



IMAGING GUIDE



US DEPARTMENT OF THE INTERIOR
OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT

IMAGING GUIDE

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NOTICE: Photos taken in association with government related activities can be considered government records. Photos that are government records must be maintained/stored in accordance with the requirements/policies outlined in the local office file plan.

EXECUTIVE SUMMARY

This manual was generated because of a clear need within the Appalachian Region to create more effective photographic images tailored to the ultimate use and effectively manage, disseminate, and electronically store these images. Additionally, some degree of uniformity in terms of image collection and storage based on individual needs is desirable. Intended users of this document include but are not limited to inspection and enforcement (I&E) personnel; individuals conducting geologic, hydrologic, and engineering investigations; developers and instructors of NTTP and TIPS classes; and personnel involved with technology transfer (TT). Depending on the end use, the composition, quality, and handling of the image may differ. For example, photographic images created for I&E and investigative work may involve litigation and thus require specialized care in handling and storage that images used for TT will not. Conversely, images created for TT and/or teaching purposes will likely require a much higher resolution than those for I. & E.

Recommended standard operating procedures for the creation and handling of photographic images are discussed herein. While these recommendations are not necessarily agency policy, they are based on the best information available at this time. It is recognized that future changes in technology will likely require modifications to these recommendations. Additionally, storage space limitations will bear on the number and size of image files that can ultimately be saved.

CHAIN OF CUSTODY

Photos for Investigations and Enforcement Actions (I & E), Complaint Investigations and Abatement Projects

All photos uploaded to the photo archive for investigative or enforcement action, complaint investigations or abatement projects should be unaltered. This means no drawings or annotations should be added to the photo. This information should be added in the notes field. If you require such information on the photo itself you must store a copy of the photo to your local hard drive or directory.

Photos added to the photo archive for these purposes should not be viewed with any type of photo altering software such as Adobe Photoshop. This can alter the Exchangeable Image File (EXIF) data of the file. EXIF data is the standard format for storing interchange information in **digital photography** images (please see section titled EMBEDDED DATA, EXIF). Photos should be viewed using only photo viewing software like Windows Picture and Fax Viewer.

To ensure the best protection of the photo it is recommended that the photos be uploaded directly from the camera or memory card to the archive to ensure the photo's integrity

Photos for Non-investigation (Presentations, Posters and Training) Uses

Photos uploaded to the photo archive for any use other than I&E may be changed as needed to exhibit the desired effect or situation. However, these changes should be noted in the notes area indicated for each photo in the archive

For All Photos

Do not upload images that have been exported from or other programs. These programs can cause corruption of the image and render it useless.

If you are uploading a photo taken by someone else, please make sure the name of the photographer is noted in the appropriate field.

COMPLAINT INVESTIGATION, PROJECT MANAGEMENT AND ENFORCEMENT PHOTOGRAPHS (DIGITAL IMAGES)

Field

During the normal course of complaint investigations, inspections, abatement projects and enforcement investigations, OSM personnel are required to photographically document field conditions for a variety of reasons. Those reasons might include, but are not limited to, documentation of violations, safety conditions, mining progress, or to provide images for inclusion in many different kinds of reports/documents.

The advent of **digital photography** provides the camera operator with a number of possible camera setting options which will affect the end result digital image. Thusly, the camera operator can choose the proper settings to achieve the desired purpose of the digital image.



Of the multitude of camera settings available on the **digital camera**, those affecting the “size” or “resolution” of the digital image should be considered as to the intended purpose of the digital image. Other factors to consider regarding the size or resolution of the digital image include the image space available to the storage media. These include, but are not limited to the camera’s memory card and the repository for the digital image when it is downloaded (i.e. a computer hard drive/ network drive, or CD/DVD). Generally speaking, the larger the “size” of the digital image, or the finer the resolution, the greater the digital file size as well. The “size” of the digital image and resultant file size should be appropriate to the intended purpose of the digital image as well as the storage media.

For example, during a mine site inspection, an inspector photo documents existing conditions such as a breached diversion. In this case, ordinarily a medium to small sized digital image would be adequate for this purpose. Selecting a medium (ex.: 1600 X 1200) or small (ex.: 640 X 480) file size or resolution would adequately show the necessary image detail and would save digital file space on the storage media.

Another example of the advantage of selecting the appropriate resolution would be if an inspector needed to share images across a computer network. Selecting the small (640 X 480) resolution would allow more digital images to be e-mailed using a lesser amount of network resource and without computer resizing..

There are occasions where the largest image size or the highest resolution (ex.: 3072 X 2304) the camera could provide would be that where an image required greater detail or the image was to be enhanced using digital zoom features. For example, if the subject of the photograph were small or at a distance, using the higher resolution would provide better results as the image could be digitally enlarged or edited to show the details. Similarly to the smaller sized images, selecting the larger size resolutions reduces available space on the digital storage media and can overload e-mail networks.

INVESTIGATIVE IMAGES (LEGAL ASPECTS FOR COURT)

Investigative images are primarily collected as part of the documentation of site conditions, data collection and/or capturing of specific points-of-interest. However, there are times that images collected in the course of an investigation would be subsequently useful for teaching or TT purposes as well. When taking images one needs to be cognizant of both the primary and possible secondary uses.

Suggestions for collecting photographic images during the course of an investigation include:

- Be sure your camera's time and date stamp are correct prior to any photographing.
- It is a good idea to include something in the image for scale. Use a common object in the view, if possible. For example, a soft drink can for close up shots, a person for intermediate shots and perhaps a vehicle for larger scale and more distant shots should suffice. Inclusion of an actual graduated scale (e.g., yardstick) where practical is recommended.
- A good rule-of-thumb for all photography is to get closer to your subject than you think you need to be. The quality of the image will in all likelihood be improved.
- In most cases, the size of the image file is predicated on the ultimate size that will need to be reproduced. For investigations, often the image is included in the report and will be fairly limited in size because it may be printed at a size to fit within the margins of the report (2" by 3" to perhaps no more 7" by 9" size). Therefore, very high resolution images are usually not necessary.
- If the image is of sufficient interest and it is likely that it could be used secondarily for future teaching or TT, taking a second higher resolution image is a good idea. A low resolution image blown up onto a screen for teaching or for a TT poster will be poor because it will be grainy or pixilated.
- If an image or a series of images are collected showing a field procedure, be sure that the procedure is being performed properly. If a procedure is shown via images to have been conducted improperly, this will render your data invalid.
- Be sure the image is properly in **focus**, the lighting is adequate and what you intend to document is well within the view. There may be times where a series of wider angle shots are needed to sufficiently encompass the subject or a close-up of a point of interest needs to be followed by a wider shot to bring it into perspective (Figure 1). If a broader area than can be viewed with a single image needs to be captured, a panorama of shots can be taken then stitched together later with a computer application.
- If you have a camera that allows you to vary the shutter speed, **aperture** width or other settings, this may permit you to better tailor the image to your needs. For example, a smaller **aperture** width yields a greater depth of field and vice versa or a slower shutter speed may accommodate lower light level conditions, but may require the use of a tripod or setting the camera down on a stationary object. Unless you are familiar and comfortable with changing shutter speeds, **aperture** widths or the other settings, it is probably best if you use the camera defaults.
- For protocols for uploading images and electronic transfer, see the section within this document for the suggested procedures.

In many cases, litigation pertaining to the investigation may not occur, but it is best to assume that it will. It is a good idea to go on the premise that any photograph that you collected may be called into question within the realm of litigation. Therefore, document all the pertinent information on how the image was taken. Where and when the shot was collected, who else was present, site conditions (e.g., use of artificial light), camera parameters (e.g., shutter speed, **aperture** size, etc.) and any other salient information should be recorded, if the camera does not automatically do this in an **EXIF** file.

