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Ochiichagwe'babigo'ining Community Mapping Workshop with GIS: Final Report

A three day community mapping workshop was conducted in the Ochiichagwe'babigo'ining First Nation community located north of the City of Kenora in northwestern Ontario from April 26th to 28th, 2011. The purpose of this document is to outline various aspects of the workshop, such as: the process by which the workshop was developed, how the workshop was conducted, the reasoning behind some of its specific elements, the final outcomes of the workshop, and the academic value of the exercise as a whole.

Motivation for Developing the Workshop:

The concept and motivation for this workshop has evolved over the past two years. The initial idea came during a conversation between myself and an elder from the Ochiichagwe'babigo'ining First Nation (the community) during an elder led youth outing along the Winnipeg River in late October 2009. The elder had expressed a concern that the young people of her community had a decreasing interest in, and connection to, the land around them. During the outing we made several stops along the river's shore so the elders could speak about different sites where they remembered themselves, their parents and their grandparents carrying out various activities such as camping, fishing, collecting plants, or leaving offerings to local spirits. I could see how interested and

surprised some of the youth were to hear the stories and legends, and to see the faded pictographs that would easily be overlooked from the seat of a fast moving motorboat.

Shortly after that trip onto the river I was asked by Cuyler Cotton, a local historian who had mapped many similar cultural sites along the river several years earlier, to help him preserve the knowledge of the community's connection to the landscape by making digital copies of seven hard copy maps. I agreed to help, and then contacted Larry Laliberte, a geographical information systems (GIS) librarian at the University of Manitoba's Elizabeth Dafoe library, to enquire about using a very large flatbed scanner he had once mentioned while guest speaking in one of my classes at the university earlier that term. After making arrangements with Larry, I brought the maps to the university and created digital copies that could then be reproduced and preserved on several compact disks. While inspecting the maps it occurred to me that it was a shame this information, while being preserved in digital format, really was not being stored in a way that would make it useful for future projects. Only in a spatial database would this information be able to assist in future community projects at its full potential.

Over the course of my thesis field work and various community projects, which had me speaking with elders from eleven different First Nation communities around the region, I had begun to take notice of a reoccurring theme in the concern many of the elders had shared with me during our conversations. The concern was that many of the young people in their communities had little or no professional aspirations or goals, and that the communities themselves did not provide any real opportunities for young people to engage in meaningful long term work. Around this same time I had become interested

in learning an open source GIS software package that would allow me to continue to accept the short-term employment opportunities in the field of traditional land use and occupancy (TLUO) mapping that were being offered to me, without having to rely on the local organizations that had licences to the prohibitively expensive proprietary GIS software I had been using up to that point.

The last motivating factor for developing and conducting this workshop was the fulfilment of the final course requirement of my master's degree. I had always been interested in the idea of doing a projects course and taking my learning experience outside the classroom. My academic adviser, Iain Davidson-Hunt, and I had previously discussed using the projects course option as a way of creating a product of some sort, likely GIS based, that would be of use to one of the communities I had been previously working with throughout my thesis research. Finally, it was in trying to think of a suitable course topic that would allow me to produce such a product, while pursuing the development of my GIS skill-set in a practical way, that I began to piece together possible solutions to the concerns of the community elders into the framework of a community workshop in community mapping with GIS.

Preparation for the Workshop:

Selecting a GIS

After the topic and general outline of the workshop were determined, it was time to start making preparations. One of the first decisions I needed to make was to select the GIS software that would be suitable for the purpose of the workshop. I knew I wanted to use an open source software package so that the participants would be able to have access

to the tool which they were learning to use. I also wanted to choose a GIS with an intuitive graphic user interface to make learning the software as simple as possible for both the instructor and the participants. I wanted to choose a GIS that was powerful enough to be useful in a variety of circumstances and have the ability to perform all of the task I usually employ a GIS to do, beyond what the basics of what the workshop would require; as I figured if I was going to spend the time and effort familiarizing myself with a new software package, it might as well be one I can work with in the future as well. Finally, I felt that choosing a GIS software with a strong, detailed, and up to date online community of users was also very important, again for both myself as I leaned but also for the participants if they themselves choose to further investigate GIS beyond the workshop. I was very happy when I found that Quantum GIS (QGIS) met all of these requirements, as well as it having a similar feel to the proprietary software I had been formally trained on.

Data considerations and preparation

During the time I was learning the QGIS software I also began to assemble the various data sets that I expected would be useful in the final workshop. Before I could choose which specific geographic areas I would need to download data for however, I needed to first determine what areas would be covered by the community maps the participants would be working with during the workshop. The three map sheets I selected for the workshop covered a continuous area of the Winnipeg River from just north of the small community of Minaki to just south of the Ochichagwe'babigo'ining reservation, and then a separate section of the Winnipeg River further south around

Tunnel Island. All three map sheets were chosen because they had been used to record many TLUO features, and also were relatively easy to read compared to the other map sheets which had been scanned. The geographic areas represented in these map sheets, namely the area directly around the reservation that potential participants would likely be most familiar with, and the area of my thesis research which I was most familiar with, made these particular map sheets the best choice for the workshop.

