Dene Mapping Project Repatriation and Analysis - GIS Component:

2014 - 2015 Interim Report

Prepared for:
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1.0 Introduction

In 1974, 564 trappers and hunters of the Mackenzie Valley were interviewed as part of a traditional land use and occupancy study. Originally intended to document Dene interest in Northwest Territory and provide a land use data base for land claim negotiations and similar initiatives, individual trappers' knowledge and areas of use were spatially documented on hardcopy maps and sometimes audio-recorded. Later in 1981, the Dene Mapping Project was established to formally computerize this data into an accessible format in order to assist in research surrounding Dene and Métis land claims negotiations. Over the course of the Project's history a variety of digital formats and methods were employed to represent the data's spatial component, enhance its compatibility with modern formats and computer environments and link its associated biographical and activity information, ultimately resulting in the GIS format that it exists in today.

This report presents a description and explanation of the methods employed to date, to further analyze and correct the known issues identified in the project's previous year's work (2013 – 2014) and their effect on the currently identified (most recent available) version of the Dene Mapping Project's GIS dataset as provided by the Prince of Wales Northern Heritage Centre (PWNHC).

2.0 Background

The contractor was hired by the Sahtú Renewable Resources Board (SRRB) in 2014 to update the Sahtú component (Fort Franklin (Délı̨nę), Fort Good Hope, and Fort Norman (Tulít'a)) of the Dene Mapping Project trail GIS dataset and assist in the creation of a new GIS point dataset, that will be digitized from the original interview maps after they are digitally scanned. The current project is a continuation of project goals and processes initially undertaken in the 2013 -2014 project year, and represents the next stage of the dataset's cleaning and editing process: it builds off initial work which identified a variety of issues and problems deemed necessary to correct before the commencement of spatial editing and the re-creation of a clean dataset can be completed.

The SRRB is a regional wildlife co-management board and acts as a 'decision-maker" in wildlife management in the Sahtú Settlement Area, and has a strong community interest in understanding the geography and trends in caribou-harvester relationships as a basis for developing harvester management policy.

Repatriation of Dene Mapping Project data as a basis for environmental research and decision-making has long been requested by the Sahtú Elders who participated in the original project and Renewable Resource Councils (RRCs) in the Sahtú Settlement Area. The need for data as part of the regional socio-ecological baseline became more acute with settlement of the Sahtú Dene and Métis Land Claim Agreement and establishment of co-management Boards tasked with wildlife management, land use planning and regulation of development. The Elders hope that the information they provided 30 years ago will not be lost, and can be reinvigorated to be useful in decision-making and creating baseline datasets. The resulting data will be used by RRCs in their various mandates, and will also be used by the proponent SRRB in their decision–making process. The work is urgent, since every year there are fewer living Elders that are not able to interpret the documented information.

As baseline land use and wildlife data from the 1880s – 1980s, Dene Mapping Project data is critical to addressing traditional knowledge and scientific data gaps in assessing cumulative impacts of development in the Sahtú Region. Its historic value will also be of use in various species at risk processes, including territorial and federal assessments, monitoring, and management planning. Current species at risk processes require a strong understanding of caribou-harvester relationships. Extensive data gaps exist, and management plans are being created even with existing gaps. As Sahtú hunters have extensive knowledge and use of the areas in question, gaps can be addressed with harvester knowledge.

3.0 Review of 2013 – 2014 Project: Previous Issues and Solutions

3.1 2013 – 2014 Project Objectives

2013 – 2014 project objectives were to ensure that:

1) All linking mechanisms between the spatial (trail) data and attribute (biographical/use) data be re-established,
2) All problematic issues effecting the ability to correctly link the spatial and attribute data be identified and if possible corrected,
3) All known/hereto discovered substantive attribute issues, content and inconsistencies be identified, corrected, and made consistent, and
4) The original dataset's integrity be maintained as much as possible by ensuring that its original structure, format, and contents remain unaltered, and that file and record level metadata be created.

The overall objective was to provide a clean dataset that would form a foundation on which future attribute use and analysis could be performed. In this way the dataset would be accessible for land use and occupancy analysis and decision making; the flagging of problematic issues within its structure and contents would also deem it non-exhaustive or definitive, thereby allowing and safeguarding its contents and structure, while ensuring it retains the capability to withstand potential scrutiny should it be used for the substantive information it contains, rather than merely for its geographic scope and density.

