

Appendix A: Mapping Tools

Using a GARMIN Etrex Global Positioning System (GPS) Unit.	34
Foot Mapping Materials Checklist	36
Boat Mapping Materials Checklist	37
Invasive Weed Mapping Form	38
Mapping on Computer Instructions.....	40

Using a GARMIN Etrex Global Positioning System (GPS) Unit

Refer to your user manual if you have a different type of GPS unit.

2. Turn the unit on using the lower button on the right side of the GPS Unit.
3. When first turning on your GPS unit, stand outside where you can see the sky. This will help your GPS unit acquire satellites. The more satellites it acquires, the more accurate it will be.
4. Click on the top button on the right side until you can see a menu page that includes "Satellite".
5. The button on the front of the GPS unit acts like a joy stick. Click on "Satellite" and you will read at the top "Location" # ft. That number represents how accurate the GPS unit is reading. The more satellites you acquire, the lower this number will be. Ideally, your number will be lower than 20 feet.
6. To the right of this, you will see the coordinates for your position. If it is reading in decimal degrees your number will be in this formation:
N42.67639°
W070.81796°
If your GPS unit is not reading in that formation, known as "decimal degrees", toggle back to the menu screen and click on "Setup" and then click on "Units" and where it says "Position Format" make sure it reads hddd.dddd°. If your GPS unit is more accurate than a Garmin, there may be more decimal points. That is fine!

Decimal degrees is the easiest format to write down, and type in. It is also the format that the Citizen Science Website CitSci.org uses.

7. On your data sheet record "Accuracy" and the number of feet shown on your GPS unit.
8. Record your coordinates.
9. Toggle back to the screen with a menu, and use the joy stick button (on the front) to go to and click on "Mark"
10. Toggle to the top of the screen (Your curser will be at the bottom, so the easiest way to do this is to go down with one click, which actually takes you to the top immediately.) Click and you will get letters and numbers, This is where you type in a code for the site you are recording.
11. If you are just starting out (in the year 2011) and there is no pepperweed present, record ANP111. A is the letter you will use on your first day mapping. NP stands for No pepperweed. 1 is the first no pepperweed found. "11" represents the year 2011. When you start typing letters, the numbers disappear, to get them back click on the upward facing arrow just above the letters x and y.
12. Once you have typed in your code, click on "ok".
13. **To save your waypoint: Toggle down and click on "ok" once more or your point will not be saved.**

14. Walk along the upland edge of the marsh, looking for pepperweed. If you started at a point where no pepperweed was found, you can indicate later on a map there was “no pepperweed” by drawing a green line from your starting point to the place where you first encounter pepperweed.
15. If you find a small patch of pepperweed mark it with one point.
16. If you find a large patch of pepper weed, mark the beginning point, fill in the rest of the data, and then walk to the end of the patch and mark the end point. On your data sheet draw a double headed arrow between the two data points to indicate they are connected and are one large patch.

Accuracy	Patch ID	Location Description/ GPS Coordinates	Parking/ Safety Concerns	Dimensions	Density	How much?	Comments/ Other invasives	ID % Confidence
19 feet	cP111	N 42.68736° W: - 70.8009	Island- hard to access.	50m x 1m	B	D	Need permission to access	100 %
15 feet		N 42.68763 W - 70.79994	ditto	Same as above	B	D	None	100 %

Fig. 8 Mapping form with double headed arrow.