After identifying the geographic area covered by the community maps, I then needed to identify what other spatial data sets would be required to complete the tasks required by the workshop itself. The first spatial layers I accessed were the georeferenced CanMatrix images from the Natural Resources Canada's online data warehouse www.GeoGratis.ca. The CanMatrix data layers are very useful because of their rich detail, including shorelines, roads, railways, and toponyms. I have often used these raster images to complete past projects, and felt that introducing them to the participants would be of great benefit. For the workshop they were used during the georecification section. The second source of data layers used in the workshop was the National Hydro Network accessed from the Canadian Council on Geomatics' online data warehouse www.GeoBase.ca. The data sets offered by this national initiative were chosen to be the layers which participants would use during the digitizing and map creation sections of the workshop for two reasons. The first is that the data sets themselves are some of the most accurate and complete spatial layers available that cover the region of northwestern Ontario. The second reason is that I worked with the team of GIS technicians who are currently producing the Manitoba portion of the NHN during a

six month internship I held at Manitoba Water Stewardship in 2009, so I was very familiar with many details about the data sets and felt it would provide a good opportunity for me to highlight another potential professional opportunity involving GIS.

To prepare the NHN data layers for the workshop some spatial processing needed to be done, beyond what was covered in the workshop. First of all three separate work units, the smaller local areas which the larger regional data sets are divided into, needed to be combined to ensure that there would be data cover for the entire area that the selected community map sheets represented. This larger data set then needed to be clipped, or cropped, to the actual size of the map sheets to avoid the increased processing lag that would occur as a result of using data sets that extended beyond what was needed to perform the workshop tasks. Finally, the resulting data layers, representing water polygons, land polygons, and single line water features, all needed to be projected into the same coordinate reference system used by the CanMatrix data sets.

Drawing on outside sources

Initially I had expected to make use of the free online QGIS manual *Shuffling Quantum GIS into the Open Source GIS Stack*[1], to learn the ins and outs of the software's functions, but I quickly realized that I was facing the same problem I had intended to solve for the participants, which was to provide a manual that did not require the reader to sift through a lot of long explanations and background information to learn how to perform fairly straight forward tasks. Fortunately, as I had mentioned earlier, I was familiar enough with GIS to figure out much of what I needed to know simply by taking the time to explore the software on my own. With this independent exploration, along

[1]Sherman, G. 2007. Shuffling Quantum GIS into the Open Source GIS Stack. Free and Open Source

with the assistance of several previous forum postings on websites such as linfiniti.com, I was able to become proficient enough with QGIS to perform the tasks required by the workshop as well as to troubleshoot any unexpected issues that arose during the georeferencing, digitizing, and map making sessions.

To better prepare myself to answer the questions 'what is traditional land use and occupancy mapping and why is it important', I looked to the book *Living Proof: A guidebook to land use and occupancy mapping research and data collection*.[2] The author of this book, Terry Tobias, has been working with First Nations across Canada for many years in the field of TLUO mapping, and is widely regarded as the leading authority in this field. Interestingly, it was in the book's opening chapter, which was not even written by Mr. Tobias, that I found the majority of the information I wanted to convey to the participants about the importance of this topic. This chapter tells the story of a First Nation on the west coast of Canada, which has greatly benefited from their own TLUO mapping projects and the products they have produced. I did draw heavily on several other sections of the book though, in my explanation to participants of how detailed and involved the process of completing a quality community mapping project is. It was also in these sections that I feel I gained the most insight into the methods I employed in my own thesis research project, which will no doubt be most useful in completing my final thesis document.

Familiarizing myself with the community's data

[2]Tobias, T. 2009. Living Proof*: A guidebook to land use and occupancy mapping research and data collection.* Vancouver: Union of British Columbia Indian Chiefs.

To gain a better understanding the TLUO information recorded on the map sheets that would be used in the workshop, and of the context in which the information was originally collected, I conducted an informal interview with the original researcher and local historian, Cuyler Cotton on February 15th, 2011; the interview lasted just over five hours. To adequately explain the circumstances which led to the creation of the original maps and the outcomes of their use, Mr. Cotton described a large portion of the entire community's history from the early 1940's right through to the early 2000's. The depth of detail to which Mr. Cotton went when describing many of the community happenings during that period of time was both fascinating and extremely valuable, not only in putting the workshop maps into context, but also in terms of the community data I had already collected during my thesis research.

