GPS Lesson 5
USING TRACK LOG DATA
TEACHER INFORMATION


Lesson Summary: During this lesson students will use trail data they have collected on a local field trip with their GPS units and digital cameras. They will download their GPS track logs and create a CSV file, which they then use to make a map in AEJEE.

Objectives: Students will learn to download track log data from their GPS units and to create a CSV file which they then use to make a map in AEJEE.

Estimated Time: 1 hour

Correlation to Alaska Standards:

Geography A-6 Use spatial (geographic) tools and technologies to analyze and develop explanations and solutions to geographic problems.

Technology A-1 Use a computer to enter and retrieve information.

BACKGROUND FOR THE TEACHER

This lesson assumes that students have already collected and saved track log data as described in GPS Lesson 2. It then teaches students how to prepare that GPS track log data for inclusion in an AEJEE GIS map. This lesson is quite similar to GPS Lesson 3 - Using Your Own Field Trip Data, with two exceptions:

- This lesson deals with track log data instead of waypoint data
- This lesson guides students through the download, CSV file creation and map creation processes but does not repeat instructions for map layout.

Therefore, if map layout is to be included, students will need to refer to GPS Lesson 3 or GIS Lesson 11 for guidance.

The best data is the students' own data, and students are very excited to see their own observations and pictures attached to an AEJEE map. If time or weather issues preclude students being able to make their own field trip observations, you may opt to go out yourself and make observations and collect

a GPS track log along a road, trail or near the school, and then share the pictures and GPS unit with students so they can download and prepare the data.

At the end of the lesson, you might ask the students for ideas about other field trips that could be documented this way and shared on maps that would be interesting to the local community.

Some important concepts and tips for success:

- Please review GPS Lesson 3 and the information provided on CSV files and layouts that appears in other lessons

MATERIALS

- Computers - one for each student is best or two students can share. The computers must meet the following specifications to run AEJEE:
  - Macintosh: MacOS 10.3 or above, 100 MB hard drive space, Internet connection; recommend G4 or faster processor and more than 64 MB RAM.
    - We recommend: Mac OS 10.4 or above, 500 MB hard drive space (400 MB for data).
- AEJEE, BaseCamp and GPSBabel software and MapTEACH GIS data can be downloaded from the MapTEACH website at http://www.mapteach.org, or provided by MapTEACH on a DVD by contacting:

  De Anne Stevens - MapTEACH
  Alaska Division of Geological & Geophysical Surveys
  3354 College Road
  Fairbanks, AK 99709-3707
  Tel: 907-451-5014
  E-mail: deanne.stevens@alaska.gov
- GPS units with track logs of the field trip sites, and GPS/USB download cables
- Copies of student directions for the lesson.

INSTRUCTIONAL PROCEDURES

Getting Ready

- At the minimum, have a single GPS unit prepared with a track log, so that the track log includes the locations of sites of interest and digital photos. Students can then all download data from this one shared GPS unit.
- Ideally, students will use records from a field trip where groups of students were able to travel a trail or route and collect their own: digital photo, GPS track logs, and observation notes. Students will need to keep careful track of which camera and which GPS unit they used. They may also have collected waypoints for sites of interest along the trail, which can be added to their AEJEE project as an optional extra step.
- Check, update and/or maintain all student equipment including computers so everything works as smoothly as possible.

- Prepare materials for the lesson and try out all the activities well in advance before the students work through them.
- **Make sure your local base map data layers (topography and satellite imagery) are accessible in the Data_MapTEACH_WGS84 directory and that you have the file names and directory locations written down correctly. You will need to supply this information and the correct angle for the North arrow for your local area to your students before they can make their local field trip maps.**

Gear-up

- Remind students of the field trip they took when track log data was collected and explain that a track log is a series of coordinates of points along the way that the GPS can automatically collect if you set it up to do that. This is like a breadcrumb trail, where each breadcrumb is a point that the GPS locates and records the location of. This sprinkling of points shows where you have traveled with your GPS unit.
- Explain that in this lesson they will download track logs collected by the GPS units and then make an AEJEE map of their trail.
- If students are going to work on layouts in the current session, they will need to refer to GPS Lesson 3 – Explore 4 and understand that instead of adding waypoints to an AEJEE map, they will be adding track logs

TEACHER RESOURCES

Specific instructions for creating CSV files with Macs and PCs to make point shapefiles and hotlinks can be found in ESRI's "Introduction to ArcExplorer—Java Edition for Education" for AEJEE 2.3 available as an Adobe Acrobat PDF:
http://downloads2.esri.com/EdComm2007/software/aejee/aejee23.pdf

Wikipedia provides information about Comma-Separated Values (CSV) files at:
http://en.wikipedia.org/wiki/Comma-separated_values

TEACHER REFERENCES

GPSBabel converts waypoints, tracks, and routes collected using GPS from one format to another (including CSV files) and runs on multiple computer platforms
http://www.gpsbabel.org/

