

Virginia Geospatial Extension Program

GPS Utility: a User Guide for Natural Resource Professionals and Educators

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Overview

GPS Utility is an easy-to-use software application that allows you to manage, manipulate, and map your GPS information. This is a “point-and-click” software package that is fairly user-friendly.

While there are a number of things that GPS Utility software can do, some of the functions most applicable to natural resource management include the following:

- **transferring** GPS data between a GPS receiver and a PC.
- **converting** GPS data to one of several different text formats (i.e. compatible with spreadsheets, ESRI shapefiles, and other GIS compatible formats, etc.).
- **converting GPS data** (i.e. waypoints, routes, etc.) between different map data and many coordinate formats (Lat/Long, UTM, country grids, etc.).
- Information can be **filtered** in various ways and waypoints **sorted** according to specified criteria. Route and track statistics are available and can be transferred into other programs for analysis (i.e. spreadsheet programs).

GPS Utility also has some very basic mapping capabilities. This will provide you with some confidence that the data you have collected with your GPS “look correct” before you begin downloading your data. GPS Utility works with a variety of GPS receivers. This guide is written to support the Garmin eTrex series. Most GPS receivers will follow the same protocols. If

you are using a different GPS receiver, then refer to the GPS Utility documentation, or your GPS manual user’s guide. GPS Utility is a free software program that can be downloaded from: www.gpsu.co.uk/

The free version is fully functional, but limited to 100 waypoints, 500 trackpoints, five routes. You can register the software and eliminate this limitation. Refer to the Virginia Geospatial Extension Program’s website for links to this and other URLs associated with free geospatial software tools: www.cnr.vt.edu/gep/tools.html

Note: This handbook was written for GPSU version 4.5. Newer versions may have slightly different menus or capabilities.

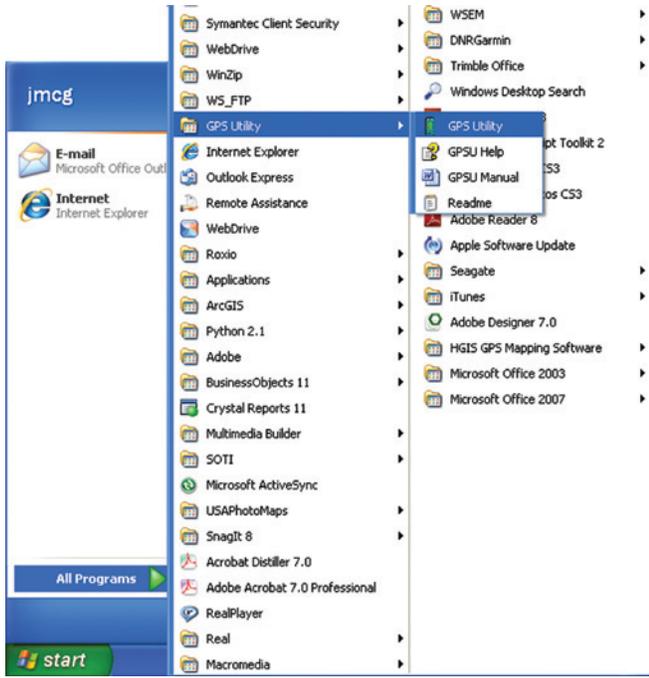
Before Using GPS Utility

The instructions in this handbook assume the following:

1. You have already installed GPS Utility software on your computer. (If not, refer to *GPS Utility Installation Instructions*.) These step-by-step instructions are available online: www.cnr.vt.edu/gep/tools.html
2. You have already collected GPS data (i.e. waypoints, routes, tracks, etc.), and have stored the GPS data on your GPS receiver (If not, refer to *The Garmin eTrex Legend: An Introductory Handbook for Natural Resource Managers and Educators* for additional information and instructions.) This information is available online at: www.cnr.vt.edu/gep/tools.html

Let's Get Started Downloading Waypoints

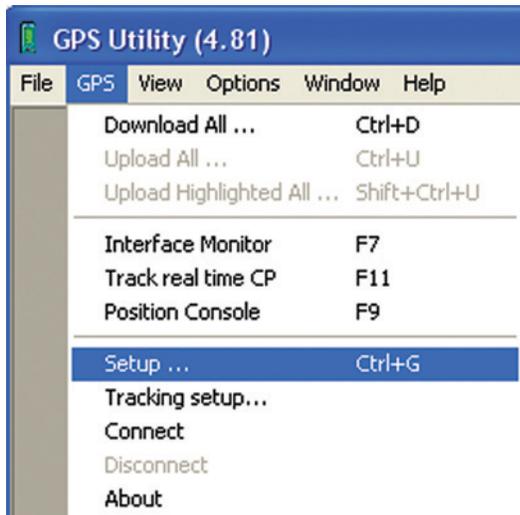
1. Start GPS Utility by selecting it from the Program list on your computer (Figure 1).



