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Second Edition

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Jay Dickman
Pulitzer Prize–winning *National Geographic* photographer

Jay Kinghorn
Olympus Visionary photographer and Adobe® Photoshop® Certified Expert

Perfect Digital Photography

Second Edition

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Photo by Lauren DeBell

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Perfect Digital Photography

Second Edition

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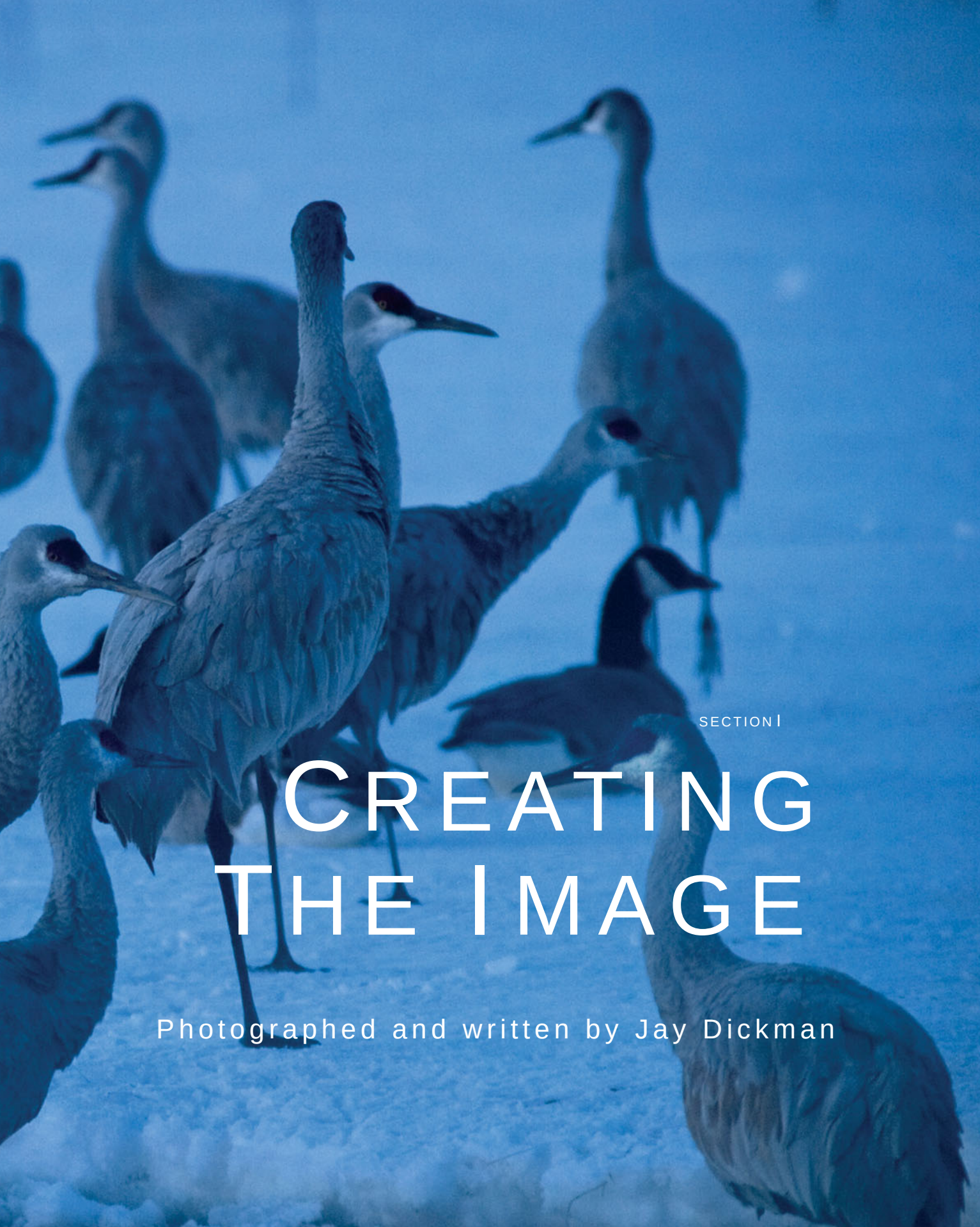
Introduction



SECTION I

Creating The Image

Photographed and written by Jay Dickman

THE POWER OF PHOTOGRAPHY

Photography records the gamut of feelings written on the human face, the beauty of the earth and skies that man has inherited, and the wealth and confusion man has created. It is a major force in explaining man to man.

„Edward Steichen

We are a nation of photographers. With millions of “Im cameras in homes and a hugely growing market in digital photography, our lives and times are the most documented events in history. Magazines and newspapers have the capability of going to press with photos shot only moments earlier. Television newscasts use viewers• digital images, sent in via the Internet, with photos ranging from news events, to weather photos, to beautiful sunsets. We send our relatives electronic photo albums of our vacation or the baby’s first year.

We now have the ability to produce high-quality books containing photos and text at the click of a mouse and at a next-to-nothing cost.

The Correfoc (fire run) is one of the most striking visual events of the week-long La Mercè festival in Barcelona, Spain. Set amidst a cacophony of fireworks, the parade travels for several blocks in the heart of the city. To celebrate the end of summer, •spiritsŽ are exorcised. Many participants in the Correfoc are dressed as devils, sprites, or monstersƒthe event is amazing! 14…35mm lens, 1/60 second at f2, 1250 ISO

A fish-eye view of a bonefish, moments after it was caught by a fly fisherman in the Bahamas. Bringing a unique perspective, you can make your photos more engaging. Underwater housing with a 8-megapixel camera, 8mm lens, 1/250 second at f4, 100 ISO

One of those moments that lasts for two frames. I was photographing the Kazakh peoples of far western China forA Day in the Life of ChinaWandering around a collective horse farm near the village of Yining, I walked to a bridge crossing a small river, saw this fellow watering his horse, shot two frames, and the moment was gone as he looked away and the light fell off. 300mm lens, 1/125 second at f4.5

Part of the job of the photographer is to create an image that makes the viewer want to be in that photo, in that place. On assignment at Kamalame Cay resort in the Bahamas, I spotted this hammock in the late afternoon sunlight. When I look at this, I just want to be in that hammock. 12...60mm lens, 1/60 second at f6.3, 100 ISO

Family heirloom photographs are not only touchstones to the past, but they define who we are by freezing the subject at that moment in time. Many old photographs contain visual keys to an era by clothing or signage, as seen here in an old photo of my wife•s family.

the “rst image stored in that data bank of our memory„it doesn•t start the projector rolling with a 10-second clip of Ian“ ink of the Vietnam War, and more often than not, Eddie Adams•s photograph of the Viet Cong suspect being executed by a gunshot to the head comes to mind.eHindenburg is a

Oban, Scotland, was the site for our FirstLight Western Highlands photography workshop. I photographed piper Ian MacDonald on the banks of Loch Feochan (Lake of the Winds) as he played the bagpipe. The clouds and overcast sky provided a dramatic background as well as •soft lightŽ under which this photo was made. 11…22mm lens, 1/60 second at f6.3, 100 ISO

name that instantly brings up the image of the airship coming down in ”ames. e tragedy of 9/11 will be remembered with mental images. Photographs remind us of so many historical moments. e history of our own lives are also archived in photos. In the brief time it took to gather everyone together at a family picnic in the 1920s for a photo, little did they realize how we would study those images today, de“ning who we are by examining our visual history.

Some Key Elements to Great Photography

When you employ the understated power of KISS (keep it simple, shutterbug), many great photographs have a commonality in their simplicity and directness. But this simplicity is part of the photo•s elegance; the photographer has used the view“nder like a canvas. Everything in the photo is relevant to the message of the image. You pick up the image, study it, move it closer or farther away,

By sitting in the field of grass, I caught a slightly different look of this old windmill near the Midi-Pyrenees village of Auvillar in France. Using the grass in the foreground to frame the image also provided a foreground •layerŽ of interest. This was shot with a point-and-shoot 5-megapixel Olympus 5050 camera. 14mm lens, 1/60 second at f3.2, 64 ISO

In the Ukraine, two expert equestrians perform a traditional horse-riding drill, Kiss a Maiden, as part of a demonstration of their horsemanship. Shot for A Day in the Life of the Soviet Union, this photo illustrates the power of still photography to freeze an otherwise fleeting moment, allowing the viewer to study the many aspects of the photo. 600mm lens, 1/250 second at f4

The power of the camera to affect change in the world is huge. We document events, and those images can impact the thinking and opinions of the viewer. Eddie Adams•s photo of the Viet Cong suspect being shot in the head has been credited with having great impact on the Vietnam War finally drawing to a close, as Americans were graphically shown the horrors of war. I photographed the war in El Salvador in the early 1980s, and this photo is from the Pulitzer Prize…winning series. This skull belonged to a death squad victim who had been executed in a remote area outside the capital city of San Salvador. 300mm lens, 1/500 second at f8

What Is There to Photograph?

As a working photojournalist, I either propose stories or I am assigned a shoot. Publications have space to “ll every month, so stories must be generated by sta or from outside story proposals. Part of the luxury of being assigned a story is that the subject material has been researched and found to be credible and having interest for the readership. Upon accepting the assignment, the photographer goes into research mode, deciding how to visualize the story. Every publication is di erent in its makeup, in what visual ”ow the photographer is trying to create. What story are you trying to tell?

I•ve found one major concern for aspiring photographers is determining what to photograph. I teach my own series of photographic workshops (www .“rstlightworkshop.com), and we provide assignments for the participants in the area where we are hosting the workshops. These assignments have been arranged beforehand on a scouting trip. (FirstLight has hosted workshops in France, Scotland, Spain, the Eastern Shore of Maryland, and Dubois, Wyoming, with many other locations slated.) But you don•t have to venture too far, because there is a lot to shoot in your

own neighborhood. Check out your local newspaper to see what outdoor events are going on, such as street fairs, community events, or youth soccer games—these can provide an abundance of photographic subjects. If a national or state park is nearby, venture out to check the location, deciding where you want to be at the Golden Hour, that time of day in the late afternoon when the sun bathes everything in a golden glow. It takes only a bit of research to come up with many such locations.

The camera is a tremendous passport, not a barrier, as I've heard a lot of aspiring photographers claim. Countless times, I've walked up to people, domestically or internationally, and used words or gestures to ask if I can take their photo. I have made friends around the world as a result of this simple and direct act of showing interest. Next time out, if you take a deep breath and approach a person you'd like to photograph, you'll probably get the okay, and one of the "rst steps toward becoming a better photographer will have been accomplished. Everyone has a comfort zone, a distance where coming closer becomes an invasion of space. Time will teach you how closely you can work with a person, so you're not invading his or her zone. And, above all, create a photograph that will do justice to your subject.

We are a nation of photographers, and throughout this book, we will give you hints, show you tools, and, we hope, inspire you to take this marvelous craft to greater heights.

We take our cameras everywhere we go to document our travels and our lives. I was working with Kevin Gilbert and Reed Hoffman of Blue Pixel in Colorado, where they'd created an event using the launch of several balloons. After the flight, I saw one of the ground crew pulling a line attached to the top of the balloon as it collapsed. 7…14mm lens at 7mm, 1/640 second at f4, 100 ISO

How To: Respecting Human Dignity, Promoting Social Change

by John Isaac

I served as a photojournalist for the United Nations and UNICEF for over 20 years. During that time my work focused mostly on international social issues such as wars, refugees, and the plight of humanity in general.

I feel that I am a human being “rst and a photojournalist second. During my career, I followed one simple guideline: Never take away someone•s dignity, just as I would not want someone to take away my dignity. I learned about human dignity from three important people: my own mother, Mother Teresa, and Audrey Hepburn. ey all emphasized human dignity in their own way. is guideline has prompted me to put down my camera in several situations where it would not have been appropriate for me to be making pictures. Sure, I may have produced some powerful photographs, but only at the expense of another human being.

Many years ago, I covered the plight of the Vietnamese boat people in Southeast Asia. For over 10 weeks in 1979 I traveled around that region photographing the beleaguered people who had washed ashore after several days adrift in the ocean in small boats. I met a young Vietnamese girl who had been raped by several pirates while she was in a boat with no food, water, or protection. She had lost her father and her mother during the se with the pirates and was very alone. When I heard the story and saw her sitting by the beach staring into the sky, tears rolled down my cheeks. She had not spoken a word to anyone in days. I had no desire to take her photograph. All I wanted was to show her that there was somebody in this world who cared for her. I had taped some Vietnamese music in my tape recorder in another camp a few days before. I played the music while sitting next to her on the beach. I had some chocolates in my hand that I owed her. I was praying that she would just look at me and take the chocolates from my hand. After some time she really looked at me and took the chocolates. at was all I wanted from her. Several days earlier, I had met a few Catholic nuns who were doing aid missions in that area. I went and got them in the middle of the night and rescued this little girl to a better life. I know she is living somewhere in California today. I did not take a single photo of this girl nor did I take her name and particulars. I have many stories like this from my career, where I did not point my camera at situations where I felt that I would diminish someone•s dignity.

ere were many people who did not agree with me. Many felt that my job as a photographer was to document a situation and tell the world the story and not to play the role of rescue worker. When I was covering the Ethiopian

famine in 1984, I saw a woman who had fainted on the ground with her newborn child still attached to her umbilical cord. She had traveled several miles to get to a medical tent, but had fallen before she could reach help. She was naked, her clothing having come unwrapped. My “ rst reaction was to put her clothing back in place, since it was taboo for a woman to be naked in front of strangers. After clothing her, I ran to get the doctor. At the same time, a TV crew that witnessed this scene had gone back to their Jeep to get their equipment to be in her incapacitated state. When the cameraman returned to the scene, he was not happy to see her with her clothes on. He almost punched me for interfering with his subject and the situation.

I have told you of times when I didn•t take a picture. ankfully there are many more times when taking pictures can make a positive di erence, and not only in the midst of famines, war zones, or social emergencies. Start with community issues where you live. Think globally and act locally. e “rst step in addressing a community issue is to bring attention to it. Words alone often are insu cient to arouse the public•s interest, but one photograph can speak a thousand words. e best way to let large numbers of people know about your cause is through the news media. You•ll be surprised how easily you can get local newspapers, or even national magazines, to run your story if it is compelling and well illustrated. A poster that I donated to UNICEF showing a collage of children•s faces from around the world sold more than 100,000 copies (in several languages),„and raised more than a quarter-million dollars to bene“t children in need.

Perhaps you could arrange a personal or group exhibit, with proceeds from photo sales going to a charity. How about taking pictures of the animals at a pound or pet adoption agency? Ask the manager of your local mall or shopping center to let you hold an exhibit to attract people to adopt them. I have been photographing tigers and donating my images to make posters to bene“t the Save the Tiger organization, and I show the images in my presentations at schools and colleges. I want people to be aware of the delicate position of tigers in today•s rapacious world.

How about sharing some of your photographic enjoyment with others? Residents of retirement communities, shut-ins, and hospital patients, for example, always can bene“t from additional attention and a change in routine. Showing pictures from your travels can bring pleasure to those whose travel opportunities are unavoidably more limited. Or consider giving a talk on photographic tips and techniques liberally illustrated with examples of your own pictures. A little of your time can go a long way. We are all busy with tight schedules. But no matter how busy you are, you can always swing a little time to share your photos in a retirement home. You will surely cheer those people on a lonely cold night with your images. e smiles you will receive in return for sharing the joys of your photography will be such a huge reward for you. Probably more than winning “rst place in a photo contest.

ere is another simple guideline I try to follow. As Antoine de Saint Exupéry writes in e Little Prince: •It is only with a heart that one can see rightly; what is essential is invisible to the eye.Ž I try my best to capture images with my heart and not just with my eye alone.

OLYMPUS
E-3
Canon
M8
LEICA
SUMMILUX
OLYMPUS
MADE IN CHINA
Carl Zeiss
Lexar
UDMA

EQUIPMENT

ere is only you and your camera. e limitations in your photograhy are in yourself, for what we see is what we are.

„Ernst Haas

Photography is a technical art. As a consequence of this, many photographers become equipment junkies, and the many options available to the digital photographer certainly can satisfy the equipment junkie•s cravings. But all these options make choosing a camera more di cult for someone new to the world of digital photography. Ultimately, when it comes time to head out on the shoot, every photographer should be looking at ways to minimize the amount of equipment and weight needed for the type of photography he or she likes to shoot. None of us wants a camera bag to get in the way of what we love to do: shoot photos.

Choosing the correct camera does not have to be a daunting task if you buy according to your needs. Cameras courtesy of Englewood Camera, Englewood, Colorado

This consumer camera from Olympus is an excellent choice for the casual photographer, yet it is also highly sophisticated in its ability to photograph underwater, to 33 feet, and will withstand a drop of nearly 5 feet. Video capability is also onboard this camera.

Lag time Make certain the camera reacts quickly to the shutter press.

Speed of the lens is dictates how much light the lens allows to pass and therefore will a ect the shutter speed. e little pocket cameras are cute, but they will generally have a slow lens, probably an f4 or f5.6, which can slow things down.

Speed of the in-camera processor After you take the photo, it•s stored in the camera•s bu er (memory) as it processes the image and downloads it to your capture media. e bu er also has a limited amount of images it can hold. Ask about this, as the less expensive models will hold fewer images. is can be extremely frustrating on a limited bu er because the camera will not allow you to shoot more photos until it has cleared its bu

Zoom length of the lens Most consumer-level cameras will provide a 3x or 4x lens. For most amateurs, this will be enough until you want to photograph the elk bugling in the state park. If photographing animals or sports is of interest, consider one of the new breed of •ultra-zoomŽ cameras, such as the Olympus 5060. Digital zoom will œr greater length, but the quality goes downhill quickly the more you use this zoom.

Image quality e cost of a consumer camera is lower than that of the prosumer or professional DSLR for a reason. e chip (the electronic device that captures the photo, analogous to “lm) is generally smaller, and enlarging the image will show less quality than the images of this camera•s bigger siblings.

File size e same issues apply here as with the image quality„in general, the more money you spend, the larger the “le size. And the size of the “le indicates the maximum size to which the image can be enlarged while retaining quality.

Noise In “lm images, noise refers to graininess. Due to the smaller sensors point-and-shoot cameras, greater noise is the natural byproduct of the smaller sensor size. is will show up more readily in shadows and dark areas.

Pixel size Smaller sensors typically ha smaller pixels. Smaller pixels hold fewe electrons and are therefore noisier than bigger pixels.

ISO settings e consumer-level camera has a narrower window of ISO (image speed) settings. Limited to the lowest ISO of 100 to 400 or so, this restricts the camera•s (and thus the photographer•s) ability to increase the ISO to shoot faster exposure in lower light. is can be an issue if you enjoy photographing sporting events e ability to shoot at a higher shutter speed requires either a lot of light or an increased ISO setting. e pro cameras will go up to 3200 ISO and beyond, which enables very fast shutter speeds necessary to stop action.

The Canon PowerShot G10 camera bridges the gap between the ease of a point-and-shoot and the full control of a pro-level DSLR.

Prosumer-Level Cameras

 e Canon PowerShot G10 shown here straddles the line between the consumer camera and the pro model. Usually in the 10…14 megapixel range, such cameras often provide a “xed lens with a zoom range from 3:1 all the way to 6:1. In addition, most prosumer cameras have fast apertures and fast processors for moving the images from•bu to the media card with little or no lag time.

Prosumer features include the following:

Short or no lag time between the time the shutter is depressed and the time the picture is taken.

Good zoom range of 4:1 or 5:1 is ideal.

Most pros prefer a wide-angle length in the zoom equivalent to about a 28mm.

Fast aperture„the wide setting of f2.2 to f2.8 is preferable.

Ergonomics to “t your hands and shooting style.

More control over the exposure modes for shooting. is would include the ability to set the camera to overexpose or underexpose by an amount determined by the photographer.

A greater range of available ISO settings. is feature may approach the pro DSLRs in providing an extended range of available ISO.

- Larger chip for better quality.
- Availability of a hot shoe, so an auxiliary ”ash can be used with the camera. A hot shoe is a receptacle on the camera that accepts the foot of the strobe to attach a ”ash to the camera, allowing manual, automatic, or TTL (through the lens) ”ash capability.

Professional or Expert…Level Cameras

e advantages of the SLR camera are multifold: the method of focusing and composing through the lens; being able to see exactly what the lens is seeing; the accuracy of the metering as it, too, is able to meter o the composed image; and so on. Several top-of-the-line digital cameras, such as the Olympus E-3, the Nikon D3, and the Canon EOS-1Ds Mark III, give you 100 percent of the image you see in the viewfinder. Others are somewhere in the 90 to 94 percent range, a holdover from the days when most avid amateurs and pros were shooting slide, and the slide mount cut o 4 to 6 percent of the edges. Another advantage of the SLR is that any e ect from “lters„such as polarizers, graduated “lters, and special-e ect “lters„is readily seen through the viewfinder.

Other advantages include interchangeable lenses, state-of-the-art bu ers and processors for moving images rapidly to the media card, and nonexistent lag. When you press the shutter, the camera reacts. Cameras relatively new to the market, such as the Nikon D90 and the Canon 5D Mark II, with limited video recording capability, may in some cases eliminate the need to carry a second, video camera. Like any works in progress, these cameras have some limitations„they do not change focus automatically and are limited to about a 5-minute shooting burst (due to the chip becoming hot as the current passes through it). But video ability will become a popular feature for the prosumer.

e pro camera also o ers you manual control over every aspect of your photography. is may seem like too many decisions to have to make at your current knowledge level, but throughout this section of the book, I will show you how to use the manual features to improve your photographs.e pro-level camera also o ers better metering, faster shutter times, more control over ISO, less picture noise, and a greater choice of lenses. Other features include the following:

- Very fast processor Most top-of-the-line cameras are capable of shooting a minimum of 25-plus high-quality JPEGs (SHQs, or super high quality) at a frame rate of “ve to nine frames per second. is may sound like overkill, but when you•re shooting something like the running of the bulls in Pamplona or porpoises leaping, the importance of being able to keep shooting without being hampered by the camera stopping while processing images cannot be overstated.
- Sturdy construction Check the lens mount. It is preferable to have a steel lens mount instead of a plastic or synthetic mount. Steel will support larger and longer lenses and will withstand the abuse of quickly changing lenses many times, which will make the camera last longer.

Olympus E-3, Nikon D3X, Canon 1Ds Mark III, Pentax K20D, and Sony DSLR-A900 These top-of-the-line digital SLRs are constructed with water-resistant seals, gaskets, and O-rings to provide a pretty secure barrier against splashes and moderate amounts of rain. Combined with a weather-resistant lens, these cameras offer the photographer the ability to work in some less-than-ideal situations, where rain or dust might damage lesser cameras.

Proprietary lenses, especially in the wide range, that are digital-specific Many manufacturers build digital cameras that will allow you to use existing 35mm lenses on the body. But there is an issue with the "legacy" lenses' method of focusing the light from the rear element to the chip. Evidence has mounted that 35mm wide-angle lens design has the light striking the chip array at an angle, causing softness on the edges of the frame due to a shadowing by the sensor containing the pixel grid. Following Olympus's lead, most companies are now producing digital-specific lenses.

Dust on the sensor Pro-level cameras all have a sensor-cleaning function to deal with the Achilles' heel of the digital realm. When current is flowing through the sensor, it acts like a magnet, attracting dust to its surface. By various methods, each camera brand deals with this problem, some more successfully than others. I've taught a couple of workshops to the US Navy Combat Photographers Group, and the dust these folks get on their sensors is pretty amazing, and understandable.

Image stabilization Along with reducing the dust on the sensor, many cameras have image stabilization built into either the lens or the camera body. Lens stabilization works through a series of "accelerometers" (similar to small gyroscopes) that correct movement (shake) in the lens by countering that motion in the lens. Body stabilization provides a "sensor-shift" to counter the movement/shake of the camera in slow shutter speed conditions.

Whose Advice Should You Take?

An older neighborhood pro is always a good bet for advice, and this photographer will usually have plenty of it. Years of experience working with good and not-so-good equipment provides a lot of insight into the performance of camera gear. An informed camera shop salesperson can be a good source of information as well, as long as you don't feel you are constantly getting the sell job. Find a shop that doesn't mind your hanging around for extended lengths of time while handling several different cameras.

Your neighborhood pro will often have a favorite camera store and salesperson he or she deals with. And how do you find that friendly pro? Try attending a local American Society of Media Photographers (ASMP) meeting. This professional organization has monthly meetings in most major markets, and guests are welcome for a small fee. Talk to the photographers there and ask about the best stores in town. While at the meeting,

Three professional-level digital SLR cameras: the 22 megapixel (MP) Canon EOS-1Ds Mark III, the Olympus E-3, and the Nikon D3X

An ultra-zoom camera may be the perfect camera for the non-pro photographer who wants to capture junior playing hockey, football, or another sport. This Olympus camera offers a 20-power zoom that provides a super-zoom of 520mm. A nonchangeable lens makes it a simple tool that gives the photographer a lot of lens for the buck.

Sports

Interchangeable lenses

6+ megapixels

Fast processor and lens

Travel

Compact size and weight

Weatherproofness

Interchangeable lenses

or

4…6 power zoom on fixed-lens camera

Built-in flash

Outdoors/Wildlife

Rugged body with weather resistance

Interchangeable lenses with long telephotos available

Zoom lenses in the 10…12 power range

Compact size

5…10 megapixels

Fixed lens

Built-in flash

Built-in sensor cleaning for dust reduction

Telephoto lenses as long as 600mm for outdoor photography

Image stabilization, either in the camera body or in the lens

Lenses that have a fast aperture: In a lo telephoto of 400…600mm, really fast lenses are in the f4 maximum aperture range and very expensive. A lens in this length in the f5.6 or f8 range is a good choice for wildlife.

Quick processor and bu er

Sensor cleaning for dust reduction or elimination

Portrait/Wedding

10…22 megapixels

Prosumer level may work with xed lens and moderate zoom

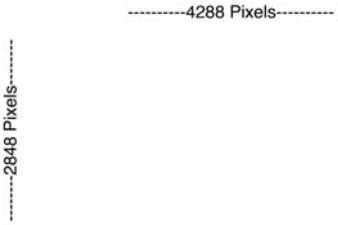
Quick processor and bu er

External ”ash capability

Regarding the Megapixel •MythŽ

All the “gures I•ve provided regarding chip size and megapixels should be viewed as interesting but not totally relevant information. Camera manufacturers have been creating larger, more densely packed chips, and many photographers assume that better quality is a natural consequence of larger chips. Not so. Recently, a •movementŽ to reverse this thinking is underway, and I would like to add my voice to the revolution.

When digital cameras arrived at the 6 to 8 megapixel range, that technology addressed probably 95 percent of the amateur, nonprofessional photographers• needs. Beautiful prints up to 16 × 20 can be made with those cameras, and now with prosumer cameras in the 10 to 14 megapixel range, prints up to 20 × 24 and larger are manageable. Do not buy into a salesperson•s push that you need to move up from your 8 megapixel to a 16 megapixel camera, because the di erences will not be that great„unless you are printing billboards.



The standard for 35mm photography for decades, the 3/2•s box provides a good horizontal image format.

A bare-bones illustration of the 4/3•s format

What is the maximum size you can imagine you•ll print from the ‘les? For an 8 × 10, a 5-6-10 megapixel camera should easily su ce. If you love printing images in the 16 × 20 size, you should be looking for equipment in the 8 megapixel range. Be aware of Photoshop•s ability to upsample images well. is means that the software takes your smaller “le and uses algorithms to sharpen the photo for larger prints.

What will you be shooting primarily? If you•ll be shooting the family vacation and documenting the life of your brood, a Canon EOS-1Ds Mark III (a 22 megapixel, expensive body) would be a major case of overkill. Look at the Olympus E-520, which is a step down from that company•s top-of-the-line camera, at a considerable cost savings. Not quite as rugged, as it does not have the weather resistance of the Olympus E-3, but that may not be an issue if you don•t plan on shooting regularly in rain.

How does the camera feel? Is it an extension of your hand, heart, and eye? camera should never get in the way and should enable the process of picture taking.

Will the camera grow with you? Does the system you are looking into have the expandability for your future growth as a photographer? A point-and-shoot will not accept much in the area of an expanded system of lenses. If photography is a passion, this is an important consideration.

How To: Buying Your Digital Camera

In the course of workshops or assignments, I•m often asked for good guidelines to follow when buying a digital camera. Here•s a list of my ideas, combined with buying pointers from other pros:

How much can you spend? Be speci“c and set a realistic maximum price that you are able to do.

Realize that generally price, quality, and features go hand in hand. Expect to pay more for a top-of-the-line DSLR than for a compact point-and-shoot camera.

Don•t entirely fall into the •megapixel myth.Ž I•m shooting with a 10 megapixel camera and getting very good results up to 24 × 18 inches (and larger). e quality and size of the image sensor often plays a more pivotal role in the quality of the •nished image than the sheer number of megapixels.

As I mentioned earlier, know what equipment you need for the type of photography you prefer. If you don•t need lens interchangeability, a prosumer camera may very well su ce. However, if you are passionate about wildlife and sports photography, you•ll be hamstrung by a camera that doesn•t have interchangeable lenses.

If you already have a 35mm camera system going, and the lenses will work on a digital camera of the same brand, consider purchasing a DSLR by the same manufacturer as your “lm camera. You•ll be able to use your old lenses and upgrade to digital lenses as your budget allows.

If you take anything useful from this chapter, I would hope it would be that our focus is still about photography, and the digital camera is simply another tool in your bag. e core elements of a great photograph stay the same: composition, exposure, content, and the decisive moment. A great photograph transcends equipment. e camera is the vessel to help you capture your artistic vision.

What to Look for in the Camera Store

Look for an organized display with multiple brands out and available to test. You need to know how the camera feels in your hands. Are the dials and knobs easy to access? is is a particular concern for people with small hands. Does the camera feel like an extension of your arm, or is it a lead weight requiring “nger gymnastics to access the controls?

Does the salesperson have a real working knowledge of the equipment brand? If you note a bit of hesitation or uncertainty, ask for a clerk who is knowledgeable in the speci“c brands in which you are interested. Be leery of anyone reading you the camera•s speci“cations from the manufacturer•s literature. Spec sheets don•t have much value out in the “eld.

Is the salesperson working with you to “t your needs to a speci“c camera, or is he or she trying to •upsellŽ the equipment?

Ignore any talk that a store has quit selling a brand because of too many returns or too many failures. Just doesn•t happen with the quality of today•s equipment. If you hear this, go on to the next store.

Don•t expect to get the same level of knowledge and expertise when visiting one of the •box stores.Ž Support your local camera store. e salespeople are often more knowledgeable and are better able to answer questions. You may save a few dollars by going to a discount store, but you are losing the knowledge infrastructure that a store with expert salespeople can provide.

Used equipment is also an option. If the camera is in good shape and has been checked out by a reputable source, I would not hesitate in buying a used piece of gear. Look in the yellow pages under •Photographic Equipment: Used.Ž

Turn around and leave the store if the advertised price on a camera in which you are interested is raised because you need the battery or cables that were not part of that great price. A digital camera will come with all accessories necessary to shoot photos„more than likely a minimal capture card, but cables, covers, and the obvious pieces will be included. However, with upper-end equipment, lenses are often not included in the price unless noted.

If it sounds too good to be true, it probably is.

The World of Buying Online

Over the years, I•ve had great luck with B&H (www .bhphotovideo.com) and Roberts Imaging (www .robertsimaging.com). If you know what you•re looking for, online can be a great way to go, as reputable “rms allow returns within reasonable lengths of time on equipment, giving you the opportunity to check out the equipment at your leisure.

Do not„repeat, do not„pay via Western Union, cash, or money orders for online purchases. is is a world where your credit card can o er tremendous protection against unscrupulous sellers. Cash and money orders can leave you hanging if the seller is a thief.

If you can•t pay with a credit card, then use PayPal or another third-party payment system that holds the funds for you until the equipment is in your hands and veri“ed.

Some companies advertise unbelievable prices for equipment. Once you call them, usually the story is the camera is sold for that price when it is purchased as part of a •kit,Ž which usually consists of a bunch of stu : bag, cheesy ”ash, snazzy neck strap, cleaning ”uid, perhaps extra lenses„almost always you could purchase separately for less money. Again, beware of o ers that sound too good to be true.

Photography is an art form that requires equipment, and this gear can be dizzyingly attractive„one reason so many people collect cameras. But as I stated earlier, remember why we have this gear: to provide access to this magical art form we love.

E-3
OLYMPUS

DEVELOPING TECHNICAL PROFICIENCY WITH YOUR CAMERA

ere is only you and your camera. e limitations in your photography are in yourself, for what we see is what we are.

„Ernst Haas

Such a simple little box, yet the complexities of today•s cameras are staggering. Precise exposure, the closely guarded secret of all serious photographers, is now just a half-pressed shutter button away. Even the lowly PHD (•push here, dummyŽ) cameras, which account for the majority of cameras sold, possess technical capabilities that could only be dreamed of a decade ago. Programmed into the camera•s memory are perhaps thousands of sample photos that the onboard computer scans to judge the likely shooting situation for each shot. Say, for example, that

A photographer uses the latest technology in a high-end digital SLR„50…200mm lens at 137mm, 1/20 second at f16, 100 ISO

A modern digital SLR (DSLR) is great for all-around photography. Accuracy of exposure, speed in handling, and great image quality are hallmarks of this type of equipment.

An LCD display screen provides information about almost all camera settings. From shutter speed to ISO to “le type, all the user-controlled settings appear here. With a quick glance, the photographer knows where he or she stands, technically speaking.

In addition, many modern DSLRs now include a variation on a live view function,

Many critical settings, such as autofocus points, ISO, and white balance, can be set in the camera menu for the photographer's ease. Several of those commonly used settings are accessed with buttons on the camera, so photographer does not have to go back into the menu. Instead, she can press one of several buttons on the camera, immediately accessing those settings.

Aperture Aperture is the variable opening in the lens that controls the amount of light striking the light-sensitive material. The figure will be 1.4, 2, 2.8, 4, 5.6, 8, 11, 16, 22, or some fraction in between. The aperture setting controls the depth of field; the larger the number, the larger the zone of focus (area that is in focus) from front to back.

Shutter Speed Equivalents

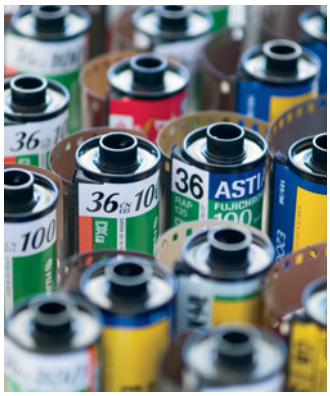
Shutter Speed	Aperture Setting
1 second	f22
1/2 second	f16
1/4 second	f11
1/8 second	f8
1/15 second	f5.6
1/30 second	f4
1/60 second	f2.8
1/125 second	f2.0
1/250 second	f1.4

These shutter speed and aperture combinations all result in the same exposure. The photographer can use shutter speed or aperture to increase their creative control—one of the best reasons to learn and use manual exposure!

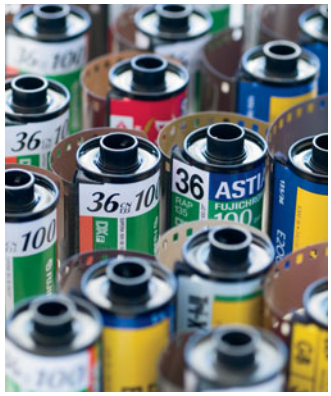
A photographic example to illustrate depth of field is shown on the following page. I started wide open at around f2.8 and progressively stopped the lens down to f22, illustrating the increased depth of field impacted by the aperture. The first photo was shot at f2.8, which is the maximum aperture on the 100mm lens I used to shoot these photos. Notice the rolls in the foreground and in the background—they are out of focus and the only real area of sharpness is the film in the middle of the frame. As the lens is progressively stopped down, f4 in the second frame, f5.6 in the third, f8 in the fourth, all the way to f22 in the final image, the depth of field, or area of apparent sharpness, deepens with the stopping down of the aperture.

ISO setting Back in the old days, when I was shooting film for a major daily newspaper, we'd carry Tri-X black and white film (this was before daily color usage in the paper) and we'd physically change the ISO setting on the camera (it was ASA then), which affected the sensitivity of the film to light when the situation called for it. Using a higher ISO, we could go to a higher shutter speed. We'd even push the film to 12,000 ISO with some exotic blends of developers. The grain was the size of your fist, but we could actually photograph high school football in dimly lit stadiums without using a flash. However, we were stuck with the speed of the film in the camera. If a great event took place in front of me, and it required going higher or lower on the ISO, the other images on the roll would have to be sacrificed.

With digital, each frame is its own event. ISO can be changed accordingly for one frame, or several, and then



1/250 second at f2.8

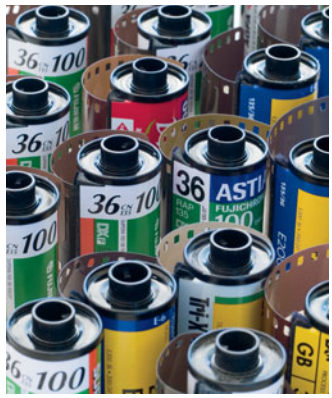


1/125 second at f4

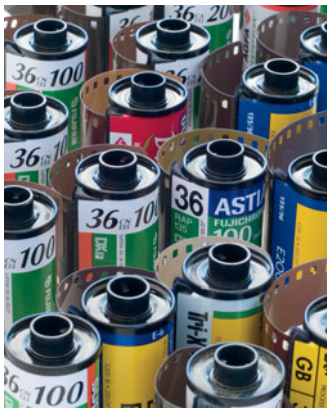
1/60 second at f5.6

1/30 second at f8

1/15 second at f11



1/8 second at f16



1/4 second at f22

I finally found something to do with all those rolls of film sitting in the freezer.

changed back. This empowers the photographer with the ability to react to the moment by setting a higher ISO to capture high-speed action in lower light or dropping it back to a low ISO for the better quality it produces.

ISO can also be a creative tool, using the ISOs in the range of 3200 or more to create a grainy (called noise in the digital age), ethereal-looking image. As my friend John Knaur of Olympus describes it, "Film ISO is the standard by which the industry described the sensitivity of film to light." When digital cameras began to appear in the early 1980s and late 1990s, it became commonplace to use the same terminology to describe the imagers' (sensors') light-gathering abilities with ISO terms familiar to the consumer. So cameras showed equivalent ISO settings, such as ISO 100, ISO 200, and so on. The reality is that the imager has a native sensitivity to light, which often is expressed as the lowest equivalent ISO. This setting, such as ISO 100, is the starting place for the imager chip's sensitivity. To increase the sensitivity, or ISO, the gain on the imager is increased in steps, such as +1, +2, and so on. This can be likened to turning up the volume in your audio player or television. The higher the volume, the greater the amount of hiss or noise. A similar thing happens with the camera—when the gain is increased, the noise becomes more visible in the image, hence the noise in higher "ISO" settings such as 1600 or 3200. To counter this problem, noise reduction technologies have been developed to control the noise in digital photography.

WB indicator This may appear as a small icon, such as a cloud or a light bulb, indicating the white balance setting to which the camera is set, or an Auto mode setting. We'll cover this in detail a bit later in the chapter.

File type indicator Wonder what that SHQ, HQ, or TIFF means? These tell you the type of file the camera is saving. Most point-and-shoots provide the JPEG (Joint Photographic Experts Group) format, a universally accepted format that compresses the image. Cameras also generally provide raw files, and several manufacturers no longer include TIFF (Tagged Image File Format) capabilities. SHQ stands for Super High Quality, and HQ stands for High Quality. Each of these file types provides images of different sizes and different capabilities.

Deciphering the MAPS Settings

Looking at the controls on a camera, you might see a dial that shows the choices M, A, P, and S (MAPS). Is this a compass device? Nope. M gives you the power to manually control your settings, A is for aperture priority, S is for shutter priority, and P is for program mode. They're all pretty easy to use, so let's take a look.

Manual mode is often the choice of avid enthusiasts, advanced amateurs, and pros. In this mode, the full power of the camera is in your hands. You must know the basics of exposure to use this setting to its fullest. All modern cameras have meters built in, and Manual is one setting with which you will be using the meter religiously. You set the shutter speed, the aperture based on the meter, and fire away.

Aperture priority mode is a semi-automatic mode that allows you to control the aperture (the f-stops), and the camera will then set the proper shutter speed. Many pros I know use this setting often. You have the ability to control the depth of field, which is directly impacted by the aperture. The more you close down the lens, the deeper the zone of focus you create in your photos. If you are photographing Aunt Martha in a field of flowers, for example, and you want the flowers in the foreground to be in focus, the more you "stop down" the aperture, the more in focus the flowers closer to the camera will be, as well as those on the other side of Aunt Martha. When looking through the camera, you will see (in the display) numbers representing the shutter speed and the aperture. The shutter speed is the number represented in steps of 1, 1/2, 1/4, 1/8, 1/15, 1/30, 1/60, 1/125, 1/250, 1/500, and 1/1000. The f-stops, or aperture, will appear as f2, f2.8, f4, f5.6, f8, f11, f16, and f22. These numbers tell you the actual size of the opening that the blades in the lens create relative to the length of that particular lens. The larger the number, the more closed down the lens and the deeper that zone of focus. Every f-stop is doubling or halving the quantity of light striking the digital chip. Also, wider lenses have more inherent depth of field than do long, telephoto lenses. Think of photos you may have seen in Sports Illustrated—the receiver leaping for the ball, all in perfect focus, with the background out of focus. Those shots are taken with very long lenses, often shot wide open or with the aperture set at a smaller number. Look for a more detailed explanation about depth of field a little further on.

Program mode authorizes the camera to take control and set optimum shutter speed and aperture. Other settings, ISO, and white balance often remain in your control.

Shutter priority mode allows you to slow down the shutter speed manually. You have control of the shutter speed and can allow the camera to take over setting the correct f-stop or aperture. This is allows you to slow down the shutter—say, to 1/60—to track and shoot a runner passing by and to get that cool blurry background, maybe with a little motion in the athlete's body, but keeping the focus fairly sharp on the runner. This is a good way to create a sense of motion in a still photograph. Set the shutter speed up to around 1/1000 of a second, and that

shot of a helicopter flying overhead will look like it is about to fall out of the sky, because the blades are not moving.

Other Shooting Modes

Designers of modern digital cameras have figured out that a lot of their customers do not want to deal with the perceived complexity of the controls discussed so far, so they have taken it another step and included modes for di erent types of scenes. T ese modes set the camera to function best for the style of photography indicated by the icon.

Mode indicator

My Mode/Custom, or something similar, allows you to make and save specific settings on the camera to use later. You can use this setting, for example, to create a quick way to switch the camera to a black and white mode or to a higher ISO (to be able to shoot in lower light).

Movie mode is indicated by an image of a movie camera. Many cameras also have a movie mode that will capture an MPEG (Moving Picture Experts Group) video. Movies can last several minutes, but are limited in time because the sensor generates heat as the current is passed through the circuitry. T e inclusion of high-definition (HD) video capability in still cameras is a growing trend within the industry.

Landscape mode is indicated by an image of a mountain. T is mode will set the camera to help you achieve the maximum depth of field, gaining as much sharpness foreground to background. Be aware, however, that if the photo is taken in late daylight or other low light conditions, the shutter speed will drop accordingly, and you should think about using a tripod. Many cameras will optimize the color settings to emphasize blues and greens, figuring you are probably shooting natural scenery.

Sports mode is usually indicated by an image of a running person. T e camera will set the exposure, pushing the shutter speed to its highest point, taking in the exposure for the scene to “freeze” the motion in the image.

Portrait mode is indicated by a likeness of a person’s head. T e camera will set itself so the aperture will lessen the depth of field, throwing the background out of focus. T is will make the subject stand out against a “soft” background. Try and zoom the lens out and fill the frame with the person you’re photographing, as the closer you are, and with the lens wide open, the shallower that zone of focus will be.

Night mode is indicated by a moon and/or star. The camera will operate at slower speeds than normal, so you can shoot a night view of San Francisco and capture details. Often, this can be combined with flash, so both the flash-illuminated foreground and the background will have correct exposure, making the photo more interesting. I often see people shooting pictures of someone in the foreground with a flash, but utilizing the Auto or Program mode, which will not compensate correctly for the background. The resulting photo resembles a person floating in a sea of black, as the camera exposes for the flash, but sets a default shutter speed, probably 1/60, that does not create enough exposure for the background. Often this mode will also compensate for the "hot pixels" that show up in some long exposures. Caused by the heat buildup in the chip that a long exposure creates, these hot pixels look like specks of light in your image. The camera will actually make a "second" exposure, equal to the first, but recording only black, using this to reduce or remove the effects of the long exposure. Pretty cool.

Landscape and Portrait mode is usually indicated by a mountain and a variation of a face. This will keep both foreground and background in focus, so the person in the foreground will be sharp, as will the scene behind. This is done by closing down the aperture to create a greater depth of field.

I hear a lot of amateurs talk about reducing the quality to get more photos on a card. Why would you purchase a 10 to 24 megapixel camera if you are not going to take advantage of the big beautiful chip? The cost of CompactFlash cards and other media is dropping, and you'll never be able to increase the quality of that small file you shot to squeeze out a few more photographs. What if you capture that once-in-a lifetime photo, and the camera is set to shoot a 640 × 480 image? You'll never be able to print anything larger than a wallet-sized print.

