

Linking Digital Photos to a PhotoPt Feature Using TerraSync Software

Alaska Regional Office - GIS Team Cheatsheet
Created 3/1/07; Last Modified: February 2, 2009

Purpose

This document is intended to provide steps for linking digital photos with a PhotoPt feature collected in the field with Trimble TerraSync software. Photos and PhotoPt shapefile are processed using GPSPhotoLink software. Photos of features mapped with GPS are useful for site description and form a basis for hyperlink functions in GIS.

Introduction

The PhotoPt feature is collected in Trimble TerraSync Field software. The linking is accomplished using GeoSpatial Experts GPS-Photo Link software*. The digital photo may be taken with any camera constructed in the last 5 years.

How does this work? The time of the digital photo is matched to the time of a GPS location. The coordinates of that GPS location are then linked (GeoTagged) to the photograph. These coordinates may be watermarked on the photo or used to position the photos in geospatial software such as ArcMap or Google Earth.

The time of the digital photo is recorded in the digital photo file according to the camera clock. Usually camera time does not match GPS time to the second. GPS-Photo Link software can eliminate the time discrepancy, if we take a photo of UTC time. The software will display this photo so that we can enter the UTC time in the software. Then it calculates the time offset and applies it to each photo in order to link each photo to the correct GPS position.

There are a variety of ways to use GPS-Photo Link software. This procedure describes one specific way. Let's say you want to collect the locations of all the light poles and create geotagged photographs of some of them. Even though your Data Dictionary already includes a feature called Lightpol, you will not link the photographs to this feature. Instead, you will use another feature called PhotoPt, and link the photographs to it. This means that if you want to create a geotagged photograph of a light pole, you will need to collect the light pole location twice – once as the Lightpol feature and a second time as the PhotoPt feature. This also means that the coordinates watermarked on the photo will be the coordinates calculated for the PhotoPt feature, not the coordinates calculated for the Lightpol feature. Furthermore, we will use PhotoPt feature for any feature we choose to photograph, not just the light poles.

The PhotoPt feature can be copied from the Refer_Features_NPS.ddf, or can be created in Trimble's Data Dictionary Editor.

Links

Alaska's Photo and GPS page – Dedicated to geotagging
<http://165.83.62.205/rgr/akgis/index.cfm?action=dsp&topic=gps&item=photo>

Download from Alaska Professional GPS page the Data dictionary. Copy and paste the Photo_Pt feature into your data dictionary. http://165.83.62.205/rgr/akgis/documents/GPS/Photo/Refer_Features_NPS.zip

Managing photos is a nightmare. Use this executable to create a photo directory.
<http://165.83.62.205/rgr/akgis/documents/GPSToolBox/PhotoGPSToolKit07/Cheatsheets/GPLPhotoManager.exe>

* www.geospatialexperts.com, select Downloads, complete survey, select [Download GPS-Photo Link: Trial Version](#)

Pre-Field

Digital Camera Setup: Set Camera Date/Time to match GPS Time as closely as possible

1. Bring additional batteries
2. Clear all photos from camera. (Not absolutely required, however highly recommended.)
3. Set resolution to at least 2MB. (Note: higher resolution will require more card space and more disk space.)
4. Turn off Date/Time Stamp on camera, also known as Watermark on some cameras.
5. Verify GPS Time is current – turn on GPS Receiver, in TerraSync/Status/Receiver verify almanac is less than 1 week old
6. Display GPS Time – in TerraSync/Status/UTC Time page (make sure the receiver is tracking satellites)
7. Calculate your local time for your camera- subtract appropriate number of hours (for Fairbanks on Standard Time, subtract 9 hours)
8. Set correct time on camera - find the Date/Time set screen, wait until the seconds on the UTC page roll into the next minute and set the camera to the UTC minute. Practice makes it possible to calibrate camera within several seconds of GPS time.

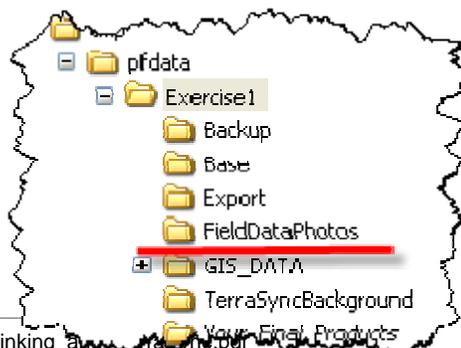
Screenshot showing UTC time in TerraSync and corresponding Local time offsets depending on Date. For November 4th in Fairbanks a user would subtract 9 hours: 20:51:02 - 9 = 11:51:02 am

Local Time Zone	GMT Offset	2008	2009
Alaska Daylight Saving	Subtract 8 hours from UTC	Begins March 9	Begins March 8
Alaska Standard	Subtract 9 hours from UTC	Begins November 2	Begins November 1



File Management Setup: If you do not have a photo file management scheme in place BEFORE the field, organizing photos will be a nightmare.