COMMUNITY	Number of Attribute Records	Number of Trail Feature Class Records
Fort Good Hope	2429	2189
Fort Norman	1562	1442
Fort Franklin	4741	4518

Table 1: Breakdown of Sahtú community attribute and trail feature class records.

3.2 Relationship Class

Issue:

Past documentation concerning the original dataset identifies the data cardinality as many-to-many, yet the geodatabase relationship class properties contained within the dataset identify the relationship class

as a one-to-one, with the feature class (spatial component) being the origin table. Relationship properties identify the primary key and foreign key as the OBJECTID.

After close examination however, it became clear that the geodatabase in actuality is of one-to-many cardinality: Each trail record in the trail feature class is spatially unique and has a relationship to one or more attribute (use/bio) records, quite possibly because original attribute records are linked/related to the trail feature class via the OBJECTID field. Therefore, *the linking mechanism used to link trail records with attribute records is incorrect*.

Solution:

1. All existing (incorrect) relationship classes were deleted.
2. Relationship classes were left unassigned. Instead, metadata and instructions are provided with the dataset regarding linking mechanisms (relate) via specific fields.

3.3 Suffix or Hyphenated Issues

Issue:

A variety of the Geodatabase's feature classes contain a hyphenated suffix of "-0" or "-1" attached to its unique identification number within the "ID_" field. In the example below for instance, record 23167001, 23167001-0, and 23167001-1 are three physically distinct trails, and correspond to three records contained in the attribute table's "B_RECID" field. Each of these three records denote three distinct uses recorded on three different original map mosaics, but because the hyphens are not included in the attribute table's corresponding records, a link or join between attribute and spatial data is impossible in its current state.

What makes this example and other occurrences interesting and more complex is that it brings to light the possibility of two scenarios:

1. The suffix issue is indicative of the interviewee having interview data that is spatially located on more than one original map mosaic, as indicated by the "B_OMNUM" field (original map number) in the attribute table, and/or,

2. The suffix issue forces the question of what original map mosaic matches to what trail. In the situation below for example, the possibility that trail 2316700 has three uses is entirely correct, but it may also mean that trail 23167001-0 and 23167001-1 share the same three uses, or that 23167001-0 and 23167001-1 have a variation of the three uses. Conversely but not exclusively, it could mean that each trail should be linked only to the use that is located on each individual original map mosaic.

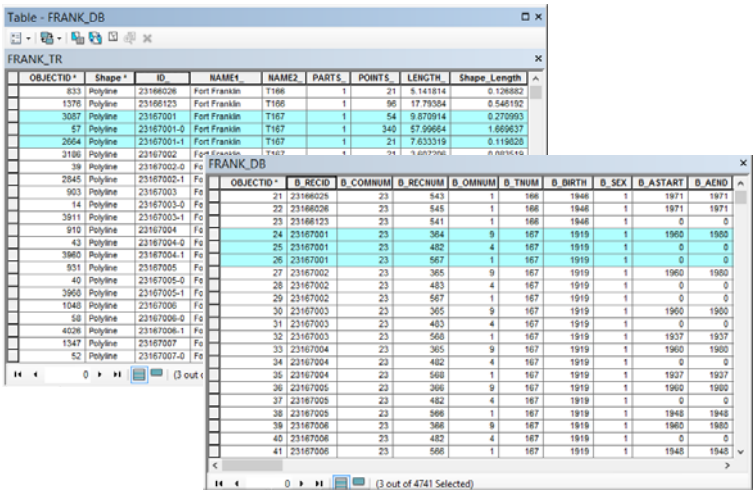


Figure 1: Example of trail feature class suffix issue and potential attribute uses.

Solution:

1. Addition of one new field within the original trail feature class ("DMP_TR_NO") and attribute table ("DMP_DB_NO") that share the same structure to enable linking between the trail feature class and the attribute table. Each new field duplicates the contents of the original linking field, minus the hyphenated suffix. For example, 23167001-0 in the trail feature class' original "ID_" field now becomes 23167001 in the new field "DMP_TR_NO", and becomes linkable to the "DMP_DB_NO" in the attribute table, which contains the value of 23167001.