Name:_____

GPS Lesson 5
USING TRACK LOG DATA
STUDENT EXERCISE

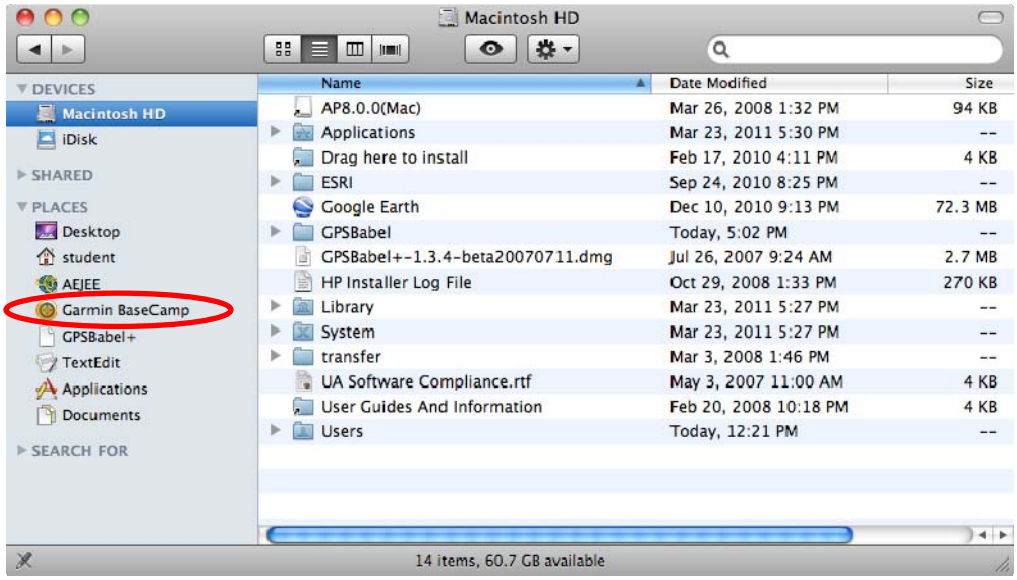
Objectives: Students will learn to download track log data from their GPS units, create a CSV file and make a map using these data in AEJEE.

Estimated Time: 1 hour

Explore 1: Download your GPS track log

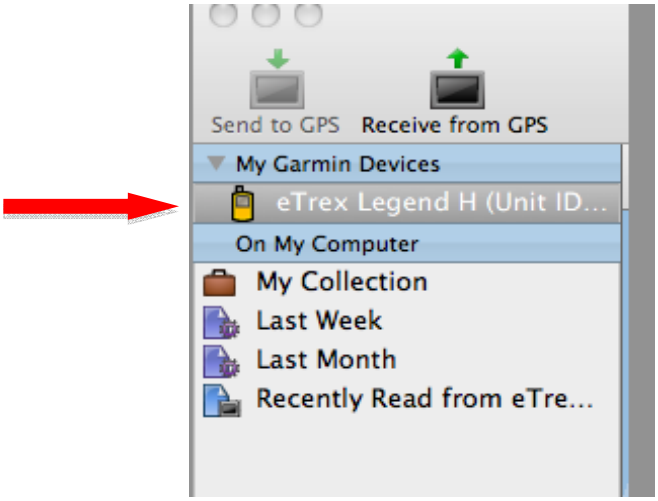
1. **Connect the cable to your GPS unit and plug it into a USB port** on your Macintosh.

2. **Start "Base Camp"**. You can start it from the dock on your computer or from its icon on the desktop.

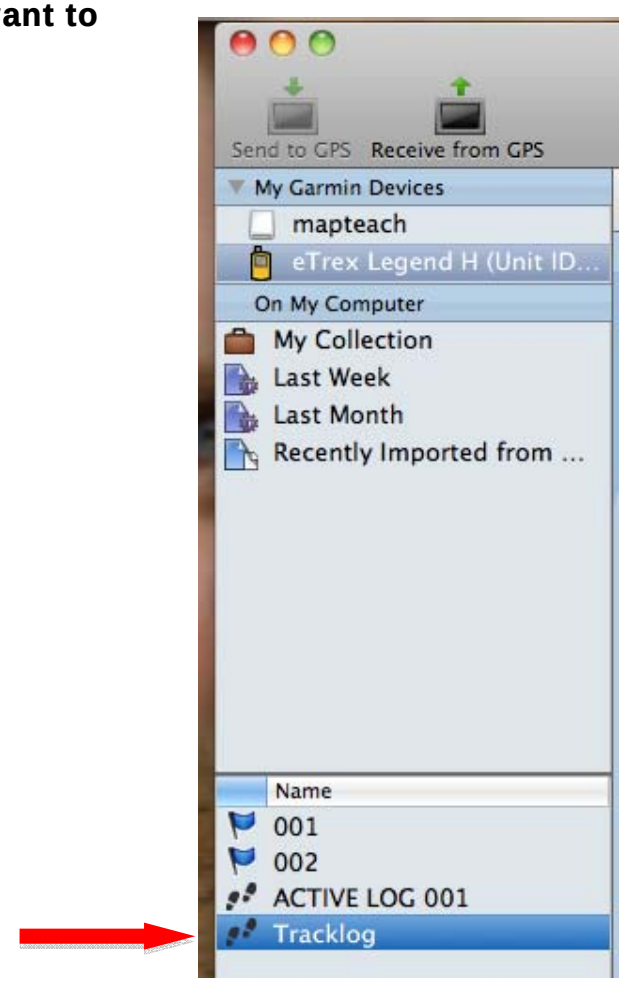


3. **Turn on your GPS unit.** Wait a minute for the computer to recognize the unit. You will then see your GPS unit listed on the left side of the BaseCamp screen.