Image Sizes: Two Different Chips

10MB Camera	
Smallest JPEG	About 0.1MB
Medium quality JPEG	5.3MB
Best quality JPEG	6.8MB
Raw	11MB
22MB Camera	
Smallest JPEG	2.2MB
Medium quality JPEG	11MB
Best quality JPEG	21MB
Raw	21MB

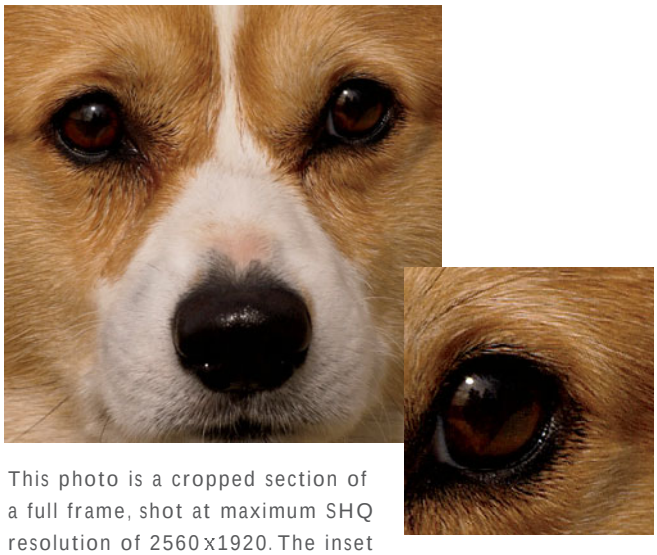
Shooting the same image with different chip sizes produces a variety of image quality.

Sooner or later, the camera industry has to "stop the madness" of the megapixel race. I have printed 30 × 40 inch images from a 5 megapixel camera that are stunning; however, if you are a commercial photographer who shoots images used on billboards, you may need the latest and largest megapixel camera. These huge files also impact storage, forcing you to purchase more storage space as well as significantly slowing down your editing software. However, if you are shooting like 98

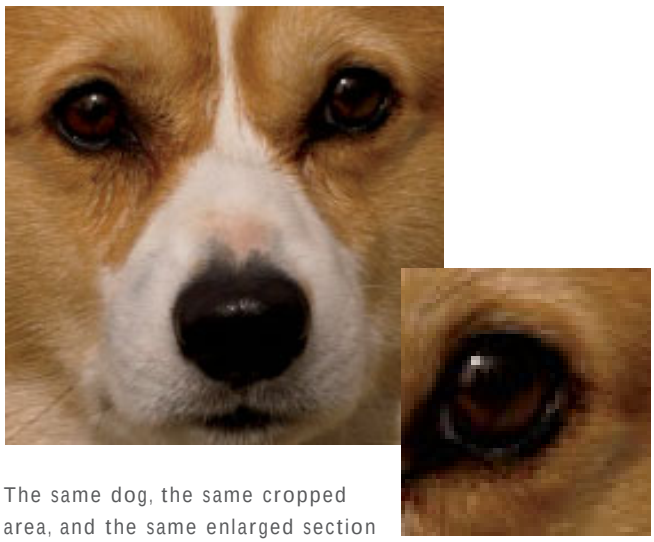
percent of the market out there, and a 16 × 20 print will be an ultimate goal, then a 10 to 14 megapixel camera (a DSLR) will more than su ce. Do be aware that not all megapixels are the same: a point-and-shoot 10 megapixel camera that uses a smaller sensor, with smaller pixels to fill that smaller space with that 10 megapixel number, will not produce the same quality image as a full frame or four thirds camera (camera with a 4:3 aspect ration) with a larger sensor.

As a rule of thumb, unless you are shooting for very high quality reproduction or printing needs, a high quality JPEG will su ce. TIFFs are usually four to five times the size of a JPEG, but TIFFs su er none of the compression problems that a ect a JPEG. Every time you open a JPEG image, make a change, and save that change, the quality of the file deteriorates, and information is thrown away; this is not true with a TIFF, however.

A raw file is essentially pure data. T e camera white balance settings, sharpness, and other camera processing issues do not apply to this type of file. T e raw format is closest to an undeveloped color negative that can be developed over and over again, until you achieve satisfaction, and this gives you the most control over your image. Many photographers are hesitant to use raw because they're afraid of the technical mystique of this file type, but when opening a raw file in a raw converter for the first time, that photographer will realize the power of this file: many corrections are available in that raw converter that allow the image to be corrected to near perfection.



This photo is a cropped section of a full frame, shot at maximum SHQ resolution of 2560x1920. The inset is a further enlargement of the eye of the dog, showing almost no pixilation.



The same dog, the same cropped area, and the same enlarged section of that photo shows a lot of image degradation caused by the poor image quality of the 640x480 SQ image.

Choosing a File Type

Within the controls of the digital camera, the photographer is given a choice of file types ranging from the low quality Standard Quality (SQ), to the very large TIFF, to the color negative of the digital world, raw. Your choice will forever impact your ability to edit, print, and manage the image.

Standard or High Quality If you are shooting images for web use, and the images will always remain small or for web only, you should consider using this file type. Limited by its small (640 × 480 or a bit larger) file size, a 4 × 6 inch photo is about as large as you can print this file. In addition, any work on the image done in photo editing software will further deteriorate the quality of the file. Generally, these image files will be less than 1MB in size, which is a good size for sending as e-mail attachments or for web gallery display.

Best Quality with least compression JPEG A great, all-around file type to shoot, JPEG has been available since 1986. Compressible in varying degrees, this file will take up less space on your hard drive than a raw image and will print quite well. However, remember that you should always do your editing/tweaking to a TIFF or PSD (Photoshop) file that you have converted from the original JPEG, not the original JPEG. For the A Day in the Life of Africa book project, we all shot JPEGs. These images were reproduced in a large coffee table book, and they looked beautiful. On a 5 megapixel camera, these files are each about 3MB in size.

Raw Think of this file type as closest to a color negative. This is pure data, meaning that no in-camera processing (sharpness, white balance, saturation, or contrast) will be imposed on the file. In raw, the image, as it is seen, is recorded. Many pros shoot only this file type, because it gives them the greatest control over their images. However, you must convert the raw files in either the proprietary software that comes with the camera or with Photoshop CS43 or CS4. This can slow down the editing process, as each image has to be opened and then saved as either a JPEG or TIFF. A side benefit to this, however, is that if anyone claims a photo has been altered or manipulated, you can show the raw file, which is unalterable. National Geographic has decided to handle the controversial manipulation issue by requiring that all digital shoots for the magazine be done in raw.

The raw algorithms written by each manufacturer are a closely guarded secret. Conversion in anything but the proprietary converter does not take full advantage of the raw file, and doing this type of conversion can cause noise in the image and imperfections in shadow detail. Proprietary conversion is being challenged by Adobe Camera Raw, as it is suggesting that proprietary development of raw is

unnecessary and that Adobe can do as well or better. The Adobe DNG (Digital Negative) format was developed to address the lack of an open standard for raw files created for each digital camera. DNG allows photographers to archive their raw camera files to a single format (DNG) for easy access and cataloging of those files.

Upon opening raw files in a raw converter, the photographer has the choice of an 8-bit or 16-bit file. This is very important, as a 16-bit file provides a much larger well of color on which to draw. This allows you to perform critical adjustments such as levels and curves with far less deterioration of the image file.

If you want to function well within the digital darkroom, you should use the raw format for its absolute controllability. TIFF Fewer manufacturers are incorporating TIFF files into the working file types. Raw provides more control of the image at a smaller size. TIFF files will be the largest files to reside in your media card or hard drive. About five times bigger than a JPEG, a TIFF file offers a great advantage, in that it will not lose data when it is opened, tweaked, and saved, regardless of how many times this is done. Because a "lossless" compression can be used, the image file can take up less space. TIFF is a good file format for shooting large prints, as the artifacts (tiny, jagged edges that appear as the file is enlarged) that inhabit JPEGs will not be evident in a TIFF.

All digital cameras record images at a bit depth of 12 or 14 bits. When you shoot TIFFs and JPEGs, the camera uses its internal settings to create an 8-bit image, throwing away perfectly usable image information. A raw file will allow a file with more bit depth to be created, giving the photographer far more color information to draw from when working on the file.

Flash Modes

The flash is one of the most underused, underappreciated, and, conversely, overused tools on the camera. In national parks, I often see tourists visiting the sights and shooting photos like crazy at the worst time of day—noon. Invariably, they are disappointed with the washed-out colors and harsh shadows that result. A simple yet highly effective trick in such situations is to turn on your flash.

The Dawning of the Digital Age

A Day in the Life of Africa was one of the first all–digitally produced coffee table books published. I shot for this 2002 project as a newbie in the digital realm, as did the majority of the photographers working on this project. Many went on assignment hesitant and questioning this technology, and most came back digital converts. All assigned photographers were required to shoot SHQ files on all images. The book, with open spreads measuring 20 x 12.5 inches, is a testament to the unbelievably high quality of the file. Take a look.

You can also move a bit closer to the person you're shooting. The flash, even those on the point-and-shoots, will fill the shadows in eye sockets created by the sun directly overhead. This results in a kinder, gentler photo that will make your significant other much happier to pose for your endless photos next trip. Moving closer fills the frame and brings the center of attention, the main subject, closer to the viewer of the photo. The simple trick here is to "force on" the flash, turning the setting on your controls so the lightning bolt shows in the display. This makes the flash fire with every exposure, and it's a great tool for very bright and high-contrast days.

I also see people shooting photos with a flash at night, usually in Program mode, and then wondering why the picture of Uncle Joe looks like he's floating in a black universe. Again, utilizing the Night mode, or slowing down the shutter speed so the exposure on the background is correct, will place the subject in the environment, giving the viewer a sense of place. This is why you shoot such a photo in the first place—to communicate that idea.

No flash This is good for scenic shots, very wide shots, and shots in which the subject is too far to be lit by the flash. Remember that digital cameras are power-hungry beasts, so the energy you save by not using flash may keep you shooting at the end of the day. Be wise, and don't energize (when you don't need to).

Flash This setting is often represented by a lightning bolt. It tells the camera to fire the flash with every exposure, regardless of other settings.

Auto-flash This setting is indicated by a lightning bolt with the letter A beside it. You are turning over control to the camera to decide when you need the flash. The downside to this setting occurs when you are taking an "available light" photo, with hopes of capturing the ambience of the scene, and the flash fires. This not only can disrupt the scene, but the camera (in the Auto mode or Program mode, where this function is applicable) may not go to a slow-enough exposure to capture the image.

Red-eye flash We've all seen this: a group stands ready to have its photo taken, and several pulses of light are emitted from the photographer's flash. The purpose of this light is to force the pupils in the subjects' eyes to close down, using a series of weak rapid flashes, so the back of the eye with its many blood vessels won't bounce back a red that would look great only in a Dracula movie. You may want to tell your subjects that the camera will do this; otherwise, the group might start to walk away after the first flash fires!

Rear-curtain sync When a photographer is shooting in the dark or near dark, and moving items with lights (a car, for example) are in the shot, using normal flash has inherent problems. The headlights become streaks of light moving through the body of the car, which looks

very unnatural. The desired effect is to have the lights appear behind the vehicle, in a more natural-looking scene. This is accomplished by using rear-curtain sync, a technical sounding term meaning that the camera is instructing the flash to fire at the end of the exposure, instead of the normal flash time at the start of a longer exposure.

Working with White Balance

One of the "magic tools" of digital photography, white balance enables the photographer to control the filtering of the light with a button set on the camera. This is one area where shooting digital is vastly superior to film.

Years ago, on assignment for a magazine, I used film to photograph the president of a major railroad. I scouted the location as usual and found the conditions abysmal, to be polite. The main light source was faded-out sodium vapor lights. This required several gel filters over the camera lens to bring the source at least close to daylight, which reduced the exposure by several stops. Attempting to shoot on a slower speed film wasn't possible, because of the loss of light the gels created, so I had to use a higher speed film, with its inherent quality sacrifice. Plus, I had to shoot Polaroids to check how he looked, and a lot of these folks give you a minimum of time. Now, if this had been on digital, I could have walked in, done a white balance by pointing the camera at a white card and pressing the WB button, and the camera would have neutralized the heavy off-coloring of the sodium lights. Plus, I could have checked the image with the actual photographs I was taking, not a Polaroid simulation.

White Balance Can Be a Creative Tool

White balance is a very powerful child of digital technology that you can use as a creative tool, as well. In my film days, I always had an 81A filter mounted on the front of all my lenses. This filter creates a slight warming effect, making many scenes more pleasant in their ambience. Now, if I'm shooting digital, I put my white balance setting on 6000 Kelvin, which is also shown on most cameras as a setting to use on cloudy days. Thus, the little cloud that appears in my monitor tells me I've got the white balance set to a bit of a warming "filter." Settings in the white balance area will also neutralize the greenish cast from fluorescent lighting or the very orange cast from tungsten lighting, the most common lighting used in homes. The little icons for these settings show—you guessed it—a fluorescent bulb and a regular light bulb. These manufacturers are on to something!

Note Kelvin, simply put, is the measurement standard for the temperature of light. The higher the temperature, the cooler or more blue the light. The lower the temperature, the warmer or more orange/yellow the light. Sometimes I like to shoot a daylight white balance under tungsten light because it imparts a warm, snuggly cast, like being at home. Or I might shoot outdoors at dusk with the camera set on a lower Kelvin setting to emphasis the coldness of the evening with the extra blue this WB setting will provide.

White Balance Tips

White balance is our bag of filters in one simple button. I am always aware of the WB setting and have used it often for control or e ect.

T e following tips illustrate how you can capture more compelling images no matter what actual light is available:

Don't use the Auto white balance setting. T is may provide an uneven response from frame to frame, as the camera—with even a slight shift of perspective—may establish its white balance from a di erent "white" it finds in the frame. Also, since the purpose of white balance is to bring white back to true white, the beautiful "golden hour" hue may be removed from the photo!

Carry a white card or piece of cloth (or make sure you always wear a clean, all cotton T-shirt), so you always have a white sample available to take the reading from. If your white shirt has an optical brightener in it, it will fluoresce under the strobe's UV illumination. Just like white colors in a funhouse, the white shirt will glow bluish, but you may not notice it if you're not in a funhouse dark environment (although it can balance your scene oddly). Consider pretesting your shirts under a UV source. I find that a folded piece of white typing paper is a practical thing to include in a camera bag. Use it folded to make it opaque, and photograph at least one image of this paper, shot in the same illumination in which you'll ultimately shoot your primary captures.

Here are some typical color temperatures:

Temperature	Ambient Lighting Conditions
20,000+K	High mountain open shade
9000–18,000K	A blue sky (the higher your altitude, the higher the temperature)
6500–7500K	An overcast sky
5300–5650K	Electronic flash
5500K	Daylight, around noon on a sunny day
5000–4500K	Xenon lamp
3400–3600K	"Golden hour," one hour before sunset or after sunrise
4000K	Warm white fluorescent bulbs
2750–3000K	A tungsten lamp, found in most homes (the lower the wattage, the lower the temperature)
3000K	Early sunrise or late sunset
1500K	Candlelight

Color temperature measured in Kelvin (K)

These two photos, shot within seconds of each other, illustrate how the photographer can use the Kelvin setting as a filter. The photo at top was shot at a white balance setting of 3000 Kelvin, usually thought of as a tungsten setting. I wanted the intense blue cast, normally used to balance out the extreme warmth of tungsten, to create a mood. In the photo at bottom, I shot at the white balance setting of 6000 Kelvin to warm the photo slightly. 50–200mm lens, 1/125 second at f4

As mentioned, use the white balance as a warming filter or a slight cooling filter by dialing in appropriate Kelvin degrees.

Use the custom settings on your camera if you intend to return to and shoot in an area that required an unusual white balance. T is way, a twist of the dial will ready your camera immediately, so you can come in from outdoors and resume shooting in that room that uses fluorescent lighting.

Get your white balance (and exposure) correct while shooting! Photoshop is a powerful tool, but the more you have to tweak the photo file, the more you will negatively impact the quality of the final image. T e old saying "garbage in, garbage out" holds true.

Now, after the preceding discussion, let me emphasize the power of shooting raw files. Most mid-level DSLR's on up are able to shoot raw and shoot it quickly. Without question, this file format provides the most power to the photographer. See Jay Kinghorn's Chapter 11 for a thorough discussion of raw.

Achieving Sharpness

Digital cameras often come with a setting to control the sharpness of the JPEG or TIFF image. T is setting is actually an algorithm that the computer in the camera applies to the image. Be careful in setting the sharpness too high, as you will produce artificial looking edges in the photograph. Many, if not most, professional photographers do their sharpening in Photoshop, preferring to keep the camera on a medium setting while shooting. In the raw file mode, sharpening will not be applied to the image.

Nothing is nicer than a well-focused, sharp image, and this is one of the first things a photographer checks when viewing a photo. As with brightness, the viewer's eye seeks the area in a photo that is in sharp focus. Many factors impact sharpness, including unwanted movement, or shake, of the camera; improper focus; and depth of field. Often, a precise use of focus that intentionally causes an out-of-focus area is desired.

Sharpening Tips

A new aspect of the digital world is the ability to heighten the apparent sharpness of the image, either in the camera or during postprocessing in Photoshop. Some manufacturers provide a default file from the camera that, upon initial viewing, may not appear as razor sharp. Many pros want to sharpen their images in postprocessing, in the computer, believing that the microprocessor in the camera will not do as good a job as the full-blown computer application. Remember these tips when sharpening your images:

Don't do the sharpening in the camera; leave that to Unsharp Mask or Smart Sharpen in Photoshop or another sharpener application.

Never, never sharpen the original. Always work on duplicates, so you always have the original file to go back to.

Note For a more in-depth discussion of sharpening, see Chapter 15.

Contrast and Saturation

Back in the old days of film, a photographer could choose from various emulsions to achieve a specific look for an image. Kodachrome was the standard by which all others were judged for years; its accuracy was unparalleled. Velvia, the supersaturated transparency film, is a favorite of mine, though it's too saturated for some. I always thought it replicated how your memory remembered the scene, slightly exaggerated across its palette.

With digital technology, we now have the ability to "dial in" the contrast and saturation we require. That is, too, is a function of the algorithms in the software.

Use the Histogram to Get Brighter Whites

The histogram is another powerful informational tool of the digital realm. It displays the distribution of tones in the digital image and resembles a cross-section of a mountain range. It can be displayed on your camera monitor, either separately or superimposed over the image just shot. The breadth of the range the histogram displays, from left to right, represents 256 levels of brightness—from pure black at 0 to pure white at 255. The "mountain peaks" tell you the number of pixels that are being used, or stacked, in that particular brightness level. The higher the peak, the more saturated that color or tone.

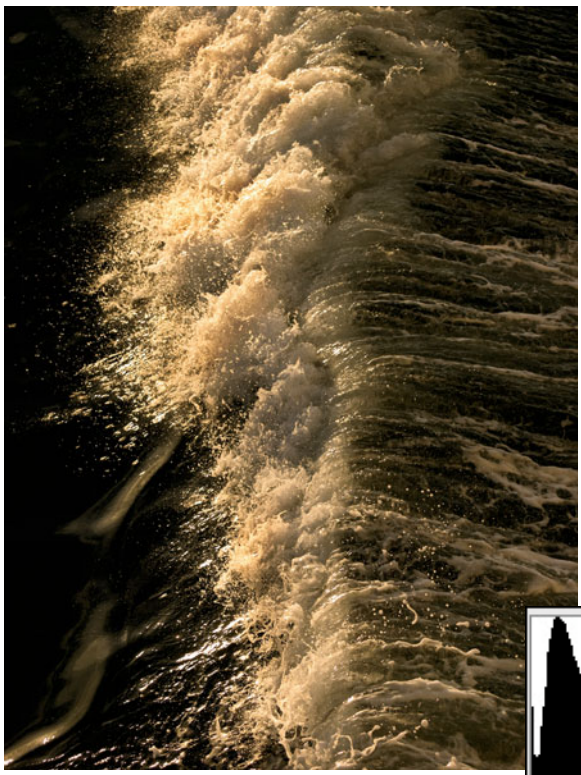
It's impossible to say that a perfect or normal histogram can exist, as the tones used depend on what you are trying to accomplish in your photograph. A histogram heavily weighted to the left, toward black, could, for example, appear for an image of a bow wave of a ship, the dark water and light wave tops each being correctly exposed. On the other hand, an Arctic explorer's face in the snow could be heavily peaked toward the right, the bright end of things. Often you'll have to decide whether the image works, regardless of what the histogram tells you.

As a camera setting, the histogram can be displayed immediately after shooting a photo, or it can be called up on the monitor via menu or button pushes.

The image on the next page is a good example of not reading the histogram literally. The wave in the image is lit well, and the background appears as it should. That is image would not produce a "classic" histogram of the evenly spaced mountain range. Again, the histogram is information, not creative genius. As a tool, the histogram will tell you, with a fairly straightforward image, if the exposure is over or under, by indicating the location of the peak of the range. Adjustment to the exposure can be made at that point.

When you've gone into Photoshop and made Level or Curves corrections, the histogram displayed will be more evenly distributed.

Using the histogram's power, the photographer can check the exposure immediately to determine whether the photo is within the range the chip can handle. You'll often see "blinkies" in one form of



The bow wave of the National Geographic Endeavour is properly exposed: the highlight on the wave top and the dark water below are in their correct density range, yet the histogram is heavily indicating an overly dark exposure. This is a classic example of understanding that the histogram provides information relative to the image at hand—the photo is exposed well. 50–200mm lens at 69mm, 1/2000 second at f3.2, 100 ISO

the histogram—that is, a warning that the camera senses an overexposed area. T is will literally appear as a small patch of white, overexposed area blinking to black on your camera monitor. T e blinkies tell you that the chip cannot hold any detail in the blinking area when viewed or printed. Personally, I don't give the blinkies much attention, because I like to concentrate on the image at hand. However, if you are photographing a static scene, and not an event, this warning can be of tremendous benefit, as lighting and exposure can be adjusted or changed to eliminate the overexposed area.

UNDERSTANDING STORAGE MEDIA

Heading out on a Geographic shoot, I used to carry two bags on the plane: One held all my cameras, a full set of gear (discussed in depth in Chapter 2) that I needed to get the shoot done, a couple of camera bodies, necessary lenses, and a strobe. T e other bag contained film. Lots and lots of film. If I was to be gone a month, this probably meant around 250 rolls of slow emulsions and fast, and possibly a bit of tungsten balance film for indoor

photography. It was a nice balance with the bags resting on either shoulder, about 25 pounds each. Added to the mix was having to get to the airport early to request a "hand check" on this mass of rolls, making sure the film never got too hot, and captioning each and every roll. Plus, I would regularly have to ship film in, partly to make sure no equipment problems would require a reshoot.

T ese days, I still arrive at the airport early, but there's no need to request a hand check on my digital media, as it will not be impacted by the x-rays used at the security check.

Several types of media are available to photographers now: CompactFlash (CF, the professionals' choice) and Microdrive, xD cards (developed jointly by Olympus and Fujifilm), Sony's Memory Stick (MS), Secure Digital (SD) cards, MultiMedia Cards (MMC), and SmartMedia (SM) cards. All these cards serve the same purpose in photography: they store images.

This image of penguins running for cover was shot in the Antarctic, and in the accompanying histogram, it would appear to be too bright, as the histogram is heavily weighted toward overexposure. This is where the histogram provides relative information with which you can react accordingly—here, the whites are not overexposed, and the darker areas are properly exposed. 50–200mm lens at 96mm, 1/400 second at f6.3, 100 ISO

A recent trend in digital camera design is the support of multiple types of media cards—the Olympus E-3 camera, for example, can use a CF or xD card, the newest Nikon D3x holds two CF cards, and the Canon EOS-1Ds Mark III holds a CF and an SD card. T is second card allows the photographer to back up or copy an important image and provides additional storage.

A 16GB CompactFlash card

CompactFlash Most professional cameras use this old-timer of the digital realm. T e early version of CF cards is Type 1, and the next and current version is Type II (2). Type II cards are thicker than Type 1 cards. Be aware that the Type II holder in your camera can handle a Type 1 card, but a Type 1 slot cannot hold a Type II. CF cards are currently available in sizes ranging from 16MB to a 16GB monster, and these cards also are available in di erent write speeds, which dictate the speed at which the image is written to the card. T e faster the write speed, the better. Upping the speed level, Lexar introduced the Ultra Direct Memory Access (UDMA) card, and SanDisk created Extreme.

According to Je Cable, Lexar's Director of Marketing, "UDMA technology enables CF cards to reach blazing new speeds. T e new Lexar UDMA cards reach speeds of 300x, which translates to 45MB per second. To take full advantage of these cards, you must use the cards in a UDMA-enabled device (camera, card reader, and so on). Many of the new DSLR cameras support UDMA, which means that they can clear their internal bu ers faster than ever, and the newer card readers, such as the Lexar Professional UDMA FireWire 800 Reader or the Dual-Slot USB Reader, are UDMA compatible as well."

Note Cards of 2GB or larger generally are FAT32 compatible. (FAT stands for the File Allocation Table.) FAT32 supports large drives along with an improved disk space efficiency better than the older FAT technology, which used 16 bits to address each cluster, up to a maximum card size of 2GB versus the 816GB capability of FAT32. Your camera must be compatible with the newer FAT32 system to be able to use those larger cards. Check out Steve's DigiCams site at www.steves-digicams.com/high-capacity_storage.html for a more thorough discussion and reference to other great sites. Steve's site has links to Rob Galbraith's excellent site on CompactFlash, as well as manufacturers' compatibility sites.

Microdrives While these cards have the same dimensions and physical looks of a CF card, they are actually mini–hard drives used to store images. These cards will fit in a camera that is capable of holding a Type II CF card.

Note While you'll save considerable money if you buy a 4GB Microdrive versus a 4GB CF card, the Microdrives do have an Achilles' heel. The drives are somewhat fragile, due to the moving parts enclosed, and are sensitive to hard bumps, drops, or other physical mishandlings. However, I do know photographers who do the same kind of work I do and have had no problems with their Microdrives.

Secure Digital or MultiMedia Card These two cards are identical physically, but they vary internally. SD and MMC cards can be used interchangeably in some cameras, while others will recognize only the SD cards. These cards might be the wave of the future, offering connectivity between many devices, fast speed, and potential huge capacity.

Memory Stick This Sony card is used primarily in Sony cameras and videocams and is available in sizes up to 4GB. The Memory Stick Select card allowed older Sony cameras to use a 256MB MS card by using a switch on the back of the card. Memory Stick PRO cards are the latest version, with capacities up to 4GB. However, unless you are using the Cyber-shot F717 that can utilize both types of MS cards, the Memory Stick PRO will not work in cameras that were manufactured before 2003.

xD Cards A joint effort between Olympus and Fujifilm, these cards are very compact (about the size of a postage stamp) and have capacities of up to 8GB.

Note When using an Olympus camera, writing to an xD card is the only way to use the panoramic function.

Media Card Tips

A few years ago I was photographing my son, Matt, working through his Eagle Scout project as part of an assignment for *Boys' Life* magazine. This was early in my conversion to digital, and I hadn't had the opportunity to make the big mistakes and learn from those ugly processes. Sure enough, I had a major hard disk crash, with no retrievable files left of a number of images of Matt and his project—and I had not backed up those files. Learn from my mistake so you don't lose valuable photos! The following are some storage tips I've learned and tips I've picked up from talking to other pros:

- If you've bought a camera with 6, 10, 14, or 24.5 megapixel potential, make sure you use it! I hear amateurs say they are going to shoot smaller files on their cameras, SQs (super quality) or HQs (high quality), which will allow more images per card. But those space-saving 640 × 480 photos won't have the quality

to print that once-in-a-lifetime photo large. Camera media is relatively cheap; buy as large as you can a ord. I always carry at least two additional cards as a minimum. Presently, I'm using 8GB cards in each camera.

After you have downloaded images to your computer and to a separate CD or DVD (as part of that redundant storage), and you are ready to erase the card to shoot more, don't do a simple erase. Instead, do a format after reinserting the card. Your camera model will write specific data files to the card, and it's better to start clean with a card formatted for your camera. An erase leaves the data from prior uses on the card. Also, when placing a new card in the camera, format it immediately.

Carry a "digital wallet" to store extra cards, both empty and full. Get into the habit of marking cards that have been shot as well as those that are empty. Lexar makes a great media wallet with mesh pockets topped with red and green flags. T e flag with the red side showing indicates a used card, and the empty cards are flagged with green.

Your camera purchase should be influenced by the card type. Is the card technology going to be around in five years? CF and SD are a very safe bet at this point.

T is sounds obvious, but write your name on whatever kind of media card you're using. I've seen photographers working together on projects and inevitably media cards will be brought out for downloading. When five Lexar 4GB cards are lying on the table, it's a lot of e ort to load, open, and determine which card belongs to whom.

T e following definitions are applicable to both film and digital, and any photographer should fully understand them.

Depth of Field (DOF)

You will hear this term tossed around by photographers who are discussing their images. Simply put, depth of field is the zone of focus, from foreground to background, that is sharp. T is zone of focus increases if you close down the lens to a larger aperture number (toward f22), and the DOF zone will become shallower the wider open you have the lens (f4, f2.8, or a smaller number). T e focal length of the lens you are shooting with adds other dimensions as well. A wide-angle lens, 35mm or wider, will have a greater DOF than a longer lens.

As a rule, the wider the angle of your lens, the more DOF it o ers. Conversely, a longer lens, from 50mm, to 85mm, to 120mm and so on, will give you shallower zones of focus or DOF. And this DOF becomes shallower and shallower with longer and longer lenses. A long lens with a shallow DOF is very often used for creative e ect, and you can press a button, usually located on the front of the camera or lens, to close down the lens to the predetermined aperture so that you can preview the DOF through the viewfinder.

How Aperture and Shutter Speed Affect Exposure

Your camera lens has internal blades that open or close, allowing light in or decreasing the amount of light. These f-stops are represented by the numbers f1.4, f2, f2.8, f4, f5.6, f8, f11, f16, f22, and so on. Moving from one f-stop to the next doubles or halves the amount of light striking the chip. These numbers represent the ratio of the aperture's opening created by the blades to the focal length of the lens. The f-stops work interactively with the shutter speed to control exposure. In other words, the two factors that affect exposure are shutter speed and aperture. These are interrelated; to maintain the same exposure, the shutter speed is moved up accordingly, and the aperture is changed in the other direction. If the exposure is 1/125 at f4, and you want to increase the shutter speed to stop the action more effectively, then you could go to 1/250 at f2.8, or 1/500 at f2.

If you wanted to change the aperture to get greater or less DOF, and your exposure was 1/125 at f4, you could move the aperture to f5.6, and the shutter speed would then drop to 1/60, to maintain the same exposure.

Shutter Speed

I used to shoot NFL football, and my rule of thumb was to use a shutter speed of 1/500 of a second to stop the action. If I went to 1/250, a bit of blur would start to appear in moving feet and arms. Remember that the longer the shutter stays open, the more movement will be recorded.

Shutter speed can also be used for creative effect, using a long exposure—say, 1/2 second—to capture the effect of a lot of movement in the frame, such as people moving on the street. Another example would be opening the shutter in a long exposure to capture the rotation of the Earth shown by the stars streaking across the frame in a two-hour exposure.

The Grand Mantra of Photography: There Are No Rules

I've seen phenomenal photos taken with $7 disposable cameras, and—at the other end of the photographic spectrum—we've all seen the beauty of Ansel Adams's exquisite environmental images. Modern "edgy" photography, the catchword of editors requesting the latest look, has created wonderful images. I really think the bottom line in photography is this: Does it work? Does the photo convey the message the photographer is trying to express? Photography is a totally subjective craft; what I think is great, you may think stinks, and vice versa.

As I said earlier, the camera is a tool. The better we know our tools, the easier our work is—and the more we can focus on our craft and not the mechanics.

How To: Panoramic Photography

It's almost impossible not to be impressed when viewing a well-shot panoramic photo. This format brings to the viewer a version of reality that cannot be revealed with the human eye, and this is part of the fascination. Creating panoramic photos has become easier with today's software and, in some cases, with the cameras themselves.

As I shot from the balcony of a friend's apartment in Paris, the only way I could do justice to this amazing panorama was to shoot a number of images, stitch them together, and work on the final file in Photoshop to brighten up the dark foreground and bring down the value of the sky. I even like the rough edges, caused by my not shooting a perfect circuit of images. 12–60mm lens at 24mm, 1/60 second at f5.6, 100 ISO on each frame

Your first attempt at a panoramic may result in an image only a mother could love—the component images do not "stitch" together well, a bit of wide-angle distortion may create a slightly warped look, and the sky may have some unusual dark areas. But you will be so elated with the final product, that these issues can be overlooked—that is, until you pull o a really good one.

Here are some tips that should be helpful for any photographer, from an informal shooter who just wants to put together a panoramic view of a vacation site, to the very serious photographer who wants the image's construction to be transparent and flawless.

Use a tripod. T is can help keep the camera on a true horizontal axis, allowing greater accuracy of the stitching. T is also allows the camera to swing on a tighter axis. A bubble level or a self-leveling tripod can be of immense help to keep the line of the horizon so that the image doesn't "drop" down, which is caused by the camera not being level.

Don't shoot wide angle. T is is one of the most common errors photographers make. T e distortion of the wide-angle lens makes for an uneven and distorted horizon line. Use a minimal lens length of 35 to 50mm.

T ink about shooting vertical. T is provides more depth to the image, and it lets you shoot just a few more frames to complete the breadth of that panoramic image.

As you move the camera across the scene, be sure to allow a 15 to 25 percent overlap of each image. T is provides a "fudge factor" that allows the software to combine the images without encountering gaps where the images are not quite wide enough.

To help the stitching process, and to make sure that each image is perfect in terms of joining its neighbor, learn about the nodal point of your particular lens. T is is not a necessity, but it makes things a ton easier when you're putting the images together. T e nodal point is the area within the lens where the light rays cross before striking the chip. If you have the camera mounted to a tripod and tripod "pan head" that allows adjustment for the nodal point, each frame will intersect more perfectly with the preceding and following frames.

Each lens is di erent, as is the nodal point on varying lengths on a zoom lens. Here's a fairly easy way to determine the nodal point:

Step 1
Mount the camera on a tripod that has been leveled.

Step 2
Looking through the camera, find something vertical in the frame that is close to the tripod (within 4 to 15 feet). Also, find a second vertical component in the background, at a greater distance than the up-front reference point. These two verticals (telephone poles, fence poles, or buildings) should be almost lined up, with very little space between.

Step 3
As you rotate the camera, watch how the perspective on these two vertical poles changes. It will start out pretty close, and as you swing the camera around, the distance between them will change.

Step 4
Using a nodal point head, move the camera back and forth on the rig while looking at that scene, until those two vertical poles maintain their perspective throughout the arc of movement.

Step 5
Lock down the rail, and you have established the nodal point for that particular lens perspective. You can then start photographing the different images that will make up this panoramic image, knowing that the overlap of images will be smoother and more consistent.

Putting the Images Together

After the shoot comes the part that seems magical—putting those separate photos together to create a sweeping panoramic landscape. Olympus has actually integrated the technology of the xD capture card with the Olympus Master software, which walks the photographer through this process from capture, by providing site "guides" in the camera, so that when it's switched to the panoramic mode, the software is told to stitch the images together.

Here's how to do it in Photoshop and Photoshop Elements:

Step 1
After capturing and downloading the images, use the Bridge or some other photo editing software to select the images you want to stitch together.

Step 2
Open Photoshop and choose File > Automate > Photomerge.

Step 3
In the Photomerge window, you will see several options. On the left side of the window, under Layout, you'll see five choices: Auto, Perspective, Cylindrical, Reposition Only, and Interactive Layout. Choose Auto to make the final image look both pleasing and natural.

Step 4
Under Source Files, choose Browse, which will allow you to find the files you want to open. Select all the files you want to use.

Step 5
These files will then appear in a dialog box in the center of the Photomerge window.

Click OK in the upper-right corner, and the magic will begin.

UNDERSTANDING LIGHT

Available light is any damn light that is available!

—W. Eugene Smith

Edward Hopper's painting Nighthawks is as representative of the realist movement in American paintings as any work in that genre. College students have posters of the painting hanging in their dorms, and it's been reproduced so many times that it has become an iconic image. T e painting, a view into a well-lit diner from the gloomy outside street, is an excellent example of

My first opportunity to travel to the Antarctic was aboard the National Geographic Endeavour as the "expert" on this ship. My job was to make myself available to the expedition travelers, providing my expertise and advice on all things photographic. It was an exhausting trip, as the light was stellar for most of the day, with early morning starting at around 4 A.M. and sunset occurring near 11 P.M. In the entrance to Terror Gulf, we passed the sensory overloading scenery of the Antarctic Peninsula. Everything started coming together—the boat slowly passing the peninsula, an iceberg moving into position, and penguins "porpoising" through both air and water in graceful leaps. Rays of the sun illuminated the rugged peaks in the background and painted the edges of the iceberg, its blue ice electrified by the light. 50–200 lens at 158mm, 1/160 second at f3.5, 125 ISO

how adding or removing light a ects an image. Starting with a white canvas, and adding dark colors intersected by coldly bright hues, directs the viewers' attention to the stark and fluorescent-lit interior of this lonely place.

T e photographer does the same within his or her own "canvas," adding, removing, and controlling the light to "paint" the subject. Without light, we wouldn't have much to work with. T is chapter deals with di erent types of light and the issues of controlling and/or creating light.

T e camera allows light in to strike its sensor, recording the image. Too much light, and the image is washed out; too little light, and the image is too dark to make out. T e correct amount of light is the correct exposure.

The streets of central Loreto, Baja California Sur, Mexico, are colored a deep and rusty red. I was working with National Geographic/Lindblad Expeditions, when we came upon a street crew paving a new stretch of road. I watched them work for a while, and as the late afternoon light improved, the workers began tossing red powder on the surface of the wet concrete to embolden the hue. I love the look of the powder floating away from this fellow's hand. The backlighting emphasizes the structure and provides definition to the dust as it rolls off his fingers. 50–200 lens at 200mm, 1/500 second at f5.6,100 ISO

PELIGRO

The Viewfinder Is Our Canvas and Light Is Our Paint

Available Light

Available light is the most common form of lighting that all photographers use. If we're shooting outdoors, available light is the light from the sun or other available sources. Indoors, it's the light provided by lamps and other light sources in the room. Using the available light to your benefit is the key.

We have at our disposal six "flavors" of available light:

Frontlight T is is the light coming over your shoulder and falling on the subject. Frontlight creates a flat, often dull light. If you want to shoot in frontlight, try moving around the subject so the light comes more from behind, and try using a flash.

Sidelight As the name implies, this light comes directly from the side. Great for landscapes and scenic shots, this light is pretty severe for people pictures, unless you're trying to emphasize character in a face (lines, crags, and the like). Be kind here, because you want to be remembered in Aunt Bettie's will. T is being such perfect light for landscapes, as it creates dimension in your photos, you can perhaps include a person in the shot to provide a sense of scale, placing him or her at the edge of the shot, and shooting wide—just establishing the human presence.

Toplight Noon, with the sunlight illuminating the subject from the top down, is not a favorable light for photographing people, because it creates harsh shadows and tends to be colorless. T is is a great time of day to scout areas, however, so you can decide when to come back. If you have to shoot in this light, use a graduated filter, which will help saturate the sky's color and create a bit more interest. It's also a great time, if you are photographing Aunt Bettie, to use the on-camera flash to "fill" the harsh shadows with light.

Backlight T is light comes directly from behind and can create an ethereal look, emphasizing the spray in ocean waves, adding depth and magic to smoke, and creating halos when used in portraits. T is is wonderful light, but it does weaken the saturation of color. Try popping in a little flash to bring up the light on the backlit side and strengthen the colors.

Overcast/shade T is is one of the kindest types of light for photographing people. Clouds create a giant "soft box," softening the light and smoothing out the skin. T is light also helps out the exposure, as the dynamic range of light that the chip can capture is within range; often side/front/toplighting will provide an exposure range greater than the sensor can capture in the frame.

Twilight Twilight can be the "magical hour" for taking great shots. T e sun has nearly or just passed the horizon, and

the ambient (aka available) light starts moving toward the blue range. Shooting on a daylight setting will emphasize this effect, but do not set auto-white balance, because that will remove this cool/cold effect. Try setting the camera to the correct exposure, manually, for the scene, and then use a strobe to fill-flash the subject. This will create a wonderful dichotomy in light—the warm light from the flash and the cool ambient light.

The Golden Hour

It's noon at the Grand Canyon. Everyone is standing in herds on the South Rim, photographing the giant expanse of canyon. The noon light is sterile, with no character of its own—yet this is the most common time that the tourists turn out. Inevitably, their images are a disappointment—horribly bright and with a lot of contrast, almost monochromatic images.

This scenario is a perfect introduction into a discussion of The Golden Hour. The light during this magical time, the hour before sunset, produces a gigantic warming filter, and it's almost difficult not to take a good photograph in this environment. One benefit of air pollution is that light passing through all that crud in the air is softened and warmed, creating a beautiful glow.

I'll often arrange shoots so I can benefit from this great light, which occurs not only in the early evening, but in the early morning as well. Shooting at either of these times can result in better photos. I like shooting in the evening best, not only because I don't have to get up at the crack of dawn, but because, as night approaches, the light keeps getting better and better, reaching its crescendo in the final minutes before the sun touches the horizon. The photographer working in the late afternoon/early evening light has the opportunity to work the subject, moving around the shot to find the best place to be when the light reaches its peak. Early morning light is also beautiful, but we have to be in place as the sun crests the horizon, and the quality of light deteriorates the longer we work into the morning, away from the crescendo that occurs at the moment of sunrise.

Back to that scene at the Grand Canyon; I'll head out for these scenic vistas and other "photo-op spots" in the late afternoon or early morning, and I'll usually be shooting alone or with little company, save for other serious photographers. The tourists are filling the restaurants or sleeping in (which is one of the benefits of a vacation). However, with just a little rearranging of their schedules, these folks could make time for visiting spectacular views that coincide with The Golden Hour.

Chimping

Most experienced digital photographers are familiar with the term "chimping." Not a reference to our Simian cousins per se, but it does take on one characteristic of those critters.

The next time you are at a function that may draw a number of digital photographers, say a sporting event, watch the clutch of photographers from the sidelines. After a play

It's always great to be able to photograph in the best light possible, but sometimes that's not realistic. This was the case on a shoot in Cairo, Egypt, when I had a very short window to photograph the pyramids—at noon, not a good time of day. I ran into this fellow at a classic overview of all three Pyramids...and I had less than three minutes to figure out a photo as our bus was leaving for the airport. Hours before there had been a sandstorm in the area, and enough of the particulate matter was still hanging in the air to cause a diffusion of light. I placed him looking out of the frame, positioning him asymmetrically with two of the three pyramids, finishing off the composition. The overhead and diffused light worked in my favor in this simple portrait as the sand-filled air acted as a giant "lightbank," causing a soft and flattering light. 12–60mm lens at 20mm, 1/80 second at f13, 100 ISO

is over, you'll see a number of those digitally-equipped individuals direct their vision, and attention, to the monitor on the back of their digital cameras. As their latest and greatest work of art is displayed on the screen, you can almost hear the "Ooh, ooh, ooh!!!" utterances of admiration coming from their lips over that image.

This is all well and good when photographing an event that has a defined start and finish of action, but it can be a habit that mistakenly diverts the photographer's attention from the subject they are photographing. There's nothing worse than snapping the shutter at what you think is a perfect moment, stopping to admire your work on the monitor, look up to see the real moment occur before your eyes, and then not have the camera ready. So remember, no chimping!

Tips for Golden Hour Photography

Here are a few hints for using that Golden Hour light:

Add the tiny strobe atop many consumer and prosumer cameras to the mix of Golden Hour light, and you have the recipe for successful people pictures.

Plan your day to make the most of the Golden Hour. Use the middle part of the day to scout and reconnoiter the area to determine where you want to be during the late afternoon.

Use a compass! I always carry one in my photo vest. A number of websites offer exact compass points for finding the location of sunrise and sunset from your present or projected location. Carrying this information, along with a compass, can help you choose your spot with the knowledge of where the solunar event will occur (sunrise or sunset, I mean).

I also carry a page I've printed from the website of the US Naval Observatory, "Sun or Moon Rise/Set Table for One Year": http://aa.usno.navy.mil/data/docs/RS_OneYear.php. This information tells you, for a specific domestic or international location, the exact times of sunrise and sunset. Another great site for determining sunrise/sunset in addition to moon phases, moonrise, and moonset is www.sunrisesunset.com/custom_srss_calendar.asp.

Guadalupe Peak is the tallest mountain in Texas, at 8479 feet. This image was shot for Texas Highways magazine, part of a story on the "Seven Great Wonders" of the state. I found pilots George West and Richard Davies to fly me over the rugged terrain shortly before dusk, so I could take advantage of the low setting sun to emphasize the structure and striation of the landscape. I intentionally included the wing of the Cessna because I thought it provided a bit of human perspective to this stunning landscape. 12–60mm lens at 12mm, 1/250 second at f5.6, 200 ISO

One of the most beautiful monuments in the world and one of the most thoroughly photographed sites, the Taj Mahal in India is a challenge for the photographer to come up with something different. I was part of a National Geographic Expedition, the Taj being one of the stops. Pre-dawn, I gathered a group of the photographically-driven Expedition members and headed out to photograph the building. I'd been there before, and I knew there is a classic vantage point just across the Yamuna River. We arrived early, photographers spreading out to capture dawn from different angles. Shortly after the sun rose, this camel driver appeared, taking his camel to drink for the Yamuna. The scene was illuminated by the heavily-diffused sunlight (pollution is good for something—adding so much particulate matter to the air, acting as a giant "lightbank," softening and warming the harsh light), but I still had to use a Singh Ray Galen Rowell Graduated Neutral Density filter to allow the exposure on the foreground to balance out the brighter exposure value of the sky. 12–60mm lens at 12mm, 1/500 second at f6.3, 100 ISO, Singh Ray Galen Rowell 2-stop, hard step Graduated Neutral Density filter

Take a tripod. To quote the Boy Scout motto, be prepared. You may want to extend your shooting into the evening hours, and there's nothing more frustrating than not having a simple piece of gear that can make a huge di erence in your ability to keep shooting.