Make sure FieldDataFolder is in your Exercise1 project folder. This was created during the Project Folder setup portion of class



Don't have a photo file management system? Click [this link](#) to download a directory to store your photos.

Field

Photograph UTC Time on the GPS Receiver

CAUTION: Never change camera time after taking the first picture of GPS time, or you risk photos linking to the wrong GPS location.

1. Display GPS Time – in TerraSync/Status/UTC Time page (make sure the receiver is tracking satellites)
2. Position GPS datalogger - hold GPS datalogger at arm's length (18"), slant the screen away from you (about 30 degrees) and ensure glare is kept off of the screen.
3. Photograph UTC Time - review the photo to ensure you can see time to the nearest second.



TIP For Collecting GPS Positions and Photographing Features (Point and Shoot): Always begin collecting GPS positions (Point) before photographing (Shoot) the feature. The GPS time of a feature is the time of the first position that is stored in PhotoPt feature - not the time of the last position that is stored. Therefore, in the GPS-Photo Link software we will choose "Match to closest point BEFORE photo". (See Page 8).

First: Collecting PhotoPt feature – Single or Two-Person Team

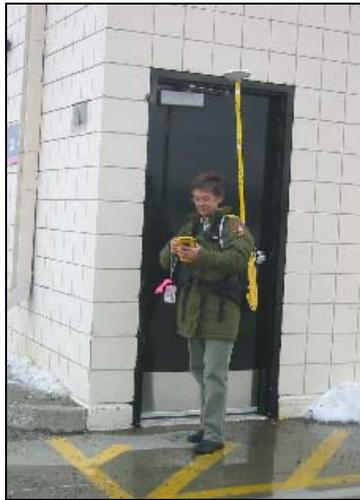
1. Select the feature for which you would like to create a geo-tagged photo. Place GPS antenna over feature. Select **PhotoPt** from the list of Feature Names and tap **Create**.
2. Fill out the Comment field – enter the name of this feature, max 30 characters. Although TerraSync accepts up to 100 characters, GPS-Photo Link's limit is 30 characters. (Note: what is entered here will appear in the Comment field in the watermark on the geo-tagged photo.)
3. If appropriate, fill out the Internal field – enter a description of the feature, max 100 characters. (Note: what is entered here will appear in the GPS-Photo Link software on a form. It does not appear in the watermark on the geo-tagged photo.)
4. If appropriate, fill out the Direction field – this is the cardinal direction (north, south, etc.) you will be facing when taking the picture. (Note: what is entered here will NOT appear in the Direction field in the watermark on the geo-tagged photo.)
5. Fill out Photographer field - your full name or initials.
6. Close feature

Second: Photographing feature — Single Person Team

1. Stand back from the feature
2. Photograph feature
3. Review photo in camera to ensure the photo is in focus. Delete image and retake, if photo is poor.

These photos depict how a one-person team would collect a photo representing the location of a building's primary entrance.

Collect PhotoPt Feature

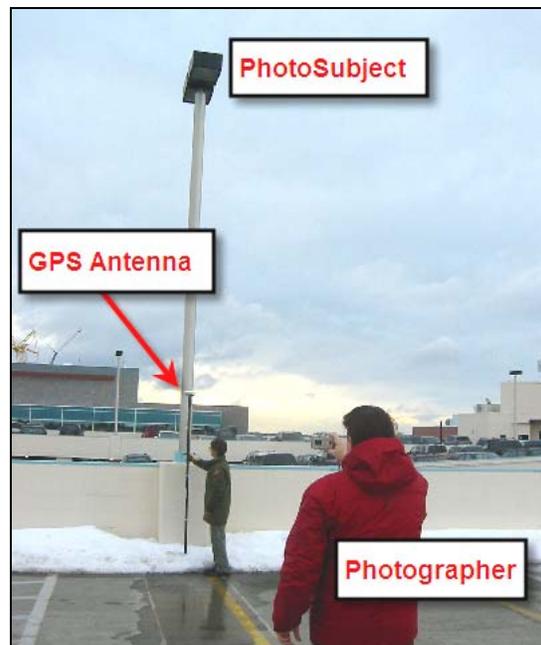


Photograph Feature



Second: Photographing feature — Two-Person Team

Photographer may elect to include the GPS antenna in the picture. Photographer waits until the other person has collected at least one position for the feature, then photographs the feature.



