Geoinformatics at the Barrow High School
Exercise: Mapping using handheld GPS

Objectives: The objectives of this exercise are to:
1. familiarize with the Garmin MAP76CS GPS
2. collect waypoints for a local feature (eg. boundaries, trails etc.) near the school
3. download waypoints data and generate a GIS shapefile

Background information:
You probably have used GPS receivers to navigate along a trail, locate your favorite fishing or hunting spots, to keep from getting lost, or to find your way back after being lost. In this lab you will use a handheld GPS to make a map of features around the Barrow High School. Depending on the time available, we will collect the data necessary to make a map of the graveyard next to the school and map some walking trails near the school.

Waypoints are locations or landmarks worth recording and storing in your GPS. These are locations you may later want to return to or may want to show on your map. The procedure to collect waypoints that describe the outline of a feature is given below. As we walk around the trails outside we will stop about every 50 meters and mark a waypoint. 50meters is about 30 paces. Count your paces as you are walking and be sure to collect a waypoint at about the 30th pace. You can add waypoints if you come to a location that is really cool – like Mr. Buckley's truck, or a sharp corner of the trail add an additional waypoint. But if you do so, remember to make a note of that waypoint number.

The last page of this exercise is a photograph taken from an airplane looking down at Barrow in August 1997. You can follow the progress around the trail on this photo or look on the map page of the Garmin MAP76CS.

Collecting the data will take the entire class period. When we get inside we will download the data from the handheld receiver and into the GIS computers. In a later lab, you will learn how to locate the trails on the airphoto and make a paper map of the trails you traverse. Using this method you could make maps of any features. Infact, this is how many of the maps you use are made.

Data and tools:
Garmin MAP76CS GPS unit
Garmin USB cable
Minnesota DNR freeware

Schedule: This entire exercise will take about 45 minutes. We will have a short 10 to 15 minute introduction inside the warm classroom to get familiar with the GPS. Then we will break into small groups for the field work which will take about 25 minutes. The download process will take about 5 to 10 minutes in the classroom.

Procedure:
Step 1. Switch on the Garmin GPS receiver. Make sure your instructor has an extra set of batteries (just in case).

Step 2. Wait until the GPS receiver wakes up and switches to Satellite Page – the screen will look like:

Your location will be recorded in UTM coordinates. UTM's are easier to visualize than Latitude and Longitude because the units for UTM's are meters. In the screen to the left the Easting is 579825 meters, and the Northing is 7911200 meters. Fun Fact: Northing is the number of meters we are north of the Equator (that is about 79,112 football fields north of the equator).

Step 3. To take a measurement at a point, move to the first point along the trail. Stop walking and press the "Enter button" for a few seconds until the GPS receiver switches to the waypoints page. Press "Enter" to confirm the measurement.
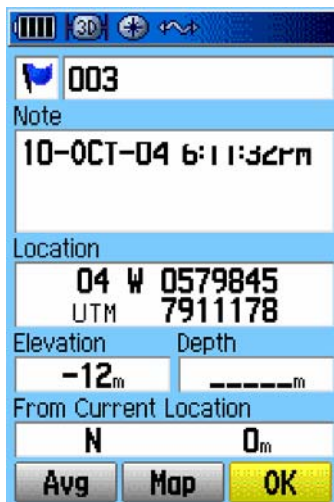
The GPS actually records a lot more info than just the location such as the time and date of the measurement.

<u>Step 4.</u> Repeat steps 2 and 3 until you have collected all the measurements for this exercise. Take about 30 paces between each point. If you enter a "bad" waypoint – let your instructor know and he/she will remove any bad points.

<u>Step 5.</u> Back in the classroom you need to transfer your GPS waypoints to the computer. For this, you need to connect the GPS receiver to the computer using the USB cable and to start the MN DNR Garmin software.