A graduated filter can make the di erence between a successful shoot and one that is almost there. A scene where the sky is brighter than the foreground is the perfect situation for this type of filter. T ese filters are dark at the top, graduating, either sharply or in a soft change, to clear at the bottom. T is allows the photographer to capture the bright sky and the darker foreground in the frame; without using a filter, this would be impossible, due to the great di erence in exposure in those two areas. Singh-Ray makes some very good filters; I like them because they are rectangular and can be moved up and down in front of the lens, giving you far more control over where the impacted area will be (see www.singh-ray.com/grndgrads.html). T e Singh-Ray filters can be purchased in varying degrees of density, from one stop all the way to five full stops. T e filters can also be purchased with di erent colorations for di erent e ects.

Singh-Ray graduated filters, seen in both hard step and soft step. The hard step is for an exact horizon line, and the soft step is for a more subtle change. Photo courtesy Singh-Ray

Many photographers carry a neutral density (ND) filter. T is filter reduces the overall amount of light entering the lens. Why not just stop the lens down? If you want to use a low ISO setting and shoot a slow exposure, perhaps a waterfall at midday, using an ND filter is a great idea.

NDs can be purchased with one, two, or more stops. Singh-Ray sells a Vari-ND filter that allows the photographer to dial in the amount of reduction infinitely from one to eight stops.

The same neutral density filter, Singh-Ray Vari-ND, offers three phases of controllability.

Sometimes the Simplest Light Is the Best

I always carry a flashlight with me for lighting purposes—just a small one, either a standard bulb or a halogen, with an adjustable beam. A flashlight can o er a spot of light for a dramatic e ect. I was on Alaska's Yukon River, working for National Geographic, photographing a story about the river. T e day was cold and dark, and the village, Kotlik, was nearly empty. T is was an important village in that it is the last outpost on this mighty river. An old man walked by and I started a conversation with him. Turns out Tom Prince was the oldest man in the village, and I felt that warranted a photograph. I wanted to maintain the icy cold, blue look of the scene, so instead of using a warming filter or white balancing the blue out of the frame, I shot it as is, a daylight balance, and lit Tom's face with my flashlight. T e exposure was about 1/15 of a second; I had to move the flashlight slightly to smooth out the light. T e e ect is exactly the look I was hoping to capture. His face is very warm, tending toward an orange-gold, because the flashlight bulb provided a tungsten light source, and I knew that it produced that warmth when recorded on a daylight-based setting. T e village in the background appears in a bluish cast, which is exactly what I was after.

Cloudy days can provide a beautiful soft light that is ideal for close-ups of people. T e light is very kind to human complexions, and your subjects' eyes won't be squinting, as they can be when the subject faces the sun.

Dynamic Range

T e human eye is amazing in its adaptability. We look over a scene, and our eyes are able to see the full range of light, from shadowed areas to the parts lit by full sun. T e eye has the ability to see a dynamic range, or ratio of dark to light, of about 100 to 1, where the camera sensor is able to see a range of only about 10 to 1. Photographers are often surprised when they look at their images and the shadows are totally black or the highlights are completely washed out. T e histogram on the back of the camera can display the five-stop range that the sensor can cover.

Tom Prince is the oldest fellow in Kotlik, Alaska, the last village on the Yukon River. I used a small flashlight to illuminate his face. 20 35mm lens, 1/15 second at f3.5

We can now address the limited dynamic range of the camera by using software packages featuring High Dynamic Range (HDR).

e photographer captures several di erent exposures, exposing the rst for the very darkest areas of the photo, with the next frame closed down one or two stops, and so on, until the nal exposure captures the very brightest area in the photo. Using HDR, the software averages the images together, using the broad range of exposures to create an image that more closely matches what the eye is seeing.

e power of this is that the photographer can create an image with an even greater dynamic range than the eye can see.

scenarios. Photographing lightning by using a shutter speed of 1/2 second to several seconds at dusk can capture several bolts of lightning. I've photographed freeways at night with a long exposure, the taillights and headlights of the vehicles becoming streaks of light in the frame as the long exposure captured the movement of the vehicles.

Long exposures open an entire world of possibilities that call for a tripod—the major requirement for long exposures. Another rule

On a commercial shoot for a client, my job was to photograph "grand scenes" of America. I was in Lake City, Colorado, photographing the wilderness with Uncompagrhe Peak as a background. Art director Tom Kaminsky and I had discussed the idea of shooting these grand scenes with an almost "Where's Waldo?" human presence. Late dusk helped set the scene, the late-day sunset warming the sky slightly, and the car driving through the scene provided the human link. 14–54mm lens, 1/4 second at f4, 100 ISO

of thumb from the pro side of photography is this: When shooting wide angles, the slowest speed that can be comfortably used without a tripod is equal to the focal length of the lens. So, for example, a 24mm lens could be hand-held at 1/30 of a second. I've found, with practice, that I can go a couple of shutter speed settings slower by using the techniques described here. I spread my feet apart and hold the camera up, shooting as I slowly exhale. It works!

Applying the rules of thumb further, let the length of your lens determine the minimum shutter speed at which the camera can be hand-held. If you are shooting with a 105mm lens, the minimum shutter speed you could generally use would be about 1/100 of a second, so as not to show camera shake in the photo. The longer the lens, the more pronounced movement will appear in the exposure. With really long lenses—500mm plus—even the motion caused by your heartbeat can be a factor in sharpness if you're shooting slow exposures without a tripod. So if you're shooting with a 500mm, the minimum shutter speed would be 1/500 by this rule. If you don't have a tripod, try resting the camera and lens against a tree, or try shooting in a prone position, resting the camera on a rock or tree stump.

A Few Hints Regarding Stability and Holding the Camera

One classic flaw I notice among amateur photographers is the tendency when holding the camera to "hang" the lens from the fingers instead of supporting the lens with the hand used for focusing. This may sound silly, but try stretching your arm out and hanging a baseball-sized rock from your fingertips. Now try the same thing by cradling the rock in your palm, face up. You'll find that your arm muscles are much more comfortable supporting the weight versus hanging the weight. I've always told classes that the telltale sign of the amateur is watching how he or she holds a long lens.

Examples of Aperture Control

Think of the aperture as a window shade, increasing or decreasing the amount of light coming through the window. The aperture in a camera does the same in controlling the amount of light coming through the lens.

In this same spirit, another trick of the trade when shooting slower exposures is to use your body as a camera stand more efficiently, creating a more stable platform. Spreading your feet apart is the first step in this simple trick, and if there is a tree or wall to lean against, you are closer to performing the role of a tripod.

Okay, so you're cradling the camera lens in one hand, and the other hand is holding the camera body. Feet are spread about shoulders' width apart and you are leaning against a convenient tree or other support. Now add controlled breathing, and you have increased your ability to shoot at a slower shutter speed, sometimes up to two or three speeds slower. Controlled breathing means taking a deep breath, exhaling slowly, and pressing the shutter while exhaling.

Sometimes the details tell you as much as the overall photo. Case in point: at one of our Dubois, Wyoming, FirstLight Workshops, our group had the chance to photograph the Dubois Rodeo, which is held every Friday night during the summer...a real- and wonderful-small town rodeo. I was in the back where the riders prepare and was watching a bull rider prepare for his ride, and I was intrigued by his boots as they reflected the toughness of his sport. I wanted more than just the boot, so I waited until he adjusted his spurs, creating an almost "environmental portrait" of this rider. 90–250mm lens at 106mm, 1/160 second at f2.8, 100 ISO

If It Isn't Good Enough, You're Probably Not Close Enough

The fatal flaw of many aspiring photographers' work is not being close enough. As discussed in Chapter 3, learn to use the viewfinder like a painter's canvas, filling the frame so everything going on in the photo is relevant to the image. Moving in close is often the essential key here.

Using this theory and taking it a step further, you can use a portion of your subject to tell the story. Try shooting very close on someone's hands or face. □is will work when the viewer knows what the subject is; otherwise, it can be a meaningless abstraction.

Bringing the subject closer to the camera forces the viewer to interact with the photograph. Unless a carefully composed image uses the dead or empty space as part of the composition, a subject that is very small in the frame will not engage the viewer. Remember that your finished piece will often be a 4 × 6 inch card, and a small detail in the image may be lost in a small print. Sometimes your composition needs to shout to get your message across.

Achieving Impact in Your Photography

We've all seen the Sports Illustrated photo of the wide receiver, hands outstretched, fingertips reaching for the ball. □is is a great example of impact in a photo. Impact is also about the decisive moment. □e power of the athlete is conveyed in the image in an unmistakable way. Shooting with a long telephoto lens that helps to compress the image forces the background out of focus because of the very shallow depth of field. Using a high shutter speed freezes the action, emphasizing the instant of the catch.

A high shutter speed can freeze the runner mid-step, the dancer in flight, or the Frisbee just outside the reach of the dog's jaws. □e impact of this style of photography has defined how we think about athletes.

Adjusting Aperture for Maximum Impact

□is is where long lenses shine. Try using a lens in the 200mm-plus length. □e inherent nature of these lenses in compressing the field of view is amplified the longer the length of the lens. When shooting, try a shallow depth of field, f4 or f2.8. □is will force the background out of focus, creating a greater zone of interest on the main subject, being the only area that is sharp.

Shooting fast-moving subjects can be intimidating at first, especially when you're trying to use a long lens. Try prefocusing on a spot on the field where the runner is going to pass, such as a piece of dirt, grass, or anything that marks the spot. □en wait until he is charging toward you and press the shutter at the moment he hits that spot. □e more you do this, the more comfortable you'll become with shooting moving targets.

If possible, shoot with the sun or main light source at your back. Not only will this provide better light, but it will be easier to track the subject. Watch for the key moment—the third baseman throwing the ball or scooping up the grounder.

This style of photography isn't exclusive to sports photography. On assignment for National Geographic photographing the Yukon River, I was out for almost nine days with the Yupik people, who fish and hunt the river using traditional methods. This photo shows a Yupik man throwing a harpoon at a seal. The effectiveness of the photo is in its simplicity...and its power. In other words, it works by impact. 17–35mm lens, 1/500 second at f4

The Magic of Long Lenses, the Breadth of Wide Lenses

Within our camera bags are mechanical tools we carry: telephoto lenses, wide-angle lenses, and macro lenses. Each lens serves a specific purpose, enabling us to compress our photos, expand horizons, or capture the tiny details of the macro world that exist all around us. The first "long" lens I bought was an 85mm for my 35mm film camera, many years ago. I remember looking through it the first time and marveling at how the slight compression of this short telephoto lens dramatized an otherwise normal portrait. Shooting wide open, the background dropped slightly out of focus, yet the range of focus encompassed the nose to the ears. I thought it was magical.

Small apertures are used interchangeably with the term "wide open" in the photographic world. These refer to the diaphragm in the lens being open to allow the most amount of light to pass through the lens to the chip. Wide open in an 85mm f2 lens would be f2.

Short lenses and long lenses: You'll hear photographers use these terms in talking about their images and equipment. Short lens is another term for wide angle—anywhere from 14mm up to about 40mm. Long lenses cover lenses from about 85mm up to the super telephotos of 600mm and beyond.

I was fortunate to work in a camera store when I bought my first telephoto lens. I had the opportunity to use or at least "try on" many lenses before purchasing. Because of the sheer number of lenses I could try, my choice was made simple. Looking through a macro lens for the first time, seeing through the viewfinder the life-size rendering of a tiny flower or small bug, opened up another world to me. □is was such an exciting visual awakening. At the same time I was absorbing the visual lessons of National Geographic magazine, LIFE magazine, and other photographically powerful publications. What I learned was that photographs made with a long or short lens did not rely strictly on the lens's compression or expansion e□ect, but that the photographer was using the physical traits of the lens along with shutter or aperture to create these wonderful moments.

□e first time I looked through a 24mm was another visual epiphany. □e world literally opened up, bringing a wide, new world into that tiny viewfinder. □e lessons came quickly, and I learned to use a wide lens very carefully. □e dramatic reduction in size of the subject as it moved away from the camera could reduce or eliminate the impact of the photo. Using wide lenses e□ectively

The start of the Ironman Triathlon is bedlam. As the sun breaks on the horizon, hundreds of swimmers explode into the surf for the two-mile ocean swim. I wanted to convey the huge numbers of swimmers, so I shot this with a 24mm wide-angle lens, allowing the sea of arms to carry the eye from foreground to background. 24mm lens, 1/250 second at f5.6

takes practice. Another benefit of digital is that you can shoot and check while you are in the moment.

Using a wide lens, placing the subject close to the camera, and shooting wide open creates a very different look than shooting with the lens closed down for a greater depth of field. Many photographers prefer using a wide lens stopped down to f11 or f16, to obtain maximum depth of field so the image is tack-sharp, front to back. This exaggerates the feeling of distance between subject and background.

Use leading lines with a wide-angle lens to give a dynamic perspective. Train tracks leading from foreground to background, either vertically or on a diagonal, force the eye to move through the photo, following the direction of the lines.

We have so many options, both within our camera bags and within our thinking process, to control creativity in our photos. Learning about your equipment and understanding the traits of particular lenses will enable you to use that knowledge to your own photographic advantage. Remember, the photographer makes the image, not the lens or equipment. This is a key point of this or any other photo book. The photographer's vision makes the photo, and the camera and lenses are creative tools we have to work with, similar to the painter being able to choose from different brushes.

Digital is the perfect tool for growth as a creative artist. The ability to check your photographic endeavors in "real time" versus looking at them as a historical artifact, as with film, is invaluable in the growth process of a photographer. Experimentation without the costs of film and processing is an obvious benefit. The EXIF file, which is attached to every photo, contains information on the shutter speed, ISO, aperture, and white balance as well as the date the photo was shot. This is EXIF file information, found by choosing File > File Info > Camera Data 1 & 2 in Photoshop, can provide answers for your photographic experimentation. Say you shot photos of your child's soccer game, and the photos were blurred. Look at the EXIF file to determine the exposure used, and then increase the shutter speed for the next game. Your photographic experimentation is documented with digital.

The opportunity to witness a full solar eclipse is not a common occurrence. American Way magazine sent me to Rio de Janeiro to meet the cruise ship Sagafjord, on which we were to steam 600 miles along the coast of Brazil to position ourselves in the middle of the path of totality—over four minutes' worth. This photo is an example of leading lines, the streamers, pulling your eye into the photo. Telephotos create their own "look" through the natural compression the lens creates. With the telephoto set at f2.8 or f4, the zone of focus is restricted to the subject and the background drops out of focus. If you shoot with a telephoto and the lens closed down to f11 or f16, the background will appear more in focus, which can be either a distraction or a benefit to the photo. 20–35mm lens, 1/125 second at f4

How To: Creative Shutter Control

Since the invention of photography, two constants in the world of the photographer have been shutter and aperture. □e equipment may become more and more technically sophisticated, but these two compatriots of the camera are still the core of the mechanical side of the camera. Here are a few ideas on using the shutter as your creative tool.

If you are using your camera in the Program mode, you still have control over the shutter in most cameras. Moving the control dial while in the P mode will allow you to change the shutter speed and the aperture in sync. You will notice that the mode indicator will change from P to Ps or some other indicator that you are using as the Program mode, but you are changing the default shutter speed. In the P, S, or A mode, the camera will automatically adjust the aperture to match the new shutter speed you've chosen. A flashing exposure number or exposure warning means that you have either too little or too much light available for that particular shutter speed. If necessary, adjust the ISO to compensate. Moving it to a slower speed will set the aperture correctly.

Working with designer Mike Sukle in Denver to photograph an ad campaign for the National Sports Center for the Disabled and that organization's skiing program, I shot this world-class skier running a grand slalom course. Shooting with a slow exposure to create the feeling of speed, I also used a powerful battery-powered flash unit to illuminate the side of his body as it passed, freezing some of the detail on his outfit. 80–200mm lens, 1/4 second at f4.5

If you're photographing a moving object, try "panning" with the subject as it passes. Panning is the trick of following the motion of the passing subject with the camera. When combined with a slower shutter speed, in the 1/30 of a second or less range, panning will make the background blur with the motion, but the subject will retain some sharpness—creating a feeling of speed in the still photo.

Along with the preceding method, try using either the pop-up flash or a supplemental flash for fill-in light. Setting the flash to the TTL (through the lens) mode provides the most accurate flash setting as the camera meter is reading the flash as the lens sees it. As the subject moves by you, the flash will help freeze the subject while the background exposure is maintained. I do this in Manual mode, often underexposing the background by about a half stop. □is makes the moving subject become more the visual center of the image as the background becomes a little less prominent. I've also found that the camera/flash combination needs to be tested to achieve the perfect balance. For my tastes, the flash is also set about two-thirds of a stop underexposed, creating a more natural looking light.

Many modern electronic flashes provide an ability to use much higher sync speeds than normal, but only if you're using the proprietary flash for that camera. □e Olympus E1 with an FL50 flash allows a shutter speed of up to 1/4000 of a second sync in Special mode versus the maximum 1/180 of a second in Normal mode. □e e□ective guide number is greatly reduced, meaning the power of the flash is limited to very close subjects. But this can work well in brightly lit situations, where you may want to use the flash for fill light, such as a midday portrait with the subject near the camera and the vista in the background, or in an environmental portrait where you want the background to be totally out of focus.

COMPOSITION

Every other artist begins with a blank canvas, a piece of paper...the photographer begins with the finished product.

—Edward Steichen

In the craft of photography, we work with a small canvas—the viewfinder—just as the painter works with his or her canvas. The photographer and the painter construct their images using moment, content, and composition. One of the main components of a good photograph, the composition of an image is often the engine that drives the photo.

The Namib Desert, Namibia, Africa. The tallest and oldest sand dunes on Earth inhabit this huge and photo-rich landscape, providing incredible compositional opportunities for the photographer. Following the S-curve, the eye is drawn into this frame. 14–54mm lens, 1/250 second at f5.6, Singh-Ray warming polarizer

Retired from active duty, these giant B-52s, with a wingspan of 185 feet, resemble a field of toys, and their repeating pattern is what makes this photo work. Shot from a helicopter over Davis-Monthan Air Force Base, Tucson, Arizona. 20mm lens, 1/125 second at f8

By following a few rules of composition, you can create even better photos. What are the rules of composition and how do you apply them in your photography? This chapter offers a discussion of various rules and guidelines, but always remember that these are not written in stone, as composition is a subjective issue. Part of the joy of this craft is using the rules as well as bending them or totally ignoring them. As with painting, we decide whether the image is successful.

Rules of Classic Composition

For centuries, painters have followed several rules of composition that are applicable to the world of photography. These include the rule of thirds, leading lines, and tension.

I've had the good fortune of working in the Aeolian Islands of Italy on assignments for National Geographic as well as this shoot for Traveler Overseas magazine. We'd rented the sailboat Biligu to travel between islands. The beautiful afternoon light helped create a layered image: several layers of information reach from the foreground of the captain, to the middle area of the ocean, to the rock structures Spinazzola on the right and Stromboli on the left. 7–14mm lens, 1/125 second at f5.6

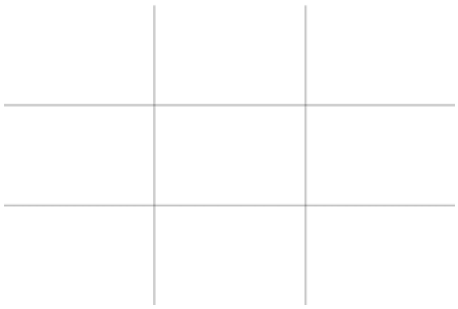
The Rule of Thirds

One of the classic compositional theories is the rule of thirds. □is is a simple but quite e□ective way of constructing your image so the viewer's eye is drawn to one of several key spots. Applicable in both the art and photographic worlds, this helps you create images that are nicely balanced and pleasing to the eye.

To visualize the rule, divide your viewfinder equally into thirds, both horizontally and vertically. □en compose the photo to allow the subject or center of interest to fall on one of the four intersection points.

S-Curves

□e eye is also attracted to the gentle sweep of an S-curve (see the opening photo). Be it a road or river leading from the foreground into the distance, this curve will draw the viewer's eye along the path where your main subject can be placed.



The intersection points on the horizontal and vertical lines are the spots where you should place your subject or point of visual interest.

A horizon line placed low in the frame creates a more interesting photo of a buffalo herd in northern Colorado. If the horizon line were across the center of the photo, it would have been too symmetric to be interesting. Here, the "big sky" is emphasized. 14–54mm lens, 1/250 second at f8

Rhythm and Repeating Patterns

As in the photo of the B-52 bombers, another compositional theme is repeating patterns or rhythm. Seen in the redundant pattern of the aircraft, this theme carries the eye from the foreground to the background of the photo.

Using Horizon Lines

Horizon lines are best not placed across the dead center of the photo. When centered, the photo is divided into two distinct frames in the viewer's mind. Both parts are given equal importance and no tension is introduced

An opening photo often will be one that conveys a sense of place, providing the viewer with a feeling of the area he or she is seeing. On the Caribbean islands of Turks and Caicos, I was photographing a story on the luxurious and idyllic lifestyle a tourist can lead in these beautiful islands. We used this photo as the "sense of place" image to create that feeling of "I want to be there" to the viewer. 17–35mm lens, 1/125 second at f8, Singh Ray Graduated Neutral Density Filter

Sometimes composition takes the back seat to the immediacy of the image. This whale leaped immediately off the starboard side of the National Geographic Sea Lion during a recent trip to Mexico's Baja California, where I was photographing the huge density of wildlife. 90–250mm lens, second 1/500 at f8

A visual opposite of the image of the whale leaping, here a whale quietly breaks the surface of the Sea of Cortez. This photo tells a totally different story from the explosive energy of the other image. 12–60mm lens at 39mm, 1/500 second at f6.3, 100 ISO

An area that aspiring photographers may have difficulty with is shooting close portraits of strangers. This is discussed in detail in Chapter 8, but here are a few important points regarding portraits in a photo story.

Approaching a stranger on the street can be intimidating at first. However, a bit of confidence along with a compelling reason why you want to photograph that person can go a long way. You're shooting a series of portraits on the craftsmen in the flea market or fishermen in a small village. Most potential photographic subjects will comply with your request if it sounds legitimate. The first few times are the toughest, and it does get easier.

Show an interest in what that person is doing. That's what appealed to you photographically in the first place, right? I've found that if I am sincere in my interest, more often than not I am allowed to photograph that individual. Here's where asking some questions about what the person is doing can be of some value as it allows the would-be subject to be the expert. Genuine interest is often a ticket to making a good photograph. When you take the time to be interested, you're an interesting person to the subject.

Photographing that person doing what attracted you in the first place is essential. This is takes time as the first few minutes he probably will be staring at your camera waiting for you to take the photo. Explain that you would like him to do what he was doing when you approached, and then give it time. I'll often spend an hour or so (if it feels like I'm not intruding) watching and waiting for that one moment.

This is bears repeating: Photography takes time. This is makes budgeting your time important, especially if you're not at home.

Last, but certainly not least, use that benefit of the digital technology—the monitor on the camera—to show your subject the images you've captured of him. This is can be a tremendous ice-breaker, drawing the person's interest further into this process of making his image as powerful as you can.

Key Moments Are Essential

This is is a natural extension of my last point, as working the situation for key moments also takes time. A key moment is, as Henri Cartier-Bresson described, existent in every situation in life. The dynamics of two people conversing on the street will build to a "decisive moment," where the gestures of the individuals reflect the peak of energy in their discussion. It doesn't have to be a dramatic over-the-top photo to be powerful. An example of a key moment could be the second a woman touches her new grandchild's face, how her face lights up as her hand is extended to touch the baby. Or when the Little Leaguer leaps in the air after touching home base with his team around him—now, that is a loud key moment.

Stories involving people usually benefit from a tight, close-up portrait. This makes the photos much more personal by forcing the viewer to confront the subject visually. This photo of a couple of kids was shot for A Day in the Life of China. Typical of any son anywhere in the world, the 12-year-old on the left was scared his mother would see him smoking. 35–70mm lens, 1/125 second at f4

These key-moment photos will bring life and energy to your story, and they can be the fabric that not only connects the images, but also helps the viewer understand how those moments felt as they occurred.

A key moment does not always have to be a super-dramatic, wide receiver flying through the air with the ball on fingertips photo. Good key moments can be much more gentle.

Anticipating human response allows the shooter to be ready when the decisive moment arrives. This is a skill that will develop the more you shoot. Knowing when to shoot is made easier by staying focused, literally and figuratively, on your subject.

Bringing Closure to the Story

You've got a good opener, a photo that introduces the viewer to your subject and explains a bit of the character of the place or people. Your story then contains a detail or portrait, or both, that makes the story more intimate. You've introduced the viewer to a specific person or aspect of the story. You've worked the situation for those wonderful explosive or quiet moments that bring energy to the story.

Bill Allen, retired editor of National Geographic, says that each reader is coming into the story through his or her own door, and you want the reader to leave through your door. That door is the closing photo.

The closer can be as obvious as the sun setting over the kids walking down the beach on the last day of the vacation. It can be as gentle as a flower lying in the church aisle as the bridal couple is walking away in the background. The closer wraps up the story and

can direct the emotional feeling the viewer will be left with.

Looking at photo essays—not just any old photo essays, but really good ones—is of definite benefit to anyone aspiring to shoot one. W. Eugene Smith's famous 1948 photo essay on the "Country Doctor" for LIFE magazine is one such essay, and scores of others can help guide the aspiring shooter.

Less Can Be More

In your vacation story presentation or in a National Geographic layout session, one rule holds true: less is more. Six photos of kids kicking soccer balls will be good for the season-end dinner presentation, but in a story those redundant images will bore the viewer. One really strong action photo will speak volumes compared to several weak photos.

On assignment for Texas Highways magazine, I spent a few days canoeing Santa Elena Canyon, which forms the southern boundary of Big Bend National Park. Rich McCaffery was my guide and paddling partner—this is Rich as he is just about to exit the canyon. A quiet scene, the paddle in the air is that subtle decisive moment that brings a bit of visual interest to the photo. This photo ended up on the cover of the magazine. 12–60mm lens at 14mm, 1/250 second at f8

When shooting a story, the photographer has to produce an image that will close the visual narrative. On an assignment for TIME magazine, my subject was the Canadian Rockies. As a closing image, this photo of the highway between Banff and Jasper National Parks creates that ending; the taillights streaking by provides that visual element of interest, pulling the viewer into the photo. 11–22mm lens at 14mm, 2 seconds at f4, 400 ISO

How To: Creating a Photo Story

As a contributing editor for American Way, the in-flight magazine of American Airlines, I was asked to come up with story ideas. I would research story ideas in or near cities to which the airlines flew. One story I proposed to the editors was on the Palio di Siena, in Siena, Italy. □ is twice-annual horse race has been run since the 11th century and was an event I'd always wanted to see. A race track is created in the village square, the Piazza del Campo, with tons of dirt being trucked in to cover the ancient brickwork. □ e 17 contrade—neighborhoods or city wards—are each represented by a horse and rider who will tear around the piazza at breakneck speed. □ e winning horse can even be riderless. It is utter and wonderful mayhem.

I'd contacted the tourist o□ce in Siena and arranged a meeting with the director. He in turn put me in contact with a few contrade directors, and I made sure I at least introduced myself to them prior to the weeklong events leading up to the July race.

□ is is an overview of how I shot the story and how it was constructed as a finished piece.

Step 1
Needing an opening photo that introduces the Palio to the reader, we wanted to use a strong dynamic photo with enough photographic tension (see Chapter 6 for a discussion of tension) to stop and draw the viewer into the image.

Step 2
Having made a graphic entrance into the story with the opening photo, I then immediately brought in the main element—the horse and the flag theme continued from the first photo—that is also carried to the next image. This created a visual narrative by establishing a palette of colors and shapes.

Step 3

With this photo, the visual narrative of the palette continues, but it brings the human element into the story. I like the idea of the contrade colors being common to the first three photos.

Step 4

A photographer friend, Jeffrey Aaronson, told me once that if something makes us laugh or go "Oh, wow!" we should be photographing that subject. Historically in the Palio, each contrada's horse is taken into the neighborhood church to be blessed. You don't see that every day in Topeka. It's always nice to be able to introduce humor into the piece.

Step 5

I've teased the viewer with some very nice images of specific events happening in Siena; now I wanted to bring a view of the town, the track, the race, and the crowd. There's a lot going on in this photo, but it actually is quite simple—and necessary to show the reader where I was. That detail does not always have to be up front in the story.

Step 6
Providing more continuity, as I did with the palette theme, I use the crowd from the previous photo in this image. But I bring the human element into it with the beautiful young lady.

Step 7
As with the opening three photos, I use three crowd photos, but each has a totally different feeling and place in the narrative. The main focus of this photo is the two kids watching the race; the crowd is the supporting cast.

Step 8
Another repeating theme, and this is what the event is all about: the race itself. In the magazine layout, we actually used these four photos as a series. This corner of the track is notorious for horrendous crashes, and it happened during this race. I had to purchase a very, very narrow seat with an overview of this spot—it was not cheap, but, as you can see, it was well worth it.

Step 9
This contrada had not won the Palio for a number of years, so it was an emotional event for the neighborhood members. Following them back to their church where the winners have historically gone, I found this woman emotionally celebrating the win.

Step 10
After giving thanks in the church, the contrada carries the winning jockey through the streets of Siena. This is purposely shot at a slow shutter speed with a flash to get the movement, while freezing the jockey's face.

Step 11
This is our closing photograph. Small fires are lit atop a few buildings to celebrate the race, and I talked my way atop a hotel nearby to get this important overview. Is working on a story tiring? Yes. Is it exhausting? Yes. Is it worth it? Yes!

How To: Choosing What's Inside the Camera Bag

Since the invention of photography, two constants in the world of the photographer have been shutter and aperture. □e equipment may become more and more technically sophisticated, but these two compatriots of the camera are still the core of the mechanical side of the camera. Here are a few ideas on using the shutter as your creative tool.

Photographic equipment is the hammer and wrench of the photographer's toolbox. □e lighter and more e□cient the toolbox, the easier it is for us to work. Plan ahead for your photo outing, whether it is a Little League game down the block or a month-long trip to Nepal. Take only what is necessary to get the job done. Don't load yourself down with so much gear that it gets in the way of making photos.

My camera bag is pretty well defined by years of travel and getting caught with too much or not having brought the correct equipment. On the plane or in the car, one medium-sized Domke camera bag, with two camera bodies and three or four lenses—depending on the shoot—will usually su□ce for almost all conditions.

I carry two Olympus E-3 bodies, along with an Olympus E520 as a backup. I'll often carry a small point-and-shoot Olympus. □e 5060 can go in a pocket and works in some situations where the larger bodies and lenses would broadcast "Photographer!" □ere are areas where someone shooting seriously may not be well received, and for those times, the 5060 looks more like a tourist's camera. But the quality from a camera like this is excellent and provides good quality files for printing. Another camera that resides in my pocket at all times, the Olympus 1030 is good to 33 feet underwater—and it's very small and compact.

Your camera choice may be a Nikon D300 with a second body, a D80, or a Canon 50D and a Canon 1Ds

In my Lightware wheeled carry-on case, I carry two Olympus E-3 bodies, three to four lenses ranging from 7mm to 200mm (equivalent to a 14mm up to a 400mm), a flash and cord—along with a LumiQuest 80-20 diffuser, and battery chargers (two with one cord that has been adapted to using one plug for both chargers). Also, two Singh-Ray graduated neutral density filters, a warming polarizer, remote release cord, card readers and cords, extra batteries, extra CF cards, and my tripod: a Gitzo Carbon Fiber with an Acratech ballhead. With this equipment, which will all go onboard a plane, I can pretty much get any job done that doesn't require exotic lenses or gear.

Mark III. Having two bodies really makes the shooting process easier. I'll carry a wide zoom on one body, a medium-long zoom on the other. □is way, I'm ready to shoot anything almost instantly. In many if not almost all situations, this camera setup can cover all your bases.

Lens choice is specific to the type of photography you are doing. In my "basic" bag I'll carry a 7–14mm (which, in the 35mm film world, is equivalent to a 14–28mm), a 12–60mm (24–120mm equivalent), and a 50–200mm (100–400mm equivalent). On shoots that require high-speed lenses, a 14–35mm f2 (28–70mm equivalent) and a 35–100mm f2 (70–200mm equivalent). If photographing sports or wildlife, a 150mm f2 (equivalent to a 300mm f2, extremely fast), and for wildlife or sports photography, a 90–250mm f2.8 (180–500mm equivalent) and/or a 300 f2.8 (a 600mm f2.8 equivalent). □ese lenses, along with a 1.4 or 2 power converter, which multiplies the focal length of lenses by a 1.4 or 2x factor, give me just about all the lens power I need.

Always found in my bag is a TTL (through the lens) flash and a remote cord for that strobe so I can shoot o□-camera with the flash. □e cord allows me to hold the flash away from the camera so I can bounce or reflect the flash o□ of a ceiling or wall for a softer and more natural light. Today's flashes often use infrared or radio control, allowing the photographer to set up several wireless lights that are controlled from the camera. □is is the o□cial "Next Best □ing Since Canned Beer."

A Lexar wallet carries my assortment of Lexar CF cards, usually a couple of 8GB cards that reside in-camera, a few 4GB cards, and a 1GB card in the wallet.

In a second bag, I carry two 160GB WiebeTech pocket drives. □ese are configured, in my computer's operating system, to act as a RAID (Redundant Array of Independent Disks) device. When plugged in to my laptop, the two drives appear as one on my desktop. When I drop images onto the drive icon, the images are copied to both drives, which mirror each other. Packed in that bag are enough CDs or DVDs to burn the number of images I think I may shoot on the particular assignment. Before I erase/reformat a card, I make sure the files are in a minimum of two independent places. □is is a cardinal rule.

In a backpack, as my second carryon, I carry a MacBook Pro (maxed out with 4GB of RAM), two WiebeTech hard drives, my JOBO GIGA Vu PRO (as my third backup, this allows me to run a slideshow), a reading light, a high-end voice/sound recorder, my iPod with a great music selection, and my New York Times crossword puzzles.

If you don't want to lug a laptop to Lithuania, several manufacturers make small and very portable hard drive viewing units. JOBO makes a beautiful unit, the GIGA Vu PRO evolution, which provides up to 160GB of space. Epson makes the P7000, and Apple o□ers the photo-capable iPod, iPod Touch, and photo-capable iPhone, now found in many photographers' bags. □ese units will hold a huge number of images and allow the photographer to

view and share them. □e one downside to using only one of these two units: will this be the only backup for your photos? □is could be reason enough to carry a laptop or a portable CD or DVD burner.

In the bits and pieces category, I carry a Sharpie black marker wrapped with about 1 feet of ga□er's tape (ga□er's tape di□ers from duct tape as it can be used on lights and other hot items without leaving behind a sticky residue), a small headlamp (a very lightweight model made by Petzl), a pen, and my ubiquitous reflector, discussed in Chapter 4.

Power Management and the Traveling Photographer

One of the great benefits of shooting digital is the elimination of film and the problems of transporting the number of rolls needed for a trip. Now we carry a few CF cards that equal many rolls of film. One of the big issues with digital is power. We now have a technology that is 100-percent power dependent. Gone are the days of carrying a fully mechanical 35mm body as a backup. When I turn the lights o□ in my hotel room, it looks like the approach of the mother ship in Close Encounters of the □ird Kind due to all the power chargers running.

Here are some power necessities for the road:

As I mentioned earlier, use a camera system that uses the same batteries and charger.

Always carry extra batteries. □is includes rechargeable and non-rechargeable types. In addition to two or three extra camera batteries, I also carry a small bag with extra AA and AAA batteries. Nothing, and I mean nothing, is worse than running out of power with no backup in the middle of a great photo event.

I always carry an extra charger, well worth the minimal weight increase since this provides 100-percent faster battery charging because you are charging two at once. It also provides a backup if one breaks. Not likely, but don't tempt Murphy's Law!

I carry a small 12-volt power inverter (NexxTech Power Inverter model 2218075), which can be found at Radio Shack. It's a 75-watt model that is small and light and provides charging time while on the road, plugged into your cigarette lighter.

Keep appropriate adaptor plugs for the area in which you are traveling. I'll stop for lunch and ask to sit at a table by an outlet, so I can use my charger to top o□ the batteries. Steve Kropla's website (www.kropla.com/electric2.htm) not only lists the voltage availability worldwide, but it tells you the type of adaptor plug you'll need for that country. Take at least three adaptors.

Brunton released the Solaris series of portable solar panels and Solo series of portable battery units that solves a *lot* of problems unique to digital—that need for power. I've been using the Solaris 26 solar panel, and with the Solo 15 battery pack, I've been able to charge several of my E-3 camera batteries. This is an invaluable tool for today's traveling photographer. This gives you the ability to charge not only your camera battery, but your laptop battery, and your databank (JOBO, Epson, iPhone, whatever) in those powerless areas, as long as you have direct or indirect exposure to the sun for the charging process. These pack nicely, the battery being about the size of thick pocketbook and the panel folding up to similar size.

The Brunton solar panel and battery pack—finally the photographer can charge necessary batteries in remote or powerless areas.

Travel and digital photography are natural and necessary partners, as we love to document our world and our travels. Taking that step and moving from shooting passable images to memorable showstoppers is our aim, and creating a moment that defines our memory is our task. We photographers can reap the benefit of our exposure to the world. Isn't this what travel is about, experiencing a moment in time that transcends our daily routines?

We travel to find the mystery and intrigue of foreign lands. On a National Geographic expedition in the Antarctic, I found this colony of penguins at Port Lockroy, a sheltered anchorage used by early whalers and later established by the British as their first Antarctic "Base A" in 1944 as part of a secret wartime initiative to monitor German shipping operations. I sat on some rocks, waiting for the curious critters to come closer to investigate. The mountain in the distance forms the background, providing a lot of information about this rugged and remote location. The penguins in the mid-left of the frame provide a nice moment, while the fellow in the foreground is the initial layer to which the eye goes to initially. 12–60mm lens, 1/250 second at f8, ISO 100

On the Web

Geotagging allows the photographer to capture the exact map coordinates of where a picture was taken by using an external device, such as the JOBO Photo GPS. Adobe Photoshop Lightroom has a really cool feature that uses this information along with Google maps to create a map of exactly where your photo was made. Go to www.perfectdigitalphotography.com online for a further discussion of this process.

Scouting ahead can pay off handsomely. My assignment was to photograph the posh Royal Scotsman train on the six-day route around Scotland. I had read that at one point, the diesel engine is exchanged for a traditional steam engine when the train goes from Fort William to Mallaigh in the Western Highlands, crossing this amazing trestle bridge, as seen in the Harry Potter movies. I'd gotten off the train in Fort William and hired a taxi to take me to the trestle bridge, clambering through the heather to this overlook of the tracks. 35–70mm lens, 1/60 second at f4

Sharing Your Vision

by Jack and Rikki Swenson

Jack and Rikki Swenson lead Photo Expeditions for Lindblad Expeditions, in alliance with the National Geographic Society, guiding photographers to many of the world's wildest places. Jack, a professional photographer and wildlife biologist, has co-authored two books, and his images have been widely published in wildlife and nature publications worldwide. Rikki is an inspiring instructor of digital photography, photo imaging techniques, and her own unique programs of creative ideas for photographers. Their travels regularly take them to Africa, Baja California, Galapagos, Antarctica, Alaska, Costa Rica and Panama, and the high Arctic. Their image collections can be viewed at www.ExpeditionGallery.com.

Photographs are rich visual descriptions of our world as it was in the brief moment the shutter was clicked. In that fraction of a second, a photographer creates a tangible artifact that has the power to inform, to educate, and even to move hearts. Although many images may never reach quite this far, you give them this possibility when you share them with others.

We've been fortunate, spending years leading other photographers on photo expeditions and safaris around the world, having amazing opportunities to photograph wildlife in a great variety of locations. Some of these remote places have been preserved within parks or refuges, while others remain potentially threatened by development or other causes. Through the years, we've seen how our images have helped to create awareness back home as they are viewed by others, building further appreciation for the natural world we hope to see conserved for future generations.

You don't need to be able to travel to the far reaches of the earth to reveal the magic of our planet through photographs. This is can be true regardless of your subject matter. You might have spent your time photographing an aging building in your hometown, traveled to a distant country, or found hidden beauty in a nearby swamp. For people who weren't there with you, their understanding and awareness of this other place will be shaped by the images you share with them. Through viewing photographs, people create associations with a place. These associations can be strong or weak depending on the structure and power of your images. By this simple process—arcing through you and your images—a place name on the map evolves into other people's increased understanding and perhaps a meaningful connection to a place. By this elemental process, the roots of deeper values begin to grow.

It was this fundamental step that photographer William Henry Jackson made in 1871, joining the now famous Hayden Expedition to document the marvels of the little known Yellowstone region of Wyoming. After this expedition, it was Jackson's photographs and Thomas Moran's paintings—depicting incredible landscapes and strange geothermic formations—that are largely credited with helping to convince the U.S. Congress of the stunning beauty of the Yellowstone

region. Within a year it was designated as the nation's first national park.

In terms of conserving the places we love, it is a sad reality that people seldom protect something just for the sake of preserving it. People only want to save the things, or places, that have a perceived value or intrinsic charm. Few people have the opportunity to watch a polar bear leaping across a gap in the arctic ice pack, yet photographs and films have opened a window into those remote places, showing us the magnificence of these creatures and the tenuous nature of their frozen world. That is part of the power of photography. In our contemporary world, many renown wildlife photographers, like Frans Lanting, David Doubilet, Tom Mangelsen, and Kevin Schafer (to name only a few) use the power of their images as a means of encouraging awareness of the natural world they hope to help preserve. Their work will reach millions through the pages of National Geographic, conservation organization's annual calendars, fine art prints, and well-distributed books. Most all of these photographers began small, exploring the world around their home with a simple camera.

One doesn't have to be a professional photographer with publishing contracts to have a role in this process. Sharing your own images from your experiences can help build awareness in very meaningful ways. We make individual photographic books, ordered online, and it's amazing how they move like wildfire through a room of people, sparking interest and discussion on the places we've traveled.

Today, more than at any other time in the history of the photographic image, there is an amazing array of creative tools for any photographer—amateur to expert—to share and display photographs. For many people, their photographs often remain essentially unseen in shoeboxes or tucked away on a hard drive. The advances of digital technologies have spawned ever simpler means to re-create your images in different forms. Like ripples radiating outwards from a little splash in a pond, your images can now easily reach more and more people. Don't underestimate the power of one—whether it be one photo, one book, or one person's inspiration—and what might be generated from there.

Use your imagination to find new creative ways to let your images speak to others. You will find that you, too, can have an influential voice for helping others to care about the treasures of our world.

CHAPTER 10

PHOTOGRAPHING THE NATURAL WORLD

Twenty years from now you will be more disappointed by the things you didn't do than by the ones you did do…. Explore. Dream. Discover.

—Mark Twain

As evidenced by the explosion in popularity of Outside magazine, National Geographic Adventure, and the ubiquitousness of Patagonia outdoor clothing, more and more people are exploring the great outdoors. As long as photography has been in existence, the natural landscape has been a prominent subject in photographs. □e subtle contours of rolling hillsides, the grandeur of precipitous and craggy cli□s, and the ever-changing sky provide an infinite array of photographic potential. □is

At Point Wild in the Antarctic, Weddell seals and penguins lounge on ice floes in this remote part of the world. I love the name of the place, as those words re-create the essence of what this felt like to me. In the background, a lone penguin on its own journey is the one extra "dimension" providing depth and a feeling of discovery in that layer of the photo. 50–200mm lens at 169mm, 1/320 second at f8, 100 ISO

chapter will help you improve your outdoor photographs and give you invaluable tips on photographing wildlife and protecting your camera equipment in unpredictable environs.

We All Want to Be Ansel Adams

It was early in the morning when we set the helicopter down on Roraima-tepui in southeast Venezuela. □ese giant and ancient granite monoliths rise straight from the surrounding rainforest floor to heights of 5000 to 6000 feet. Roraima-tepui, the largest, is almost 15 miles long and several miles wide. □e tepuis are protected by the Venezuelan government as part of the country's national park system. National Geographic had obtained permission for me and a writer, Tom Melham, to escort a mountain rescue team as they practiced for a month on several of the nearly 100 tepuis.

Angel Falls, the world's tallest waterfall, shot from a bird's-eye view while I was on assignment for a National Geographic book, Beyond the Horizon. I spent several weeks photographing the tepuis in southern Venezuela. 20mm lens, 1/500 second at f3.5

We had the luxury of air support (two helicopters) on this assignment, which allowed us to visit Roraima-, Auyan- (the home of Angel Falls, the tallest waterfall in the world), and Cuquenan-tepuis. Normally this is a hike of several days from small villages, themselves very remote. Wandering about the vast geological wonderland of Roraima's surface, I saw a couple of people standing perilously close to the near-vertical edge of the 4000-foot drop. I thought perhaps they were two locals from a nearby village. Two local tribes had recently been warring, and I didn't want to be mistaken for an adversary, so I moved with as much noise as I could to give them plenty of warning that I was in the vicinity. I cautiously approached the people, and as I drew closer I realized that their huge size was due to their backpacks and camera bags. They were photographing the amazing view of the jungle canopy afforded them by days of hiking. I'd found the local Ansel Adamses.