At some time, you may be called to explain the specific conditions under which the image was collected and any subsequent handling of the file. Be prepared to do this and keep good file notes. Follow all chain-of-custody procedures.



Figure 1.

IMAGE SCALE AND PERSPECTIVE FOR DOCUMENTATION

Problematic with photographic images is the concept of subject size or magnitude of the subject as compared to its surroundings. For example, an inspector is giving court testimony concerning a breached diversion and is using photographic evidence of the violation. Without an example of “scale” in the photograph, the judge might not perceive the magnitude of the breach even though it is visually apparent in the photograph.

This problem can be solved by using an object of discernable size to be compared to the subject size in the image. A ruler, tape measure, ink pen, a person, or field notebook are examples of items that could provide adequate perspective. The following examples demonstrate the utility of adding perspective to the subject of a photograph.



Example 1: The inspector has discovered a coal stockpile in an unapproved location. By standing beside the coal stockpile in the photo, he adds perspective to the height of the coal pile and its width can be similarly judged.



Example 2: Shows how using an ink pen approximately 5 inches long clearly shows that the coarse refuse exceeds the two-inch size limit.

In Example 2, the maximum particle size of coarse refuse to be disposed is two inches or less. The inspector has found coarse refuse larger than the approved maximum size. Using an ink pen for scale to show the size perspective of the coarse refuse, the inspector photographed the violation.

As a rule, photo documentation should be taken as a natural representation of existing site conditions. Avoid embellishing the magnitude of the subject of the image or distorting the subject’s perspective. Human subjects used for perspective should appear natural and not “posed” or “animated”.

IMAGES AND FILE TYPES

Along with composing your photo (see section on Composition), you should keep the end result in mind when choosing the file type and size for your image. Will it be for used for court evidence, a record of your project, for printing or reproduction in signage or brochure or will it simply be used for the internet and emailing? A rule of thumb to keep in mind is that... once you’ve taken a photo at low resolution, you can never size back up. But if you take your photo at medium to larger resolution, you can always reduce your file size or delete larger files when you no longer need them. Having knowledge of file types is helpful when you know the end-result of your image.

There are numerous file types available to use when taking photos or saving imagery. Currently, the I&E system is designed to accept only JPEG and extract the **EXIF** information from the JPEG header.

With most imagery in the geospatial world, for descriptive metadata, we turn to an html file or a simple text file to provide us with the critical information associated with the data. With a JPEG image the metadata is recorded as an **EXIF** file and embedded within the image. Annotations like copyrights and other notes can be input into the Information Interchange Model (IIM), also called IPTC, which is a file structure and set of metadata attributes that can be applied to different media types.

File Types

FILE	COMPRESSION	USE	PROS	CONS
Joint Photographic Experts Group (JPEG)	Lossy* JPEG compression	Best choice for novice photographers, professional printing, internet applications & emailing	<ul style="list-style-type: none"> • user can select compression algorithm: low, medium or high - which enables more images on the memory card • 2nd only to TIFF for unquestionable quality • can shoot more bursts for continuous shooting mode • easy transfer between PC, Mac or Unix • download to print capability without editing 	<ul style="list-style-type: none"> • adds unnecessary pixels when restoring algorithm • artifacts occur (such as irregular blocks of pixels, increased digital jagged edges) • poor image quality • overexposure or underexposure not fixable • 8-bit space with only 256 brightness levels (in comparison to RAW images with 16-bit space and thousands of brightness levels)
RAW (digital negatives)	lossless compression**	for serious photographers and reproductions	<ul style="list-style-type: none"> • ability to modify data after the image is taken • 16 bit image which allows thousands of brightness levels (vs. 256 available in JPEGs) • no data loss occurs • no artifacts will occur 	<ul style="list-style-type: none"> • must use image-editing software to read RAW then convert to a common file type • take up a huge amount of space
Tagged Image File Format (TIFF)	Can use lossy* and lossless compression**	For professional printing	<ul style="list-style-type: none"> • best quality • PC, Mac or Unix compatible 	<ul style="list-style-type: none"> • can be over 2x the size of JPEGs so emailing & other uses can be cumbersome • will have to be converted to another format such as JPEG for use on the web
Portable Network Graphics (PNG)	lossless ZIP compression** (ZIP compression format is used for storage and archival purposes)	For internet	<ul style="list-style-type: none"> • slightly more effective than LZW (slightly smaller files) 	<ul style="list-style-type: none"> • only supports still images • not as widely accepted on all browsers as GIF and JPEG

Graphics Interchange Format (GIF)	lossless LZW compression** (LZW represents the initials for the inventors of this method: Lempel–Ziv–Welch)	Internet and emailing	<ul style="list-style-type: none"> • supports both still and moving pictures • effective on indexed color • quick to save into this format • enables knock out of backgrounds for logos and other art on a colored background 	<ul style="list-style-type: none"> • compresses the file with a limited amount data analysis, thus there is no dpi info for printing purposes. • worst choice for quality
<p>* A method of compression which loses some of the data</p> <p>** Lossless compression uses algorithms that maintain integrity of original data</p>				

Resolutions and Memory

Following is a chart giving basic image resolutions and their purposes to help you select the proper settings on your camera before you take the picture.

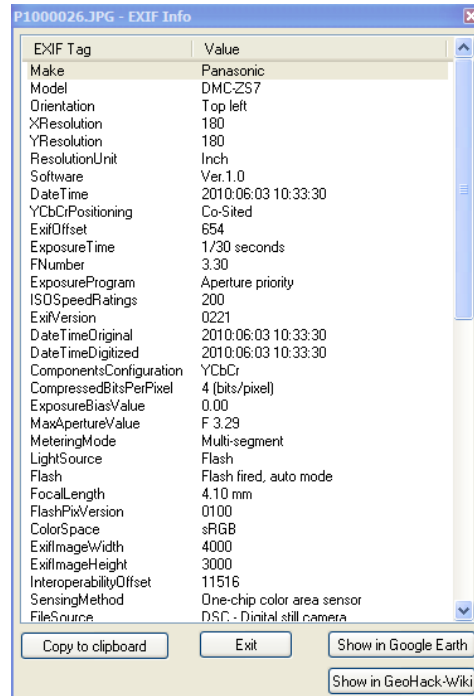
	HIGH RESOLUTION 300 TO 400 DPI (LITTLE DATA LOSS)	MEDIUM RESOLUTION 150 TO 200 DPI	LOW RESOLUTION 72 TO 100 DPI (MOST DATA LOSS)
PURPOSE	<ul style="list-style-type: none"> • Printing • Brochures, magazines and other glossy print (300 to 400 dpi) 	<ul style="list-style-type: none"> • Printing • Newspaper Print (150 to 200 dpi) • Court documents 	<ul style="list-style-type: none"> • Internet and Screen Resolution (72 dpi) • PowerPoint presentations • Emailing (72 dpi) • Court documents • Signage – should be 100 dpi at same size
DPI	• 300 dpi	• 100 to 150 dpi	• 72 to 100 dpi

EMBEDDED DATA

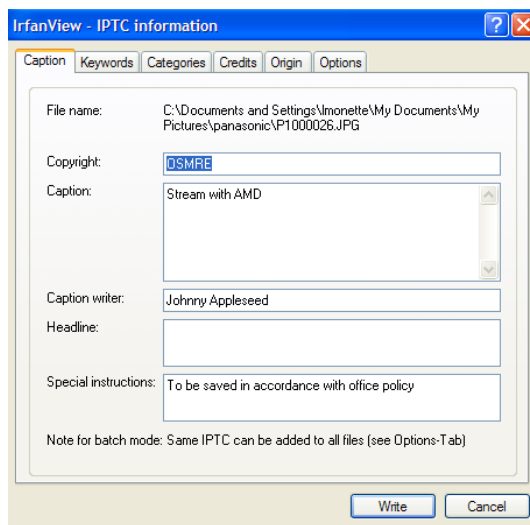
EXIF DATA

Short for **Exchangeable Image File**, a format that is a standard for storing interchange information in **digital photography** image files using JPEG compression. Almost all new **digital cameras** use the **EXIF** annotation, storing information on the image such as shutter speed, exposure compensation, F number, what metering system was used, if a flash was used, ISO number, date and time the image was taken, white balance, auxiliary lenses that were used and resolution.