Foot Mapping Materials Checklist

- Filled water bottles (More than one!)
- Sunscreen
- Insect Repellent
- Pencils/pens
- Pepperweed ID cards to share (Appendix D)
- Landowner Permission forms and letters (Appendix B)
- Pepperweed mapping forms
- Camera (with recharged batteries)
- GPS Unit (with recharged batteries)
- Binoculars
- Clip board
- Hat
- Waterproof boots
- Extra layers of clothes, depending on weather. We suggest long pants and sleeves due to insects.
- Snack/lunch
- First Aid Kit
- Extra batteries
- Sunglasses
- Invasive Weed Mapping Forms (Appendix A)

Boat Mapping Materials Checklist

- Recharge your batteries for the GPS unit, and for your camera.
- Make sure you have enough fuel for your trip.
- Map of the area you are mapping.
- Red pen for marking on map.
- Sunglasses
- Water bottles (More than one!)
- Sunscreen
- Insect repellent
- Pencils/pens for data sheet.
- Pepperweed ID cards
- Landowner Permission Letters (Appendix B)
- Personal flotation device
- Standard boat safety gear
- Invasive Weed Mapping Forms (Appendix A)
- Clipboard
- GPS Unit (with charged batteries)
- Camera (with charged batteries) and case
- Binoculars (one for each participant)
- Hat with a brim
- Water sandals or shoes
- Extra layers of clothes, (wind breaker, sweatshirt)
- Long pants and sleeves due to insects.
- Snack/lunch
- Cell phone
- Extra batteries

Invasive Weed Mapping Form

INVASIVE WEED MAPPING FORM

Species (common, *Latin*) name: Perennial Pepperweed, *Lepidium latifolium*

Observation date: Observation time(s):

Observation team members:

Contact email address(es):

Contact telephone number(s):

Area searched:

Town -

Map section -

Main road(s) -

Description of area search (e.g. west of Newbury Road to east of High Street):

Surrounding land use:

Landowner(s) contacted:

Name

Property Address

Telephone

Was the area thoroughly searched? ___yes ___no ___uncertain

If uncertain, explain:

Comments:

(Record data on other side of sheet)

Mapping on Computer Instructions (EXAMPLE – your equipment may differ)

Introduction:

Once you have collected data points in the field, transferring them to a map will help communication and planning. If you are using a Garmin GPS unit, the following instructions will assist you in downloading your points, and transferring them onto an electronic map. The programs involved are fairly user friendly, and are free. They include DNR Garmin, and Google Earth. These instructions will explain the following procedures needed to use Google Earth to map data gathered on GPS units and by hand.

Instructions include how to:

1. Download points (from Garmin GPS units) using the DNR Garmin program.
2. Transfer points to Google Earth
3. Edit the appearance of your points and create paths and areas
4. Organize, share and save your work.

1. Downloading Points onto your computer:

The fastest way to transfer points from a GPS unit to your computer is to download them. Current models of GPS units work with USB cables but need another program to allow the transfer of information.

DNR Garmin is a free program that allows you to transfer information in a Garmin GPS unit to various Geographic Information System (GIS) packages, as well as to “Google Earth”, a free, easy to share web-based mapping program.

Steps:

- a. If you do not have the “DNR Garmin” program on your computer already, go to: <http://www.dnr.state.mn.us/mis/gis/tools/arcview/extensions/DNRGarmin/DNRGarmin.html> and scroll down until you see “Download Program”. Read through the various versions. You may want to choose the most recent version to download, but check to see if it is compatible with programs already loaded onto your computer. Follow the instructions to download, and install this program. This will allow you to transfer from Garmin GPS handheld receivers and various GIS software packages as well as with Google Earth.
- b. Turn your GPS unit on. (Make sure batteries are charged so it will go on!)
- c. Connect the USB cord from your GPS unit to your computer.

d. Start DNR Garmin program by clicking on the icon (Figure 1).

