10 Steps to Better Macro Photography – ©Wil Hershberger

Know your subject – "To be a better nature photographer you must be a better naturalist." ©John Shaw. I couldn't agree more. Knowing the natural history of your subject prepares you for the shoot in the field. When and where to look for a subject; what behaviors to look for and photograph; what hazards are there for you or your subject if you approach too close. Knowing your subject also makes the experience richer for you as you work with your subject and for editors when they see your well written captions.

Look for a good situation – Don't shoot the first thing you come to. Look around for a pristine specimen that is in good light with a good background. It is an unfortunate fact of life that not every individual will be representative of the species. Some are damaged from weather, insects, bacteria, fungi, predators etc. Make certain that you are working on the best specimen you can find.

Use the correct lens – Macro photography can be done with dedicated macro lenses, diopters that attach to the front of a lens or extension tubes. Dedicated macro lenses will produce the best results with edge-to-edge sharpness that you can't get any other way. Two element diopters produce much better results than the single element designs. While more expensive than single element diopters you will be much happier with the results using the two element design. Extension tubes are "free" magnification. By placing an extension tube between the camera and the lens you allow the lens to focus closer than it can on its own. However, you will lose the ability to focus to infinity but, when was the last time that you were doing macro photography where you were focused at infinity? Dedicated macro lenses are the most expensive option but certainly the best of the options available to us.

Look for the best angle – Photograph your subject at its "eye" level. Don't shoot everything from a standing position. Getting down in the dirt at eye level with your subject allows for a more intimate view and a greater connection with the viewer of your image. While composing the image remember the rules of composition. Don't place everything dead center in the frame. Use vertical and horizontal formats to match the subject. Macro photography is perhaps the most demanding photographic discipline because of the magnifications involved and the longer shutter speeds required. It is therefore imperative to use a TRIPOD. Be certain that you have a good tripod, one that works with you and not against you. Also make certain that the tripods' legs open all the way so that the tripod can be placed directly on the ground. You cannot be at eye level with a wildflower of a salamander if your tripod has a two foot long center column. For macro work a column-less tripod is best. You want to be able to get your camera down to the lowest level possible…right in the dirt. Hint – a cheap pair of rain pants can protect your clothing while you are working at low levels. The rain pants get caked but, you will look great when you get to work. No one will know you were eye level with wildflowers at sunrise.

Examine the light – Is natural light working for us or against us? Is there another good specimen in better light? Is the background in the same light or darker than our subject? All of these thoughts should be going through your mind as you prepare to photograph a subject. Nothing ruins an image faster than a cluttered background or one that is brighter than your subject (unless of course you are doing silhouettes).

Modify the light – If the natural light isn't working for us how can we modify the light? Using reflectors or diffusers or both might save the day. Perhaps we should use flash as fill or as the main light. All of these light modification devices also allow you to get creative with colored gels, colored foil wrapping papers etc. It is your image, be creative and have fun. Reflectors made of aluminum foil taped to cardboard work very well, they are cheap and if damaged, easily replaced. An effective diffuser can be made from a car window sun shield and white nylon fabric for a fraction of the cost of a manufactured unit.

Chose the appropriate aperture – Not every subject requires f/22. Examine the subject, use the depth of field preview button (if your camera has one) and visualize what really needs to be in focus for this subject in this setting. An aperture

of f/8 or even wide open might yield a more artistic and pleasing rendition of the subject. If you don't have a DOF preview button on your digital SLR or point and shoot, just take an image at different f-stops and preview the image on the LCD screen to examine which f-stop produces the most pleasing image.

Stay parallel to the subject – Nothing is worse than getting back to your computer to view your images from a mornings shoot and finding that all of the butterfly images that you thought you nailed aren't sharp throughout. Watch those wingtips and noses. Whether shooting butterflies, grasshoppers, spiders, wildflowers, etc., make certain that all of the important elements are within the plain of focus for the chosen f-stop. If you want to get creative and only have a portion of the subject sharp, make certain that IS what you do. Go all the way and really make the selective focus stand out. If you don't, it will look as if you made a mistake when setting up the original shot.

Check the DOF – Not only is the DOF preview button good for determining what is in focus but, it very useful in determining if there are any extraneous elements in the background of the image or intruding on the edges of the frame that you cannot see while the lens is wide open. At smaller f-stops the view finder will get dark. Allow your eye time to adjust to the darker light level. Scan the edges of the frame and the background looking for hot spots, intruding elements from the edge of the frame etc. A little judicious gardening now can save a lot of work in PhotoShop later.