Figure representing a Geotagged image's EXIF header in Irfanview's viewer.



IPTC HEADERS



The **Information Interchange Model (IIM)** is a file structure and set of metadata attributes that can be applied to text, images and other media types. Information such as the name of the photographer, copyright information and the caption or other description can be embedded either manually or automatically.

IIM metadata embedded in images are often referred to as "IPTC headers," and can be easily encoded and decoded by most popular photo editing software.

GLOBAL POSITIONING SYSTEM (GPS) AND GEOTAGGING

Geotagging

Geotagging is the process of adding geographical identification **metadata** to various media such as photographs. **Geotagging** is used to tell users rather precisely the location of the content of a given picture. Currently this is done either manual by editing the image metadata with an **EXIF** editor or by using a camera with a built in **GPS**.

GPS Signal Degradation

When a **GPS** signal is degraded the positional error can be affected due to receiver trying to reach a solution using 4 or more satellites that are closely grouped together in the sky. The following bullets are common pitfalls to avoid when working with **GPS**.












- Triangulation is impossible inside buildings
- Triangulation is difficult near tall buildings and thick forest canopies.
- Time to achieve location accuracy is shortened when the **GPS** has downloaded the assist data prior to use. If the **GPS** has not been turned on for an extended period it will need to download the current almanac from the satellites. This could take 10 to 30 minutes to complete.
- Having an accurate time set in the receiver will expedite positional fix
- Be prepared to walk, stop, and wait when trying to get a fix.
- All receivers must observe at least four satellites to get a 3d positional fix.
- Poor atmospheric conditions such as cloud cover and rain can effect signal
- A phenomenon called "Canyon effect" can block the **GPS** receiver from communicating with the satellite. This effect occurs when the terrain or other object obstructs the skyline.
- Metallic masses or structures can deflect signals.

CAMERA CONTROLS

Preset Camera Modes

These are pre-programmed into the camera so that you simply select one of these settings to achieve your desired end result. Following are the most common presets that appear on most cameras. The last four in the chart following are advanced settings.

CHART OF PRESET CAMERA MODES		
ACTION		<ul style="list-style-type: none"> • freezes the action to catch images faster • increases International Organization for Standardization (ISO), or sensitivity to offset loss of light • decreases amount of light striking the film surface by increasing shutter speed • often results in underexposed images • reduced depth of field (DOF) - results in only a small portion of image properly exposed (see sub section Depth of Field under COMPOSITION) • brightly lit situations such as daytime sports activities work best with this setting
LANDSCAPE		<ul style="list-style-type: none"> • allows for a large DOF • defaults to a small aperture, but needs more light to expose the image • requires a slower shutter speed - tripod recommended to prevent blur • can use for portraits when you want background in focus
MACRO		<ul style="list-style-type: none"> • for instances where subject is very close to camera and will fill the frame • allows focus from a very short distance • DOF becomes very small in macro photography • automatic/manual focus is controlled separately as it pertains to the lens motor. • combination of shutter speed, aperture, and ISO must be determined to create the proper exposure • can underexpose or overexpose your image as needed
PROGRAM		<ul style="list-style-type: none"> • camera responds to preset conditions you programmed through the menu • allows you to set shutter or aperture priority (camera will adjust other setting to achieve proper exposure)
NIGHT PORTRAIT		<ul style="list-style-type: none"> • slower shutter speed to allow more light into camera • uses flash to achieve properly exposed foreground • may require a tripod
PORTRAIT		<ul style="list-style-type: none"> • portrait photography • not well suited for full-length portraits or groups of people • uses slow film speed and a larger aperture • the end result is a finer film grain and a blurry background
APERTURE PRIORITY		<ul style="list-style-type: none"> • photographer sets the aperture (F-Stop) and the camera sets the shutter speed (and sometimes ISO) to maintain a middle level exposure • used to control DOF when shutter speed is insignificant
SHUTTER PRIORITY		<ul style="list-style-type: none"> • TV = Time Value • photographer sets the shutter speed and the camera sets the aperture • best for action settings and night photos
MANUAL		<ul style="list-style-type: none"> • photographer has total control of the camera

Aperture and Shutter Speeds for Manual Setting of Your Camera

The two main features on your camera that affect the amount of light to expose your picture are the **aperture** and shutter speed. The balance of these two features affect the quality of your image, Use the following chart on the next page to help you adjust these settings for the desired end result.

BALANCE OF APERTURE (F-STOP) AND SHUTTER SPEED					
← Items to the left produce a shallower depth of field			Items to the right produce a larger depth of field →		
Description of APERTURE (F-STOP)					
<ul style="list-style-type: none"> The aperture is a variable opening in your camera lens that works like the iris in the human eye. When it is open wide (as with eye dilation), more light hits the lens to expose the picture. With a small aperture (like your pupil in daylight), less light hits the film. F-Stop numbers are fractional representations of the amount of light passing through the aperture. On some cameras such as point and shoot, you may not be able to set specific aperture or F-Stops. If this is the case, you may want to learn about your camera's Preset Camera Modes (see next section). Many Single Lens Reflex (SLR) cameras have these preprogrammed modes in addition to other modes of control. 					
Common F-Stop Values					
f/4	f/5.6	f/8	f/11	f/16	f/22
F-Stop Relationship to Light					
Little F-Stop Number = Less Light Needed ←			→ Big F-Stop Number = More Light Needed		
Allows a faster shutter speed			Requires a slower shutter speed		
Description of SHUTTER SPEED					
<ul style="list-style-type: none"> Shutter speed controls the amount of time that your film or digital sensor is exposed to light. The shutter opens and closes to let light hit the film or to keep light from reaching the film. 					
Range of Common Shutter speeds (in fractions of a second)					
1/500	←		→		1/60
Shutter speed Relationship to Light					
Open less time = less light allowed into camera			Open more time = more light into camera		
Effect of Focal Length on Depth of Field (see Depth of Field in the Composition Section)					
300mm (macro)		200mm		100mm	70mm
Distance to Subject					
Closer to Your Subject			Further Away from Your Subject		

Viewfinders

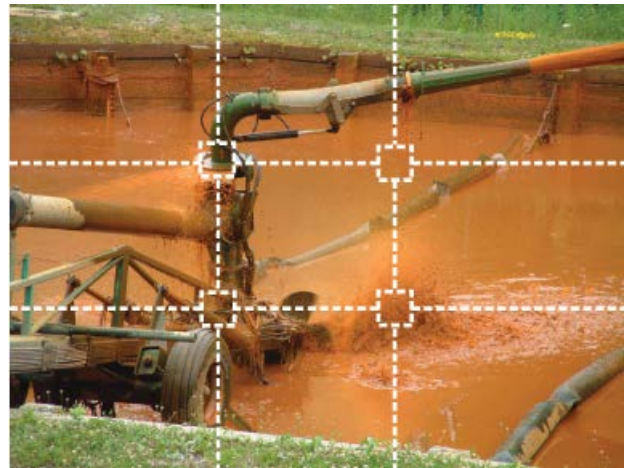
THROUGH THE CAMERA	THROUGH THE LENS (TTL)
<ul style="list-style-type: none"> you are looking through a hole cut directly into camera body not a true or precise representation of where the camera records the picture you end up with poor cropping results take practice photos to test framing of your picture 	<ul style="list-style-type: none"> redirects vision via video or mirrors used on professional cameras WYSWYG (what you see is what you get) framing

COMPOSITION

Composition simply means how your image is put together. The best quality does not automatically equate to a great image. You have to know where and how to place the image in your viewfinder. The most important thing to think about when composing your photograph is to know what the end-use of your photograph will be. If the end-result is court evidence, then you are certainly more concerned about documenting facts than aesthetic composition. However, when taking photos in the field, if you want your photos to have multiple end-results, then take more than one photo of a particular subject, such as medium resolution photos for record or for court evidence, then take another high resolution if you think this photo warrants credit in the annual report or on signage for an upcoming OSM event. Following are some simple rules to help you compose better pictures depending on the desired end result.

