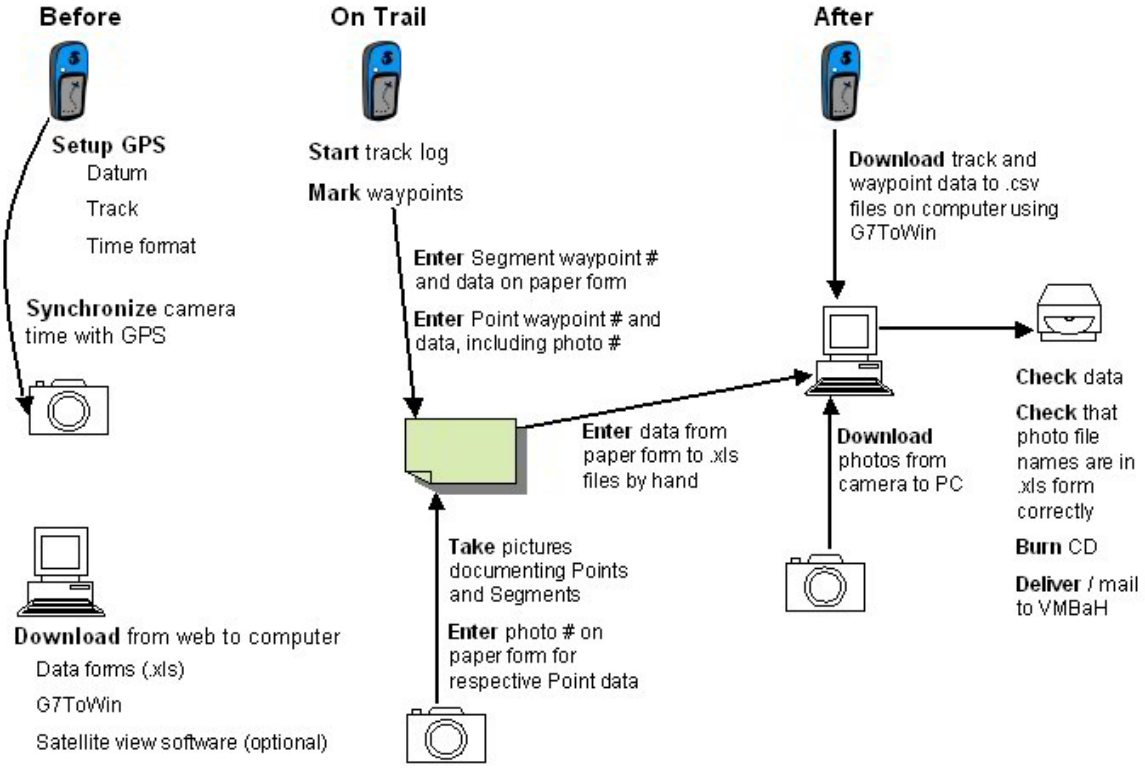
GETTING STARTED

This manual has been setup in three main parts: what you do before, during, and after the trail visit. The diagram on the next page will help guide you through the steps and what software or data are going where. In "Getting Started" (left side), you download software and data entry forms from web sites to your computer, setup your GPS unit, and synchronize camera with GPS. In "Assessing the Trail" (center) you create a track log and waypoints with your GPS, take pictures, and enter trail assessment data on data sheets. In "Preparing and Submitting Data" (right side), you download GPS data and camera images to your computer, enter data in spreadsheet file, check data, create CD, and send CD to VMBaH.



Before going to field, you will need to be sure to have your GPS receiver setup as well as camera. Simplified steps are provided here. More detailed discussion is provided in Appendix 1, but if you already know how to use your GPS you may not need to go there. This manual deals mostly with Garmin since that is what we are most used to and have access to. It is not meant as any type of endorsement, and other brands and models with the appropriate features (see #1 below) will certainly work.

WHAT YOU'LL NEED

This Procedures manual and training sessions will provide volunteers with the skills needed to conduct trail assessments. Volunteers should work in teams of at least two in order to efficiently observe and record necessary data. Volunteers will need to have the following equipment or be able to do the following before beginning trail assessment work:

1. Have (or have access to) GPS receiver capable of being downloaded to computer, set datums (or have a default of WGS84), create a track log, and save waypoints.
2. Have digital camera.
3. Be able to enter field data into spreadsheet template (.xls).
4. Be able to create CD with data from GPS receiver, spreadsheet file, camera images, and simple text file.