Isla Rasa in the Sea of Cortez is a protected bird sanctuary with huge, huge numbers of Heermann's Gulls, Elegant Terns, and other unique ornithological species (birds, in other words). Late afternoon, in a Zodiac raft, a group from the National Geographic Endeavour was watching as these Elegant Terns (Sterna elegans) gathered on rocks along the littoral zone of the island. I love the one tern hanging above the others and the lineup of other birds, each part of the composition of this image. 50–200mm lens at 158mm, 1/500 second at f5.6, 100 ISO

On Isla Rasa, this group of Heermann's Gulls had been frightened into an explosion of flight by another more fearsome resident of this densely packed isle sanctuary—a falcon had flown overhead. 50–200mm lens at 200mm, 1/500 second at f3.5, 100 ISO

Cameras have given us glimpses into the most remote and untraveled corners of the Earth. When we can see and share the images of the rainforests in Brazil or the tepuis of Venezuela, it gives us a greater understanding of the importance of these areas instead of what we gain by just reading a description. □ rough photographers such as Eliot Porter and Frans Lanting, the photograph has helped generate support for the preservation of wild places.

Photographers and travelers (almost synonymous) want to record their travels into the natural world. Let's talk about the various components of photography in the outdoor world and what a perfect fit digital is with the great outdoors.

The Components of Outdoor Photography

Successful landscape and outdoor photography uses several components that are key in making it successful. A powerful photograph provides the viewer with a sense of scale, place, or magic.

Creating a Sense of Scale

Who isn't overwhelmed by the scale of the Grand Canyon or the size of the redwoods in northern California? If you've seen Yosemite, the view from Glacier Point can hold you for hours. Unfortunately, most aspiring photographers are underwhelmed when they view their photos of these places. One of the reasons this happens is that they fail to convey a sense of scale in their images. □is is critical, as you have to translate an immense physical location into a 4 × 6 or 8 × 10 print.

One of the simplest solutions is to add a person to your landscape. □is creates an instant sense of scale if that person can be used to gauge the size of the cli□, waterfall, or whatever natural feature you're photographing.

Here are a couple of tips for e□ectively communicating a sense of scale:

- Don't place the subject too close to the camera. □is does not put the person in a place that creates scale. Place her back in an area where the size of the natural feature can be judged against the size of the person.
- Use a clean background. If the person in the photo is lost in the trees, the sense of scale will not exist. Place her against a solid bar of color or against the sky. □is will make your photo stronger by making the subject stand out and uses scale as another dimension of the photo.
- Incorporate subject elements that are familiar to the viewer. A barn, a lone house, a fence post, or a windmill can also help tell the story of the area and provide a tangible point of reference for the landscape.
- You don't always have to use a person for sense of scale. □e interior of Iceland is one of the most phenomenal places I've had the fortune to visit. Equally portioned between stunning and breathtaking, these four photos shown on the following page convey my sense of this amazing place.

Finding Your Subject

Within those "Big Places," your subject can be the focal point of the photo, whether that subject is a person, bird, or bear. What your subject is doing helps create a more interesting photo. When the subject is centered in the frame staring into the camera, our eyes gravitate toward the center and little else. Conversely, when your subject interacts in the scene, the overall photo becomes the message.

Adding a subject to your photographs of Big Places not only adds a sense of scale, but it heightens your personal interest in the photo. Photographs are most successful when the subject interacts with the environment, as the interaction tells a story and engages the viewer.

During a late afternoon snowmobile foray to the middle of Vatnajökull Glacier in Iceland, the largest glacier in Europe, I looked back to see another member of our party rushing to catch up with us, under the rising moon. 180mm lens, 1/30 second at f2.8

Part of the assignment was a three-day, 100-mile horseback ride in the mountains of southeast Iceland. This photo was shot the morning our farmers were gathering the Icelandic ponies for the trek. 300mm lens, 1/500 second at f5.6

Iceland gets the majority of its power from geothermal sources; I saw this natural geothermal vent one late afternoon as the sun was setting. 180mm lens, 1/125 second at f2.8

A pair of white swans perform a mating ritual in the volcanic fissure lakes in the interior of Iceland. 80–200mm lens, 1/125 second at f4

The photographer has to be ready—when that camera strap goes over your head, a switch should be turned on in your mind so you are "on," thinking photographically. Magdalena Bay on the Pacific side of Mexico's Baja California peninsula is a breeding ground for the gray whale. Hundreds of these magnificent creatures return to this fairly remote bay to give birth to their calves. This event also attracts viewers, arriving by boat. As I was photographing the whales, the mothers almost pushed their babies to the surface to encounter humans (whales must have short memories, considering how humans nearly wiped them off the face of the Earth), bumping against as well as under our Zodiac rafts. I wanted to capture a slightly different look at this event, so I used my camera's Live View, holding it at arms' length, just above the water's surface, to capture this young whale just as it surfaced, while it eyed my camera with curiosity. 12–60mm lens at 12mm, 1/500 second at f4.5, 100 ISO

Creating Interest: Make Your Audience Want More

Flipping through a stack of prints from your latest vacation can be an exhilarating experience or an exercise in frustration, depending on the content of those photos. How do you make your photos command the attention of the viewer and make your audience want more? Here are a few tips:

Keep things simple in the frame. One common mistake is having too much going on in the frame. Strive for simple, elegant compositions.

Have your subject interact with the scene, not stare into the camera. Stay with the subject until something interesting happens. If you are photographing prairie dogs in a field, wait until two dogs interact or one stretches its head toward the sky. Often a simple gesture creates a spark of interest in what could have been a boring photo.

Use contrasting colors to create interest. An expanse of blue sky with a strategically placed person in a red sweater creates a contrast in palette that draws the attention of the viewer.

Shoot during a time of day when you can utilize the light. Good afternoon or morning light against the wall of a cli□ may not only produce a nicer quality light, but it can also create a more even light that helps the photograph succeed.

Even in the natural world, the idea of "moment" still exists—the photo of the young gray whale is an example of this. If the photo had been shot a moment before or after, the eye might have been closed or underwater. □ is is our job—to wait for that moment when everything comes together.

Creating a Sense of Place

One of the old rules of thumb when covering a story as a newspaper photographer was to shoot wide as you started your coverage. □ is anchors the story within the environment. It could be the zoo, the middle of the Sahara, or a village in Scotland. Next time you pick up a photo-driven magazine such as National Geographic, look for the establishing photo that shows the viewer where you are. A photo that works well in this sense works on several layers. □ e first and most obvious is to introduce the viewer to what the subject's world looks like. Second, it gives clues to the character of the subject as we are heavily influenced by where we live.

You've traveled far and wide to get to the place of your dreams, and you want your photos to convey that feeling of being there. You want the viewer to understand the magic of what attracted you to the locale. Remember that if something makes you say "Wow!" it's worth a photograph. What is the single element in the environment that compels you to pick up your camera? Isolate it and make that element the subject of your photograph. It's easy for landscape images to become cluttered. By composing your photo around a central element, your landscapes will be easier to "read" and will convey the essence of the environment.

Creating a Sense of Magic

Veteran photographers have the uncanny ability to be at the right place at the right time, consistently—almost like a sixth sense. Your "spider" sense may not tingle when a stunning opportunity is near, but your pictures can benefit by using some of the tricks employed by professional landscape photographers.

The photographer is constantly struggling with glare, scattered light, and reflections that degrade the quality of the photograph. These can dilute the light or obscure subjects in the photograph. The extended dynamic range of a scene may be beyond the ability for the sensor to capture the full range of bright to dark in the image. A polarizer, when used correctly, can assist in mitigating these problems.

A polarizing filter is one of the most essential filters to reside in your camera bag. What makes it indispensable is its ability to control glare, deepen colors, and eliminate reflections. All photographers should have a basic understanding of how the polarizer works to take full advantage of this uber-filter.

The Namib Desert in Namibia, Africa, is one of the oldest deserts on Earth, and Traveler Overseas magazine sent me there on assignment. Our job as a photographer is to make sense of the "visual chaos" that is always in front of us. As an oryx was passing the dunes in the background, I shot this image with a "super-telephoto," allowing the compression created by a long lens to place foreground and background on the same plane of focus. 20–250mm lens, 1.4 converter, at 320mm, 1/500 second at f5.6, 100 ISO

Some shooters leave polarizers on their cameras permanently, which can result in images that look obviously polarized. Also, be wary of wearing polarized sunglasses—you might miss a good picture because you couldn't see a reflectance that the polarized glasses absorbed.

A Quick Polarizer Tutorial

Almost all outdoor photography is accomplished with primary light sources such as the sun or moon. The light from these sources can be described, very simply, as a flow of particles moving perpendicular from the source. These light sources are unpolarized, and the job of the polarizer is to allow passage of the light rays that are directed in the polarizing direction, effectively "selecting" which light rays may enter your camera's lens.

Polarizers work when the lens is pointed at a 90-degree angle to the light source (sometimes you may want to polarize a source or reflectance that isn't related to the sun). One easy trick: Use your hand to make an "L" with thumb and index finger. With your index finger, point at the sun and extend your thumb at a 90-degree angle to your index finger. That will be the direction you'll want to point your lens for maximum polarizer effect.

The bezel, or rotating front glass element of the polarizer, is turned while you're looking through the camera. You watch through the viewfinder or the monitor to ascertain when the desired effect is reached. Wide-angle lenses can create problems with landscapes that include a lot of sky. Since the wide lens takes in such a large expanse of horizon, the ideal 90-degree positioning of the camera to the sun is changed on the extreme sides of the wide-angle image. The lens takes in so much of the horizon that the effective angle of the edges of the frame to the sun will not be 90 degrees, but closer to 45 to 75 degrees. This causes the polarizer not to darken the sky equally in the corners, but proportionally as to the relative angle. You will notice a darkening of the sky in the middle of the frame and lighter sky at the edges. One way to deal with this is to use a graduated filter. (See the section "Another Necessity: The Graduated Filter" a bit later in the chapter.) This filter will provide an even darkening of the sky. Polarizing filters also affect the exposure as they are essentially a neutral density filter that absorbs about 2 f-stops of light. Your camera's TTL metering will adjust for this, but if you are using an external meter, adjust the camera's aperture by opening it 2 f-stops. If the external meter reads 1/250 second at f8, the correct exposure with the polarizer would be 1/250 second at f4.

Two types of polarizing filters are available:

- Linear polarizers are considered standard and can actually cause problems with auto-focus and/or auto-exposure, contributing to inaccurate exposure and focus problems. Also, they may play havoc with your TTL light meter.
- Circular polarizers can be used on all cameras without any of the problems associated with the linear polarizer. A circular polarizer is preferred for digital photography as it will provide the best results with auto-focus lenses.

Using a polarizer for this photo of the volcano on the Aeolian island of Vulcano allowed the sky to darken, balancing out the density of foreground and sky, and having a human in the scene provide a sense of scale. 12–60mm lens at 12mm, 1/125 second at f8

Polarizers in Action

Saturation of colors is a natural and often desired component of using a polarizer…an almost other-world scene is enhanced by the use of this filter.

Another Necessity: The Graduated Filter

We photographers use many tools in our business. Some deal with the natural inability of digital to capture the dynamic range of the scene as our eyes can see it. □e human eye can look at a scene and readily capture the full range of light, while the camera is limited by its ability to capture only a slice of that full brightness range.

Another lifesaver that is a close second to the polarizer is the graduated neutral density filter. □is filter helps to compress a scene's brightness range into a range that can be captured by film or digital. □is rectangular filter is half neutral density, half clear, with a split in the middle. Used for situations where the sky is significantly brighter than the rest of the image, the filter is placed over the lens so that the split section of the lens aligns with the horizon and the neutral density portion of the filter covers the sky. □is balances the brightness values so you can correctly expose for both the sky and the foreground.

Two Singh-Ray graduated filters are always in my bag. The version at left is a 2 f-stop filter, the version at right a 3 f-stop graduated filter.

When we look at a beach scene, our eyes capture the deep blue sky, the aquamarine of the water, and the soft umber color of the sand—all in the full blaze of the midday sunlight. The camera's sensor does not have the dynamic range of the eye and thus the unfiltered photo of that scene will suffer. If the exposure for the sky is correct, more than likely the sand will be blown out. Or if we expose for the sand, the sky will be almost black. The graduated neutral density filters let you more nearly capture the scene as you see it. Filters are the method by which we control the light and the exposure range.

The Neutral Density Filter

A graduated neutral density filter, as used in the photo of Oban, has half the filter darkened to enable the photographer to reduce half the image's exposure. A neutral density filter is 100-percent darkened.

The sole purpose of this filter is to evenly reduce light passing through the lens. This can be used when the ambient exposure requires too high a shutter speed. These filters come in 1 f-stop, 2 f-stop, or 3 f-stop levels of reduction. Say you want to shoot a blurred image of runners to accentuate the movement, and the slowest exposure you can achieve is 1/60 of a second at f16. Pop on a 2 f-stop neutral density filter and you immediately alter the exposure to 1/15 second by the 2 f-stop light loss the filter creates.

Skylight/UV/81A Filters

These are the filters to leave on the lens at all times. With no light loss and a very minimal amount of impact on the image, these filters will be a cheap insurance policy against having to replace an unprotected front element if something whacks the front of your lens. And believe me, after replacing a few front elements over the years, I have learned that keeping a filter on the lens is a lot cheaper way to go. I use B+W or Heliopan as my filters of choice, as I've seen the results a cheap filter can create on optical benches in measuring the distortion.

As a photographer who grew up shooting film, I always kept an 81A filter on the lens for protection and for the slight warming effect the filter imposed. The 81 filters come in three strengths: 81A, 81B, and 81C. I have all the filters listed on the back of a Minolta color meter, which includes 81D and 81EF. The A filter has a very slight warming effect, just enough to add a warm (gold-orange) feeling to the photo. The B filter goes further, as does the C, both being too strong for everyday

Oban is a resort town in the rugged and beautiful Western Highlands of Scotland. Becky and I were there scouting a location for a FirstLight Workshop. It was late afternoon, and the day had been rainy and cold, but we decided to venture to an overlook of the port city. The early evening skies broke open, providing a stunning scene as one of the ferries that ply the outer isles came into port. The use of a graduated neutral density filter and a Singh-Ray warming polarizer allowed me to darken the sky so that the foreground could be exposed properly. 50–200mm lens at 100mm, 1/20 second at f4, 100 ISO

shooting. Digital does present a bit of a problem with the 81A, B, and C filters. The white balance setting on your camera will see that warmer light that has been enhanced by the filter and will pump up the blue channel in the camera's software, thereby neutralizing the filter's effect. The problem here is that the blue channel is where the main body of noise comes from. A skylight or UV filter is the best choice for a permanent filter on your lens.

Software Filter Packages

In the not-so-long-ago past, all filtration was done in the obvious place, in front of the lens. Understanding filter packs, light loss, and mixed light sources all were part of that knowledge you gained through years in school or in the business. With the advent of digital, the photographer now has some filtration options that can be introduced in the computer.

Unfortunately, the most common uses of photographic filters can't be introduced in the digital darkroom. Filtering a scattered light source with a polarizer or compressing the brightness range of the scene can't be done on the computer. Digital filters are nice tools for slightly enhancing or modifying photographs, but they are not a substitute for filtration done on the lens.

The photographer can use warming and cooling filters that can be applied to the image with ultimate control as Photo Filter adjustment layers in Photoshop and Lightroom.

Photographing Wildlife

Animals, animals, animals require patience, patience, patience. Wildlife photography is a wildly popular area of photography that does not necessarily demand that you travel to the four corners of the Earth. I'll discuss where you can go to obtain great wildlife photographs without breaking the bank. I'll also include some ideas regarding photographing critters.

I spent some time in the Dry Bay Area of the enormous Glacier Bay National Park, a very remote section accessible only by bush plane or boat via the Gulf of Alaska. I was photographing a story for National Geographic on the Tatshenshini-Alsek River and needed to photograph grizzlies for the story. Greg Dudgeon, a National Park Service ranger for the northern extremes of the park, had suggested the area, which has one of the highest densities of the bears in the world. Access to Greg's location had required an all-terrain vehicle (a four-wheeled motorcycle) trek followed by a short hike to the banks of the East Alsek River. We took off early and made it to the river before dawn. A shallow rapid was a natural ladder for the salmon swimming upstream to spawn, and we were right in the middle of the spawning season. Moving as quietly as we could so we would not scare off any bears, we tiptoed past dozens of bear-mauled salmon carcasses.

Greg chose a spot on the riverbank, thinking that we could make our presence known to the grizzlies and not surprise them, which could initiate an attack. We sat that first morning for two or three hours, with several predators moving past in the distance. A gray wolf and a grizzly were out that morning, but not close enough to photograph. We decided to try again the next morning and headed back to the same place. A super-telephoto 600mm lens was mounted on my tripod with a second camera carrying an 80–200mm zoom. I hoped I would be ready for anything.

Within a few minutes a large coastal grizzly (so named because these bears stay close to the ocean for the abundance of fish) appeared out of the willow brush along the far shore, about 200 yards away, thus a little too far to photograph. Still, the grizzly's arrival caused an immediate increase in my pulse rate and focused my attention—these bears are generally larger than their mountain brethren and this one was no exception. Greg, armed with a shotgun, was talking softly so the bear would not be alarmed by our presence.

The grizzly stopped just short of us, deciding to feast on this salmon instead. 80–200mm lens at 100mm, 1/125 second at f2.8, 200 ISO

The initial rush of seeing this huge critter so close soon gave way to our relaxing a bit as the bear moved around in a small area. Twenty minutes passed and my attention was starting to drift. Something, a sound or motion, triggered the bear's next reaction. Turning toward us, he lit out in a full sprint directly at our exposed position. I started shooting with my camera and Greg brought his weapon up. The charging bear stopped in the water immediately in front of us. Sizing us up, he looked at us, and then looked into the water, back at us, and back at the water. He then dunked his enormous head into the rapids, bringing up a large salmon. I've always thought he was deciding, "Hmmm, surf or turf?"

Animal Encounters Close to Home

The Serengeti, the Arctic Circle, the rainforest…. Traveling to these exotic locales will provide amazing photo opportunities. However, it will also expose you to hungry lions, ornery polar bears, and a host of creepy crawlers that you'd probably rather not have scurrying around your camera bag. Practicing your techniques at your local zoo provides access to animals from around the world, but without the risk of becoming lunch for a hungry carnivore.

Encounters like my grizzly adventure are rare and require time—a lot of time. I've always hugely admired the wildlife photography of

Frans Lanting, Paul Nicklen, and John Shaw and wished I had the same patience their craft requires. If you are short on time or don't want an unexpected encounter with a giant bear, the zoo can provide a wonderful environment for capturing wildlife. In your bag, be sure and carry a long lens for close-up portraits of the animals and to help compress the photo enough that the distracting background is a blur.

> A 300mm lens is a great choice for shooting in a zoo—long enough to reach out but not so long that any tiny bit of motion is amplified because of the long reach. □ is long lens will also help to blur the bars of the cage between you and the animal you're photographing.

Find out when feeding takes place. □ is is a time when you'll get action from the animals instead of a series of portraits of sleeping bears.

Take your time. Hang out at a cage or pen that has an interesting animal and give it time for something to develop. Remember that wildlife photographers may be hunkered down in a cold blind for hours waiting for the moment the eagle swoops down for a fish. □ is is good training for the time you are in the field and have to practice patience.

□ ink early and late when deciding when to visit. Often, these are the times when the zoo is least crowded and the animals may be up and moving.

In the Sea of Cortez, a porpoise breaks the surface of the ocean. Steady tracking and anticipation was the formula for this image. 50–200mm lens at 158mm, 1/500 second at f5.6, 100 ISO

Approach a zoo administrator and ask if they ever need photos for possible publicity, archiving, and so on. Most larger zoos have their own photographic staff, but smaller zoos may be quite interested in working out an arrangement. This relationship may pay off by them contacting you the next time they have an animal birth or special event happening.

Bring a flash so you can fill in the shadows on a harshly lit or backlit photo.

Zoos are more than pleased to have amateur photographers on the premises as long as they are not shooting for commercial gain. This means no selling the images, for publication or for any monetary gain. This is a strict policy with large zoos, and you should ask for a copy of the zoo's policy on commercial photography if that is your intent.

Specialized Equipment

The world of outdoor photography can demand a lot of photographers and their equipment. Weather conditions are not always ideal, traveling to and from a location can be arduous if not hazardous, and trying to combine good light with the perfect moment can be frustrating. In this section, I'll talk about how to improve your odds and make life a bit easier.

Camera Equipment and Such

We'd hiked across the tundra in the eskers country of the Northwest Territories for hours, trying to find the den of arctic wolves that Terry had seen earlier. I was on assignment for Condé Nast Traveler to photograph this unspoiled and largely uninhabited area of Canada. Terry was not only a guide; he was an accomplished photographer as well. He'd whittled his equipment down to two bodies—one in a LowePro TLZ Pro AW chest case and the other a body with a long (400mm) lens attached to a monopod. (Imagine using one leg of a tripod with a ballhead attached and you get the picture: fast and stable.) This was no country for a camera bag. I had my vest loaded with the minimum amount of gear to get the job done: a total of two cameras and three lenses. I used a wide zoom on one body, a medium-length zoom (80–200mm) in my vest pocket, and a 600mm on the other body, also on a monopod.

The outdoors will teach you quickly what works and what doesn't. What does work well are cases such as the LowePro bag that attach firmly to your torso so there is no bouncing of the camera against your chest. Providing a snug fit for a camera with up to an 80–200mm lens attached, the bag also affords weatherproofing and is well padded against shock and accidental knocks.

When you don't need them, tripods are a pain to carry, but when the conditions require the use of a tripod, they are utterly invaluable. Those conditions include long exposures, and when shooting with longer lenses and holding 15 pounds of lens and camera would be unrealistic. I carry a Gitzo GT2540 6X carbon fiber base with an Acratech GV2 ballhead. This is light combination works extremely well for me in the outdoors and has taken and shaken off quite a bit of abuse. For further information, please visit www.perfectdigitalphotography.com.

Another piece of equipment that is always in my outdoors bag is a macro lens. □ is extreme close-up lens opens worlds to the outdoor photographer. I've spent hours in a 10-square-yard area working on shooting close-ups. It is another world that some photographers even specialize in. Here are a few tips for macro work:

A small flash can be helpful, or try a ring light. Ring lights are flash units designed in a circular pattern to fit around the lens. □ e light produced by a ring light is very even across the photo.

A reflector is a must for the macro photographer, often to reflect a bit of light to fill in the shadow caused by the camera and photographer or to warm up the image. To improvise, I'll carry small pieces of paper and aluminum foil to create mini-reflectors that can be fitted into very small spaces yet reflect just enough light to fill in shadowed areas of a flower or insect. □ e foil that wraps Wratten filters can sometimes be the right size.

A small tripod is a necessity as the zone of focus of a macro lens can be very shallow, and working close in lower light amplifies any movement of the camera.

On that small tripod is a ballhead, and my brand of choice is the Acratech head, which is beautifully machined, ultra-light, and very stable. Ballheads are great because they give you almost unlimited positioning and lock down quickly once you have found that perfect angle.

A shutter release cord should also be in your macro kit. When you are working with extreme close-ups in low light, any movement of the camera can a□ect the sharpness, and the shutter release cord removes your shaky hands from the camera. If you've forgotten your shutter release cord, try using the self-timer on the camera. Set it for a couple of seconds, compose your photo, and then remove your hands as soon as you press the shutter. □ is allows any movement of the camera to settle out, ensuring a very stable platform. Mirror lockup can be used to help steady the camera further when shooting long exposures, but focusing must be done pre-lockup as this trick eliminates the ability to see through the camera.

A small spray bottle of water can be used to moisten leaves, petals, flowers, and other parts to give them a bit more life.

If shooting insects, bugs, birds, and such for possible sales, decipher the scientific name. Any serious biological journal will want to know that you've photographed an *Euchromus giganteus* and not a "funky kinda green and gold huge critter."

Various and Sundry Other Gear to Contemplate

In my years of working as a photographer, I've accumulated my own set of specialized outdoor gear as well as stu□ I find helps me in my photographic mission. Keep a list of what you take, and at the end of the shoot note

The Amazon basin has a dizzyingly large array of insects. On assignment for Condé Nast Traveler, my photographic subjects, who happened to be biologists, found this beautiful beetle, Euchromus giganteus, about 2.5 inches long. I used a reflector to fill in the light on the insect's wings, producing a visual "pop" to heighten the attention on the colorful creature. 60mm macro lens, 1/60 second at f5.6

what was used and what wasn't. Over time you will have your own list addressing your shooting style and needs.

Here are a few other bits of specialized gear I'll take on outdoor shoots:

I always carry one or two chamois cloths in my bag/vest. These are invaluable as camera wipes and rain covers. Check your local auto parts store or grocery store for a chamois.

A camera raincoat is a rain cover made specifically for the camera and lens. Several different brands are available, including Photo-Fax Camera Raincoat, which is one of the most serious looking covers, and rain covers made by FotoSharp (www.fotosharp.com) and Think Tank (www.thinktankphoto.com/ttp_products.html). If you're serious about shooting in the great outdoors, a good rain cover is an absolute necessity.

I always take an umbrella—either a small, portable one that fits in a pocket of my vest or a golf umbrella. It's cumbersome, but it provides great protection as long as the wind is not blowing!

Desiccants and zippered baggies are also permanent residents of my travel/outdoor kit. At the end of a day shooting in a rainforest or other high-humidity situation, the camera and lens go in a baggie along with a small container of desiccant. Desiccants are the little bags of moisture-absorbing silica gel we're not supposed to eat that are included in almost every bit of electronic/photographic gear that we purchase. The Camping Survival website (www.campingsurvival.com) offers good silica gel desiccants in containers that make them realistic to carry and reuse, as they are able to be "baked" back to new.

One unfortunate byproduct of the Golden Hour, that perfect time near sunset when the light is ethereal, is that it is also the time mosquitoes call lunch hour. To deal with these little devils, I always wear a long-sleeved, light-colored shirt, sprayed with Permethrin. When sprayed on clothing, this product repels ticks, mosquitoes, chiggers, and mites. I've never had a reaction of any sort to this product and it works wonderfully. Find it online at www.sawyerproducts.com. Several clothing manufacturers now offer clothing that is pretreated with Permethrin, such as Exofficio's Buzz Off line of clothing.

I keep a lens pen and batteries specific to my camera in my vest.

The Benefits of Digital in Nature Photography

On a three-month assignment in Papua New Guinea, I was so remote I did not have the opportunity to ship my ever-growing pile of film to National Geographic for processing. Every day I'd check the case where the rolls resided and worry about exposure, camera problems, if the moment was captured, and so on. Beyond frustrated, I found myself shooting more than normal with different cameras on the same situation. I wanted to cover my tail and protect against losing an important image due to camera malfunction.

Fast-forward to the digital era. I shoot, I confirm, I move on. At night, I back up my cards to my laptop and external RAID system (two WiebeTech pocket drives configured in my Disk Utility to appear as one icon on my laptop) and burn them to DVD. The advantages of digital in this particular area of photography are legion. The ability to check out the image immediately for composition and exposure actually empowers the photographer in this craft. (And, don't forget, it also allows you to spend countless hours poring over your laptop when you could be sleeping!) Instead of covering your tail by shooting and shooting, you can move on to the next image when you see the fruition of the moment or situation on the monitor. If possible, I shoot test exposures based on my metering and make adjustment prior to the real deal. Then I know I don't have to bracket, shooting additional exposures a third of a stop or so on either side of the correct exposure to cover myself—and I can work on the moment.

How To: Creating a Sense of Place in Your Outdoor Photography

When photographing on assignment for an outdoor publication, the photographer is responsible for capturing a sense of place. The viewer has to feel that photo resonate. Here are some tips for effectively conveying that sense of place:

It may take more than one photo. Start with a wide shot to create an overall scene. Again, use your light as a key factor by shooting at good times of the day. Supporting photos can be details and moments that help create that sense of grandeur.

What attracted you to this area? This could be the key element to your photos. If it's Yellowstone National Park's Old Faithful, then use it as an element in your photo, even if it is only in part of the frame—perhaps with your child in the foreground taking a photo of the geyser.

The preceding tip goes hand in hand with this one: Don't be literal. A photo of Old Faithful by itself will not be as interesting as a photo that includes a human. Try shooting from different levels—up high, down low. Look around. An image of Old Faithful reflected in a tourist's sunglasses tells a lot about the crowds that eagerly await its eruptions.

Include scale if the scene is grand. This will give the viewer a sense of the majesty of the place.

Don't stop working the scene after the sun sets. This can be a wonderful time to bring out the tripod for long exposures, which open up another world of photography and a fresh look and palette.

As an aside, here's a website that I recommend to students: www.artphotogallery.org. This website has a Masters section with important images from some of the most legendary photographers ever: Ansel Adams, Edward Weston, Arnold Newman, Joel Meyerowitz, Walker Evans, Yosuf Karsh, Irving Penn, Richard Avedon—62 artists are catalogued here. This is a nice, free access photo library for anyone interested in seeing accomplished work.

Stromboli volcano, the Aeolian Islands of Italy. A long hike in late afternoon with a guide landed us at the constantly changing overlook of this active volcano. Explosive eruptions were absolutely startling, and first instinct is to run for cover. Looking down into the crater resulted in this late-day photo. 12–60mm lens at 36mm, 3/10 second at f5.6, 100 ISO

SECTION II

The Digital Darkroom

Photographed and written by Jay Kinghorn

CHAPTER 11

WELCOME TO THE DIGITAL DARKROOM

Photography has always been a technical art. Shutter speeds, apertures, development times, darkroom chemistry, and print contrast ratios have always challenged traditional photographers. Digital photography is no di□erent. □ e tools found in Adobe Photoshop, Adobe Photoshop Lightroom, and Apple Aperture help a skilled photographer guide a viewer's eye through a photo, establishing resting areas for the viewer's gaze to linger and infusing a photo with depth and vibrancy.

As is true with all technologies, digital photography will continue to grow and change. New tools will emerge, making digital photography easier and more powerful. To get the most out of your digital photography, you should learn how to use these new tools to capture your vision, organize your work, and create compelling prints to share with others.

Car Trails on Trail Ridge Road. Olympus E-500, 7–14mm lens, 1/10 second at f18, ISO 100

Until this point, this book has concentrated on capturing a brilliant digital negative. Now let's turn our attention to distilling the content in that digital image through a series of adjustments, then preparing it for print or the Web, and finally archiving the image for posterity.

New Tools, Same Challenges

Since we wrote the first edition of this book, tools for processing, managing, sharing, refining, and printing your digital photos have become both more powerful and easier to use. Although the essential tool for photographers working in the digital darkroom continues to be Adobe Photoshop, it is no longer the only tool at your disposal. New image processing programs such as Apple Aperture and Adobe Photoshop Lightroom provide a unique suite of tools to help photographers organize, correct, and print digital photos. These applications complement Photoshop's specialty in exercising complete control over specific areas in a photo with tools designed to help photographers work faster and more efficiently.

In this chapter, I'll discuss the differences between applications such as Photoshop, Aperture, and Lightroom to help you decide which programs are right for you. In addition, I'll discuss the differences between shooting in the camera raw and JPEG formats and why this decision, made before you even shoot your pictures, has a profound impact on the quality of your photos.

This chapter is designed to be an introduction to the digital darkroom and provides an overview to the components that help you download, store, correct, print, and archive your photos. These steps, from image capture to print, can be summarized in a single word: workflow.

Building Your Workflow

For most of Photoshop's life, the application was designed to give you complete control over editing pixels, the basic building blocks of digital photos, in a single digital file, traditionally a scan of a film negative or slide. This system served photographers well because only a small percentage of the hundreds or thousands of photos in a photographer's collection were ever scanned into a digital format.

The invention of digital cameras changed everything. Instead of having a handful of digital photos to manage and correct, a photographer now has thousands or tens of thousands of digital photos to cull through, correct, and store. This change requires an entirely new approach to the process of handling digital photographs, one that focuses less on the individual photo and more on the processes involved in taking large numbers of photos from the camera to final print. These processes are your digital workflow. While your workflow will differ slightly from that of another photographer, several workflow stages are common to all photographers. In this book we'll address each stage of the process in detail to help you tailor your workflow for the best

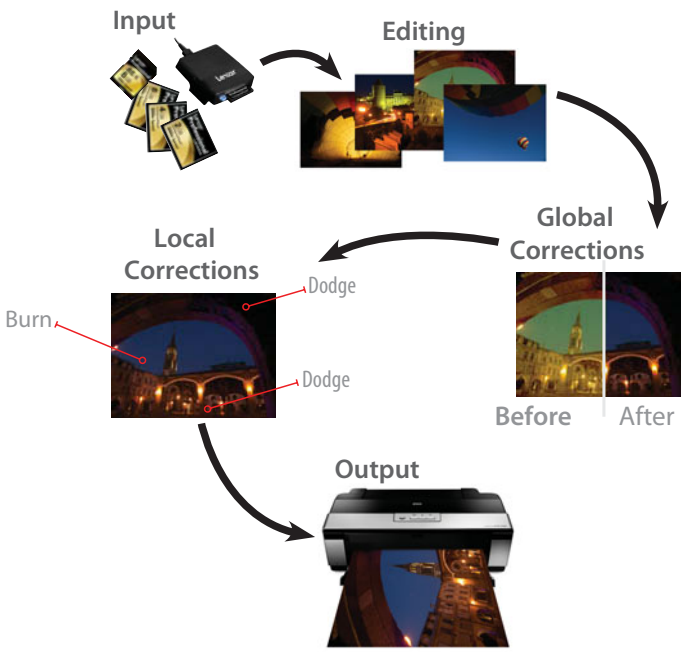
image quality and greatest e□ciency. To begin this journey, let's take a bird's-eye view of each stage of a digital photography workflow to see how they fit together.

Stages of a Photography Workflow

Your workflow is unique to you. Like a fingerprint or signature, no two workflows are exactly alike. Because we all approach challenges such as organization, backup, and even image correction in slightly di□erent ways, one specific workflow does not fit everyone. For that reason, this book is designed to help you develop a workflow that best suits your individual needs, instead of prescribing a workflow for you to copy exactly.

As unique as workflows are, they all share at least five major stages in the process:

1. Input □e process of copying photos from your camera's memory card to your computer. As simple as this seems, several important steps are often overlooked in this process. We'll cover the input stage in greater detail in Chapter 12.
2. Editing How do you select the best photos in a shoot? What do you do with the rest of the images that aren't necessarily bad photos, but don't represent your best work? Strategies for quickly editing your photo shoot along with answers to these questions and more are covered in Chapter 13.
3. Global corrections Refers to a change applied to the entire image. For example, a correction to a photo's overall color balance is a global correction. Global corrections form the bulk of your image processing duties and are covered in detail in Chapter 14.
4. Local corrections Adjustments applied to specific areas of a photograph—brightening a person's face, for example. Most local corrections emulate advanced techniques from the wet darkroom and combine them with the power and control that Photoshop o□ers. Learning how to master local corrections gives you a high degree of nuanced control over how your photos appear onscreen and in print. □ese intermediate to advanced techniques are covered in Chapters 15 and 16.



The five stages of a digital photography workflow

5. **Output** While the print is still the gold standard for photographic reproduction, it is by no means the only game in town. Websites, mobile devices, and multimedia hybrids o□er exciting new avenues for displaying and sharing your photos. With any output medium, it is essential that your photos meet the technical requirements of the output device; otherwise, the results will be disappointing. □ e output-based Chapters 17, 18, and 19 all focus on helping you achieve the best results, whether you're printing to a wide-format inkjet printer or preparing a photo for inclusion in a multimedia production.

□ ese five stages are built around maximizing quality while minimizing time spent organizing, correcting, and managing your photos. A cornerstone of an e□ective digital workflow is shooting in your camera's raw format.

The Importance of Shooting Raw

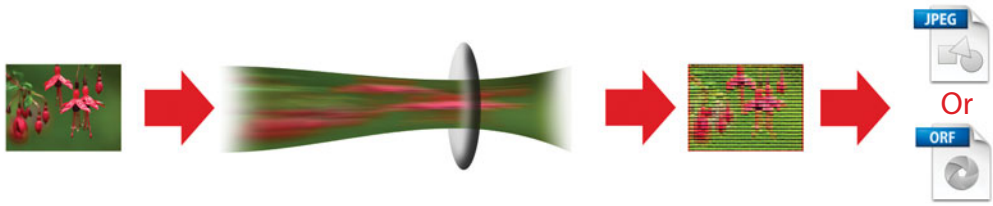
□ e most significant change that has occurred in digital photography in recent years is the rapid adoption of a camera raw workflow. Whether you are new to camera raw or an experienced veteran, it is beneficial to understand just how fundamentally di□erent raw files are from their JPEG counterparts.

What Is a Raw File?

A camera raw file, or raw file as it is commonly called, is the unprocessed information stored by your camera immediately after the light reaching your camera's sensor is converted to a digital signal. All digital photographs begin their lives as raw files, but depending on your camera model and your on-camera settings, this raw information may be processed in-camera and stored on your camera's memory card as a JPEG. If you are photographing in raw mode, your camera will not perform any processing on the photo; instead, it will store all of the digitized information to your memory card in its raw state.

Why Is Raw Important?

Shooting in raw is important for three major reasons:



Once the light is digitized by the camera's sensor, your photo is stored in either a raw or JPEG format depending on the camera's settings.

It provides the full range of unprocessed information, just as your camera's sensor captured it. □ is gives you more latitude to fine-tune highlights and shadows, contrast, and color. JPEG files are processed in-camera with preset color, contrast, and sharpness settings. □ is limits the range of corrections you can perform in Lightroom and Photoshop.

It is easier to batch-correct multiple raw files at once, greatly improving the speed of your workflow.

And here's the clincher: When you make corrections to a raw file, your adjustments are completely nondestructive. Short of moving your photo to the trash bin, you cannot ruin a raw file. Changes made to a JPEG file can be permanent, and a JPEG photo can lose quality by being saved repeatedly.

□ ese three points illustrate why shooting in raw gives you a better experience in the digital darkroom—but perhaps the most important reason for Perfect Digital Photography readers is that processing raw files is easier and more intuitive than processing JPEG files. □ e adjustment controls are simpler and more logically arranged, and, to reiterate a point, the changes you make to a raw file are never permanent, making it easy to experiment with tools available in the raw processing software without fear that you will damage or lessen photo quality.

What If My Camera Doesn't Shoot Raw Files?

Most digital SLR cameras, and an increasing number of point-and-shoot cameras, can shoot in raw. If you don't see the option in your camera's menu, you can check to determine whether your camera offers a raw option by reading your owner's manual or viewing the technical specifications.

If your camera isn't set up to create raw files, don't worry. Photoshop CS3 and CS4, Lightroom, and Aperture all allow you to adjust JPEG photos as though they were raw. Since JPEG photos are already processed, you won't have the same degree of flexibility you would have with raw files, but you will still be able to perform common corrections and make beautiful prints from your photos.

For the tutorials in this book, we're assuming you are shooting in raw mode. For a refresher on setting up your camera to shoot in raw, please visit Chapter 3. As we go deeper into the correction process, the di□erences between raw and JPEG will become clearer. You'll see why raw is the format of choice for an e□ective digital photography workflow.

What Tools Do I Need? Building Your Digital Darkroom

In a traditional wet darkroom, you would expect to find enlargers, chemicals for development, wash and rinse basins, and an array of papers for printing. Since pixels have replaced negatives, you might find the following items in the digital darkroom.

Hardware

Camera

Digital images are most often captured with a digital camera or created by scanning a piece of film. Photographers wanting the most control over their images will use a digital SLR (DSLR) with interchangeable lenses. For the tutorials in this book, you can use a DSLR, point-and-shoot, or film camera.

Image courtesy Olympus Imaging America

Memory Cards

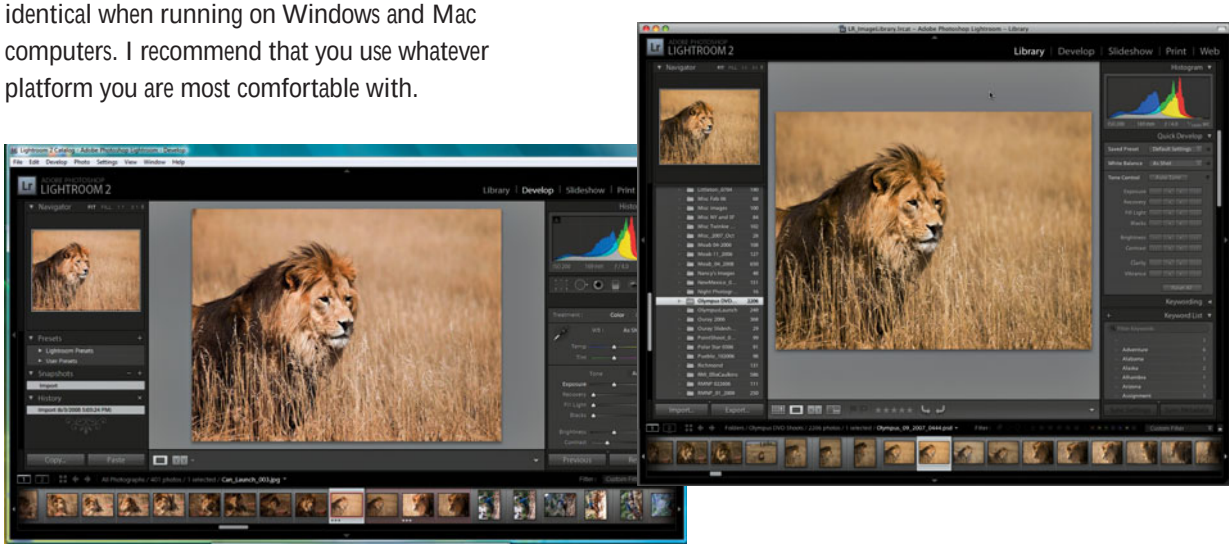
Most digital photos are temporarily stored on CompactFlash (CF), Extreme Digital (XD), or Secure Digital (SD) cards until they are transferred to your computer. Photographers working in a studio environment will often shoot in tethered mode, where the camera is connected directly to the computer and photos are automatically stored on the computer's hard drive instead of the camera's CF card.

Tip When downloading photos from your camera, it is easier and safer to use a card reader instead of connecting your camera directly to the computer.

Computer

Technology evolves at a blistering pace. Many pros suggest buying the fastest processor you can a□ord and loading up the computer with as much RAM as it can hold. □ is is sage advice.

Both the Windows and Macintosh operating systems are appropriate for digital photographers. Each system o□ers slight advantages and disadvantages when compared to the other, but the core applications such as Photoshop and Lightroom are virtually identical when running on Windows and Mac computers. I recommend that you use whatever platform you are most comfortable with.



Hard Drives

Your photo library will take up more space than you can imagine. Although I don't recommend buying a bunch of hard drives now, you should consider your future storage needs before purchasing any new hard drive. Most important, you need to have enough space on a separate hard drive to back up your entire image library. I'll help you develop a bombproof backup strategy in the next chapter.

Image courtesy WiebeTech

Monitor

Your monitor is your primary means of judging your photos. Because of this, you should get the best one you can a□ord. Otherwise, you could find yourself limited by a poor-quality monitor when it comes to fine corrections and printmaking. I strongly recommend that you spend as much money as you possibly can on your monitor. It is an investment that pays for itself quickly when you begin making prints. □e better quality your monitor, the fewer prints will be ruined by inaccurate color. In fact, it is more important that you have a high-quality monitor than a fast computer.

Monitor image courtesy EIZO Nanao Corporation

Shopping for a monitor can be daunting. Few reviews specifically address the needs of serious photographers. Of all the product specifications, only a few impact a monitor's e□ectiveness in the digital darkroom. □e rapid pace of development makes it impossible to o□er concrete recommendations; however, the higher end Dell and Samsung monitors are both good values, Apple and LaCie monitors are a step up in both price and performance, while EIZO and the top-of-the-line HP DreamColor displays are currently leading the pack. □e following information may help you in reading reviews and product specifications to sort through the jargon and find a monitor that is right for you.

On the Web

For a current list of monitor recommendations for digital photography visit www.perfectdigitalphotography.com/monitors.php.

Monitor Type

Photographers are likely to encounter three types of monitors: CRT, LCD, and LED. You can think of these monitor types as the past, the present, and the future.

CRT (cathode ray tube) monitors are virtually extinct, having been surpassed by the LCD monitors in common use today. While CRT o□ered a few advantages for viewing photographs, few, if any, manufacturers continue to produce CRT monitors. □e last remaining CRTs are approaching the end of their usable life and will give way to new LCD and LED monitors.

Odds are the monitor with which you perform most of your photographic corrections is an LCD (liquid crystal display). While LCD monitors are widespread and used in all types of professional workflows, some inherent limitations in the technology will make the LCD's dominance short-lived. First, an LCD display is illuminated from a single light source, making it di□cult to maintain consistent

brightness and color in all areas of the monitor. Second, LCD monitors cannot be calibrated as accurately as CRT or LED monitors because they have only a single light source instead of separate light sources controlling the intensity of red, green, and blue information, as is found with CRT and LED.

LED (light-emitting diode) monitors hold great promise for digital photographers. These monitors deliver accurate color more evenly across the screen and can be calibrated to tighter tolerances than LCD monitors. For these reasons, LED monitors, which are already beginning to appear in laptops and professional-level displays, will quickly overtake LCD as the technology of choice for high-quality monitors.

Making the Most of Your Monitor

Unfortunately, with monitors, you tend to get what you pay for. Spending the extra money to get a professional-quality monitor will usually pay dividends over the life of the display. That said, if you're suffering from sticker shock, here are a few tips to make the most of your investment.

