Activity C1 Creating New GPS Waypoints

Introduction:
In the activities so far, your students have created waypoints by directly marking the position with a GPS receiver that was in active contact with the satellites. There are other ways to load new waypoints into a receiver however. Now your students will explore how to create new waypoints by entering coordinate numbers, by projecting at a desired direction and distance from a position, and by electronically transferring waypoints into their receivers. These techniques can be very useful in a variety of GPS endeavors.

Time Involved: 2 ½ hours – easily split into 50 minute segments

Materials Needed:
- GPS receivers (exercises A and B)
- GPS receivers, computer, connector cable, digital mapping programs (exercise C)
- World atlas, globe, and/or wall map

Getting Started:

Review this entire activity. If you have the computer access necessary for your learners to complete Exercise C, you will need to investigate the digital mapping / waypoint management programs listed under Resources. Choose one or more programs that suit your situation and load the program(s) in your learners' computers. Become familiar with the features and operations of the selected program(s).

Also see *"Preparing GPS Receivers for Group Activities"*

Do the Activity:

Exercise A. Entering Coordinates to Create a New Waypoint

Most GPS receiver models allow you to create a waypoint by entering new coordinates and a new name. Connection to the satellites is not necessary, so this can be done indoors. The process is usually fairly simple. "Mark" a waypoint as you would normally do outside, but before hitting the "OK" button, highlight the coordinate field and change the numbers and letters to those of the new waypoint. OK the changes, then highlight and change the name too. Some models also allow you to enter a new elevation and other data. OK all of your changes and you will then have a new waypoint.

To practice this exercise, here are three coordinates to enter. These locations all have something in common, as your learners will see. Have your learners do a *GoTo* to see what the direction and distance is to each waypoint. Then use the coordinates to try to find the locations in a world atlas. Identifying the countries should be easy; the specific towns may be more difficult. See the answer key below if necessary.

COORDINATES TO ENTER	DISTANCE	DIRECTION	TOWN & COUNTRY
N53° 54.996' W008° 01.994'			

Exercise B. Projecting a Waypoint

Many GPS receiver models allow you to *project* a waypoint. This is the process of creating a new waypoint by entering a specific direction and a distance from an existing waypoint. This technique is often used when there is a need to follow a straight line, with designated stops along the way. A forester's cruise line is a good example. The process is fairly simple. Mark or select a beginning waypoint. Pull up that waypoint's page and select the *Project Waypoint* option. Enter the desired distance and direction, edit the name (and elevation if you have that option), then OK your work. You now have a new projected waypoint in your GPS receiver.

For some inexpensive GPS models, the shortest projected distance that you can enter is 0.1 miles (statute) or 0.1 km (metric). This equals 528 feet and 100 meters respectively, which may be too far for some uses. However for most GPS models, the shortest projected distance that you can enter is 0.01 miles (52.8') or 0.01 km (10 m). This equals 528 feet and 100 meters respectively, both of which can be very useful.

Practice activity # 1. To practice this technique, have your learners mark a beginning waypoint, then *project* waypoints at distances of 0.1, 0.2, 0.3 miles, all at the direction of 90°. If done properly, on their GPS screen they should see four waypoints in a straight line, all at equal distances apart.

Practice activity # 2. To make a perfect square on the GPS screen, have your learners mark a beginning waypoint, then *project* a waypoint at 0.1 miles and 90°. From that new waypoint, *project* another waypoint at 0.1 miles and 180°. Repeat twice more using 270° and 0° to produce the square.

Exercise C. Transferring Waypoints

The quick and easy way to enter new waypoints into GPS units is to electronically transfer the coordinates from a computer into the receivers. The transfer works both ways, so you may just as often want to move data from your receiver to the computer. To do this, you need a PC-GPS connector cable, a computer with a waypoint management/ digital mapping program installed. The correct connector cable is often supplied "in the box" as part of the purchase package for many GPS models. If not, they can be purchased separately, but sure you get the correct cable for your particular GPS receiver. Some receivers now come with a waypoint management and/or digital mapping program in the box. A couple of very useful freeware programs are available too (see the Resources list below).

Your GPS receiver's manufacturer most likely offers a variety of cartography options (for purchase) designed for your particular model. These programs not only store and manipulate data (points, tracks, and routes), but they also provide maps for loading into

suitable GPS receivers. Note that these programs are proprietary - Garmin mapping programs are designed to work with Garmin receivers and Magellan mapping programs are designed to work with Magellan receivers.

Once you have decided which of the waypoint management/ digital mapping programs that you want to use, study the particular techniques for manipulating and transferring waypoints and other data. Most of them provide easy ways for your learners to accomplish the tasks in exercises A and B above.

Background Information

Knowing how to enter new waypoints into a receiver is important for many GPS tasks. Your learners are already familiar with marking waypoints when in active contact with the satellites. This activity explores three other methods:
1. manually entering coordinate numbers
2. projecting new waypoints in a desired direction and distance from an existing position
3. electronically transferring waypoints into their receivers from a computer.

Even the basic beginner level GPS models are usually capable of performing these three tasks. More advanced models provide some additional waypoint creation options. Many GPS models allow the user to scroll across the map page with a panning arrow, and then mark a selected position as a new waypoint. Receivers with installed data bases allow the user to find points of interest and to save them as waypoints - places like restaurants, hospitals, emergency services, recreational facilities, service stations, and many more. On some models, the user can enter a street address to find and mark a new waypoint.

Resources:

Digital mapping / waypoint management programs (several include freeware*)

- GPS Utility * http://www.gpsu.co.uk/
- Waypoint+ * http://www.tapr.org/~kh2z/Waypoint/
- USAPhotoMaps * http://www.jdmcox.com/
- Easy GPS* http://easygps.com/
- Garmin http://www.garmin.com/cartography/
- Magellan http://www.magellangps.com/en/products/software.asp
- MapTech http://www.maptech.com/
- Delorme http://www.delorme.com/
- Topo! http://maps.nationalgeographic.com/topo/

Digital Grove http://www.digitalgrove.net/
GPS Information http://gpsinformation.net/

Answers Key
Exercise A.

N53° 54.996' W008° 01.994'	Jamestown, Ireland
S33° 12.916' E138° 36.819'	Jamestown, SA, Australia

(distance & direction answers will vary according to your location)

Note: Comments and suggestions regarding this activity and other components of the Virginia 4-H GPS curriculum are appreciated. Please contact Mike Clifford at:
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