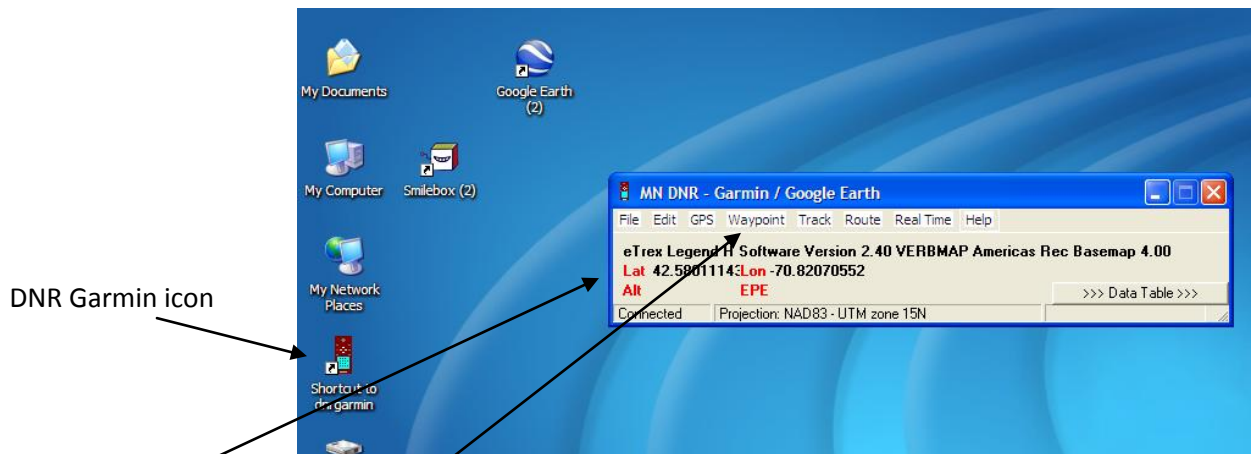


Figure 1 DNR Garmin Program

- e. Click on “Waypoint” and as a dropdown menu appears, click on “Download.”
- f. All of the waypoints on your GPS will appear, and you need to look for the ones you want. It will tell you how many records you received. Click “OK” to acknowledge this information and to move on.

You may get the following error message:

GPS on com port 1 failed to initialize. Check the following:

1. Your GPS is turned on
2. The proper port number is set
3. You have the latest driver installed for your GPS (USB Only)
4. You have the latest firmware installed on your GPS.

If you get this error message, first make sure that the GPS unit is on. Next, set the port by clicking on the GPS tab and then choosing “Set port” and “USB” as the dropdown menus appear. Then click OK.

Your points should then download and you should get something that looks like Figure 2. You will probably want to click and drag on the lower right hand corner, to allow you to view all the information contained (Figure 3).

