mapping service is chosen as the medium for representing the mapped traditional activities and related knowledge.

3.1 Methodology

The general project methodology includes the following phases:

- Map Biography (Interview)

- Field Tour and Mapping

- Compilation of mapped data and database design

- Development of web mapping application

The Map Biography process seeks to gather primary information from research subjects through interviews with those knowledgeable of the history and traditional activities of the region (see Appendix I for a sample of the interview guide designed for this research).

Answers to questions which have a geographic component (such as the location of a specific hunting site) are recorded on a base map. A handheld GPS (Global Positioning System) receiver can be used to map the physical locations of the points of interest recorded during the Biography phase. Once all information on the traditional activities is collected and compiled, the database schema for the information can be designed. The web mapping application can then be developed and the geographic data included. Refinements can be added to improve the usability and customization of the mapping service.

The extent to which the above methodology was strictly adhered to, was influenced by factors such as, the availability (willingness) of research subjects to participate, the actual data available for the study area and project time constraints. With the available secondary information (see section 3.2), the last two (2) steps listed in the methodology were executed.

Information security is an important consideration for research in general and even more so when personal information may be involved and internet technology forms a component of the research methodology. At the end of this research, the information gathered and the resulting web application will be presented to the UNBI. The intent is for the web application to be regulated through UNBI's website (www.unbi.org) with decisions on accessibility taken by them. The relevant data sharing issues will be addressed to allow for the publication of the written research and associated papers as a part of the University of New Brunswick's body of knowledge.

3.1.1 Providers of additional Sources of Information

Supplemental data on the study area was obtained. The data sources included the:

- Archaeological Services Unit, Department of Wellness, Culture and Sport, NB,

- New Brunswick Federation of Naturalists,

- Union of New Brunswick Indians.

3.2 Google Maps Application Programming Interface (API)

An API comprises a set of routines, protocols and tools for building software applications. It is an open source interface (the source code is available for modification and redistribution by the general public) that a computer system or program library provides to support requests for services by a computer program. This interface enables more "friendly" program development by providing the necessary sub-components that the programmer assembles to create the application.

The Google Maps API allows users to embed Google Maps in their own web pages with JavaScript. They can add overlays to the map, which may include markers and polylines and display shadowed "information windows" similar to the Google Maps interface. For more information on the Google Maps API refer to sections 6.1 and 6.3. Two (2) web applications which utilize this API are hosted at www.housingmaps.com and www.georgia-sex-offenders.com/maps and display information on real estate and registered child sex offenders in the state of Georgia, respectively (see Appendix II).

3.3 Summary of Project Concept

Anthropology seeks to study humans, their origins, institutions, practices and relationships. Geomatics embodies the disciplines associated with the capture, storage, processing, analysis and representation of geographically related information. With the advent of internet technology, the presentation of geographic information online has been a natural part of the development process.

Mapping and Anthropology have for a long time shared a close relationship. Once an area of interest is found, it is logical that a graphical record of this region be made for the purposes of: preservation of information, visualization and in some cases further research. Paper maps have been widely used to capture and represent anthropological information.

For this project, aspects of Anthropology and Geomatics were fused to form a prototype web mapping application (see Figure 3.1).

Anthropology   **Geomatics**
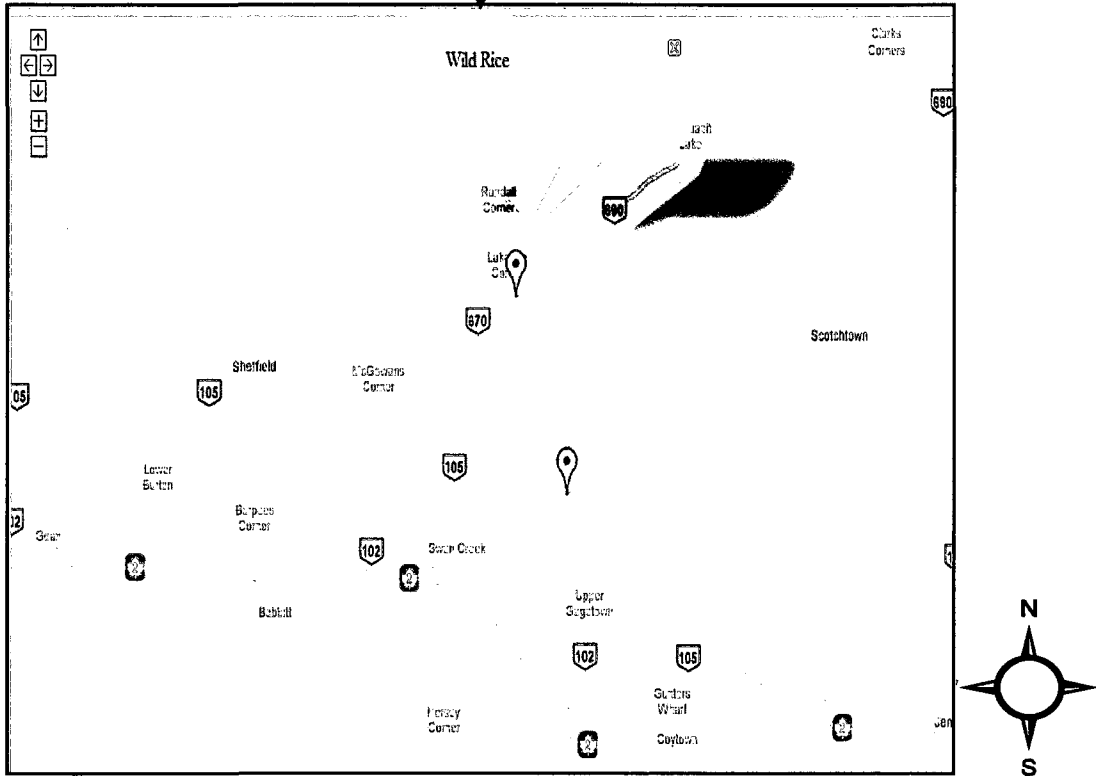
Figure 3.1 Screen shot of simplified version of web mapping application.

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CHAPTER 4

HISTORY OF FIRST NATIONS IN NEW BRUNSWICK

The information provided in this chapter is by no means exhaustive, but rather provides a historical summary of First Nations in New Brunswick. The Pre-contact and Contact time periods are discussed in sections 4.1 and 4.2 respectively. Section 4.3 provides thoughts on the context of history discussed in the two previous sections.

It is useful to note that under the *Canadian Constitution Act*, 1982, the word "Aboriginal" is used to include the following groups of peoples: Indians (First Nations), Metis and Inuit. Metis are Aboriginals of combined European and Indian parentage. Inuit are found primarily in northern Canada, including Nunavut, Northwest Territories, northern Labrador and parts of northern Quebec.

The history of First Nations in North America and more specifically New Brunswick, Canada, has been broken down into different time periods by various authors. Two (2) broad distinctions used by some in classifying time periods are: Pre-Contact period and Contact period. The Pre-Contact period covers the time line before Europeans came to North America, while the Contact period covers from the time of European contact with North America, onwards. What is certain is that there are differences in the contact times given by various authors for some geographic areas.

There are several First Nations groups within eastern Canada. These include (but are not limited to) the:

- Abenaki;

- Wolastoqiyik (Maliseet);

- Mi'kmaq (Mi'kmaq);

- Passamaquoddy;

- Penobscot.

One criticism concerning historical accounts of First Nations peoples in Canada is the fact that most accounts are written by western "scholars" from a western perspective. This has in many cases been to the disadvantage of Native peoples as the impression created of them has been misleading and degrading in some instances. The western research approach has been accused of portraying First Nations in sometimes negative and inaccurate ways through literature, media and movies [Perley and O'Donnell, 2005]. Native American scholars have sought to present the history of their peoples in a more accurate and balanced light. One such book, *WE WERE NOT THE SAVAGES*, written by Daniel Paul presents First Nations history from a Native American perspective. He states concerning one particular First Nations group (the Mi'kmaq) [Paul, 2006, p.1]:

> *Canada has kept the horrors committed against the First Nations resident within its borders under wraps for centuries. The physical and psychological torment the Mi'kmaq suffered started shortly after significant European intrusions began in northeastern North America in the late 1490s and has continued to some degree right up to the present time.*

It should not be concluded that only this specific native group faced adversity from European influences as this was not the case. All Native American groups were in some way affected by European contact with North America. Some groups have survived the

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adversities faced while others were not as successful. The Beothuk First Nation tribe of

Newfoundland was not as fortunate and eventually fell to extinction through European

hostility [Paul, 2006].

4.1 Pre-contact period

The Pre-contact period has been generally subdivided into the following

archaeological time frames [Abbe Museum, 2008]:

- Paleoindian Period (11500 – 9000 years BP[1]);

- Archaic Period (9000 – 3000 years BP);

- Ceramic Period (3000 – 500 years BP).

Archaeological surveys have uncovered evidence of aboriginal ceramic artifacts at

several sites across New Brunswick. Two places of interest are the Mud Lake Stream and

Fulton Island sites (left and right dots respectively, in Figure 4.1 below). The first site is

situated on the northern end of Spednic Lake, along the Chiputneticook - St. Croix

Waterway, which forms part of the border between Maine (United States of America) and

New Brunswick (Canada) [Deal et al., 1991]. Fulton Island is a part of the Grand Lake

Meadows and is located on a natural levee which lies in a channel connecting French and

Maquapit lakes [Deal et al., 1991]. This island is located in the northwestern corner of the

GLM study area.

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[1] BP denotes Before Present. It is a timescale used by scientific disciplines such as geology and archaeology. The year 1950 is generally used as the bench mark to define the "present"
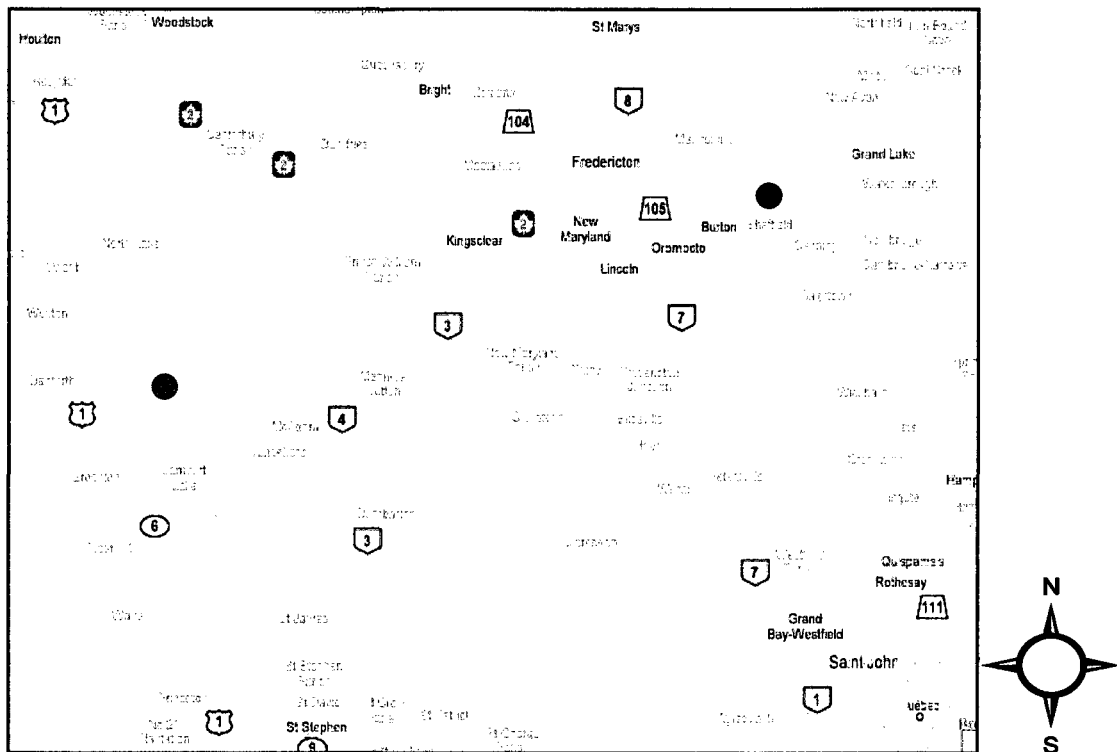
Figure 4.1 Mud Lake Stream (left dot) and Fulton Island (right dot) archaeological sites (from Google Maps [2008]).

Within the Spednic Lake area, 78 prehistoric sites have been located since 1982. Of this number 27 have been classified as late Archaic while only 17 are believed to date back to the Ceramic period [Deal et al., 1991, p.171]. Spednic Lake has a large game fish stock and the abundant evidence of fish remains from the Mud Lake Stream site shows that fish stocks were also of importance during prehistoric[2] times [Deal et al., 1991]. The Lake's shores provide habitat for a variety of birds and animals such as goose, black duck, porcupine and white-tailed deer. Ceramic artifacts can give insight into the nature of activities conducted in an area in the past. Evidence may point to full fledged

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[2] Prehistory refers to the period of human history preceding written records.

settlement patterns or to temporary campsites used during a particular season (during hunting for example).

With respect to the Fulton Island site, Sanger states that, "archeological investigations have demonstrated that the islands, levees and thoroughfares of this area were the scene of aboriginal activity as early as 3700 years ago [Sanger, 1973 as stated by Deal et al., 1991]. The Grand Lake Meadows region appears to have been used more extensively during the Ceramic period than the Archaic period [Deal et al., 1991]. Through the archaeological research done, the remains of beaver, fish and various species of edible berries have been found at the Mud Lake Stream site while the remains of beaver, muskrat, moose and butternuts dominate the findings at Fulton Island [Deal et al., 1991].

In an excerpt taken from the book, *Wolastoqiyik Ajemseg* (The People of the Beautiful River at Jemseg – Volume 1: Important Stories and Spoken Histories) one First Nation member expressed [Perley et al., 2003, p.34]:

> *Then you came into Quapit (Maquapit Lake) and French Lakes. There was a little island, there's reserve; there's burial grounds there too. Then you come up around that point, which is the out skirts of Grand Lake, coming into the Saint John River, which takes you up along the Jemseg. So Indians occupied that whole lake area, from Indian Point, right around to Jemseg, right up to the Saint John River.*

The *little island* described above is likely Fulton Island and as stated, there has been a strong First Nations presence in the Grand Lake Meadows region. Figure 4.2 shows the web prototype map for archaeological sites in the study area.
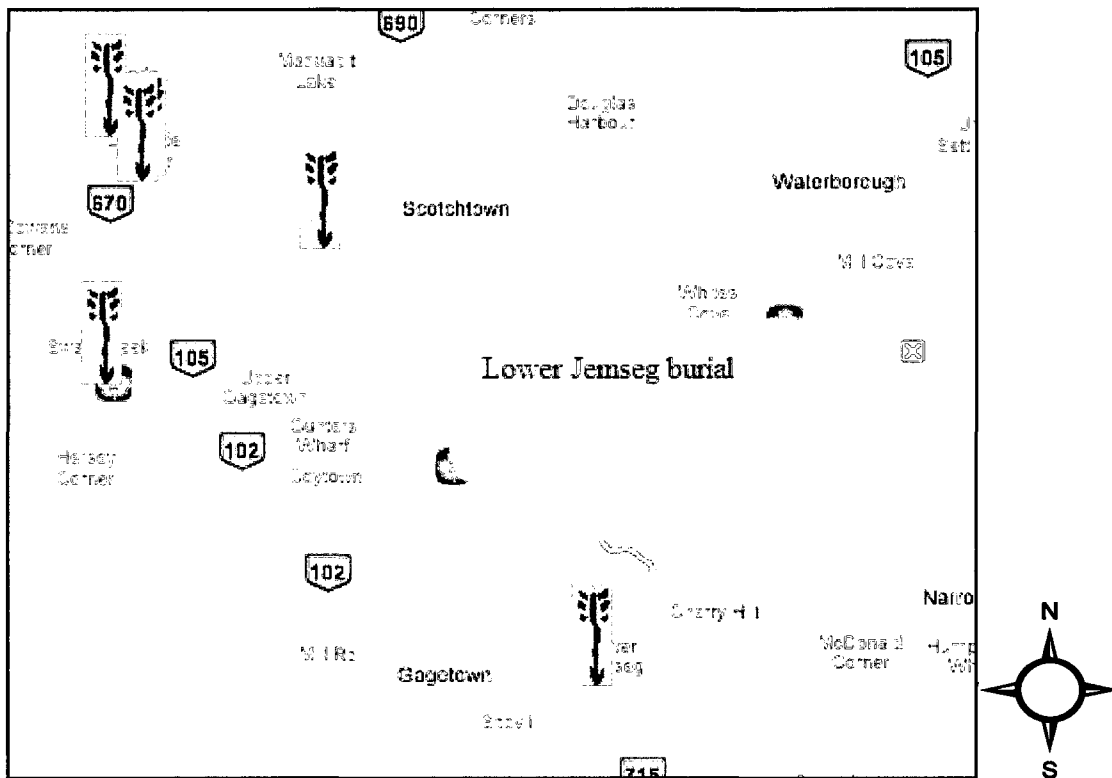
Figure 4.2 Web prototype map of Archaeological sites.

