



GIS Workshop Data Collection Techniques

NOFNEC Conference 2016

Presented by:

Matawa First Nations Management

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Collector for ArcGIS

- For Androids – please use Google Play to download
- For IOS / iPhone users please use the app store for download

Username: Matawa_Guest

Password: Matawa12345





Matawa First Nations

- Nine Ojibwa and Cree First Nation communities in Northern Ontario
- Four road-access communities
- Five remote communities
 - Accessible by air or winter road
- Population: ~8,000 people





Geomatics Program

- Comprehensive programming to build capacity
 - Provides hardware, software and training
 - The goal is to assist communities in mapping their traditional lands and support various community projects related to the land and water.
 - Customized training programs to suit individual community needs
 - Services Provided include, but not limited to;
 - Values collection mapping
 - Land use planning
 - GIS and GPS training
 - Customized map requests
 - Aerial Imagery collection
 - Data backup and storage
 - Printing, scanning and digitizing
 - Project management and coordination



Agenda

- What is GIS?
- What is data/spatial data?
- How do we collect data?
- Data Collection Techniques
 - Handheld GPS units
 - ArcGIS Collector App (Mobile device/smartphones)
 - UAV Technology (Drone)



What is GIS?

- GIS stands for Geographic Information System
 - It is a system that integrates hardware, software and data with the purpose of capturing, managing, analyzing and displaying all forms of geographically referenced information.
 - All geographic information systems are computer representations of some aspect of the real world.
- G** -geographically or spatially referenced
I -the data and information you put into the system
S -the hardware and software used within the system

What is GPS?

- A Global Positioning System (GPS) uses a system of orbiting satellites for navigational purposes
- A GPS unit is capable of giving highly accurate geographic co-ordinates using hand held receivers
- There are a variety of different types of GPS units that range in cost. Usually the more expensive and technical units will provide the user with a higher level of accuracy, but the more basic units are usually accurate to within 5m.



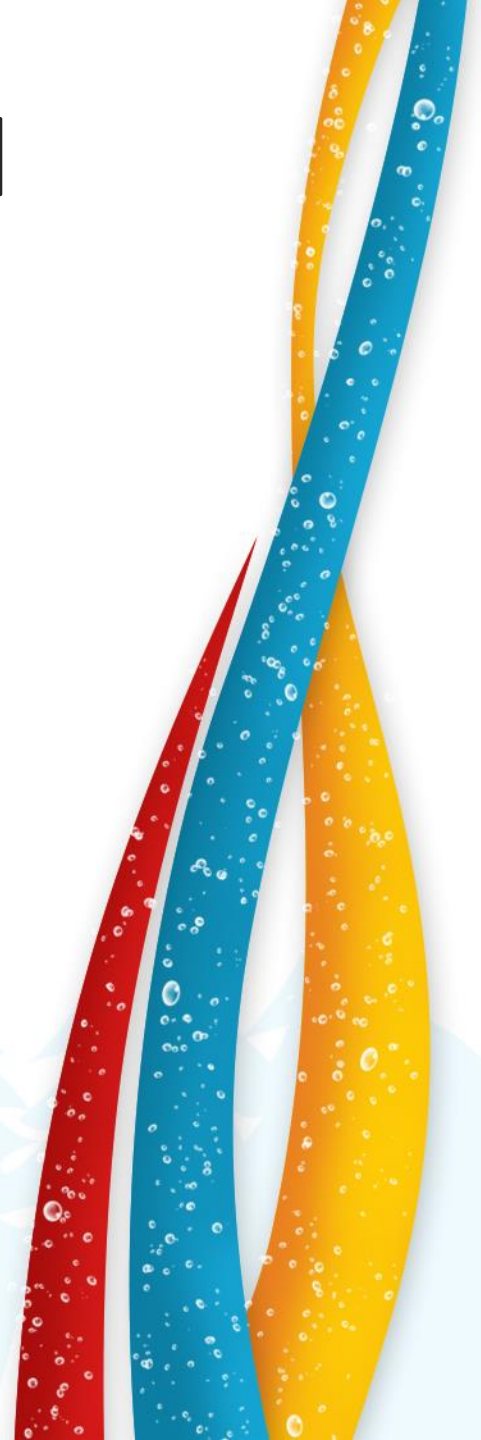


Values and Benefits

- GIS is particularly valuable when you need to answer questions about :
 - Location
 - Patterns
 - Trends
 - Conditions
 - Implications