Post-Field

Download Photos and File Management

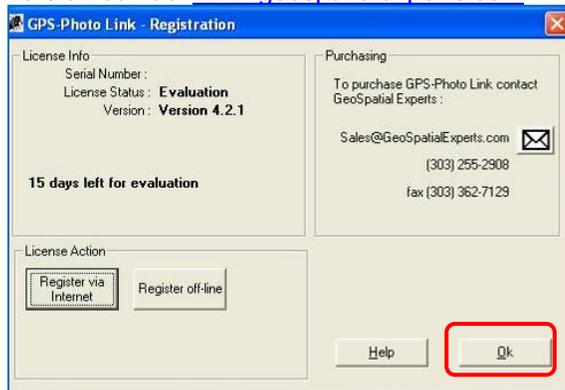
1. Connect computer to the camera or to the camera memory card.
2. Use Windows Explorer to browse to the photos in your camera or on the card, and copy them.
3. Still using Windows Explorer, browse to the **FieldDataPhotos** directory (C:/tmp/Pfdata/Exercise1/FieldDataPhotos), and paste your camera photos here.
4. Review photos – now is a good time to discard poor quality photos and remove unrelated photos

CAUTION: At this time do not edit any photos. If you rotate, resize, or alter the contrast and brightness you may lose the time the photo was taken, and then it will be impossible to geo-tag the photo. Later on there will be an opportunity to alter the photo attributes in GPS-Photo Link.

5. After photos have been copied safely to the computer, disconnect camera or card and delete photos from the camera or card in preparation for the next field trip.

GPS-Photo Link Software

1. On the desktop, open **GPS-Photo Link**  **GPS-Photo Link**
2. **Registration** Window - Click **OK** to use the Evaluation Version. This trial version does not require registration, but allows a maximum of 10 photos to be processed at one time, and watermarks each photo with the company's logo. To purchase or re-activate a previous version contact www.geospatialexperts.com

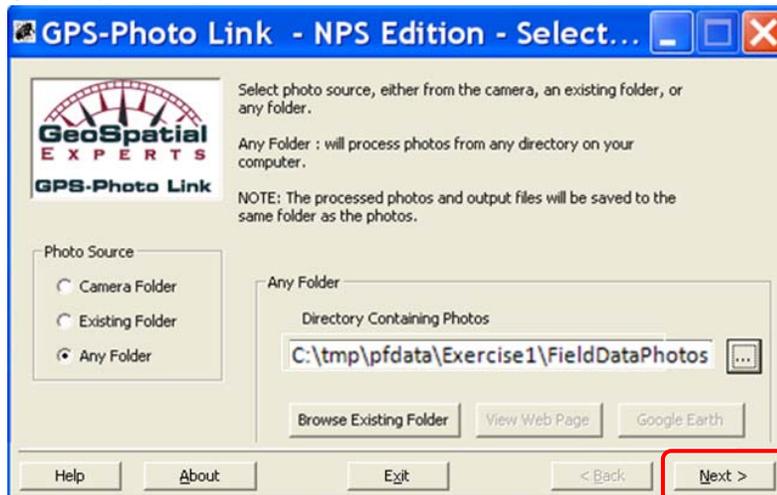


3. **Introduction Window** - Click **Next** to skip the Introduction window



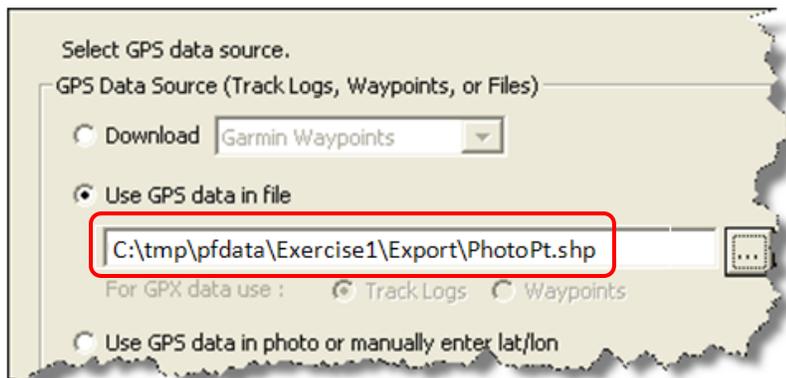
4. **Select Photos Window** –

- In the Photo Source Section, select **Any Folder**
- In the Directory Containing Photos field, browse to the **FieldDataPhotos** directory you created in your pfd data Exercise1 directory (C:/tmp/Pfd data/Exercise1/FieldDataPhotos)
- Click **Next**.