First, buy small. Big monitors are in vogue right now, but the quality of a large monitor is often inferior to that of a smaller one. For most of my career, I've worked on a single 19-inch monitor and it has served me well. When I upgraded from my original system, I invested in a professional-quality 19-inch and purchased an inexpensive 19-inch to store my palettes and other documents. Buying the highest quality display will more than pay for itself over the display's life—in saved ink and paper, not to mention the hair pulling you avoid when prints actually match your monitor.

Second, lower the brightness. Most monitors have an expected life of around three years. Keeping your monitor at full brightness often cuts the life of a monitor in half and causes problems when you're trying to match color in photos between your monitor and your prints. Lowering the brightness of the monitor not only saves you money in print costs by improving screen-to-print accuracy, but it will extend the life of your monitor.

Finally, carefully weigh your needs before you buy. If you're a photography enthusiast who predominantly shares photos online, you don't need a super high-quality monitor. If you are a fine-art photographer who does a lot of printing and is very discerning of tone and color, you will save money in the long run by investing in the highest quality monitor you can afford. I've spent a lot of time consoling frustrated photographers who keep striving for better print quality but are limited by their monitors.

What About Laptops?

While laptops can, and often are, used for digital photography, the displays used in laptops aren't as accurate as their desktop brethren. If you are currently using your laptop for performing corrections, and it's working for you, I encourage you to continue to do so. If, however, you get to a point where you can't seem to get the color right in your prints, you may be asking for more than your laptop can deliver, and it may be time to add a desktop monitor to the mix.

Monitor Calibration Package

No serious digital photographer should be without a software and hardware package dedicated to calibrating and profiling your monitor. A well-calibrated monitor is an accurate monitor that will save you a tremendous amount of ink, paper, and frustration when making prints. My favorite monitor calibration packages come from X-Rite, basICColor, and ColorEyes.

A detailed tutorial on calibrating and proofing monitors is included in Chapter 18.

Image courtesy X-Rite Inc.

Output

Viewing images on the screen is nice, but it is difficult to hang a monitor on the wall or send your laptop to a friend as a gift. The output stage of the workflow is still commonly geared toward printmaking, but multimedia uses of photography are increasing by the day. We'll cover printing in great detail in Chapter 18 and will explore multimedia in Chapter 19. For now, it's worth looking at two common printing methods available to help you round out your digital darkroom.

Inkjet Printers

You probably have a photo-quality inkjet printer sitting on your desk or stationed in your studio. Printers that print only letter-sized photos are fine for general photo printing duties, but serious photographers will want to take advantage of the superior archive life, print quality, and variety of paper types supported in 13×19-inch and larger format printers.

Image courtesy Epson America, Inc.

Digital Photo Lab

The digital darkroom extends well beyond the walls of your home or office. Professional photo labs offer medium- to high-quality prints made on photographic paper from digital files. Printers such as the Fuji Frontier, a common printer found in minilabs, or the Océ

LightJet use lasers to expose photosensitive paper to light. Because they do not require the same chemistry used for traditional color printing, these prints have a good archival life and a brilliant color palette, and they make high-quality prints. Many online printing services use a photographic printer such as the Fuji Frontier to make inexpensive prints from photos you've uploaded to their website.

Lighting

Believe it or not, the lighting and the color of the walls in your workroom has a profound impact on your ability to perform color and tone corrections accurately and match your prints to your monitor. We'll go into greater detail on room lighting in Chapter 18, but suffice it to say if your print colors don't look right, try moving the print to a north-facing window to see if the color improves.

Software

The computer, monitor, and printer all serve as a support system for your software, which performs most of the actual work involved in image correction. As digital photography has grown in sophistication, specialized programs have been developed to address specific needs. Considering the myriad applications geared toward digital photographers can be a bit overwhelming. To help clarify your choices, in this section, we'll discuss the different types of digital photo applications and how they are used in a photo workflow.

Adobe Photoshop is synonymous with correcting, processing, and adjusting images. While Photoshop is still the best pixel editor on the planet, several other software applications can help you edit and manage files or quickly process a shoot. These applications typically fall into one of four main categories: file browsers, asset managers, raw processing applications, or all-in-one workflow solutions.

File Browsers

File browsing software allows you to view the contents of a single folder very quickly. This makes file browsers an excellent choice for your initial edit or for managing a small image library. File browsers offer only limited help in managing a large image library as they can only view the contents of one folder at a time. The most popular file browsers are Adobe Bridge and Photo Mechanic.

Adobe Bridge (Included with Adobe Photoshop CS and Later)

Adobe Bridge has evolved into a central file management application for all of the applications in the Adobe Creative Suite. Within Adobe Bridge, you can sort, keyword, and edit your photos, or preview a folder of project files including page layouts, Flash animations, HTML documents, and video clips. This versatility is advantageous for working across applications, but it can become

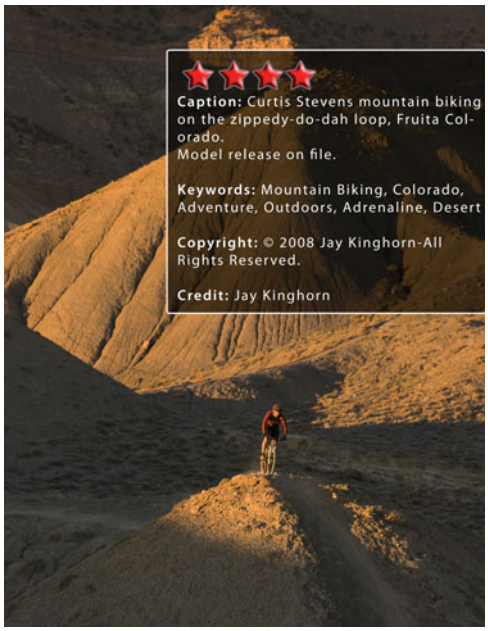
cumbersome for photographers who need only the ability to download, edit, and organize photos quickly.

Photo Mechanic

Photo Mechanic has long been the file browser of choice for newspaper photographers and photojournalists who measure deadlines in minutes instead of hours or days. Photo Mechanic is a specialized tool for downloading images, applying descriptive metadata to photos, and selecting the best images from the shoot. While not as versatile as Adobe Bridge, Photo Mechanic is the tool of choice when speed is an absolute necessity.

Asset Management

Asset managers help you create a visual database of your photo library, allowing you to view all your photos in one location, even if they reside in different folders or hard drives. The searching capabilities within asset management applications are superior to those found in file browsers. For example, a quick keyword search for "beach" might bring up photos from your trip to Hawaii in 2005, plus a visit to Big Sur, California, last year, plus a host of individual photos from your trip to Ireland this year. Asset management software is essential for managing a large image library, because it helps you catalog, search, and find photos very quickly. Two of the most popular asset management applications are Microsoft Expression Media and Extensis Portfolio.


Caption: Curtis Stevens mountain biking on the zippedy-do-dah loop, Fruita Colorado.
Model release on file.
Keywords: Mountain Biking, Colorado, Adventure, Outdoors, Adrenaline, Desert
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Dimensions
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Cropped
2736 x 3648
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Focal Length
100 mm
ISO Speed Rating
ISO 250
Flash
Did not fire
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OLYMPUS IMAGING CORP.
Model
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Lens
35.0-100.0 mm f/2.0

Photo Credit: National Archives and Records Administration

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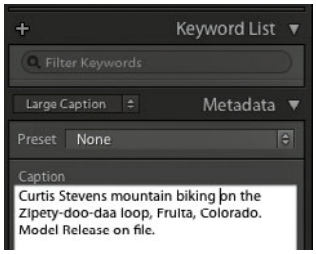
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Filter Keywords
Large Caption
Metadata
Preset
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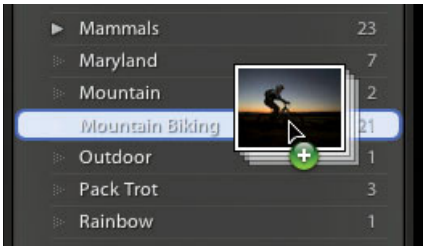
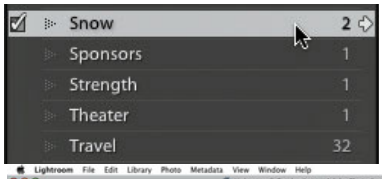
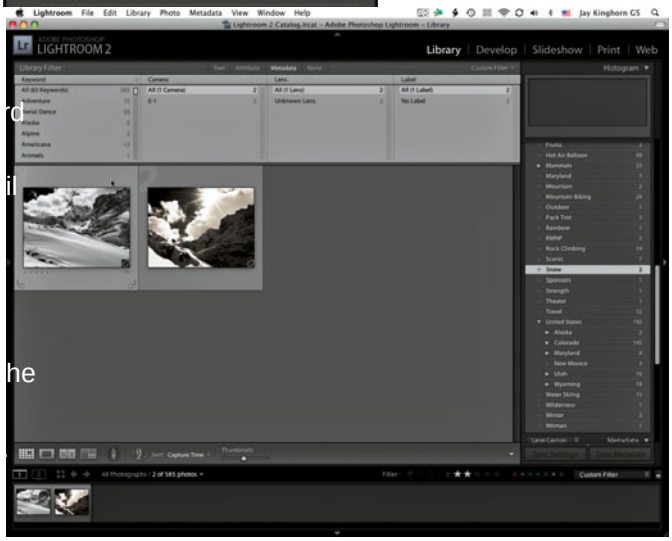
Caption
Curtis Stevens mountain biking on the Zipety-doo-daa loop, Fruita, Colorado. Model Release on file.

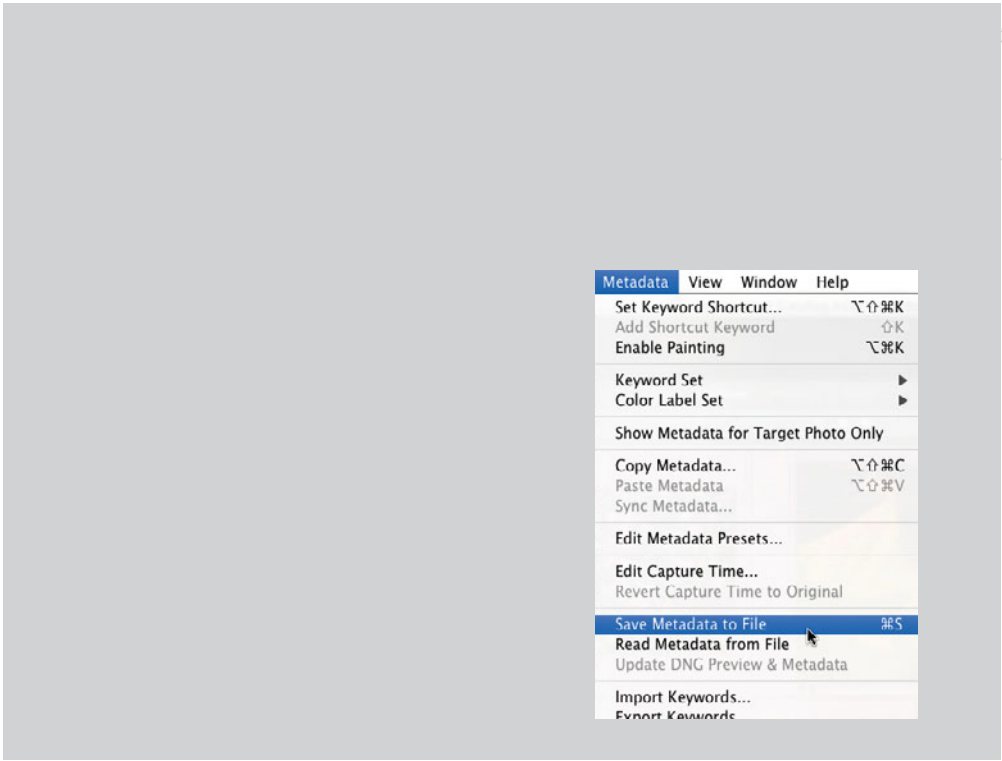

Mammals 23
Maryland 7
Mountain 2
Mountain Biking 21
Outdoor 1
Pack Trot 3
Rainbow 1

On the Web

Mammals 23
Maryland 7
Mountain 2
Mountain Biking 20
Outdoor 1
Pack Trot 3
Rainbow 1


Snow 2
Sponsors 1
Strength 1
Theater 1
Travel 32


LIGHTROOM 2
Library
Develop
Slideshow
Print
Web



After you've applied your captions and keywords, select all the images within the shoot currently containing the red label and apply the yellow label by pressing . You're now ready to move on to the next phase in the workflow.

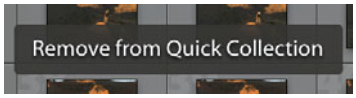
Collections

Before moving onto the next chapter, I'd like to show you one last feature in Lightroom that will help streamline the editing process. Collections are, as the name implies, groupings of images that you've determined belong together. You can build collections of your best images to serve as an impromptu portfolio, images that need to be printed, or images that fit a certain theme. For instance, in gathering photos for this book, I created a collection of images called 'Perfect Digital Photography.' Collections serve an important role in filling in the gaps between other filtering or sorting methods.

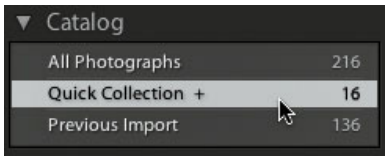
Four types of collections are used in Lightroom:

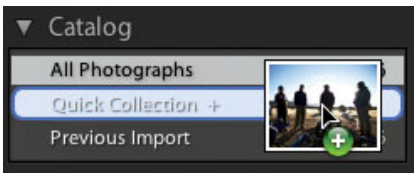
- Quick Collection
- Collections
- Collection sets
- Smart collections

has been added or removed from the Quick Collection.



ClickQuick Collection in the Catalog panel to view the photos currently stored in your Quick Collection.





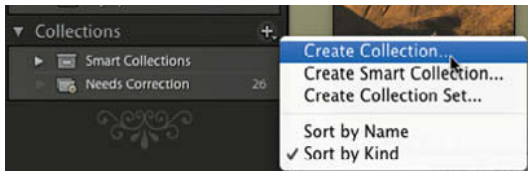
Collections

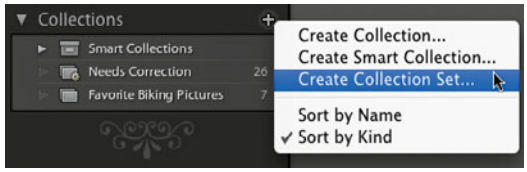
You are limited to one Quick Collection at a time, because a Quick Collection is meant to be a temporary holding place for photos that will later be moved. When you need a more permanent solution, look to collections. You can create as many collections as you need. Like the Quick Collection, collections are great for grouping photos for any number of di erent purposes.

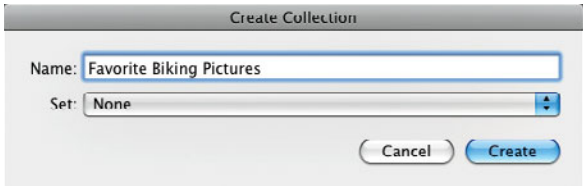
To create a collection, click the "out menu on the right side of the Collections

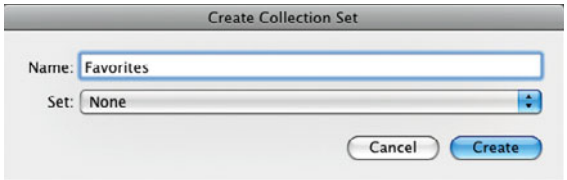
In the thumbnail view (Grid view), a small gray circle in the upper-right corner of the thumbnail (shown at right) indicates that the photo is part of the Quick Collection.

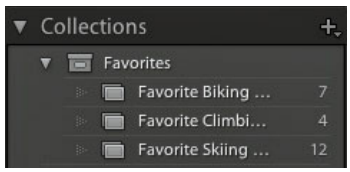
Whenever you change the status of the image, a textual overlay appears in the lower third of the main Lightroom window. This unobtrusive reminder can help you keep tabs on whether the photo

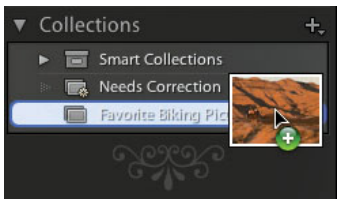

Collections
Smart Collections
Needs Correction
26
Create Collection...
Create Smart Collection...
Create Collection Set...
Sort by Name
Sort by Kind

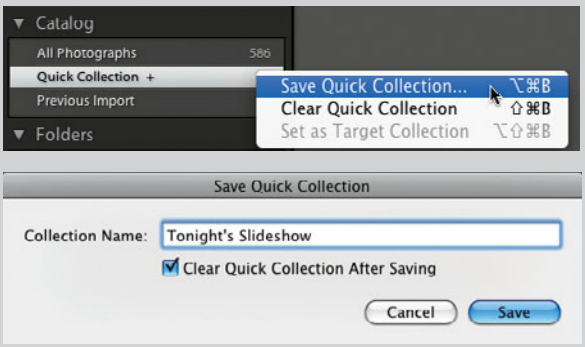

Collections
Smart Collections
Needs Correction
26
Favorite Biking Pictures
7
Create Collection...
Create Smart Collection...
Create Collection Set...
Sort by Name
Sort by Kind


Create Collection
Name: Favorite Biking Pictures
Set: None
Cancel
Create


Create Collection Set
Name: Favorites
Set: None
Cancel
Create


Collections
Favorites
Favorite Biking ...
7
Favorite Climbi...
4
Favorite Skiing ...
12

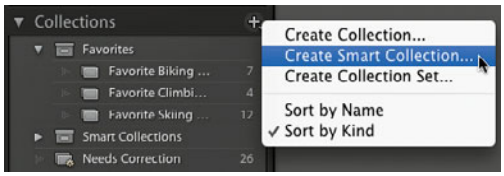

Collections
Smart Collections
Needs Correction
Favorite Biking Pic

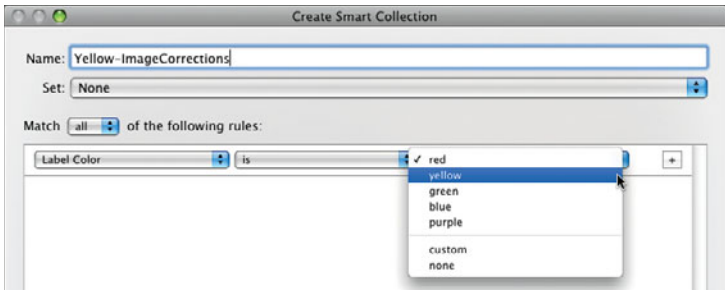


On the Web

been taken with a specific lens, must contain a specific rank, or must have been shot at a designated ISO setting. Lightroom will read your photo•s metadata to determine whether or not an image belongs in the smart collection.

New Collection icon, then choose Create Collection Set and give it a name. You can drag your Collections or Smart Collections into the Collection Set listing to group collections within the collection set.





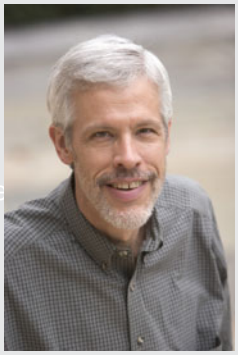
For this example, I•ll create a smart collection that searches for images with a yellow label, which indicates they are ready for image corrections. After titling the smart collection, I•ll create a rule allowing only images with a yellow label into the collection.

You can group your Collections and Smart Collections into Collection Sets, which are organizational tools for grouping together your Collections. Click on the Create

As you•ve seen in this chapter, Lightroom provides a number of tools you can use for editing, organizing, and sorting photos and the ability to create presets for your most commonly used tasks. Lightroom brings this level of attention to your image corrections as well. In the next chapter, you•ll learn how to make your camera raw “les shine with the tools found in the Develop module.

How To: The Philosophy of Editing

by Bert Fox



As a former photo editor for National Geographic and now Director of Photography Charlotte Observer, my most important role is to help develop my photographers• e abilities to tell a story through pictures.

Often, photographers get mired in the process of taking a photo. ey remember struggling through the harrowing windstorm or chasing the light, but they lose focus of the original story they meant to tell. ls colors a photographer•s opinion of that photo, often adding more weight to the picture during the editing process. As an editor, I bring the approach of someone who wasn•t there. is allows me to "nd •momentsŽ that speak to me, without being jaded by the ease or dif ty of taking that photo.

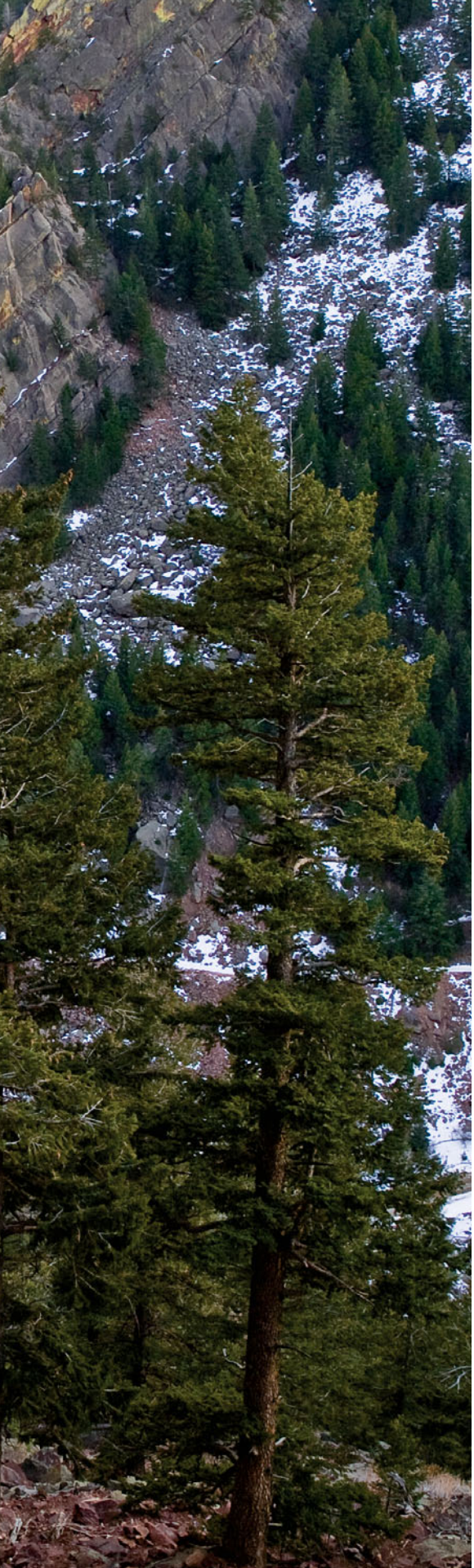
e role of an editor is as important for serious amateur photographers as it is for my sta photographers. By cultivating an objective eye, like an editor, and having others edit your work, you will gain a deeper understanding of the photographic process and become a stronger photographer.

In honing your editorial eye, look for pictures that move you because they speak about love, or hate, or revenge, or terror, or about virtues like honesty or generosity. I look for the human nature or the personality that comes out of the scene. I•m looking for the subtleties in the environment, the drama of the human condition, or the elegance of form, structure, and line.

I look for images lacking •visual noise,Ž annoying light or color, or objects that take away from a picture•s impact by cluttering its visual message. Pictures, like good writing, need clarity to tell their stories. e photograph•s center of interest should grab the eye while the remainder of the frame supports it. If numerous parts of the picture compete for the viewer•s attention, the picture fails.

Great photographers don•t just •grabŽ moments. ey lead the viewer through their pictures by orchestrating the scene. No, I don•t mean arranging the people, but rather arranging scenes through your choice of lens and point of view to carefully create a backdrop driving the viewer•s eye to the most important part of the picture. As a supportive background emerges, photograph emotive moments between your subjects. If I can read your subject•s feelings hours or weeks later on my monitor, you have succeeded.

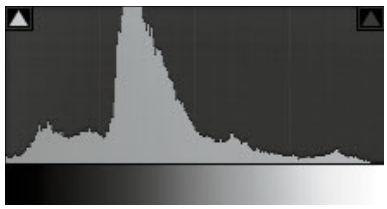
Remember that the camera is an objective viewer of the scene, while the photographer•s view is highly subjective. ink like a camera when you make pictures. Take control of the entire frame. Make it support the moment. And stay with a scene. Don•t take



Climber, Eldorado Canyon State Park, Colorado. Olymbus E-3, 12...16mm lens, 1/60 second at f4.5, ISO 200

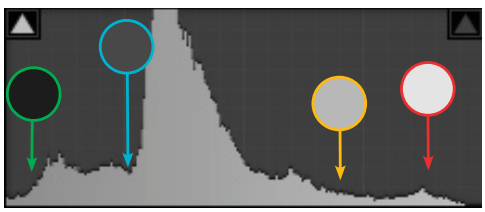
Before

After



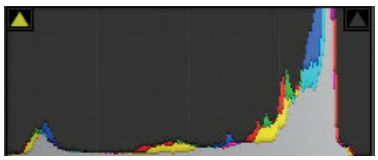
photograph. Speci“c areas within the photo are represented with their lightness values and their locations on the histogram.

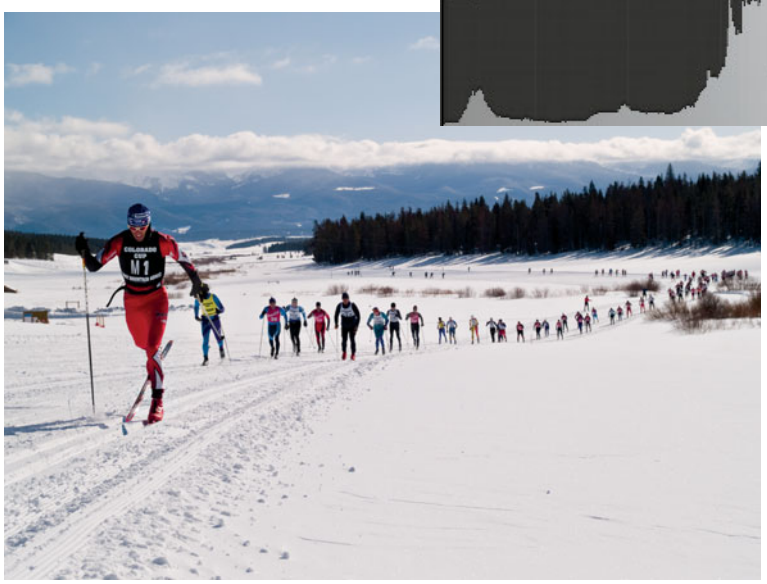
Most images should show a distribution of tones across the full range of the histogram, from shadows to highlights. e locations of the peaks and troughs will vary depending on whether the image contains predominantly light tones or dark tones. is particular image has peaks on either side of middle gray.



An image with a large number of darker shadows will show a histogram with high peaks on the shadow side.

Here, specific tones within a photograph are drawn out from the image and their location is displayed on the histogram.





With histograms this bad, these exposure errors should have been caught in camera and the exposure corrected for subsequent shots.

When in Doubt, Overexpose Slightly

Photographers have long been trained to underexpose slightly to get better highlight detail and color saturation. is is a recipe for poor image quality when using a digital camera, however. Your camera•s sensor doesn•t •seeŽ light the same way our eyes do. Our eyes have a natural response to the distribution of brightness in a scene that, more or less, pays equal weight to light colors and dark colors: bright tones and dark tones.

A histogram for a badly underexposed photo

e camera•s sensor does not give equal weight to all tones. In fact, your digital sensor is heavily weighted to the brightest areas in your photo. If you took a grayscale ramp like the one shown here and applied the camera•s way of seeing it, you•d notice that instead of a smooth, gradual transition from light to dark, the camera lumps all the shadows on top of one another.

A histogram for a badly overexposed photo

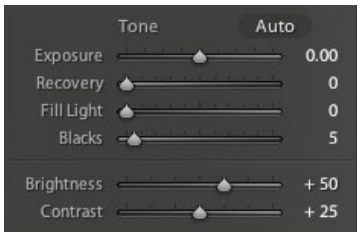
di erences in tone and color between adjacent pixels. In the shadows, where fewer values are available to describe these di erences, it becomes more di cult to retain details. Underexposing photos drives more of the information contained within a photo deeper into the shadows, causing a loss of detail and an increase in noise (unwanted color impurities) in the photo.

Take, for example, these two photos shot by the same camera, only seconds apart. “rst is correctly exposed, while the second was underexposed signi“cantly and then lightened using raw processing software. At a small size, the two photos look very similar, yet when you look closely at the images you can see that smooth tones are blocky in the underexposed image and the shadows have lost details that are present in the correctly exposed image.

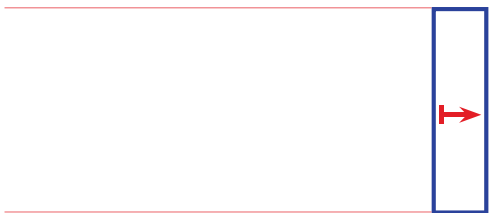
The image on the left is exposed correctly. The image on the right was underexposed by one f-stop, and then corrected in Adobe Camera Raw. Notice the difference in shadow detail and smoothness in the detail images.

e key message is this: If you want the highest quality pictures, you have to pay close attention to your exposures. Your light meter and your on-camera histogram are terri“ tools for gauging and adjusting for the correct exposure, but they aren•t perfect. If you•re uncertain and you think you have to hedge your bets toward over- or underexposure, it•s better to err toward slight overexposure. It is important to emphasize the word slight. image adjustment tools found in Lightroom and Photoshop•s camera raw processing software are very good at bringing back up to

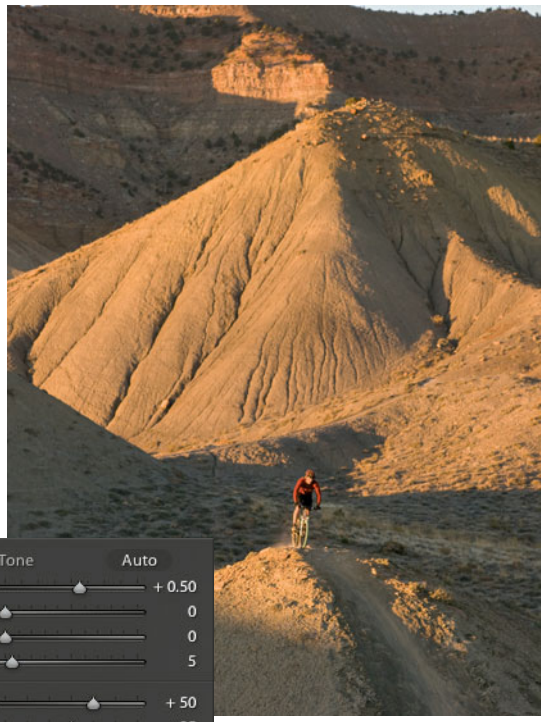
Lightroom File Edit Develop Photo Settings View Window Help
Wed 11:53:44 AM Jay Kinghorn GS
LR_ImageLibrary.lrcat – Adobe Photoshop Lightroom – Develop
ADOBE PHOTOSHOP
LIGHTROOM 2
Library | Develop | Slideshow | Print | Web
Histogram
Basic
Tone Curve
HSL / Color / Grayscale
Split Toning
Previous
Reset (Adobe)



Increase the exposure amount until you begin to see important detail appear in the clipping display. en back o your correction until the clipping display returns to black. If your image has specular highlights, the bright re”ections o shiny surfaces such as chrome, water, or glass, it is okay for them to appear in the clipping display since they don•t contain any important detail. Base your correction o the lightest point in the photo that should contain detail. For this particular image, the clipping display indicates that the right side of the rider•s jersey is the lightest point in the photo, so I•ll increase the Exposure slider amount until I see areas of the jersey appear in the clipping display; then I•ll reduce my correction just past the point at which these areas disappear from the clipping display.

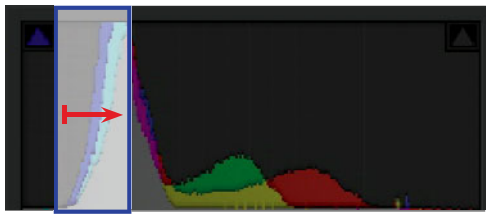


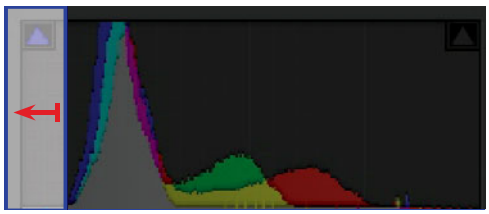
While this can be set by eye, you can use a trick to make this process even easier. Hold down the (Mac) or (Windows) key on your keyboard while adjusting the Exposure slider. is activates the clipping display that shows areas in the photo that will



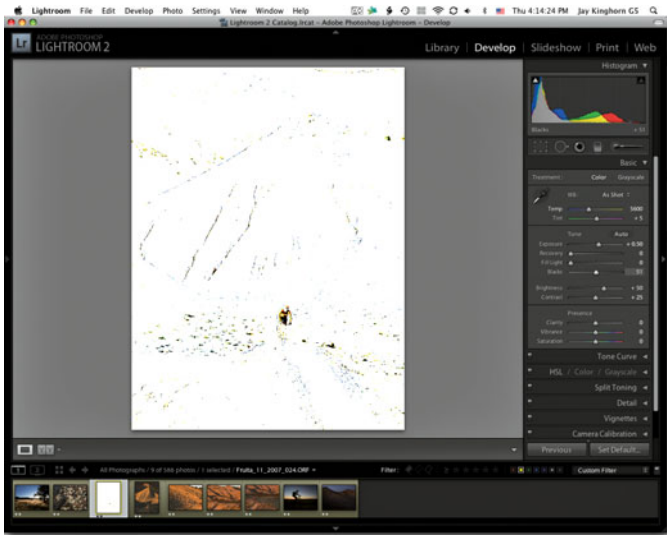
Tone	Auto
Exposure	+ 0.50
Recovery	0
Fill Light	0
Blacks	5
Brightness	+ 50
Contrast	+ 25

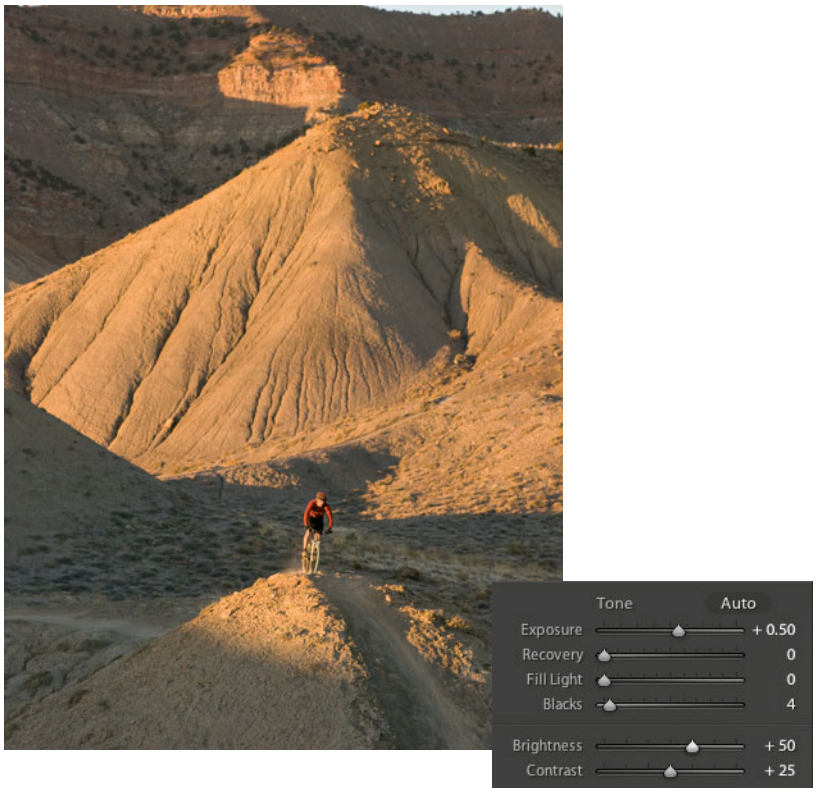
Tone	Auto
Exposure	0.00
Recovery	59
Fill Light	0
Blacks	5
Brightness	+ 50
Contrast	+ 25

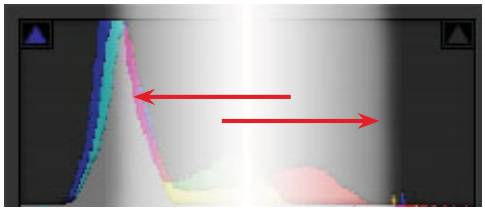




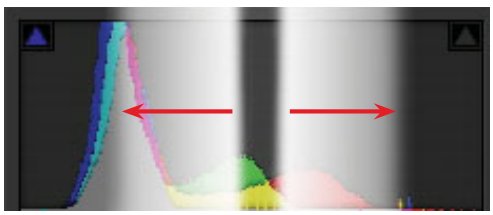
Tone
Auto
Exposure
0.00
Recovery
0
Fill Light
22
Blacks
5
Brightness
+ 50
Contrast
+ 25


Lightroom File Edit Develop Photo Settings View Window Help
Thu 4:14:24 PM Jay Kinghorn G5
ADOBE PHOTOSHOP
LIGHTROOM 2
Library | Develop | Slideshow | Print | Web
Histogram
Basic
Tone Curve
HSL / Color / Grayscale
Split Toning
Detail
Vignettes
Camera Calibration
Previous
Set Default...

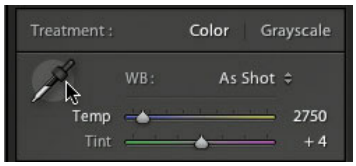

Tone
Auto
Exposure + 0.50
Recovery 0
Fill Light 0
Blacks 4
Brightness + 50
Contrast + 25

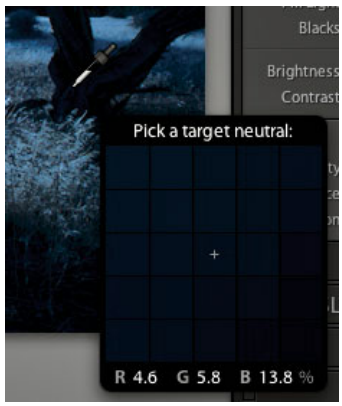


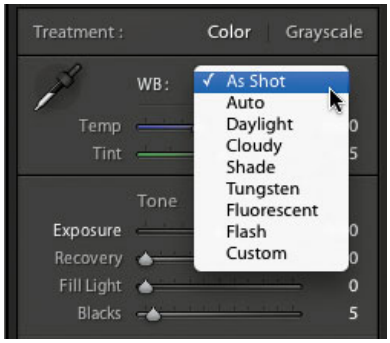
Tone
Auto
Exposure
+ 0.50
Recovery
0
Fill Light
0
Blacks
4
Brightness
+ 31
Contrast
+ 25

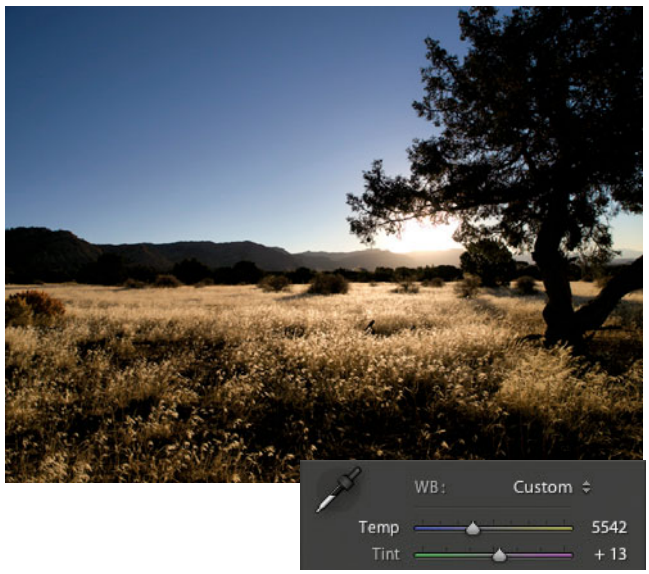


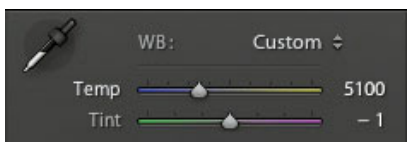
Tone
Auto
Exposure
+ 0.50
Recovery
0
Fill Light
0
Blacks
4
Brightness
+ 31
Contrast
+ 41

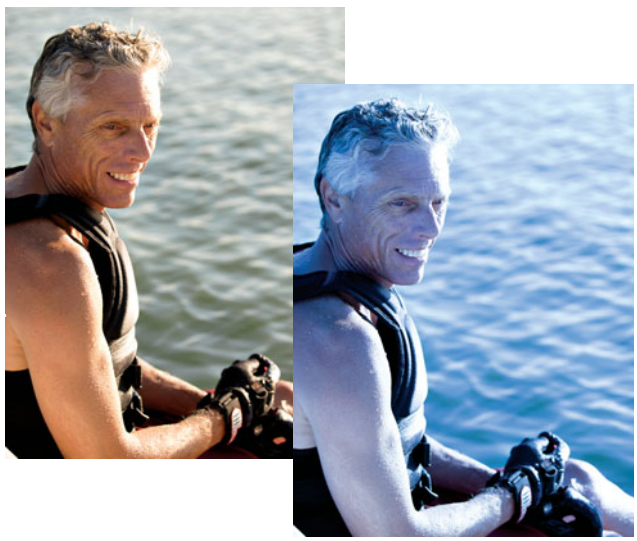

Treatment :
Color
Grayscale
WB :
As Shot
Temp
2750
Tint
+ 4


Blacks
Brightness
Contrast
Pick a target neutral:
R 4.6
G 5.8
B 13.8 %


Treatment :
Color
Grayscale
WB :
As Shot
Auto
Daylight
Cloudy
Shade
Tungsten
Fluorescent
Flash
Custom
Temp
Tint
Tone
Exposure
Recovery
Fill Light
0
Blacks
5


WB: Custom
Temp 5542
Tint + 13

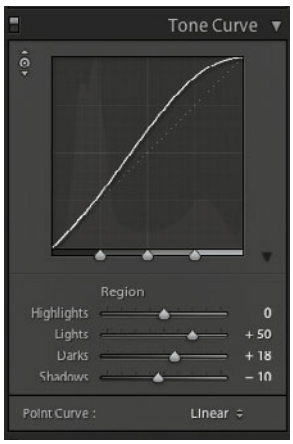

WB: Custom
Temp 5100
Tint – 1

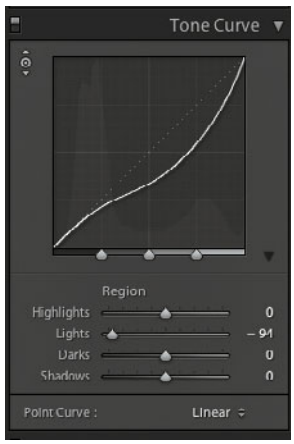


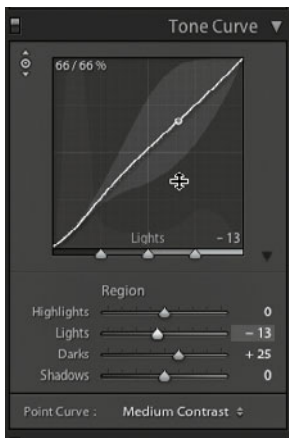
Vibrance 60

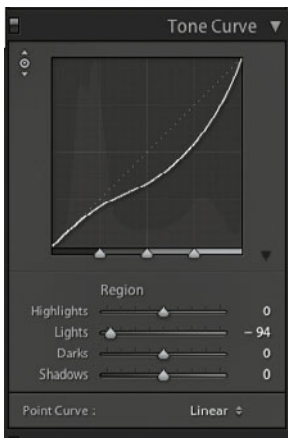
Saturation 60

Vibrance 21, Saturation 10

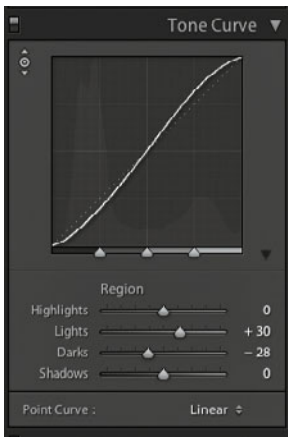

Tone Curve
Region
Highlights 0
Lights + 50
Darks + 18
Shadows – 10
Point Curve : Linear

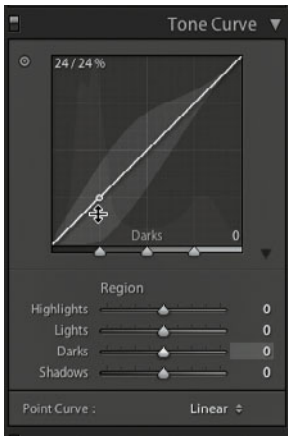

Tone Curve
Region
Highlights 0
Lights – 94
Darks 0
Shadows 0
Point Curve : Linear


Tone Curve
66 / 66 %
Lights – 13
Region
Highlights 0
Lights – 13
Darks + 25
Shadows 0
Point Curve : Medium Contrast

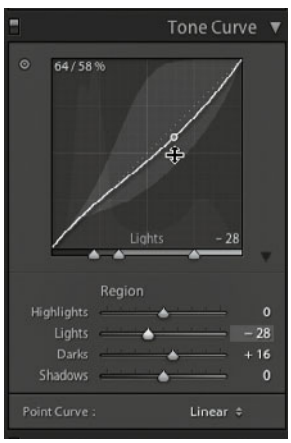

Tone Curve
Region
Highlights 0
Lights – 94
Darks 0
Shadows 0
Point Curve : Linear

region that will be adjusted and highlights the corresponding slider.