Some of the benefits include;

1. Cost savings and increased efficiency.
2. Better decision making.
3. Improved communication.
4. Better recordkeeping.





Using GIS in First Nation Communities

- Often, a GIS program or database is developed through a Traditional Land Use Study, which usually collects information on; hunting, trapping, gathering, ecological knowledge, habitation, spiritual and sensitive locations, legends, travel routes aboriginal place names etc.
- The environmental department within a community might use the information in a GIS for;
 - Land Management and Planning
 - Measuring impacts from, and monitoring industrial and resource development
- For Example, is there was a new highway proposed to run through your community's traditional territory, you might want to see a map that shows;
 - The route of the proposed highways
 - The traditional values in that area

Depicting these together on one map allows you to consider whether the new highway would impact any important spiritual sites, gravesite, animal or plant populations, etc.



Data and Information

- **Data** are observations we make from monitoring the real world. Data is collected as fact or evidence that may be processed to give them meaning and turn them into **information**
- Information is data with meaning and context added.



Types of Data

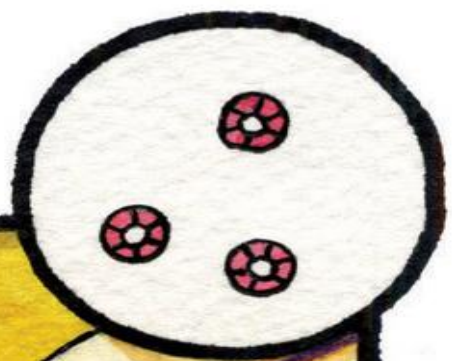
- Spatial Data
- Spatial Entities
- Vector and Raster Data
- Features and Attributes



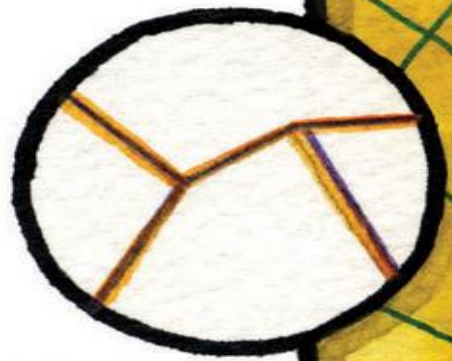
Spatial Data and Entities

- Spatial Data is information that is tied to a specific location on the earth's surface and it must have some form of spatial or geographic reference that enables it to be located (Ex, latitude and Longitude).
- Traditionally, maps have used symbols to represent real-world features.
- There are three basic symbol types or entities used on a map;
 - Points
 - Lines
 - Polygons (area)
- Each basic entity is a 2-dimensional model used to represent a feature in the real world.