Use The Rule of Thirds

In a frame, the human eye is naturally drawn towards particular areas in a photo. To use the rule of thirds, divide the frame into nine imaginary, equal squares. The strongest focal points are the four points where these lines intersect. The lines themselves are the second strongest focal points. In the photo on the right, the machine pumping water creates interest right along the vertical line to the left.



DESIRED END RESULT	WHICH RULE OF THIRDS LINE TO USE
SOLITARY SUBJECTS	<ul style="list-style-type: none"> • use left hand line (unless you live in a country where reading is right to left)
WHEN THERE ARE MULTIPLE SUBJECTS, SUCH AS A GROUP OF PEOPLE (use the lines & points to suggest emotion or to establish dominance of one subject over another)	<ul style="list-style-type: none"> • object on bottom horizontal line (foreground) have more strength than the objects in the background • bottom right point is the strongest for multiple subjects • upper left point is the weakest for multiple subjects • these lines / points can be used to convey emotional dominance of one person over another
SINGLE SUBJECT GAZING AWAY FROM CAMERA	<ul style="list-style-type: none"> • place subject on the opposite line from the direction in which he/she is staring (this draws the viewer towards the direction in which the subject is staring)
SINGLE SUBJECT IN PORTRAIT PHOTOGRAPHY	<ul style="list-style-type: none"> • the top line should line up with the subject's eyes
MULTIPLE SUBJECTS IN PORTRAIT PHOTOGRAPHY	<ul style="list-style-type: none"> • use both horizontal rows to line up the subject's heads or faces

- In an image, DOF is the degree that the foreground and background will be in **focus**.
- A **large** depth of field is often desired for landscapes or outdoor photography so that the entire photo is in **focus**.
- In portraiture and macro photography, a **small** depth of field is used to blur the background and reduce distractions from the main subject.
- See **BALANCE OF APERTURE (F-STOP) AND SHUTTER SPEED** chart to more thoroughly understand how DOF works with the other camera settings.

EXAMPLES OF DEPTH OF FIELD



This example shows no depth of field, foreground and background are blurry.



This example shows poor depth of field, foreground is blurry while background is not.





This examples shows good depth of field, foreground and background are equally exposed.



This examples shows poor depth of field, however, this was done on purpose so that the viewer's attention is on the flower and butterfly.

Orientation of Your Photo

Cameras are made to take horizontal photographs because human eyes see the world horizontally, but a vertical image can create a better photo in certain situations.

WHEN TO USE HORIZONTAL FRAMING	WHEN TO USE VERTICAL FRAMING
<ul style="list-style-type: none"> • subject is wider than it is tall • subject is moving from left to right to increase sense of motion • in conjunction with the rule of thirds • subject is looking to left or right, thus creating a line of interest for the viewer's eye to follow • to create horizontal leading lines (lines that create energy and movement for the eye to follow) • to imply a sense of space, such as in landscapes • to suggest loneliness by placing a small subject in a proportionally larger frame 	<ul style="list-style-type: none"> • subject is taller than it is wide • subject is moving in vertical motion, thus allowing subject room to continue moving. • subjects are staring upward or downward, thus creating line of interest for viewers eye to follow • to create vertical leading lines (lines that create energy and movement for the eye to follow) • subject is moving further away from the photographer or towards the camera, thus creating vertical movement • to focus viewer's attention on a single subject by removing almost all sense of peripheral vision • in combination with rule of thirds or centering to increase visual impact
<div style="text-align: center;">  </div> <p style="text-align: center;">Note how this photo lends itself to the vertical orientation.</p>	<div style="text-align: center;">  </div> <p style="text-align: center;">Note how the fence creates vertical leading lines, therefore it lends itself towards horizontal orientation.</p>

PORTRAIT VS. FIELD PHOTOGRAPHY

Having a person looking at the camera and smiling can make a nice image for portraits or family photos, but it doesn't necessarily make a good photo compositionally taking pictures to represent work done by OSM personnel. The best photos of field work or office work are the ones that show the person doing something constructive.

EXAMPLES OF DIFFERENT TYPES OF PHOTOGRAPHY IN THE FIELD



While this photo makes a good portrait for a story about the person and his career, it becomes a cheesy photo when the story is about stream reclamation.



This example shows well composed elements for a story of hydrologic work being done by OSMers in the field photography (and also follows the rule of thirds!)



While this photo makes a good portrait for a story about the woman and her career, it becomes a cheesy photo when the story is not about her.



This example shows well composed elements for a story of reforestation in Appalachia (and also follows the rule of thirds!)

Avoid Over-Cropping

When your photo is object-based, such as in portrait photography, and you expect your photo to be used for insertion into printable items in the future, it is advisable to leave some space around your subject to prevent irreversible **cropping**. An example of over-**cropping** would be when taking ID photos, the photographer often make the mistake of **cropping** too around the subject's their head, causing that particular person to look like they have huge heads compared to persons in other properly composed photos of the same size. Remember that you or someone familiar with image editing software can always go back and crop the photo properly later.

Pay Attention to Your Foreground

Objects in the foreground can hide the actual subject. Use this chart to correct these problems.

Change your Depth of Field	<ul style="list-style-type: none"> • If you get the camera close enough, certain foregrounds can be thrown so far out of focus until it becomes virtually invisible, but remember that larger the object, the more difficult it will be to visually remove that object using depth of field
Change Your Angle	<ul style="list-style-type: none"> • place unnecessary objects outside the intended frame. • change your position or angle • raise the shooting angle by standing on something or lower the angle by getting closer to ground

GOOD AND BAD USE OF FOREGROUND



Poor use of foreground - mans arm distracting from the story.



Good use of foreground, there is something in the foreground, but it helps to tell the story.

IMAGE CORRECTION

Dark Photos

Dark photos are a result of not enough light being recorded into the camera. The two most common solutions are to use a flash and use a faster ISO (or film speed). Other common instances of dark photos and their solution are listed in the chart below.



Example of a very dark photo.