If equipment is a problem, ask and perhaps someone has something you can borrow or you can work in a team with other volunteers.

SETUP GPS

1. Familiarize yourself with your gps before going out in field by reading the Owner's manual and / or Quick Start Guide. Since many GPS receiver models exist, it is impossible to give specific information for each. We are providing instructions for Etrex Vista or GPSmap 60 or similar GPS receivers, but expect these should help for most other Garmin handheld units.
2. Be sure to have adequate **batteries** in your GPS and/or bring spares.
3. Setup datum to **WGS84**. Very important. (If you don't know how to do this, see Appendix 1.)
4. Setup track log frequency (**auto, more frequent** or anything with greater frequency) and initiate tracking. (See Appendix 1 for details, if needed.)
5. Setup time format. (**24 hr, AKDT**) (See Appendix 1 for details, if needed.)
6. Setup communications protocols on GPS to talk with your computer. (**comm port** and speed, if adjustable, or **USB**). You may need to check your computer to see what **comm port** is available and perhaps adjust its speed if that of your GPS isn't adjustable.
7. If your GPS receiver has the capability to **lock on roads**, please set this **OFF**. (Main – Setup – Map). Not all receivers have this capability.. (See Appendix 1 for details, if needed.)

SETUP CAMERA

1. Set date and time in your camera to correspond to that of your GPS receiver. Your GPS unit is getting its time from the satellites. Use a page of GPS that displays time to at least seconds, if you can – sometimes the Satellite page,

perhaps more a short distance (<30 feet). You might be able to position yourself in an opening in the canopy and the difference in location is within the error associated with handheld GPS receivers.

If you still can't get reception, you'll not be able to collect data. You might consider

1. Skipping that point, doing the rest of the trail, and coming back on another day or even later in same day to collect the waypoint.
2. Enjoying a nice hike and consider it a scouting day.
3. Coming back another day.

Things happen. Some things are just beyond your control.

CHECKLIST

Before you head to the trail, be sure you have the following equipment and have it set up properly.

1. GPS receiver
    a. Setup appropriately – datum (**WGS 84**), **track format (auto, more frequent**), track logging started, **road lock off** (if you have that setting)
    b. Charged **batteries** or spares
2. Digital camera
    a. Adequate **storage** for pictures
    b. Charged **batteries** or spares
    c. Be sure the **date and time are synchronized with your GPS**.
3. Clinometer (**see Appendix 5**)
4. Small hand spade for soil sample
5. Rod or something to poke down for organic matter depth, if available
6. Ruler (for depth of ruts)
7. Measuring tape or marked cord for estimating width of trail
8. Data sheets and maybe a clipboard to write on
9. Cards with codes needed for data entry (provided)
10. Pencils (please do not use ink – it runs in rain)
11. Any manuals you might need
12. Personal gear – like fluid, food, rain gear
13. Compass, map – optional for navigation

ASSESSING THE TRAIL

START TRAIL ASSESSMENT

1. Turn on GPS and wait for satellites to be acquired. Be sure **Map Datum** is set to **WGS 84**.
2. Be sure that **road lock** is "**Off**" (if you have this setting).
3. Be sure that your **track log** is set to on – Main Menu, Tracks, ***"On",*** **Automatic logging, More frequent**.
4. Satellite Page will be the first page shown on power up.
5. "Acquiring Satellites" message will be displayed until sufficient satellites are in view to begin acquiring data. Satellites on the sky display will darken as they are acquired (dark) or lost (clear). The bar graph indicates strength. The more satellites, the stronger signals, and the more dispersed across the sky, the better. (see **Appendix 2 – Checking Satellite Availability** if you need help).
6. "Location Coordinates" will display when 4 or more satellites are acquired. It will also show position accuracy. When this has stabilized, you are ready to enter data.
7. Check that your camera clock is synchronized with GPS. The GPS clock gets its time from satellites, so your camera is the device that needs to be changed. Be sure that both date and time (within a few seconds) are set.
8. Take picture of GPS screen with time in seconds showing. This is to verify that GPS and camera are synchronized.
9. On the paper data sheet, enter the trailhead information including weather and volunteer names.
10. GPS receiver will be on the whole time so it will track both outbound and inbound. This will increase the probability of obtaining data should there be some glitches with satellite reception.
11. Enter first waypoint in center of parking lot (or what passes for a parking area) as a Point (see Entering Point Data section). (This is exception to the statement that every Point is within a Segment.)
12. Proceed to actual trail and begin trail evaluation.