POINTS



LINES

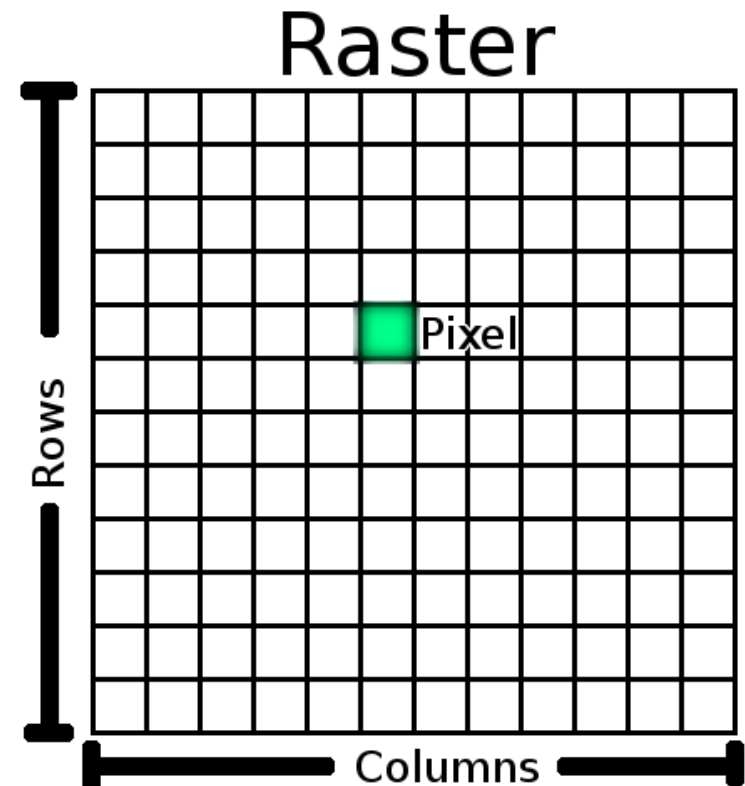


POLYGONS



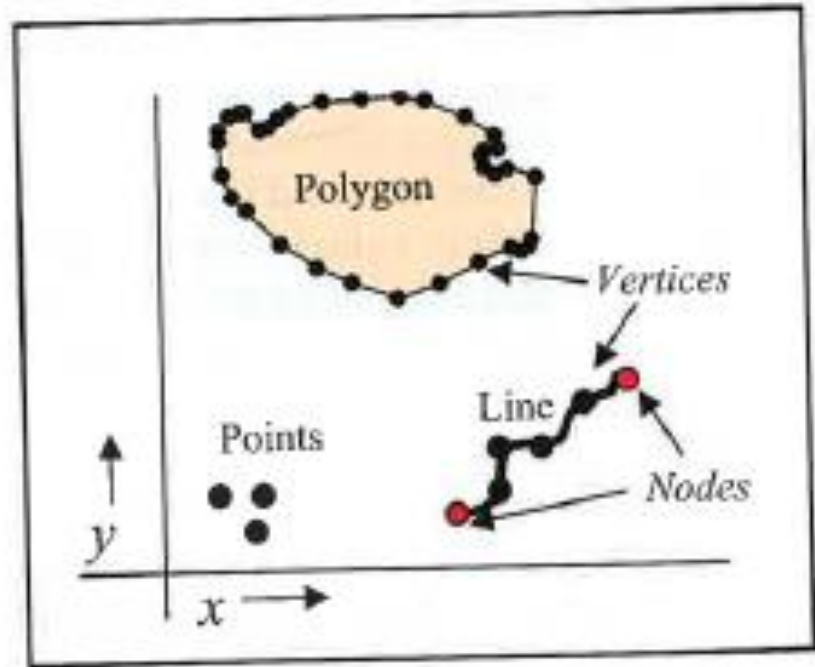
Raster Data

- A spatial data model that uses a grid of cells (or pixels) to represent the spatial variation of a feature.
- System of rectangular cells in which individual cells are used as building blocks to create images of point, line, and polygon entities
- Each pixel contains a numeric code indicating an attribute and the raster is stored as an array of numbers.
- The dimensions of each pixel define the resolution of the raster data. The higher the resolution, the more precisely the data can be represented.



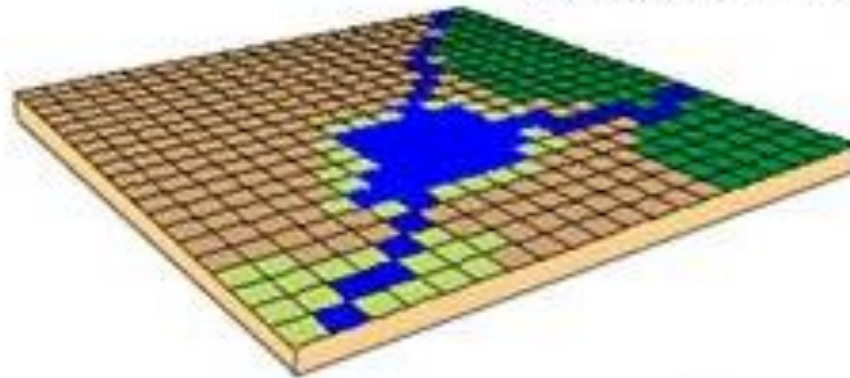
Vector Data

- A spatial data storage method in which features are represented by one or more pairs of x-y coordinates values forming points, lines and polygons