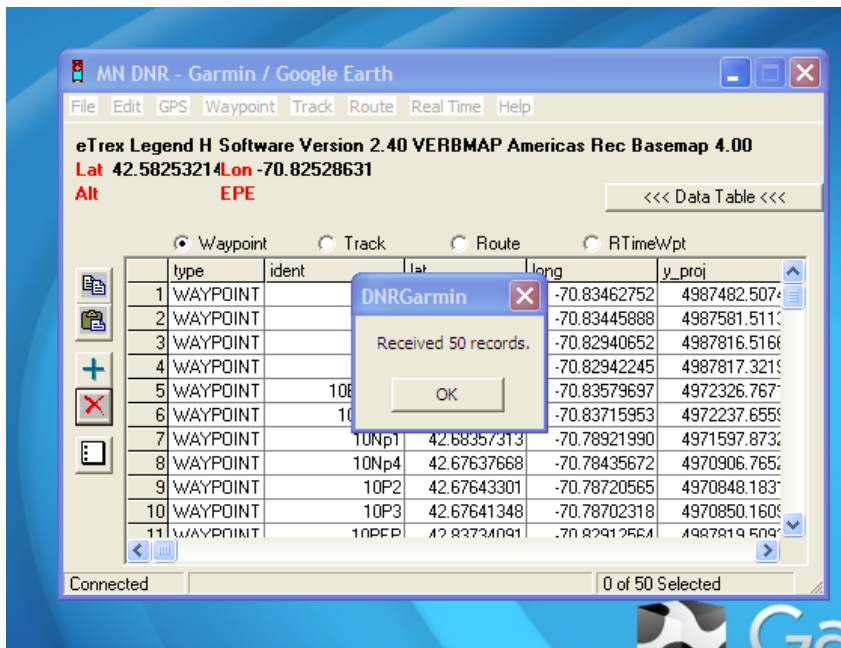


Figure 2 Waypoints downloaded to DNR Garmin

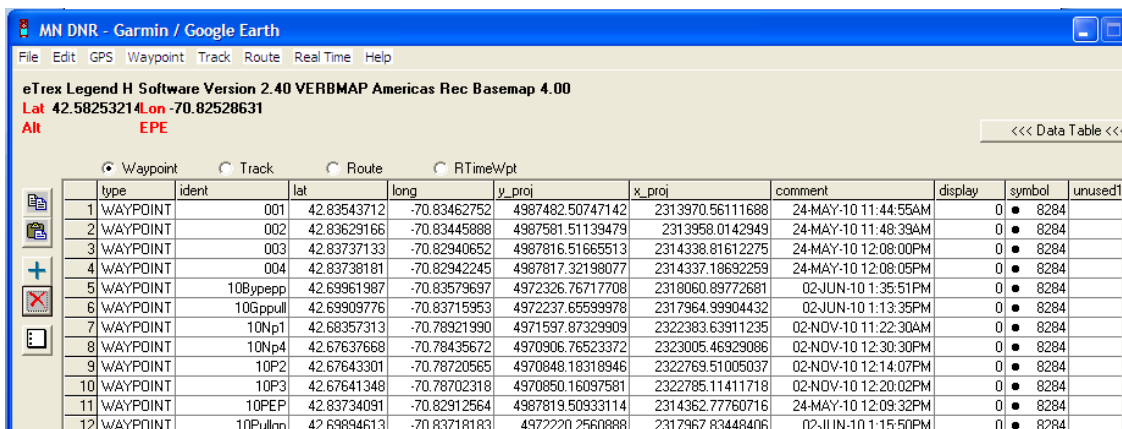


Figure3 DNR Garmin Expanded View.

Mapping Suggestion: When mapping, make the initial part of your code the same number, so the points you are downloading will be found all in one group, rather than interspersed throughout.

- g. In the Garmin program, select the lines of data which you wish to download.

2. Transfer Points to Google Earth:

Google Earth is a free program that you can download that allows you to map points, lines, and polygons, and to share these via email. If you do not yet have this program, go to <http://www.google.com/earth/index.html> click on



“Download Google Earth” and follow the instructions.

Figure 4 Google Earth Icon

If you have the program on your computer already, click on the Google Earth Icon to start it.

- a. In the Garmin program, select the lines of data which you wish to download. Click on “File”; on the drop down menu, click on “Save To” and on the next Drop down, click on “Google Earth” and “My Places” (Figure 5).