Participants

Potential participants were discussed and identified while organizing the initial logistics for the workshop with members of the community's band office. Several of the community's youth had recently completed a six month literacy program where they were required to complete online learning tasks in a classroom setting five days a week. As a reward for successfully completing the course these youth were given the small laptop computers they had been using, which for many was the first computer they had ever owned. It was decided that this group of youth would be excellent candidates for the workshop I was planning, as they were all now familiar with the basics of using a computer and were 18 to 36 years old, when being introduced to a new professional

opportunity would be most useful. This group in particular was also chosen because each now had accesses to the necessary hardware required to compete the workshop.

Detailed Workshop Outline:

Workshop attendance

Five community members attended the first day of the workshop. Four of these participants had little prior knowledge of what the workshop was about, other than it had something to do with computers. The fifth participant though, had a much better idea of what to expect and was looking forward to learning about computer mapping, which they hoped would be useful for a summer sturgeon monitoring project they would be part of later this year. All of the participants were active in the day's discussions surrounding what maps are, and why TLUO mapping is important. Four participants attended the second day of the workshop. One of the participants however, did not bring a computer of their own to use and needed to pair up with one of the other participants during the 'hands on' georeferencing and digitizing sections of the day's agenda. Three of the original five participants completed all of the training offered each of the three days. It was these three who contributed to the final spatial database, completed maps of the database they had compiled, and who received certificates of completion acknowledging their achievements in the workshop. Each of these three participants also completed a workshop evaluation form at the end of the third day.

<u>DAY 1:</u>

The workshop's first day's agenda was to broaden participants' view of what maps are and the power they have in shaping the world around them; to introduce

participants to the concept of TLUO mapping, and to why it is particularly important for First Nations; and to look at GIS as being a useful tool in the mapping process. In addition to this, the first day also included the installation of the QGIS software onto the participants' computers and an introduction to various features of the software's graphic user interface (GUI), which they used over the following two days.

Introduction to maps

To facilitate the introductory conversation on maps and the power they possess, the first part of the day's presentation relied heavily on various quotes I had pulled together from the literature review I prepared for my thesis research. I selected quotes from several authors who make key observations about the nature of maps and mapping, as well as opposing perspectives of how maps are used. More specifically, the nature of maps being incomplete[3] and selective[4] representations of the reality of a place, and the perspectives of maps as ideological weapons[5] or tools for knowledge building[6]. In the end, I hoped to engage the participants in thinking about maps as they are used in the land use and natural resource planning taking place in their local region, what values are represented in those maps, and what perspectives are missing from those decision making tools.

Introduction to traditional land use and occupancy mapping

[3]Binnema, T. 2001. How does a map mean? In *From Rupert's Land to Canada.*, 201-224. Edmonton: University of Alberta Press
[4]Bryan, J. 2009. Where would we be without them? Knowledge, space and power in indigenous politics. *Futures* 41, (1): 24
[5]Wood, D., and J. Fels. 2008. The natures of maps. Chicago: The University of Chicago Press
[6]Suchan, T., and C. Brewer. 2000. Qualitative methods for research on map making and map use. *The Professional Geographer* 52, (1): 145-54

The next topic of discussion was traditional land use and occupancy mapping. To define and describe this topic I drew on the book, *Living Proof* written by Terry Tobias (2009). The goal of this section was to introduce participants to a possible solution to the lack of First Nation input in land use and natural resource planning. To emphasize the abundance and broad distribution of the community's TLUO knowledge over the landscape, beyond the boarders of their reserve land, participants were shown images of some TLUO maps that I created during a workshop I volunteered to help facilitate in October 2009 with local elders.

Examples for why to map

To further stress the importance of TLUO mapping for First Nations, four current real world examples were presented which focused on how the mapping of this knowledge, and the traditional territories which are defined as a result, are being used to benefit communities in north western Ontario. The first example described how the TLUO information that we eventually digitized in the workshop was originally collected and utilized in four successful negotiations between the community and Hydro One.[7] The second example outlined a recent decision of the Ontario Ministry of Natural Resources to withdraw its official court appeal regarding a case where members of the Aroland First Nation in Treaty 9 were building hunting cabins within their traditional territory without building permits.[8] This example also helped to illustrate the importance of defining a First Nation community's traditional territory though the process of TLUO mapping. The third example summarized how another Ontario government ministry, the

[7] Interview conducted with local historian and author of traditional land use and occupancy maps, Cuyler Cotton, held on February 15, 2011 in Kenora, Ontario.
[8] Province abandons hunt cabin appeal. The Chronicle-Journal. Published March 2nd, 2011; accessed at chroniclejournal.com/content/news/local/2011/03/02/province-abandons-hunt-cabin-appeal

Ministry of Northern Development and Mines, is proposing changes to the Mining Act to accommodate for First Nation values on the landscape by removing culturally significant sites from potential resource development.[9] This example provided a current instance where the practise of TLUO mapping is being adopted as the mechanism by which First Nation knowledge is being applied to the western decision making process of government. Finally, the fourth example was the Rat Portage Common Ground Conservation Organization initiative within the City of Kenora, where the municipal government has entered into a shared management agreement with local First Nations. This example allowed me to further introduce my thesis research to the group and to outline a current TLUO mapping project that the community is currently involved with.