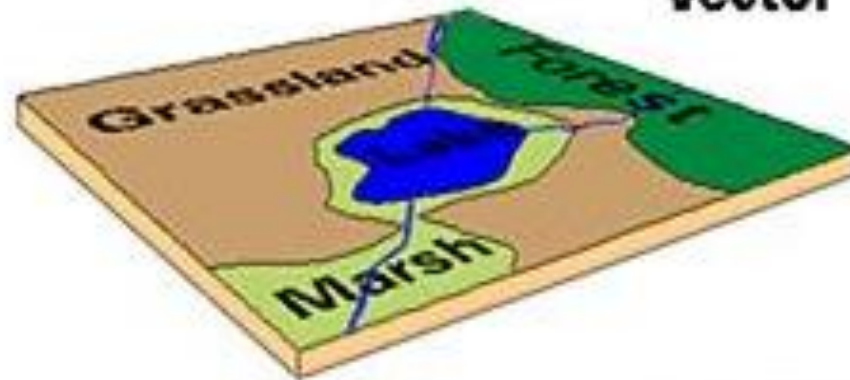


48.3809° N, 89.2477° W

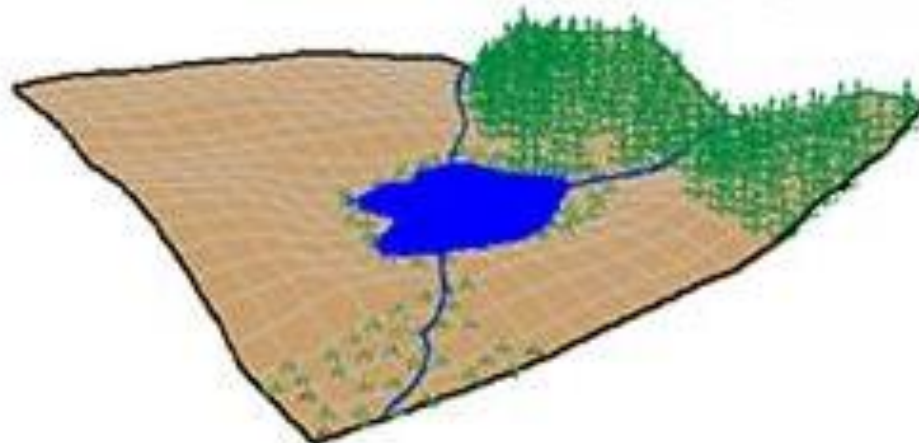
Raster / Image



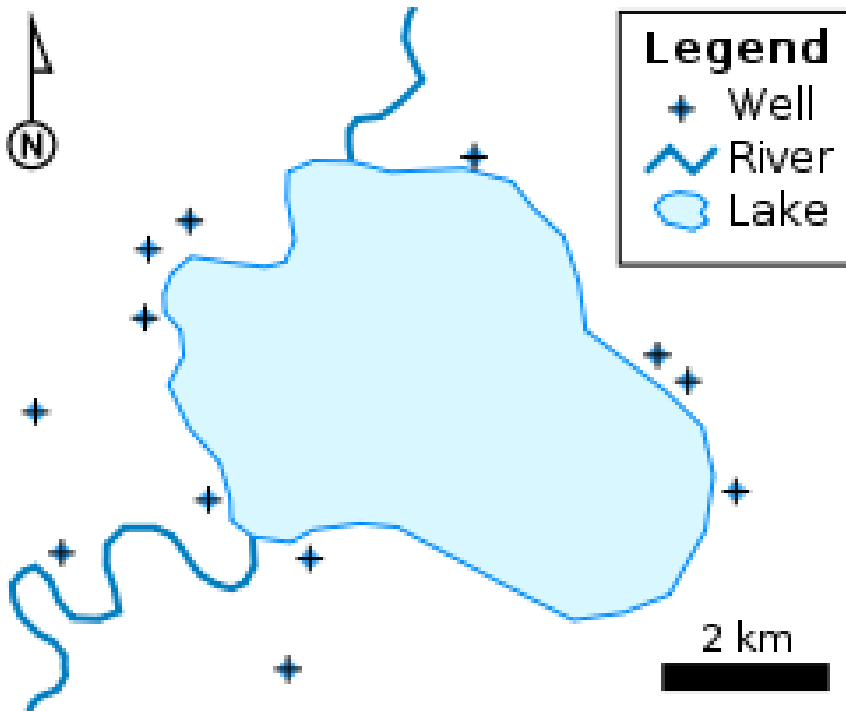
Vector



Real World



Features



- A spatial object composed of one or more x-y coordinate pairs and having one or more attributes in a single record of an associated table
- Discrete geographical features (points, lines and polygons) represented in a digital data structure.
- In a GIS these are most commonly displayed in what is called a shapefile or a geodatabase
 - Ex. The Rivers and lakes displayed on a map.

Attributes

- descriptors relating to geographical features or entities in a GIS.
- The attribute data describes the nature of the real world feature a point, line or Polygon is representing on the map.
- Ex, the name and size or length of the lakes and rivers displayed on the map.