Sensor Dust – With DSLRs sensor dust is a way of life. This is especially true for the macro photographer. Using f/16 and f/22 will reveal every single speck of dust on your sensor. A sensor cleaning routine should be part of you shooting day. Using a bulb blower is effective if it is used regularly. The special nylon brushes work wonders and work best if used routinely. The absolute last resort would be to use a wet method of sensor cleaning such as the "Copperhill method." All of these cleaning methods are to be used at your own risk. Many camera manufacturers require that you send your camera in to them for sensor cleaning. Can you imagine?

I hope that these tips will make your macro photography more fun and productive this spring.

Links –

Insect cage - http://www.musicofnature.com/songsofinsects/pets.html

Sun shades for reflectors - http://www.topoftheline.com/auto-sunshade-pop-up.html

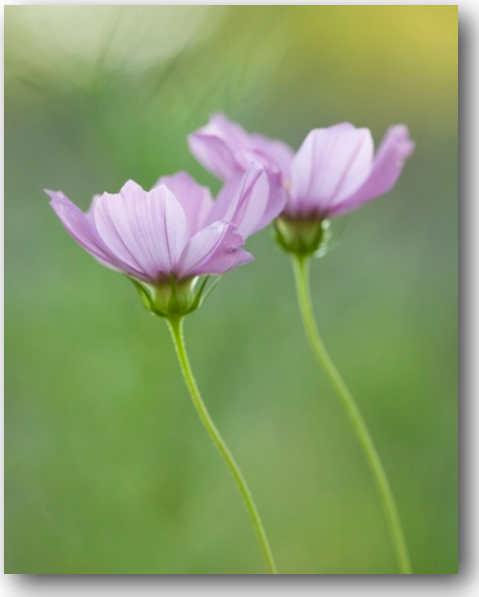
Blub blower - http://www.bhphotovideo.com/c/product/259157-REG/Giottos_AA1900_Rocket_Air_Blower_.html

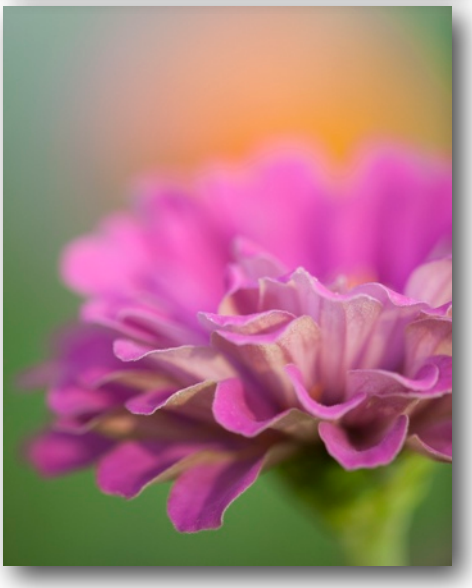
Nylon brushes - http://www.visibledust.com/products3.php?pid=3

Copperhill cleaning method - http://www.copperhillimages.com/index.php?pr=Tutorials

Nature Images and Sounds, LLC –http://www.natureimagesandsounds.com

Cross polarization flash photography–http://www.naturescapes.net/042004/wh0404.htm





Understanding Leads to Better Exposures-

Meters - The cameras meter is designed to make everything medium toned. If you point the camera at a medium toned subject and center the meter the image will be recorded as medium toned. This is what the camera meter was designed to do.

Shutter Speed– The shutter speed controls how long the sensor or film sees the light. Longer shutter speeds allow for the capture of movement and low light scenes. Short shutter speeds will freeze motion. Wildflowers of a breezy day may require a shutter speed of 1/250 second to freeze that motion. Flying birds usually require a 1/1000 of a second or faster to freeze their motion. Changing the shutter speed from 1/100 second to 1/200 second halves that amount of light getting to the sensor. Going from 1/60 second to 1/30 second doubles that amount of light getting to the sensor. Changing shutter speeds in full stops is merely doubling or halving the amount of light getting to the sensor.

Aperture – The aperture is the variable hole in the lens that allows light through to the shutter and the sensor. The aperture is composed of metal blades that form a hole based on the setting. F-stop is defined as a ratio of the diameter of the aperture divided by the focal length of the lens. So, at f/16 the diameter of the aperture is 1/16 the focal length of the lens. For longer focal length lenses the diameter of an f/16 aperture is larger than the diameter of f/16 for a shorter focal length lens. However, f/16 for any lens allows that same amount of light through to the sensor. Shorter focal length lens have a very large field of view and therefore gather more light than a long focal length lens with a much narrower field of view. Smaller apertures (f/16, f/22 etc.) also increase the depth of focus (DOF). This allows the photographer to have more objects in the scene in focus at the same time. Larger apertures (f/2.8, f/4 etc.) produce a very narrow DOF allowing the photographer to capture an image with a very shallow DOF and keep the viewers attention on just one aspect of the subject.