Introduction to spatial data and geographical information systems

The next section of the day's presentation introduced participants to geographic information systems (GIS) and spatial data, and their role in the act of preserving and presenting the information collected during TLUO mapping. Four aspects of spatial data were highlighted during this segment: projection, resolution, scale, and accuracy. As it was explained to participants, spatial projections are the process of representing a 3-dimensional object, such as the Earth's surface, with a 2-dimensional medium, such as a map or computer monitor. The affect different spatial projections can have on the way information is perceived is significant because of the degree to which the appearance of landmasses may be distorted. Having a basic understanding of spatial projections was also important as it was one of the parameters participants would later set when creating

[9] Modernizing Ontario's Mining Act: Sites of Aboriginal Cultural Significance, Grand Coucil Treaty #3. Ministry of Northern Development, Mines and Forestry. Presented March 24, 2011.

new spatial layers during the digitizing process. The concepts of resolution and scale were underlined in this section as they relate to the selection of the base datasets, namely the CanMatrix images and National Hydro Network spatial layers, which were employed during the georeferencing, digitizing, and finally presentation of the community's TLUO information. The last feature of spatial data discussed was accuracy, which was used to impress upon the participants the importance of doing 'quality digitizing', through using such best practise measures while digitizing as closely zooming into features before capturing them and flickering between the various data layers used in the process. These best practise measures were later highlighted again during the digitizing demonstration.

The GIS data model, or how spatial data is organized within a GIS, was the next topic covered by the day's presentation. Here participants were introduced to the concepts of raster and vector data, how they are used to represent real world features, and how they are organized into layers which can be ordered one on top of the other in a variety of ways to highlight different patterns on the landscape. This section was a useful preamble to the datasets the participants would encounter in the following days, and how they would need to organize these datasets within the Quantum GIS user interface. During this section participants were also briefly introduced to the attribute tables containing the information represented by a feature. The topic of attribute tables was further covered in greater detail during the digitizing section of the following days presentation and in pages 28 and 29 of the workshop manual.

After this introduction to GIS and spatial data participants were informed of some of the tasks which may be performed with a GIS and the appropriate spatial datasets

beyond the scope of the workshop, such as graphic data representation, spatial queries, network analysis, and 3-dimensional modelling. The purpose of this final section was to highlight the potential power of GIS, while stressing the fact that you do not need to know everything about GIS to make it a useful and relevant tool for community mapping. This discussion also provided an opportunity to introduce more of the various GIS projects I have worked on over the years, from grizzly bear habitat modelling and tracking glacial recession in British Columbia, to mapping the network of water flow directions of the many rivers and streams which make up southern Manitoba's Lake Winnipeg watershed. Touching on the wide rage of uses for GIS and opportunities in this field which have been presented to me over the years, was intended to further build the participants' interests in GIS as a potential professional career choice.

The next topic of the day, linking land use and occupancy mapping with GIS, was intended to put the digitizing and mapping work the participants would be carrying out through the course of the workshop into the context of a larger TLUO mapping project. A diagram, which was modified from the 'Tasks of a Use-and-Occupancy Map Survey' appendix of Terry Tobias' best practises manual for TLUO mapping,[10] was made to highlight the twenty-eight steps of a complete mapping project and how digitizing and map creation are only a small, but important, piece of a much larger puzzle. This diagram was also used to impress upon the participants the huge amount of work and careful planning that goes into a mapping project, and how this level of effort is

[10] Tobias, T. 2009. Living Proof*: A guidebook to land use and occupancy mapping research and data collection.* Vancouver: Union of British Columbia Indian Chiefs

absolutely required if the maps created are to be taken seriously in a negotiation or litigation setting.

Introduction to Quantum GIS

The day's presentation ended with an introduction to the GIS software the participants would use over the next two days, specifically the QGIS GUI. For this section participants were encouraged to refer to their workshop manuals, to write notes in the manual as different functions were explained in more detail, and to follow along with their own computers that had the GIS software installed on them during the lunch break earlier that day. The first part of this segment focused on simplifying the participants understanding of the QGIS GUI by describing it as five separate sections which performed specific tasks or housed specific tools. Only the features and tools that would be used by participants were covered in this section, so as not to overwhelm anyone and to provide for the most amount of time to be spent answering questions regarding the challenges participants would likely face in using some of these tools. One such challenge was the likelihood of a system's crash if changes to datasets and project files were not saved regularly by participants. At the end of the day participants were encouraged to explore the QGIS GUI and the tools it offered that night while at home. To further encourage them to investigate the new software, I mentioned how I had also only recently learned how to use this software on my own and how self directed exploration was the best way to familiarize one's self with any new application.