Attributes of Countries

FID	Shape	NAME	TOT_POP89	TOT_POP80	GRW_RATE8	GRW
0	Polygon	Luxembourg	378500	364899	0.93	
1	Polygon	Switzerland	6541000	6385000	-0.49	
2	Polygon	Korea, Republic of	42380000	38124000	0.96	
3	Polygon	Cyprus	694000	629000	1.01	
4	Polygon	Libya	4395000	3043000	3.47	
5	Polygon	Nepal	18431010	14640000	2.5	
6	Polygon	Bhutan	1403000	1165000	2.16	
7	Polygon	Western Sahara	-9999	-9999	-99.99	
8	Polygon	Mauritania	1954000	1551000	2.49	
9	Polygon	Qatar	431000	272000	4.75	
10	Polygon	United Arab Emirates	1544000	1015000	3.16	
11	Polygon	Taiwan	-9999	-9999	-99.99	
12	Polygon	Mali	8212001	6590000	2.83	
13	Polygon	Oman	1486000	984000	4.47	
14	Polygon	Niger	7179001	5515000	3.03	

Record: 14 Show: All Selected Records (0 out of 161 Selected.) Options



How to Collect Good Data

- Being prepared with all important field equipment (Clipboard, notebook, spare batteries, pen, topographic map, camera).
- Take good notes. Make notes of your surroundings, the weather, the time of day, the date and any other important information regarding the data you are collecting. Take pictures if possible.
- Knowing the type of data you are going to collect ahead of time and preparing a table or a standard form to fill out for data collection
 - This ensures all the necessary information is actually collected.
- Planning your route for data collection.
 - Look at a map to understand where you will be going and the terrain you will be covering to plan the most efficient route.



Data Management

- GIS must be carefully managed to provide useful information
- Standard methods for entering, updating, and retrieving data.
- It is important that data is managed and organized properly to ensure; data integrity, lack of errors, no loss of data (back up schedule).
 - Having a plan for a new data set or a standard way of creating and managing data prior to developing new databases or starting new projects.



Evolution of Data Collection

- People have been making maps for majority of history
- Technology is constantly changing to accommodate faster and more accurate ways of collecting, storing and displaying data on maps.
 - Handheld GPS units
 - Mobile applications
 - UAV technology



Handheld GPS Units

- Garmin handheld GPS units are the most common, affordable and user friendly devices for data collection.
 - This type of unit has dominated the field for basic data collection
 - Provides a simple and user friendly platform to collect point and line data.
 - Garmin units are good for many types of projects, but particular good for more general data collection. Ex, mapping a new road and collecting points of interest along the way.
- Trimble Handheld unit are more complex in function and provide higher level of detail for data collection
 - This unit is essentially a small portable computer operating a ArcGIS platform called ArcPad.
 - ArcPad is a simplified version of ArcMap that allows you to create custom forms for data collection, take pictures and assign those pictures to specific features and collection point line and polygon data.
 - Trimbles are great for collecting data for all types of projects, but are particularly good for projects that have many types of features and lots of information that needs to be collection for those features. Ex, community Infrastructure project.



ArcGIS Online

- A collaborative web based GIS that lets you use, create and share maps
- You get access to ready to use maps and apps
- Access to a secure cloud based system through ESRI
- Becoming an integral part of the ArcGIS system – extend capabilities throughout all programs within the system.
- To use ArcGIS Online you need to have an account, this comes with the purchase of the desktop software and license.



Mobile Applications

- many apps have been developed to collect data in a faster and more efficient way basically replacing the paper and clipboard method.
- Collector for ArcGIS
 - Works on android and IOS (iphone, ipad).
 - Free to download, but to view maps and collect data, you need to have access to an ESRI ArcGIS online account to use the app.
 - Offline data collection is possible on cellular enabled devices.

Collector for ArcGIS

- For Androids – please use Google Play to download
- For IOS / iPhone users please use the app store for download

Username: Matawa_Guest

Password: Matawa12345



Demonstration

ArcGIS Collector App





UAV Technology

- UAV stands for unmanned aerial vehicle
- Technical term for a drone.
- A small aircraft with no pilot aboard
- Operates either via remote control by a human operator or completely by itself by onboard computers
- Originated mostly in military applications, but is now expanding into many other areas; agriculture, surveillance, commercial, scientific, personal use etc.
- Rapidly changing technology
- Becoming increasingly simpler to use.

Demonstration

UAV Technology





Thank you all joining us today. Please don't hesitate to contact Charlene or myself with any questions you may have.

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