DOF – The closer the lens is to an object the narrower the DOF for any given f-stop. So, at f/16 with the subject at a considerable distance, there would be a large DOF. If we move in on the subject, to just a few inches, that same f/16 will give us just a fraction of an inch of DOF. This is the physics of light and lenses. There is no way around it. This is why wide angle lenses appear to have a lot of DOF. You are typically physically farther away from the subject so any given f-stop will produce a nice DOF with a wide angle lens.

Compensation - In order to record tonalities, other than medium tones, as they should be it is best to set the camera to manual mode. Now, you have complete control over the exposure. You know that you are pointing the camera at a snowy scene. The camera has no way of knowing this. Therefore, it is the photographer's job to tell the camera that they want the scene recorded as a very light tonality. You would do this by adding 1 1/3 to 2 stops of exposure.

Tonalities – How do we determine what the tonality of something is? A green lawn is medium tone (0). The palm of your hand is a light tone (+1). Concrete sidewalks are a light tone (+1 1/3). Old blacktop pavement is a medium tone (0). Snow and white coral sand beaches are an extremely light tone (+1 2/3 to +2). Experiment, set the camera to a known tonality and then meter other objects in the same light. The green leaves of a forest from above are medium toned. Yellow flowers are a light tone. Wet moss is often a dark tone (-1).

Highlights are Important – When metering a scene remember that the highlights of that scene are the most important to expose correctly. If the highlights are over exposed you can't get them back. Digital is very unforgiving in that respect, over exposed areas are lost and will be detail-less. Using the histogram and flashing highlight warming will make getting correct exposures much simpler.

Reciprocals – Shutter speed and aperture are related. In fact, they are reciprocally related. If you change one you must change the other in the opposite direction to retain the same exposure level. So, if we have an exposure setting of 1/125 sec at f/11 and we want a faster shutter speed, say 1/250 we would have to change the f-stop to f/8. As we reduced the amount of light by going to a faster shutter speed we have to add light by opening to a larger f-stop. These are referred to as equivalent exposures; 1/125 sec at f/11 is equivalent to 1/250 sec at f/8.

Histogram – Most modern digital cameras can be set to show the histogram of the previous shot as soon as that preview appears on the LCD. This allows the photographers to examine

the exposure and determine if an adjustment in needed. The histogram is simply a bar graph running from black (0) on the left to pure white (255) on the right. A properly exposed image will have some pixels very close to the right edge but not going over and the rest of the images pixels falling in place to the left. The latest digital single lens reflex (DSLR) cameras have amazing exposure latitude of 7-9 stops. Most cameras and slide film have around 5 stops of exposure latitude. This means that there are going to be scenes that have too much dynamic range for the camera to record in one exposure. It is far better to have the shadows under exposed than to over expose the highlights.

Exceptions – If the sun is in the frame it WILL be over exposed. The sun if far too bright to attempt to keep it from over exposing and still retain any kind of detail in the rest of the scene. Specular highlights from the sun reflecting off of water or chrome will be over exposed. Very distant snow in a scene does not need to be exposed properly because you won't see any detail in that distant snow. Therefore, it is ok to allow that distant snow to over expose a little in order for the rest of the scene to be exposed properly.

White Subjects – If you are taking a photo of a swan, white duck, or other white subject that is on a medium toned background it is best to meter the medium toned area of the scene and reduce the exposure by one stop (-1) in order to keep the white subject from over exposing.

Black Subjects – Similarly, if you are photographing a dark or black subject such as a black bear, grizzly bear etc that is on a medium toned background it is best to meter the medium toned area of the scene and then add one stop of exposure (+1) in order to keep the dark subject from being under exposed. The medium tones will record as light tones but the dark subject will have more detail rendered than you would get with the default medium toned exposure.

Take a shot, take a look – With the availability of the histogram and flashing highlight warning it is a simple thing to setup an exposure, take a shot and take a look at the results. Examination of the histogram will let you know immediately what needs to be done to the exposure if anything. All of the data crammed to the right and the image is over exposed; reduce the exposure with a faster shutter speed or a smaller aperture. If all the data is crammed to the left, the images is under exposed; increase the exposure with a slower shutter speed or a larger aperture.

