



Four Rivers

MATAWA ENVIRONMENTAL SERVICES GROUP

Introduction to GIS

Saving our knowledge for a better
tomorrow





Topics to be covered

- What is GIS?
- What options are out there for GIS?
- Esri
- How does this benefit our communities?

What is GIS?

- Geographical Information Systems
- GIS is a “computer assisted process designed to; acquire, store, analyze and display spatial data (Dent, 1999)
- Spatial data is the data or information that identifies the geographic location of features and boundaries on Earth, such as natural or constructed features, oceans and more. Spatial data is information that can be mapped for visual reference.



Why use Spatial data collection?

- The need to preserve our traditional knowledge
- Protection of our lands
- Planning for our future generations





Equipment

From paper maps to Trimble and back





What equipment should we use?

- Over the years technology has gotten better and better, making the choice in what to use harder than ever before.
- Things to consider when choosing the right equipment are: cost, accuracy, reliability, ease of use, available support.
- The two most commonly used GPS collection units are Garmin and Trimble. Both have their pros and cons.

Garmin Units

- Relatively inexpensive
- Easy to use
- Rugged and sturdy
- Limited accuracy
- Limited in data collection capabilities
- Uses AA batteries



Trimble Juno Units

- Highly accurate
- Designed for substantial data collection
- More memory storage
- Designed for use in ArcGIS
- Needs more training to use
- Requires power for charging



Other Tools

- Other tools to be familiar with when collecting spatial data are:
- Paper maps. Knowing how to properly navigate using this
- Compass. Knowing how a compass properly works in conjunction with a paper map
- Remember; batteries die, technology can fail, so knowing how to properly use a map and compass is essential for field work





How a GPS works



GPS

1. Determines where you are
 - Provided as a Latitude/Longitude or UTM coordinate system
 - Provides position in X,Y and Z
2. Provides instruction on how to get to a point
 - Typically uses compass azimuth and distance
 - Some GPS packages use left and right turn directions
3. Collects waypoints or tracks where you have been
 - This can be done automatically or manually
 - Some units can collect lines and polygons, as well as attach georeferencing to pictures.



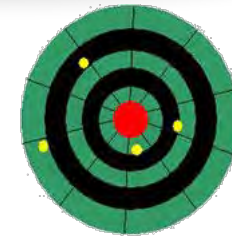
How you see where you are on Earth

- A GPS uses a system based on 24 satellites developed by NAVSTAR
- Emit a radio frequency picked up by GPS unit
- Measures the time it takes for the satellite signal to get to the receiver
- Requires at least 3 satellites to get an X,Y position
- You need 4 satellites to get an exact position of X, Y, and Z



Precision and accuracy

- Precision and accuracy are two major considerations when purchasing a GPS unit
- Precision refers to the quality of the operation of the unit
(how close are my results to each other)
- Accuracy refers to the quality of the result
(how close are my results to the true position)



#1. Neither accurate, nor precise



#2. Precise, but not accurate



#3. Accurate, but not precise



#4. Precise and accurate

Projections

- What is a projection?
 - A projection is “a systematic reconstruction of parallels and meridians on a plane surface”
(Dent, 1999)
- Why are they important?
 - Without projections, nothing works. Knowing this early will help avoid problems later. They tell the GPS unit how to collect the data so it can be properly used later.

The Projection Model

- The first part of the projection model is the Datum
- This defines the shape of the earth for a specific area
- Examples of this are: NAD1927, NAD1983, WGS84
- For our purposes we will use NAD1983
- NAD stands for North American Datum

Projections cont.

- The second part to the model is the Geographic Coordinate System (GCS)
- Defined latitude and longitude lines wrapping around the datum
- Latitude/Longitude lines define a 3D referencing system
- Also known as parallels and meridians
- Essential for describing the location of any feature on earth.



Projections cont.

- The third part is the Projection itself
- It is a mathematical model using geometric shape to transfer curved surface onto flat plane
- Any projection can maintain one or two out of four properties well:
 - Area (Equal area or Equivalent)
 - Shape
 - Distance
 - Direction
- Any projection used will distort one or more of these properties, the best one to use for our area is the UTM zones.



UTM

Universal Transverse Mercator



UTM

- There are 60 UTM zones in the world and each zones has very little overlap between them
- Coordinates are measured in meters based on distance from the equator and the false easting
- It uses 6° zones up to 800 km wide to reduce as much distortion as possible
- For the purpose of what we are doing, we will be collecting all data in NAD1983 UTM Zone 16N



Any questions?

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