First Nations groups have an intimate connection with the land, which has spanned

thousands of years in the Maritimes. They were Hunter-gathers and among the animals

hunted were big game such as Moose, Deer and Caribou. Smaller animals such as

Muskrat and Beaver were trapped and fishing was also an important component of the

First Nations' way of life. Important fish included: salmon, bass and sturgeon. Birds such

as duck and geese were also of importance. While western scholars try to stipulate a

timeline for which First Nations came to North America, these Native peoples hold the

view that they have always occupied these lands and that these lands are their ancestral

home.

First Nations peoples also traded among themselves. Items of trade included, fur, baskets, tools and other forms of craft. An important trading post existed at Jemseg. Perley et al., [2003, p.9] explains the meaning of the name, "Jemseg or Ajemseg which means 'gathering place', a place where people gathered drift wood, food and medicines, and where people grouped together to trade and socialize." Traditional names are an important aspect of First Nations culture. They give insight into the resources associated with the area, whether for example it was habitat for a particular fish or animal or its proximity to a particular feature such as a water body.

The St. John River (Wolastoq) bears a special significance for Native Indians of the Maritimes. The river served as an important transportation network for First Nations. The St. John River originates in northwestern Maine and linked several native groups from as far north as Quebec, through to Madawaska (close to Edmundston), Grand Falls, Tobique, Woodstock, Meductic, Fredericton, Oromocto and Jemseg, and eventually empties into the Bay of Fundy.

The notion of Native peoples of North America being "uncivilized" was probably passed down through the exaggerated reports brought back to Europe by early Norse and Viking voyagers [Paul, 2006]. This notion was clearly misleading. Speaking of the Mi'kmaq people Paul writes [Paul, 2006, p.7]:

> *Prior to European settlement the Mi'kmaq lived in countries that had developed a culture founded upon three principles: the supremacy of the Great Spirit, respect for Mother Earth and people power. This instilled in them a deep respect for the laws of the Creator, the powers of Mother Earth and the democratic principles of their society. As a result they enjoyed the benefits of living in a harmonious, healthy, prosperous and peaceful social environment.*

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The nature of their society, which included sharing and free expression,
was so advanced in the establishment of equitable human rights principles
that greed and intolerance were all but unknown.

Words such as "democratic principles" and "equitable human rights principles" hardly depict the traits of an uncivilized people. This type of misrepresentation as uncivilized, affects the attitude of Native peoples towards research initiatives, especially in cases where the work is being done by a non-native person. This attitude cannot be overcome without an ongoing partnership and established standards of cooperation favourable to all stakeholders.

While Paul mentions the Mi'kmaq nation (of which he is a member), the traits mentioned can be applied to the wider First Nations peoples as they shared an ethnic identity that affected their thinking, language, culture and organization. These people as a whole were organized and enjoyed a harmonious way of life.

An interesting idea presented in justifying the civility of Native Americans prior to European settlement, is the fact that if indeed Native Americans were an uncivilized and intolerable people, then it would not have been possible for European colonization to take place [Paul, 2006]. Why? With the arrival of a "strange people" (Europeans) to American shores, with a different skin colour and strange religions, the natives would have either "enslaved," "repulsed" or "exterminated" them upon arrival [Paul, 2006]. History shows that this was not to be the fate of European settlers and therefore you can draw your own conclusion as to the nature of Native peoples of North America. The European definition of being civilized was tied closely to the Christian religion. In fact, "their intelligentsia

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equated civilization with Christianity," expresses Paul [2006, p.9]. The implication was that if a people residing in a place where not Christian, then they were by default uncivilized [Paul, 2006]. The misrepresentation of Native Americans can be better understood by appreciating the ways in which Euro-centric "superiority complexes" skewed the efforts of their early scribes in making unbiased judgments on the character of Native American peoples [Paul, 2006].

4.2 Contact period

> *On June 24, 1497, John Cabot laid claim on behalf of England's King Henry VII to what thereafter would be called Newfoundland. The fact that the land was then owned and occupied by human beings, whose residency stretched back for millennia, was not viewed by Cabot or England as a legal impediment to this claim. In addition to appropriating another Nation's land, Cabot's explorations revealed for future European exploitation the region's fabulously endowed fishing grounds. These events soon led to a full-scale European invasion of northeastern North America.* – [Paul, 2006, p.43]

There are variations in the accounts of first European contact with the Maritimes. Some scholars hold the view that first contact took place around 1000 A.D. with Norse ships visiting the Gulf of St. Lawrence [Whitehead, 1991]. However, due to insufficient historical records for the period of Norse exploration, the contact period is generally held to begin in the sixteenth century, after the voyages of John and Sebastian Cabot had informed Europe of the abundance of fish resources available on the Grand Banks [Whitehead, 1991]. Early records showed that the English and Portuguese were among the first Europeans to visit the Maritimes in the 1500s. The voyage of Gaspar Corte Real

(of Portugal) arrived in 1501 and an English Expedition also set sail from Bristol to the Maritimes in the same year [Whitehead, 1991]. It is mentioned by Ross et al. [1992, p.4] however, that as early as the late 1400s and early 1500s, Basque fishermen (in addition to the Portuguese and French) were "...frequenting the rich fishing banks located off the south coast of the islands of Newfoundland and Cape Breton."

When permanent European expansion began in the New World in the 1500s, the Mi'kmaq were living in what is now present day Nova Scotia, Prince Edward Island and northern and eastern New Brunswick [Whitehead, 1991]. The Maliseet (distant cousins and language affiliates of the Mi'kmaq) occupied southern and western New Brunswick and parts of Maine [Whitehead, 1991].

The history of the Maritime Provinces of Canada is tied closely to two (2) European groups: the British and the French. These two groups were in conflict over control of North American territory- territory which had long been the ancestral home of Native Americans prior to European expansion into the New World. It is useful to note however, that other European countries such as Spain and Portugal also had made contact with the Maritimes.

In the early stages of European contact with the Maritimes, the activity of trading which had been an established custom among Native American groups was extended to European visitors. The long established trading relationships among Natives eventually deteriorated as trade with Europeans increased [Paul, 2006, p.39].

It is believed that the earliest written European records of the Maliseet First Nation came from French sources, which referred to this Native group as *Etchemins* [Gagnon,

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2006]. Ross et al. [1992, p.3], states that the first written account of the native people of Canada was provided by the French explorer, Jacques Cartier. The French founded the colony of Acadia (which was located in what is now present day Nova Scotia and New Brunswick) in 1604 through the effort of Pierre Dugua de Mons [Ross et al. 1992, p.7].

Native American peoples comprise several different Indian groups. Some groups formed themselves into Confederations as a means of strengthening ties and protecting their way of life from external influences. The Wabanaki Confederacy consisted of First Nations groups in north eastern America (including the Maritimes) and was created "…for the purpose of providing mutual protection from aggression by Iroquoian and other hostile nations," explains Paul [2006, p.12]. The Wabanaki Alliance consisted of the Abenaki, Passamaquoddy, Mi'kmaq and Maliseet Nations [Gagnon, 2006].

With the progression of time, conflicts between Britain and France which originated in Europe extended into North American territories, where they both had interests. King Williams's War (1685 – 1697) fought between Britain and France saw the Wabanaki Alliance aligning themselves with French colonists in the Maritimes [Gagnon, 2006], while members of another Native American Confederation, the Iroquoians, sided with the British [Paul, 2006] who occupied parts of present day United States of America (including Maine and Massachusetts). It is fair to mention that while European presence in North America brought about conflict between themselves and Native Indians, a degree of conflict also existed among different native groupings prior to European contact.

As mentioned, history has shown that First Nations groups of the Wabanaki alliance were sometimes at odds with Native Indians of Iroquoian affiliation. The Iroquois are described by Paul [2006, p.45] as "... the Mi'kmaq's historic and numerous enemy... ." He further expresses [Paul, 2006, p.67];

> *Prior to the European intrusion, the Nations of the Americas had been at times involved in wars among themselves, and the animosities between some national groups were of long duration. The Mi'kmaq were involved in such an entanglement with the Iroquois. The animosity between the two Nations was some time in the making.*

The historic rivalry between some Native American groups helps to explain the development of the past alliances formed between the various European colonizers and these Native groups. In essence these alliances facilitated a continuation of hostilities that existed prior to European contact.

Acadia, despite the attempts of the French and Wabanaki resistance, fell to the British in 1713 [Gagnon, 2006]. The *Treaty of Utrecht* was signed on July 13, 1713 between France and Great Britain and this agreement saw the transfer of the French controlled Acadia to the British Crown [Paul, 2006, p.74]. What followed was the eventual movement of British settlers into the territories controlled by the Wabanaki Alliance nations.

The year 1744 saw the resurgence of hostility between Britain and France, in this instance over the disputed Austrian throne [Gagnon, 2006]. As with King William's War, the war of Austrian Succession (King George's War 1744 – 1748) traveled across the Atlantic Ocean and "landed" in North America [Gagnon, 2006]. What followed next as

expressed by Gagnon [2006] was that; "All the smoldering resentment of the last 29 years of British occupation erupted throughout the Canadian Maritimes, and the Mi'kmaq and Maliseet attacked the British outposts."

Although the British faced stiff opposition from Wabanaki Alliance nations as well as French forces, they eventually prevailed, through strategic victories and the assistance of a naval blockade of Canada, which cut French supplies to the Maritimes [Gagnon, 2006]. Attacks on the British however continued until 1749.

With the Treaty of Aix-la-Chapelle in 1748, the Austrian Succession dispute between Britain and France was resolved [Gagnon, 2006]. However, both sides were still at odds over control of the Canadian Maritimes. By 1749 the French again started to occupy the St. John River valley in New Brunswick. At the same time the British began to populate the Maritimes with their colonists as a means of establishing control [Gagnon, 2006].

A large percentage of Acadia's French population along with the Mi'kmaqs, some of whom intermarried with the French, were expelled from Acadia by the British in 1755, during the French and Indian War (1755 -1760) [Gagnon, 2006]. By the year 1758, British forces had "swept through the remaining Acadian settlements on the St. John River destroying everything in their path" [Gagnon, 2006]. The expulsion of the Acadians (*Grand Derangement*) which began in 1755 is described as a "...disastrous event,..." which "shattered and dispersed the entire French-speaking population of the Atlantic region" [Ross et al., 1992, p.VII].

British Dominance of the Canadian Maritimes began with the defeat of French forces in Quebec, which facilitated the British takeover of French possessions (occupied

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territory) in North America [Gagnon, 2006]. British emergence after 1760 also impacted the First nations groups that had supported the French. The Maliseets of the St. John valley signed treaties with the British in 1760, although "lasting treaties with the Maliseet were not signed until 1770 and 1776," states Gagnor [2006].

In 1764 Maliseet representatives – Pierre Tomah and Ambroise St. Aubin voiced concerns to the Governor of Canada in Quebec (J. Goldfrap) regarding trespasses on the Maliseet's territory in the St. John River valley and petitioned the British to uphold the rights to the Maliseet territory that the French had recognized [Gagnon, 2006]. The request was granted in a letter from the Governor dated January 19th 1765. This petition emphasized the reality that by 1765 (after a few centuries of European contact) the Maliseet and by extension other Native American groups were subject to colonial authority.

The American Revolution (War of Independence), which ended in 1783, lead to further complications for First Nations peoples of the Maritimes. Loyalists (British North American colonists who remained loyal subjects of the British Crown during the American Revolution) fled from south of the Canadian border and were granted land along the St. John River in New Brunswick. This land of course was part of Maliseet territory. A ripple effect was created, and as the Loyalists moved into the River Valley, the remaining Acadians were displaced and were forced to move further up the St. John River beyond Grand Falls, up to the area surrounding the Madawaska River settlement of the Maliseet [Gagnon, 2006]. This area lies in the northwestern region of New Brunswick in the general vicinity of the present day city of Edmundston. The net result of

this systematic displacement of the Loyalists (British) and Acadians (French) was that the entire territory of the Maliseets was now being occupied by non-native people [Gagnon, 2006].

As French influence increased in the Madawaska settlement area, some Maliseet families moved further south to areas such as Grand Falls, Woodstock and Tobique to join other Nation members [Gagnon, 2006].

European influence resulted in Native Americans being forced to assimilate into a Euro-centric model of existence. They were encouraged to settle in reserves defined by colonial authorities and influenced to change their way of life. The intention was for the Natives to become sedentary farmers, therefore losing their need for large tracts of land for hunting and fishing [Madawaska Historical Society, n.d.]. This had economic, social, cultural, religious and political implications.

With British control in the Maritimes, First Nations became subject to the ruling authority and with their independent way of life destroyed, became dependent on governmental assistance for their survival (including food and other necessities). Titles such as "Superintendent of Indian Affairs" and "Indian Agent" demonstrated the type of institutionalization under which the Natives would fall.

Moving from the 18th to the 20th century, the general sentiment of poor treatment by Colonial authorities was still expressed. Over these two centuries (however less in magnitude) the exploitation of First Nations members persisted. A Nation member relates the following story of one Indian Agent [Perley et al., 2003, p.48]:

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He made money off the Indians. He was an ex-RCMP officer and he retired a millionaire. And all the goods and services that were provided to the Indians along the Saint John River, went to his personal gain. All the farm produce, the animals, the farm supplies, lumber supplies, army, air force, navy, RCMP supplies, the surplus, he got them, gave them to the Indians and paid himself for the services rendered. Vegetables, beef, sheep, all them things, he paid himself for services.

The Indian Act of Canada (1876) providing the framework for governmental control of Native Canadian Indians. This Act has been amended on several occasions with an overhaul taking place in 1951 (partly influenced by the contribution and sacrifice of Aboriginal members who participated in World War II and an acknowledgement of the general poor conditions faced by native Canadians). Issues relating to health care, education, land and movement of First Nations, among other things are covered under this Act. Today in Canada, First Nations Reserves are still in existence. Among other issues, housing still remains an important concern for First Nations in New Brunswick [Perley, 2008].

4.3 History in Context

In developing an understanding of the history of Native Americans both prior to and after European contact, it is easier to appreciate many of the socio-political issues today raised by First Nations groups across Canada. The lobby for greater self-determination and ownership of resources (including land – which has been the foundation of the First Nations' way of life for millennia prior to colonization) continues within Canada to this day.

The battle format over the centuries has changed, from one of physical combat to one of litigation and negotiation. Native Americans have had to master the very English law that served in some cases as a tool of dispossession against them to now obtain a sense of redress. The legal battles continue, with signs that there is greater political pressure towards having the issues affecting First Nations communities addressed.

There have been instances when the government has taken into consideration the concerns of the First Nations community. What is now known as the Jemseg Crossing Archaeological Project resulted in the re-routing of a segment of the Trans-Canada Highway (in the Grand Lake Meadows region) in order to not disturb the remains of a "major ancestral Wolastoqiyik settlement dating to between 2000 and 3000 years ago," as described by Chris Turnbull of Keswick Ridge, NB [Perley et al., 2003, p.x]. This adjustment of the highway's alignment took place in the Spring of 1997.

CHAPTER 5

TRADITIONAL USE STUDIES

The historical summary discussed in Chapter 4, highlighted several sites across New Brunswick that First Nations have had a connection with. This chapter (Chapter 5) elaborates on the concept of a Traditional Use Study and some of the related traditional activities that have been of importance to First Nations. An introduction to traditional use studies is given in section 5.1 and First Nations traditional activities are highlighted in section 5.2. Section 5.3 provides a summary of the level of present day activity in the Grand Lake Meadows.

5.1 Introduction to Traditional Use Studies (TUS)

The Earth's resources form the foundation of First Nations culture. Aboriginal communities across Canada have been formally involved in the process of recording and mapping aspects of their history and culture for decades. Freeman [1976] spearheaded *The Inuit Land Use and Occupancy Project*, which served to document land use from an aboriginal standpoint (in the Northwest Territories) and this work has subsequently been used as an authoritative reference for more recent studies [Berkes et al., 1995]. These general types of studies have been given several names including [Government of Alberta, 2003]:

-Traditional Land Use Study (TLUS);

-Traditional Knowledge and land use study (TKLUS);

-Traditional land use and occupancy study (TLUOS);

-Traditional use study (TUS).

This project will adopt the term "Traditional Use Study," which is defined as, "a project that is designed to capture and record patterns of traditional use by Aboriginal communities" [Government of Alberta, 2003, p.3]. It is useful to note that in New Brunswick, these studies are most often referred to as *Traditional Ecological Knowledge* studies (TEK) [Blair, 2008]. There are three (3) primary data collection components necessary for a TUS:

(1) Interviews and discussions with Aboriginal elders and or other custodians of traditional knowledge;

(2) Historical and other types of research (through archives for example);

(3) Mapping and documenting of traditional uses including sites and activities.