   In this way, each trail is linked/matched to the *full range of potential uses so as not to exclude any potential use; this* is an *interim measure only*, used until each suffixed trail and its associated records can be determined with absolute certainty. It incorporates the possibility of 1) links based on multiple uses, and, 2) links based on the location of the interviewee's information on an original map mosaic. Further, each record is flagged for verification in a new field "DMP_VERIFY" (see below) in both the trail feature class and attribute table, and a description of its use potential is described in the "DMP_TR_NOTE" and "DMP_DB_NOTE" fields in both the trail feature class and attribute (below).

2. Note that the use of "ID" or "IDENTIFICATION" has intentionally not been used in these fields – instead the use of the term "number" is intended to denote a numeric value for linking purposes only *at this time*. It is hoped that the use of "ID" will be incorporated in future dataset revisions with formally correct cardinality to denote a specific unique identification number, potentially associated with the creation of a unique key/identifier.

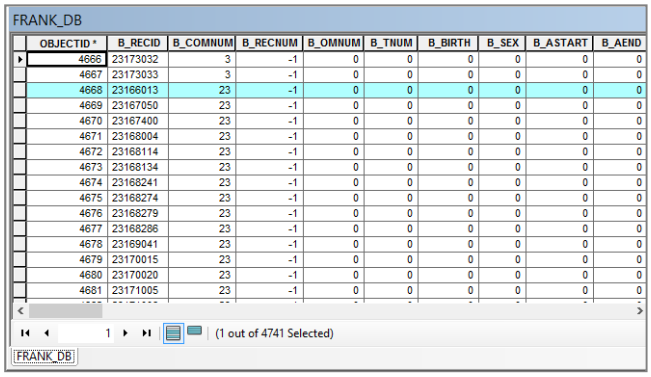
3. Addition of one new field within the original trail feature class ("DMP_TR_NOTE") and attribute table ("DMP_DB_NOTE") that references the suffix issues as they relate to each individual trail feature class record and attribute record. It provides information regarding the number of physically separate trails associated with the record, the number of uses, the number of potential uses, the number of original map mosaics that the information was originally recorded on, as well as various information regarding issues noted in previous sections of this report. In this way the user is able to see at a glance each individual record's information or metadata without having to consult additional documents, and what potential numerous or direct links exist between the trail and its use.

4. Addition of one new field in both the trail feature class and attribute table “DMP_VERIFY” which denotes if the associated record requires verification to ascertain use or location (as well as flag other concerns mentioned above). In this way, the user is able to see at a glance whether any given individual record requires verification, and can be used in conjunction with the respective note field (“DMP_TR_NOTE” or “DMP_DB_NOTE”) for each individual situation and undertake relevant verification procedures.

3.4 Empty Attribute Values

Issue:

A variety of records in each attribute table contain “empty” values or records that do not contain complete use (biographical) information, despite their relationship to existing trail feature class records. In the example below, the attribute table for Fort Franklin shows a series of records with the value of “-1” in the “B_RECUM” field. Although attribute record 23166013 can be linked to the trail feature class record of 23166013, it contains values for Trapper and Community number only and does not contain use information.



FRANK_DB

OBJECTID *	B_RECID	B_COMNUM	B_RECNUM	B_OMNUM	B_TNUM	B_BIRTH	B_SEX	B_ASTART	B_AEND
4666	23173032	3	-1	0	0	0	0	0	0
4667	23173033	3	-1	0	0	0	0	0	0
4668	23166013	23	-1	0	0	0	0	0	0
4669	23167050	23	-1	0	0	0	0	0	0
4670	23167400	23	-1	0	0	0	0	0	0
4671	23168004	23	-1	0	0	0	0	0	0
4672	23168114	23	-1	0	0	0	0	0	0
4673	23168134	23	-1	0	0	0	0	0	0
4674	23168241	23	-1	0	0	0	0	0	0
4675	23168274	23	-1	0	0	0	0	0	0
4676	23168279	23	-1	0	0	0	0	0	0
4677	23168286	23	-1	0	0	0	0	0	0
4678	23169041	23	-1	0	0	0	0	0	0
4679	23170015	23	-1	0	0	0	0	0	0
4680	23170020	23	-1	0	0	0	0	0	0
4681	23171005	23	-1	0	0	0	0	0	0

1 (1 out of 4741 Selected)

FRANK_DB

Figure 2: Example of empty attribute values contained within attribute table.

Solution:

“Empty” values or records that do not contain complete use (biographical) information have been flagged in the “DMP_DB_NOTE” field of the attribute table, and have been designated for verification via the “DMP_VERIFY” field in both the attribute table and trail feature class. Since digitization (tiff) of the original map mosaics is currently in process and therefore cannot be consulted at this time, and further research into accompanying metadata is ongoing, little can be done at this point to populate the “empty” values, other than flagging them for further research and analysis.