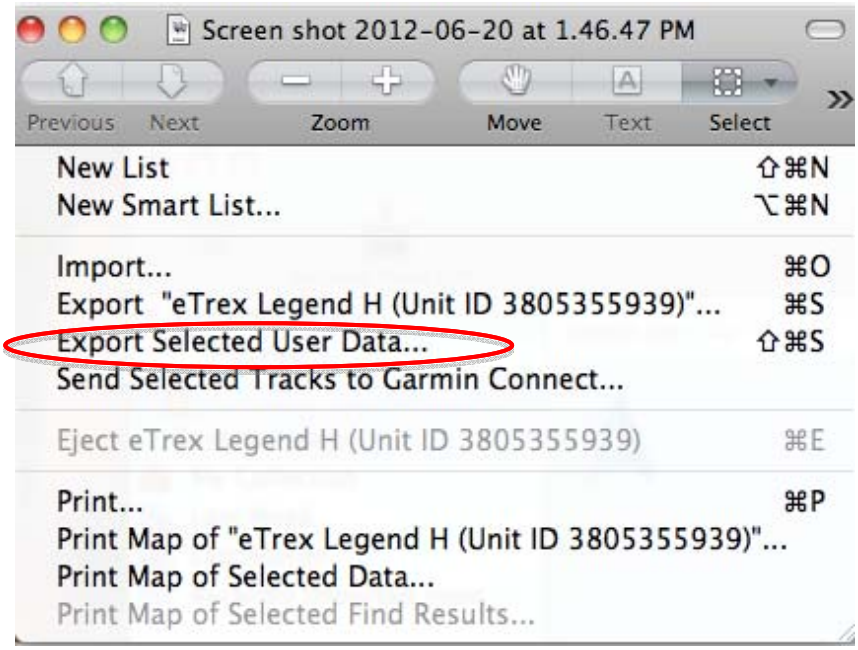
4. **Click on "eTrex Legend H"** on the left side of the screen. When you do this, your waypoints and track log will appear.



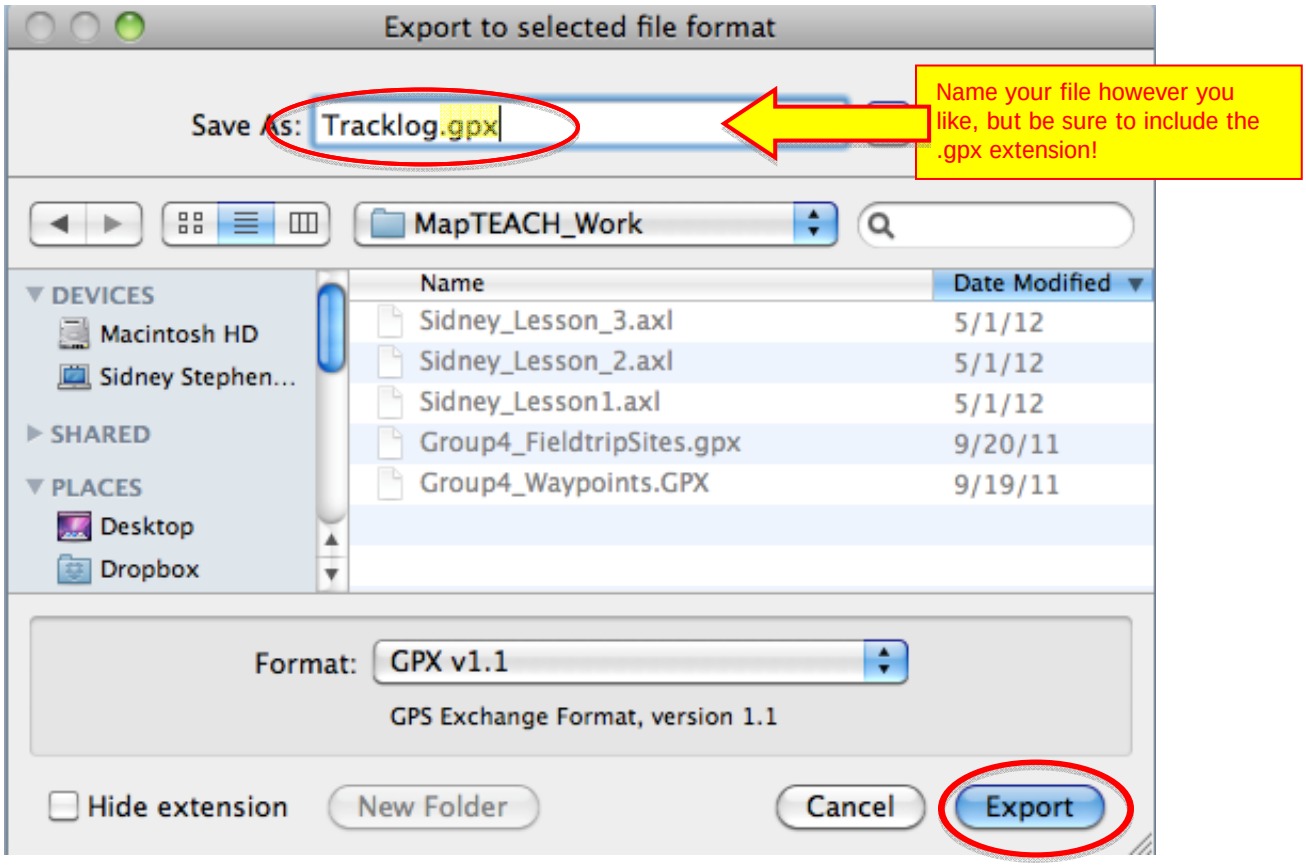
5. **Select the track record that you want to export by highlighting it.**