COMMON INSTANCES OF DARK PHOTOS AND CORRECTIONS	
INCORRECT BALANCE OF SHUTTER SPEED AND APERTURE	<ul style="list-style-type: none"> When setting your camera manually, use the camera's light meter to help you pick the shutter and aperture settings for proper exposure
IMPROPER LIGHT METERING	<ul style="list-style-type: none"> Since most cameras meter off of the center of the frame, your subject could be underexposed. To meter your camera hold the button half way down, so the light meter can read the amount of light hitting the sensor. Now you can adjust your shutter speed/aperture accordingly, or you can force the meter to take its reading from wherever you want it to by pressing the shutter button halfway down and pointing at a different desired metering spot. If you have an SLR camera you can choose one a light meter reading to meet your needs: 1) center-weighted; 2) average single point selection; and 3) multi-segment
INACCURATE LIGHT METER	<ul style="list-style-type: none"> camera needs repaired, may need a new camera or use image editing software to lighten image

How to Prevent Unwanted Blur

WITH POINT & SHOOT CAMERAS	WITH SLRS	ADJUST DEPTH OF FIELD	AVOID CAMERA SHAKE
<ul style="list-style-type: none"> • The preferred focus point is in the middle of the viewfinder, So if your preferred point of focus is not located in the center of the viewfinder, aim at your preferred point of focus and press the shutter release button half-way down to lock the focus. Then simply recompose your photo while maintaining the button at the half-way point, then press the button all the way down to take your picture. 	<ul style="list-style-type: none"> • Use the same method of recomposing as a point and shoot camera • Switch to manual focus • Override the focus selection point 	<ul style="list-style-type: none"> • Use a wider depth of field 	<ul style="list-style-type: none"> • Increase your shutter speed to less than 1/60 • Try different combinations of your camera settings • Use a tripod • Use a remote release option if on your camera • Keep your elbows close to your body • Maintain a firm grip on the camera • Steady yourself by standing with legs apart or leaning up against something stationary • Do not strike the shutter release button, press firmly but gently • Remain still for a couple seconds after you've taken the picture

LIGHTING AND COLOR

ISO Speeds Role in Lighting

International Organization for Standardization (ISO) speed in traditional 35mm cameras refers to the film speed, but now that **digital cameras** are being used, ISO speed measures the sensitivity of the image sensor. Most **digital cameras** automatically select the ISO speed but have a setting to change it manually. Because ISO controls the amount of light coming into the camera, knowing more about it will help you to take better photos.

	ISO 80	ISO 100	ISO 200	ISO 400	ISO 800, 1600 +
WHEN TO USE	Use in bright light, close-ups, landscape, & portraits	Use for extra sensitivity with	Use for cloudy and overcast days	Use for indoor photography with or without flash. Useful for "stop-action" and sports photos	Use for low lighting, or outdoors in <u>good light</u> when increased shutter speeds are required, such as for <u>fast moving objects</u> .
RESULTS	fine detail & image quality	little reduced image quality	Medium image quality, with some visible noise	high image noise	Results disappointing when shooting at these high numbers with compact digital cameras

Note that higher ISO numbers (traditionally referred to as faster films) also equate to less clarity/quality of the picture (traditionally equated to actual grain in the film). Conversely, lower ISO numbers (slower films) produce better quality (less grain) but require much more light to expose the image, so you will have to make decisions based on your goals in taking the picture before you can select and ISO. Modern automatic cameras select this for you, but if you have manual settings you can affect your end result.

EXAMPLES OF HIGH AND LOW ISO SETTINGS



The lower the ISO the more blur you will get, but you want to show the blur for effect, then it's okay to do so.



The higher the ISO, the more stopped the motion will be, however you will need a lot of light from other camera settings to compensate.

Understanding Your Camera's Light

The light meter tells you if the amount of light hitting the film will be sufficient to expose the photo properly. As shown in the chart under **CONTROLS**, the light meter balances shutter speed, film speed, and **aperture** settings. A camera's light meter indicates the amount of light by the F-Stops. Dots on the meter represent **partial** increments, while the numbers represent **whole** ones. Meter readings are also affected by film speed or shutter speed.

When to Overexpose	When to Underexpose
<ul style="list-style-type: none"> • Subject is very dark in comparison to background • Snow • On a bright day if your subject is in shadow 	<ul style="list-style-type: none"> • Subject is very light in comparison to background • To achieve a silhouette effect • On a overcast day to increase color saturation

Understanding Exposure



Understanding exposure allows you to give correct instructions to your camera to record the proper amount of light. You can control the amount of light allowed into your camera by balancing shutter speed, **aperture**, film speed and the light meter. To manually set your camera to control light follow these steps:

1. Determine ISO/ Film Speed
2. Adjust <u>depth of field</u> (controlled by aperture) and/or motion control (controlled by shutter speed) for these scenarios: <ul style="list-style-type: none"> • Sports/ Motion Control • Nature Photography/ Depth of Field & Motion Control • Landscapes/ Depth of Field
3. Adjust light meter reading and ensure meter needle is centered on the scale. To correct consider the following: <ul style="list-style-type: none"> • Change the ISO • Adjust the setting combination • Use a tripod

FORCED OR "FILL FLASH"

Fill flash is used to "fill in" shadowy areas of a composition.

WHEN TO USE FILL FLASH		
When your subject is in a shadow to even out the exposure across the subject Ex: a person wearing a hat that casts a shadow across the eyes	In a backlit lighting situation, thus the camera will try to underexpose the image even when metering off subject itself?	If you are further than about 9 feet away, then fill flash will probably not work. This distance is further jeopardized in outdoor lighting and in brighter lighting situations.

SITUATIONS FOR FILL FLASH	
	
<p>While this photo might be a very nice shot creatively, if there was a person standing in the shot, fill flash would be needed so that you could see their face.</p>	<p>Again, if the idea of this shot is to show the details inside this mine, good fill flash should be used to bring that out.</p>

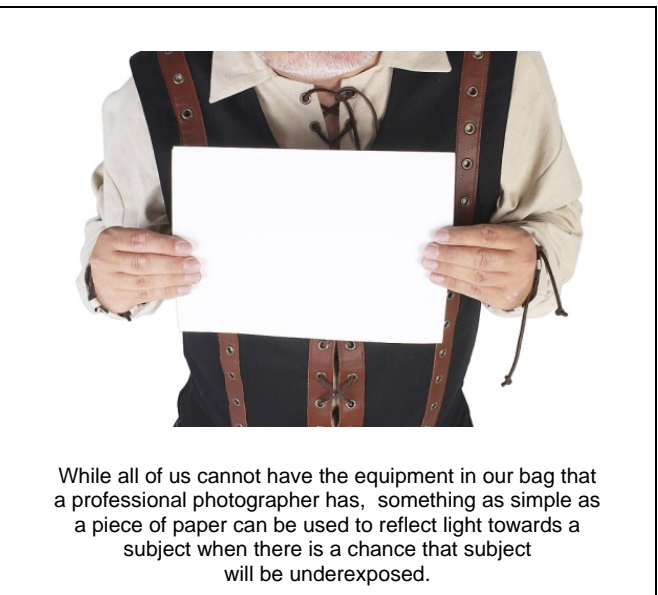
White balance and Color Temperature

White balance is the **color temperature** of a photograph. Whenever a photo is taken in different lighting situations, white does not look white. The visible light spectrum is a not complete representation of the true light spectrum. RGB is the manner in which emitted light is displayed (as opposed to reflected light such as on a printed photo or fabric). The acronym RGB stands for red, orange, blue, but is a shortened manner of indicating actual light colors in the Kelvin scale, which is used with photography to indicate **color temperature**. The Kelvin scale, as shown in the following chart below, ranges from red to white to blue.

LIGHT SOURCES AND APPROXIMATE COLOR TEMPERATURES				
KELVIN COLOR SALE	LIGHTING SITUATIONS	COLOR	TEMPERATURE OR MOOD	RESULTS
	Sunlight/Camera Flash	Orange to Red to Yellow	Warm	Flattering to human skin, but casts unflattering shadows on people's faces
	Flame	Yellow to Orange	Warm	Flattering to human skin
	Tungsten/Incandescent Lighting (indoor light bulbs)	Yellow/Green (shows up only rarely in lighting situations - "white light" normally takes up green's space most often)	Cool	Gives human skin tone a jaundiced look. Not complimentary in portraiture
	Midday	White	Cool	Best natural lighting in most instances
	Moonlight	Bluish to Faint Yellow	Cool	Soft, silhouette type photos, but hard to get enough exposure for details
	Cloudy Sky	Blue to Gray	Cool	Great for outdoor portraiture because it casts no unflattering shadows on faces
	Strobe and Fluorescent	Purple	Cool	Not complimentary to portraiture

Reflectors to Control White balance and Light

Reflectors are any item used to reflect light towards your subject or change the color of light cast upon your subject.