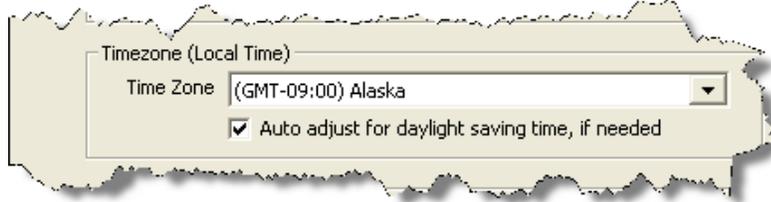


5. **GPS Data Window** –

- In the Select GPS data source section, click the radial button for **Use GPS data in file**
- Browse to **PhotoPt.shp** in the Exercise1 Export folder. (C:/tmp/Pfd data/Exercise1/Export)

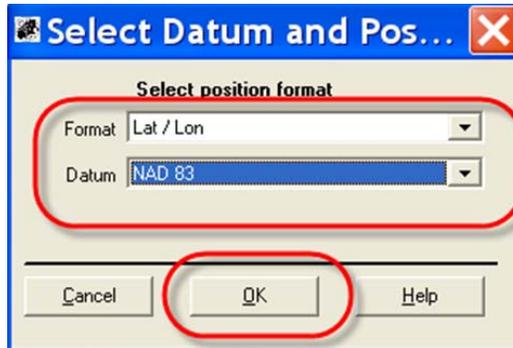


- c. In the Timezone (Local Time) section, from the dropdown menu, select **(GMT-09:00) Alaska**. Check **Auto adjust for daylight saving time, if needed**. (The software will automatically compensate to GMT-0800 when Daylight Savings Time kicks in).



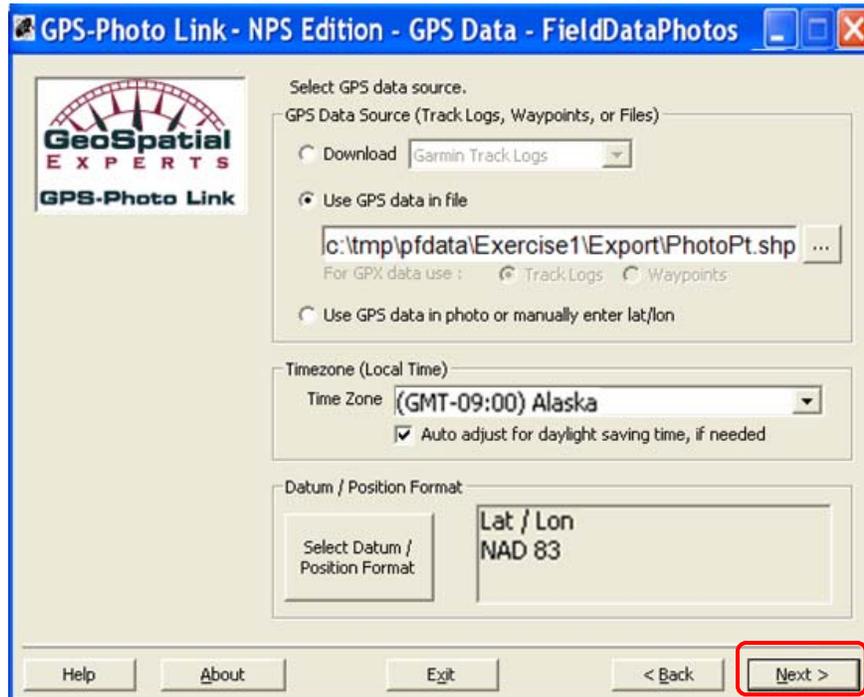
- d. In the Datum/Position Format section, the coordinate system and datum are displayed that will be used to express the coordinates in the watermark on the geo-tagged photos. Lat/Lon NAD83 is the Alaska Region National Park Service standard for display of all GPS coordinates.

Click the **Select Datum / Position Format** Button, and from the dropdown menus select **Lat / Lon** and **NAD 83**.