<u>DAY 2:</u>

Sources of spatial data

The second day of the workshop started with a review of the QGIS GUI and an opportunity for participants to ask any question they had thought of after hearing the previous day's presentations and independently exploring the QGIS software. After speaking with the participants I was pleased to hear that one of them had spent some time the previous night exploring and figuring out features of the software which were not included in the manual. The second part of the day's presentation focused on introducing the online sources of digital spatial data that I often use when working on projects, and that were used to create the resources for this workshop. The first of these sources was www.Geobase.ca, which is an initiative to provide the most accurate and up to date spatial datasets covering the Canadian landmass at no charge and without restriction. The Geobase initiative is headed by the Geomatic Council of Canada, and is where the National Hydro Network datasets used in the workshop were acquired.[11] The second online source introduced to participants was www.GeoGratis.ca, which has a similar mandate as the previously mentioned source, but is maintained by the Earth Science Sector of Natural Resources Canada.[12] The CanMatirx images used during the georectification portion of the workshop were retrieved from this second source. During this portion of the workshop the importance of crediting data sources in the final map products was stressed, which was also touched on again during the metadata section of the third day's presentation.

Quantum GIS workflows

[11] www.GeoBase.ca; accessed April 25, 2011
[12] www.GeoGratis.ca; accessed April 25, 2011

After discussing data sources with participants it was time to start processing the data. These 'how to' sections of the workshop closely followed the instructions found in the participant's manuals, and were demonstrated first by me on the projected computer monitor before participants attempted to process the data individually. Three processing tasks were covered during the second day of the workshop including georeferencing a raster image, creating a polygon reference grid layer, and digitizing data points. Georeferencing (or georectification) refers to the process of giving a real world coordinate reference system to a spatial data set, either raster of vector, and associating the features of the data set with their actual locations on the Earth's surface. This is achieved by comparing an unreferenced data set to an already georectified reference data set. The data sets requiring georeferencing in the workshop were three scanned images of the original maps containing the community's TLUO information. Each participant was assigned a separate image to georeference, which would later be the image they would be assigned to digitize. The CanMatrix raster images used as the reference data sets during this process were chosen because of their high level of shoreline detail and their display of local toponyms. The purpose of creating a polygon reference grid was to assist participants with organizing which sections of their image had been digitized, and to help them breakdown the sometimes intimidating task of digitizing a large data set into smaller, more manageable areas. This task also served as the initial introduction to the workflows of creating a new spatial layer, and to manipulating a spatial layer's symbology, both of which would be reoccurring tasks throughout the remainder of the workshop. Digitizing is the process of capturing new features within a spatial database as

either points, lines, or polygons. The features digitized in the workshop as points were the hand drawn locations of various TLUO information previously recorded on hard copy maps. For participants to properly preserve these features various topics of discussion were covered under this section of the workshop including planning attribute tables, planning vector types, and tips to facilitate a more accurate and timely digitizing process. The discussion regarding attribute and vector type planning is summarized in the manual on pages 29 to 30. All three of the participants got a good start on their respective data sets by the end of the day, and were excited to see their own spatial databases beginning to take shape.

DAY 3:

Questions and answers

The third day of the workshop began with a question and answer period and review of the digitizing workflow before participants started independently digitizing. Once again I was happy to hear that one of the participants had spent sometime working on their data set and exploring the QGIS GUI. They had created a point which they wanted to later delete but could not figure out how to. Even though the 'delete feature' tool had been shown to them during the previous day's session, I had not explicitly gone through the steps of how to remove an already digitized feature from a data layer, which had caused the confusion. Fortunately I was able to quickly walk him, along with the rest of the group, through the process and we were all back on track. Nearing the final hour of the digitizing session two members of the group finished their data sets, while the third participant had fallen a little behind due to a late start. Rather than move onto map

creation without the entire group, I simply copied the unfinished georectified image and reference grid from the third participant to the other two and assigned each of them different rows of the undigitized portion. This allowed the group to move to the next portion of the workshop together, and provided an excellent example of how useful the reference grid could be in facilitatomg a group digitizing effort.