Click and drag on the curve to perform tonal adjustments. Although this is the most common method of adjusting the curve, it is the most difficult to use correctly because it requires the user to be able to look at the picture and guess correctly the corresponding location on the curve. You can use the histogram behind the curve as a guide to help you manipulate the curve correctly.



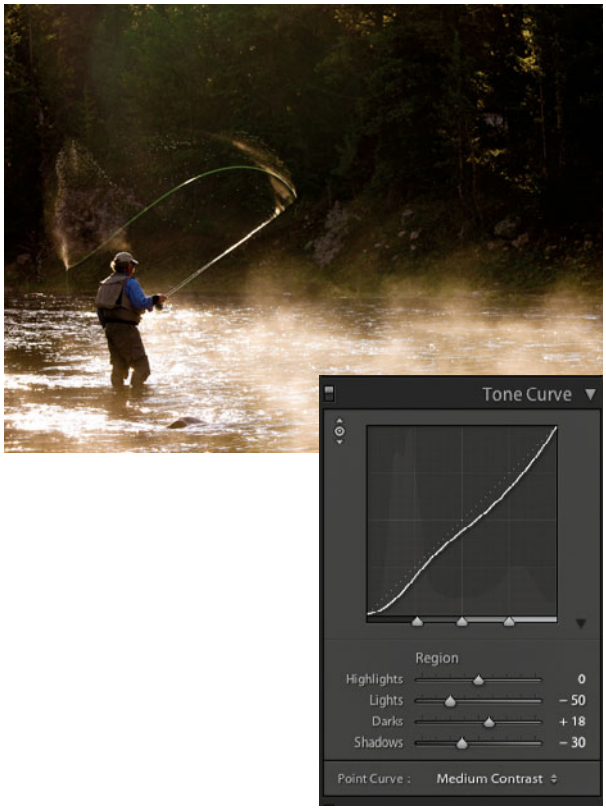
Use the sliders below the curve to adjust each of the tonal regions on the curve. Hovering your cursor over the curve lists the tonal

Use the Targeted Adjustment tool (TAT) to make corrections on the image directly. is is the most intuitive and certainly the coolest method of performing corrections, because it allows you to directly target a speci“ tonal region in your photo. Single-click the TAT icon in the upper-right corner of the Tone Curve panel, and then click and drag on the image to make adjustments to the curve. Clicking and dragging the cursor up toward the top of the photo lightens the corresponding tonal region on the curve, while dragging toward the bottom darkens it.

For adding contrast, you•ll have the best success with the TAT, because it allows you better control over your adjustments. For example, in this image of the “sherman, the TAT allows you to darken the water in the river and lighten the mist to increase the visual separation between them.

You can also increase the detail in the trees by lightening the highlight areas of the trees and darkening the deeply shaded bases of the trees.

To follow up with our ỳ-“shing image, the top photo on the facing page is the result of adding heavy contrast using the Contrast slider. e image on the bottom-right is the result of using the TAT to add contrast to the highlights and the shadows, where contrast is needed most in this photo. Notice the di erence in shadow detail in the background and the detail in the mist above the river.


Tone Curve
Region
Highlights 0
Lights – 50
Darks + 18
Shadows – 30
Point Curve : Medium Contrast

Correcting one set of color separately from another, as in the example of warming up green grasses without a ecting skies.

Correcting the di erences in color between what your eye sees and the camera captures.is e ect, called camera metamerism, is quite common and requires a custom set of corrections in Adobe Camera Raw to align the color in ACR with what your eye sees.

Making your photos look more three-dimensional by lightening spec colors to •bring them to the frontŽ visually and darken background colors to help them recede from view.

I encourage you to dedicate some time to learning how to use the HSL sliders. Many of the corrections I once had to perform in Photoshop using masks and selections I can now do completely in Lightroom.

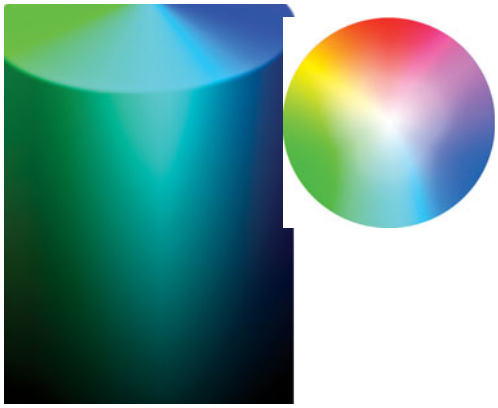
Introduction to HSL

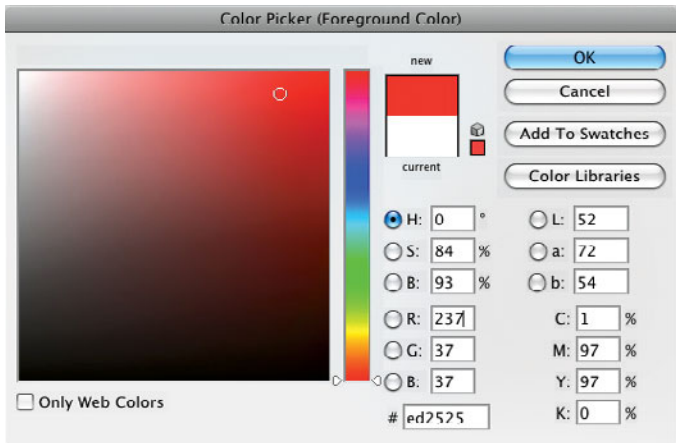
You•ve probably already used the Hue, Saturation, and Luminance (HSL) color scheme without necessarily knowing it. Many computer applications use HSL standard when selecting colors for type and design. On the Macintosh, HSL is the standard color model used in Apple•s Color Picker.

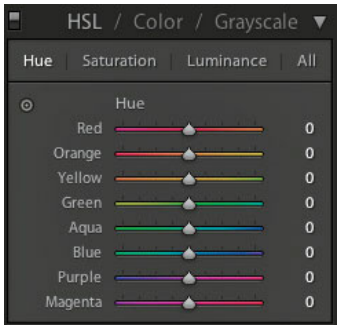
Even though HSL may be familiar, that doesn•t necessarily help you use it for correcting images. For this, you need to have a basic understanding of how the HSL system is set up and why it makes dult corrections easy and intuitive.

Several di erent models can be used to describe the full spectrum of colors. When working with digital cameras and digital images, we commonly use the RGB color mode, where all colors are created using varying amounts of red, green, and blue. HSL is similar in that you can describe any color using three variables; however, HSL is unique in that each of the three variables controls a di erent aspect of the color.

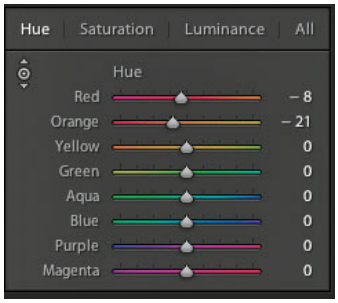
e best way to visualize the HSL color mode is to imagine a cylinder containing all the colors in the spectrum. Looking down on the cylinder•s top surface we see the color wheel, familiar from art classes, paint stores, and software color pickers.




Color Picker (Foreground Color)
new
current
OK
Cancel
Add To Swatches
Color Libraries
H: 0 °
S: 84 %
B: 93 %
R: 237
G: 37
B: 37
L: 52
a: 72
b: 54
C: 1 %
M: 97 %
Y: 97 %
K: 0 %
Only Web Colors
ed2525


HSL / Color / Grayscale
Hue
Saturation
Luminance
All
Hue
Red 0
Orange 0
Yellow 0
Green 0
Aqua 0
Blue 0
Purple 0
Magenta 0

HSL / Color / Grayscale
All
Red
Hue 0
Saturation 0
Luminance 0

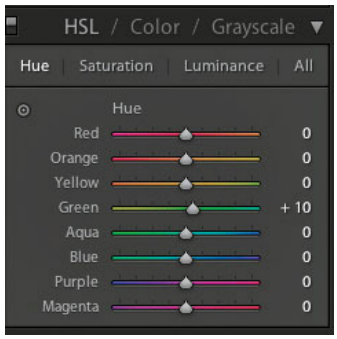


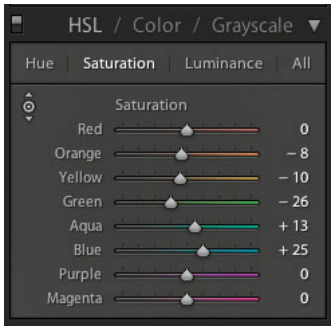
Remove some yellow from the pine trees in the background.

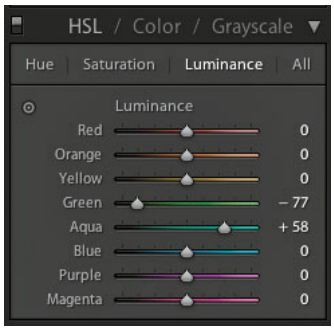
Darken and desaturate the greens in the pine trees and water.

Lighten and saturate the blues of the “sherman•s shirt to bring them to the front.

Tone down the saturation from the “ sherman•s face.


HSL / Color / Grayscale
Hue | Saturation | Luminance | All
Hue
Red 0
Orange 0
Yellow 0
Green +10
Aqua 0
Blue 0
Purple 0
Magenta 0


HSL / Color / Grayscale
Hue | Saturation | Luminance | All
Saturation
Red 0
Orange −8
Yellow −10
Green −26
Aqua +13
Blue +25
Purple 0
Magenta 0


HSL / Color / Grayscale
Hue
Saturation
Luminance
All
Luminance
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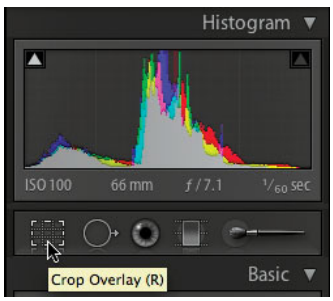
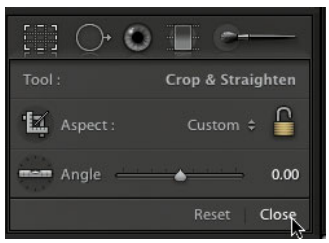
Orange 0
Yellow 0
Green – 77
Aqua + 58
Blue 0
Purple 0
Magenta 0

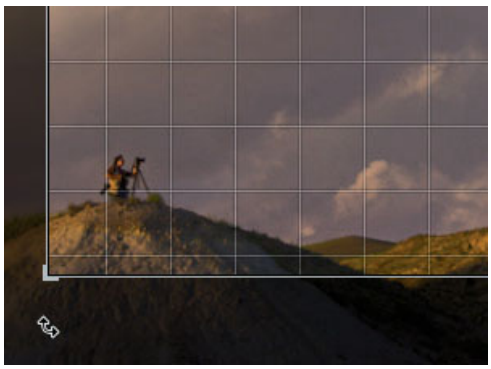
On the Web



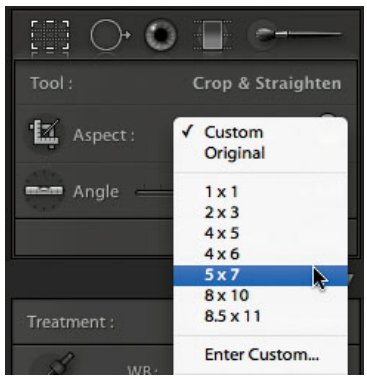


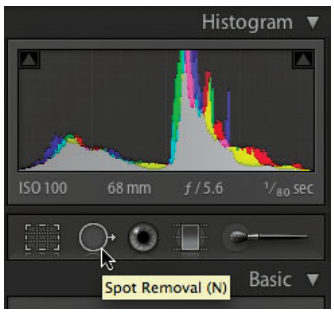
To reposition the cropping grid on the image, click inside the cropping grid and drag the photo into the new positione trick here is to remember that the crop stays in the same position and you are relocating the photo within the anchored crop grid.

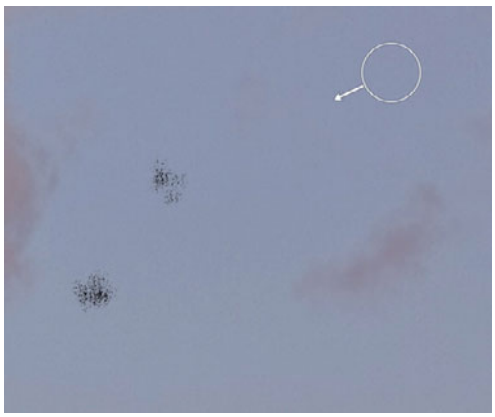
To crop and straighten your image simultaneously, move your cursor outside the cropping grid at any of the four corners until the cursor changes from a

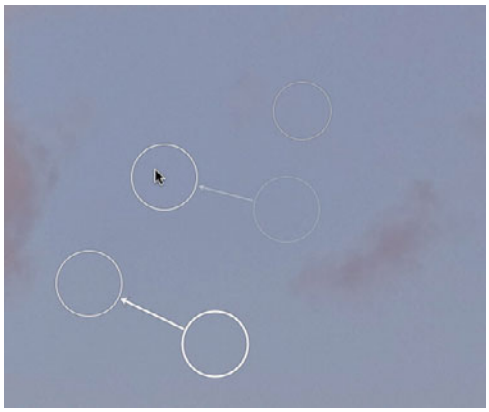


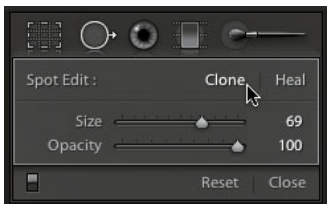
To crop to a speci“c proportion, choose your desired proportion from the Aspect pull-down menu in the Crop & Straighten panel. Select Custom to crop to sizes not included in the preset menu.

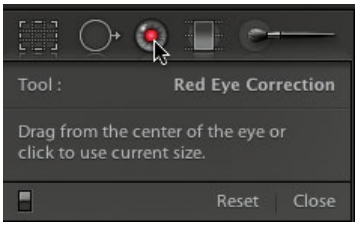


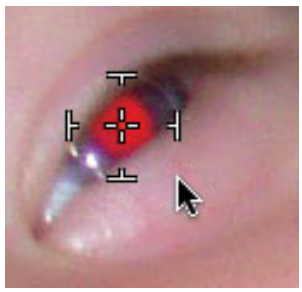


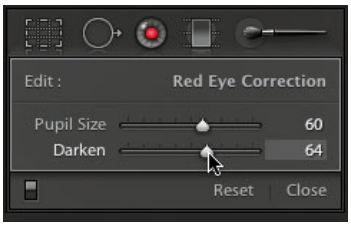





Spot Edit :
Clone
Heal
Size
69
Opacity
100
Reset
Close


Tool :
Red Eye Correction
Drag from the center of the eye or
click to use current size.
Reset
Close





burning and dodging, sharpening, and noise reduction in later chapters. is will help arm you with background on these tools so you will have a comprehensive view of how to use them to make your images pop.

I•ll cover the two remaining selective correction tools, Graduated Filter and Adjustment Brush, in the next chapter, where they “t within the broader context of making selective adjustments to optimize images. Additionally, the Sharpening and Noise Reduction controls are grouped with the Image Sharpening sections in Chapter 16 to teach you what image sharpening is, why it is important, and how to use a two-pass sharpening technique to tease out maximum detail in your photos.

is change allows us to focus our attention on batch processing multiple photos quickly and easily by synchronizing camera raw corrections and building presets to signi“cantly cut the time you spend correcting images after a shoot.

Photo Credit: Steve Gleich

Context Is King

Instead of covering all tools in the Develop module in this chapter, I•ll discuss tools for

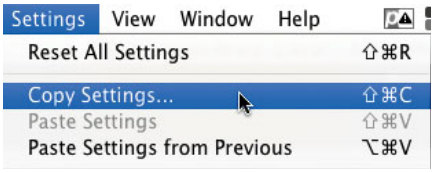
Correcting Multiple Photos

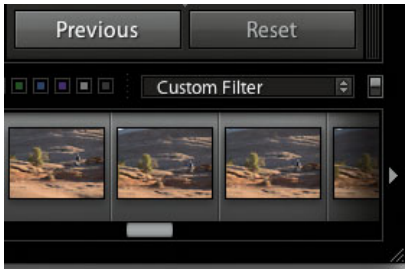
While the correction techniques demonstrated in this chapter will help you process photos quickly, correcting the best images individually still amounts to a lot of time. Fortunately, using presets and batch adjusting photos will trim your image correction time tremendously. For the remainder of this chapter, we•ll focus our e orts on applying the image correction

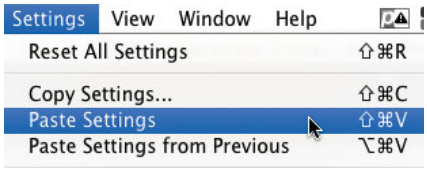
XMP
XMP
XMP
XMP
Moab_04_2008_011.ORF
Moab_04_2008_011.xmp
Moab_04_2008_012.ORF
Moab_04_2008_012.xmp
Moab_04_2008_013.ORF
Moab_04_2008_013.xmp
Moab_04_2008_014.ORF
Moab_04_2008_014.xmp

Sync...
Reset
Custom Filter

Synchronize Settings
White Balance
Basic Tone
Exposure
Highlight Recovery
Fill Light
Black Clipping
Brightness
Contrast
Tone Curve
Clarity
Sharpening
Noise Reduction
Luminance
Color
Chromatic Aberration
Treatment (Color)
Color
Saturation
Vibrance
Color Adjustments
Split Toning
Vignettes
Lens Correction
Post-Crop
Local Adjustments
Brush
Graduated Filters
Calibration
Spot Removal
Crop
Straighten Angle
Aspect Ratio
Check All
Check None
Cancel
Synchronize

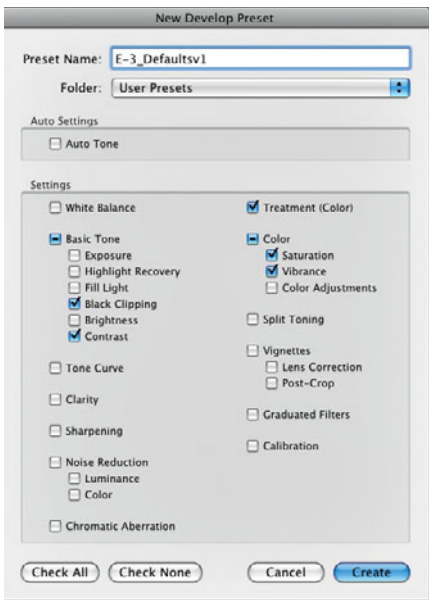

Settings
View
Window
Help
Reset All Settings ⇧⌘R
Copy Settings... ⇧⌘C
Paste Settings ⇧⌘V
Paste Settings from Previous ⌥⌘V


Previous
Reset
Custom Filter


Settings
View
Window
Help
Reset All Settings ⇧⌘R
Copy Settings... ⇧⌘C
Paste Settings ⇧⌘V
Paste Settings from Previous ⌥⌘V

Previous
Reset
Custom Filter

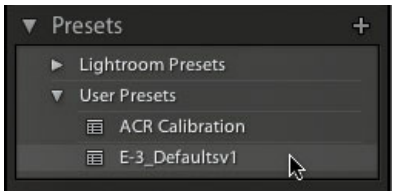
For subsequent re“nements to this preset, title them v2, v3, and so forth.is helps you keep track of your changes. Versioning your corrections instead of choosing the same “lename each time allows you to revert to an earlier version if you are dissatis“ed with new additions to your preset and compare the same photo with di erent presets.



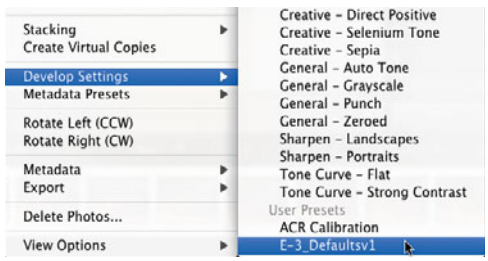
Applying Your Preset

You can apply a new preset to photos in several ways:

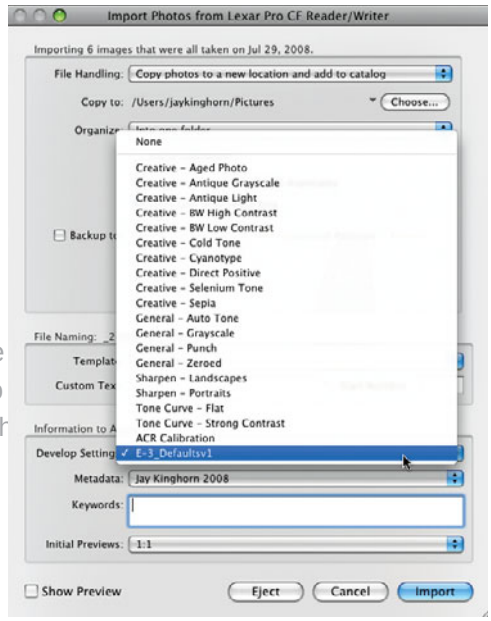
For a single photo, click the preset name in the Presets panel in the Develop module.



To apply your preset to multiple photos outside of the Develop module or in the Filmstrip, select the images you wish to correct, right-click the images to open th context menu, click Develop Settings, and then click the preset name.



To apply your preset to an entire shoot upon import, select your preset from the Develop Settings pop-up menu in the Import Photos dialog.



On the Web

is chapter introduced you to the controls in the Develop module; helped you adjust the tone, color, and contrast of your photos; and helped you develop efficient routines for batch correcting multiple photos. In the next chapter, we'll go into even greater depth on optimizing a single photo in Adobe Photoshop. These corrections will build upon the work you've performed here and take your corrections even further to help your photos stand out from the crowd.

How To: Making the New Three-Minute Correction

e techniques presented in this chapter may initially appear to be complex and time consuming. Be assured, however, that once you become accustomed to using the tools, you can correct an image using the full suite of Lightroom•s editing tools in three minutes or less. In this How To, I•ll explain the thought processes behind the corrections I used to take a photo from bland to rich, vibrant, and full of interest. is How To is focused on helping you see the big picture and learn which tools to choose and why. Speci“c instructions on using each of these tools is contained throughout this chapter.

Overcast, drab days can be great for highlighting subtle colors in a scene, like the streaks of lichen on rocks and the bright green of a climber•s sweater. Unfortunately, they don•t always come out the way you•d like in-camera. Looking at this photo, I see several problems that need correcting:

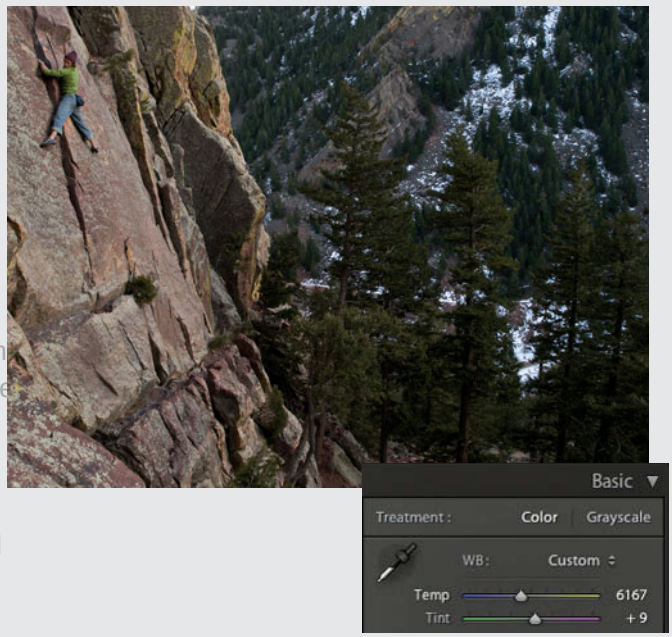
White balance It was a cloudy overcast day, I remember the orange of the rocks, the green the trees, and the yellow-green streaks of liche being far more prominent than the original suggests.

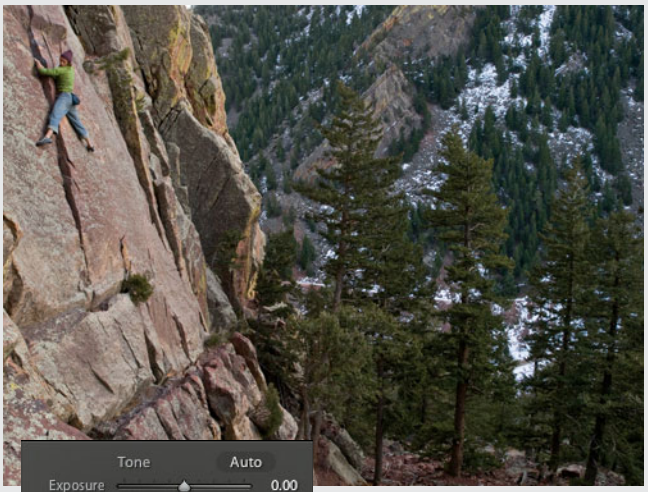
Shadows e right side of the picture is a bit of a muddled mess. e trees in the foreground aren•t visually distinct from the trees in the background. is makes the picture feel “at” and two-dimensional.

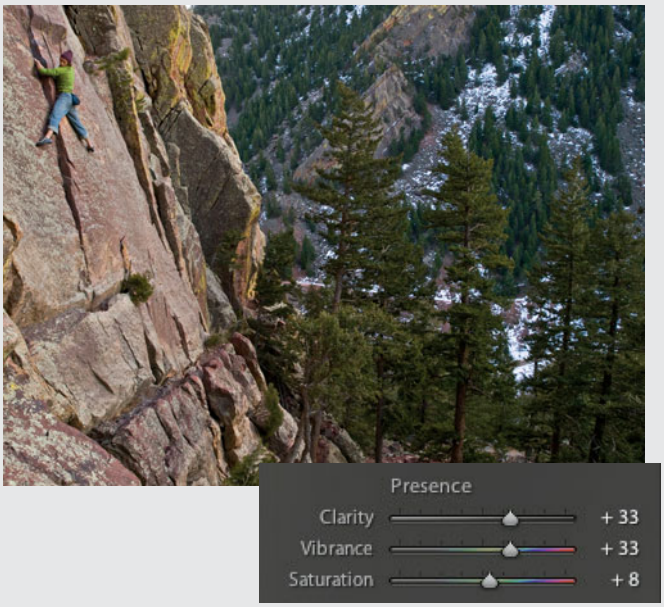
Climber Since the climber is a small subject in a large scene, I need to bring him to the front by lightening and increasing the saturation in his shirt so he is the “rst thing you see in the photo.

With these goals in mind, let•s get started with the corrections.

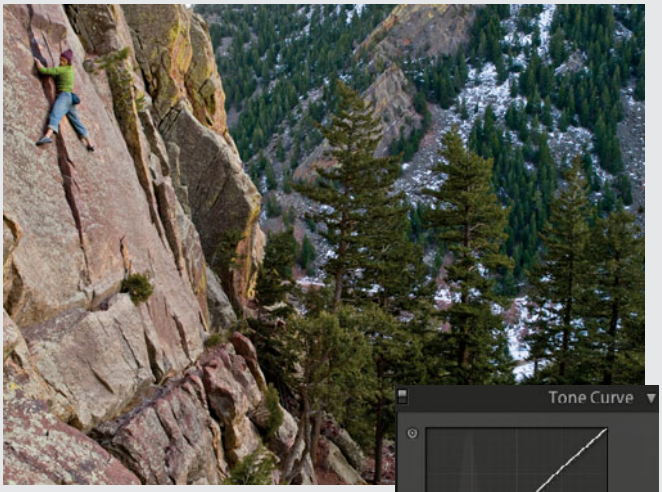
Step 1
The first step is to correct the photo•s white balance using the White Balance tool, followed by a manual correction to the WB sliders.

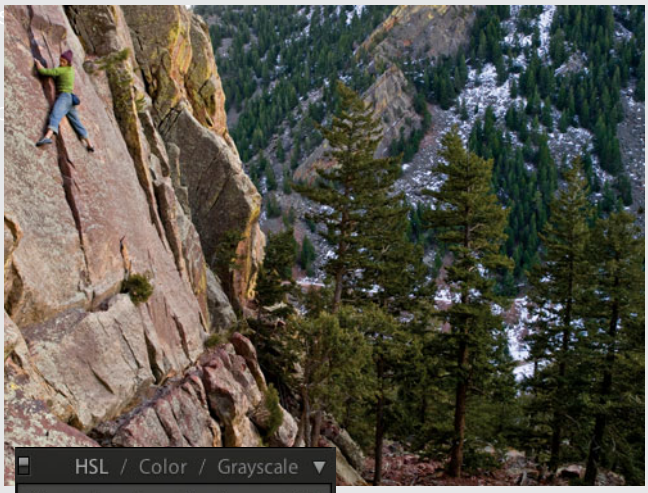


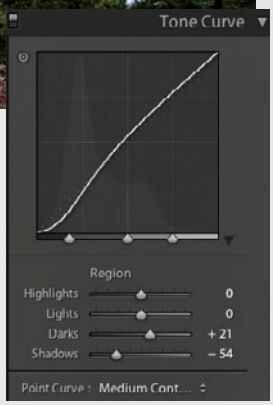

Tone
Auto
Exposure
0.00
Recovery
16
Fill Light
22
Blacks
8
Brightness
+ 69
Contrast
+ 25

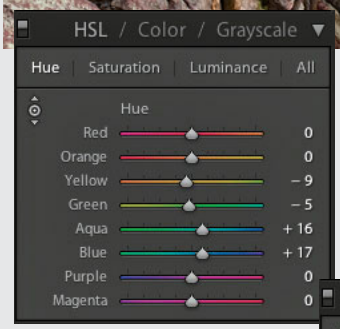

Presence
Clarity
+ 33
Vibrance
+ 33
Saturation
+ 8

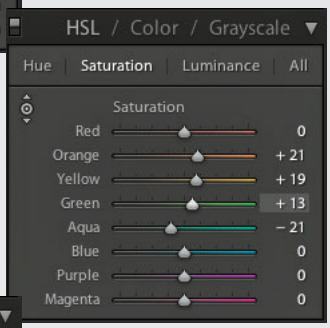
This adjustment allowed me to control the background tree with the Shadows slider and the foreground trees with the Darks slider. This Tone Curve adjustment is impossible to replicate using only the sliders in the Basic panel and is a of why mastering the Tone Curve is so valuable.

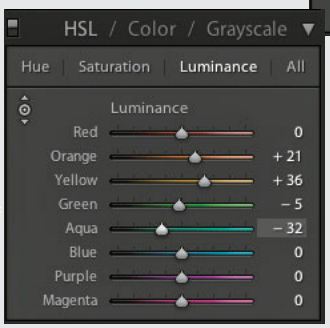








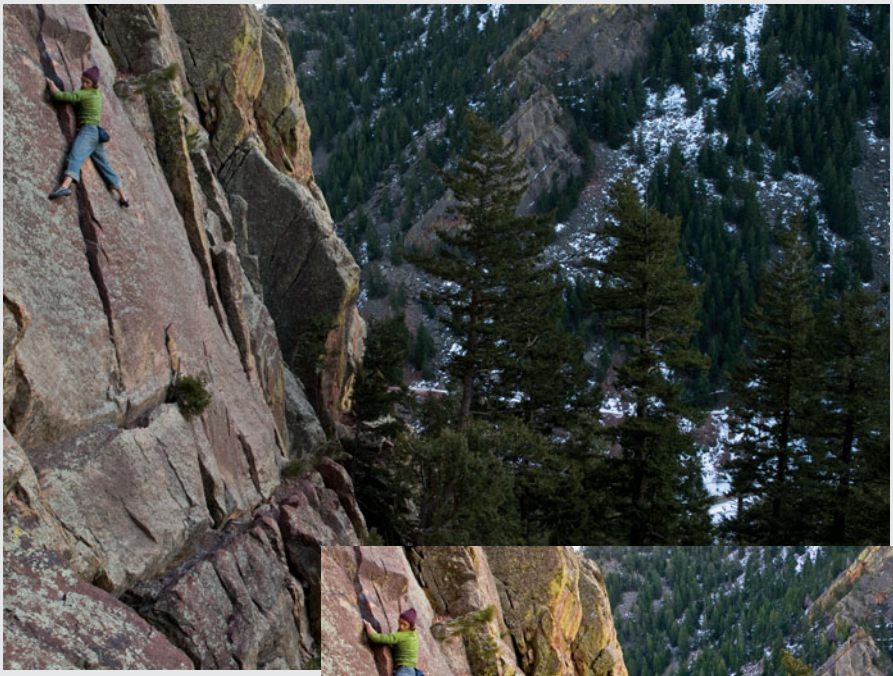




Step 5

To further increase the separation between foreground and background, I use the HSL sliders to make the background trees bluer and darker while boosting the lightness and saturation of the yellows, oranges, and reds, making the cliff climber, and foreground trees more prominent in the photo. At this point, the photo feels a little too bright overall, so I go back to the Brightness slider and darken it three points, a subtle but noticeable improvement.

At this point, I•ve addressed my three goals and improved the appearance of the photo noticeably. ere are a few minor, selective corrections I•d like to make before the photo is ready for print, but I•ll save those for the next chapter.



Before

After

Using only the tools discussed in this chapter, you can make changes like these in three-minutes or less.

Ice Climbing, Ouray Box Canyon, Colorado. Olympus E-500, 7…14mm lens, 1/200 second at f5, ISO 200

Mask :
New
Edit
Effect :
Brightness
Amount
62
Exposure
Saturation
Brightness
Clarity
Contrast
Sharpness
Color

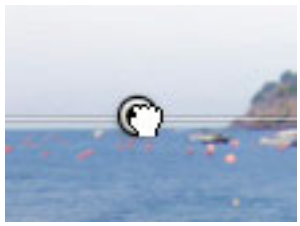
Step 3 e location midline of the gradient, indicated with a black and gray circle •pinŽ in the center, is key, because the midline indicates the area where the gradient transitions most sharply from corrected to una ected. Ideally, this midpoint will land on a horizon or other natural transition in the photo to help disguise your corrections and make them appear more natural.

Adjust the gradient by clicking and dragging the portion of the gradient you want to change.

If the midline isn•t along the horizon, click the center pin in the center of the gradient and drag it to a new location.

If you want to adjust the •throw,Ž the length of the gradient, click and drag its start or end points.

To rotate the gradient, hover your cursor over the center line until your cursor changes to the double-headed arrow, indicating the rotation tool.e closer the cursor is to the center of the gradient, the more wildly the gradient will rotate. Bringing your cursor out toward the margin of the picture will make subtle rotation of the gradient easier.



Step 4 Once your gradient is positioned correctly, you can begin applying corrections to the gradient using the ect options. ese corrections function exactly the same as those found in the Basic panel.

Use the Eect sliders to perform corrections along the gradient. Toggle the switch at the lower-left corner of the Graduated Filter panel to turn the Graduated Filter preview on and o .

The Graduated Filter darkens the sky, calling attention to the foreground. Settings: Exposure ...0.97, Brightness ...21, Contrast 13, Saturation 8

Lightening the foreground slightly makes the photo appear more three-dimensional and calls attention to the boats and their mooring lines. Settings: Exposure 0.32, Brightness 2, Contrast 26, Saturation 24, Clarity 10, Sharpness 10

Before we leave the Graduated Filter, here are two additional tips for working with gradients:

Adjust the length Gradients with a short throw create a hard-edged correction, which is usually not very natural looking unless it•s along a well-de“ned horizon, such as those at sea or along a ”at horizon line. If your horizon line contains trees, buildings, people, or other variations, increase the length of the gradient. is spreads the transition across a larger distance, making the gradient more di cult to detect.

Hide your gradients Whenever possible, hide the midpoint of your gradient in a portion of your image with natural transitions in tone or color.

ten the
cenes
r to your
s. Visually,

After adding an orange tint with 30 percent saturation to the foreground and a blue tint at around 40 percent saturation to the sky gradient, the image is far more lively than it was originally.

Placing gradients along the horizon is successful because a natural gradient almost always appears along the horizon. Positioning your gradients along other transition points, such as shadow changes in subject or distance, will also make your corrections appear more natural.

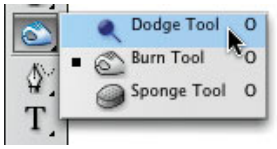
Adjustment Brush

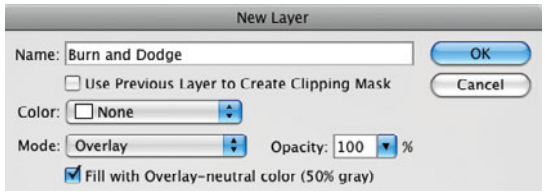
While the Graduated Filter is ideal for adjusting a large swath of an image, the Adjustment Brush is designed for quickly adjusting smaller areas with great precision. Performing corrections using the Adjustment

Kane Creek Road, Moab, Utah. Olympus E-3, 12...60mm lens, 1/5 second at f11, ISO 100

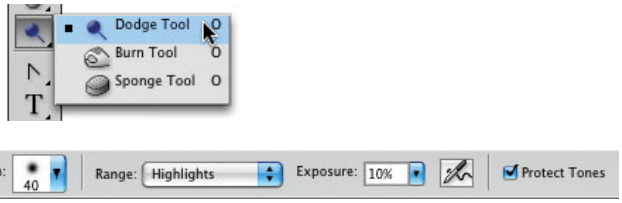
Several subtle, yet important, changes have enhanced this picture. First, the two patches of snow on the far bank were removed so as not to detract from the main subject. Second, contrast is enhanced throughout the photo to increase the visibility of details. Third, red and yellow have been added to warm the photo. Finally, key areas of the photo were burned and dodged to make the photo easier to •readŽ with a quick glance.

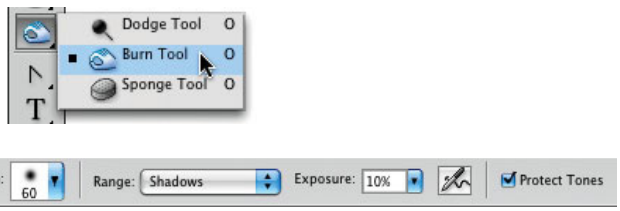
On the Web

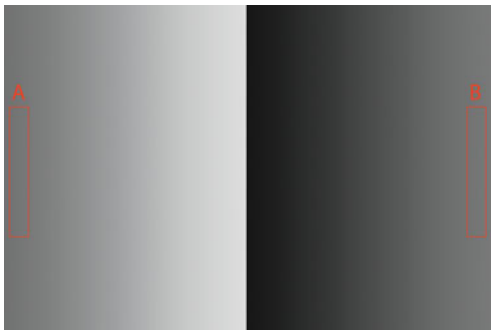

Dodge Tool O
Burn Tool O
Sponge Tool O


New Layer
Name: Burn and Dodge
OK
Use Previous Layer to Create Clipping Mask
Cancel
Color: None
Mode: Overlay
Opacity: 100 %
Fill with Overlay-neutral color (50% gray)

On the Web


Dodge Tool O
Burn Tool O
Sponge Tool O
Brush: 40
Range: Highlights
Exposure: 10%
Protect Tones


Dodge Tool O
Burn Tool O
Sponge Tool O
Brush: 60
Range: Shadows
Exposure: 10%
Protect Tones



Which of the two rectangles is lighter: A or B? Cornsweet illusion adapted from Livingstone's Vision and Art: The Biology of Seeing

excessively sharpening images. Photos that are too sharp appear gritty and saccharine, two qualities best avoided unless that is your explicit goal.

The key to making your sharpening both effective and realistic is learning to set the Radius setting effectively. The Radius setting, as you'll see, is found in all sharpening tools discussed in this section. It controls the width of the lightening and darkening that occurs along each of the edges in your photo. Set your Radius too high and you'll actually diminish the amount of detail in your photos. Set it too low, and the sharpening won't be effective. Keep this in mind as you evaluate Lightroom and Photoshop's sharpening tools and place them within the context of your workflow.

When to Sharpen, Early, Late, or Both?

For many years, photographers and Photoshop experts argued whether sharpening should be a single-step process that occurs at the end of the workflow, immediately prior to printing, or a two-step process with one round of sharpening occurring early in the workflow and a second one happening right before printing.

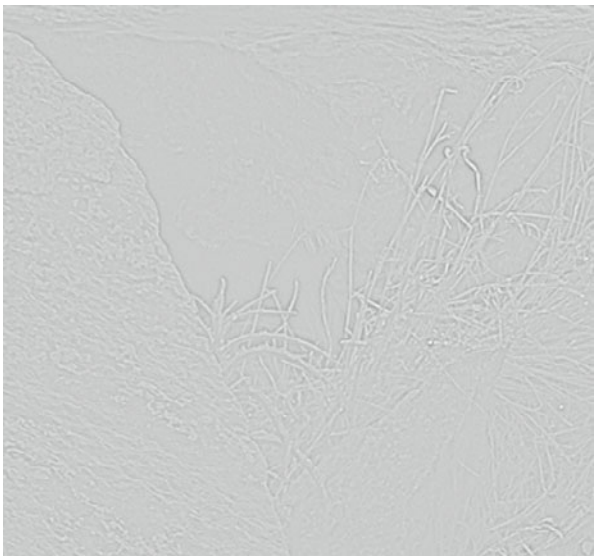
When using camera raw files, it makes the most sense to adopt a two-step sharpening approach. The first round of light sharpening improves the overall definition and clarity of the image, and the second prepares it for the output method: print, web, or video.

Amount The Amount slider controls the intensity of the sharpening. Boosting the Amount ampli“es the e ect of the other settings, particularly the Radius.

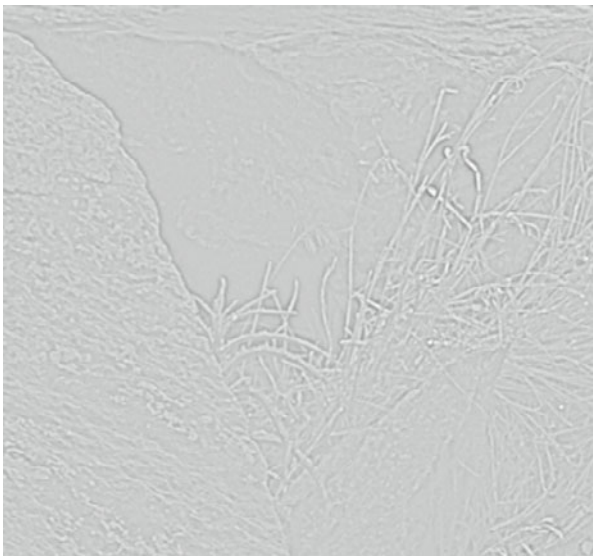
Radius The most critical control, Radius, determines the width of the halo created by lightening and darkening each edge in the photo. Images with lots of “ne detail require a low radius, while images with coarse detail are best served with a medium radius setting. A high radius setting can be used for creative e ect.

Detail This slider controls how deeply Lightroom •digsŽ into the image to tease out hidden or subtle detail. A high Detail setting will pull detail out of subtle, smooth tones, while a lower Detail setting concentrates sharpening on well-de“ned edges.

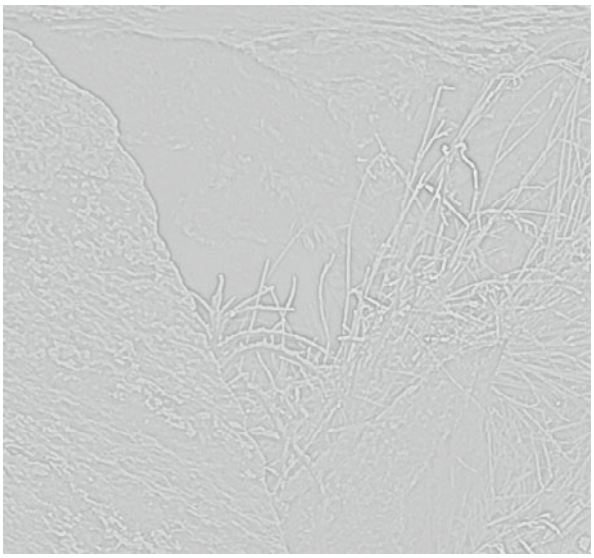
Masking Increasing the Masking slider causes Lightroom to build a layer mask on the ”y to restrict sharpening to the higher contrast, well-de“ned edges. This prevents image sharpening from ruining



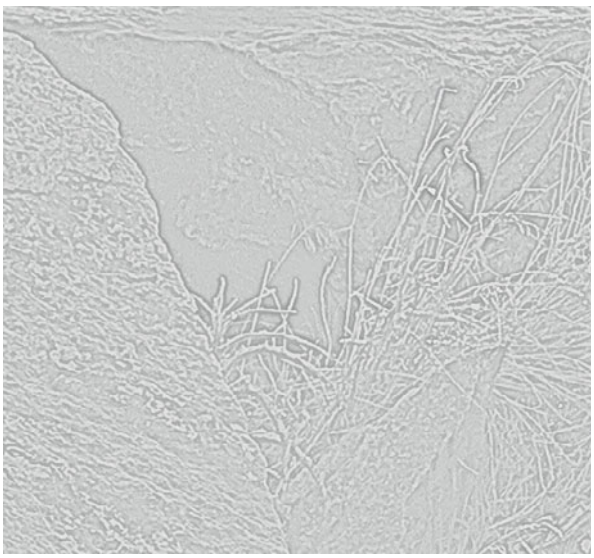
A lower Radius setting (0.7) creates lighter halos along key lines in the image while still improving the definition of details within the scene.