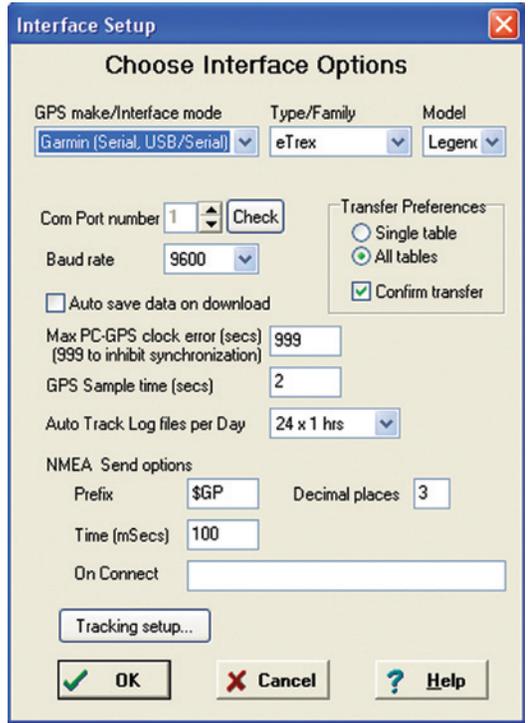
2. Make sure that the GPS Utility software is properly configured to work with your Garmin GPS receiver.

a. Connect your GPS receiver to the computer using the data cable provided with your GPS receiver. Make sure that your GPS receiver is turned on.

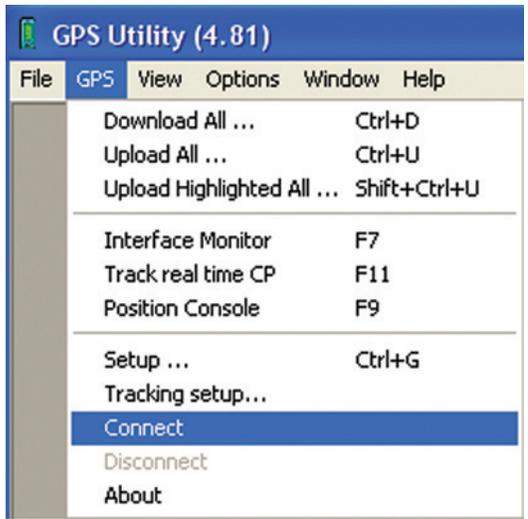
b. Select "GPS" and "Setup" from the GPS Utility Menu interface (Figure 2).



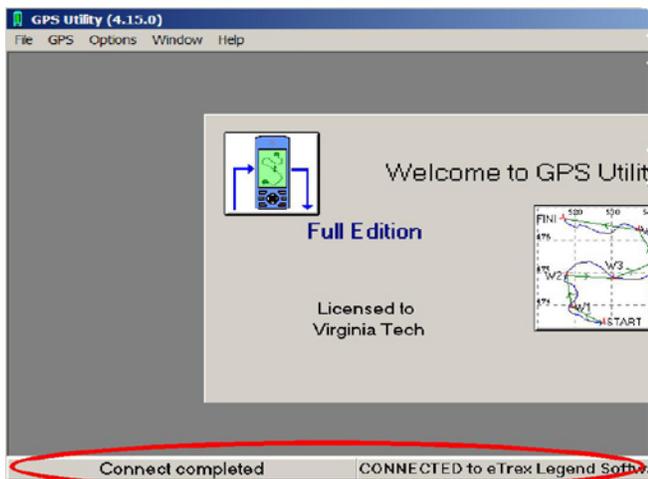
c. The Interface Setup dialogue box will appear (Figure 3). Select the "Garmin (Serial, USB/Serial)" option. The baud rate should be set to 9600. Click "OK."



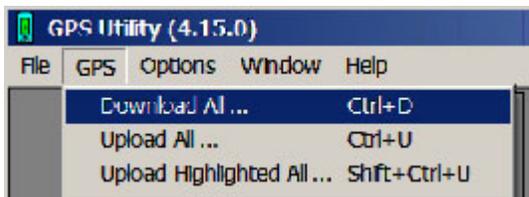
d. Select the "GPS" menu again, and select "Connect."