SCOUT THE TRAIL OUTBOUND

If you are not familiar with the trail you are assessing, you may want to scout the trail first, making notes as you go. Be sure your GPS is on and tracking is initiated so a track is being obtained. This will be helpful if satellite reception is better outbound than inbound. Also, things look different in two different directions, so making observations in both directions will be helpful.

1. Begin hiking outbound to get an idea of trail segments and point data (see ***WHAT TO LOOK FOR*** section for instructions)
2. Take notes and maybe use some flagging or other temporary marker to remember certain things on your way out. (Remove flagging on way out.)
3. Turn around when reaching end of section.

type and descriptive information. Point data can be used for special features such as viewpoints, small stream crossings, or trail junctions. Point data is used to locate where photographs are taken. They can also be used to identify localized trail conditions that differ from the average condition of the trail segment. An example would be a very wet, depressional area in an otherwise dry, level trail segment. Only significant points, impacts, or obstacles should be recorded, not every small variation within the trail segment. *Figure 2* illustrates points within a trail segment.

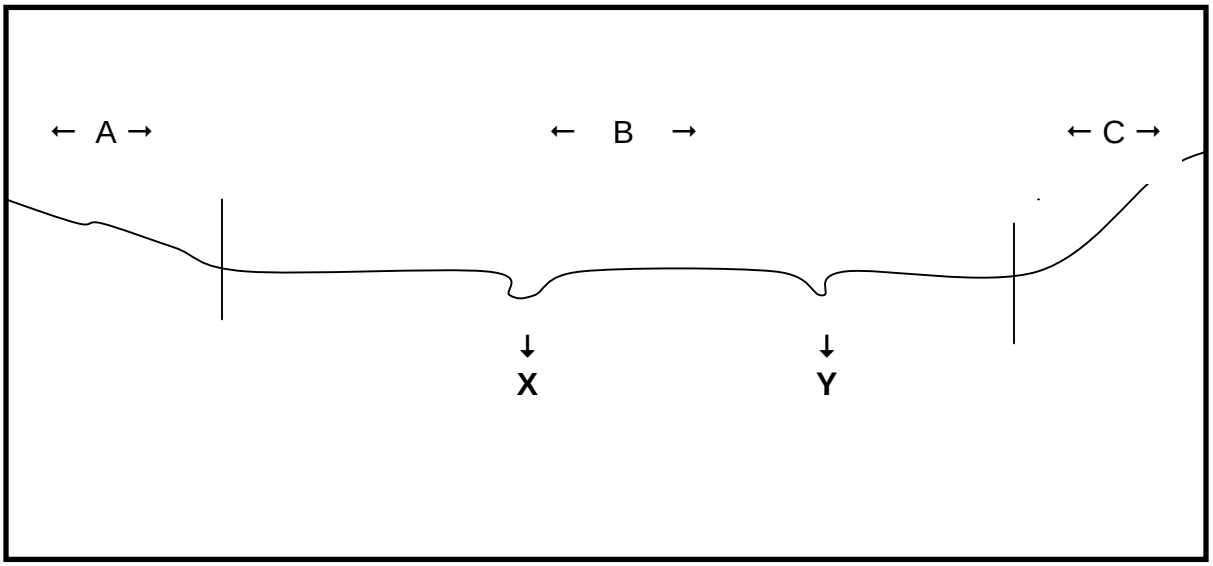
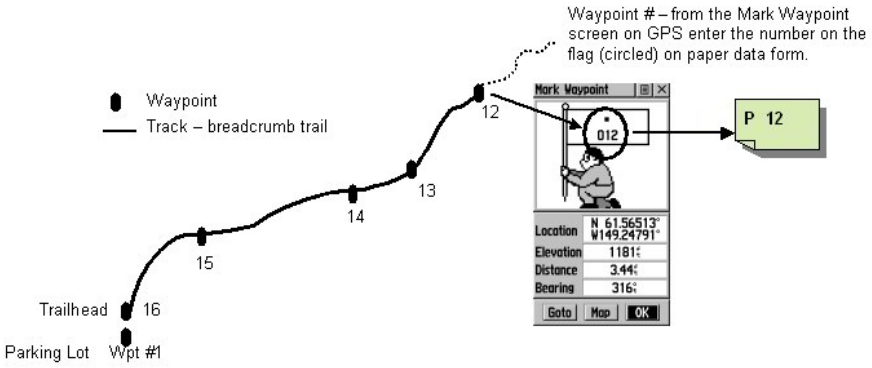


Figure 2. An isolated mudhole (X) and a small stream crossing (Y) are two examples of point data within trail segment B. Segment B has a start and end waypoint. Point X and Point Y each have only one waypoint.