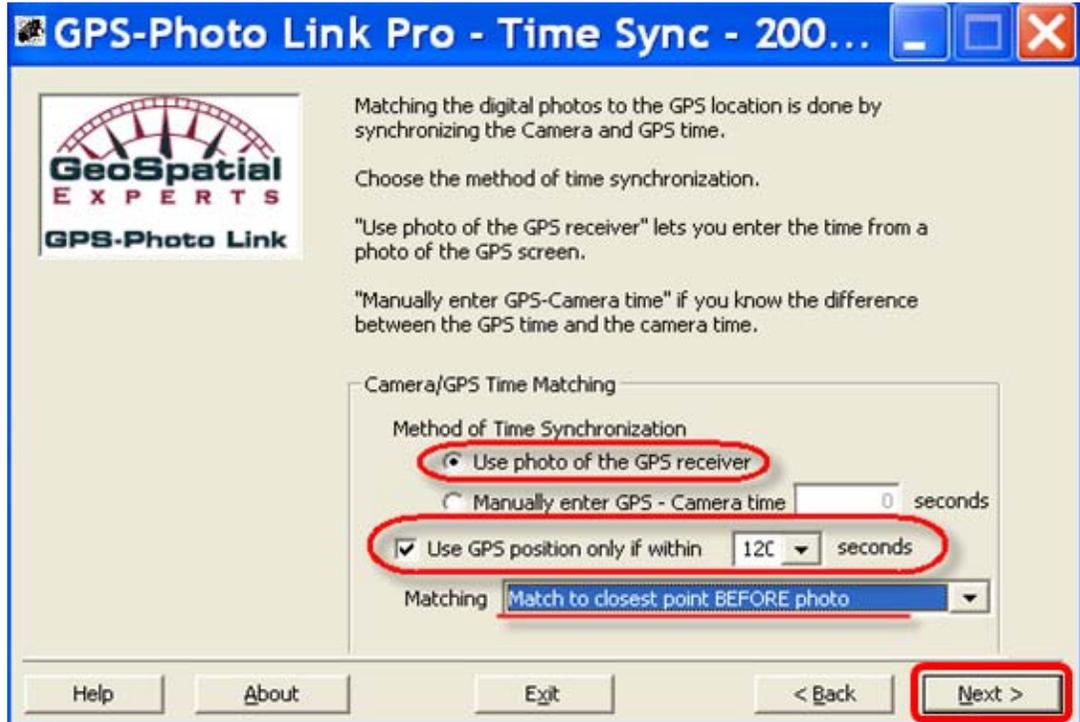


Datum Note: As of Jan 2009, this software applies no transformation to incoming data when selecting NAD 83. That's fine for this example since our PhotoPt.shp has already been transformed to NAD83 within Pathfinder office. Others *not* using this method will impart 1+meter in their solution.

- e. This is how the GPS Data window should look. Click **Next**



6. **Time Sync** Window –
 - a. Under Method of Time Synchronization, select the radial button for **Use photo of the GPS receiver**
 - b. Check the box for **Use GPS position only if within**, and from the dropdown menu select **120** seconds (Note: in the seconds field it is possible to enter a number as well as select from the dropdown menu.)
 - c. In the Matching field, from the dropdown menu, select **Match to closest point BEFORE photo**
 - d. Click **Next**

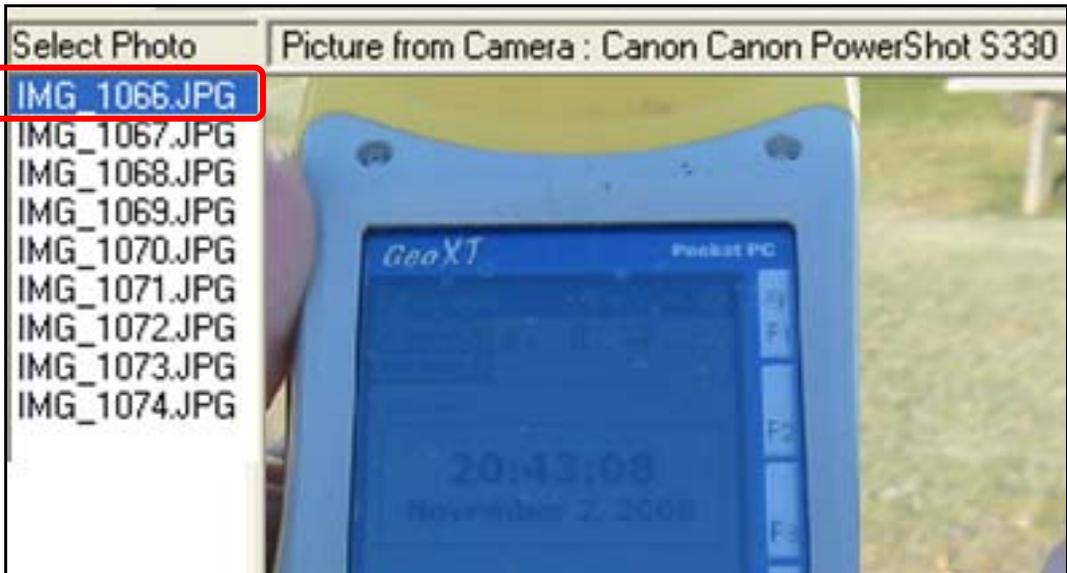
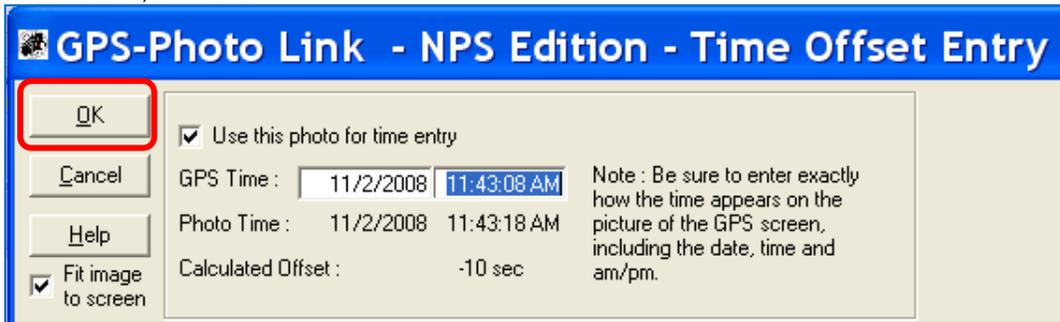