Your GPS receiver should now be properly communicating with your PC through the GPS Utility software. To verify that your GPS receiver is communicating properly, look at the status bar at the bottom of the GPS Utility dialog box.



- In GPS Utility, select the “GPS” menu option, and select “Download All.”



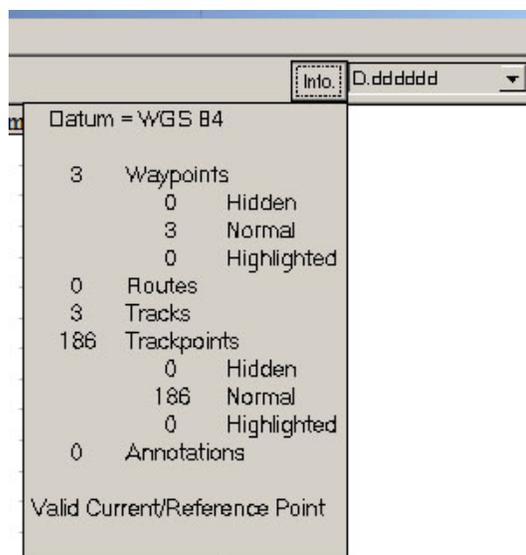
- The GPS Transfer dialog box will appear. You can download “everything” from your GPS at once (“everything” includes waypoints, routes, and tracks), or you can select the specific items that you need.



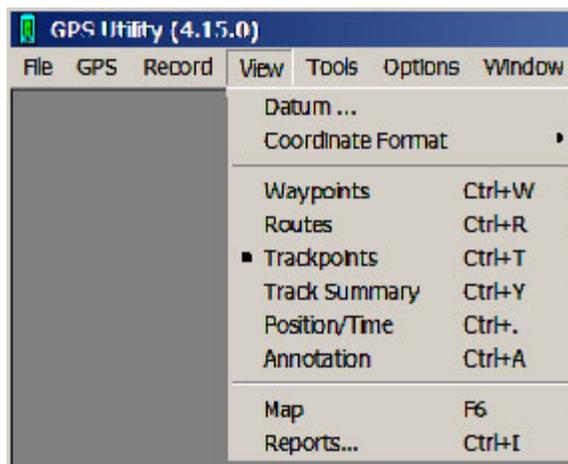
- After downloading, you should see a database table that shows data that is being read directly from your GPS receiver. In this example, there are three waypoints that have been transferred to the GPS receiver. The names of these waypoints (in this example) are AAA, BBB, and CCC.

ID	Coordinate	Symbol	T	O	Alt(m)	Comm
AAA	N37.223784 W080.421817	Waypoint	I	E	649.5	
BBB	N37.223792 W080.421828	Waypoint	I	E	640.8	
CCC	N37.223791 W080.421834	Waypoint	I	E	637.5	

Note: The “Info” button on the status bar provides you with summary information about the data that you have collected with your GPS receiver.



- If you would like to view the other data that GPS Utility is reading from your GPS receiver, then you should select the “View” menu, and select either “Routes” or “Trackpoints.” Refer to page 7 for a description of Trackpoints.



Review of terms:

- a. **Waypoints** are “virtual points” or marks that you have saved on your GPS. Waypoints can be assigned customized names (the GPS receiver assigns them numerical names [001, 002] by default).
- b. **Trackpoints** define a previous path of travel. These are often referred to as tracks. When you turn on your GPS receiver, it will start to “map your movements” (similar to dropping virtual bread crumbs). **Trackpoints** are individual points used to create a track (if you connect these points with a line you will create a track).
- c. A **route** is a “path to a destination with intermediate stops along the way.” The “stops” along the way are defined by waypoints. You can define your route in the field or wait to define a route from existing waypoints when you return to your office.
- d. The **Tracksummary** is a log that summarizes your tracks (time and date stamps, etc.)

Viewing GPS Data

GPS Utility provides some basic viewing capabilities that enable you to “see” if the data you have collected “looks correct.” However, the best (more failsafe) way to verify that your data “looks” correct is to use a (free) software program called USAPhotoMaps (www.jdmcox.com) You are not able to add additional layers of information as a “background” to GPS Utility. However, you can change the colors and symbols associated with waypoints, tracks, etc.

To visually examine your data, click on the  “Map” button.