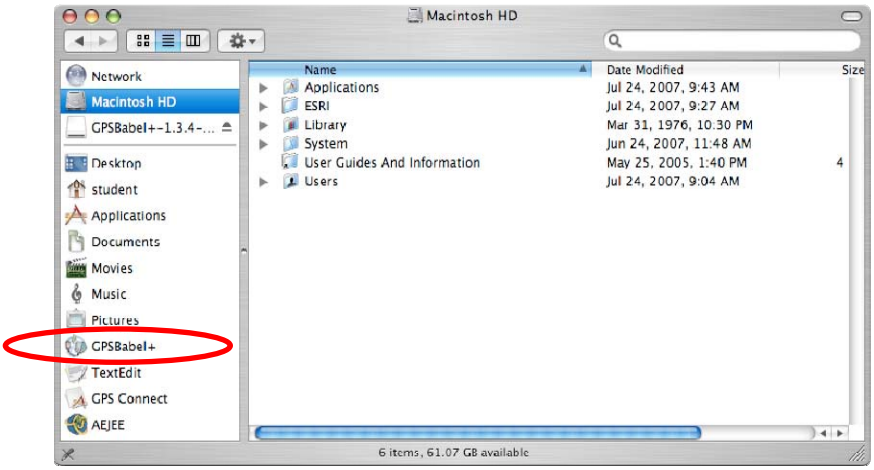
6. To export your selection, **click on "File" and then click "Export Selected User Data."**



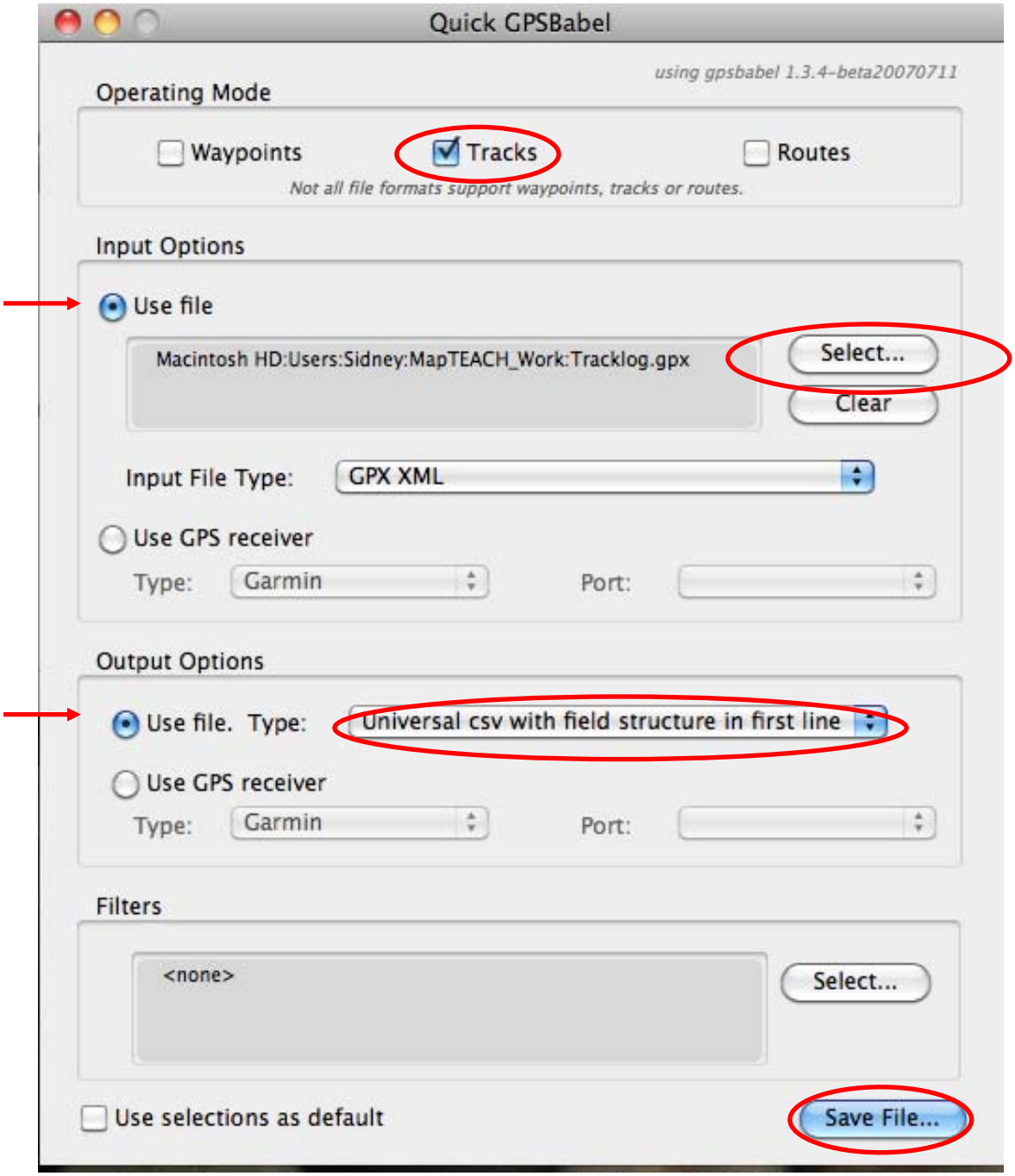
7. Click **"Save File"** and **save the file in your MapTEACH _Work folder**. Name it whatever you like, but be sure **to include the .gpx extension.**