3.5 Tabular Errors

1. Gender Designation

Issue:

The occurrence of incorrect gender designation in the attribute table's "B_SEX" field affects a variety of records in each Sahtú community feature class. In all cases below the tabular designation for females has been incorrectly assigned.

Also, a number of records contain a gender designation of "0" in the attribute table's "B_SEX" field affect a small number of individuals for whom gender can likely be determined through name designation. Further, some records contain inconsistent gender designations of "0" or "1" for "unknown" individuals (those who are listed with "unknown" in previous versions of the dataset) in the attribute table's "B_SEX" field.

Solution:

The occurrence of incorrect gender designations in the attribute table's "B_SEX" field has been corrected with all female gender correctly assigned with the value of "2" rather than the original value of "1" that denotes male gender.

Records containing a gender designation of "0" for known individuals (those who are listed with names and not a value of "unknown" in previous versions of the dataset) in the original attribute table's "B_SEX" field have been correctly reassigned to either "1" denoting male, and "2" denoting female genders.

Records containing a gender designation of "0" or "1" for "unknown" individuals (those who are listed with names and a value of "unknown" in previous versions of the dataset) in the original attribute table's "B_SEX" field have not been reassigned and are pending further verification.

2. Community Designation

Issue:

The occurrence of incorrect community designation is evident in the Fort Franklin (community number 23) data set, where two attribute records are incorrectly assigned to the community of Fort Resolution (community number 3).

Solution:

The occurrence of incorrect community designation in the Fort Franklin community attribute table has been corrected; the original value of "3" which denotes Fort Resolution has been changed to "23" in the "B_COMNUM" field. This has been ascertained by cross referencing original product dbase files.

3.6 Attribute Records without Matching Trail Feature Class Records

Issue:

Attribute records containing use information that lack corresponding trail feature class records (trails) occurs occasionally, and is outlined in the table below:

Solution:

The occurrence of attribute records containing use information that lacks corresponding trail feature class records (trails) have been flagged in the "DMP_DB_NOTE" field of the attribute table, and have been designated for verification via the "DMP_VERIFY" field. Since digitization (tiff) of the original map mosaics is currently in process and therefore cannot be consulted at this time, and further research into accompanying metadata is ongoing, little can be done at this point to ascertain the location or existence of the missing trail features, other than flagging them for further research and analysis.

3.7 Hand Drawn Continuous Trails on Original Map Mosiac

Issue:

Particular inconsistencies were discovered when conducting a random comparison of original map mosaics (tiff) with the digital trail feature class version. In one instance, a hand drawn trail on the original map mosaic is rendered as a continuous line, but is depicted in the digital trail feature class and attribute data as two separate trails, with two distinct sets of biographical/use information.

In the Fort Norman example below, one can see that the biographical data for the two records are distinct - they both list different modes of travel, and one lists trapping marten as an activity and the other has no activities listed. Further, they have different record ID's ("B_RECNUM" and "B_RECID" in the attribute table, and "ID_" in the trail feature class), making them distinct entities. Yet when one compares the digital line work to the original interview map, it appears that the hand drawn line is one line – not two.

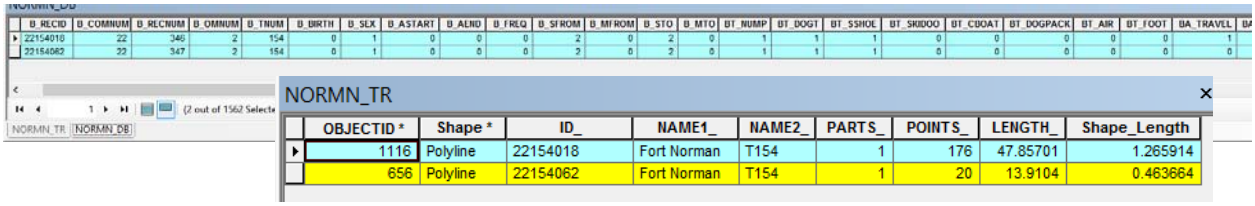


Figure 3: Example of inconsistencies between trail feature class and attribute table.