A graphic image of all of your waypoints and tracks should appear. Waypoints are identified (by default) with red crosshairs. Furthermore, their ID numbers/names should be located  Field 1 near the redcross hairs

In addition, there are some basic map interface tools that you can use to pan around, zoom in, zoom out, etc.



These mapping tools are a bit clunky but they get the job done.



Converting data from different coordinate systems

Another nice capability associated with GPS Utility is the ability to easily convert GPS data from one coordinate system to another (e.g. convert from Lat./Long. DMS to Lat./Long. DD, UTM, etc.).

To convert GPS data from one coordinate system to another, simply select your desired coordinate system from the pull-down menu below!

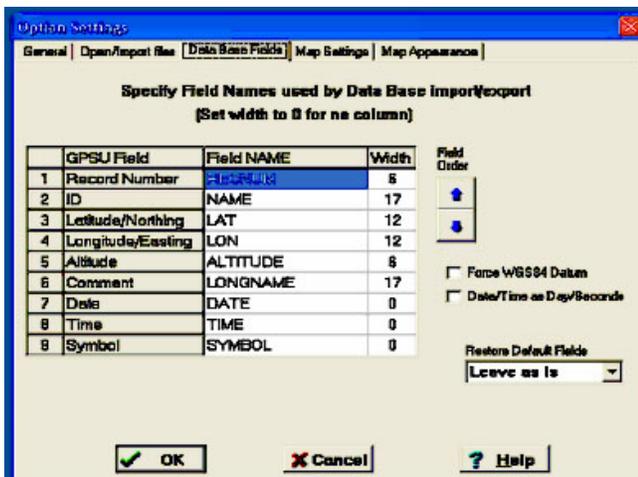
Seq.No	Coordinate	Alt(m)	Local Time (UTC)		m	m/s
0001	N37.222474 W080.421359	626.0	4/29/2004 22:32:47	D.M.mmmm		
0002	N37.222280 W080.421145	623.1	4/29/2004 22:33:10	D M S.ss	29	1.2
0003	N37.222195 W080.421059	626.0	4/29/2004 22:33:19	UTM/UPS	11	1.4
0004	N37.222173 W080.420909	631.7	4/29/2004 22:33:33	Swiss grid	54	1.0
0005	N37.222109 W080.420673	634.6	4/29/2004 22:33:49	Maidenhead	76	1.4
0006	N37.222173 W080.420437	636.0	4/29/2004 22:34:05	British grid	09	1.4
0007	N37.222173 W080.420415	636.5	4/29/2004 22:34:06	German grid	00	1.9
0008	N37.222152 W080.420351	637.0	4/29/2004 22:34:10	France Zn lle	83	107 1.5
0009	N37.222130 W080.420287	636.5	4/29/2004 22:34:15	Dutch (RD)	88	113 1.2
0010	N37.222044 W080.420136	636.5	4/29/2004 22:34:27	Sweden	100	129 1.4

It is recommended that users make a note of their chosen coordinate system in the event that the user may import GPSU data into a mapping software system (i.e. ArcGIS, etc). Software packages sometimes require you to manually enter appropriate coordinate information, so this information can be valuable later on.

Setting up your database fields

GPS Utility allows you to set the fields you want to appear in the Attributes Table of your data once you have saved it. To do this, go to “Options” and “Data Base Fields.” The Option Settings dialog box will appear and you will be on the “Data Base Fields” tab. A table listing possible fields is visible.

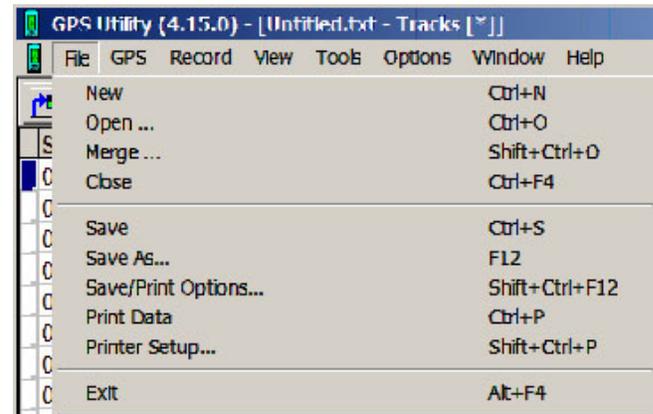
If the “Width” field has a numerical value other than “0,” the field will appear in your Attributes table. If “0” is in a field that you would like in your table, you must specify a column width other than “0” so the field will appear. Once you decide what fields you would like, you are ready to save your data!