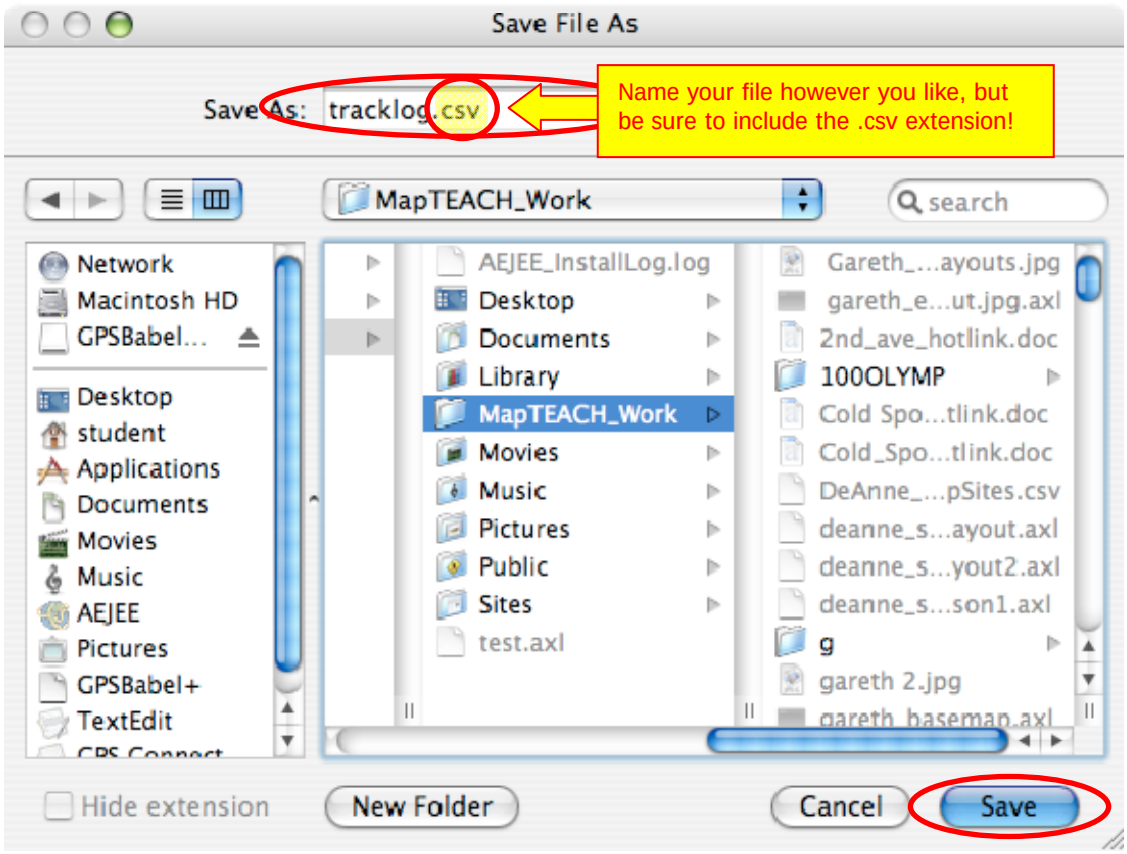
8. **Turn on the GPS unit, then Start GPSBabel**. You can launch it from the dock on your computer or from its icon on the desktop.



9. In the Quick GPSBabel window:
   - For the Operating Mode: **Check "Tracks"**.
   - For the Input Options: **Check "Use File"**.
   - Click on **"Select"**, browse to your MapTEACH_Work folder, and **select the .gpx** file that you just created and saved.
   - For the Output Options: **Check "Use file"** and **select "Universal csv with field structure in first line"** for the Type drop-down menu.
   -



10. **Click "Save File,"** and **save the file in your MapTEACH_Work** folder. Name it whatever you like, but ***be sure to include the .csv extension*** so the computer will know that this is a Comma Separated Value file.



11. **Exit** the GPSBabel program and pass the GPS unit and cable to the next person in your group.

Show your .csv file to your teacher.

Teacher sign-off: _____
(Check for errors)

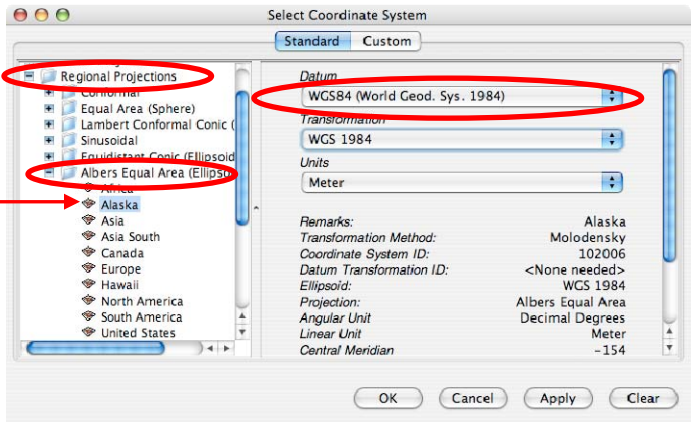
Explore 2: Add a Track Log to Your AEJEE Map

1. **Open AEJEE** and start a new map.