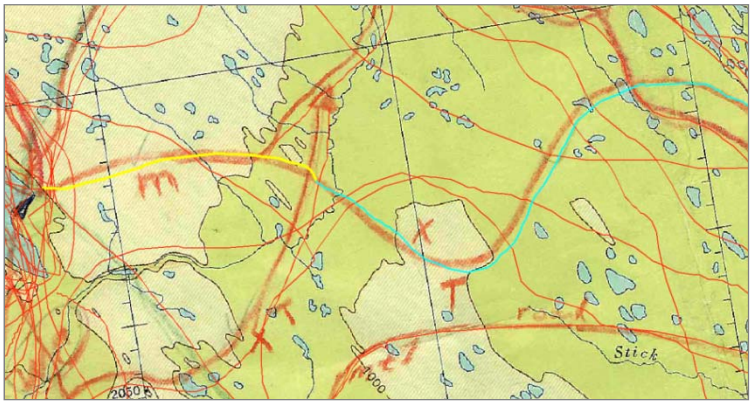


Figure 4: Example of inconsistencies between digital feature class, associated use, and the original map mosaic.

Solution:

There is no immediate fix for the inconsistencies discovered between the hand drawn trail information contained in the original map mosaics with that of the digital trail and biographical data. Since a complete scanned version (tiff) of the original map mosaics is currently in process and therefore cannot be consulted at this time, and further research into accompanying metadata is ongoing, little can be done at this point to ascertain the location or existence of the missing trail features, other than flagging them for further research and analysis.

3.8 Inclusion of Additional Data

Issue:

The current geodatabase dataset (both the trail feature class or the attribute table) does not contain the first or last names of the interviewees. Rather, individuals are assigned a unique code in the "B_TNUM" field of the attribute table.

Solution:

For ease of use and identification, two fields were inserted into each community's attribute table to denote an individual's first and last name: "NAME_LAST" and "NAME_FIRST". Because of potential issues surrounding confidentiality, an additional attribute table was created that does not contain the first or last name, and can easily be linked to the trail feature class.

3.9 Logical Inconsistencies and Irregularities of Spatial Data

Issue:

Throughout the feature classes a number of line segments end in what resembles jagged angles, tangents or hooks (Creighton 2006) (see Error! Reference source not found.). Although these occurrences are most likely due to lines being broken into segments during the original digitizing process, their presence when converted to modern GIS format makes them spatially less precise and misleading, and allows for errors if the dataset is used for spatial statistics or analysis.

Figure 5: Example of line-ends resembling jagged angles or hooks.

In addition, a number of segments are located within close physical proximity to one another, raising the question of whether such segments were originally intended to be individual separate segments or to be a single feature that was possibly separated by map sheet edges and data clipping in the initial or subsequent editing processes.

In the example below (see **Error! Reference source not found.**) it is apparent after closer examination of both the geodatabase table record and the feature class, that these two segments were intended to be one line, as they share the exact same attribute information (geodatabase table record).

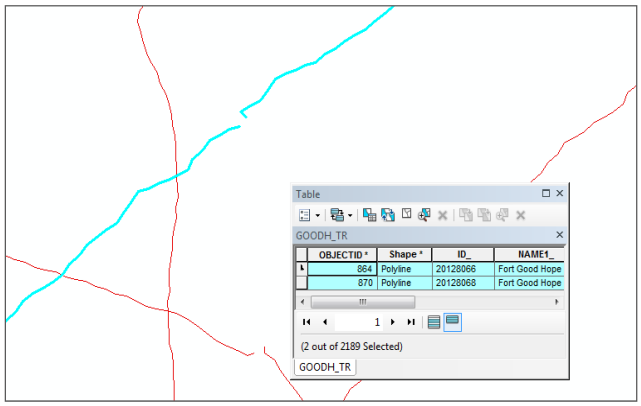


Figure 6: Example of two physically separate segments originally intended to comprise one trail.

Solution:

A comprehensive review of the trail feature class as it exists at present must be conducted to ascertain the number and degree of such occurrences, including a thorough overview and where necessary a series of random sampling techniques, queries, audits and inventories to ascertain their existence and properties. Further, it should be determined through proximity and attribute analysis whether the jagged lines were originally intended as continuous lines (with inherent relationship), or are two distinct spatial entities. Such work will rely on spatial comparison between the original interview map trail

representation and the GIS feature class, and therefor necessitates the use of the scanned original map mosaics when they become available.