ISO the other exposure variable – Know that we have a handle on shutter speed and aperture and the reciprocal relationship between them we can add the third and final exposure variable. In the days of film it was very difficult to change your film speed mid-roll. Many pros carried two or more camera bodies each with a different speed of film loaded. Now with digital we can vary the ISO from shot to shot if needed. Let's say we were photographing a flower at close range on a breezy day. We have the camera set for ISO 200 and the exposure comes out to be 1/60 sec at f/16. Oh, that is not a fast enough shutter speed to freeze the motion of gently swaying flowers. We really need a 1/250 sec, but we really need f/16 to cover the DOF need to include the flower. What to do??? We can change the ISO to a higher sensitivity to allow for the situation. So, to go from 1/60 sec to 1/250 sec is 2 stops. We would have to set the ISO to 800 to get the proper exposure. Changing the ISO allows the photographer to slide either the shutter speed or the aperture relative to the other in achieve a desired exposure setting. Another example, we are photographing a stream after shooting this flower. Our ISO is set to 800. We want f/16 to maximize our DOF to include the stream and its setting. Since the stream is in a shaded portion of the woods it results in a shutter speed of 1/60 second. Well, this will almost freeze the flowing water and create a very static looking image. We really want a slow shutter speed to create that flowing sugar look to the water. We will need a shutter speed of ½ second at the fastest to do this. Therefore, we have to go from 1/60 sec to ½ second which is 5 stops! If we change our ISO to 100 that is only 3 stops! We could change the aperture to f/22 to get us another stop but, that leaves us 1 stops short of the needed exposure. Going to f/32 would result in an image that lacked sharpness due to diffraction effects. If we can change the ISO to 50 we are set. Some cameras don't allow for this. We could use a circular polarizing filter which would give use two stops less light. Now we would have an exposure of ½ sec at f/16 at ISO 100 using the polarizer or ½ sec at f/22 at ISO 200 or perhaps even better would be 1 sec at f/22 at ISO 100. All of these are equivalent exposures. Problem solved.

Wildlife Photography Tips

Know your subject – I cannot stress enough the importance of knowing the life history of the subject that you are trying to photograph. One only has to see the videos of tourists being hurled through the air by an elk to know that you do not walk right up to these large mammals. Knowing what behaviors to watch for, interesting interactions between individuals, seminal events in the yearly routine of wildlife, and knowing when you are stressing an animal and should back off are all important considerations when in the field. There is a plethora of terrific field guides to all kinds of wildlife from mammals to wildflowers. Studying these guides before venturing out on a quest will give you a decided advantage in finding compelling images. Knowing how to identify the venomous snakes in your area can mean the difference between an action shot of a snake and a trip to the emergency room. Many species of wildflowers, frogs, insects and others are only found during certain times of the year. Looking for hepatica in January would be an exercise in futility. Knowing that hepatica is a small, ephemeral wildflowers of the forest floor that blooms well in advance to the trees leafing out would confine your search window to mid-April in our area.

Shoot at your subject's level – In order to make compelling and intimate images of wildlife we need to get down on their level. Shooting turtles from a standing position will generate field guide like images of the turtle. However, if we get done to eye level with the turtle we can make engaging images that allows the viewer to connect with the subject, images that make a lasting impression. This is true for wildflowers, fungi, salamanders, grizzly bears etc. This can require that you are down on your belly getting your camera and tripod into position. A rain suit can be a life saver in these situations keeping you dry and your clothes clean. A tripod that will open up so that the legs lie flat to the ground is essential. You can imagine that a center column on a tripod would prevent you from getting to ground level. This is why I suggest buying a tripod without a center column or cutting it off so that the tripod can go flat to the ground. If you know that you are going to be at ground level for most of the time that you will be shooting there are other devices that can get your camera down and are much easier to move around than a tripod. The best is the skimmer made by Naturecapes.net. This plate allows you to attach your ball head or Wimberley head to it so that you can push the plate around commando style. This is terrific for shorebird photography, mushrooms, moss, turtles etc. The plate design allows you to place some accessories in the dish that will move around with you. Extra batteries, tele-converters, extension tubes and more can be placed in the dish and be at the ready.