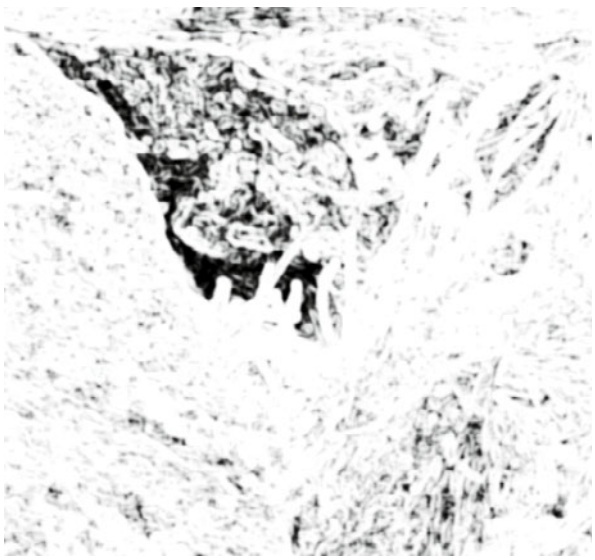
Too high of a Radius setting (2.2) creates a strong halo along the high contrast edge of the rock on the left and the grasses on the right.



A lower Detail setting (17) highlights the key edges on the rock and grasses while adding some texture to the rock. This lighter setting is more visually balanced between sharply defined and subtle textures.



When the Detail setting is too high (78), the halos along key edges become exaggerated, leading to potential problems in printing. In addition, the subtle textures on the rock are now as well defined as the edge of the rock. Given the soft light source, this is visually confusing„the texture on the rock should be secondary to the edges.



The perfect Masking setting sharpens the smooth tones without reducing sharpening along key edges or highly detailed areas.

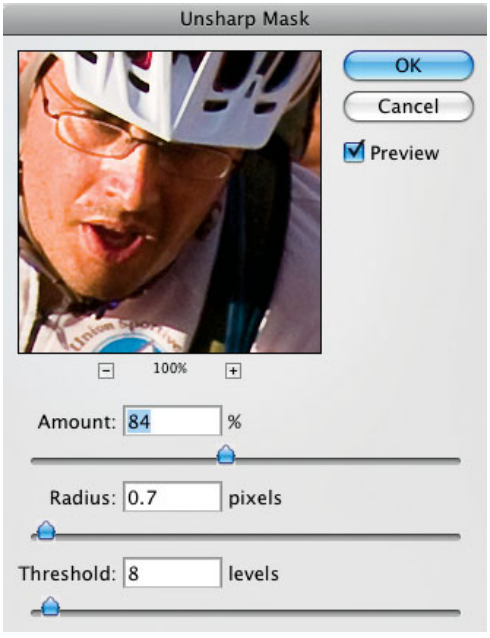
Too high an Amount setting can create a watercolor-like texture in the smooth areas in the print and make detail appear unnaturally sharp.

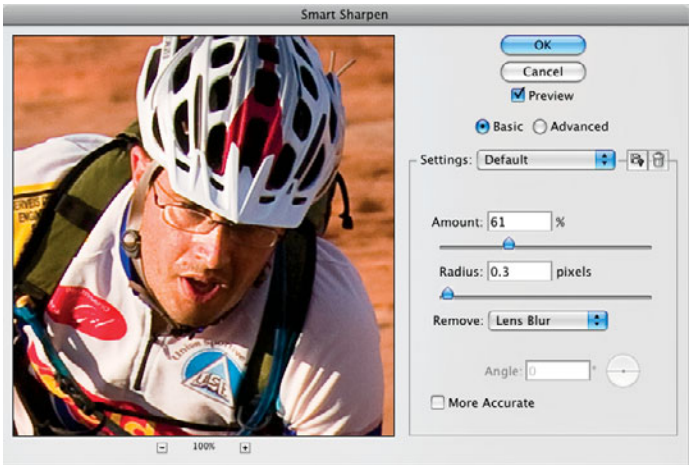
Before

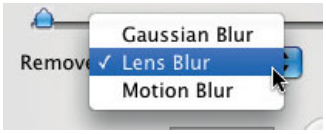
The right Amount setting brings out the natural detail within the photo without appearing unnaturally sharp. There•s a •rightnessŽ about correctly sharpened photos that looks richly detailed and natural simultaneously.

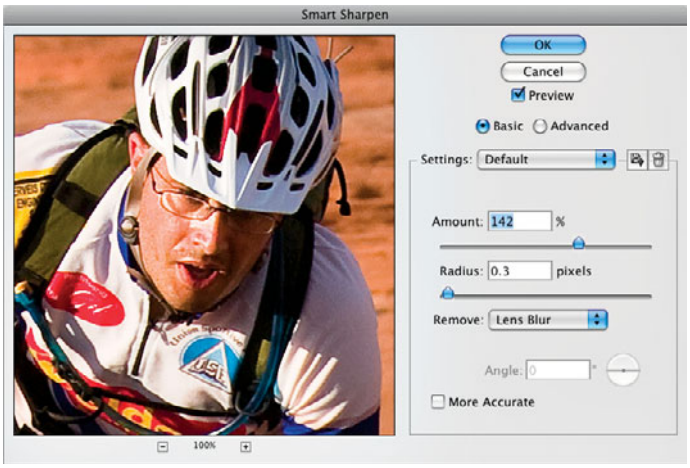
After

Output Sharpening
Sharpen For
Screen
Matte Paper
Glossy Paper
Amount:
Standard
Metadata


Unsharp Mask
OK
Cancel
Preview
100%
Amount: 84 %
Radius: 0.7 pixels
Threshold: 8 levels


Smart Sharpen
OK
Cancel
Preview
Basic
Advanced
Settings:
Default
Amount:
61
%
Radius:
0.3
pixels
Remove:
Lens Blur
Angle:
More Accurate
100%


Gaussian Blur
Remove
Lens Blur
Motion Blur



The image above has received basic capture sharpening, but no creative sharpening. The image on the left has received a light pass of creative sharpening to call attention to the rider•s face, helmet, and jersey. Smart Sharpeni settings: Amount 142, Radius 0.3

Image size and image resolution

Size and viewing distance of the finished print

e type of printer, paper, ink, and processes used (inkjet, laser, sheet-fed press)

Content of the image, including the frequency of “ne details, the quantity of smooth tones, and the message contained in the photo (soft and inviting like a baby or sharp like a knife)

Becoming pro“cient in sharpening takes practice„lots of it„to gauge the correct intensity of sharpening over the predicted softening that will occur as part of the printing process. Sharpening for the Web is far easier since you can see the “nished result immediately on the screen.

For more in-depth information on image sharpening, I strongly recommend that you read Real World Image Sharpening with Adobe Photoshop CS2 by the late, great Bruce Fraser. Bruce was a leading voice in the development and implementation of Photoshop. He helped to design and test the sharpening presets found in Lightroom•s output module, and he distilled his deep knowledge of image sharpening in this informative and easy-to-read book.

Adobe Photoshop: Essential Skills

As you continue to re“ne and craft your photos to match your “nal vision, you can take many paths and apply many techniques to get where you want to be. From the beginning of the Chapter 15 until now, I•ve tried to focus on the skills you•ll use most frequently„the •bread and butterŽ techniques you•ll use on a regular, if not daily, basis.

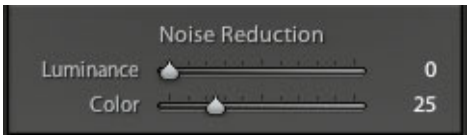
Of course, those aren•t the only skills you•ll want to have. From time to time, it is essential that you dust o an infrequently used technique to reduce image noise, or make a beautiful black and white version of your favorite color image. e rest of this chapter is devoted to those techniques that broaden your repertoire and improve your photos.

Noise Reduction

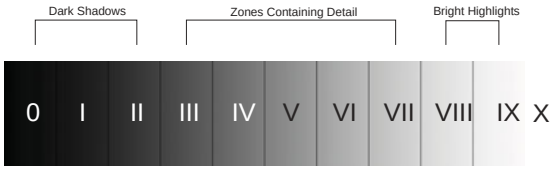
Digital noise, the errant ”ecks of tone or color on your photos, isn•t the problem it once was. e current crop of digital cameras produce superior results at high ISO settings compared to the cameras available just a few years ago. With that in mind, there are still occasions when you need to clean up a noisy image. A couple of good noise reduction tricks are a helpful addition for any photographer•s bag of digital darkroom tricks. In this section, I•ll highlight the inherent tradeo s present with any noise reduction technique and give you tips for making noise reduction e ective.

An Ounce of Prevention

e single best noise reduction technique is judicious exposure. e number one cause of digital noise is not high ISO settings; it•s underexposure. If you•re still in the habit of setting your camera to …2/3 of an f-stop, like many photographers did with slide “lm, stop. You need to retrain yourself to expose accurately, if not slightly overexpose. Keep in mind that breaking old habits often means you•ll run into some roadblocks here and there. However, once you become accustomed


Noise Reduction
Luminance
0
Color
25

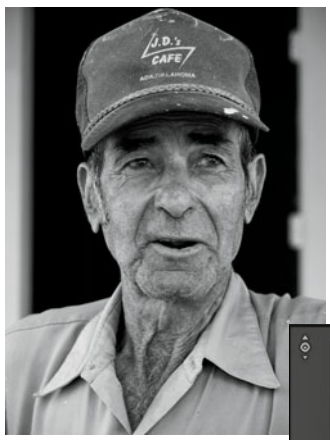
On the Web

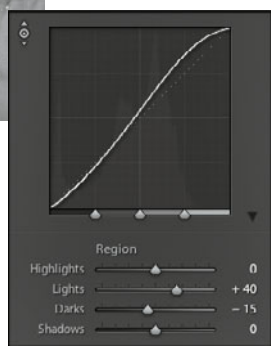


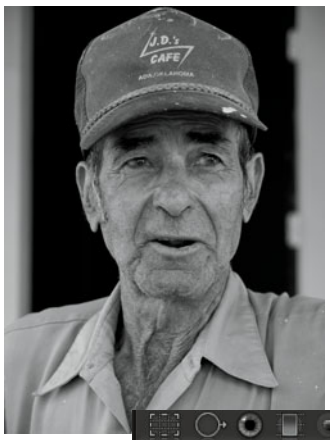
e underlying philosophy behind the Zone System is previsualization, the act of imagining the appearance of the finished print

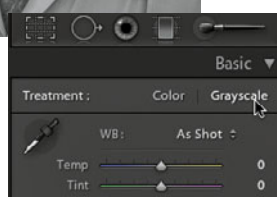
J.D.'s
CAFE

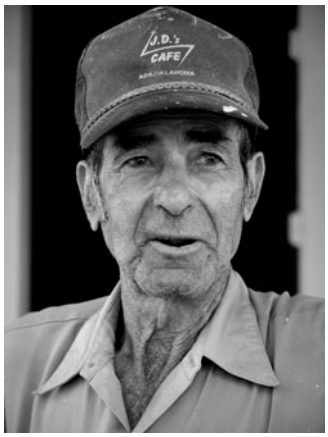
J.D.'s
CAFE


J.D.'s
CAFE


Region
Highlights 0
Lights +40
Darks −15
Shadows 0


J.D.'s
CAFE


Basic
Treatment : Color Grayscale
WB : As Shot
Temp 0
Tint 0



Tip For dramatic blue skies, drag the Blue and Aqua sliders to …100. This will create a dark gray sky similar to the effect created by placing a red #25 “lter over your lens while shooting black and white “lm. You can “ne-tune the darkness of the sky by adjusting the Temperature slider toward blue, but be careful as this can negatively impact other areas within your photo.

At this point, you should be fairly satis“ed with the overall tonality, contrast, and tonal separation. You can now shift attention to performing selective corrections using the Adjustment Brush or Graduated Filter, or by making small adjustments to earlier corrections.

Add more Clarity to improve de“nition of key lines in a person•s face, or use a negative Clarity setting to smooth out skin tones and skin detail.

With a moderate Contrast or Sharpness setting to add de“nition to key lines or shadows. Pay particular attention to the eyes in a portrait, because this is often the place a viewer•s eyes will travel.

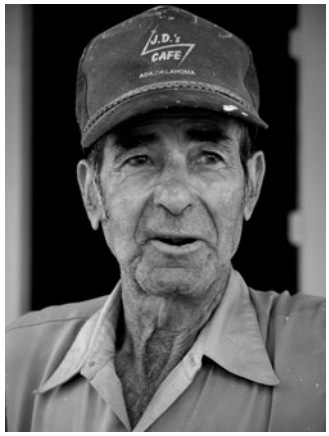
Add Brightness or Exposure to lighten the shadows surrounding the eyes in a portrait.

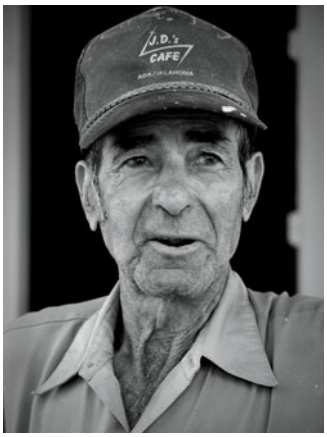
For this image, I used the Adjustment Brush as follows:

Brighten and add clarity around the eyes

Darken the man•s neck, shirt, and hat

Add pop to the lettering and paint spatters on his hat, add de“nition to the gray hair in his sideburns, and lighten the catchlights in his eyes using the Exposure slider at a low opacity




J.D.'s
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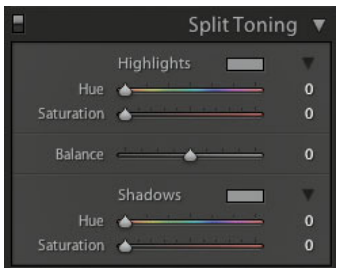
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Saturation
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Balance
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Shadows
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Saturation
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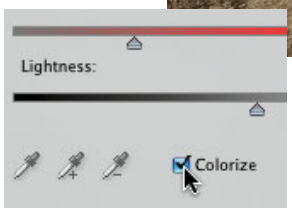
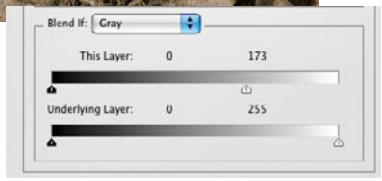
On the Web



Add a layer style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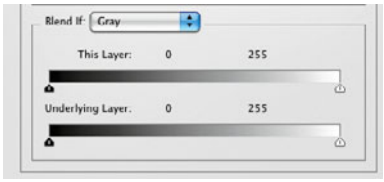
Underlying Layer: 0 255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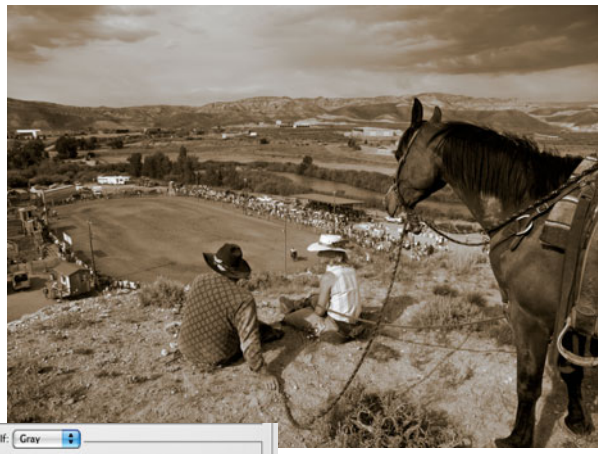

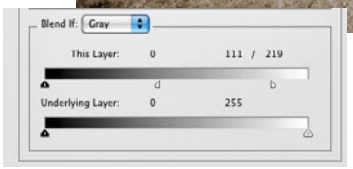
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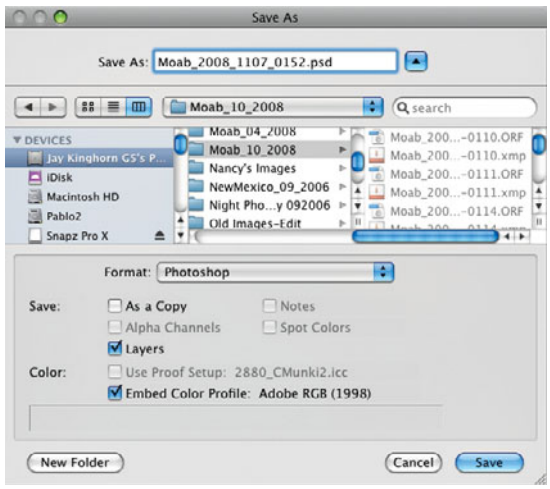
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Save As: Moab_2008_1107_0152.psd
Moab_10_2008
search
DEVICES
Jay Kinghorn G5's P...
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Pablo2
Snapz Pro X
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Moab_10_2008
Nancy's Images
NewMexico_09_2006
Night Pho...y 092006
Old Images-Edit
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Moab_200...-0114.ORF
Format: Photoshop
Save: As a Copy
Notes
Alpha Channels
Spot Colors
Layers
Color:
Use Proof Setup: 2880_CMunki2.icc
Embed Color Profile: Adobe RGB (1998)
New Folder
Cancel
Save

On the Web

Auto Blends images automatically using the layout method Photoshop determines is best for the images. It is typically, but not always, Perspective or Cylindrical. I use Auto as a first choice for panoramas with hand-held images.

Perspective Distorts the image to keep the horizon line true. The Perspective layout has a tendency to create panoramas that wrap around the viewer. Unfortunately, this can cause problems as the elements within the photo are greatly exaggerated.

Cylindrical Ideal for blending images taken with a wide-angle lens. The Cylindrical layout will compensate for the slight vignetting that occurs at the corner of wide-angle lenses and the slight distortion along the horizon.

Spherical Designed for 360-degree panoramas. Spherical panoramas hold promise for photographers to create interactive worlds for the viewer and certainly should be an avenue of exploration for photographers with the technical inclination and temperament to pursue this craft.

Collage Positions the photos as though in preparation for a panorama, but does not blend the images into one. Instead, the intact edges of each photo give the appearance of a scrapbook collage made from multiple prints.

Reposition Repositions the photos without performing any blending. This is ideal for photographers shooting from a technically accurate setup who want to blend the images in the panorama manually.

Additional options are available at the bottom of the Photomerge dialog:

Blend Images Together Automatically blends images by creating layer masks for each image.

Vignette Removal Useful if you are using a wide-angle lens that has a tendency to vignette at the corners. Without Vignette Removal, your blue skies will have a tendency to appear mottled near the seams between images.

Geometric Distortion Correction Designed to correct for the distortion imparted by wide-angle or fish-eye lenses. Although these lenses aren't ideal for panoramic photography to begin with, this feature can mitigate arcing horizons and bending buildings.

Step 3 After selecting your layout method, click OK and Photoshop will begin processing your panorama.

Tip Always check your panorama. Stuttered roads, bent fences, power lines that split in midair—these are a few of the problems that can plague panoramas. After your panorama is completed, zoom in to 100 percent and check any line traversing more than two images. The newer versions of Photoshop are far more reliable than those of the past, but Photomerge can still make mistakes. It's far better to catch it at this stage than halfway through a giant banner print.

On the Web

Creating HDR images is a challenge, to be sure. Still, I•m convinced HDR images will play a central role in the future of photography as more photographers gravitate toward capturing what the eye can see, bypassing the arti“cial limitations imposed by the camera.

On the Web

For more information on HDR images and a review of current HDR tools, visit www.perfectdigitalphotography.com/work”ow.php. To view a vast collection of HDR images, visit the Flickr HDR photo pool at www.flickr.com/groups/hdr/pool/.

Work”ow Automation

Mastering the digital darkroom is more than just learning a broad range of techniques. True mastery comes when you•re working both e ectively and e ciently with the tools available to you. Chapters 14 and 15 focused mostly on working e ectively. To take your work”ow to the next level, I want to introduce you to some of the productivity boosters found in Lightroom and Photoshop.

Keyboard Shortcuts

On the Web

Excellent retouchers almost never move their right hands from the mouse or their left from the keyboard. ey work quickly, with an economy of movement that is impressive to watch. One key to their success is the use of keyboard shortcuts for all their commonly used commands. I•ve posted a list of Photoshop and Lightroom keyboard shortcuts at www.perfectdigitalphotography.com/work”ow.php.

Perform basic corrections to your image in the 32-bpc stage. If your image appears a little too dark, lighten it using Exposure or Levels. If your shadows are weak, boost them using Levels before tone mapping to 8 or 16 bpc. ese seemingly small moves make a big di erence in the “ nal image quality.

Convert your HDR image from 32 bpc to 16 bpc for further editing. Working in 16 bpc gives you more leeway in adding back lost contrast or massaging the tonal relationships between objects in the photo.

At this point, your photo is ready to export. If your export settings are unique, and you're unlikely to need them again, go ahead and click Export to create your new file. If, on the other hand, you regularly export files of this size and file format, create a preset to save yourself time in the future. Creating export presets allows you to bypass the Export module entirely by storing your commonly used export settings for easy access.

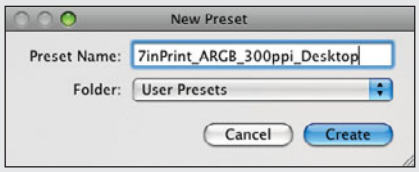
To create an export preset, first make your selections in each of the Export panels. Your preset will remember these selections exactly, so be sure you have each of the settings configured correctly. Here are a few tips:

Select a destination that won't change or be moved. For example, exporting photos to your Desktop, Documents, or Pictures folder will be more e ective than exporting to a custom folder that you might discard at a later date.

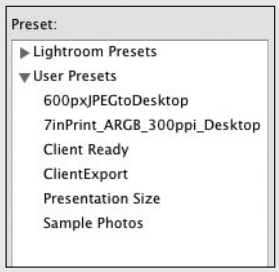
Go easy on the sharpening. Selecting a lighter sharpening setting will help ensure that your photos aren't oversharpened during export.

Give your preset a useful name. Be sure you can decipher what the export does, solely by the preset name.

Once you've configured your export settings, click Add in the lower-left corner of the Export module. T en, in the New Preset dialog, give your Preset a descriptive name and click Create.



Your export preset will now appear in the User Presets list on the left side of the Export module. Use this preset in the future by clicking the preset name to recall your export settings.



At this point, go ahead and export your photos if you haven't already done so. T is will return you to the Lightroom library. Within the library are a few additional ways to leverage your settings in the export preset without having to go through and reconfigure your settings in the Export module:

Under the File menu, clicking Export as Previous will export your photos using the most recent settings in the Export dialog.

You can export photos using your Export presets by selecting the preset in one of three places:

From the File menu Click Export with Preset.

From the context menu control-click (Mac) or right-click (Windows) an image and click Export, and then click the export preset.

From the left column of the Export module.

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CHAPTER 18

PRINTING

Despite all the advances in screen technologies, multimedia publishing, and the explosion of mobile devices, a print is still the best way to view a photograph. A high-caliber print has an almost magical quality, allowing your eyes to linger and absorb the details, colors, and textures in the photo. A good print has presence in a room and commands attention. T is chapter is devoted to helping you make prints that become the focal point in a room, that elicit oohs and aahs from admirers, and that showcase your very best work.

Fruit stand, Sant Cugat, Spain. Olympus E-3, 12–60mm lens, 1/25 second at f2.8, ISO 400

The tools for creating great prints—incredible cameras, robust technology, and precision printers—are better than ever. Unfortunately, the printing process still isn't easy. Push-button printing yields good, but not great, results. The very best prints come from photographers who have a deep understanding of the printing process. From calibrating the monitor, to selecting a paper and optimizing your photos for the printing process, the more invested you become in the printing process, the better and more consistent your prints will be.

In this chapter, I'll introduce you to the printing options available to you. Then I'll help you get the best results regardless of the printing method you use. Don't be daunted; by following a few simple steps, consistent, brilliant prints are within reach.

Before you begin any part of the printing process, it is essential that you calibrate and profile your monitor to ensure that what you're seeing on screen is an accurate representation of the colors and tones in the original file.

Monitor Calibration and Profiling

One of the most critical components in a digital photography workflow is an effectively calibrated and profiled monitor. At every point in your workflow, you're making judgment decisions on tone, contrast, color, and saturation. These judgments are all based on the assumption that what you see on the monitor is an accurate representation of the pixel values in your photograph. Calibrating and profiling your monitor ensures that the display of your photos isn't altered by any color biases or inaccuracies in your monitor.

I can't emphasize the importance of calibration strongly enough. Without a calibrated monitor, your corrections are little more than educated guesses, and when you begin the printing process and your prints don't match your monitor, these guesses usually come back to haunt you. For this reason, I consider this section to be among the most important in the entire book. I've tried to pack as much information about monitor calibration as possible here, but this is a complex topic with details that change frequently. I continue the monitor calibration discussion and provide my recommendations online at www.perfectdigitalphotography.com/monitors.php.

What Is Monitor Calibration?

Before diving into the nitty-gritty of monitor calibration, let's take a step back and look at what monitor calibration is and why it is important. Here I'll define the two commonly used terms, calibration and profiling.

Try and remember the last time you walked into an electronics store and looked at the wall of televisions. Many of the TVs were tuned to the same station, but all of them displayed a slightly different picture, even those by the same manufacturer. If you were to perform the same test with computer monitors, you'd see the same phenomenon. Every monitor displays color

in a slightly different way. This is a part of the color characteristics of the monitor that are caused in part by the materials used to build the monitor, the video card used on your computer, and the specific settings selected on the monitor itself. These differences are less acute with more expensive monitors, but they are still present.

If you can't trust the color on the screen, it is impossible to perform accurate image corrections, because you can never be sure whether the blue color cast you see in the image is actually present in the photograph or is imparted by the monitor. To work efficiently, you need to be able to trust that what you see on screen is accurate and make decisions confidently. This is why monitor calibration is a necessity.

When most people say monitor calibration, they are actually referring to two separate processes: monitor calibration and profiling. Monitor calibration is the process of changing the behavior of the monitor to match a known state. With old CRT monitors, you could physically change the amount of red, green, and blue used by the hardware within the monitor. With newer LCD monitors, this degree of control isn't possible because of the way LCD monitors are constructed. With LCD monitors, the only control we can calibrate is the monitor brightness, bringing it to a known brightness value. During the monitor calibration process, after the brightness is set, you'll begin the profiling process. Profiling means measuring the color characteristics of a device in its current state, and then building a lookup table to compensate for the differences.

To reiterate, calibration changes the physical controls of the monitor to match a known state. Profiling measures the color characteristics of the monitor in that state and builds a color profile to compensate for any differences. This two-part process minimizes the differences among monitors, printers, scanners, and other devices integrated into your digital photography workflow. It also ensures that when you and I look at the same photo, we see the same photo, regardless of our monitor type, brand, size, or age. For simplicity's sake, I'll be referring to both calibration and profiling when I use the term monitor calibration.

Now that you understand the critical role monitor calibration plays in your workflow, let's look at the devices you'll use to calibrate your monitor before getting into specific recommendations for calibrating your monitor for best results.

Monitor Calibration Tools

All good monitor calibration packages combine a physical device you place over the front of the monitor and a software application to assist in the calibration and profiling of the monitor. Avoid software-only packages that rely on your eyes to guide the corrections. Human color vision is too subjective a way to perform a monitor calibration—it's like trying to measure the thickness of a piece of paper with a yardstick. It can be done, but the results are far from accurate.

Two types of hardware devices are used to calibrate your monitor: colorimeters and spectrophotometers. Colorimeters can be used only for measuring light emitted by another source, such as a monitor. T is makes them ideal for calibrating monitors or digital projectors, but useless for creating print profiles. Spectrophotometers can measure either emissive or reflective light, which allows them to build profiles for monitors, projectors, and printers. Colorimeters are generally more accurate than similarly priced spectrophotometers, but this discrepancy is becoming less the case.

So Which Do You Need?

If you plan to have others perform most of your printing, you'll need only a colorimeter for calibrating your monitor. If you plan do to a significant amount of printing on your own inkjet printer, you may be better served with a less-expensive spectrophotometer. If you're a real stickler for quality and will perform all your own printing, often on specialized paper types, you'll want both a colorimeter and a spectrophotometer.

Monitor Calibration with i1Display 2

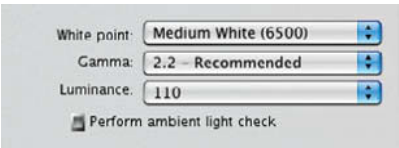
T e i1Display 2 from X-Rite is one of several excellent monitor calibration packages for photographers to choose from. In this section, I'll walk you through the steps needed to calibrate and profile your monitor. Although the exact steps will di er if you're using another monitor calibration package, the fundamentals are the same.

Begin by plugging the measurement device into one of the USB ports on your computer. Avoid using the USB ports on your keyboard because these lack su cient power to allow the colorimeter or spectrophotometer to communicate with the monitor calibration software.

Step 1 In the initial screen, select the type of device you want to profile and choose the Advanced calibration option. Don't worry—you'll see there's nothing too advanced about it. Click the right arrow to continue.

Step 2 Next, you're prompted to select your monitor type. T is helps the software tailor the options available to you in the software and ensures that the measurements taken by the colorimeter are interpreted accurately. Make your selection and click the right arrow.

Step 3 Next, you need to specify your White Point, Gamma, and Luminance settings. Almost all monitor calibration utilities allow you to set white point and gamma, but only a few allow you to set luminance. This is a shame, because setting luminance is the key to matching the lightness of your screen with your prints. Since these terms are most likely new to you, here are quick definitions.



White Point Your monitor's white point setting determines the color of the brightest white on screen. Much in the same way you adjust white balance on your camera or in Lightroom to match the color of the ambient light in the scene, you can adjust the white point of your monitor to match a print viewing condition.

For best results, I recommend selecting a White Point of 6500 Kelvin. Some advanced users may need to vary from this recommendation, but 6500 Kelvin is a perfect starting point for most users.

Gamma The Gamma setting controls the amount of contrast through the midtones. A gamma of 2.2 is recommended for both Mac and Windows users because it better matches the contrast of most inkjet printers and reduces cross-platform differences when previewing and displaying photos online.

Luminance Providing a recommendation for a Luminance setting is tricky, because the ideal setting is the one that matches your typical print viewing condition. Since I can't sit with you in your studio, you may have to do a little experimentation. I recommend starting with a luminance of 110 cm2 (candelas per meter squared), but you may need to adjust this value up or down depending on the lighting in your studio. See the "Lighting" section a little later in the chapter for more information.

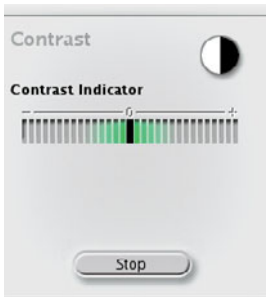
Many of the newer and less expensive monitors on the market cannot be set dimmer than 150 or 200 cm2. In this case, set your monitor at the lowest setting.

Step 4 When prompted, place your measurement device over the center of your monitor. Avoid placing the device in the corners of the monitor as you will likely get an inaccurate reading, because monitors vary most significantly at the edges. You may want to tilt the monitor back slightly to help the device sit flush against the face of the monitor. I also recommend dimming or turning off additional lights in your studio to eliminate ambient light that may affect

the readings taken by the device. Click the right arrow to continue.

Caution If you're using an LCD or LED monitor, do not affix the suction cups to the front of the monitor because this can ruin your monitor! Simply rest the device against the monitor face.

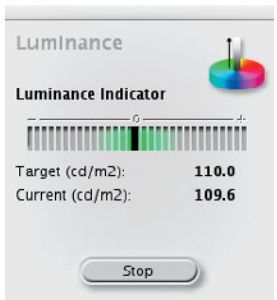
Step 5 If prompted to set Contrast, click Start in the lower corner of the dialog, and then use the feedback from the measurement device to decrease your Contrast to the correct range. Your aim is to make the vertical bar come to rest in the center of the green range in the Contrast Indicator. For many monitors, you will not need to perform any adjustment.



Step 6 In the next screen, you are prompted to select which kind of white point control your monitor contains. For LCD monitors, there is no real control over the monitor's white point. Some monitors o er a software control over the monitor white point, but this is usually less e ective for correcting the monitor's color than letting your monitor's ICC profile compensate for any color casts. Click the right arrow to skip this step.

Step 7 Next, you're asked to set the monitor brightness. Click Start to enter the Brightness module. Use the controls on your monitor to match your monitor brightness to the recommended range indicated by the green bars.

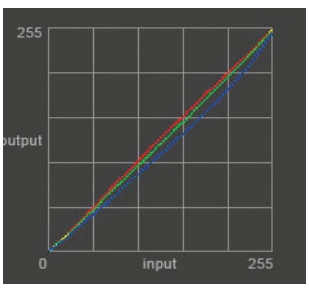
Tip After making an adjustment, allow the software time to take a couple measurements, as a change in the brightness setting often takes 15 to 30 seconds to settle into your new adjustment.



After configuring your settings, click on the right arrow to continue with the profiling portion of the monitor calibration.

Step 8 The Eye-One Match software displays a series of colored patches on the screen. The measurement device measures the displayed color values, and then the software compares the measured colors against the expected colors, creating a lookup table that compensates for the unique characteristics of your monitor.

Once this process is completed, you'll see a summary screen. The most important aspect of the summary screen is the Curve. Ideally, the red, green, and blue curves should appear as diagonal lines. Any deviation from a straight line indicates an area where the software had to compensate for a deficiency in the monitor. The greater the compensation, the more likely you will encounter problems in the accuracy and gray balance of your monitor. This screen is taken from an HP w1907, a $200 secondary monitor I use for displaying my palettes. I'm pleased with this result, but I would be concerned if the curves showed more variation than this.



Step 9 Click the Finish Calibration button to save and activate your monitor profile in your operating system. You will be reminded to recalibrate your monitor in four weeks, a good guideline for most photographers. If you're doing a lot of printing, or you're about to embark on a large printing session, you may want to calibrate more frequently.

See, that wasn't so hard! As monitor calibration tools have evolved, they have become more accurate and easier to use. If you're serious about your photography, you really have no excuse not to calibrate your monitor regularly.

LIGHTING

It might strike you as odd that in the introduction to a digital printing chapter, I'd insert a section on room lighting. The truth is, lighting is one of the biggest bugaboos for photographers who create their own prints. Lighting and room color can influence the appearance of colors in a photograph significantly enough to make the print no longer match the photo on screen.

While most photographers won't want to paint their studio or workspace neutral gray, block up the windows, replace their room lighting, and wear nothing but black, you do need to be aware of the influence your viewing environment has on a finished print. Here you'll learn some of the steps you can take to mitigate potential problems.

Discounting the Illuminant

You've undoubtedly encountered this problem: your eye sees color one way, and your camera records it another. The most common example occurs when you take pictures indoors with daylight film or a daylight white balance. Even though your eyes saw the colors as neutral, the camera recorded the orange light imparted by the incandescent light illuminating the room. Our eyes don't regularly perceive the orange light in the room because our visual system has a unique ability to filter out colors imparted by different light sources, so we see colors the same, whether they are illuminated by an incandescent light, fluorescent light, or daylight. This phenomenon, called discounting the illuminant, is why we have to change the white balance setting on our digital cameras or adjust the White Balance settings in Lightroom to make colors in our photos match what we saw in the original scene.

This system works well in our everyday environment. We see skin tones correctly regardless of the light source, and we see white paper as white even though the light reflected off the page might be orange, green, or blue. However, our ability to selectively filter out colors imparted by a light source becomes problematic when we're critically judging the color of prints. Our eyes want to see the paper as white, and usually do, but we cannot always account for the shift in colors. Hence, when viewing a print under an incandescent light, skin tones may appear warm or ruddy and neutrals may appear orange. Under fluorescent lights, neutral colors may appear pink or green depending on the printer used. The mismatch between colors viewed under two different light sources is called metamerism. These differences become particularly pronounced when you compare a print viewed under one light source with your monitor, which is itself a light source, and is typically set to a daylight white balance. The color differences between the two light sources causes your print not to match the color on your monitor.

Improving the Screen-to-Print Match

The simplest solution for improving the screen-to-print match is to install daylight-balanced lightbulbs in your workspace. This inexpensive solution is often satisfactory for most amateur to semipro photographers. When shopping for light bulbs, look for a color temperature of 5000–6500 Kelvin (K) (5000 K is ideal) and a color-rendering index (CRI) of 92 or better. You can find these specifications listed on many bulb manufacturers' websites. To simplify your search, here are a few suggestions.

Incandescent Lights If you use incandescent fixtures in your workspace, you're best served by switching to daylight-balanced compact fluorescent lightbulbs. Not only will the compact fluorescent bulbs use less energy and last longer, but they are a better match than any of the daylight-balanced incandescent bulbs I've tested.

The downside of fluorescent lights is they don't illuminate all colors evenly. This can cause problems with print viewing, but

fluorescents are a good, all-purpose solution for most photographers.

Halogen Lights If you use halogen lighting in your workspace, look for the 5000K bulbs from SoLux (www.solux.net). These are the bulbs of choice for many discriminating fine-art photographers and are superior to fluorescent bulbs because they illuminate colors across the spectrum more evenly.

Fluorescent Lights There are several commonly available daylight-balanced fluorescent bulbs to fit most any fixture. Look for the GE Chroma 50 or the Sylvania Designer 5000K.

Daylight The most effective and inexpensive light source for viewing photos is north-facing daylight. Whenever I'm judging prints or comparing color accuracy between prints, I always try to find indirect daylight. Of course, the disadvantage with daylight is it isn't always available, nor is it always consistent. Nevertheless, I prefer to use daylight as my guide unless I have access to a commercial viewing booth.

Viewing Booths The best solution for print viewing, particularly when comparing prints to your monitor, is a print-viewing booth. These booths use the highest quality, daylight-balanced fluorescent bulbs, and many allow you to dim the light source to create an accurate match to your monitor brightness. Using a viewing booth in a dimly lit room minimizes any additional color contamination caused by paint color, clothing, furniture, or other objects in the room.

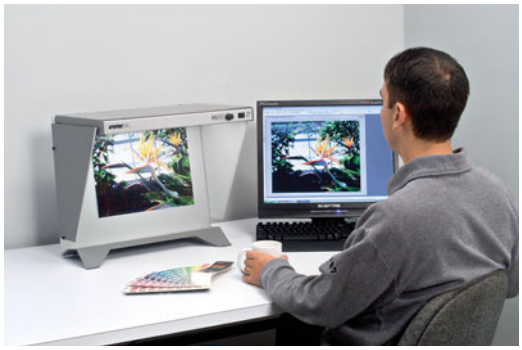


Photo courtesy GTI Graphic Technology Inc.

Room Brightness The intensity of the light in your workspace matters just as much as the color of the light used to illuminate the room. Dimly lit rooms cause colors to muddy, shadow detail to disappear, and sharpness to fade. Prints in a brightly lit room look sharp, saturated, and brilliant. The ideal setup is a dimmable viewing booth in an otherwise dimly lit room. Since most of us don't have that luxury, you can install blinds to control the amount of daylight striking your monitor and your prints since the light levels can vary significantly throughout the day.

I recommend establishing the best lighting setup you can for performing your color-critical tasks, and then tailor your workflow around these conditions. For example, if you prefer to use indirect window light for print viewing, set your monitor's luminance level to match the lightness of prints displayed in the window light. Refrain from making color decisions unless you can view the results in ideal lighting conditions.

When you have calibrated your monitor and your lighting is under control, you can truly begin printing with confidence. Without addressing these elements, troubleshooting any print problems becomes difficult, time consuming, and can often lead to inferior results.

The Art of Printing

Before committing ink to paper to create a print, it is well worth your time to think through the printing process and ask yourself why you're printing this photo and what you hope to achieve with the print. This process offers valuable insight into the type of printing process you should use, the paper type that will best suit your print, and any additional corrections that may be necessary to refine your photo for the best print.

To simplify the discussion, I'll use three classifications of prints and discuss the preparation and printing procedures for each:

Snapshot and keepsake prints

Portfolio prints

Fine-art prints

Note these are hypothetical categories used to describe a particular type of print or device. In reality, there is significant overlap between the categories.

Snapshot and Keepsake Prints

As the name implies, snapshot and keepsake prints recall a place, event, or person rather than play a central role in preserving your photographic legacy. Snapshot prints require a lower degree of color accuracy and print quality than a fine-art print because snapshot prints are designed to be stored in albums or small picture frames on a desk, rather than hung on a wall and viewed as art.

When printing snapshots, you will often favor speed over quality. Most snapshot prints are 8 × 10 inches or smaller, making them ideally suited for printing at a digital minilab due to the low cost per print and quick turnaround time that digital minilabs provide.

Most digital minilabs use a Fuji Frontier printer, or a similar printer, which uses RGB lasers to expose your image on to photosensitive paper. These printers are commonplace in photo retailers, the photo departments of big-box stores, and online print retailers. These printers make good quality prints very quickly and inexpensively, making them ideal for printing snapshots and keepsake prints.

To prepare your photos for printing on a digital minilab printer, you'll want to set your photos to the correct size and proportion for printing (4 × 6, 5 × 7, and so on), convert your photo to the sRGB color space, and save your photos in either the TIFF or JPEG format at an image resolution of 300 ppi.

TIFF is the preferred format when delivering image files in-person to a photo lab, and JPEG is preferred if you are uploading photos via the Internet to an online photo lab. When saving JPEG files for printing, use a high Quality setting (10 or higher in Photoshop; 80 or higher in Lightroom). This is

makes the upload process smoother for you while maintaining image quality for printing.

While digital minilabs are great for quick printing, they often lack the quality and consistency needed for portfolio-grade or fine-art printing. Because these machines print high volumes of photos every hour, the print quality drifts throughout the course of the day, which can mean that a print made in the morning can appear different from the same file printed in the afternoon. Additionally, digital minilab printers often have a difficult time maintaining detail in the deep shadows or bright highlights.

Despite those limitations, digital minilabs produce good quality prints less expensively than you can print on your own inkjet printer. For quick proof prints of a wedding or portrait session, a keepsake of a family gathering, or a volume of prints for an album, digital minilabs can't be beat.

Tip Some photographers are able to improve the quality of prints they receive from digital minilabs by using an ICC profile created for their favorite digital minilab. The Dry Creek Photo website (www.drycreekphoto.com/icc/index.html) stores custom ICC profiles for many popular labs around the world. Check to see if a profile exists for a lab near you.

Portfolio Prints

When you're sharing your work with others in a photographic portfolio, you want to present the best reproduction of your work. However, you are often limited in print size and constrained by the cost of producing a large number of prints. (For the purposes of this discussion, a portfolio print is any print larger than letter size up to 13 × 19 inches in size.)

These prints are really the bread-and-butter prints of serious photographers and are most commonly produced on a desktop inkjet printer capable of making prints up to 13 × 19 inches in size. This category of photo printers is compact, affordable ($400 to $700), and produces stunning prints. In fact, the only real differences between a printer of this size and a wide-format printer costing several times more is print size and the size of the ink cartridges, which is more economical for printing a large number of photos. In short, these 13 × 19 inch printers are remarkable and, dare I say, revolutionary machines.

Image courtesy Epson America Inc.

One of the many advantages of using an inkjet printer over a digital minilab is the range of papers from which you can choose. With minilab printers, you can choose between glossy or matte paper. The glossy papers tend to show fingerprints and they scuff easily, while the matte option is really more of a semi-gloss finish. With your inkjet printer,

you have literally hundreds of di erent papers and finishes, colors, and weights from which to choose—from high-gloss to cotton rag art paper. Each paper imparts a unique quality to the print, making paper selection an art unto itself.

Photographers new to the printing process are best served using a paper produced by the same manufacturer as your printer (that is, Epson paper on an Epson printer). T is simplifies the print-making process, as the paper's finishes are designed to be used with the manufacturer's printers and the ICC profiles are installed on your computer when you install the printer software. T is eliminates many of the potential pitfalls that can occur when making your own prints.

I'll discuss the specific steps required to print from both Photoshop and Lightroom in the respective sections that follow.

Fine-Art Prints

Viewing a great fine-art print is an awe-inspiring experience. A large print displayed in a gallery or home is like a window into another world. Digital printing processes have made it easier and more a ordable for photographers to make very large prints. It is not uncommon for photographers to make 20 × 30 or 30 × 40 inch prints from their digital photos.

Fine-art prints are most commonly produced on a large-format inkjet printer or wide-format photographic printer such as the Oc Ø LightJet. A large-format inkjet printer is similar in function and construction to a 13 × 19 inch printer, but with a longer carriage and larger ink cartridges, and it's designed to print from long rolls of paper instead of cut sheets. T ese printers are significantly more expensive to purchase, but the per-print costs are less owing to the bulk inks and roll papers.

Image courtesy Epson America Inc.

T e Oc Ø LightJet and similar printers use a photographic printing process that's similar to that of digital minilabs, but the LightJet produces a higher quality print and can make prints up to 48 inches wide. T is class of printers is found in professional digital photo labs. T e quality control among these printers is much higher than that of digital minilabs, and most professional photo labs can provide you with a custom ICC profile for use with the printer in use. T ese professional labs are a great way for photographers to make large prints without investing thousands of dollars in purchasing and maintaining a large-format inkjet printer. Plus, you will often get the benefit of working with a trained lab technician who can recommend the optimal steps for preparing photos for the lab's printer. Many will give you a smaller proof print and allow you to make minor corrections before

the final print is created. This is a valuable service and can make the printing process significantly easier for photographers.

When preparing photos for printing on a large-format printer at a professional photo lab, I recommend first asking the lab for its print specifications. Ask which ICC profile you should use, file type the lab prefers, and recommended image resolution. If the lab does not have this information, you are safe giving the lab the highest resolution photo you have in the Adobe RGB 1998 color space at 300 ppi, saved in the TIFF format. Often, the lab will have to make adjustments in its workflow to tailor your file for optimal reproduction on its printers, but a professional lab should have no problem working with a file delivered with these specifications.