7. **Time Offset** Window –

- a. In the Select Photo section, highlight the photo of the GPS datalogger showing UTC time.
- b. Check the box for **Use this photo for time entry**
- c. In the GPS Time fields, enter the GPS date and time shown in the photo of the GPS datalogger, **adjusted for your time zone and the 12-hour clock**. In this case, be sure to subtract 9 hours from the hour shown on the screen to reflect Alaska Standard Time. (Watch date changes, also- remember, 0100 Nov 10 UTC time is really 1600 Nov 9 AST, is really 4:00pm Nov 9 AST)

The Photo Time field displays the time the photo was taken and is based on the clock in the camera. The Calculated Offset is the difference between the camera clock and the GPS time **adjusted for your time zone and the 12-hour clock**. In this example, we set the camera to within 10 seconds from the GPS.

- d. When done, click **OK**



8. **Data Entry / Photo Edit** Window –

- a. In the Title for all Photos field, enter a title that will appear in the watermark of geotagged photos. It will be the same for all photos.
- b. For the Selected Photo section, highlight each photo in turn and observe the fields.

Observe that the fields for **Photo Comment** and **Internal** are populated automatically, if this data was collected in the field, in the PhotoPt feature. You may edit these fields. If they are not populated automatically, then there is an error preventing the photos from being geotagged.

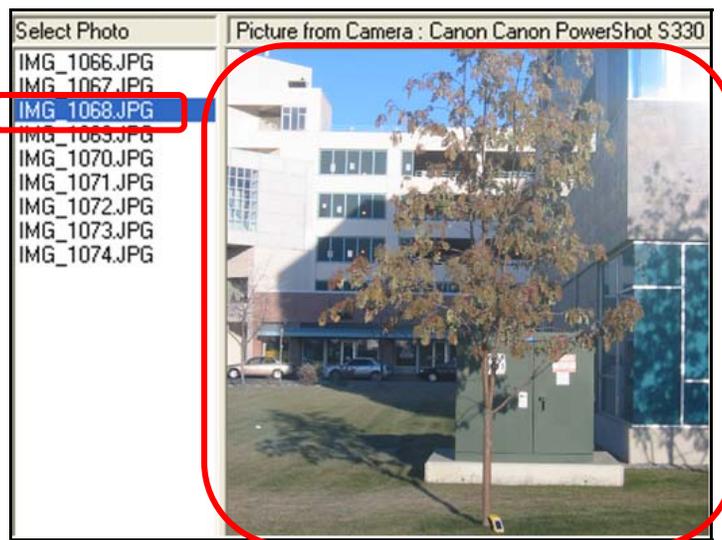
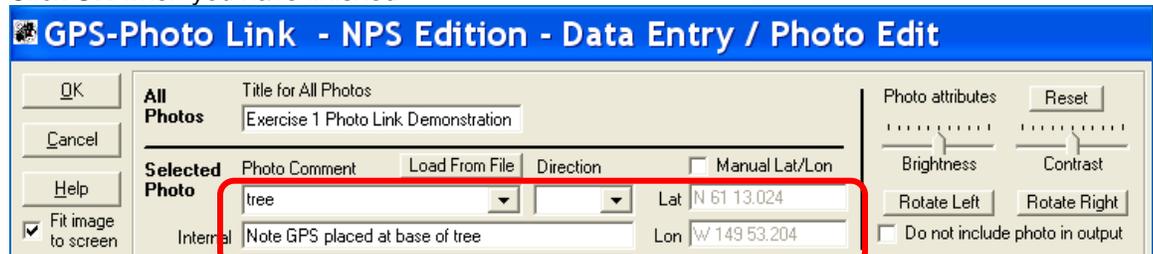
The **Direction** field is a little more complicated. If it is not populated, then it means you were standing still while collecting the PhotoPt feature. Excellent, you were implementing the good data collection techniques we emphasized in class. You may edit the field. However, if you want the field to populate automatically with bearing, then you can use an alternative data collection technique. While collecting the PhotoPt feature, move towards the feature. Can we add more description to this?