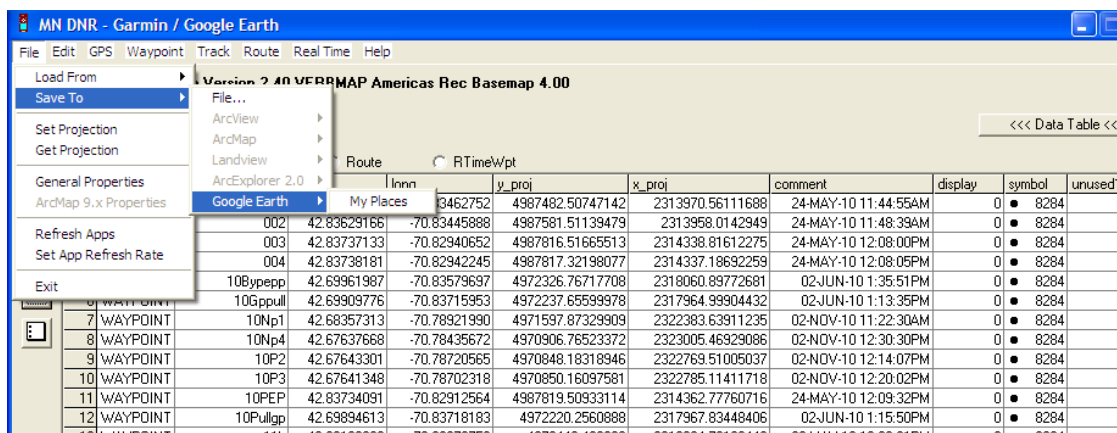


Figure 5

- b. It will ask you to “Define the Output Shape”. Click on “Point” if you are downloading points, and click on “OK” (Figure 6).

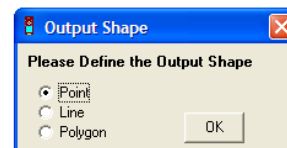


Figure 6

- c. This will transfer all of the points. If this happens successfully you will get the message “File was successfully saved to My Places. To update My Places in Google Earth right-click on the My Places icon and select REVERT.”

When you get this message, Click OK, and Go to Google Earth, right-click on the My Places icon and select REVERT.

It will ask “Do you want to revert to “My Places”, and lose any edits you have made? Click “Yes.” The map will now show thumbtacks in all the places that you just downloaded once you zoom in to the correct area (Figure 7).

- d. Check the points against your data sheet to make sure all the points on your data sheet are transferred to Google Earth. Sometimes mappers forget to hit “ok” twice when using the Garmin GPS unit, and the waypoint may not be stored in its memory.

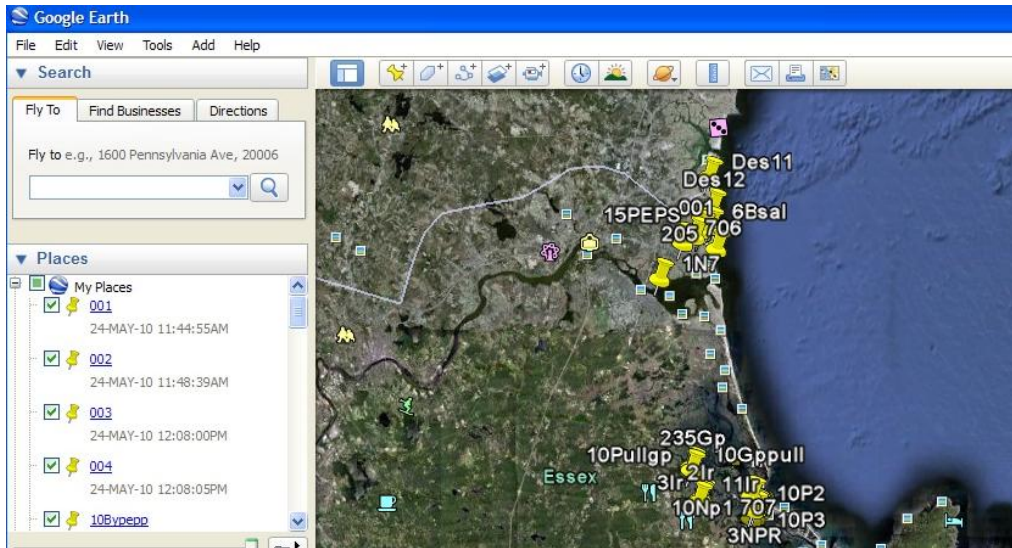


Figure 72 Google Earth- Zoomed in to regions mapped

3. Edit the appearance of your points and create paths and areas

a. Resizing Thumbtacks

You may want to change the size of the thumbtacks if they are taking up too much space visually.

To do this: Right click on a thumb tack, and scroll down to “Properties”. Click on the “Style, Color” tab, and change the Icon Scale to .5.

b. Changing Color of Thumbtacks

You may also change the color of the tack. We suggest you **change the thumbtacks to green to indicate spots where no pepperweed is growing**. The colors they offer do not all work. Experiment to see what is visually useful.