RECORD DATA

1. Enter waypoint where you start hiking inbound.
    a. Enter **S** in column 1 of data sheet for start of first Segment.
    b. Mark waypoint (see your GPS instructions or **Appendix 1**).
    c. When screen displays waypoint number, enter that number (not the latitude and longitude) on your data sheet under ***'#Start WP*** " waypoint", select "ok", then hit Enter. Just use whatever number your GPS generates.



   d. For each segment, take one picture representing the average conditions of that segment. This might be where you do the measurements. Record the image number or the time it was taken. (Note: Many cameras do not readily display the image number or the download software changes the name and number of the photo. We're leaving the details of this up to you as to exactly what you record here. However, the spreadsheet that you turn in must have the correct file name and description for the image.)

2. Fill in the data for that segment **(see Appendix 3 - Data Elements)**. Remember that these data reflect the average condition for the segment so the measurements may not be made right at the start point, but they may.
3. At the point where you make the measurements or most typifies that trail segment, enter a line of Point data (P in column 1), make and record a waypoint, enter ***Photo*** #, enter 99 as Point type, and Comments. This creates a photographic record of each trail segment to back up the recorded data.
4. Continue along until end of segment or until Point data need to be recorded.
5. To record Point data contained within the trail segment:
   a. Enter **P** in column 1 of data sheet and enter the data **(**see **Appendix 3 – Data Elements)**.
   b. Mark waypoint on GPS (see **Appendix 1 – GPS Setup**)
   c. When screen displays waypoint number, enter that number on your data sheet under ***'#Start WP*** " waypoint", select "ok", then hit enter.
   d. If at any time you have trouble recording a waypoint, try the tips for repositioning to improve sky view and if all else fails, at least record the entry without a waypoint and make a Comment on data sheet. (You might also include this information in readme.txt file being submitted on your CD.)
6. To log pictures taken at points or along Segment, treat as Point Data (see Item 5 above). Include the image number from your camera if this is readily available or the time according to GPS (this is why camera and GPS were synchronized at start) in the ***Photo*** # column. Some cameras may only display the number in a review screen, rather than where you actually see the present shot.

PREPARING AND SUBMITTING DATA

The data that you submit will consist of your GPS track log and waypoint data, an .xls spreadsheet with your Segment and Point data, hardcopy of your field data sheets, images from camera, and some general information. These files will be burned onto a CD. To keep track of data, files will be named using a six character code for the trail name, which will be in **Appendix 7** or will be provided to you by VMBaH. The date of the field work will be part of the file name in **yyyymmdd** format.

1. Download track data as **.csv** file and save in file named **trailn_yyyymmdd_trk.csv**. Be sure to include the underscores. Detailed directions are in **Appendix 4 – Setting Up Download Software**.
2. Download waypoint data as .csv file and save in file named **trailn_yyyymmdd_way.csv**. Detailed directions are in **Appendix 4 – Setting Up Download Software**.
3. Make a copy of the field data sheet .xls template and name it **trailn_yyyymmdd_dat.xls**. A template will have been provided on our web page (or by e-mail) and will have obvious field names. Be sure to name that according to your trails and dates. A hardcopy is in Appendix 6, but you will be provided with a template with pick-lists of data values for the various attributes you are being asked to record.
4. Enter the data from your field sheets in the above .xls file.
   When entering the image number, be sure to include the complete file name, such as AUT_1234.jpg or IMG_4567.jpg. Please submit only .jpg images. If you rotate the images to vertical, please leave the original time stamp within the .jpg. If you took more than one photo at a waypoint, then please select the best and enter that file name in the main submittal data form. If you want to turn in the other images which enhance the primary image, please feel free to do that and if you feel additional description is needed, fill out an OPTIONAL photo documentation spreadsheet (**trailn_yyymmdd_img.xls**) which can be downloaded from www.vmbah.org.
5. Save the spreadsheet.
6. Check your data to be sure that all spreadsheet fields are filled for each Start and End waypoint. Point data will only have waypoint number, image file name, and comment.
7. Check your image (photo) file names to be sure they correspond to your images. Check the images to be sure they represent what the Comment field says. It's much easier for you to check these things since you collected the data and images than for someone who has never been there to try to sort mislabeled images.
8. Create a **readme_trailn_yyyymmdd.txt** file using notepad or other text editor. Please include
   Names of all crew members, one name per line.
   Trail code and name.