Creating maps

The final task performed by the participants was the creation of individual maps using the entire spatial database they had each contributed to. To accomplish this I first copied each individual portion of the database from each participant's computer and combined them using a 'many shapefiles to one' function I had discovered while preparing for the workshop. After all of the data had been complied into one shapefile, I then redistributed the entire spatial database as a single data layer to each of the participants for them to work with. Before starting to describe the workflows involved in map creation, I introduced the participants to the concept of meta data and the essential components of a true map; which I described as the map's title, legend, scale, north arrow, date, and description of data used. As an example of a map which incorporates all of these individual elements, I showed the participants a map I had recently created displaying sturgeon sighting data which had been collected for the community by another researcher. Once the participants had an understanding of the specific components their maps should contain I began to explain the workflows associated with the QGIS Map Composer.

The Map Composer is somewhat of a separate interface specifically for the creation of map products as opposed to data creation, editing, and analysis, which the standard QGIS GUI is used for. As time was running short in the session, and the features contained in the Map Composer tend to be more complex than the QGIS functions covered so far in the workshop, it was necessary for me to alter the instructional style of the presentation for this section by alternating between step-by-step instructions and independent work much more regularly. More specifically, I would walk the group through the steps of how to add a map item and outline how to change some of the options associated with that specific element, then give the participants five or ten minutes to choose and explore those options to create a unique look for their maps. During these five to ten minute intervals I would walk around to each participant to answer specific questions, or to provide advice regarding their map's layout. It was also during these one-on-one moments that I would inform participants about their options for continuing to learn and develop their GIS skill-sets through such avenues as online tutorials and user forums, short term training sessions offered by private companies such as ESRI Canada, technical colleges offering one year diplomas programs in GIS like Red River College in Winnipeg, or even university degrees like those offered by the University of Manitoba. While I did present a wide range of alternatives to continue their training, I stressed the usefulness and value of the online options; being that they are easily accessible from their homes, free, and probably the most practical source of 'how to' teachings available to them. To further stress this point I put up a screen shot from one of the online forums I frequented while preparing for this workshop, and learning the

specifics of the QGIS software, which was linfiniti.com. Not only is this forum an extremely useful resource to anyone learning QGIS, because of its numerous 'how to' postings, it was also the sentiment of the forum's administrator Tim Sutton, which he has included at the top of each topic's posting, that made this resource stand out to me. Tim invites new users to ask questions, assuring them that the community of QGIS users involved in the forum "are here to help others who want to use Open Source GIS software but don't know where to start".[13]

Mission accomplished

In the end all of the participants were able to complete a map displaying the information contained in the spatial database. Unfortunately however, one of the participants had forgotten to heed my earlier warnings 'save often or be doomed to crash' just as he was making his final changes to his map and the program had crashed. This is why only two maps are included in appendix A. All three participants were awarded certificates of completion (example included as appendix D). As each participant finished their maps, I asked them to fill out a workshop evaluation form. I explained to them that this was the first time I had run a workshop of this nature, and I was interested in learning how to improve my future efforts with the help of their own experiences over the past three days. I also mentioned that their evaluations would also be reviewed by my university professor as part of the criterion which I would be graded on. Copies of the evaluations have been included in this document as appendix C.

Scheduling Adjustments and Activities Cut

[13]Source: linfiniti.com; accessed April 25, 2011

The workshop was originally structured to begin at 10am every morning and conclude each day at 4pm. All three days however, saw a start time closer to 11am and in one case 11:30am. This loss of overall time required adjustments to the planned schedule of events and the removal of some activities. The first day's presentation was to include two participant centered activities intended to break up the instructor focused components with participant interaction. The first was a mapping exercise which would have had participants quickly sketch from memory their community's layout. These personal maps would then be compared as a group to emphasis the different ways people can view the same spatial area. Focus would have been placed on comparing the distances participants showed between various landmarks, as well as what landmarks were included in each map. The second activity would have been to have participants write their own experiences on the land on individual post-it notes and then group them into the categories of land use versus land occupancy. The purpose of this activity would have been to get participants to start thinking about how their own experiences of the landscape around them might compare with those of other members of the community, as well as to place those experiences into the technical definitions of land use and occupancy which make up a significant part of the overall workshop's design.

During the attribute planning stage of the second day's digitizing segment, the participants and I decided that several more fields should make up the final spatial database including: the name of the informant, the date the original data was collected, and the date the data was digitized. As these specific data fields would have been identical for every feature captured, I decided that to save time it would be more efficient

to leave them out of the database while the features were being digitized and then to add them in at the end with the field calculator tool offered by QGIS. The field calculator allows the user to populate an entire column of data based on a simple formula (i.e. field = date). Unfortunately, at the end of the digitizing session on the third day there was no time to complete this final step, as I decided the little time that was left would be better spent allowing the participants to complete individual maps. I do feel however, that it was at least good to introduce the participants to the concept of how the digitizing workflow's efficiency might be improved, and to inform them of existing tools that could facilitate this. Also, completing the database with the field calculator will be a simple task for me to do before submitting the final product back to Mr. Cotton and the community.