ABOUT REFLECTORS			
<ul style="list-style-type: none"> • Can be used in conjunction with a flash or in lieu of a flash. • Reflectors help to achieve professional lighting effects without purchasing professional equipment. • Reflectors can be placed on a stand or other support, or can be hand-held to direct light onto a subject. • Reflectors work best when they are at an equal angle from the light source and the subject. 			
USING REFLECTORS FOR COLOR MOOD OR TEMPERATURE			
GOLD	WHITE	BLUE	SILVER
Warm tones	Neutral color	Cool tones	Neutral tones but brighter than white

Causes of Improper Light Recording

- Incorrect Shutter Speed/**Aperture**/Film Speed Combination
- Metering Off of Wrong Spot in Composition
- Inaccurate Light Meter
- Old and/or Damaged Film (if using traditional film cameras)
- Improper Developing

Red eye

Red eye is caused from using flash photography in a low lit or ambient lighting situation, either indoors or at night. When the camera flashes, the light from the flash is so fast that the pupil doesn't have time to close. The light then passes through the pupil to the back of the eye. The red color is actually the reflection of blood in the back of the eyeball and it is recorded onto the picture.



If your camera does not have red-eye reduction, try these tips to reduce it:

- have subject look to the side of camera or away from the camera instead of directly at the lens
- add as many other sources of light into the room or situation as possible
- don't use any flash if you don't have to
- use a higher ISO, thus less light is required to record the image
- use an external flash source (such as a flash gun that attaches to camera so that it goes off at same time as camera snaps the picture); hold this flash gun off to the side and at an angle (not straight on) in relation to the subject's eyes.

OUTDOOR PHOTOGRAPHY TIPS

TAKING THE PHOTO		PROTECTING THE CAMERA
<ul style="list-style-type: none"> • Determine if you are taking a landscape photo (a mountain) or a “subject” photo (such as a deer) • Cameras with a viewfinder in addition to the LCD screen offer an alternative when the light is too bright to see the LCD 		<ul style="list-style-type: none"> • Don’t leave your camera in direct sunlight or a hot car for hours at a time. • Cover your camera with light-colored or reflective material to keep it cool • In frigid temperatures placing your camera inside a sealed plastic bag will prevent rapid climate change, condensation and frost
IF PHOTO IS OBJECT BASED	IF PHOTO IS A LANDSCAPE	
<ul style="list-style-type: none"> • Clearly defined subjects in your foreground that jump out from a smudgy background will make a better composition • The focal point of your photo shouldn’t be very tiny and look like it was taken from outer space • Get close enough to your subject to insure proper quality after cropping but don’t frame so close around the subject that you can’t change cropping after the fact with editing software • It’s usually best to shoot with the sun behind you to make sure your subject is well lit • Use fill flash (forcing the flash) on images in backlit (when the sun is behind the subject) situations to get rid of shadows or avoid silhouetting 	<ul style="list-style-type: none"> • Note that the average digital camera does not take great photos outdoors because it doesn’t create enough pixels for areas of vast or similar colors - any subject with a lot of fine detail such as trees, lawns or mountains can end up looking very smudgy or even muddy 	

OBTAINING PERMISSIONS

<h3>Obtaining Permission to Use Copyrighted Materials</h3> <ul style="list-style-type: none"> • determine if the image is copyrighted • if you are not certain about ownership or have other related questions, you may wish request search from the U.S. Copyright Office • email, call or write the owner and inform them of your intended use • ask if there is a fee • ask if they have a standard copyright release form or copyright permission statement • keep a copy of the form or permission • obtaining original copy of the permission form with an original signature is sometimes warranted 	<h3>Obtaining Release of Non-Copyrighted Materials and Giving Credit</h3> <ul style="list-style-type: none"> • call, email or mail the source • ask permission to use • inform them of your intended use • ask how they would like credit, such as: <ul style="list-style-type: none"> name listed, website name listed or actual url given so they can click on it • keep a copy of permission granted • an email granting permission is sufficient for record
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APPENDIX A: PANASONIC LUMIX DMC-ZS7

“Set up and GPS Menu Options”

(Panasonic Lumix DMC-ZS7 User’s Manual, 2009 Panasonic Corporation)

Before setting menu options on your camera there are three basic operation features to consider:

1. **The Mode Dial**

Note that this dial will need to be aligned with the “iA” icon to take pictures with automatic settings. Settings will be made automatically meaning that clear pictures can be taken without the need to make settings manually.



2. **The Multi Selector**

Note that this selector allows you to navigate and apply menu selections.



3. **The Menu/Set Button**

Press this button to display the menu for the selected mode. Note that you have four menus to choose from; Intelligent Auto, Intelligent Auto Video, Travel Mode, and the set up menu. Note there is also a “Quick” Menu button located in the lower right hand corner.

Let’s get started with the set up menu:

Turn camera on, press the menu/set button, and use the multi selector to navigate down to the set up menu. Move to appropriate sub-category and apply selection to start.

• **Time and Date**

Scroll to "Clock Set", and press the multi selector in the direction of the arrow on the menu to choose the option to set hours and minutes. Up or down arrows will scroll through the number values, while right or left arrow selection will change from hours to minutes, and/or navigate the menu screens. Next, press Menu/set to accept the changes.

Various other set up options are available based on user preferences. This guide is intended to enable user to set minimal menu settings to enable the camera for field use.

Now let's set up the GPS menu:

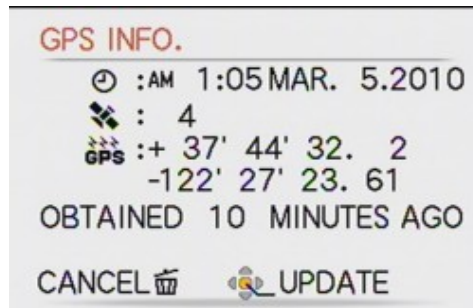
Press the menu/set button, and use the multi selector to navigate down to "Travel Mode".

- **Travel Mode**

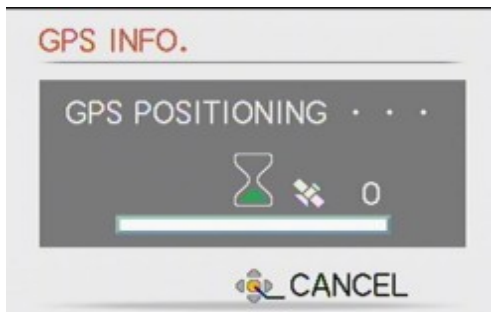
Scroll to "GPS Setting", and press the multi selector in the direction of the arrow on the menu and choose on, select menu/set. Signals are received from the **GPS** satellites and positioning begins. Note that leaving the record **GPS** data setting as on will result in faster battery depletion, when turning off the camera's power be sure to set "GPS Setting" to "off" or the third selection from the top of the screen "airplane mode". Press the menu button to return to the **GPS** signal status display screen. Note to check the positioning status prior to shooting.



Scroll to "GPS Setting" again and press the multi selector in the direction of the arrow on the menu and choose "INFO", select ok. The "Status Screen" will show you sync progress, when sync was last achieved, and where you are.



In order to update this information simply press the menu/set button and positioning will begin automatically.