Step 6. After the software initializes and finds the USB connection, choose Waypoints … Download from the menubar.
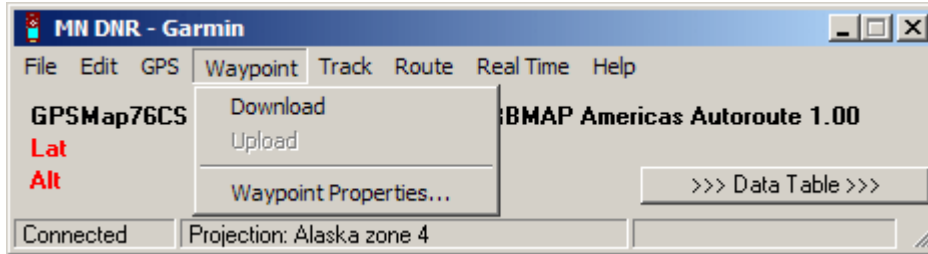
After you downloaded the GPS measurements your screen should look something like this. Your instructor will check that the UTM coordinate system is correctly set for the Barrow area (UTM Zone 04N – NOT Alaska Zone 4).
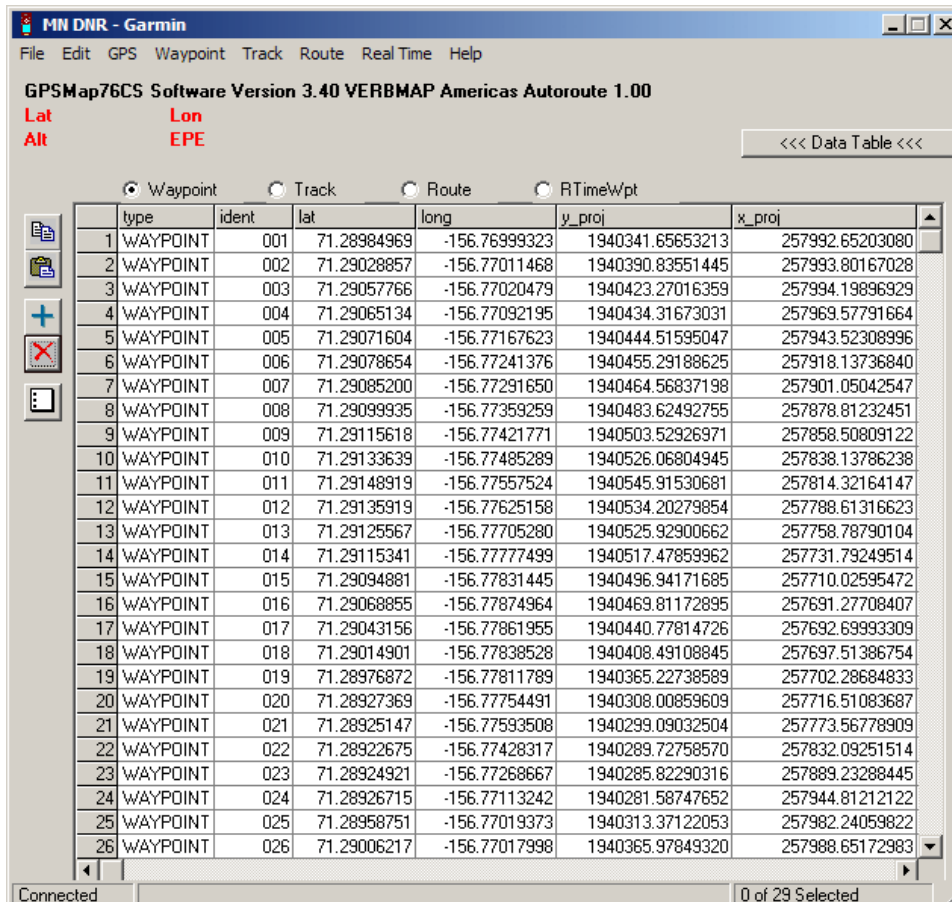
Step 7. Save your GPS measurements to the location written on the whiteboard in the GIS lab. Select File … Save To … File…shapefile from the MN DNR menubar.
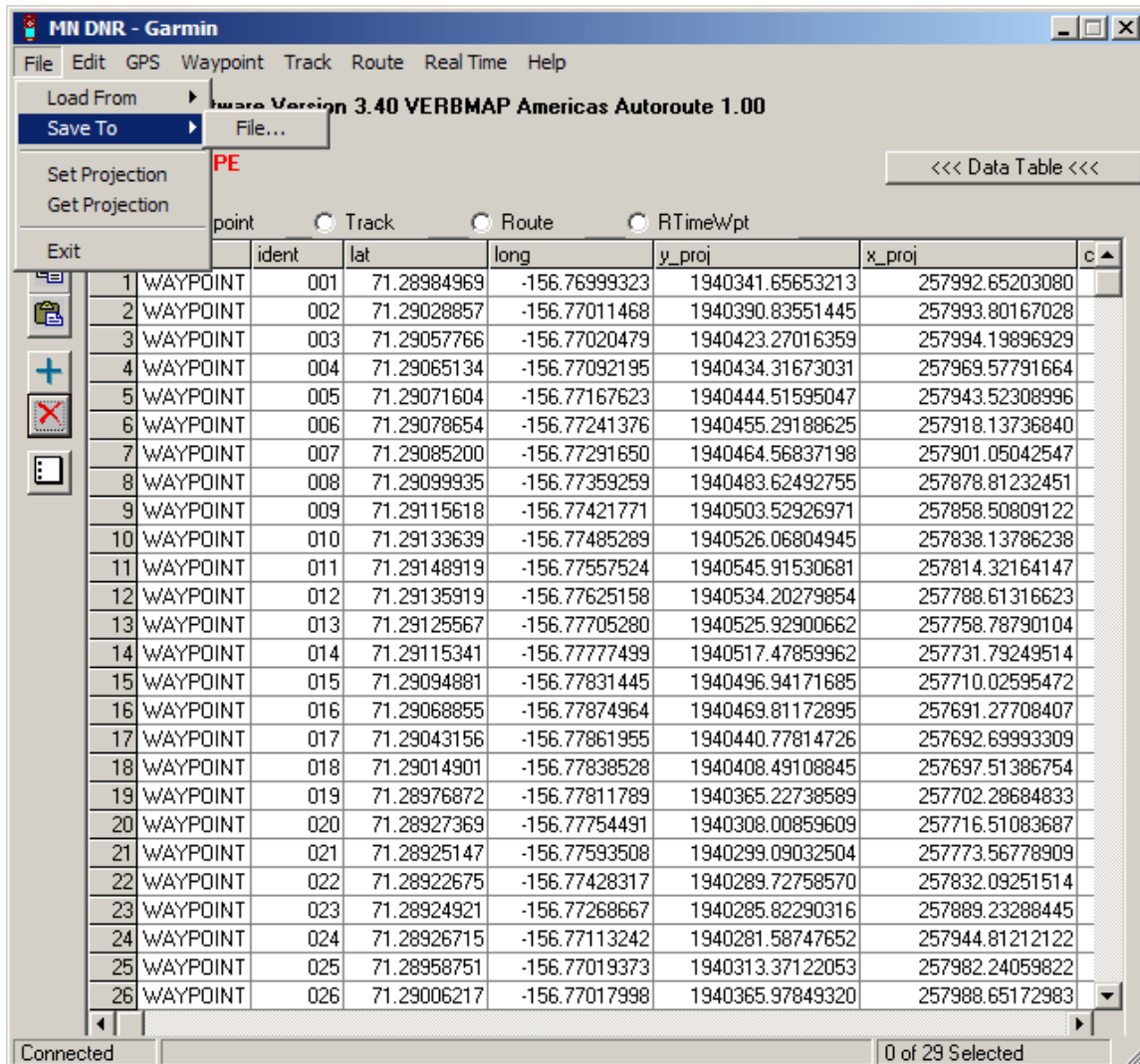
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