Traditional Use Studies also provide the opportunity for aboriginal oral history to be recorded and preserved for future generations. Research has indicated that a small segment of aboriginal community members, "hold a large portion of traditional knowledge" [Garvin et al., 2001]. Garvin et al., [2001] also expressed the concern that within a period of 10 – 15 years, these individuals will die and by extension their knowledge lost if efforts are not made to document available knowledge now.

In reality some Traditional Use Studies can take months or even years to complete, covering vast areas of land space. The two (2) major purposes put forward for land use

studies in the Canadian North were: "to document Native land claims and to assess environmental impacts of development projects" [Berkes et al., 1995].

In conducting a TUS a distinction needs to be made between "use" and "occupancy." Use, denotes activities involving the harvest of traditional resources, for example activities like hunting, trapping, fishing and gathering of plants [Tobias, 2000, p.3]. Occupancy deals with the area which a specific First Nation group considers as its own by reason of continuing use, habitation, naming, knowledge and control [Tobias, 2000, p.3]. The geographic areas defined by "use" and "occupancy" are therefore usually different in extent. Occupancy mapping may involve recording information such as: stories and legends about a place, habitation sites such as a cabin and burial sites. The geographic area defined by "use" is normally larger than the extent defined by "occupancy" and in the case of mapping traditional use (as opposed to occupancy) there is more likely to be a conflict of boundary regions if more than one interest group is involved.

A further distinction is made in considering traditional use studies, in this instance with respect to time frames. Research on traditional activities may cover *current* use and occupancy or *historical* use and occupancy [Tobias, 2000, p.35]. The study which focuses on the "current," deals with traditional knowledge "within living memory."

For this research it was intended to record information from research subjects, based on the activities that have taken place in their life time and which they could personally recall. Research over the historical time frame on the other hand goes back further in time and will rely on secondary sources collected over a longer period (for example centuries)

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as well as complimenting this knowledge with living memory sources and other available documentation.

Land use studies in many cases have given Aboriginal communities a voice in representing their concerns with development trends which may impact their way of life. These studies in some cases have proven useful submissions of evidence in court proceedings for the purpose of defending the claims of First Nations communities [Tobias, 2000, p.22].

Land use studies while having been useful in many cases, have also in instances led to unfavourable outcomes for some First Nations communities, as cases exist where information obtained during the process has been misused by researchers and other groups. Tobias [2000, p.28] mentions that there "have been numerous instances where cultural information has been collected by consultants or academics, then used for personal gain, and sometimes never returned even after repeated requests by the community." These issues among other things, help to create a sense of distrust (which is understandable) as it pertains to research on traditional issues especially if the researchers are outside of the First Nations community. This can make research initiatives a tedious process. Research guidelines, Ethics measures, stronger governance and knowledge of past experiences have all helped to mitigate some of the negative repercussions of Traditional Use studies.

5.2 First Nations Traditional Activities

Traditional Activities refer to the practices that form part of the way of life of a people. First Nations traditional activities include (but are not limited to):

- Hunting;

- Fishing;

- Gathering;

- Ceremonies (for example, Religious);

- Storytelling.

The extent to which traditional activities are practiced presently, by Aboriginal members across Canada varies. Some communities for example in the Northern regions actively carry on activities that have defined there way of life for centuries. Other Aboriginal groups have been more actively involved in the "cash economy" with less emphasis placed on some traditional activities.

An excerpt from the report on "Survey of Living Conditions in the Arctic" (SLiCA), posted March 23, 2007 on the *Science Daily[3]* website, reads as follows:

> *"Four decades ago, as wage work rapidly became more common in the north, scientists and policymakers assumed that indigenous people would take advantage of opportunities to participate in the cash economy, abandoning harvest and traditional food processing activities," report notes.*
>
> *The survey results indicate that despite lifestyle changes that have swept into northern communities as non-natives move to remote areas, traditional values still are important to native peoples, and they are willing to use their earnings in the cash economy to support those ways of*

[3] http://www.sciencedaily.com/releases/2007/03/070321130545.htm

life. Despite historical efforts by national governments to assimilate native peoples and encourage them to give up native traditions in favor of wage labor, nine out of 10 Inuit continue to think traditional activities are important to their identity.

The First Nations groups which have used the Grand Lake Meadows for their traditional activities are primarily Maliseets, with mainly three (3) Maliseet Bands located in the proximity of the Meadows. These are:

- Maliseet nation at Oromocto;

- Maliseet nation at St. Mary's;

- Maliseet nation at Kingsclear.

Other First Nations groups from Woodstock and Tobique, Maliseets from Houlton (Maine, U.S.A.) have also used the Grand Lake Meadows wetlands. Figure 5.1 shows the web prototype map for traditional activity sites in the GLM study area (fictitious data used for illustration purposes only).
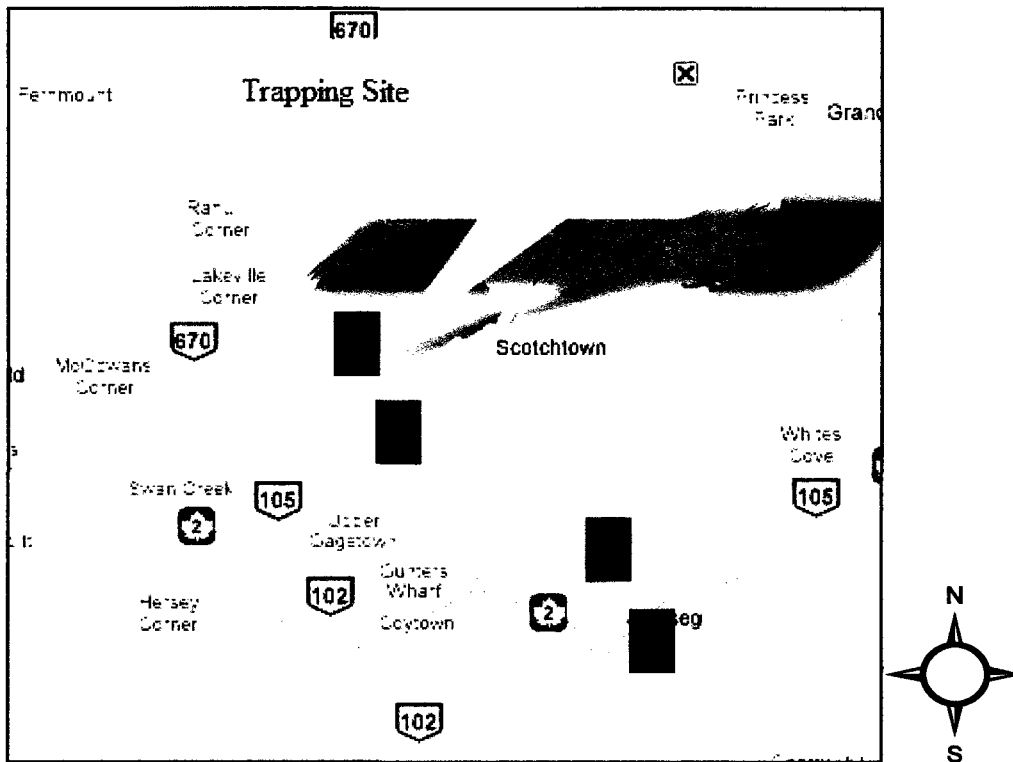
Figure 5.1 Web prototype map of Traditional Activity sites.

5.2.1 Hunting and Horticulture

Traditionally the Maliseet group were hunters, fishers, and gatherers. In the

seventeenth century they adopted some horticulture, with particular emphasis on maize

cultivation, which remained of secondary importance into the twentieth century

[Erickson, 2007].

The major large game animals hunted by Maliseets included Moose and Caribou,

with the white-tailed deer replacing the Caribou in the early twentieth century. Hunting

and Fishing were normally done by the males, while Maliseet women harvested corn and

gathered fruit. Today, though, many Maliseet girls and women enjoy fishing also.

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5.2.1.1 Birds

Grand Lake Meadows serves as an important breeding and staging area for waterfowl and other birds. Approximately 60% of the wetland has already been secured through the Eastern Habitat Joint Venture (part of a unique collaborative waterfowl conservation strategy, related to the North American Waterfowl Management Plan- NAWMP) [Burnett, 2002].

Ducks Unlimited[4] (DU) has increased the amount of permanently flooded habitat in the Grand Lake Meadows PBA through human-made impoundments. To date, seven areas of the PBA comprising 511 hectares have been modified to provide additional brood-rearing habitat for waterfowl by maintaining stable water levels during the summer. These areas are Moose Ridge, the Grand Lake Meadows Oxbows, the Ash Swamp Level Ditches, Waterbury's Marsh, the Trout Creek impoundment, Jemseg Flats and Jemseg Point [Papoulias et al., 2006, p.1]. Birds such as waterfowl, Ducks and Geese are among those hunted by First Nations.

5.2.2 Travel

The Maliseets (as most Wabanakis) traveled mainly by river in large but light portable canoes they expertly made out of birch bark. It is said that under normal conditions they could span the distance from Quebec to St. John, New Brunswick in only 5 days [Madawaska Historical Society, n.d.]. Rivers, streams and watersheds provided an interconnected network for travel throughout the various First Nations territories.

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[4] non-profit Conservation Company

5.2.3 Fishing

Spear fishing has been a technique long used by First Nations. Fish such as salmon, bass and sturgeon were caught by this method during upstream migration along The Saint John River. Line fishing and net fishing are also methods employed today. Eels, smelt, and other smaller fish were caught as well. The Maliseet, unlike the Passamaquoddy aboriginal group, think of themselves as inland hunters and freshwater fishers rather than salt-water and coastal hunters and fishers. This made wetland areas such as the Grand Lake Meadows attractive sites for hunting and fishing by the Maliseets. The following excerpt was taken from a Report written by Moses Perley[5] in August 1841 [Gagnon, 2004]:

> *The Indian method of taking the Salmon, is altogether by the Spear and torch, and it struck me that they prized much more highly the dash and excitement of the sport in taking the fish, than the profit arising from the sale of them.*

5.2.4 Rituals

Rituals serve to express the belief system of a people. They may be simple or elaborate, private or collective. A Native Indian ritual still practiced today is "smudging", which involves the burning of sweetgrass (also called Seneca grass, holy grass and vanilla grass) and allowing the smoke to pass over the body for the purpose of cleansing mind and spirit [Aboriginal Affairs Secretariat, 2008]. Some rituals are used for seeking

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[5] Moses Henry Perley (1804 – 1862). Commissioner of Indian Affairs, New Brunswick.

help from divine or spiritual beings, while others are meant to cure the sick or to obtain favourable conditions for hunting and planting. The Shaman (holy person of a tribe) served as the spiritual leader in many of the rituals practiced. This person was thought to possess spiritual powers to heal the sick and also special wisdom.

Aboriginals consider the Eagle a sacred bird, which represents and posseses important values or powers such as strength, loyalty, honesty, and compassion [Vancouver Coastal Health, 2008]. The Eagle is often depicted by those tribes who recognize the Creator as a part of their religion, as representing the Thunderbird, which is the messenger of the Creator [Veterans Affairs Canada, 2005]. Like all ceremonial objects, the Eagle feather is always treated with utmost respect [Vancouver Coastal Health, 2008].

5.2.4.1 Smudging Ceremony

The Smudging ceremony is considered a sacred purification ceremony. It highlights the importance of the four gifts of the earth - tobacco, sage, sweetgrass, and cedar. The English and Maliseet translations of this ceremony are given below, as taken from the New Brunswick student guide - Sacred Colors - Sacred Plants - Moon of the Whirling Wind 98 [Woodstock First Nation, 2001]:

English Translation of The Smudging Ceremony:

Each day, we give thanks for all our gifts. Koluskap taught the Wabanakis how to Smudge. Four Sacred medicines are used, sweetgrass, tobacco, sage, and cedar. Sacred medicines are potent when burned together in a Smudging Ceremony, honor this gift. Begin by Smudging your head, so that your thoughts will focus on compassion and generosity, honor these gifts. Smudge your eyes, so that you will see the beauty of Creation, honor this gift. Smudge your ears, so that you will hear all of Creation, honor this gift. Smudge your nose, so that you will appreciate the smell of

Creation, honor this gift, Smudge you mount, so that you will speak honorably of Creation, honor this gift. Smudge your heart, so that you will love all of Creation, honor this gift. Smudge your hands, so that you will respect all of Creation, honor this gift. Smudge you feet, so that you will always walk the Red Path, honor this gift. This is how Koluskap taught our Ancestors, now it is our turn to pass these teachings on to the one who are not born yet.

May that be the truth!

~Moon of the Whirling Wind 98~

Maliseet Translation of The Smudging Ceremony:

Ehtahsikiskahk, kulasuweltomuhtipon 'ciw psiw keq. Koluskap 'kisokehkima Skicinu weci wolasuweltomuhtihtit. Newol 'pisunol ewehkasik, wolimahask, 'tomawey, seyc naka kakskus. Skicinuwi pisunol nihtol, komac milihkikonewiwol tan ci mawi pskulehtasik, kulasuweltomon. Tomk koniyakon kuli pkotenomon woloma mecomiw koluwot ktopitahasuwakon, kulasuweltomon. Ksiskul ona kuli pkotenomon woloma mecomiw knomihtun psiw keluwak Skitkomiq, kulasuweltonom. Kcalkossiyil ona kuli pkotenomon woloma mecomiw knutomon psiw keluwak Skitkomiq, kulasuweltomon. Kihton ona kuli pkotenonom woloma mecomiw kpossehtun psiw keluwak Skitkomiq, kulasuweltomon. Ktun ona kuli pkotenomon woloma mecomiw kuskuwitomon psiw keluwak Skitkomiq, kulasuweltomon. kmushun ona kuli pkotenan woloma mecomiw kwiskitahatomon psiw keluwak Skitkomiq, kulasuweltomon. Kpihtinol ona kuli pkotenomon woloma mecomiw kuleyutomon psiw keluwak Skitkomiq, kulasuweltomon. Qatol ona kuli pkotenomon woloma mecomiw kpomush mehqeyik awt, kulasuweltomon. Nit elokehkiminaq Koluskap, kilun toke ahcuwi namkomihptuweq Skicinuwihmiyewakon 'ciw weckuwapasihtit.

Nit Leyic~

~Opolahsomuwehs 98~

5.2.5 Gathering

Gathering of berries, nuts and lily roots served to supplement the food supply obtained through other means, such as hunting, fishing and trapping. Women played an active role in the gathering process.

5.2.5.1 Wild Rice

Wild Rice (*Zizania aquatica)*, which is a grass, grows in marshlands and along waterways from Manitoba to the Atlantic Ocean in southern Canada, and over much of the eastern United States [Turner et al., 2007]. This plant produces long, thin grains in loose drooping clusters and grows up to 3m in height. When ripe, grains drop readily and can be harvested by bending laden stalks into a boat (or canoe) and flailing them. Wild Rice is traditionally an important staple food for native peoples, who sow and harvest the crop, particularly in the Great Lakes region and also in the Maritimes (see Figure 5.2 for a picture of Wild rice). It is one of the few wild plant foods harvested and marketed on a commercial scale in Canada, with large quantities also being exported to the United States.