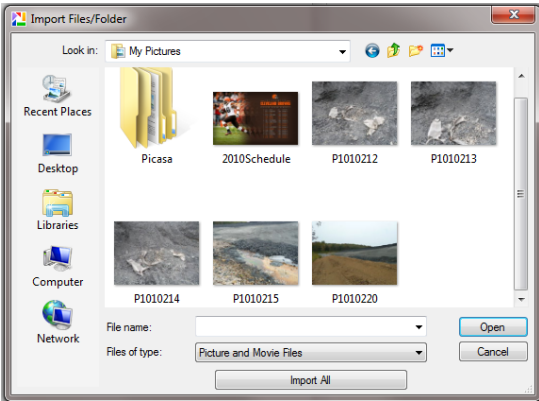

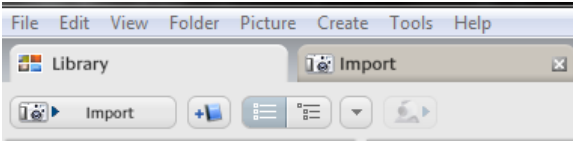


Turn the mode dial back to the "iA" icon. The camera is now ready.

APPENDIX B: IMPORTING GEOTAG PHOTOS INTO 3RD PARTY SOFTWARE

Working with Geotagged Images in Picasa 3

Steps for Importing Photos

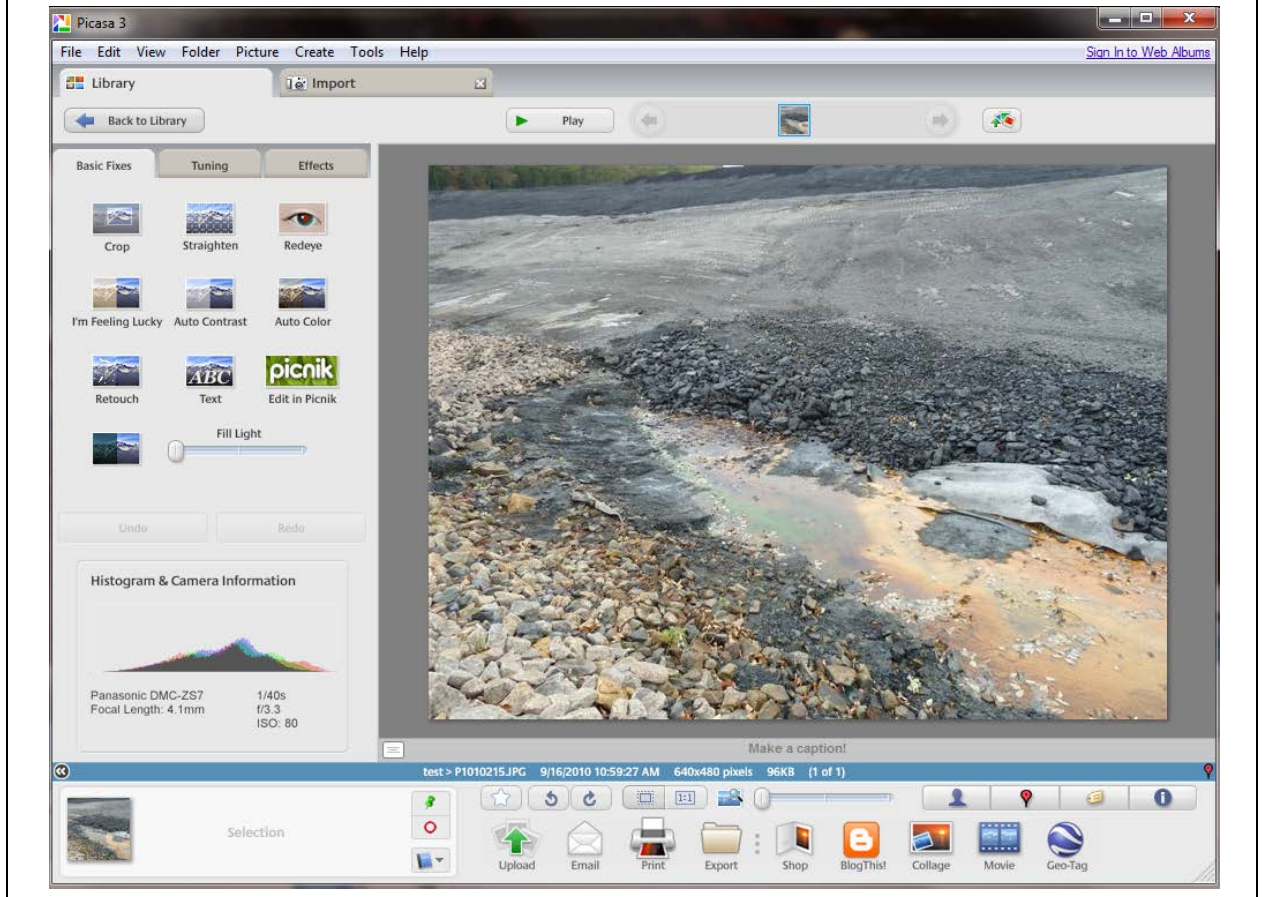
Launch Picasa
LMC  Import to import your imagery if it is not already in the Library
The screen will move to the Import Tab
Under Import From: select Folder...

An Explorer window will open.
Navigate to your Directory where your images are located and select your image or select Import All

Your images will appear under the Import Tab .
Click each image and use the  button to include or exclude each photo.
When complete LMC Import All , or if you like, highlight a few and select Import Selected .
Your photos are now linked in Picasa
Make sure you are in the Library Tab to view your images.


Using Picasa to Enhance Imagery

Under the Library tab **RMC** on your image and select **View Edit** from the dropdown or **LMC** the image and press **ENTER**.

Under this window you have numerous options to edit or enhance your imagery. Basic fixes like **Crop** or **Adding** text and advance editing like Tuning or Effects are accessed here.

When you are done editing click **Apply Changes** to save your work.



Viewing EXIF Data in Picasa

RMC on your image and select **Properties** or select your image and press **ALT ENTER**.

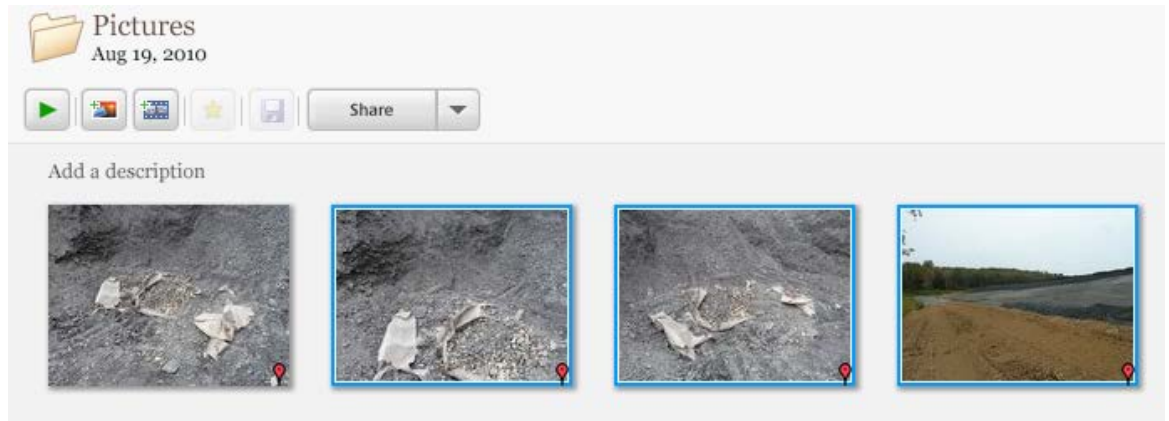
On the right-hand side of your screen the **EXIF** info should display.

Viewing Your Geotagged Photo in Google Earth

NOTE: You will need Google Earth installed on your PC.

Under the **Library** tab, select the geotagged photo you would like to view or press **CTRL** to select multiple photos.

NOTE: Photos will appear with a neat, blue line when selected.



Selected photos will appear on the lower left-hand footer of the software.



Select the photos in the lower left footer and go to **Tools>Geotag>**

Under **Geotag**, you will find numerous options.

Selected your desired option.