The third day of the workshop was to begin with a fifteen minute peer-to-peer discussion of the participants experiences so far with digitizing and perhaps any thoughts they had about the TLUO information they had been working with now that they had had an opportunity to inspect the original map sheets more closely. Due to time constraints this activity was dropped completely. Also, this final day was to conclude with a brief group discussion of future options for the participants to pursue GIS as a professional skill, which time did not permit for. I was able to discuss some of these options with the participants in more one-on-one settings as I walked around and assisted them in the creation of their final maps.

Workshop Outcomes

Final Products

Three final products were created in the preparation for this workshop, which include a Power Point presentation (included as appendix E), an instructional manual (included as appendix F), and compact disk (CD). The presentation was used during the first day of the workshop and covered topics such as what maps are, what TLUO mapping is and why it is important, and what GIS is; its contents have been outlined in more detail on pages 9 to 14. Within the instructional manual are the main QGIS workflows taught in the workshop. The main purpose of this manual was to provide step-by-step directions for participants during and after the workshop. The CD given to participants contained the data sets used during the workshop, a copy of the QGIS software, and a PDF document of the instructional manual. Providing the software and instructional manual to participants on a CD that they are able to take with them will hopefully encourage them to share what they have leaned during the workshop with others. This will also allow them to remove the software from their computers if they do not feel GIS is something they would like to further explore, but gives them the option to reinstall and work through the manual at a later date if they wish. Finally, providing the manual on the CD allowed participants to freely fill the hard copy manuals, given to them in the workshop, with notes and diagrams without having to worry about ruining their only copy.

Two final products were created by the participants as a result of completing the workshop. The first is a spatial database which stores the point vector features representing the houses (HS), seasonal living sites (SL), fish netting locations (FN), wild rice areas (WR), and culturally significant sites (CS) that were recorded on the original

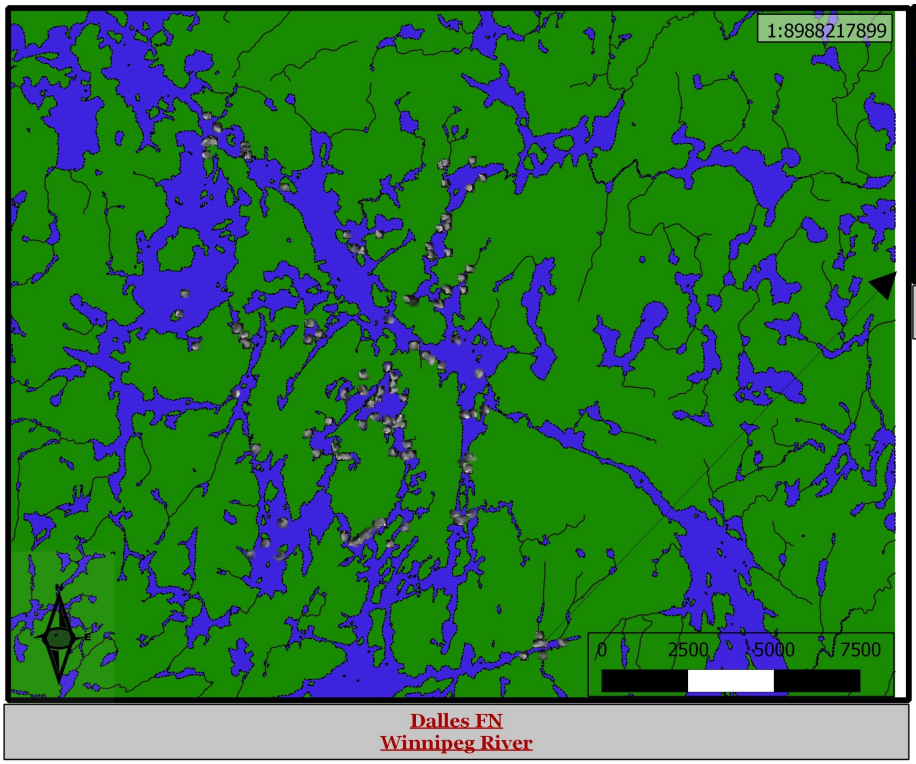
map sheets. In addition to these main categories other features were also included and coded as 'XX' under the feature type field of the associated attribute table. In total, 176 features were captured by participants, which represent 100% of the original features recorded on the three community map sheets. The second product created by the participants were the maps showing all of the databases features over a backdrop of NHN water and land data layers. Examples of both of these final products have been included in this document as appendices A and B.