Wild rice was found along the creeks, channels, ponds and along the River margin areas of the Grand Lake Meadows study area. Zizania aquatica is listed among the "Provincially rare vascular plants of the Grand Lake Meadows PBA" [Papoulias et al., 2006, p.76] and is also described as "Widely distributed" [Papoulias et al., 2006, p.89] across the GLMPBA. Figure 5.3 shows the web prototype map of wild rice distribution across the study area.

http://plants.ifas.ufl.edu/zizaqu6.jpg
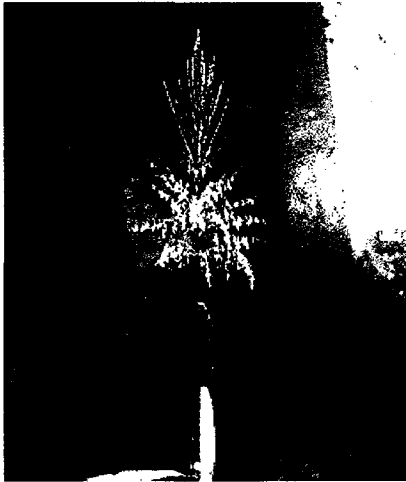
Figure 5.2 Wild rice plant.
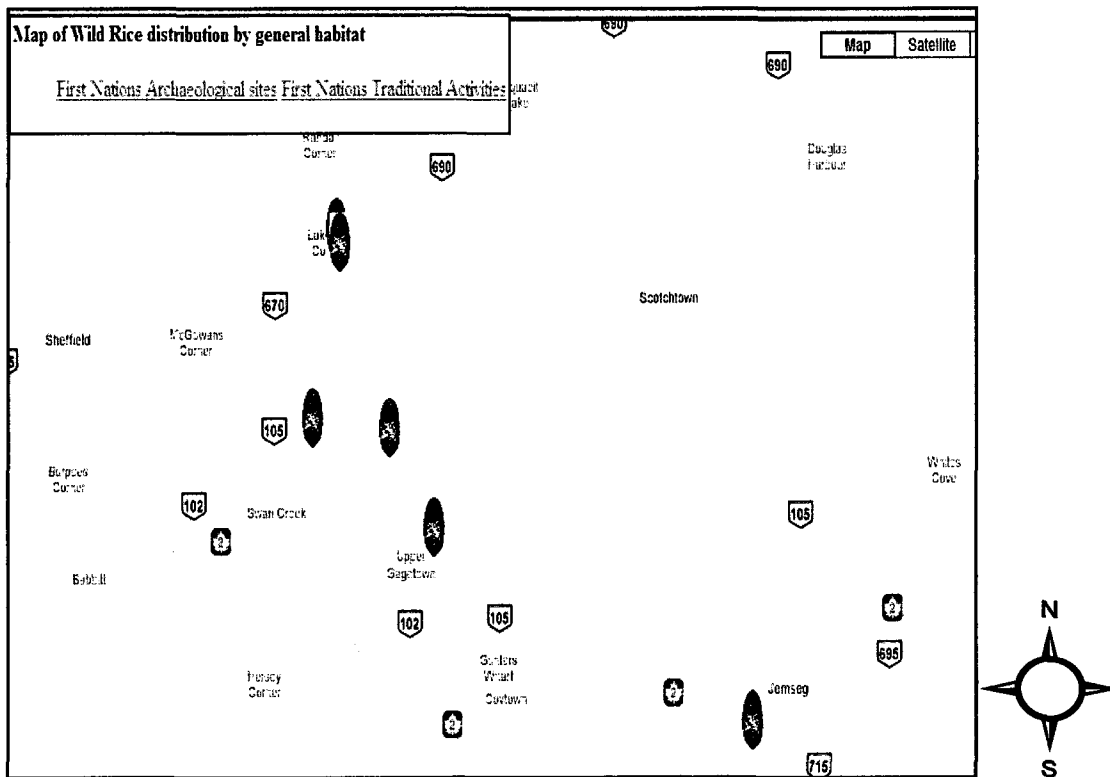
Figure 5.3 Web prototype map of Wild Rice distribution across study area.

5.2.5.2 Fiddleheads

The Fiddlehead (*Matteuccia struthiopteris*), is an edible plant of the Fern species (Polypodiaceae) and considered a delicacy in regions of Canada [Bernshaw, 2007]. The new leaves are tightly coiled and look like violin-tuning heads (hence the name Fiddlehead). The shoot and main axis uncoil upwards; the lateral parts, outwards. This perennial fern, also called Ostrich fern, sends up a ring of leaves from a circular, brownish rootstock [Bernshaw, 2007].

Fiddleheads grow in moist, rich soil (bottomlands, swamps) and in alluvial areas alongside streams across Canada. The fern propagates through spores released from under the leaves, or through the rootstock, which spreads numerous underground runners. The growing season is restricted to a few weeks around the beginning of May. Fiddleheads are best harvested when young shoots are 10-20 cm high, leaving 2 or 3 leaves so that the clump will not be weakened [Bernshaw, 2007].

Commercial demand far exceeds supply because the fern has not yet been successfully cultivated on a large scale. It is sold frozen out of season. Fiddleheads are eaten raw or cooked and are most popular in the Maritimes.

The Maliseet in New Brunswick, with a long tradition of harvesting this plant, considered it not only as a food source but also a medicinal plant [Bernshaw, 2007]. Figure 5.4 shows a picture of the Fiddlehead plant – Image courtesy of the NB Image bank (http://www.elements.nb.ca/Theme/ethnobotany/perils/jim.htm).
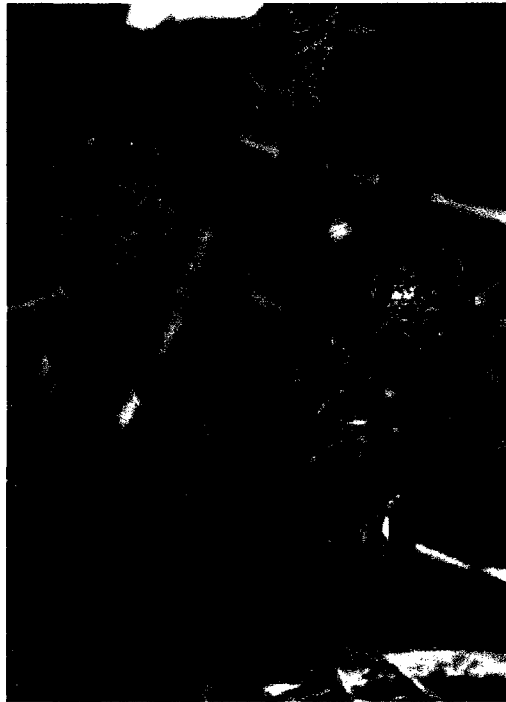
Figure 5.4 Fiddlehead plant.

Fiddleheads have been identified by Papoulias et al. [2006] along the St. John River margin in the PBA, including in the Silver Maple flood plains and on agricultural lands.

5.2.6 Trapping

Smaller animals such as beavers, muskrats, rabbits and foxes were trapped for the purposes of fur and food. The Muskrat is considered a delicacy by First Nations groups.

5.3 Grand Lake Meadows today

The level of traditional activities practiced in the Grand Lake Meadows region has decreased over time. At present, much of the traditional activity is undertaken by off-

reserve Status Indians, including hunting of moose and deer, fishing and gathering of plants [Getty, 2008].

CHAPTER 6

WEB MAPPING APPLICATIONS (MAPPING TECHNOLOGIES)

The preceding chapter introduced the topic of traditional use studies and discussed

First Nations traditional activities. This chapter (Chapter 6) delves into the representation

of the information gained from traditional use studies. Paper maps have long been used to

represent traditional knowledge information. In this case we explore the use of an online

mapping service as the presentation tool.

Section 6.1 explores web mapping services and a synopsis of mapping initiatives by

First Nations is discussed in section 6.2. The preliminary installations associated with the

Google Maps API are discussed in section 6.3. The database design behind the prototype

application is explained in section 6.4. This section looks at the entity relationships,

schemas and cardinality issues. An overview of the steps in creating the prototype

application is dealt with in section 6.5 and a summary given of the existing application

features. Limitations of the Google Maps API are highlighted in section 6.6.

6.1 Web Mapping Services

Web mapping services are applications that allow for the publishing and access of

geographic content on the web. The internet has played an important role in the sharing

of geographic information.

Geographic Information Systems (GISs) have been widely used for decades and like other information systems, have been in the process of transition. They have moved from the traditional model of stand-alone systems (where geospatial data is closely coupled with the systems used to create them), to a progressively distributed model based on independently provided, specialized, interoperable GIS web services [Alameh, 2003]. This characteristic of interoperability has been achieved by the creation of open source data standards, through initiatives such as the Open Geospatial Consortium (OGC). The result is that spatial information can be shared and integrated across the web. A GIS web service can therefore draw on geographic data sets from several information providers and render map content by combining information from different sources.

A distinction needs to be made between a web based GIS (web GIS) application and a web based mapping application. The former provides for complex analysis of geographic data: such as overlays, coordinate transformations and data format conversions while the latter has very little functionality where analysis is concerned and is mainly used for visualization purposes. Popular web GIS applications include Geomedia and ArcIMS.

There are several web based mapping applications (web mapping services) currently available. Four of the more popular online mapping sites are (not in order of popularity): Google Maps, Yahoo! Maps, MapQuest and Virtual Earth. It is estimated that approximately 70% to 80% of the data generated and used by local government organizations have a spatial component [National Academies Press, 2006]. Much of the information that businesses utilize on a daily basis also have a geographic component. Mapping therefore serves as a natural extension to the search capabilities that are

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available on internet search sites such as Google, Yahoo or MSN and as such geographic interfaces have been added to these consumer search engines.

Before the advent of online mapping, if someone made an internet search for "Niagara Falls," they would get results primarily in text form (with associated pictures). That search may now provide a web page with a link to an online mapping service or one may use the mapping service directly to search for the place or subject of interest. The search result would yield map information on the search subject with options for additional information such as driving directions.

With the introduction of Application Programming Interfaces (APIs) web developers can now incorporate the map data provided by online mapping services (including digital maps and satellite data) into their own websites. The geographic content is then customized by overlaying it (annotating the map data) with third party information (whether proprietary or public). The four online mapping sites previously mentioned provide APIs for their mapping services.

Online mapping services form part of the corporate strategies of their providers. It is perceived that these services are created "... with the expectation that they will become a focal point in one of the next significant growth areas in internet advertising: contextual advertisements tied to specific locations" [Markoff, 2005]. The service providers of these mapping interfaces reserve certain rights and privileges as to how their geographic information is used. For the Google Maps API for example, the parent company reserves the right to place advertisements on your site.

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A term that has grown in popularity over the last few years is "mashup." A mashup is an information system that combines two or more separate data streams to create original content [Goodman et al., 2006]. A mashup is essentially a hybrid web service. Therefore if someone drew on map information from Google Maps and combined this with other information such as the locations of all their friends' homes, they would have created a Google Maps mashup.

The launch of MapQuest in February 1996 propelled online mapping into the public realm [Geller, 2007]. Although Yahoo! provided maps for some cities prior to MapQuest's launch, strong public support for online mapping only emerged after the MapQuest phenomenon.

Programmableweb.com, a website with an online community of website developers, tracks the development of various forms of mashups on the internet. As of February 20, 2008, mashups tagged "mapping" accounted for 31% of the mashups listed on this website, as seen in Figure 6.1 below. On the same website's listing , where APIs are concerned, the Google Maps API was most popular and accounted for 48% of the total number of mashups developed using an API, while Yahoo! Maps registered 3% also as of February 20, 2008. See Figure 6.2.
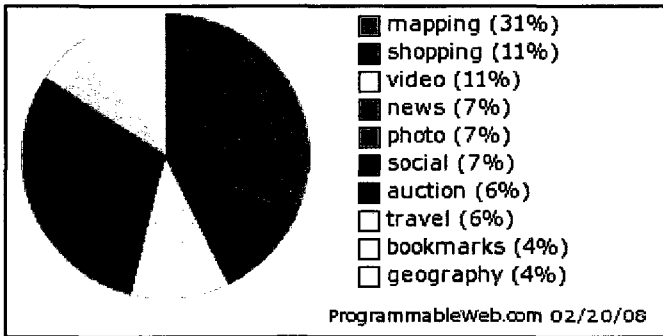
Figure 6.1: Mapping-related mashups dominate one mashup developer community's website (from www.programmableweb.com [2008]).
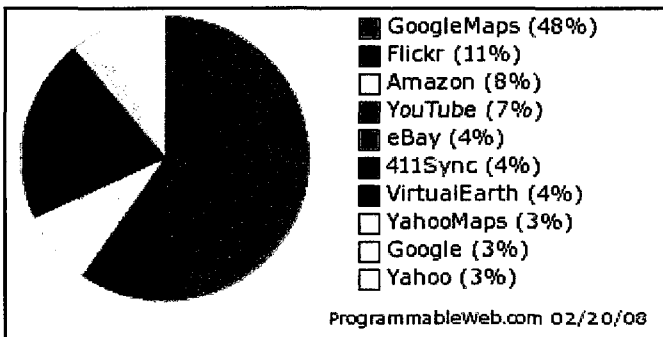
Figure 6.2: The Google Maps API is featured as the most popular API listed on one developer community's website (from www.programmableweb.com [2008]).

Google Maps is believed to offer better map coverage than its competitors and utilizes satellite imagery from Digital Globe which provides the highest quality, commercially available image data (Quickbird imagery) to date.

The popularity of online mapping services should continue to increase as service providers, "...have introduced the utility of online maps to millions of people who would have been unlikely to discover the vast riches of GIS offerings" [Geller, 2007, p.13].

6.2 Mapping by First Nations

Several First Nations groups are actively involved in mapping-related initiatives across Canada. The Aboriginal Mapping Network (AMN) was established in 1998 as a joint initiative of the Gitxsan and Ahousaht First Nations and Ecotrust Canada [Aboriginal Mapping Network, 1998]. As stated on the AMN's homepage, this network has evolved from a knowledge base forum for local First Nations technicians, leaders and decision makers into a "strategic resource for practitioners of traditional knowledge mapping around the world" [Aboriginal Mapping Network, 1998]. The Aboriginal Mapping Network now has taken on the responsibility to offer support to aboriginal and indigenous peoples facing issues such as land related claims, treaty negotiations and resource development, with tools such as traditional use studies, GIS mapping and other information systems.

The Carrier Sekani Tribal Council, which represents eight (8) First Nations groups in central British Columbia, has carried out mapping initiatives for their individual and combined territories (see http://www.cstc.bc.ca/cstc/22/mapping). This council has also used Google Earth to map the impact on their territory of some man made activities such as Forestry. One such Google Earth image shows the location of cutblocks across their territory.

Traditional use research has been done by the Sliammon First Nation on their territory, to support participation in the British Columbia Treaty and Crown Land referral processes [Roddan et al., 2000]. The Sliammon Treaty Society, through GIS technology, has completed traditional occupancy and use maps, which represent the collection of all

the research done on traditional land use and resources for their territory. A critical information source for these maps has been the oral history interviews completed with Sliammon elders from as far back as 1970 through to 1999 [Roddan et al., 2000].

Throughout the course of this research project, it was observed that much of the materials available on traditional use mapping were based on initiatives undertaken predominantly in the western Canadian Provinces such as British Columbia and Alberta. What about New Brunswick and the other Maritime Provinces? One explanation is that the Maritimes have a smaller First Nations population than western Canada and that less resources were available (both financial and technical resources) to carry out Traditional Use Studies [Getty, 2008]. As things stand now, the lands within New Brunswick have not been ceded to the Government by treaty. Negotiations with the Federal Government are on the horizon to recognize First Nations claims to the Province of New Brunswick and with these negotiations it is also hoped that funding will be made available to the First Nations community for traditional knowledge projects [Getty, 2008].

As the thrust towards greater self governance continues, First Nations groups will progressively improve their expertise and expand their influence where mapping-related initiatives are concerned.

6.3 Preliminary Installations

In order to create the prototype Google Maps API mapping application, the following preliminary software installations were done on the development machine:

- Ruby Installation (version 185-22.exe);

- Rails Installation (version 1.2.3);
- MySQL Installation (version 4.1.22);
- HeidiSQL Installation (version 3.0).

Download instructions for preliminary software installations can be found at;

http://www.onlamp.com/pub/a/onlamp/2005/01/20/rails.html.

6.3.1 Ruby on Rails (RoR)

This is a web application platform (framework) designed to improve the efficiency

with which database-driven websites can be created and offers skeleton code frameworks

to begin with. Ruby on Rails is an open source project written in the Ruby programming

language and applications using the Rails framework are developed using the Model-

View-Controller (MVC) design architecture (refer to Figure 6.3). Ruby is a dynamic

object-oriented programming language and its official implementation is free software

written in C programming language. The RoR framework forms apart of the Google

Maps API and facilitates interaction between the website and the MySQL database.
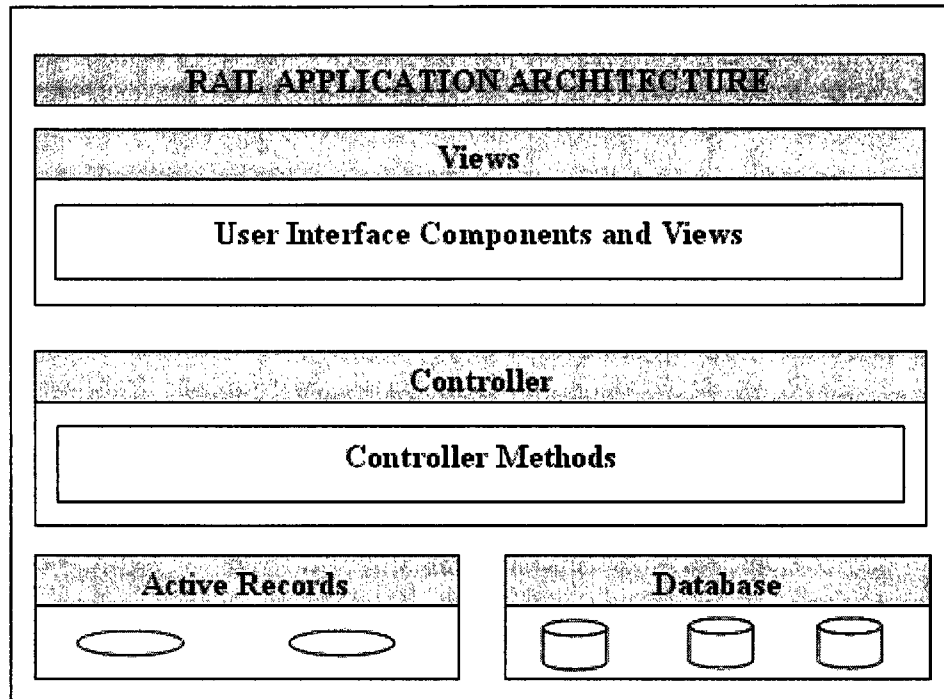
Figure 6.3 MVC design architecture (from:
http://www.tutorialspoint.com/ruby-on-rails/rails-framework.htm [2008]).