easiest for you to submit the correct track and waypoint information if you have cleared all tracks and waypoints from your GPS before going to trail. If you “save” a track on your GPS itself, you may lose some points (depending on number of allowable points), but G7toWin saves all the points, and you can reload from there later. (You might check a partial set if you have any doubts. In cases where track logs have more points than saved tracks in GPS, there may be some reload issues.)

Setup of GPS 60 series and other rocker key units

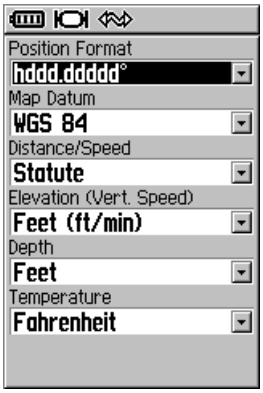
Setup Datum

1. Go to main menu of your GPS (has many rows and columns of icons). This is reached by either pressing the Menu button or paging (use Page button repeatedly) through the screens until you get there. (Some GPS receivers allow you to change order of pages, so order will differ with your unit and how it is setup.)

2. Click on “Setup” (row 2, col 1) (Use rocker switch to position, then press Enter button)

3. On the Setup Menu, click on “Units” (row 4, col 2 on GPSmap 60)

4. On the Units page, verify or setup the following fields. Rocker switch moves you between fields. Press Enter button to pull up pick list. Scroll down the list with rocker switch. Press Enter button for the desired selection.



5. Position format should be **hddd.ddddd**. (Position cursor over field
6. **Map Datum**: **WGS 84** (must be)
7. Set units to English units, but not critical – statute, feet, feet, Fahrenheit for distance, elevation, depth, temperature, respectively

POINT TYPE *Required for point data only*. Enter 99 for segment photo.
When entering point data, identify the number of the point type from the following list. Provide further information in the COMMENT column, especially if the POINT TYPE is number 98 – "Other".

Obstacles or Repairs Needed

1 (structure failure) man-made structure important to the trail that has failed.

2 (blocked drain) plugged or blocked drainage feature.

3 (wash out) section of trail washed away by water (currently wet or dry).

4 (dam) unplanned dam or blockage (beaver dam).

5 (ponded area) Ponded area affecting use of the trail.

6 (unimproved crossing) stream/gully crossing w/out any improvements.

7 (landslide/debris flow) landslide, mudflow, etc. on trail or threatening to advance on trail.

8 (boghole/depression) deep hole with mud or water that requires rerouting to get around.

9 (downed tree) blocking trail. Use judgement as to whether this tree is likely to be there for awhile as evidenced by routes around tree.

Trail Improvements

21 (culvert) culvert important to a trails function

22 (improved crossing) stream or gully crossing with minor improvements (boards/logs).

23 (bridge) stream or gully crossing with bridge

24 (gate/barrier/fence) gate or constructed barrier designed to control access (gate, posts, etc.)

25 (rest area) area adjacent to trail designed as a resting area with picnic table, benches, etc.

26 (public shelter) natural or manmade shelter available to the public.

27 (campsite) intended campsite area (fire pits, toilets, cleared tent sites)

28 **(public use cabin)** cabin that can be rented or used by the general public.

29 **(kiosk)** trail information board

30 **(outhouse)** pit toilet or latrine.

31 **(rest room)** public toilet with running water.

32 **(potable water source)** public drinking water source.

33 **(sign)** posted signage along trail (mileage, jurisdictional boundary, etc.)

34 **(improved surface material)** short trail lengths with surface materials like corduroy, geotex, brush, loose logs or boards, etc.

35 **(steps)** some type of individual steps for erosion control – wood, stone, railroad ties, etc.

36 **(staircase)** connected set of steps

37 **(boardwalk)** boards laid perpendicular to direction of travel and connected to something parallel to trail

Features

51 **(trailhead)** beginning point for a trail

52 **(survey marker/monument)** official survey marker or monument of any type.