3.10 Uncertain Spatial Locations and Attribute Associations

Issue:

In certain instances it is unclear whether individual feature class trails are associated with other feature class trails that exist in physically different locations. For example, there exists in the Fort Norman feature class of the Geodatabase (see **Error! Reference source not found.**) the feature class "ID_" field that contains 2 records with the same root ID. Note that by employing a hyphenated suffix ("-0") the ID_ becomes unique; each record therefore corresponds to the geodatabase record counterpart (table on right in teal). However, two issues deem this situation problematic as 1) the physical location of each segment/trail is unique (geographically different, illustrated in yellow), and 2) the database records contain the exact same attribute information.

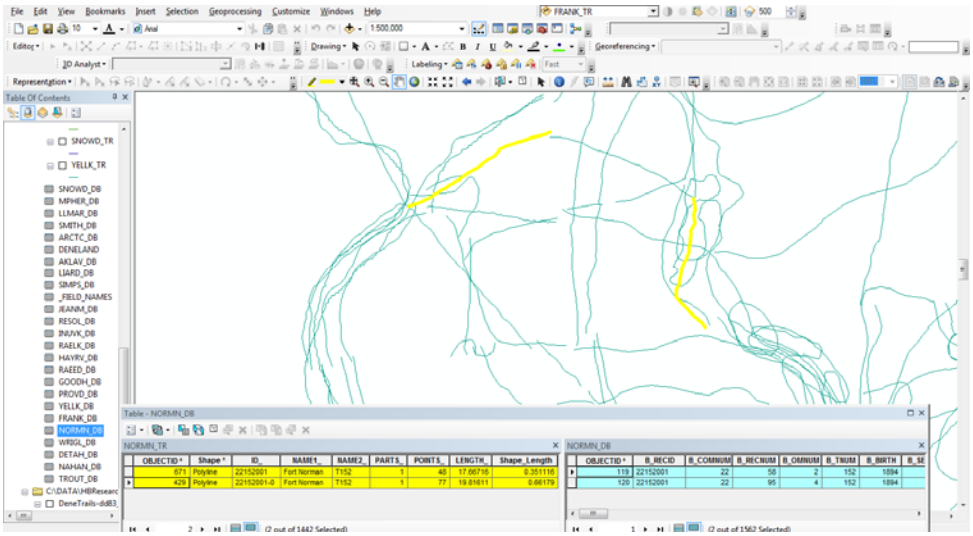


Figure 7: Example of hyphenated suffix and physical location issue.

Solution:

A comprehensive review of the trail feature class as it exists at present must be conducted to ascertain the number and degree of such occurrences, including a thorough overview and where necessary a series of random sampling techniques, queries, audits and inventories to ascertain their existence and properties. Such work will rely on spatial comparison between the original interview map trail representation and the GIS feature class, and therefor necessitates the use of the scanned original map mosaics when they become available.

3.11 2013 – 2014 Project Summary

Proposed methods to address the problematic issues identified during the 2013 -2014 project were created based on *the best available information*. Overall, it was concluded that a variety of quality measures that incorporate issues surrounding data validity, integrity, reliability, and accuracy should be in place to render it methodologically sound before the current version can be used and distributed, including:

1. Consulting the original data (namely the digitally scanned original map mosaics) for problem resolution when geographic location and proximity issues are involved.

2. Application of consistent tabular data review and editing methods/rules throughout so that potential record duplication, coding errors, correct record transfer, and tabular data inconsistencies can be identified and eliminated. When appropriate, rigorous record-by-record examination should take place.

3. Employment of spatial editing rules and analysis to demonstrate sound data validity and methodology. This is particularly relevant to issues of jagged segment ends and segment joining/merging. Manual procedures are recommended rather than adopting potentially over-zealous programming defaults. Digitally scanned versions of original map mosaics should be consulted whenever possible in order to verify geographic placement and biographical data.

4.0 2014 – 2015 Project Objectives: Further Research and Analysis

Current 2014 – 2015 project objectives seek to rectify remaining problematic issues identified in the 2013 – 2014 project scope: determining trail and use relationships, reconciling trail inconsistencies and uncertainties, and identifying any potential issues that may unfortunately remain unresolved is paramount.

Most issues rely on further research and analysis via the aid of tools external to the dataset: consequently the present project aims to include the following parameters:

1. Analysis and comparison of digitally scanned versions of original map mosaics whenever possible in order to verify geographic placement and biographical/use data.