6.3.1.1 Model-View-Controller (MVC) architecture

The MVC framework separates the User Interface (UI) of the web application from

its Domain Logic (business logic- this is the core of the application where calculations

and data storage are based). The main aim of the MVC architecture is to isolate User

Interface changes and to prevent them from requiring changes to the Domain Logic of the

application. The primary motive for this separation is that the UI and Domain Logic have

different drivers for change and different rates of change. This separation enables the UI

to be changed without disturbing the Domain Logic and vice versa.

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The Model View Controller architecture divides the work of an application into three (3) separate but closely cooperative subsystems [Tutorials Point, 2007]:

- Model (ActiveRecord);

- View (ActionView);

- Controller (ActionController).

Model

The **Model** encapsulates data that the application manipulates, plus domain-specific logic. It maintains the relationship between Object and Database (it interacts with the database) and handles among other things validation and association. This subsystem is implemented in ActiveRecord library which provides an interface and binding between the tables in a relational database and the Ruby program code that manipulates database records. Ruby method names are automatically generated from the field names of database tables, and so on.

View

The **View** component renders the model in the user interface. It enables the presentation of data in a particular format, triggered by a controller's decision to present the data. They are script based templating systems like JSP, ASP and PHP and are very easy to integrate with AJAX technology. This subsystem is implemented in ActionView library which is an Embedded Ruby based (Erb) system for defining presentation

templates for data presentation. Every Web connection to a Rails application results in the displaying of a view (the created map).

Controller

The **Controller** responds to events from the interface and causes actions to be performed on the model. This is the subcomponent of the Rails application that directs traffic, on the one hand querying the models for specific data, and on the other hand organizing that data into a form that fits the needs of a given view. This subsystem is implemented in ActionController which is a data broker sitting between ActiveRecord (the database interface) and ActionView (the presentation engine).

Advantages of the MVC framework

- Substitutable User Interface

Different views and controllers can be substituted to produce alternative user interfaces for the same model.

- Easier user interface changes

Changes which affect just the user interface of the application logic become easier to make.

-Easier testing

With MVC it can be easier to test the core of the application, as encapsulated by the model.

- Increased complexity

There are several auxiliary patterns that take place simultaneously with MVC.

- Close coupling of views and controllers to model.

Changes to the model interface require parallel changes in the view and may require additional changes to the controller. Certain code changes become more difficult as the application's complexity increases.

- Close coupling between view and controller

It is difficult and in some cases impossible to perfectly separate view and controller elements.

6.3.2 MySQL

This can be considered the most popular open source database in use. The relational tables that hold the information to be mapped are stored in the MySQL database. HeidiSQL was the open source graphical interface chosen for the MySQL database.

6.4 Database design

The following information was available to be used as base data for the prototype mapping application:

- Coordinates of wild rice plants and their habitat descriptions within the study area;

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- Coordinates and descriptions of public First Nations Archaeological sites;

- Fictitious traditional activity sites (created for illustration purposes only).

Note: The archaeological data for Grand Lake Meadows used in this project is by no means exhaustive but rather serves for illustration. There are many more archaeological sites that have been recorded within the Grand Lake Meadows region [Blair, 2008]. A comprehensive treatment of the archaeological records for the region was outside the scope of this research.

6.4.1 Database tables and map views

Three (3) map views are included in the prototype (see Appendix III for map screen shots). They are:

- Map of wild rice distribution by general habitat;

- Map of First Nations Archaeological sites;

- Map of Traditional Activity sites (fictitious).

Two (2) tables are included in the database design for plants (including wild rice). The first table, *newplants*, stores the information on the individual plants within the study area. The second table, *plantspecies*, stores additional information on the various species in existence. The *newplants* table has a many-to-one cardinality relationship with the *plantspecies* table as several plants, for example wild rice will belong to the same species - *Zizania palustris*. The Entity relationship (ER) diagram described in Figure 6.4 below

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highlights the relationship between the two tables. The primary key of each table is shown in bold underline.
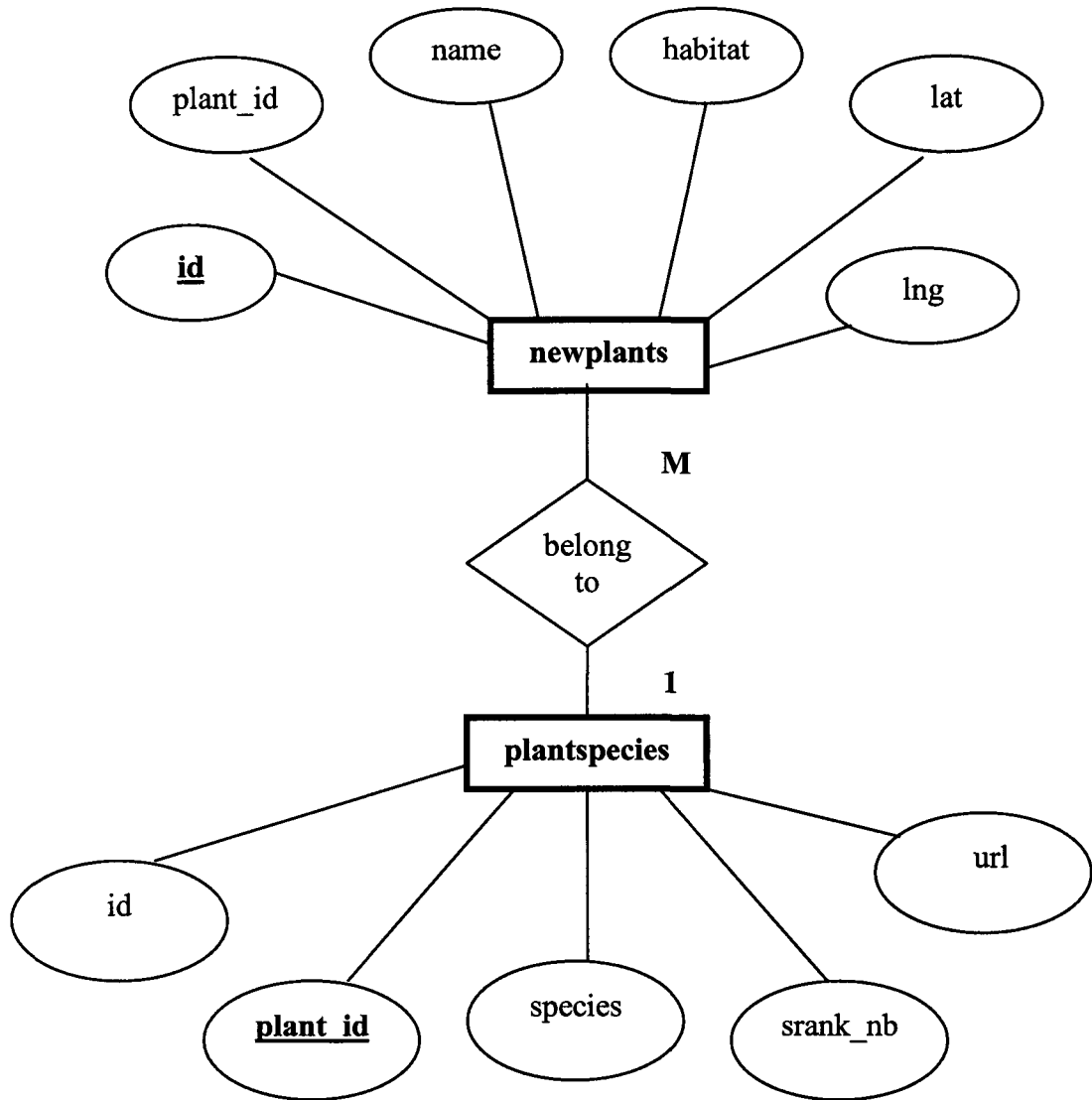

Figure 6.4 ER diagram for *newplants* and *plantspecies* tables.

One (1) table, *archaeologies* is used to store the archaeological information for the GLM study area. The ER diagram for this table is shown in Figure 6.5.
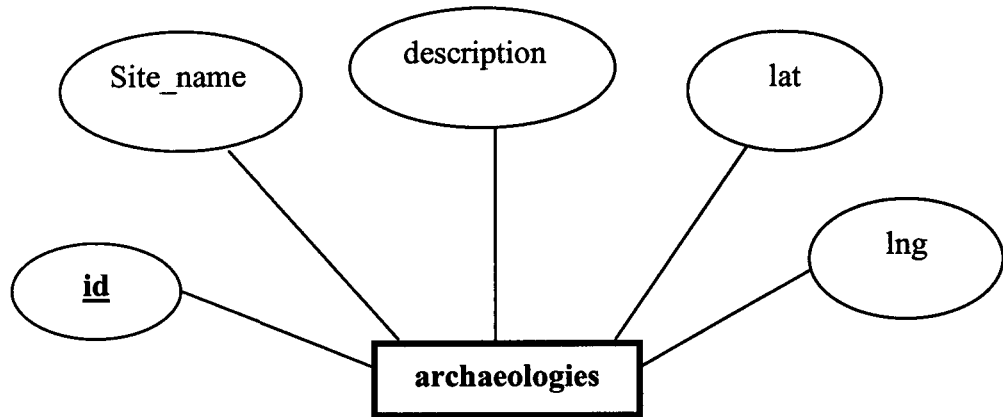
Figure 6.5 ER diagram for *archaeologies* table.

In designing a database to display the various traditional activities the most effective approach would be to create one table for each activity. From a geographic information system (GIS) perspective this would mean one layer or feature class is created per traditional activity. So we would have for example, one layer showing all hunting sites, one showing all trapping sites, one for fishing sites, one for gathering sites, one for ceremonial sites and so on. An additional table could be created, an "activities" table where each activity is stored once and then mapped to the sites (features) in the individual activity layers through a one-to-many cardinality relationship. Figure 6.6 shows a case where two (2) activity layers are considered (*huntingsites and fishingsites*) and are mapped to the *activities* table through a many-to-one relationship. This structure can be extended by including additional traditional activity layers and linking them to the one *activities* table. For the purpose of the web prototype one table was used to store the fictitious traditional activity data.
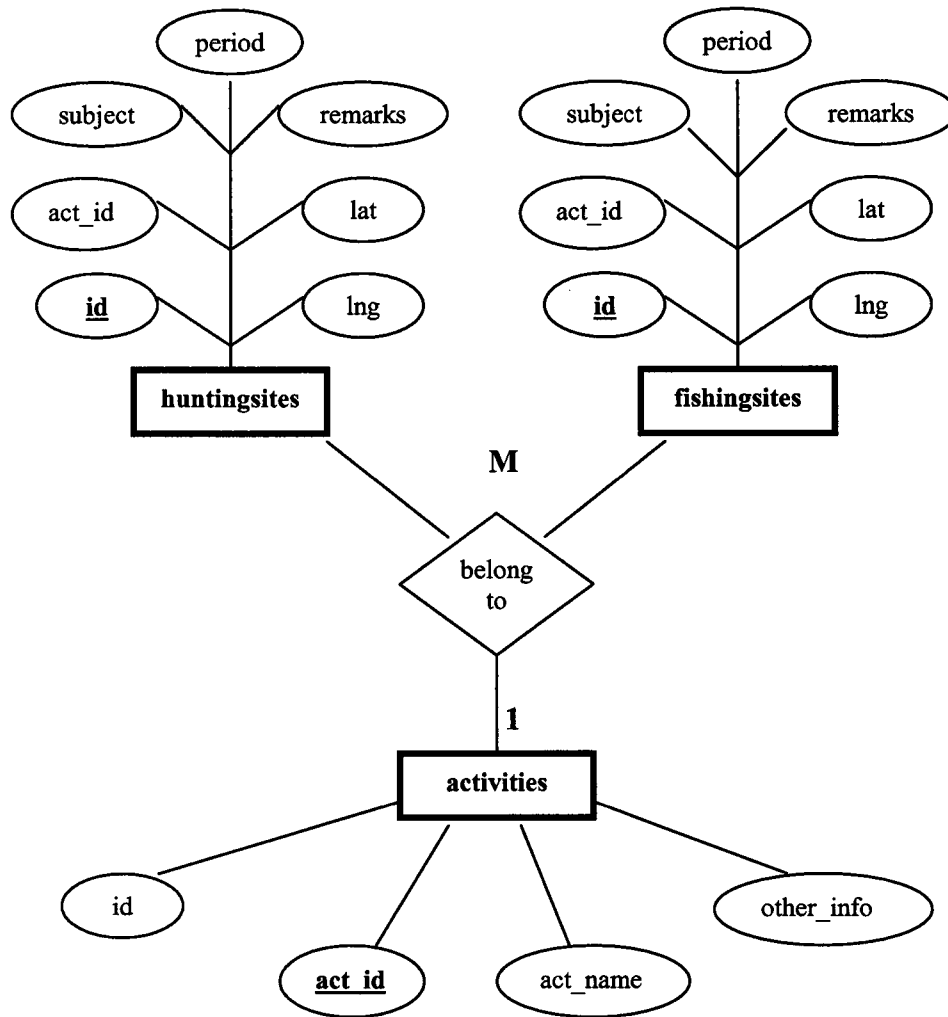
Figure 6.6 ER diagram depicting *traditional activity layers* **and related** *activities* **table.**

6.4.1.1 Relational Database schema

When a model is created in the rails framework, an associated migration file is also created. The schema for the database table is defined in this file then a migration process is executed to create the table in the MySQL database. The schema parameters for the *archaeologies* table (within the migration file) are shown in Figure 6.7a.

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```
003_create_archaeologies.rb - SciTE                                    [_][□][✕]

File   Edit   Search   View   Tools   Options   Language   Buffers   Help
1 003_create_archaeologies.rb

  1    - class CreateArchaeologies < ActiveRecord::Migration            ^
  2    -   def self.up
  3    -      create_table              do |t|
  4           t.column         ,
  5           t.column         ,        ,        =>60
  6           t.column         ,        ,        =>80
  7           t.column       ,
  8           t.column       ,
  9
 10        end
 11        execute ("ALTER TABLE newplants MODIFY lat numeric(15,10);")
 12        execute ("ALTER TABLE newplants MODIFY lng numeric(15,10);")
 13        end
 14
 15    -   def self.down
 16         drop_table
 17        end
 18     end
```

Figure 6.7a Relational Schema parameters for the *archaeologies* table.

Figure 6.7b shows the schema as it appears in the MySQL database. The Relational

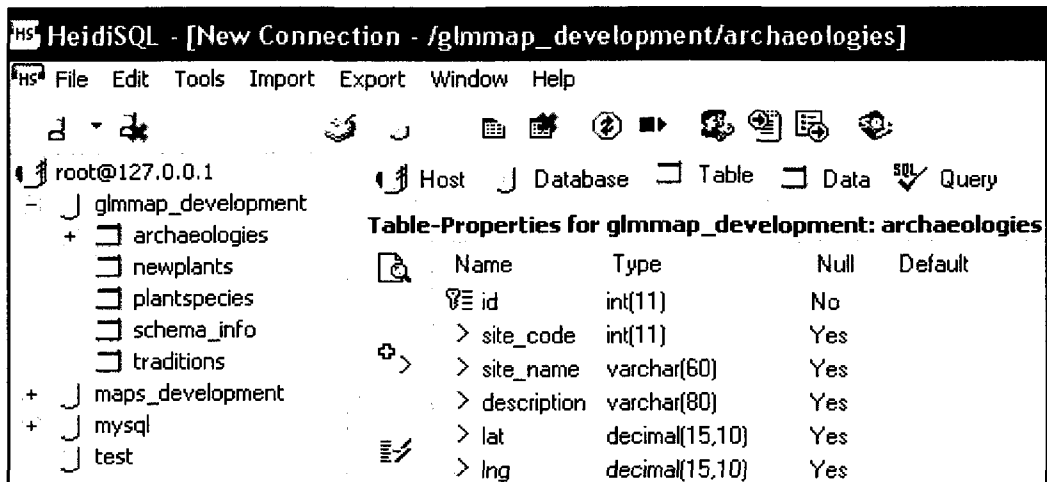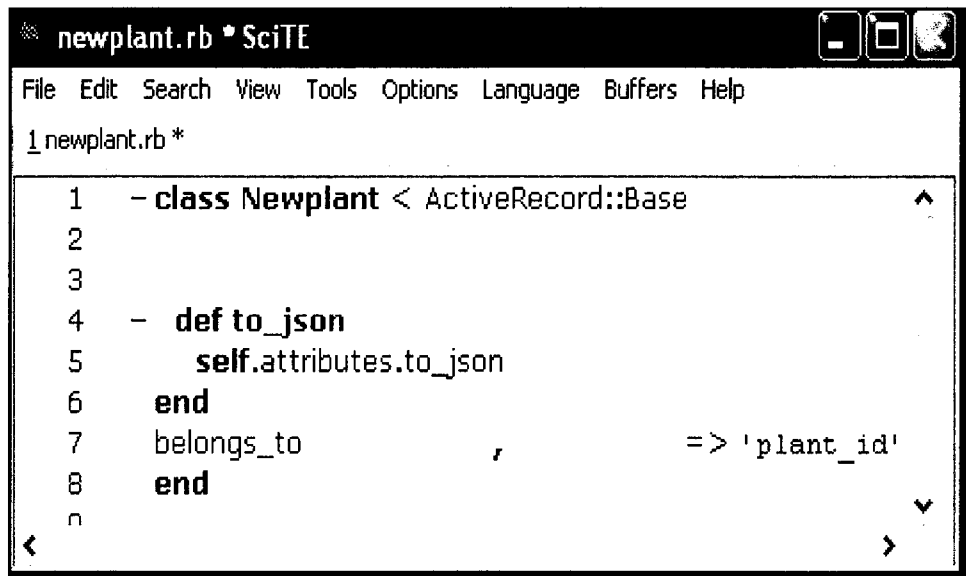schemas for the remaining tables can be found in Appendix IV.