Saving your data to a PC

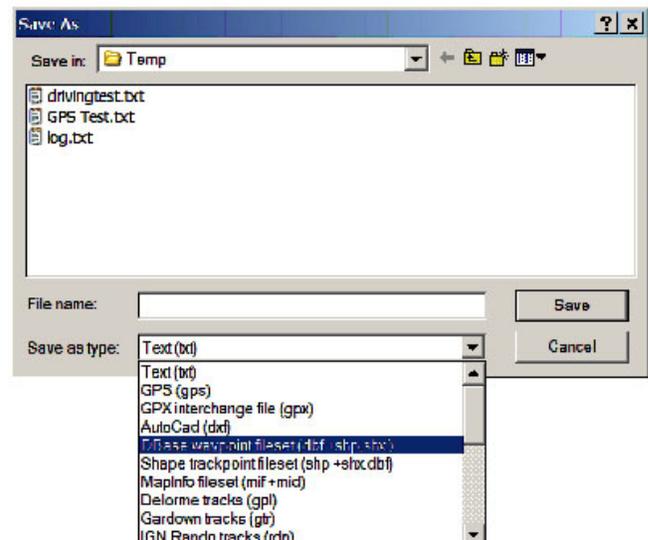
You can save the data you have collected on your GPS receiver directly as a file in your PC as a “GIS readable” file (i.e. shapefile).

1. Make sure the file that you want to save (i.e. waypoints, tracks, etc.) is “visible.”
2. Under the “File” menu, select “Save As.”



3. To save in a GIS compatible format,
 - a. enter a “Filename.”
 - b. under the “Save as type,” option, choose either:

- Dbase Waypoint Fileset - this option saves waypoints and saves tracks as a series of points.
- Shape Trackpoint Fileset - this option saves tracks as a linear feature. Refer to the figure below for a graphic depiction of these two options.



You have created a GIS compatible file from your GPS data! Keep in mind that this process does not delete the GPS data from your receiver. You may need to clear your GPS receiver after you have verified that your data has been successfully downloaded to a PC.

Waypoints are points that, when connected, will form a linear track (or a “trackpoint”).



Uploading Data to your GPS

There are two simple steps to upload data (waypoints, tracks, and routes) from GPS Utility to your GPS unit.

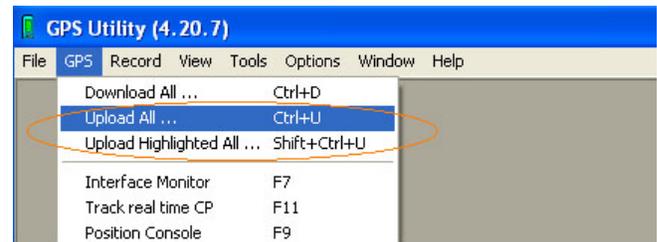
Step 1. Loading Data

The first step is to load your data file into the GPS Utility data table. You will need to retrieve your previously saved data. To do this, go to the “File” menu, then select “Open.” From the box titled “Open” you can select your data file. Be sure to select the correct file type using the “File type” pull-down menu. When the data has been loaded into the data table you may edit it before uploading to your GPS unit.

Step 2. Upload data to the GPS

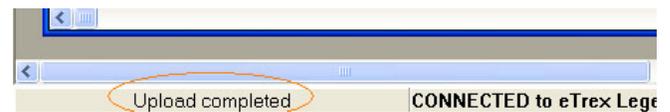
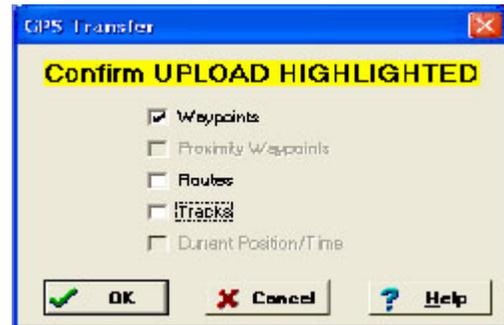
In order to upload data, your GPS unit must be connected to your computer and turned on. GPS Utility lets you select what type of data to upload (waypoints/tracks/routes). To upload data to your GPS unit, select the “GPS” pull-down menu or select the  “Upload” button on your toolbar.

You have the choice of selecting individual points to upload by clicking “Upload Highlighted” (note: data must be highlighted before selecting this option) or to upload all data by selecting “Upload All.”