2. Where and when necessary, discussion surrounding issues of an ethnographic nature be conducted to ascertain whether in fact perceived inconsistencies and errors are attributable to technological error.

3. Continued dialogue and consultation with past Dene Mapping Project researchers, staff and administrators be undertaken to address data and knowledge gaps associated with the current Dene Mapping Project dataset, and efforts to recover additional project data, associated

research, publications, and metadata continue. As best as possible, confirmation should be established that no other versions of the dataset exist.

4. Dialogue with current, potential, and future data users and researchers take place in order to ensure their needs are satisfied in any potential data rebuilds or modifications.

5.0 Current Processes

Because most issues relate to the original Dene Mapping Project data, current project processes rely on the availability and use of the original interview maps for verification and issue resolution. At present, digital scanning and reproduction of original interview maps following archival standards are underway. Of the three communities that comprise this project, Fort Norman and Fort Good Hope's digital map reproduction are complete, while that of Fort Franklin is in process. All three will be completed, barring issues, by the end of this fiscal year.

To date, GIS verification and editing of the Fort Norman dataset is complete. Remaining verification and editing of the Fort Good Hope dataset is currently in process, and verification and editing processes of the Fort Franklin dataset will follow once all original interview maps are digitally scanned.

The following technical tasks for each community dataset have been identified and are currently in process:

1. Cataloguing and georeferencing of digital scans,
2. Resolving attribute and tabular inconsistencies/errors/omissions,
3. Resolving uncertain/logical inconsistencies related to spatial representation, and
4. Creation of point geodatabase.

5.1 Cataloguing and Georeferencing of Digital Scans

As each community's original interview maps become available in digital (tiff) format, digital files are given a unique individual alphanumeric accession number that denotes the community to which it belongs and its placement within original hardcopy map context. In addition, each file's original properties, spatial location, and associated digital maps are catalogued and tracked. Once catalogued, the digital file is georeferenced into the GIS so that it can be later incorporated and integrated into the relevant trails dataset and serve as a reference for spatial and attribute verification.

COMMUNITY	Total Map Sets	Large Maps	Small Maps	Total Maps
Fort Good Hope	8	6	99	105
Fort Norman	9	42	0	42
Fort Franklin	10	20	75	95

Table 2: Breakdown of original map mosaics.

Original Dene Mapping Project documentation states, that the majority of interview maps were produced in scales of 1:250,000, 1:500,000 and 1:1,000,000 (Dene Mapping Project 1982) using various topographic maps. The topographic maps were trimmed or folded and taped together to produce mosaics representing large potential use areas, and mosaics were referred to as "original maps" by the Dene Mapping Project.

Original interview maps used as a base dataset for the Fort Norman interviews are of 1:1,000,000 scale International Map of the World (IMW) series, while that of Fort Good Hope and Fort Franklin interviews used NTS maps with varying scales. Here it should be noted that georeferencing for the Fort Norman dataset has proved somewhat problematic given the large scale and currency of the original base maps. Issues of accuracy relating to current real world coordinates, topographic reference, and scale became apparent, and questions arose as to which layer the digital interview maps would be best referenced to in light of differing objectives: either modern GIS topographic data or original trail data represented by the current trail dataset. In the end two georeferenced datasets were created – one referencing the trail feature class in order to fulfill current attribute and trail analysis (ultimately aiding in determining trail and attribute relationship objectives), and one referencing contemporary NTS placement in order to enable accurate point digitization within the GIS.

5.2 Resolving Attribute and Tabular Inconsistencies

Where available, digital map mosaics have been used to compare the original trail data captured on original interview maps with that of the trail feature class and its attributes, since in some instances supplementary information (symbols, colours, and notes) can be found in the original interview maps, and shed light on a given trail's use. Accordingly, a comprehensive review of records flagged in the project's previous year's work is being systematically conducted to correct/resolve suffix and hyphenated fields, "empty" attribute records, tabular errors or data entry anomalies, and attribute records that appear to lack a corresponding trail. Additional fields have been added where appropriate in order to aid editing reference.

5.3 Resolving Spatial Data Representation

A comprehensive review of the trail feature class is currently underway to ascertain the number and degree of jagged lines, tangents, and hooks present by directly comparing the original data captured on the interview maps (via the scanned original map mosaics) with the trail feature class. Similarly, review of the occurrence and location of segmented lines located within close physical proximity to one another is being conducted on those datasets for which scanned versions of the original map mosaics are available, in order to determine whether such segments were originally intended to be either individual segments, or are single features that were possibly separated by map sheet edges and data clipping in the initial or subsequent editing processes.