```
HeidiSQL - [New Connection - /glmmap_development/archaeologies]
HS  File  Edit  Tools  Import  Export  Window  Help

    root@127.0.0.1              Host   Database   Table   Data   Query
    - glmmap_development
        + archaeologies          Table-Properties for glmmap_development: archaeologies
          newplants                Name          Type           Null     Default
          plantspecies             id            int(11)        No
          schema_info            > site_code     int(11)        Yes
          traditions             > site_name     varchar(60)    Yes
    + maps_development           > description   varchar(80)    Yes
    + mysql                      > lat           decimal(15,10) Yes
      test                       > lng           decimal(15,10) Yes
```

Figure 6.7b Relational Schema parameters for the *archaeologies* table as shown in MySQL.
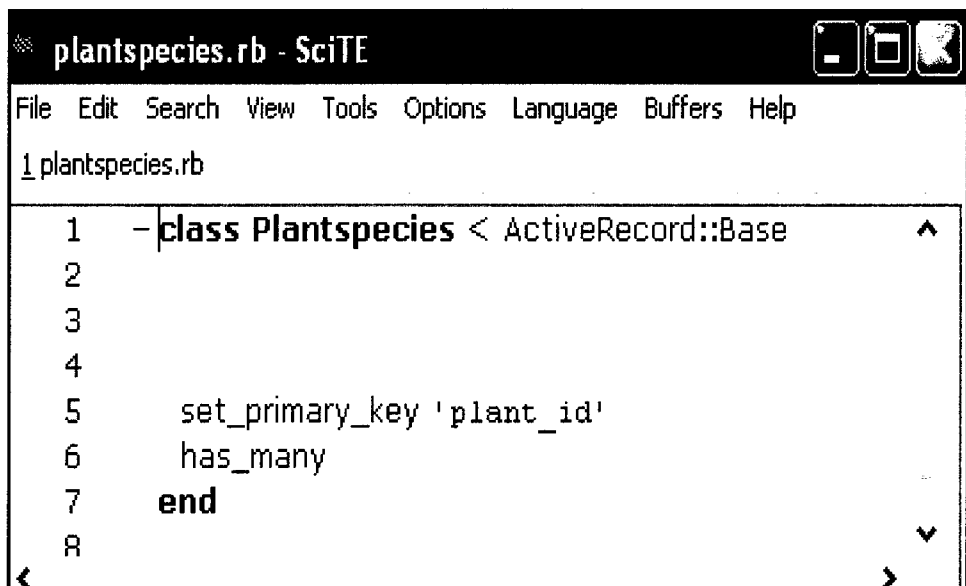
6.4.1.2 Cardinality relationships in rails

The rails framework handles cardinality relationships between classes (tables)

through the model component of the framework. In taking the example of the *newplants*

and *plantspecies* tables discussed in sub-section 6.4.1, the cardinality relationship

between the two classes is established by using the code shown in Figures 6.8a and 6.8b,

in the two models representing the respective classes.

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```
newplant.rb * SciTE

File  Edit  Search  View  Tools  Options  Language  Buffers  Help
1 newplant.rb *

  1    - class Newplant < ActiveRecord::Base          ^
  2
  3
  4    -  def to_json
  5          self.attributes.to_json
  6       end
  7       belongs_to          ,              => 'plant_id'
  8       end
  n                                                      v
```

Figure 6.8a Model file for the *newplants* table.

```
plantspecies.rb - SciTE

File  Edit  Search  View  Tools  Options  Language  Buffers  Help
1 plantspecies.rb

  1    - class Plantspecies < ActiveRecord::Base      ^
  2
  3
  4
  5       set_primary_key 'plant_id'
  6       has_many
  7       end
  8                                                      v
```

Figure 6.8b Model file for the *plantspecies* table.

The **belongs_to** clause in Figure 6.8a establishes the many-to-one relationship between the *newplants* and *plantspecies* tables respectively, while the **has_many** clause in Figure 6.8b creates the reverse one-to-many relationship between the *plantspecies* and *newplants* tables respectively. In addition to using the two clauses mentioned above, for the cardinality relationship to be established and displayed within the mapping application, the fields that are required to be displayed from each table need to be called in the *rhtml* file. Cardinality relationships are important in establishing proper mapping between the relevant tables that make up the database being utilized for an application.

6.5 Creating the Prototype application

The reference text, *Beginning Google Maps Applications with Rails and Ajax* [Lewis et al., 2007], provides guidelines throughout the application development process. A lack of computer programming experience on the part of the researcher proved a challenge during the prototype development phase. Trial and error initiatives were ongoing throughout the prototype application's development and eventually sufficient knowledge and experience were gained to bring the prototype to a functional level.

Once the preliminary installations (mentioned in section 6.3) were downloaded to the development computer, the following tasks were carried out in developing the web prototype:

- acquire Google API key (http://code.google.com/apis/maps/signup.html);
- create the application using the "rails" command;
- create the application controller;

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- edit the *rhtml* and javascript files to define your map content and behaviour;

- create the required models for the application;

- create the database in MySQL;

- define database schemas and run migrations;

- populate database tables;

- make additional enhancements (including customization) to the application.

The steps given above only provide a summary of the process. Reference can be made to Lewis et al., for further details.

The ruby on rails architecture (framework) provides a development template around which you can build. With the command **"rails glmmap,"** (for this specific prototype) a collection of folders were created to store the various components of the application, including *rhtml* and *javascript* files, images, migration files, model files and a development log file. Appendix V shows the *rhtml* and *javascript* files for each of the map views. The rails framework proves an efficient development tool for less experienced programmers. The associated folders created for the Grand Lake Meadows web application (**glmmap**) are shown in Figure 6.9.
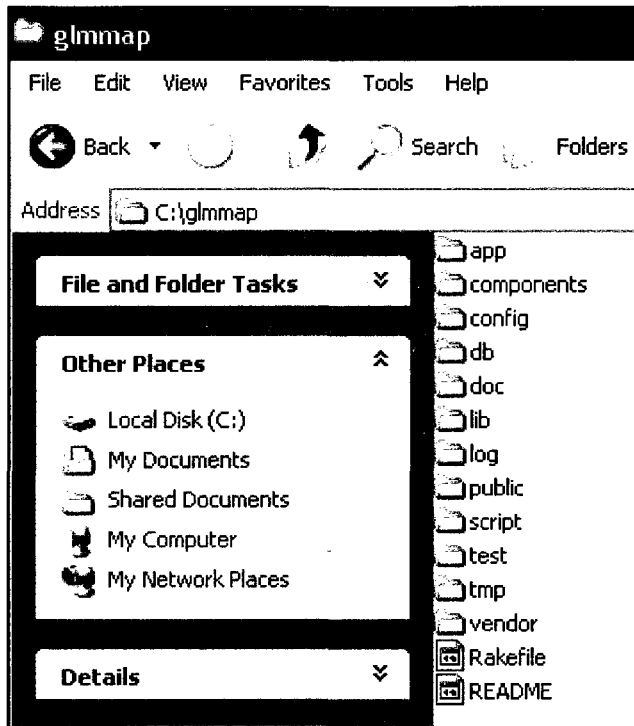
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Figure 6.9 Folder components of the *glmmap* application created with ruby on rails.

6.5.1 Application features

The additional features of the three (3) maps included in the Grand Lake Meadows

web application are;

Map 1 (Map of wild rice distribution by general habitat)

- hyperlink to UNBI's homepage,

- hyperlink to additional information on wild rice,

- side panel listing of wild rice plants and their habitat,

- customized wild rice icon,

- hyperlinks to Maps 2 and 3,

- background information on Grand Lake Meadows (GLM) including ecology,

- hyperlink to further information on the GLM,

- hyperlink for information on the Fiddlehead plant,

- hyperlink to the list of References cited on the website.

Map 2 (Map of Archaeological sites)

- hyperlink to UNBI's homepage,

- hyperlink to "New Brunswick's Timeline on Virtual Museum of Canada,"

- side panel listing of archaeological sites and their descriptions,

- customized arrow icon,

- hyperlinks to Maps 1 and 3,

- side panel information on the Jemseg Crossing Archaeological Project,

- a list of "Interesting Links" (hyperlinks) including; Native Peoples of the Upper St. John river valley, Abbe Museum and Native American Peoples,

- hyperlink to the list of References cited on the website.

Map 3 (Map of Traditional Activity sites – fictitious data)

- hyperlink to UNBI's homepage,

- hyperlink to additional information on Traditional Use Studies,

- side panel listing of fictitious traditional activities and related information,

- customized display icon,

- hyperlinks to Maps 1 and 2,

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- summary on present day activities in the GLM,

- a list of "Interesting Links" (hyperlinks) including; GLM Oral history,

  Wolastoqiyik: Portraits of a People, Extracts from Maliseet and Mi'kmaq: First

  Nations of The Maritimes, First Nations History: We Were Not the Savages,

  Aboriginal Mapping Network, Deer and Muskrat,

- list of New Brunswick First Nations and hyperlinks to existing websites,

- map showing the New Brunswick First Nations,

- hyperlink to the list of References cited on the website.

6.6 Google Maps API limitations

The Google Maps API, like the other mapping services mentioned in section 6.1,

allows website developers to embed map content in their third party applications. Users

of map services are subject to the terms and conditions tied to these services. The Google

Maps API Terms of Service can be viewed in detail at

http://code.google.com/apis/maps/terms.html. Two conditions included in Google's terms

of service are that: Google reserves the right to place advertisements on your website and

the service should not be used for any illegal or unauthorized purpose.

As mentioned in section 6.1, web mapping services unlike web GIS applications offer

little functionality where spatial analysis is concerned. The Google Maps API allows you

to take advantage of adding a visual component to your website which your viewers can

readily relate to. With experience, a few "tricks" can be included in API development

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such as converted shapefiles, polylines and area computations. Generally speaking however not much can be expected where analysis is concerned.

One of the strengths of the API is that the developer's creativity can significantly enhance the overall appearance and feel of the website through customization and useful hyperlinks. Several information sources can be drawn together to create a comprehensive product. A web browser needs to be Javascript-enabled in order to access a site using the Google Maps API.

CHAPTER 7

CONCLUSION AND RECOMMENDATIONS

A comprehensive traditional use study requires extensive work and cooperation on the part of all stakeholders to be successful. There are several factors that can influence the success or failure of such an initiative. These studies depend on multiple factors including: geographic extent, community support and training and can take from several months to several years to be completed. Section 7.1 provides a conclusion on the project and section 7.2 puts forward recommendations to improve future research initiatives.

7.1 Conclusion

A non-native individual will not readily appreciate the intricacies associated with a traditional use study. Even through extensive research and review of secondary materials on the topic, a void of knowledge still exists that can only be remedied when the First Nations community around which the study is related is meaningfully engaged in the process.

The project objectives as stated in section 2.1 were not fully met. This was of course due to the fact that it was not possible to meet with First Nations members knowledgeable of the study area. In summary, this project was intended to: increase awareness of traditional activities in the GLM study area, preserve some aboriginal oral history of this area and provide increased accessibility to aboriginal oral history and

related archaeological/ecological sites in the project area. The web prototype created provides a template to be used to facilitate the meeting of these objectives.

In order to move forward it is important to look backward. The historical relationship between native and non-native Americans helps to put into context present research challenges involving the First Nations community. For successful and sustainable research to take place, due consideration must be given to the concerns of stakeholders.

First Nations have taken the initiative to develop and improve on policies relating to research on their community. These guidelines will help to ensure that the concerns held by their members are addressed prior to permission being given to engage in research. This process should be helpful in safeguarding their interest.

In taking into consideration the various research challenges, it is still fair to conclude that this project was a meaningful undertaking. Apart from the academic knowledge gained in both technical and non-technical disciplines, a greater social awareness was obtained which by default has also transformed this project into a "social elective" course of study. From a technical perspective, the prototype web application forms a useful framework which can be built on once the relevant traditional knowledge information is available. The fact that this application is an online resource, it also benefits from being able to draw on multiple information sources through hyperlinking, therefore proving to be a useful educational tool.

A challenge for senior generations is to engage the upcoming generation by imparting the necessary knowledge. Technology can serve as a tool of engagement. The visual

dimension provided by online mapping services can stimulate the interest of a wider group of persons.

The web prototype application will be handed over to the Union of New Brunswick Indians to be incorporated into their website and updated as information becomes available. There may be a few glitches in implementing the system on their server as such a task has never been undertaken before by the researcher. The technical challenges should be overcome with the necessary effort and technical support.

7.2 Recommendations

From the experience gained during this research, the following recommendations are put forward:

- a strengthening of the relationship between the UNB community and First Nations communities and,

- promotion of the Geodesy and Geomatics programme to First Nations students.

By strengthening cooperation between UNB and First Nations, research and other initiatives can be carried out in a more efficient and mutually beneficial manner. Through the promotion of the Geodesy and Geomatics programme to students in the First Nations community, stakeholders may feel more comfortable in having someone of their community involved in mapping related studies. This individual may also in the future serve in a consultative capacity in more extensive projects.

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Appendix I

Sample Interview guide for Map Biography process

Interview Guide for Grand Lake Meadows Project
(sample questions)

Project Title: Mapping and Documenting the First Nations traditional activities in Grand Lake Meadows.

Key term:
GLM – Grand Lake Meadows

Note: Obtain aboriginal names where possible for items in questions. For example, the aboriginal name for a particular berry, tree or fish etc.

Reminder: Research subjects are free to decline from answering any question.

General questions

1) Are you familiar with the Traditional Land Use study process? (If "no," explain process).

2) I would like to talk to you about how you or your family (or any other First Nation member) used the GLM study area in the past and today. Your information is important and valuable. Do you mind sharing this information with us? (If necessary, provide further explanation of the project. Give particular benefits of project).

3) Would you be willing, after I have written (and if possible recorded) your information, to mark on the map the different locations of important sites, such as burial sites, cabins, trails and other things? (Explain the mapping concept- geographic coordinates of sites will be determined using GPS on ground and sites of interest displayed in Google Maps).

4) May I video tape this interview? (Yes or No)

Traditional Land Use questions

5) How long have you or your parents, or grandparents (or any other First Nation member) lived in (or used) the GLM study area?

6) Did you, your parents, or grandparents (or any other First Nation member in memory) hunt or trap in the area? Where was this done (indicate on map)? For how long was this activity done?

7) What kinds of animals were trapped or hunted? When and where were they trapped (indicate on map)?

8) Do you know the location of any new, old or abandoned cabins? (Indicate on map). Was this a permanent or seasonal cabin site?

9) Do you know of any trails in the GLM area? If yes what are their names (aboriginal or other name)? Where are they located (indicate on map)?

10) Do you know of any water ways in the GLM study area? If yes what are their names (aboriginal or other name)? Can you mark them on the map?

11) Do you know the location of any sacred areas and why they are sacred? For example, remnants of sweat lodges or ceremonial grounds (indicate on map).

12) Do you know of any special meeting or celebration places that were used in the past or are used today, by your family or friends, or other First Nation members (indicate on map)? What were these places used for (wakes, dances, etc)?