DOF to suit the subject – The f-stop setting on the lens or in the camera affects not only how much light is reaching the sensor but also the apparent depth of focus within the image. For any given subject size in the view finder a given f-stop will yield the same DOF. Using a wide-angle lens at just a few inches or a super telephoto lens at several feet will yield that same DOF for a subject if it is rendered the same size in the frame. When contemplating the DOF needed for a subject be certain to take into consideration the background that will be in the shot. Distracting cluttered backgrounds create disorganized images. Using the DOF to your advantage you can blur out a cluttered background rendering it as a blend of soft colors. Some subjects require a large DOF to yield an acceptable image. Some flowers with lots of relief, for example, would require a large DOF to capture the entire flower in sharp focus. With other subjects you can get creative and use a shallow DOF to create a more artistic interpretation.

Smaller f-stops can be great for creating a large DOF. However, smaller f-stops create additional image clarity robbing problems – diffraction limit. The diffraction limit is that f-stop that begins to show a decrease in the sharpness and contrast of the image. Light is composed of waves of light that also behave as particles. It is the wave property of light that comes into play here. As light passes by an edge it is bent slightly. If the entire hole that the light is passing through is a hole then there is edge all around. The diameter of the hole is so small as to become insignificant to the amount of edge around the hole. All of the bending of the light creates a diffusion of the light rendering the image softer than at a larger aperture. For most lenses this diffraction limit is in the neighborhood of f/16. At smaller apertures the image sharpness is degraded.

f/2.8 f/8 f/22

Which lens to use – An important decision to consider is which lens do I want to use for this particular subject. For wild birds it is pretty evident that you need a super-telephoto lens in the 500-800 mm range to achieve frame filling shots of these tiny creatures. Using a super-telephoto lens is a good idea when photographing grizzly bears, black bears and rutting elk, big horn sheep etc. There are certainly times when you can photograph some animals with shorter focal length lens to create compelling images that include the animals' surroundings. These are the times when the animals are more docile and more approachable. Knowing what to look for in an animal's behavior that would tell you that you are too close or that you are provoking the animal are good things to learn. Different animals have different ways of telling you that you are crossing the line. Doing research on the animals that you will be photographing before you go into the field could frankly save your life. The Galapagos Islands are famous for their approachable wildlife. Lots of wide-angle shots can be made showing an animal large in the foreground with the habitat prominent in the background. These are wonderful opportunities and all too rare. Approaching a mother grizzly bear or elk with a short focal length lens could get you into a world of trouble in a hurry.

Longer focal length lenses will help you to control the background in your images. A 500mm lens has a 5º field of view. It is very easy to completely change what is in the background of an image by moving left or right a few feet. This can allow you to avoid cluttered backgrounds or hot spots behind your subject.

A telephoto zoom lens is great for carrying over your shoulder when working with longer lenses. If something happens closer to you than the longer lens would allow you to shoot you are ready with the shorter focal length zoom on your shoulder. Many wildlife photographers will carry a 70-200mm lens with a non-full frame camera attached over their shoulder for just such opportunities. A 400mm f/5.6 telephoto lens is great for birds in flight such as herons, terns, gulls, owls etc. This lens is light and focuses very fast. Having the camera set for a very fast shutter speed will freeze the action.

Having the camera ready to go – When photographing wildlife, things happen very quickly. With digital cameras it is very easy to have the exposure already set to the current conditions. Once on location, find a medium toned object in the same light that you expect the subject to be in. Set you exposure for a medium toned object and check the histogram. Make certain that the exposure is correct, that most of the pixels are centered in the histogram. If you are after black bears you might want to open up one stop to allow all of the tonalities of the bear to be recorded. DO NOT attempt to meter the bear. There are too many shades of black and gray to get an accurate reading. If you are shooting swans you might want to close down one stop from the medium tone exposure so that all of the bright tonalities of the swan are recorded.

As you are working medium toned animals and they get to the side of you, so you no longer have the light coming from over your shoulder, you will want to open up one stop. If it gets between you and the sun so that it is backlit you will want to open 1 2/3 to 2 stops. This will create a very bright rim of light around the top of the animal and a properly exposed side of the animal that is facing you. It can be very difficult to use auto exposure modes when working wildlife that is moving around like this. Shooting in manual mode gives you complete control over the exposure. You have to remember to compensate for the different angles of light and different tonalities of the subject.

Leave only foot prints – As nature photographers we get into situations where we are encroaching on wildlife and wild plants. If we are very careful we can leave the area with very little disturbance. If we are not careful we could be trampling the very thing that we came to photograph. With wildlife we have to be extra vigilant not to interfere with the life of the subject. Being careful not to trample nests, collapse tunnels and food middens are all important considerations when walking in the fields and woods. Knowing what time of year certain animals are more easily disturbed can help the adventuress photographer avoid a potentially deadly situation.