2. Navigate to the folder **/ESRI/AEJEE/Data/Data_MapTEACH_WGS84**.

3. **Add *Coastline_Simple*** from the ***Base_Data*** folder

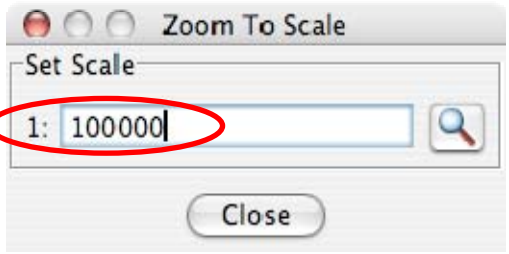
4. **Set your projection** to **Regional Projections/Albers Equal Area (Ellipsoid)** and select **Alaska. Set your datum** to **WGS84 (World Geod. Sys. 1984)**



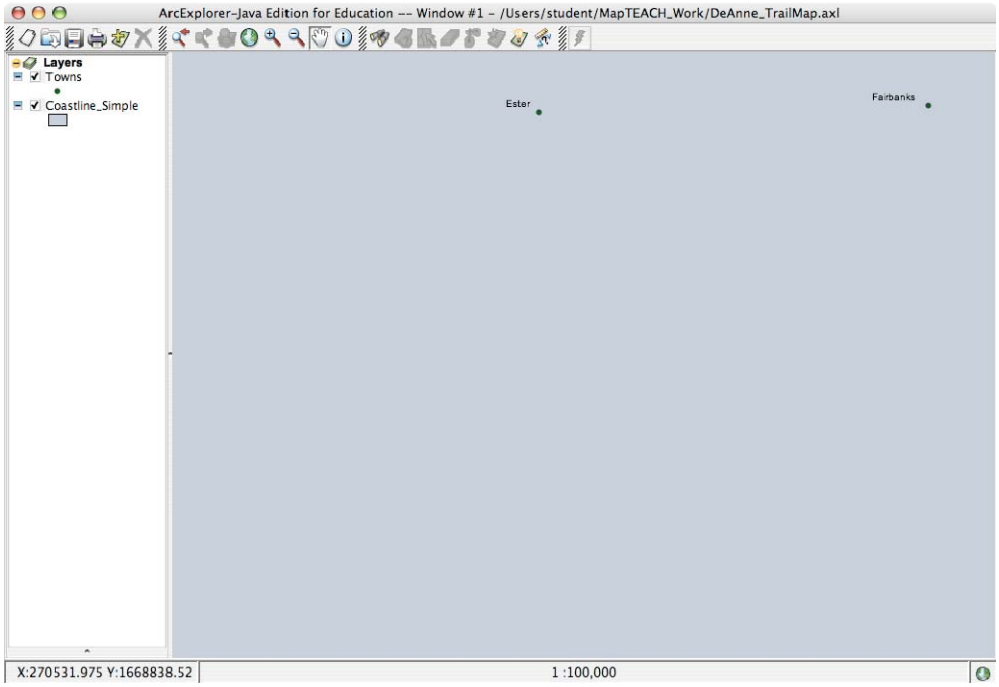
5. **Add *Towns*** from the ***Infrastructure*** folder.

6. Label the ***Towns*** using **Name**.

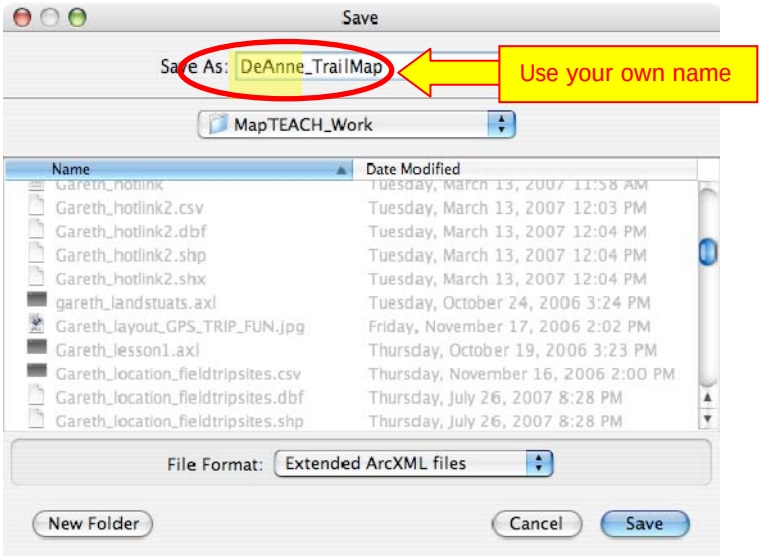
7. Zoom in on your general field trip location so it is in the middle of the screen. Use the **Zoom to Scale tool** to **zoom-in** to a scale of **1:100,000**.