- c. **Enter points by hand on Google Earth.** If some of your points are not downloaded to Google Earth, enter them in by hand.

(1) To do this if you know the coordinates:

- a. Click on the thumbtack icon.
- b. Type in the Latitude and Longitude (in decimal degrees)

- c. Name your Placemark
 - d. Click on “Style, Color” tab, and change the icon size to .5. If it is a spot marking where no pepperweed is, change the color to green.
 - e. Click ok, to lock the point in place.
- (2) To do this visually:
- a. Click on the thumbtack icon.
 - b. Drag the thumbtack to the desired location.
 - c. Click OK

d. Drawing Lines: Connect Points by hand

When mapping large infestations of pepperweed, we often mark the beginning and end points of a patch. The pepperweed typically grows along the upper edge of a marsh. To indicate a line on the marsh, we draw a double pointed arrow between the two points.

When you are editing your downloaded data, please do the following:



Figure 8 Line icon

- (1) Click on the line icon (Figure 8)
- (2) If it is a short, straight line, click near the first thumbtack, and then click again at the second thumbtack.
- (3) Click on Style and Color. Change the Color to match the color of the thumbtacks. Yellow for pepperweed, green for no pepperweed.
- (4) Change the width of the line to 3, or 5, depending on how wide the patch of pepperweed is. We want the line to be visible when we zoom out.
- (5) If the line is long and not straight, click several times along the path that the pepperweed follows (Figure 9). Then make color and size changes as indicated above.
- (6) Optional: Once you have the line in place, you can put one tack in the midpoint of the line to be a marker for the patch, and remove the two endpoints. This allows you to count that as “one patch” rather than more than one.



Figure 9 Lines drawn on map

- (7) If your patch is a polygon, rather than a line, you can use the polygon tool to indicate its location. You can also use the polygon tool to indicate areas that you have mapped that are free of pepperweed. Click on the polygon tool, and then click a series of points to outline the area, and click OK.

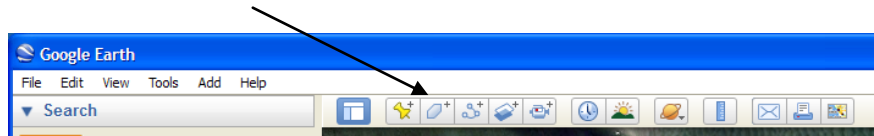


Figure 3 Polygon icon

The green area below is clear of pepperweed as of 2010 (Figure 11).



Figure 4 Green polygon and green lines were clear of pepperweed in 2010.

4. Organize, share, and save your work:

- a. **Organize:** Make a folder by right clicking on “My Places” and then “Add” and “Folder” (left click). Give the folder a name. This might be the town or region you mapped in, and the date. Be sure the “Allow this folder to be expanded” is checked. You could put the mapper name in the description if you like.
- b. **Save:** Drag and drop all of the points, lines, and polygons into that folder. Drag the points to a space below the desired folder. The folder will not be highlighted, but you can check to see if the point is there by opening the folder (click +) and noticing that the points have been indented.

If you have more than one person working on this, save this in a shared folder, and then delete from “My Places” on your own computer.

Warning: When we had the file saved in more than one place, we ran into the problem of having multiple thumbtacks representing the same place. Always save the master copy under the same name on your own computer.

c. Delete or move points out of folders:

- (1) To delete, click on the item listed under My Places that you wish to delete. Right click, and choose delete from the drop down menu.
- (2) To move, click on the item in the folder and drag it to the area below the desired folder.

d. Share: If you are working in partnership with others, Email that folder to the lead to make sure you have your work in more than one place.

To do so, right click on the folder that all of your points are in and drag and click on “email”. Hopefully you have outlook or gmail, as those are the two choices they give you. Click on the type of email you have and type in the email address you choose. Click “send”, and it is on its way.