13) What animals were used for food, or other special occasions? Where were they hunted (indicate on map)?

14) What birds were used for food, or other special occasions? Where were they hunted (indicate on map)?

15) What fish were used for food, or other special occasions? Where were they hunted (indicate on map)?

16) What insects were used for food, or other special occasions? Where were they gathered (indicate on map)?

17) Are there any special places where plants (berries, herbs, trees, or shrubs) were collected for:

- Medicine,
- Food,
- Rituals,
- fire wood?

or other purposes? Where are they located? For example, berry patches? (Indicate on map).

18) Are there special places where the community goes (or went) to fish or hunt? What season (s) do (did) they go?

19) What birds were hunted or used for special purposes? Where were they found (indicate on map)?

20) Are there any animals that are important to First Nation peoples that should be protected?

21) Are there any birds that are important to First Nation peoples that should be protected?

22) Are there any fish that are important to First Nation peoples that should be protected?

23) Are there any insects that are important to First Nation peoples that should be protected?

24) Are there any special areas that should be protected for the animals in the GLM study area?

25) Are there any special areas that should be protected for the fish in the GLM study area?

26) Are there any special areas that should be protected for the birds in the GLM study area?

27) Have any of the following items been produced using the resources of the GLM study area:
   -food,
   -clothing,
   -bedding,
   -artworks,
   -crafts,
   -tools or utensils,
   -weapons,

-hunting, trapping, gathering or fishing gear,
-housing (What materials were cabins made from?)
-storage,
-toys,
-musical instruments?

Can you explain how they were produced?

28) Do you know any legends or old stories related to the study area?

29) Do you know any songs related to the study area?

Thank you for your time and support of this project!!!

Appendix II

Sample websites using the Google Maps API

Source: http://www.housingmaps.com
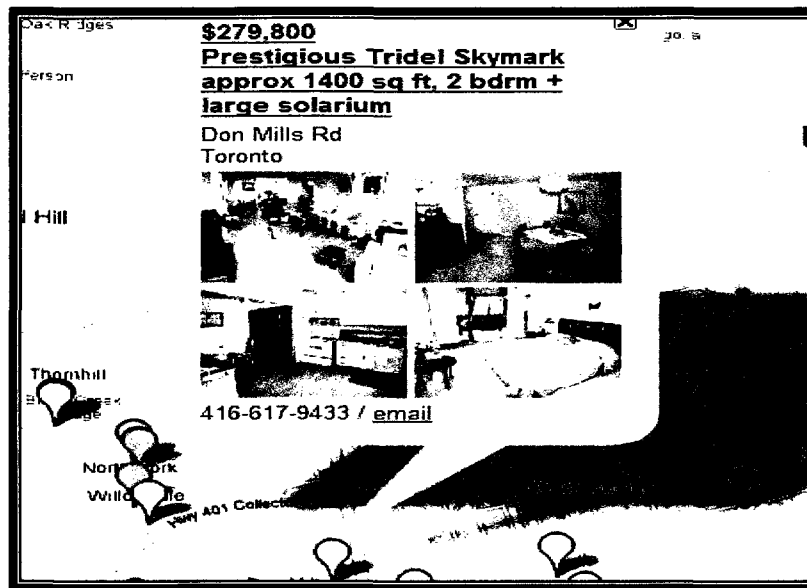
Figure II.1 Web application for finding available real estate

Note: The site above shows available real estate listings across several North American cities.

Source: http://www.georgia-sex-offenders.com/maps
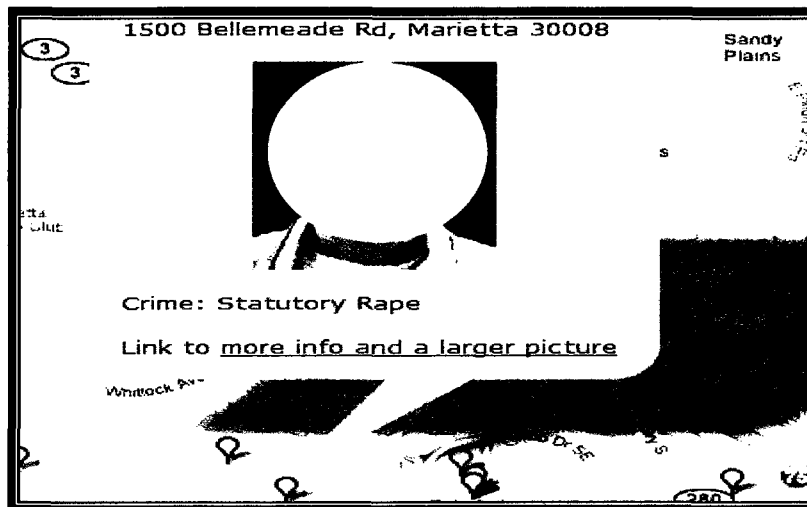
Figure II.2 Web application for displaying child sex offenders

Note: The site above shows residential information on registered child sex offenders for cities within the state of Georgia, United States of America.

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Appendix III

Map screen shots
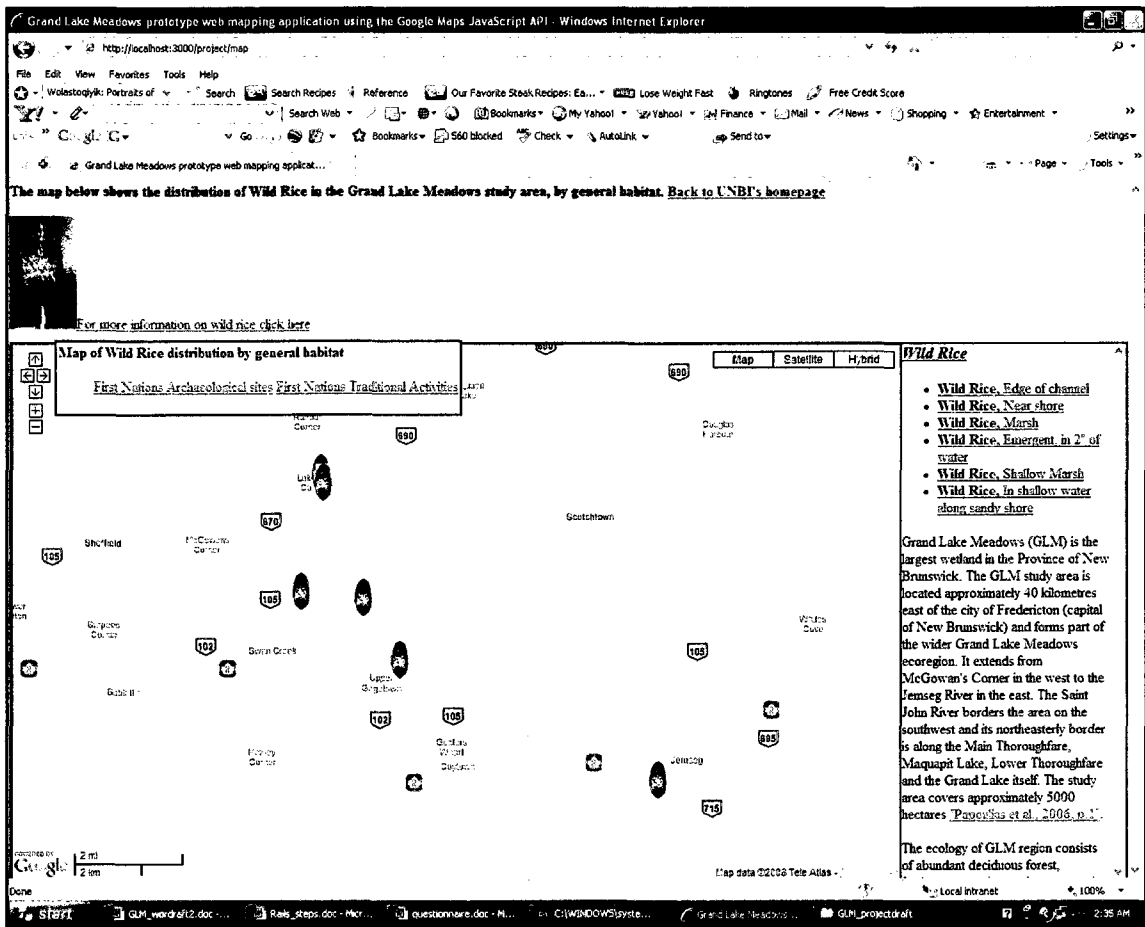
Figure III.1 Map 1 screen shot – Wild rice distribution by general habitat
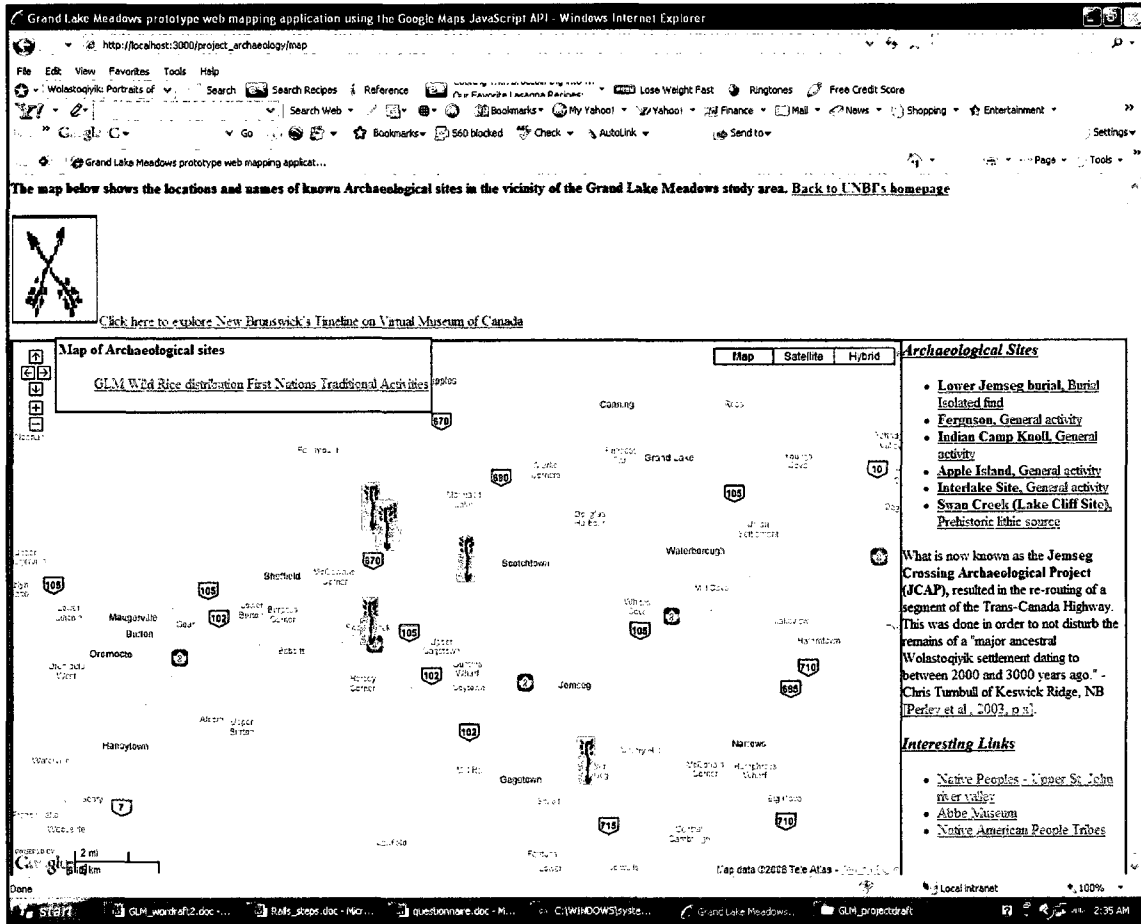
Figure III.2 Map 2 screen shot – Archaeological sites
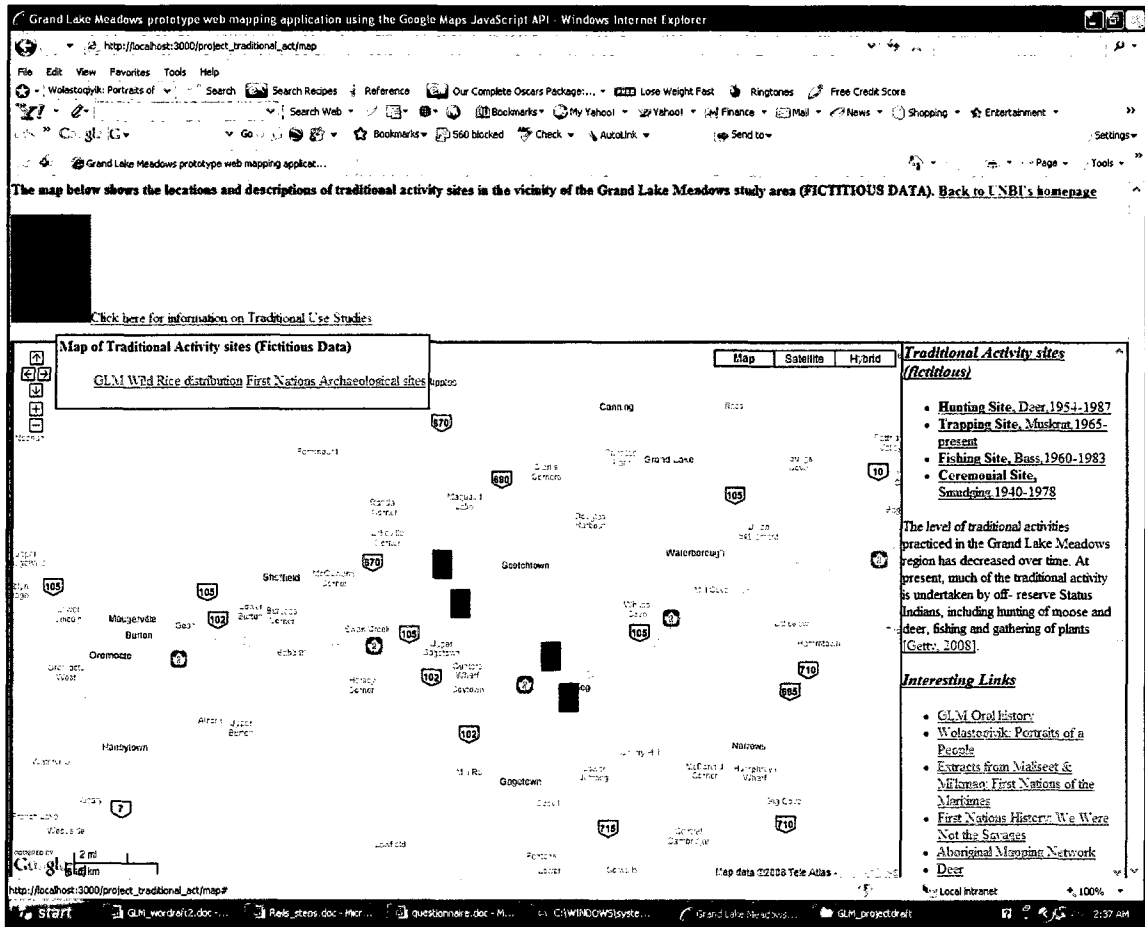
Figure III.3 Map 3 screen shot – Traditional activity sites (fictitious data)

Appendix IV

Relational Database schemas

Table-Properties for glmmap_development: newplants

	Name	Type	Null	Default
	id	int(11)	No	
	plant_id	int(11)	Yes	
	name	varchar(50)	Yes	
	habitat	varchar(80)	Yes	
	lat	decimal(15,10)	Yes	
	lng	decimal(15,10)	Yes	

Figure IV.1 Relational Schema for *newplants* table

Table-Properties for glmmap_development: plantspecies

	Name	Type	Null	Default
	id	int(11)	No	
	plant_id	int(11)	Yes	
	species	varchar(60)	Yes	
	srank_nb	varchar(5)	Yes	
	url	varchar(120)	Yes	

Figure IV.2 Relational Schema for *plantspecies* table

Table-Properties for glmmap_development: traditions

	Name	Type	Null	Default
	id	int(11)	No	
	act_id	int(11)	Yes	
	description	varchar(50)	Yes	
	subject	varchar(30)	Yes	
	time_period	varchar(30)	Yes	
	lat	decimal(15,10)	Yes	
	lng	decimal(15,10)	Yes	

Figure IV.3 Relational Schema for *traditions* table

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Appendix V

Rhtml and *Javascript* files for prototype map views

Map 1 (map.rhtml)

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
  "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
  <head>
    <meta http-equiv="content-type" content="text/html; charset=utf-8"/>
    <title>Grand Lake Meadows prototype web mapping application using the Google Maps
JavaScript API </title>
    <script
src="http://maps.google.com/maps?file=api&amp;v=2&amp;key=ABQIAAAAl78uNkJb16cXhx
czbyrGZBTJQa0g3IQ9GZqIMmInSLzwtGDKaBRl0I2Cq1OXComrf_DZxuHOTEUneA"
      type="text/javascript"></script>