53 **(road junction/crossing)** junction point with a road

54 **(trail junction/crossing)** junction point with a road

55 **(powerline crossing)** point where powerline or other utility crosses trail.

56 **(viewpoint)** scenic or overlook site

57 **(cabin)** privately owned or abandoned.

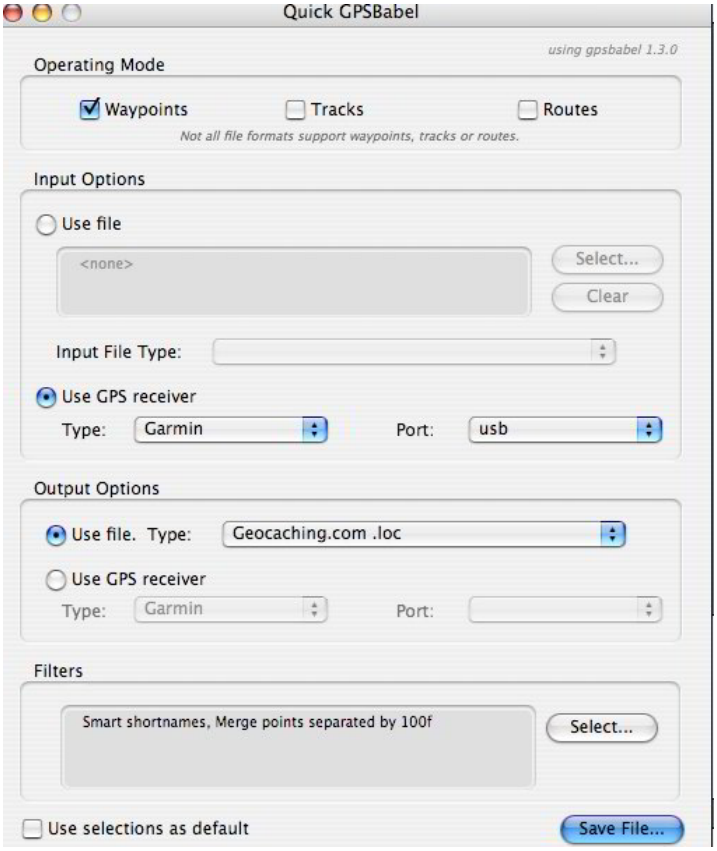
58 **(structure)** structure or ruins of something other than a cabin

APPENDIX 8 – DOWNLOAD GPS TO MAC

If you are downloading to a Mac computer, you will need to follow these directions rather than those of Appendix 3, which are for Windows machines. Some Mac computers may be able to run the G7ToWin, so try that first. In trying to find a setup that works, apparently it's very picky as to what version of Mac software, the Garmin unit, and other issues like USB port versions. If you have a serial Garmin or other GPS, you may need to get a serial to USB converter. We have seen reports of people who have gotten Garmins to talk with their Macs using GPSBabel, however, I was not able to do it on a friend's Mac. In other words, there may be issues. If you have problems, you might want to consider using a friend's PC or perhaps you can get make arrangements to download it in VMBaH project office. Apparently there's some Garmin-Mac issues.

1. Download and install the software from here (the .dmg file) http://sourceforge.net/project/showfiles.php?group_id=58972&package_id=54959 (more info here http://www.gpsbabel.org/download.html)

2. Start GPSBabel and fill in the fields as shown:



3. In Operating Mode section, check Waypoints or Tracks, depending on which you are downloading.

4. In the Input Options section, mark “Use GPS receiver” and select Type and Port according to what you are using.

5. In the Output Options section, mark “Use file” and for Type, scroll down to either OziExplorer (try this first) or Garmin Mapsource .gdb.

6. Then press the “Save File” button in lower right corner. A dialog box will then ask for file name, which will be **trailn_yyyymmdd_trk.plt** (or gdb) for tracks and **trailn_yyyymmdd_way.plt** (or gdb) for waypoints.

6. Repeat for waypoints (or tracks - whichever you didn't do the first time).

7. Submit these 2 files on the CD rather than the .csv files.

8. In the readme_form.xls file, under the Comments, indicate that you used a Mac and that is why you submitted .plt or .gdb files rather than .csv. We will do some extra processing on them before using them with the rest.