Regardless of which method of uploading you select, a box should appear to confirm the upload of data. This is also your opportunity to select which type of data to upload (waypoints/tracks/routes). Check only the type of data you wish to upload to your GPS unit and click “OK.”

The information bar at the bottom of the screen should verify the completion of the upload.



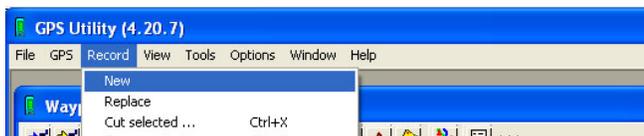
Preparing to Calculate Area and Perimeter

Area and perimeter calculations may only be determined from a track or a route.

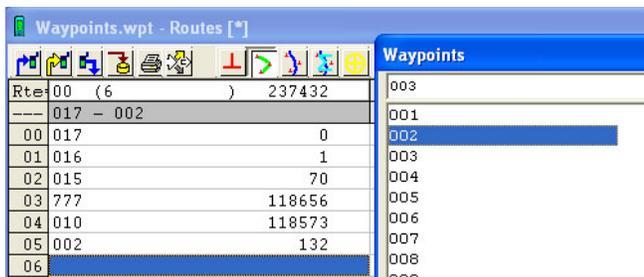
Creating a route from waypoints

Download waypoints from your GPS receiver or open an existing file (for more information see previous sections). Open the “View Menu” and select “Routes” or select the “Route” button from your toolbar. 

To create a route from your existing waypoints open the “Record Menu” and select “New.”



This will bring up a list of waypoints. Waypoints may be added to your route by a single click on each desired point. GPS Utility will close your route automatically, so there is no need to start and end at the same point. You should be able to see the points you have added appear on the Route Data Table. When you are finished, close the Waypoints box.



Calculating Area and Perimeter

To view the calculated area and perimeter of your route open the “View Menu” and select “Reports.” This will bring up a report of your route, the start to end distance (meters), and area in hectares at the bottom of the report.

777	185 274955	4167545
010	185 374102	4102766
002	185 374234	4102763
End to Start(m)	49	
Area enclosed(hectares)	176.365	

To convert the measurements from metric units (measurements are in metric by default) to other units, simply go to “Options Menu,” select the “Data Set” option, and change the “Horizontal Units” from metric to feet.

Acknowledgments

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For further information, contact the Virginia Geospatial Extension Program:

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www.cnr.vt.edu/gep

Virginia's Geospatial Extension Program
 Member of the National Geospatial Technology Extension Network

Welcome Aboard!

Virginia's Geospatial Extension Program, in partnership with the Virginia Space Grant Consortium and Virginia Cooperative Extension, seeks to promote the integration of geospatial tools and techniques through a coordinated approach at the local, regional, and state levels. The program aims to extend opportunities and empower organizations and individuals across the Commonwealth of Virginia through training, assessing application needs, and providing increased access to data resources.

Initiatives associated with this program include:

- technology and application training,
- information sharing,
- course development and dissemination, and
- educational outreach.

This program meets crucial workforce needs by providing K-12 educational outreach, specialized workforce courses, and training through Virginia's Community College System (VCCS) and other Virginia Space Grant Consortium (VSGC) member universities, faculty development, and linkages to NASA and other geospatial resources for data and programs. A key component of this program is its participation with Virginia extension agents, through Agriculture and Natural Resource programs and 4-H Youth Educational initiatives, to support the dissemination of information, training, and application development at the grassroots level.

While Agriculture and Natural Resource Extension Programs, 4-H Youth Development programs, as well as other programs associated with higher education, are some of the beneficiaries of this program, innovative partnerships have been established with other local, regional, and state organizations. One such partnership is with the George Mason University led Virginia's Access and Mid-Atlantic Geographic Information Consortium. This NASA-funded Consortium embraces a number of Virginia universities and other partners who seek to provide training in and tools for applications of geospatial data. The Space Grant Consortium will work with many partners to effect the diffusion of geospatial knowledge to the most practical local levels.

Diagram illustrating the relationship between Specialists, Agents, Knowledge, and Public:

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  graph TD
    Specialists --> Agents
    Agents --> Knowledge
    Knowledge --> Public
    Public --> Specialists
    Specialists <--> Public
  
```

Please feel free to contact Virginia's Geospatial Extension Program if you have any questions.

Contact the [webmaster](mailto:jmcg@vt.edu) if you have any comments about this Web Site.