<%=javascript_include_tag 'prototype', 'application'%>

<%=stylesheet_link_tag 'style'%>

<script type="text/javascript">
var markers=<%=@newplants.to_json%>;

</script>

  </head>
<body id="body">
<BODY BGCOLOR="#999966">

<div id="map-wrapper">

  <div id="map"></div>

</div>

<b>The map below shows the distribution of Wild Rice in the Grand Lake Meadows study area,
by general habitat.</b>

<b ALIGN=right>
<a href="http://www.unbi.org/">Back to UNBI's homepage</a></b>

<p><img src='../images/wildrice2.png'; width=75 height=125><a
href="http://thecanadianencyclopedia.com/index.cfm?PgNm=TCE&Params=A1ARTA0008589
">For more information on wild rice click here</a></p>

<div id="toolbar-wrapper">

<div id="toolbar">
<h4>Map of Wild Rice distribution by general habitat</h4>
```

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```
<ul id="options">
<TD><a href="http://localhost:3000/project_archaeology/map">First Nations Archaeological
sites</a></TD>
<TD><a href="http://localhost:3000/project_traditional_act/map">First Nations Traditional
Activities</a></TD>

</ul>
</div>
</div>

<div id="content">

<div id="sidebar">
<p ALIGN=CENTER><b><u><I><h3>Wild Rice</h3></I></u></b></p>
<ul id="sidebar-list">


<%@newplants.each do |newplant|%>
<li id="sidebar-item-<%=newplant.id%>">
<%=link_to_function "<strong>#{newplant.name},</strong> #{newplant.habitat}",
"focusPoint(#{newplant.id})"%>
</li>
<%end%>
</ul>

<p>Grand Lake Meadows (GLM) is the largest wetland in the Province of New Brunswick. The
GLM study area is located approximately 40 kilometres east of the city of Fredericton (capital of
New Brunswick) and forms part of the wider Grand Lake Meadows ecoregion. It extends from
McGowan's Corner in the west to the Jemseg River in the east. The Saint John River borders the
area on the southwest and its northeasterly border is along the Main Thoroughfare, Maquapit
Lake, Lower Thoroughfare and the Grand Lake itself. The study area covers approximately 5000
hectares <a href="../project_traditional_act/ProjectReferences">[Papoulias et al., 2006, p.1]</a>.
</p>
<p>The ecology of GLM region consists of abundant deciduous forest, freshwater marches and
streams, salt and brackish marshes and other diverse plant communities. The Meadows is
approximately 20,000 hectares in size with roughly 58% of this area having been declared a
Protected Area by the New Brunswick Ministry of Natural Resources and Energy in May 2000 <a
href="../project_traditional_act/ProjectReferences">[Great Canadian Rivers, 2007] </a>. </p>

<p ALIGN=CENTER><b><u><I><h3>Interesting Links</h3></I></u></b></p>

<ul>
<li><a href="http://www.gnb.ca/0399/grand_lake_meadows-e.asp">Grand Lake Meadows</a>
<li><a
href="http://thecanadianencyclopedia.com/index.cfm?PgNm=TCE&Params=A1ARTA0002787"
>Fiddleheads</a>
```

```
</ul>

</div>
</div>

  </body>

</html>
```

Map 1 (application.js)

```javascript
var centerLatitude = 45.8700;
var centerLongitude = -66.2000;
var startZoom = 12;
var markerHash={};
var currentFocus=false;

var map;

    var wildriceIcon = new GIcon();
wildriceIcon.image = '../images/wildrice.png';
wildriceIcon.iconSize = new GSize(19, 42);
wildriceIcon.iconAnchor = new GPoint(9, 42);
wildriceIcon.infoWindowAnchor = new GPoint(16, 24);

function focusPoint(id){
 if (currentFocus) {
   Element.removeClassName("sidebar-item-"+currentFocus,"current");
 }
 Element.addClassName("sidebar-item-"+id,"current");
 markerHash[id].marker.openInfoWindowHtml(markerHash[id].habitat);
 currentFocus=id;
}

function addMarker(latitude, longitude, id) {
   var marker = new GMarker(new GLatLng(latitude, longitude), wildriceIcon );
   GEvent.addListener(marker, 'click',
      function() {
focusPoint(id);

      }
   );
   map.addOverlay(marker);
   return marker;
}

function init(){

   map = new GMap2(document.getElementById("map"));
   map.addControl(new GSmallMapControl());
   map.addControl(new GMapTypeControl());
   map.addControl(new GScaleControl());
  map.enableScrollWheelZoom();

   var location = new GLatLng(centerLatitude, centerLongitude);
   map.setCenter(location, startZoom);
```

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```
for(i=0;i<markers.length; i++) {
var current=markers[i];
 marker=addMarker(current.lat , current.lng, current.id);
   markerHash[current.id]={marker:marker,habitat:current.habitat,visible:true};


     }
}

window.onload = init;
window.onunload = GUnload;
```

Map 2 (map.rhtml)

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
  "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
  <head>
    <meta http-equiv="content-type" content="text/html; charset=utf-8"/>
    <title>Grand Lake Meadows prototype web mapping application using the Google Maps
JavaScript API </title>
    <script
src="http://maps.google.com/maps?file=api&amp;v=2&amp;key=ABQIAAAAl78uNkJb16cXhx
czbyrGZBTJQa0g3IQ9GZqIMmInSLzwtGDKaBRl0I2Cq1OXComrf_DZxuHOTEUneA"
      type="text/javascript"></script>

<%=javascript_include_tag 'prototype', 'application_arch'%>

<%=stylesheet_link_tag 'style'%>

<script type="text/javascript">
var markers=<%=@archaeologies.to_json%>;

</script>

  </head>
<body id="body">
<BODY BGCOLOR="#999966">

<div id="map-wrapper">

    <div id="map"></div>

</div>

<b>The map below shows the locations and names of known Archaeological sites in the vicinity
of the Grand Lake Meadows study area.</b>

<b ALIGN=right>
<a href="http://www.unbi.org/">Back to UNBI's homepage</a></b>


<p><img src='../images/arrow2.png'; width=100 height=125><a
href="http://www1.gnb.ca/0007/Culture/Heritage/VMC/main.asp">Click here to explore New
Brunswick's Timeline on Virtual Museum of Canada</a></p>

<div id="toolbar-wrapper">

<div id="toolbar">
```

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```html
<h4> Map of Archaeological sites </h4>
<ul id="options">
<TD> <a href="http://localhost:3000/project/map">GLM Wild Rice distribution</a></TD>
<TD><a href="http://localhost:3000/project_traditional_act/map">First Nations Traditional
Activities</a></TD>

</ul>

</div>
</div>

<div id="content">

<div id="sidebar">
 <p ALIGN=CENTER><b><u><I><h3>Archaeological Sites</h3></I></u></b></p>
<ul id="sidebar-list">
<%@archaeologies.each do |archaeology|%>
<li id="sidebar-item-<%=archaeology.id%>">
<%=link_to_function "<strong>#{archaeology.site_name},</strong>
#{archaeology.description}", "focusPoint(#{archaeology.id})"%>
</li>
<%end%>
</ul>

<p> What is now known as the <b>Jemseg Crossing Archaeological Project (JCAP), </b>
resulted in the re-routing of a segment of the Trans-Canada Highway. This was done in order to
not disturb the remains of a "major ancestral Wolastoqiyik settlement dating to between 2000 and
3000 years ago." - Chris Turnbull of Keswick Ridge, NB <a
href="../project_traditional_act/ProjectReferences">[Perley et al., 2003, p.x]</a>.</p>
<p ALIGN=CENTER><b><u><I><h3>Interesting Links</h3></I></u></b></p>

<ul>
<li><a href="http://www.upperstjohn.com/history/natives.htm">Native Peoples - Upper St. John
river valley</a>
<li><a href="http://www.abbemuseum.org/t5.html">Abbe Museum</a>
<li><a href="http://www.snowwowl.com/peopleabenaki.html">Native American
People/Tribes</a>

</ul>

</div>
</div>

 </body>
</html>
```

Map 2 (application_arch.js)

```
var centerLatitude = 45.8700;
var centerLongitude = -66.2000;
var startZoom = 11;
var markerHash={};
var currentFocus=false;

var map;

var arrowIcon = new GIcon();
arrowIcon.image = '../images/arrow.png';
arrowIcon.iconSize = new GSize(20, 53);
arrowIcon.iconAnchor = new GPoint(10, 53);
arrowIcon.infoWindowAnchor = new GPoint(20, 24);

function focusPoint(id){
  if (currentFocus) {
    Element.removeClassName("sidebar-item-"+currentFocus,"current");
  }
  Element.addClassName("sidebar-item-"+id,"current");
  markerHash[id].marker.openInfoWindowHtml(markerHash[id].site_name);
  currentFocus=id;
}

function addMarker(latitude, longitude, id) {
  var marker = new GMarker(new GLatLng(latitude, longitude), arrowIcon );
  GEvent.addListener(marker, 'click',
    function() {
      focusPoint(id);
    }
  );
  map.addOverlay(marker);
  return marker;
}

function init(){

  map = new GMap2(document.getElementById("map"));
  map.addControl(new GSmallMapControl());
  map.addControl(new GMapTypeControl());
  map.addControl(new GScaleControl());
  map.enableScrollWheelZoom();

  var location = new GLatLng(centerLatitude, centerLongitude);
  map.setCenter(location, startZoom);
```

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```
for(i=0;i<markers.length; i++) {
var current=markers[i];
  marker=addMarker(current.lat , current.lng, current.id);
markerHash[current.id]={marker:marker,site_name:current.site_name,visible:true};
    }
}

window.onload = init, false;
window.onunload = GUnload, false;
```

Map 3 (map.rhtml)

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
 "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
   <meta http-equiv="content-type" content="text/html; charset=utf-8"/>
   <title>Grand Lake Meadows prototype web mapping application using the Google Maps
JavaScript API </title>
   <script
src="http://maps.google.com/maps?file=api&amp;v=2&amp;key=ABQIAAAAl78uNkJb16cXhx
czbyrGZBTJQa0g3IQ9GZqIMmInSLzwtGDKaBRl0I2Cq1OXComrf_DZxuHOTEUneA"
     type="text/javascript"></script>

<%=javascript_include_tag 'prototype', 'application_trad'%>

<%=stylesheet_link_tag 'style'%>

<script type="text/javascript">
var markers=<%=@traditions.to_json%>;

</script>

 </head>
<body id="body">
<BODY BGCOLOR="#999966">

<div id="map-wrapper">

   <div id="map"></div>

</div>

<b>The map below shows the locations and descriptions of traditional activity sites in the vicinity
of the Grand Lake Meadows study area (FICTITIOUS DATA).</b>


<b ALIGN=right>
<a href="http://www.unbi.org/">Back to UNBI's homepage</a></b>

<p><img src='../images/man2.png'; width=90 height=120><a
href="http://www.ubcic.bc.ca/Resources/tus.htm">Click here for information on Traditional Use
Studies</a></p>

<div id="toolbar-wrapper">

<div id="toolbar">
```

```html
<h4> Map of Traditional Activity sites (Fictitious Data) </h4>
<ul id="options">
<TD> <a href="http://localhost:3000/project/map">GLM Wild Rice distribution</a></TD>
<TD><a href="http://localhost:3000/project_archaeology/map">First Nations Archaeological
sites</a></TD>

</ul>

</div>
</div>

<div id="content">

<div id="sidebar">

<p ALIGN=CENTER><b><u><I><h3>Traditional Activity sites
(fictitious)</h3></I></u></b></p>
<ul id="sidebar-list" style="my_style">
<%@traditions.each do |tradition|%>
<li id="sidebar-item-<%=tradition.id%>">
<%=link_to_function "<strong>#{tradition.description},</strong>
#{tradition.subject},#{tradition.time_period}", "focusPoint(#{tradition.id})"%>
</li>

<%end%>
</ul>

<p> The level of traditional activities practiced in the Grand Lake Meadows region has decreased
over time. At present, much of the traditional activity is undertaken by off- reserve Status Indians,
including hunting of moose and deer, fishing and gathering of plants <a
href="ProjectReferences">[Getty, 2008]</a>. </p>
<p ALIGN=CENTER><b><u><I><h3>Interesting Links</h3></I></u></b></p>
<UL>
<LI><a href="GLMOralhistory">GLM Oral history</a>
<LI><a href="http://www1.gnb.ca/0007/culture/heritage/poridsrch-e.asp">Wolastoqiyik:
Portraits of a People</a>
<LI><a href="http://www.gnb.ca/0016/Wolastoqiyik/story-e.asp">Extracts from Maliseet &
Mi'kmaq: First Nations of the Maritimes</a>
<LI><a href="http://www.danielnpaul.com/WeWereNotTheSavages-
Mi'kmaqHistory.html">First Nations History: We Were Not the Savages</a>
<LI><a href="http://www.nativemaps.org/">Aboriginal Mapping Network</a>
<LI><a href="http://animals.nationalgeographic.com/animals/mammals/white-tailed-
deer.html">Deer</a>
<LI><a href="http://www.hww.ca/hww2.asp?id=96">Muskrat</a>

</UL>
```

```html
<p ALIGN=CENTER><b><u><I><h3>New Brunswick First Nations</h3></I></u></b></p>
<UL>
<LI>Mi'kmaq Nation at Eel River Bar
<LI><a href="http://www.pabineaufirstnation.ca">Mi'kmaq Nation at Pabineau
<LI>Mi'kmaq Nation at Burnt Church
<LI><a href="http://www.metepenagiag.com">Mi'kmaq Nation at Red Bank</a>
<LI>Mi'kmaq Nation at Eel Ground
<LI>Mi'kmaq Nation at Indian Island
<LI><a href="http://www.bigcoveband.com">Mi'kmaq Nation at Big Cove</a>
<LI>Mi'kmaq Nation at Bouctouche
<LI><a href="http://www.fortfolly.nb.ca">Mi'kmaq Nation at Fort Folly</a>
<LI><a href="http://www.ofnb.com">Maliseet Nation at Oromocto
<LI><a href="www.stmarysfirstnation.ca">Maliseet Nation at St. Mary's</a>
<LI><a href="http://www.kingsclear.ca">Maliseet Nation at Kingsclear</a>
<LI><a href="http://www.woodstockfirstnation.com/home.htm">Maliseet Nation at
Woodstock</a>
<LI>Maliseet Nation at Tobique
<LI>Madawaska Maliseet First Nation
<p><a
href="http://www.tc.columbia.edu/centers/cifas/socialdisparity/background/fnmap.htm">click to
see map</a></p>
</UL>

</div>
</div>

  </body>
</html>
```

Map 3 (application_trad.js)

```javascript
var centerLatitude = 45.8700;
var centerLongitude = -66.2000;
var startZoom = 11;
var markerHash={};

var map;

var manIcon = new GIcon();
manIcon.image = '../images/man.png';
manIcon.iconSize = new GSize(22, 32);
manIcon.iconAnchor = new GPoint(11, 32);
manIcon.infoWindowAnchor = new GPoint(20, 24);

function focusPoint(id){
markerHash[id].marker.openInfoWindowHtml(markerHash[id].description);
}

function addMarker(latitude, longitude, id) {
   var marker = new GMarker(new GLatLng(latitude, longitude), manIcon );
   GEvent.addListener(marker, 'click',
      function() {
        focusPoint(id);


      }
   );
   map.addOverlay(marker);
  return marker;
}

function init(){

   map = new GMap2(document.getElementById("map"));
   map.addControl(new GSmallMapControl());
   map.addControl(new GMapTypeControl());
   map.addControl(new GScaleControl());
  map.enableScrollWheelZoom();

   var location = new GLatLng(centerLatitude, centerLongitude);
   map.setCenter(location, startZoom);

for(i=0;i<markers.length; i++) {
   marker=addMarker(markers[i].lat , markers[i].lng, markers[i].id);
markerHash[markers[i].id]={marker:marker, description:markers[i].description};
   }
}
```

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```
window.onload = init;
window.onunload = GUnload;
```

CURRICULUM VITAE

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Publications:

Hibbert, S., C. Ramharrack and G.G. Newsome (2005). *The Impact of GPS on Modern
Surveying*. Published in the January edition of the newsletter *Misclosures*. Land
Surveyors Association of Jamaica (LSAJ). [Online].
http://www.lsaj.com/newsletter/newsjan2005.doc

Conference Presentations:

Hibbert, S. and D. Mioc (2007). *The Application of web based Geographic Information
Systems (Web GIS) in securing housing solutions within the University of New
Brunswick, Fredericton locality.* Atlantic GIScience and Geomatics Graduate Research
Seminar, Schoodic Peninsula, Maine, U.S.A.