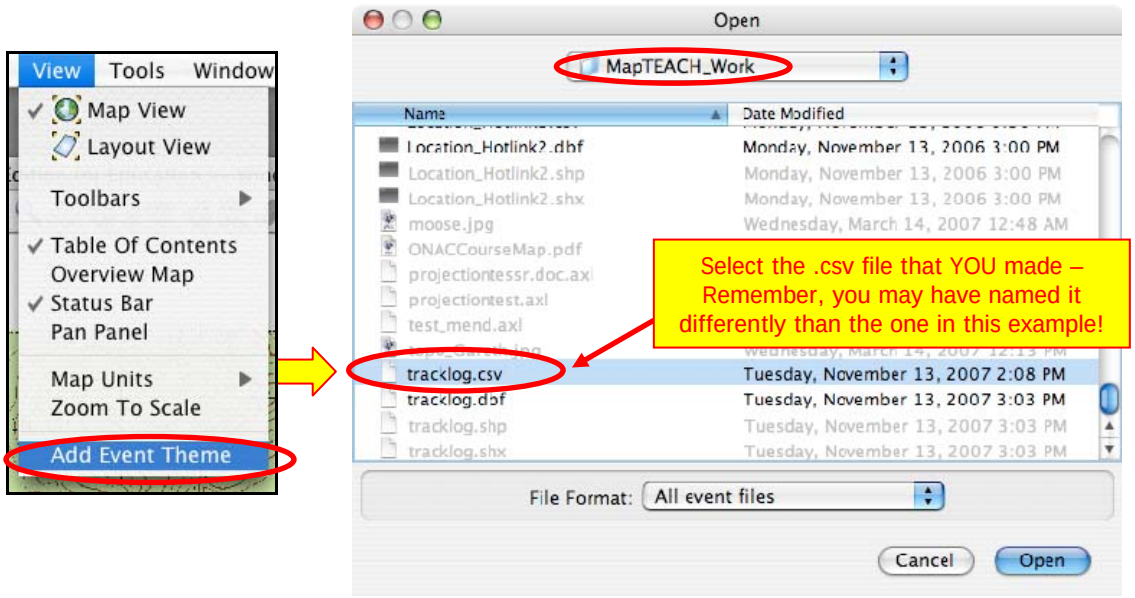
Your map might look something like this:



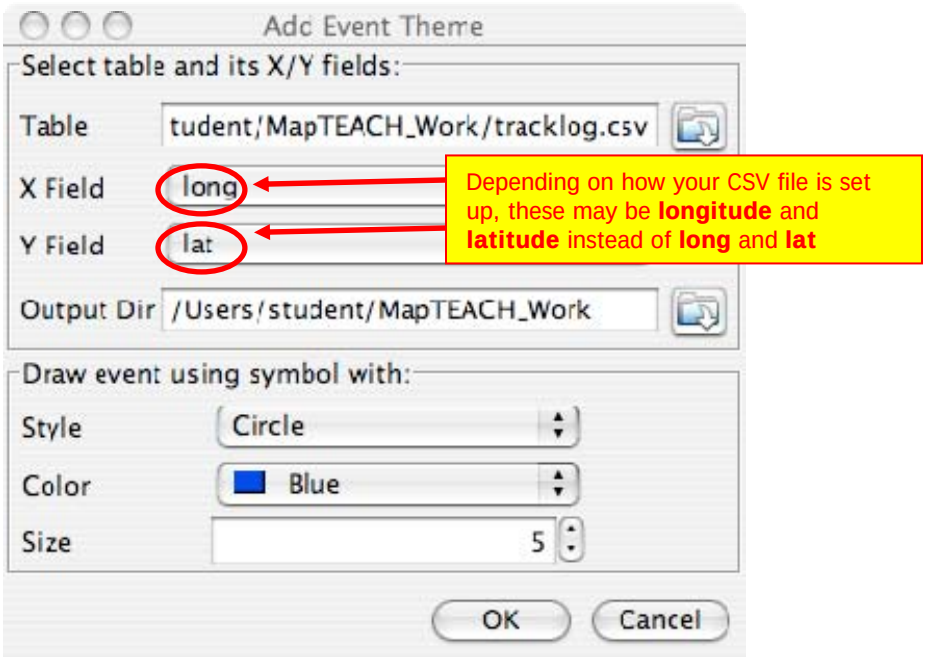
8. **Save** your map project:
   - **Click** on **"File"** in the Menu Bar
   - Select **"Save As"**
   - **Navigate** to the **student/MapTEACH_Work** folder
   - **Name the project** using your name followed by "TrailMap": **firstname_TrailMap**