Observe that the fields for **Lat** and **Lon** are populated automatically. If they are not, then there is an error preventing the photos from being geotagged.

In the **Photo Attributes** section, now it is ok to alter the brightness, contrast and rotation.

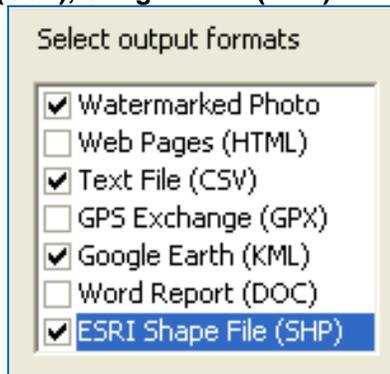
Go back and highlight the photo used in the Time Offset window. In the Comment field, type **Time Sync Photo**, or in the Photo attributes section, check the box for **Do not include photo in output**.

- c. Click **OK** when you have finished



9. **Output Options** Window –

- a. In the Select output formats section, check the boxes for **Watermarked Photo**, **Text File (CSV)**, **Google Earth (KML)** and **ESRI Shape File (SHP)**



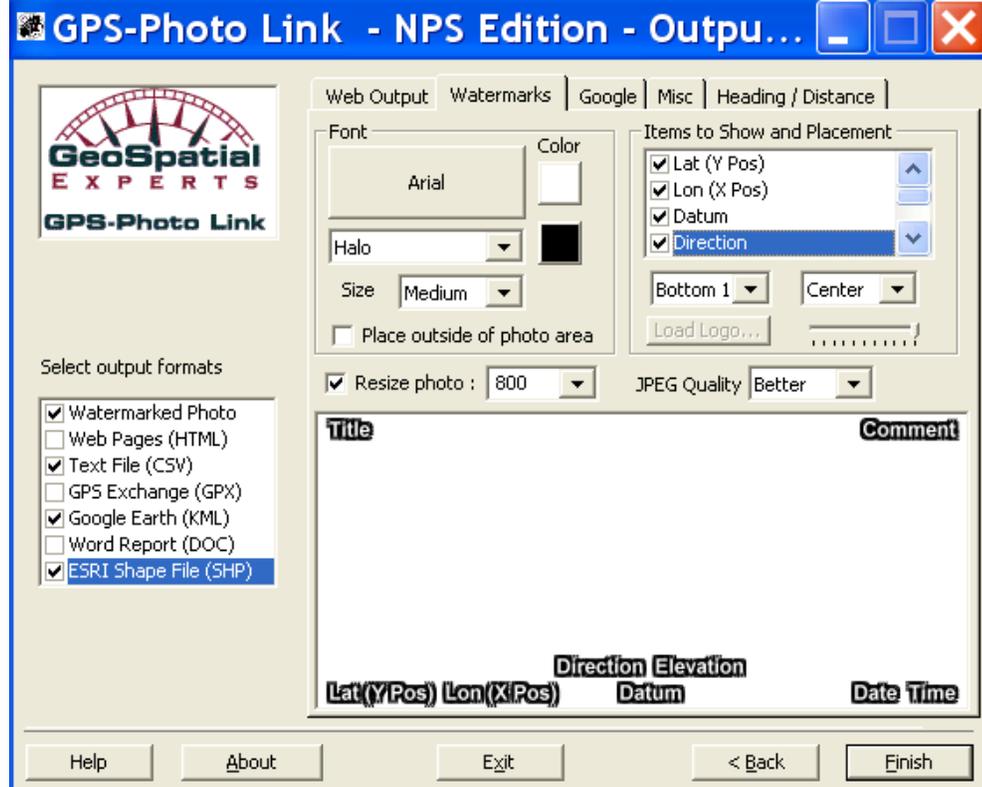
- b. In the Watermark Tab, match all the settings as shown.

Set Font Color from default Green to White (for higher contrast).

In the Items to Show and Placement field, from the dropdown menu select, **Lat (Y Pos)**, **Long (X Pos)**, **Datum**, **Elevation**, **Date**, **Time**, **Title**, **Comment**.. Highlight each one and use the fields below to determine placement on the photo – see results in photo field.

In this screen shot, Datum will be placed on the bottom level (Bottom 2) and Justified Center.

Resizing the JPEG makes it easier to email or place in presentations.



- c. In the Google Tab, match all the settings as shown, which work for a standard free version of Google Earth.

- d. In the Misc Tab, match all the settings as shown.

All format settings affect watermark display only. These do not affect shapefile coordinates.

Lat / Long DD MM.MMM is the Alaska Region National Park Service standard for display of all GPS coordinates.