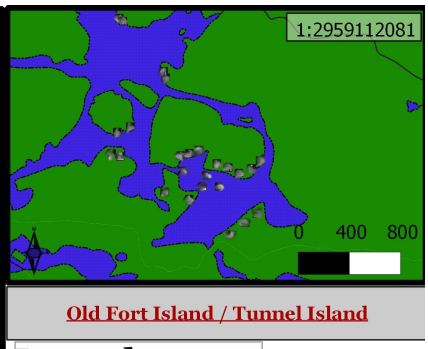
Workshop Objectives Realized

The objectives of this workshop may be categorized into two groups, academic and community oriented. Regarding the academic goals, successfully conducting the workshop has create a geo-database which has provided a broader spatial context to the data gathered during my thesis research. In addition, the workshop has also provided an excellent opportunity for me to gain a functional working knowledge of an open source GIS software package which I am currently utilizing in the analysis of the raw data produced during my thesis research. Preparing for and conducting this workshop has also allowed me to further develop my workshop organization and facilitation skills. In terms of the community objectives of the workshop, a spatially referenced digital record of previously collected TLUO data was created, which previously existed only as a series of original hard copy maps. Gauging from the conversations I had with participants during the workshop, along with the completed workshop evaluations forms, it would seem that the objective of introducing the social value and professional opportunities of community mapping and GIS to community youth was also a realized.

Appendix A:
Participant generated traditional land use and occupancy database
(Not included in this version.)

Appendix B:
Participant generated traditional land use and occupancy maps
(Note: The map icons have been blurred to preserve community data confidentiality)

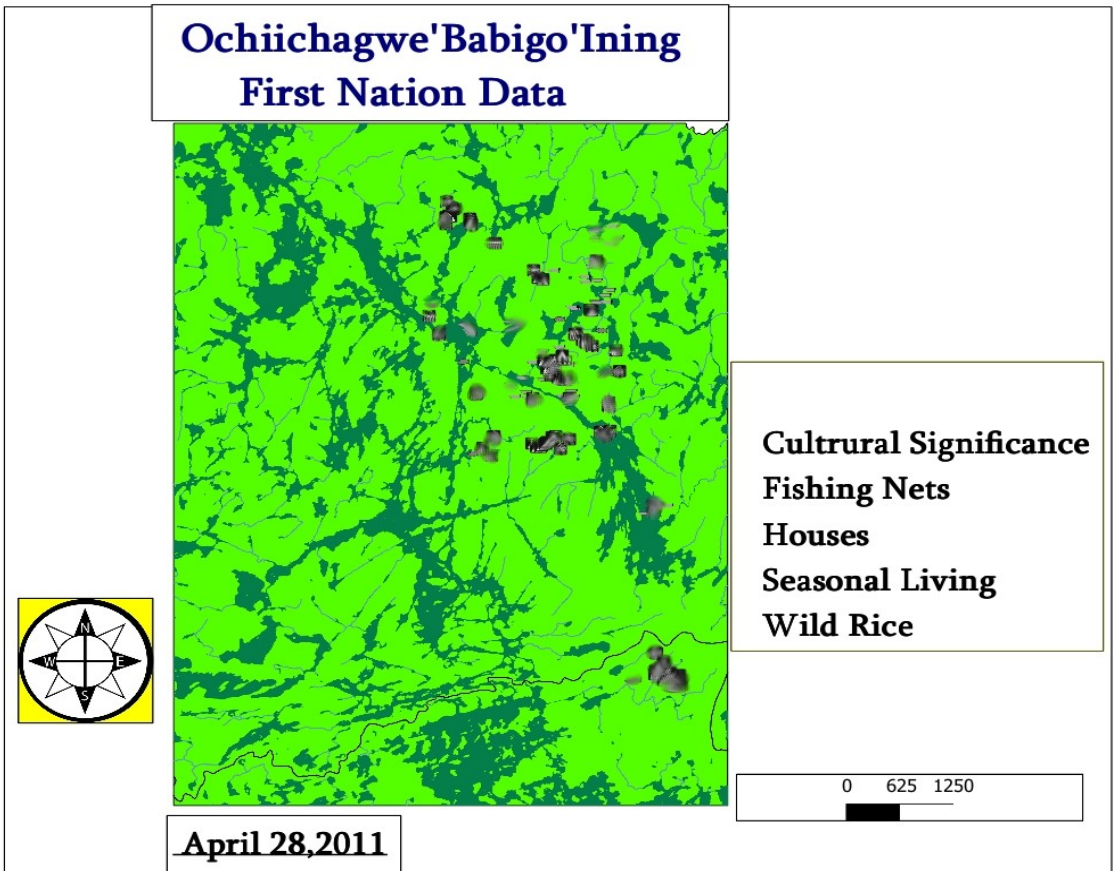




Legend

Historical Data

- *Fishing Nets*
- *Home/House*
- *Seasonal Home*
- *Wild Rice Stand*
- *Cultural Significant*



Appendix C:
Instructor evaluation form
(Not included in this version.)