9. Now we can add and view our points with **"Add Event Theme"** from the AEJEE "View" menu.

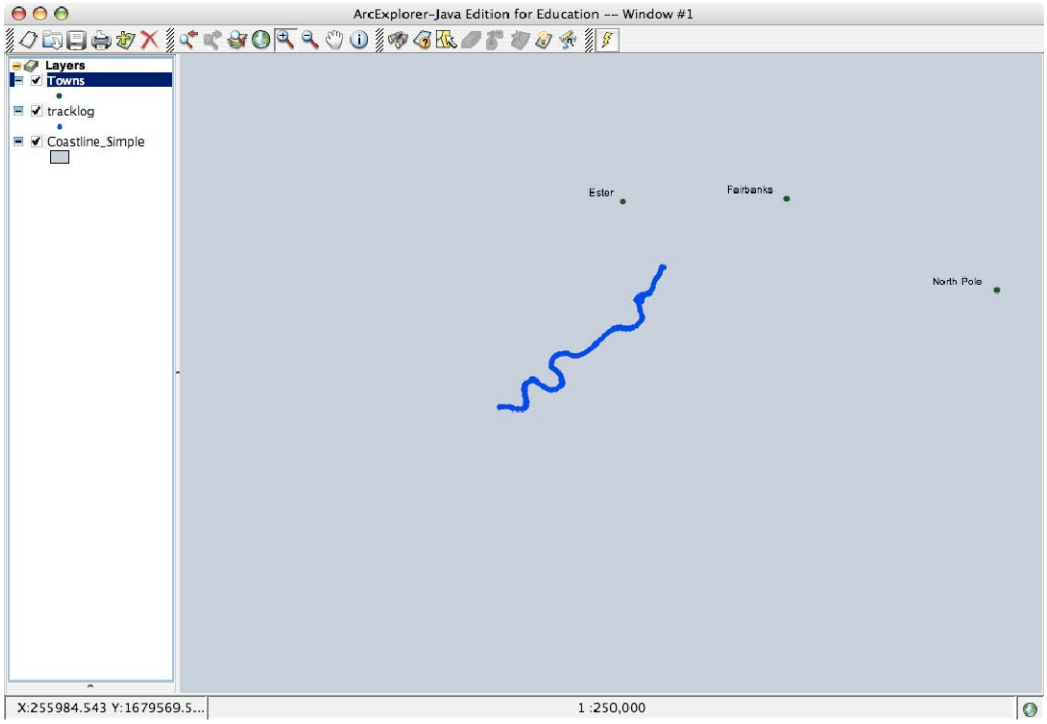


10. **Select your .csv file for "Table,"** set **"long"** or **"longitude"** for **X Field** and **"lat"** or **"latitude"** for **Y Field**. Make the symbol style, color and size whatever you like.



11. Zoom out so your entire track log is visible.

Your map might look something like this:



12. **Turn off *Coastline_Simple***.

13. **Add layers for your local topography and satellite imagery.** Your teacher will provide the file names and directory locations for these data layers. See how your map looks with different satellite imagery as a background and how it looks with the topographic map as a background by checking and unchecking the boxes next to the names of the raster data layers.

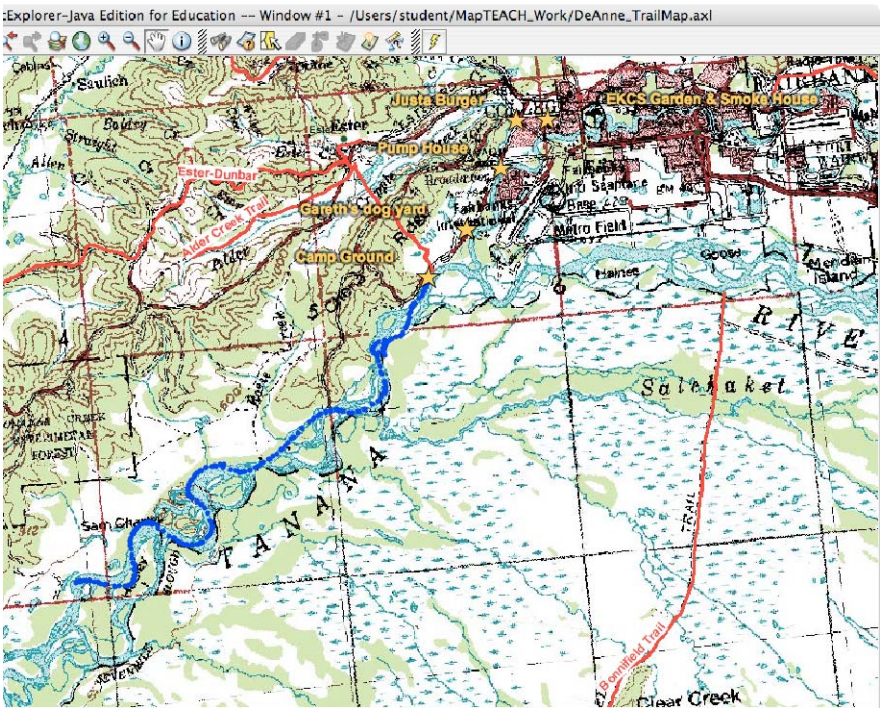
14. **Pick the base layer (topographic map or a satellite image) you like best and leave it turned on**. Turn off or remove the raster data layers you are not using.

15. Zoom in and out to see what view looks best.

16. If you have other data you would like to add to your map, do so. This might include sites that you have visited and collected GPS points for during a class field trip, or it might be other data layers from the Data_MapTEACH_WGS84 folder.

17. **Symbolize** your points and text the way you like them. Make sure that your points and text are large enough so you are able to read them easily.

Your map might look something like this:



Save your project and have a teacher sign off.

Teacher sign-off: _____
(Check that student has selected appropriate base map and symbology)

If you want to continue on to map layout
****ASK YOUR TEACHER IF YOU SHOULD CONTINUE****

If you continue, you will need to use GPS 3 – Explore 4 or GIS 11 for guidance on map layout. Remember that you cannot save layouts, so make sure you have enough time to do a complete layout before you begin.