Geotag with Google Earth lets you edit the **EXIF** file by designating a new location for the photo or defining an undefined photo.

View in Google Earth reads the current **EXIF** location in your photos and shows you the image locations.

Clear Geotags. This option will remove the location of the photo from the EXIF file.

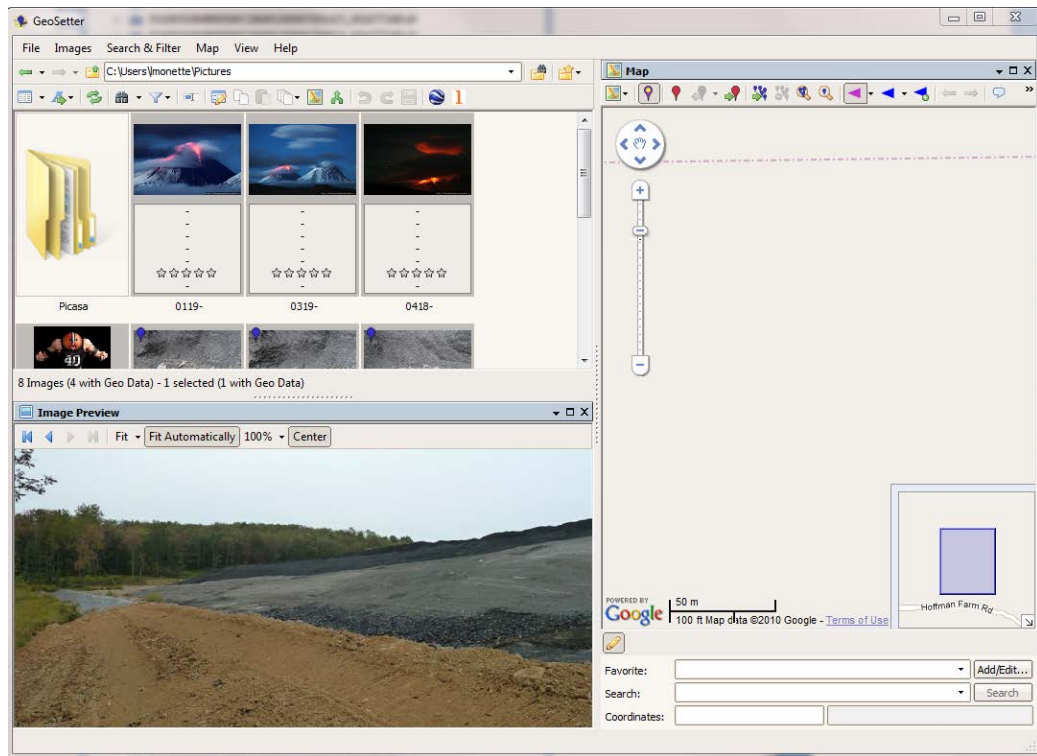
Export to Google Earth File. This option allows the user to write the current images selected to a KML file and save in a directory. This option is handy to email photos to peers.

NOTE: The **Geotag** button in the lower footer acts the same as **Geotag with Google Earth**. Using it could corrupt your current location settings in the **EXIF**.

Working with Geotagged Images in Geosetter

Launch **Geosetter**

Under **Images**, select **Open Folder** and navigate to your geotagged images location



All images in the folder will appear.


NOTE: Images that have locations in the **EXIF** header will have a blue tack at the top left of the image thumbnail.

To view a Geotagged image location on the map, **Select** the image or images thumbnails. The location will be displayed to the map on the left.

Maps can be changed by clicking the  dropdown located in the top left corner of the map.

Use the **Scroll** wheel on the mouse to zoom in and out.

Double click **LMC** on the thumbnail to bring up the location information.
Note: Location can be manually changed here.

Another way to change an image location is to **LMC** and hold the purple **Tack** . Then drag and drop it to the new location.

You will be prompted to **Move** the image.

If you are happy with the location, you can select **Images>Save As** to keep location changes

GLOSSARY

Aperture: a variable opening in your camera lens that determines how much light will hit the lens and expose the film; wider **aperture** openings allow more light into the camera; very tiny **aperture** settings allow very little light into the camera.

Aperture widths: settings on the camera to determine **aperture** starting at f1 and ranging up to 64+. Each f-stop represents a doubling or halving of the amount of light allowed into the camera.

Color temperature: a color based on the Kelvin scale that represents the mood the image denotes.

Cropping: the act of sub-setting or cutting off a section of an image.

Digital camera: recording images with an electronic sensor.

Digital photography: use of light sensitive sensors to capture an image and store it in a digital form.

EXIF: short for Exchangeable Image File, stores information on the image such as shutter speed, exposure compensation, F number, what metering system was used, if a flash was used, ISO number, date and time the image was taken, white balance, auxiliary lenses that were used and resolution.

Fill flash: used to "fill in" or add light to the shadowy areas of a composition.

Depth of field: the degree that the foreground and background will be in **focus**.

Focal length: how much your camera can see; longer **focal lengths** require shorter exposure to reduce blur caused by an unsteady camera, this is why tripods are recommended for shots which require longer **focal lengths**.

Focus: the ability of a camera to render a clear image, determined by the point at which the light rays and the image converge. An image will be in **focus** when all or the most points are converging; out of **focus** is when the least amount of points are converged.

f-stop: fractional representations of the amount of light passing through the **aperture**. In F-Stop language remember that less is more... the lower the F-stop, such as F4, the more light is allowed into the camera; the higher the F-Stop number, such as F22, the less light is allowed into the camera.

geotag: the process of establishing a spatial or geographical relationship to an image's **EXIF** through software or imbedded **GPS** sensor.

GIF: graphics Interchange Format: 8 bit file format for saving images.

GPS: short for Global Positioning System is a space based navigation tool that work with an appropriate sensor through triangulation of satellites to attain a position fix on the ground.

Header: supplemental data placed in the background of an image.

Horizontal framing: a picture with orientation that is wider than it is tall (also called landscape).

Image: two-dimensional picture captured by an optical device.

Image size/resolution: detail captured by an optical or digital sensor.

Information Interchange Model (IIM), aka "IPTC": the Information Interchange Model is a file structure and set of metadata attributes that can be applied to text, images and other media types. Information such as the name of the photographer, copyright information and the caption or other description can be embedded either manually or automatically.

ISO Speed: short for International Organization for Standardization speed in traditional 35mm cameras refers to the film speed, but now that **digital cameras** are being used, ISO speed measures the sensitivity of the image sensor.

JPEG: short for Joint Photographic Experts Group is a lossy compression used in storing imagery.

Light meter: the mechanism in a camera which measures the amount of light entering through the lens to determine the correct exposure for an image.

Lossless compression: uses an algorithm that compresses data to a smaller format sacrificing only data not recognizable to the human eye.

Metadata: used to describe the definition, structure and administration of data for further use.

Panorama: a wide angle view of a landscape composed of stitching multiple images together.

Pixel: short for Picture element, the smallest single point on a digital image.

PNG: short for Portable Network Graphics, 24 bit lossless data compression designed to replace **GIF** as a way to save images.

RAW: format that is used to save unprocessed images.

Red eye: reflection of blood in the back of the eyeball and it is recorded onto the picture.

Reflectors: an object used to bend or throw back light in a particular direction.

Scale: an object or annotation to help depict the actual size of an object.

Shutter speed: the length of time a camera's shutter is open to capture reflected light.

Storage media: device for saving electronic data.

TIFF: short for Tagged Image File Format, it is a widely used and flexible format for storing images.

Vertical framing: a picture with orientation that is taller than it is wide (also called portrait).

View finder: term used for the LCD display or the eye piece (reflex finder) used to aim or sight the camera at its intended target.

White balance: the **color temperature** of a photograph.

Wide angle: enables wide field of views with a shorter **focal length**.