5.4 Creation of Point Geodatabase

A geodatabase has been created to house the point dataset that will be created by digitizing the points located on the georeferenced original interview map mosaics, as the scanned map mosaics become available. The geodatabase is intended to dovetail with the existing trail (line) feature class, as well as populate and track each point's associated community, trapper or individual, the original use, the original interview map number, and newly designated georeferenced map scan. Once again, this work is contingent on the completion of digitally scanned map mosaic production, and will follow standard metadata documentation procedures.

6.0 Community Engagement

Over a two week period spanning the end of October and beginning of November 2014, a community engagement process was initiated within the Sahtú region with the intent to introduce and apprise individual community organizations and their TK Researchers of the projects status and process, and to obtain feedback and guidance from them regarding product outcomes, as well as other SRRB mapping initiatives.

Prior to the in person engagement, introductory letters, emails, and phone calls were made to each of the Sahtú Ɂehdzo Got'ı̨nę (Renewable Resources Council - RRC) in Colville Lake, Fort Good Hope, Norman Wells, Tulít'a, and Délı̨nę, as well as their various TK Researchers, inviting and requesting their collaboration in the project process. Various meetings at each RRC were scheduled with SRRB representatives travelling to and using each community as a home base for the meetings. SRRB representatives spent on average two days in each participating community. While there, further arrangements and meetings were conducted, comprising of general dialogue within group environments, and a more structured format during individual settings. Both settings employed live GIS demonstrations of the project dataset in order to demonstrate the project's technical components and work thus far. In instances where key participants were not able to meet in person, discussions took place over the telephone.

In addition, SRRB representatives met with other individuals within the communities who represent various Sahtú community organizations (Sahtú Land and Water Board, Sahtú Land Use Planning Board, various community Land Corporations, etc.) who frequently make use of traditional knowledge as part of their overall mandate. These discussions were deemed advantageous in terms of building informal partnerships, obtaining support, and fostering a spirit of cooperation.

The engagement process to this point is viewed as preliminary and ongoing: community engagement will continue throughout the project's duration. Further, there is recognition that practices of engagement may vary over time based on individual or group roles and perspectives. Accordingly, the projects' engagement process will be re-evaluated as it moves forward, and it is hoped that continued

collaboration with community and organizational representatives will supplement and build on current initiatives.

7.0 Next Steps

The following steps will be undertaken once the remaining scanned original map mosaics are available:

1. Continuation of scanned original map mosaic cataloguing and georeferencing,
2. Resolving attribute data and tabular errors, inconsistencies, and omissions,
3. Resolving spatial data representation (trail dataset) inconsistences, and
4. Accompanying point datasets will be digitized and added to the dataset, thereby, not only increasing the present project's scope and depth, but also providing the contextual information necessary to present an accurate and thorough representation of the current dataset and Sahtú land use.

Engagement with community representatives, researchers, organizations, and potential users will continue via in person meetings and information sessions in January and again in March, alongside the above technical tasks.

8.0 Conclusion

The project processes described in this report are on track to meet the goals and objectives as described in the original project proposal.

GIS verification and editing processes will continue as scanned interview maps become available for comparison and reference, since incorporation and integration of the original interview maps are a vital component in reconciling and solving many of the mysteries inherent in the original data. A contemporary dataset that fulfills modern GIS and research standards will be created.

Further community engagement is planned and is viewed as playing a critical role in achieving overall project success and ensuring the continuation of a meaningful dataset for the Sahtú communities – one that will support decision-making processes at all levels, and promote effective baseline research.

9.0 References

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Heidi Brown is a GIS Researcher with over 20 years experience providing support on projects of all size and scope including land claims, referrals, assertion strategies, project management, litigation, treaty, and land use planning. She brings a broad range of spatial and documentary data management and GIS experience from a variety of community based initiatives such as Traditional Use Studies, Aboriginal Interest and Use Studies, oral history, place name, archaeological, ethnographic, and heritage management, and is particularly keen on synthesizing various lines of cultural data into a comprehensive representation of land use and occupancy. She has a special interest in training and mentoring youth. Heidi's formal education includes a BA in history, graduate work in Library Science, and a technical diploma in Geographic Information Systems (GIS).