Use appropriate Units for Elevation.

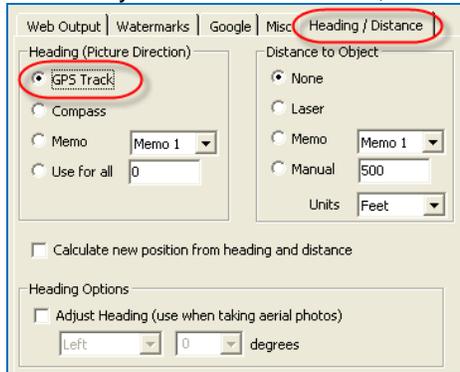
Use default size of **140** for Thumbnail default photo size. This controls the size of the small thumbnail you will observe in ArcGIS and Google Earth.

File Renaming Options: Select **Rename output files using:** Comment + MMDDYY_HHMMSS . Leave Rename original photo unchecked.

NOTE: There are many ways this program can assist in managing your photos. This one approach provides a quick method on renaming all the tagged photos with the Comment followed by the Date and Time. This generates a unique identifier for tagged images, but leaves the original photos unnamed.

- e. In the Heading / Distance Tab, match all the settings as shown.

By setting the Heading (Picture Direction) to **GPS Track**, the software will calculate the picture direction from GPS data. This is only possible if you were moving towards the photo subject while collecting the PhotoPt feature with the GPS receiver (discussed in Step 8, Data Entry / Photo Edit Window, Direction field).



- f. In the Output Options window, click **Finish**

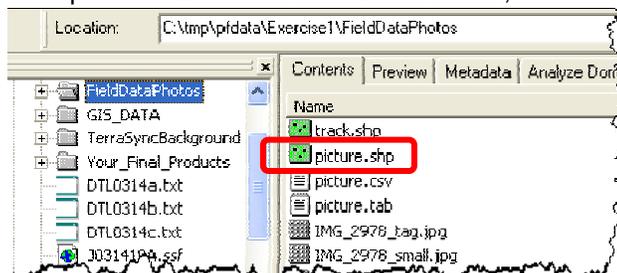


10. **Done Processing** Window – the final screen shows how many photos were linked to GPS



View Output in ArcGIS

1. Open ArcMap
2. Select the Exercise1.mxd that was saved at the end of Exercise 1
3. In the active data frame, click the Add button, browse to the folder storing the photos, C:\tmp\Pfdata\Exercise1\FieldDataPhotos , and select **picture.shp**



4. Activate the GPS PhotoLink Toolbar, by clicking **View / Toolbars / GPS-Photo Link**.

5. Click the **camera icon** and hover over a **Picture** feature.



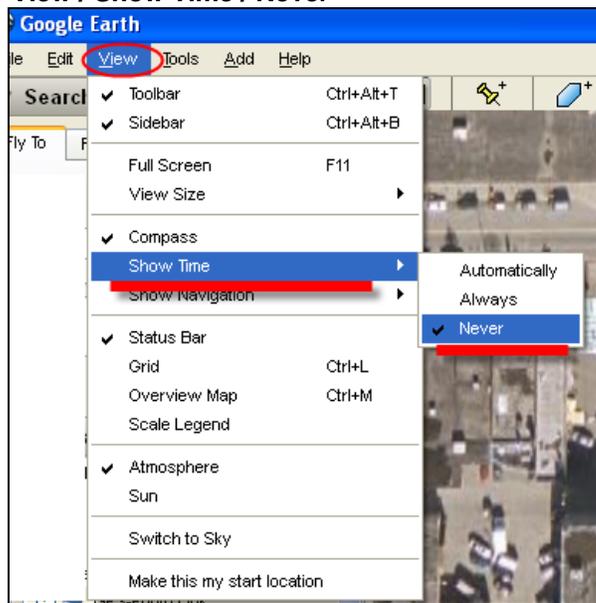
6. Clicking on the Picture hotlinks or hyperlinks to the geo-tagged photo displaying all the watermarked information.

For additional tips on using GPS with Cameras visit the Alaska GIS Web Page
<http://165.83.62.205/rgr/akgis/index.cfm?action=dsp&topic=gps&item=photo>

View Output in Google Earth (free download)

In the FieldDataPhoto folder, double-click on **picture.kml**

In order to see the photo properly in Google Earth, turn off the Show Time bar by selecting **View / Show Time / Never**



Revision History

Date Modified	Revised By	Changes Made
March 1, 2007	Joel Cusick	Original
March 10, 2008	Joel Cusick	Edits for Trimble Course
January 16, 2009	Dayle Sherba	Conv. To GIS template and updated for 2009 Trimble courses.
February 2, 2009	Joel Cusick	Standardized on geotag. Cleanup.