Preparing photos for a large-format inkjet printer is much the same as printing to a 13-inch inkjet printer, with one notable exception: image size. When producing jumbo prints, the image size needed frequently exceeds the native image size from your camera. You will need to upsample your photo for the larger print size. For recommendations on maintaining the image quality while upsampling, be sure to read the "Go Big! Image Upsampling in Photoshop" section later in this chapter. Otherwise, follow the directions included in the "Printing from Lightroom" and "Printing from Photoshop" sections that follow.

How Long Will My Prints Last?

Early digital printers produced prints that initially looked brilliant, but then faded or changed color in a matter of months or a few years. This led many photographers to question the longevity of digital prints. Fortunately, the last 10 years has seen a remarkable improvement in both print quality and longevity in inkjet prints.

The best resource for print information on longevity and print permanence comes from Wilhelm Imaging Research (www.wilhelm-research.com). Wilhelm conducts accelerated aging tests on individual printers and print processes to gauge the longevity of digital prints created today and displayed in a variety of environmental conditions. A sampling of permanence ratings for common printers and processes suggests inkjet prints created today will not only outlive you, but will also look good for generations to come.

Océ LightJet with Fujicolor Crystal Archive Preferred Paper (used in professional photo labs): 40 years (prints framed under glass)

Epson R1900 with Epson Premium Photo Paper, Semi-gloss: 85 years (prints framed under glass)

HP DesignJet Z3100 with HP Professional Satin Photo Paper: more than 250 years (prints framed under glass)

For information on selecting an inkjet printer for your studio, visit www.perfectdigitalphotography.com/printing.php

PRINTING TO AN INKJET PRINTER

Most photographers own some type of inkjet printer and use it for creating prints at home or in the studio. Some of my best photographic memories are of seeing a favorite photo roll out of the printer, ready for framing. Conversely, some of my greatest frustrations with digital photography have occurred when trying to troubleshoot an inkjet printer producing o -color or incorrectly sized prints. At these times, the inkjet seemed like an impetuous child, determined to stonewall my printing e orts and bring me to tears in the process. In this section, I'll walk you through the steps necessary to print from both Lightroom and Photoshop, helping you avoid potential pitfalls in the process. At the end of this section, the troubleshooting portion will provide assistance when things go awry.

The Printing Process

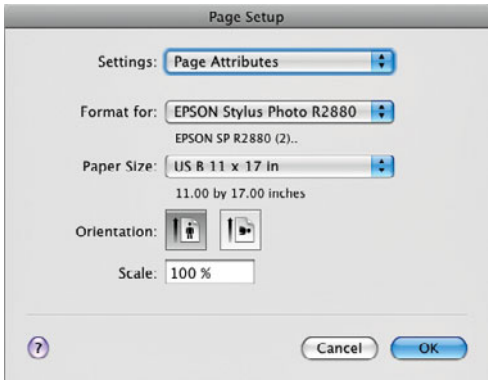
Printing from a program such as Lightroom and Photoshop is a two-part process. In the first part, you select from a series of application-specific print options. T is prepares the photo for delivery to the printer driver, the software used to convert your pixels into ink dots. Most problems occur at the interface between the application's print options and the print driver. At the default settings, most applications and print drivers conflict in the color management settings, causing poor-quality prints and immense frustration for photographers. T e newest versions of Lightroom and Photoshop help eliminate some of these frustrations, but problems can, and will, occur unless you learn how to control the color management settings within your application's print dialogs and in the print driver.

Printing from Lightroom

Of all the photo-editing programs currently on the market, Lightroom makes printing the easiest. Once you dial in your print settings with Lightroom, printing becomes a joy, not a hassle, with consistent prints only a few clicks away.

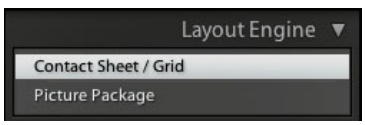
All printing in Lightroom is handled through the Print module. Within the Print module, panels on the right side of the screen control your print options and panels on the left side of the screen allow you to create, store, and access frequently used print templates, or presets. Use the Collections panel to quickly access photos grouped in a collection.

Step 1 In the upper-left corner of the print layout window, your current Print Settings and Page Setup are displayed along with the number of pages needed to print the photos currently selected in the Filmstrip. If this display does not reflect your current setup, click the Page Setup option to specify the printer and the paper size you will use for printing.

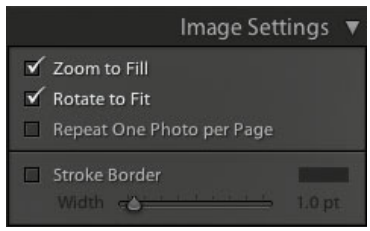


Step 2 For now, leave the Settings at their default settings. During the printing process, you'll create a printing preset you can use for future prints.

Step 3 At the upper-right corner of the Print module is the Layout Engine panel. Here, you'll specify whether you want to make a Contact Sheet/Grid or Picture Package. The Contact Sheet/Grid option is used for printing a single photo or several different photos. The Picture Package option is used when you're printing several copies of the same photo. For standard printing, select Contact Sheet/Grid.



Step 4 The Image Settings panel offers several options that affect the layout of photos on a printed page. The two most important are the Zoom to Fill and Rotate to Fit options. Lightroom adds photos to the printed page by creating "cells," or spaces on the page, where a photo can be added for printing. You can have a single cell on a page for printing a single photo or many cells on the page for printing a contact sheet. In the Image Settings panel, you can control how the photos are added to the cells.

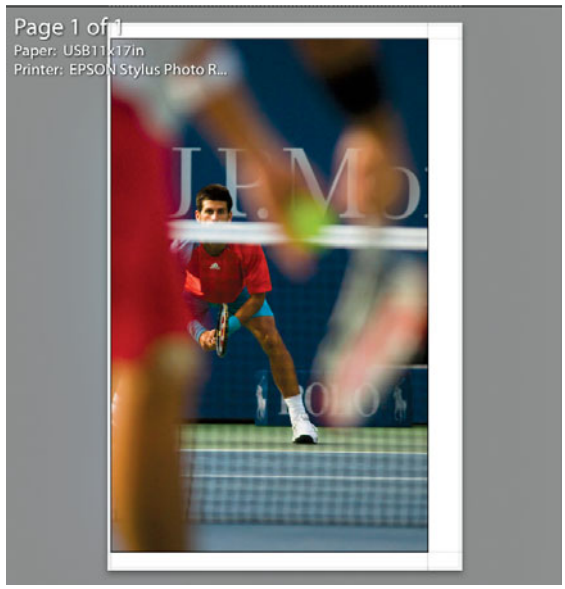


The Zoom to Fill option allows the photo to fit the dimensions of the cell, even if the proportions of the photo don't match the proportions of the cell. This saves you from having to manually crop the dimensions of your photo to match the dimension of the print. I recommend leaving this option checked.

The Rotate to Fit option automatically rotates photos to fit within the dimensions of the cell. Leave this checked as well.

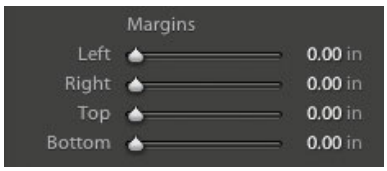
Step 5 In the Layout panel, specify the page margins, number of cells on the page, spacing between cells, and the cell size. Your inkjet printer often requires that a minimum margin exists between the edge of the photo and the edge of the paper to help feed the paper through the machine. Set these dimensions in the Margins area. Many printers use a 0.25-inch margin on the top, right, and left sides of the paper with a

When Zoom to Fill is not checked, the photo doesn't extend to the top and bottom of the cell because the image proportions differ from the print proportions.

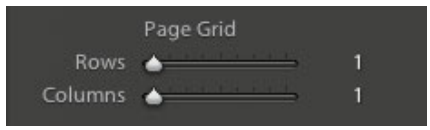


When Zoom to Fill is checked, the photo fills the cell, giving you a full-sized print by slightly cropping the photo. You can reposition the crop by clicking inside the cell and moving the photo within the cell.

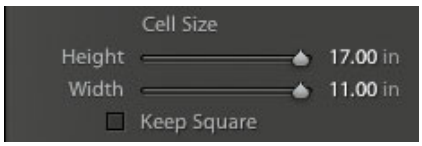
0.56-inch margin on the bottom. If you are printing borderless prints, set all Margins sliders to 0.



Step 6 Specify the number of cells per page using the Page Grid sliders. For a single photo, set both the Rows and Columns sliders to 1. Increase the number of cells to print multiple photos per page or to create a contact sheet. Obviously, as the number of print cells increases, the size available for each one decreases. If you have selected several photos, and not enough cells are available to print all the selected photos, Lightroom will automatically generate additional pages to print all selected photos. When multiple cells are added to a page, the Cell Spacing option is activated, allowing you to control the space between each cell. If only a single cell is selected, this option is grayed out.



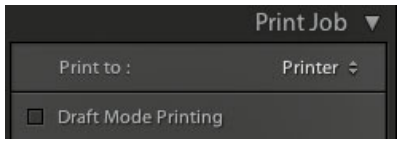
Step 7 Using the Cell Size sliders, set the cell size. Any selected cell size will be applied to all cells. When using the Contact Sheet option, all cells on the page will be the same size. If you need to produce several di erent print sizes per page, go back and select the Picture Package option in the Layout Engine panel.



Step 8 When making portfolio and fine-art prints, you can safely skip the Guides and Overlays panels. The Guides panel allows you to show or hide page layout guides within Lightroom. The Overlay panel allows you to add identity watermarks, crop marks, or metadata displays to your photos.

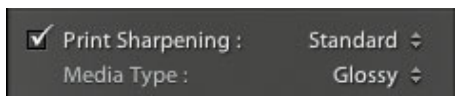
The Print Job panel is used to specify your print resolution and output sharpening, and to select your printer's ICC profile. These are the most important printing options in Lightroom and it is essential that you check the Print Job panel before each and every print.

Step 9 In the Print Job panel's Print To section, be sure Printer is selected and Draft Mode Printing is unchecked. The Draft Mode Printing option is used for making quick contact sheets. Lightroom will use the preview image instead of the high-resolution original for printing. This saves time but sacrifices quality in larger prints.

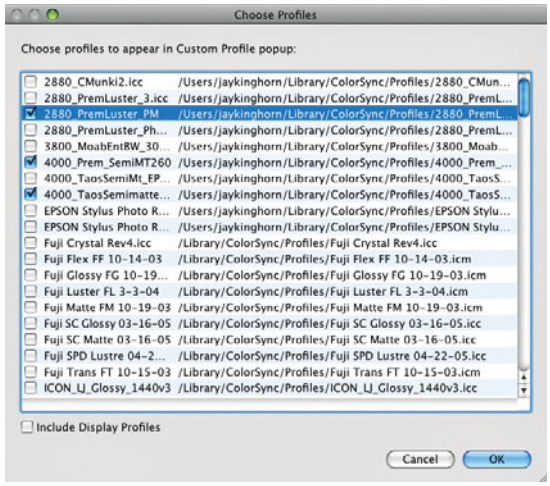


Step 10 In the Print Resolution field, enter your print resolution. Although philosophies di er on the optimal print resolution for fine-art printing, I recommend using a print resolution between 240 and 360 ppi. See the sidebar "Print Resolution Tests" later in this chapter for more information.

Step 11 Use the Print Sharpening field to tailor your output sharpening for the paper type and your personal preference. Select Glossy or Matte to match your paper type, and select the intensity of sharpening you'd like applied to the photo—low, standard, or high.

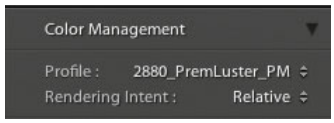


Step 12 Use the 16 Bit Output option to send high-bit data to your printer, provided the printer manufacturer supports 16 bpc printing in its print driver. Support for this feature is limited at this time, but I expect it will gain wider acceptance in coming years. See the sidebar "Print Resolution Tests" later in this chapter for additional information.



Step 13 T e Color Management panel includes the final options within Lightroom that must be addressed before you print. Here, you'll select the ICC profile for the printer and paper combination you're using for printing. Unlike many applications, which list all the ICC profiles installed in your operating system, Lightroom allows you to show only the profiles you use on a regular basis. If this is your first time printing from Lightroom, this list will be blank. From the Profile pull-down menu, click Other, and then in the resulting Choose Profiles dialog box, check the box next to each of the papers you use on a regular basis. T is populates the pull-down menu with your commonly-used ICC profiles, facilitating the printing process. When you are finished, click OK to exit the dialog.

Step 14 Now that your list is updated, select the ICC profile that corresponds to the printer and paper combination currently in use, and then choose a Rendering Intent. For most images, I recommend the Relative rendering intent, as this will give you the best color accuracy between your screen and the final print.



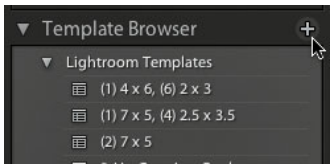
Step 15 At this point, you can click Print to enter your manufacturer's print dialogs. Yes, unfortunately there are more options to choose from. To make your life easier, I recommend saving this setup as a print template. T is allows you to bypass all the above options with a single click, saving much time in the printing process. If you

would prefer not to create a print template, skip the next section and continue with "Navigating the Print Driver."

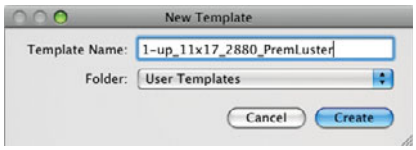
Creating a Print Template

Lightroom's print templates store all your settings associated with a particular print setup. This includes the paper size, number of images printed on a page, print resolution, sharpening, ICC profile, and so forth. You will want to create a print template for each of the papers and print sizes you commonly use.

Step 1 After configuring all the print options discussed in the preceding section, click the plus (+) symbol in the upper-right corner of the Template Browser panel on the left side of the Print module screen.



Step 2 Give your template a descriptive name. I recommend including the printer, paper type, and print size—plus 1-up or 2-up, and so on—to indicate the number of prints on the page. This is will help you quickly select the correct template from the list.



Step 3 Click Create to save your template in the User Templates folder. This is template will now be available from within the Template Browser panel in the Print module.

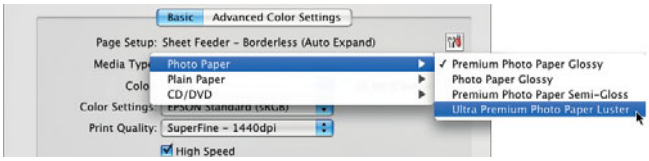
Navigating the Print Driver

After you've configured all of Lightroom's print settings, just a bit more work needs to be done before your masterpiece can be created. When you leave Lightroom and launch the print driver, you must set your paper type, set your print resolution, and turn off color management. The exact steps necessary to accomplish all three actions differ between print manufacturers and printer model, making it impossible for me to provide exact directions. The screen shots shown in the following sections are from the Epson 2880 printer and are common to the newest generation of Epson printers. Read your owner's manual or visit one of the many online forums for the exact steps necessary to print on your printer. The websites www.RobGalbraith.com and www.luminouslandscape.com offer printer reviews and discussions on printing to various printers.

Set Paper Type The Paper Type, or Media Type, setting helps your printer control the amount of ink applied to the paper. Each paper finish requires a slightly different mix. Too much ink and the ink cannot be absorbed correctly into the paper, causing streaking. Too little ink limits the color gamut, resulting in weak and desaturated colors. Choose the

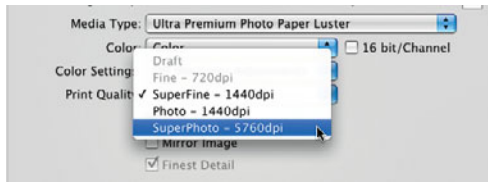
Media Type that best matches the paper currently installed in the printer. Selecting the wrong Media Type is one common reason for poor print quality.

When using manufacturer-branded paper, you should see your paper type listed exactly. For third-party papers, read the insert included in the paper's box for the correct media setting to use with your printer.

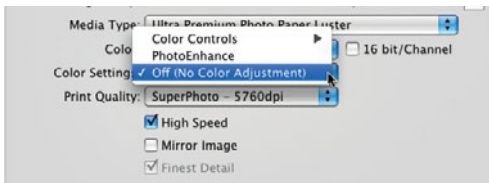


Tip If your paper type isn't listed, your printer may use two different types of black ink: one for glossy or luster surfaces and a second for matte papers. If you are using a matte paper and see only glossy papers listed in the Media Type settings, you may need to swap your black inks. Refer to your owner's manual or online documentation for instructions.

Set Print Resolution The print resolution is the number of ink dots your printer applies per inch of paper. It does not directly correlate to your image resolution, but it does play an important role in the quality of the final print. Generally speaking, the higher the print resolution, the sharper your print. The downside of selecting a high print resolution is that your print takes longer to create. For keepsake or portfolio prints, I recommend printing at 1440 dpi. For fine-art prints, I recommend setting your print resolution at the maximum setting. In recent print tests, this improved image quality more than a higher image resolution or printing from 16 bpc photos. See the sidebar "Print Resolution Tests" for more information.



Turn Off Color Management After specifying the ICC profile within Lightroom, it is essential that you turn off color management in your print driver. Otherwise, your photo will be color managed twice. The results usually aren't pretty. This is the single most common cause of poor printing from inkjet printers. With every print, manually check to make sure color management is turned off in your print driver.



Once you've addressed all three steps, click Print to create your masterpiece.

Tip My printer doesn't let me turn off color management. All modern 13 × 19 inch and larger printers allow you to disable color management in the print driver. This is not true for the smaller, consumer-grade printers. If you're printing to one of these devices, you will not be able to fully color manage your prints. For best results, follow these steps:

Step 1. In the Color Management area of the Print Job panel, click the Profile pop-up menu and click Managed By Printer.

Step 2. In your print driver, set your Paper Type and Print Resolution as recommended earlier, and then use the default option for color management. This will give you good quality prints. You may want to experiment with other color settings, sometimes referred to as quality settings, to see if other options produce better prints.

Print Resolution Tests

When writing this section, I conducted a test to assess the differences that changes in image and print resolution have on print quality. I also wondered whether using a 16 bpc print driver improved print quality.

Unfortunately, the large number of variables addressed by the test made it difficult to draw firm conclusions. What is apparent from the test is that selecting the highest print resolution setting made a significant difference in image quality. Very little, if any, improvement was visible when I selected the 16 Bit Output option in both Lightroom and the printer driver. Differences between printed images with image resolutions between 240 and 480 ppi were minimal, at best.

The one definitive conclusion I can draw from the test is that proper image sharpening makes a bigger difference than any of the tested variables. As is so often the case with digital photography, a highly skilled, well-trained practitioner makes more of a difference than technological changes alone.

Printing from Photoshop

After creating your master file in Photoshop, complete with adjustment layers, masks, and selective corrections, you have two options for printing this photo. You can save the photo as a layered PSD and print from within Lightroom, or you can print directly from Photoshop. Generally, I find it simpler to print from Lightroom because I can utilize presets to ensure all my prints are created with the same settings.

When you're preparing to print from Photoshop, I recommend that you save your layered master file in the PSD format, and then create a duplicate copy of your photo for printing (Image > Duplicate). This allows you to make print-specific corrections, like sharpening, without affecting your master file.

Preparing Images for Printing in Photoshop

Unlike Lightroom, where many preparatory steps for printing are handled automatically, Photoshop requires that you set the image dimensions and image resolution and perform your output sharpening before clicking the Print button. Since each of these steps has been covered in detail elsewhere in this book, I'll give you a quick refresher, along with a few tips, before moving into the printing options in Photoshop.

Image Size and Resolution Set your photo's print size and image resolution using the Image Size dialog box (Image > Image Size). You'll want your image resolution between 240 and 360 ppi, depending on the size of your print and the size of your original file.

If the dimensions of your photo don't exactly match your print dimensions, you will need to crop the photo to fit the print dimensions. The quickest way to do this is to select the Crop tool (C) and then enter the width and height of your print, along with the desired image resolution in the Options bar.

Drag your crop square over the image. Photoshop will automatically restrict the crop square to the print proportions. Press enter or return to accept the crop, and your photo will automatically be resized to the correct print size and image resolution.

Output Sharpening Create a new layer for storing your output sharpening. This allows you to apply the sharpening selectively to the most important areas within the image and helps protect against oversharpening. When printing to matte or watercolor paper, you will often need to make the photo appear oversharp on screen to compensate for the loss of sharpness that occurs as the ink bleeds through the absorbent paper.

Be sure to perform your sharpening after you've resized your image to the final print size, as this will ensure the best image quality in the finished print.

Printing to an Inkjet Printer from Photoshop

After you've completed all the preparatory steps, printing photos from Photoshop is fairly straightforward and similar to printing in Lightroom.

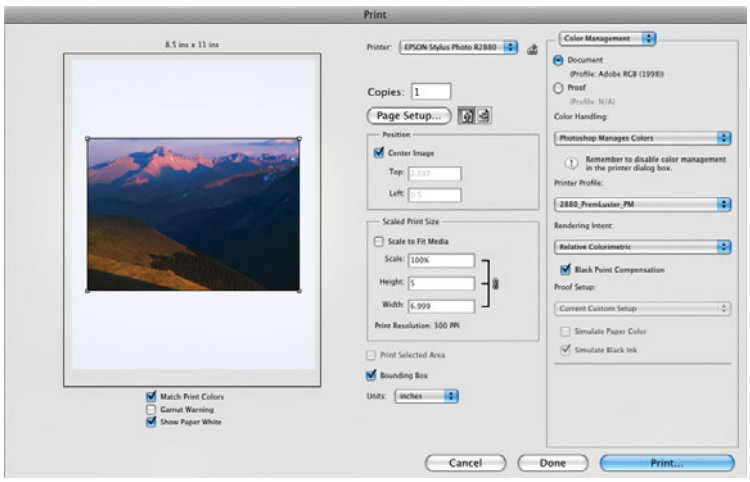
Step 1 Click the Print command from the File menu (File > Print) to begin the printing process.

Step 2 In the left third of the Print dialog is the print preview, which you can use to check the layout and positioning of your photo on the paper. Immediately below the print preview are three checkboxes: Match Print Colors, Gamut Warning, and Show Paper White.

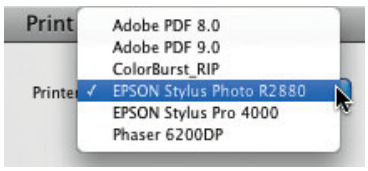
Match Print Colors Performs a soft proof of your photo using the currently selected ICC profile.

Gamut Warning Adds a gray overlay to the preview of any colors that are outside the printer's color gamut.

Show Paper White Adjusts the preview to reflect the actual paper color instead of a standard white background.



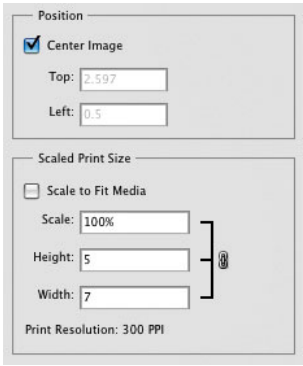
Step 3 The center column of the Print dialog contains options related to printer selection, layout, paper size, and image size. Beginning at the top of the dialog, verify that your printer is selected from the Printer pull-down menu.



Step 4 Specify the number of copies you want to print, and, if necessary, change the orientation of your print from portrait to landscape using the orientation buttons. Should you need to select a new paper size, click the Page Setup button.

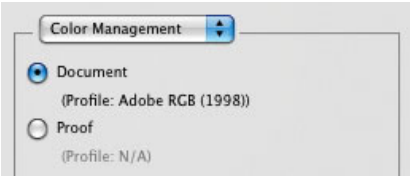
Step 5 The Position and Scaled Print Size sections allow you to tailor the layout and print size options quickly prior to printing. In the Position section, leave Center Image checked to have your photo placed in the center of the page, or uncheck this option to position the print manually on the page.

The Scaled Print Size section displays the scale, height, width, and print resolution. If your print size is larger than the paper size, you can quickly scale the photo to the maximum print size by checking Scale to Fit Media. For best results, you will want to specify your print size and image resolution before using the Print dialog and leave these options at their default settings.



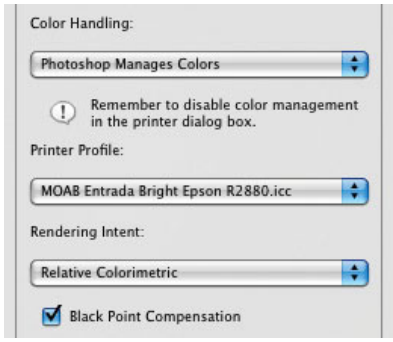
The right side of the Print dialog contains the Color Management and Output printing options. The Output options are accessed through the pull-down menu at the top of the screen. Fortunately, these options are not necessary for printing to an inkjet printer and can be set at their default settings. This allows you to focus your attention on the Color Management options.

Step 6 At the top of the column below the Color Management heading you will see your document ICC profile listed. Verify that your document has an embedded ICC profile, and then proceed to the Color Handling options.



Step 7 From the Color Handling pull-down menu, select Photoshop Manages Colors. This will give you complete control over the color management options and the best prints from your printer.

Step 8 From the Printer Profile pull-down menu, select the ICC profile that matches the printer and paper combination you're using. Next, set the Rendering Intent to Relative Colorimetric with Black Point Compensation checked.



Step 9 Click Print to leave Photoshop and enter the printer manufacturer's Print dialog. See the earlier section, "Navigating the Print Driver," for recommendations on settings and options within the print driver.

What Are the Proof Options For?

The Proof options in Photoshop's Print dialog are used when you're creating proof prints for commercial printing on an inkjet printer. For example, if you need to create proof prints to preview how your photos will look when printed in a book, you can enable the Proof option and then select the ICC profile given to you by a commercial printer. This will simulate the print gamut, contrast, and appearance of photos on the specified printing press. This is for proofing only and is not the process you want to use when making prints to showcase your work.

Advanced Printing Options

The troubleshooting instructions will help you print reliably in a wide variety of circumstances on most any commercially available inkjet paper. Inkjet printers are, for the most part, remarkably consistent. Once you configure the printer's settings, you can feel comfortable that a print you make today will look the same as one made a month from now.

Once you've established this printing foundation, you may want to explore different paper finishes and weights, try printing in black and white, and create your own ICC profiles for maximum color accuracy. This section will help you on your path toward printing mastery.

Selecting Papers

Today's inkjet printers give you the option of printing on hundreds of different papers, each with slightly different finishes, weights, colors, and textures. For snapshot and portfolio prints, your best bet is often choosing an inexpensive, good-looking paper and using it for the majority of your printing. For important prints, it pays to spend some time matching the paper type with the content of the photo. For example, the feeling of a dreamy cloudscape will be enhanced by a cotton-rag paper with a velvety smooth finish, such as the Moab Entrada Rag Bright 190. A moody black and white texture study of rock formations will feel rougher when printed on a watercolor paper that isn't smooth, such as the Arches Infinity Textured Finish paper. For pictures like these, the paper adds an additional dimension to the visual feel of the photo. By seeing the texture of the paper, we feel the textures in the photo.

Unfortunately, there is no easy, or inexpensive, way to test all papers on the market to find the one that will work best for you. To help narrow the search, I've compiled a list of paper characteristics to look for when evaluating paper types. Jay Dickman and I posted a listing of our favorite papers at www perfectdigitalphotography.com/printing.php.

Paper Finish

With traditional photo printing, you had two options for printing your photos: glossy or matte. Today the options are seemingly infinite. You can choose between glossy, matte, luster, semi-gloss, smooth rag, or textured rag. The list continues into esoteric papers such as bamboo, mulberry, and silk. Choosing the correct paper finish is both a technical and aesthetic decision.

From the technical perspective, certain printers and ink types perform best on papers designed specifically for the ink delivery method. For example, most dye-based inkjet printers require the use of a paper with a swellable coating. When the ink droplet reaches the page, it is absorbed by the paper, causing the micropores on the surface of the paper to close, encapsulating the ink droplet within the paper surface. If a paper does not contain a swellable coating on the surface, the dye ink is exposed to the elements and quickly fades. For best results from dye-based printers, be sure the paper is manufactured specifically for your printer's ink type.

With pigmented inks, the individual fragments of pigment are encapsulated in a carrier medium that protects the pigment from the environment, maintaining a long archival life regardless of the paper used. This makes pigment-based printers more versatile for photographers wanting to experiment with different paper types and finishes.

Another factor to consider when selecting among glossy or semi-gloss paper types is whether or not these papers will display a gloss differential, sometimes called bronzing. Bronzing is most commonly seen when viewing prints at an oblique angle. Areas of the photo with a high concentration of ink, such as deep shadows, appear metallic, often with a copper color. Bronzing isn't usually visible when viewing the print head-on, as you normally would, but it can be seen as you walk past a print. This is most commonly seen on glossy or semi-gloss prints made on pigment-based printers. For this reason, many photographers prefer to use luster, satin, or semi-gloss papers on pigment-based printers. Dye-based inks are less frequently affected by this problem because the inks are absorbed by the paper and therefore don't create a reflective surface on the paper.

Aesthetically speaking, you want to select a paper finish to complement your photo's content. Selecting a heavily textured paper for a softly lit portrait of a young girl at play would be as incongruous as playing heavy metal music in a fancy restaurant. Bright, vivid colors are best suited to semi-gloss, pearl, or

luster finishes, as these papers have a wider color gamut and a deep black for maximum contrast.

Softer images, muted colors, and black and white photos reproduce well on cotton rag, watercolor, or other matte papers. Matte papers have a wide variety of finishes from smooth to heavily textured, so be sure to examine the paper finish carefully before buying. Papers with a smooth finish are more subdued, making them more versatile. When printing on matte papers, you will often need to boost the saturation of your photos and add contrast to your shadows and preserve shadow detail. Matte papers absorb ink, particularly in the deep shadows, causing shadow details to bleed together unless there is su cient contrast.

Paper Color

If you carefully examine a half-dozen di erent inkjet papers, you will be surprised at the di erences in paper color. While it is natural to think of these papers as white, very few are truly neutral. Some contain a blue tint, while others are more yellow, making them warmer. The paper color imparts a subtle, yet tangible accent to your photos. A slightly blue paper often appears brighter than a pure white or yellow paper, yet a warmer paper is often better for portrait photography.

Some matte papers are very yellow, almost cream colored, and their use evokes an antique quality, similar to a sepia tone.

Paper Weight

The physical weight of a paper, often listed in grams per square meter (g/m^2), is an indication of the paper thickness and density. The heaviest papers—watercolor, rag, and other matte papers—impart a sense of quality, elegance, and durability to photos.

Heavy papers above 250 g/m^2 are too thick to run through the normal paper path on your printer. Instead, they need to be fed flat through the back of the printer. Most higher quality photo printers have a special paper feed for printing on heavy materials. Be sure to indicate the correct paper type and paper path in your print driver to ensure that the paper is fed correctly into your printer.

Optical Brightening Agents

Optical brightening agents (OBAs), sometimes called bluing agents, are added to papers to increase their apparent brightness. This can be disadvantageous for archival prints, as the OBAs can diminish over time, causing the print to dull. OBAs can also cause prints to change color in di erent light sources and can complicate the creation of custom ICC profiles for printing. Whenever possible, select papers without OBAs for fine-art printing. Look in the paper's specification sheet to determine whether a paper contains OBAs.

Printing Black and White

The last photographers slowly making the transition from film to digital are dedicated black and white photographers. The primary reason for their slow adoption to digital is

not the lack of tools for image processing, but the inferior quality of digital black and white prints. For years, digital photographers struggled to achieve the neutrality, contrast, and richness found in traditional black and white prints. The latest round of inkjet printers and specially formulated papers are quickly winning converts from traditional darkroom printing.

Three primary attributes are necessary to create a digital black and white print—neutrality, detail throughout the tonal range, and dmax:

Neutrality Only the most trained eyes can discern subtle variances in rich colors, but even a novice photographer can see slight color shifts in a black and white image. This makes printing black and white images using cyan, magenta, yellow, and black inks particularly problematic. Any imperfection in the mix of inks imparts a color cast to the photo. For many years, digital black and white photographers were forced to purchase separate printers and specialized ink sets to ensure neutral black and white prints. The most recent printers from HP, Epson, and Canon are changing this, allowing photographers to make beautiful black and white and color prints from the same printer, without any specialized equipment.

Detail Another frustration with digital black and white prints has been the lack of deep shadow detail. Frequently, deep shadows would print as pure black, limiting the effective tonal range of the printer. This was particularly problematic as the foundation of most outstanding black and white images is the detail in the shadows. This has been largely remedied in modern printers. Any remaining issues can easily be corrected in Photoshop using the "Zone System Test for Printers," discussed a bit later in the chapter.

Dmax Traditionally measured with a densitometer, the dmax, or maximum density, is used to indicate the darkest black achievable on a given printer, paper, and ink combination. Since the white of the paper (dmin) is fixed, the deeper the maximum density, the wider the contrast range available to the photographer. When comparing prints from different printers or papers, compare samples of maximum black, RGB 0, 0, 0. This will help you determine whether this printer and paper combination is well-suited for black and white printing. Deeper, richer blacks create powerful shadows in the print and serve as a visual anchor for the midtones and the highlights, making your photo appear more dynamic and lifelike.

The digital solution to these issues is the use of multiple gray ink cartridges. Instead of printing the entire tonal range using a mixture of cyan, magenta, yellow, and black, many inkjet printers today use black ink for the shadows, a mid-gray for midtones, and one or more gray inks for midtones and highlights. Additionally, many printers offer a matte black ink option for the best dmax on matte papers.

For example, my Epson 2880 uses either a matte black or photo black depending upon the paper type, and it adds a light black and a light-light black to improve detail and neutrality through the midtones and highlights.

You can also improve the quality of your black and white prints by creating a custom ICC profile for your printer. This improves the color conversions between Photoshop and your printer driver, resulting in more neutral prints and better shadow detail. I discuss the creation of custom ICC print profiles in the next section.

If you haven't tried printing black and white on today's inkjet printers, give it another try. More than likely, you'll be pleasantly surprised by the quality of the prints and the tonal control Photoshop and Lightroom give you. To get the very best from your inkjet printer, be sure to read the How To on applying the Zone System for digital printing at the end of this chapter.

Go Big! Image Upsampling in Photoshop

The increased affordability of large-format printers has led photographers to begin using these tools to make oversized prints from their digital photos. Whereas a 16 × 20 inch print used to be among the largest size printed, photographers today can print 44 × 55 from a single file and go even larger with panoramic photos.

No digital SLR creates files natively large enough for printing at such enormous sizes. Photographers need to upsample their photos to reach the final image size for printing. As you might expect, having read this far into the book, you can use some tricks to improve the quality of upsampled images in Photoshop.

Upsampling is the process of enlarging a photo's image size by adding pixels. Adding pixels can degrade the image quality, so the process is best avoided unless it's absolutely necessary. To help you maintain image quality while upsampling, I'll begin this section by demonstrating the base upsampling technique, and then I'll show you variations to use when upsampling images to more than 400 percent of their original size.

Your upsampling results will depend on the following:

Image sharpness and focus When upsampling images, you need a sharp, well-focused image. During the upsampling process, Photoshop attempts to add pixels in a way that preserves the integrity of edges and maintains detail. It does this by evaluating the RGB values of surrounding pixels, and then adds a pixel of like color and tone. The sharper your images are to begin with, the more accurate Photoshop will be in this process. When upsampling, a sharp photo doesn't give marginally better results than a soft image; it gives exponentially better results.

Image quality In addition to a sharp photo, you'll get the best results when your image is free from image noise, chromatic aberration, or other imaging problems. These flaws become magnified

many times in a large print. A colored highlight caused by chromatic aberration along a high contrast edge may be barely perceptible in the original file, but it will be easy to see in a large print. Make sure you've carefully scrutinized your photo at 100 percent view before beginning the upsampling process.

Bit depth The upsampling process gives better results from a high-bit image. Export your image from Lightroom as a 16-bpc image for the upsampling process.

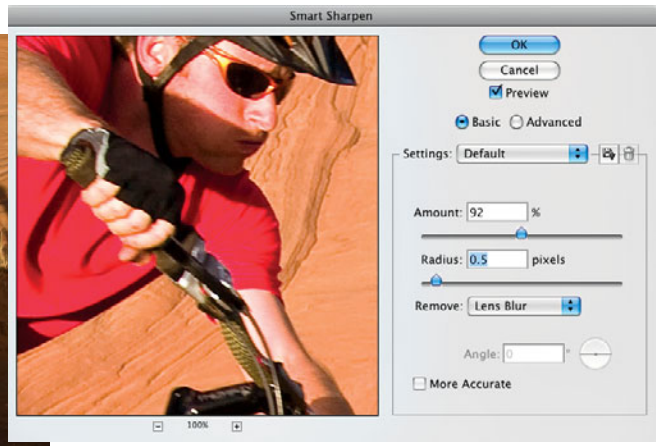
If your image meets these three criteria, it is a good candidate for upsampling. One of the great advantages of digital capture over film is the ability to upsample digitally created images without a significant loss of detail. In a recent test, I used a variety of methods to upsample an image 800 percent and was stunned by how good the results were. I could never have made enlargements this big from my film images!

Upsampling: Base Method

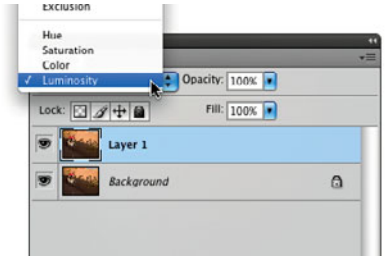
Open an image you want to upsample into Photoshop.

Step 1 Duplicate the background layer by pressing cmd-j (Mac) or ctrl-j (Windows)—or, if you have a layered image, create a separate, merged layer exactly as you would for sharpening by pressing cmd-option-shift-e (Mac) or ctrl-alt-shift-e (Windows). To maintain quality during the upsampling process, you'll need to add some sharpening to preserve detail. It is helpful to perform this sharpening on a separate layer for flexibility.

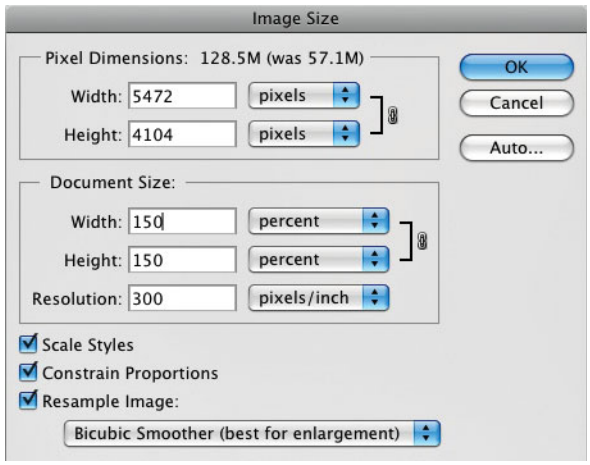
Step 2 Using Smart Sharpen or Unsharp Mask, add a light amount of sharpening to the image. I typically use Smart Sharpen set to an Amount around 100 and a Radius at around 0.5. The sharpening helps improve the definition of edges in the photo, making upsampling more effective.



Step 3 After applying the sharpening, change the layer blending mode from Normal to Luminosity. T is prevents the sharpening from exaggerating any chromatic aberration or color fringing in the image.



Step 4 In the Image Size dialog box (Image > Image Size), make sure Resample Image is checked, and then change the units in the Document Size fields from inches to percent. Enter 150 in the Width or Height field to enlarge the image 150 percent. By enlarging the photo in 150 percent increments, you get a smoother, more natural-looking image than performing a big enlargement in one step. If you are enlarging your photo less than 150 percent the original size, enter the desired image size in the Width, Height, and Resolution fields. Finally, change the Resampling method from Bicubic to Bicubic Smoother and click OK.



Step 5 Repeat steps 2 and 4 until you reach your desired image size. If your image size does not fall exactly on a 150 percent increment, simply enter the remaining values into the Width, Height, and Resolution fields. For example, you may perform three passes of sharpening and enlarging (150 percent, 150 percent, and 120 percent) to reach your final image size.

Step 6 Mask out any areas that have become too sharp as a result of multiple passes of sharpening.

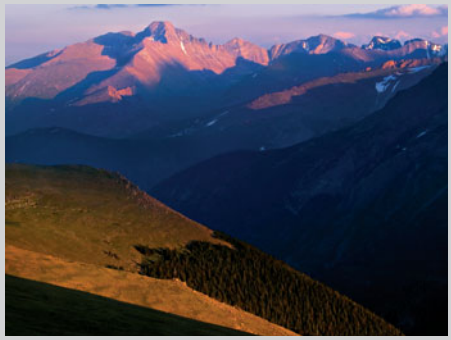
T is technique works very well for upsampling images up to 400 percent. Once you go above a 400 percent enlargement, you need to begin adding contrast in addition to sharpness and increase the Radius setting in either Smart Sharpen or Unsharp Mask. Since the original detail has been enlarged considerably, a Radius setting of 0.5 will

have little or no effect on the sharpness of the image. A better choice is to switch to Unsharp Mask and use a Radius setting between 2 and 4 pixels with an Amount around 100. Use the threshold to remove the sharpening from areas of smooth tone that may be negatively impacted by additional rounds of sharpening.

Tip As you continue enlarging the photo, you will find yourself working on a very large file, several gigabytes in size. Opening, closing, and saving such a large file can become problematic, particularly on an older computer or one with insufficient RAM. I tend to work on big enlargements in the evening so I can adjust the image size, leave the computer for 30 to 45 minutes, and then come back for the pass. Once your file surpasses 2 gigabytes, you will need to save your photo in Photoshop's Large Document Format (PSB).

Note Many older Windows machines use NTFS (Windows NT+ File System) formatting for their hard drives. NTFS-formatted drives cannot store a file larger than 2GB in size. If you encounter this problem, you can save your photo to an external hard drive instead of your computer's internal hard drive.

Make a Small Sample of a Large Print



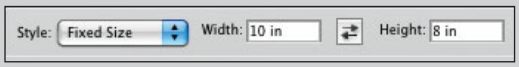
An oversized print is an impressive sight to behold. Unfortunately, large prints are also time-consuming and expensive to create, making it essential that you get the color, contrast, and sharpness of the print right the first time.

For any large print, you'll want to create a smaller proof print to check overall color and tone. In addition, I recommend creating a second proof of a segment of the photo, printed at actual size. For example, if you are creating a 20 × 30 inch print, make an 8 × 10 inch proof print of the most important detail in the photo. I call this a detail proof. This way, you can use one proof for judging overall tone and color and a detail proof for judging the results of your upsampling technique, image contrast, and sharpness.

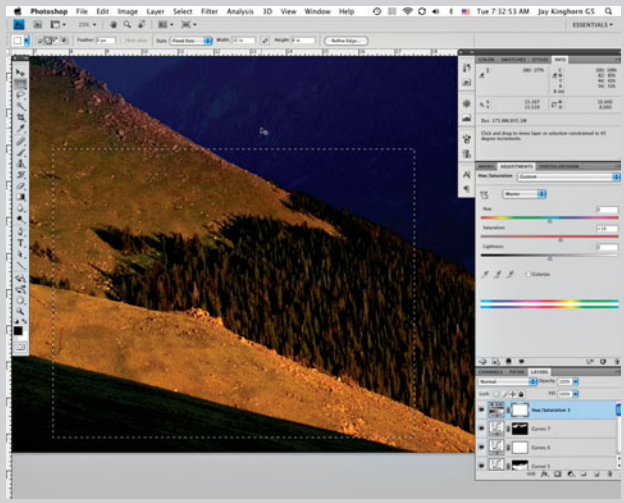
To create a detail proof in Photoshop, follow these steps:

Step 1 After performing your upsampling and other image corrections, duplicate your photo (Image > Duplicate).

Step 2 Select the Rectangular Marquee tool from the Toolbox, and then, in the Options bar, set the Style to Fixed Size and enter the dimensions for your detail proof.



Step 3 Click the image near the area of most important detail. This will create a selection at the size of your detail proof.



Step 4 Crop the photo to the selected area (Image > Crop). This crops the photo to the correct size for printing your detail proof.

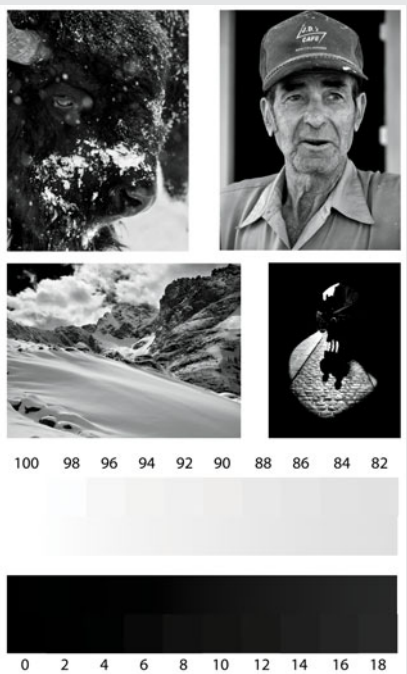
If you are printing to a wide-format printer using roll paper, you may want to print a strip of the image to serve as your detail proof. For example, if you are printing on a 24-inch roll, you can set your Rectangular Marquee to 8 × 24 inches, creating a short banner from the full image.

How To: Printing Fine Art from Photoshop

While color management is a powerful tool to help streamline the printing process and dramatically improve print consistency, it cannot fully account for many aspects of the human visual system. For the best fine art prints, you will often need to make a test print to evaluate tone, color, contrast, and sharpness at the final print size.

Zone System Test for Printers

Frequently, inkjet printers are unable to print detail in the deepest shadows, causing them to print as solid black. For photos with important shadow detail, particularly black and white images, you'll want to adjust the tonal range within your photo to match the printable tonal range of the paper and printer combination you use. This clipping is sometimes visible in a soft proof with the Black Ink option enabled. Your most accurate tool for assessing shadow clipping will be a test target to help you determine the exact point at which your printer is unable to reproduce deep shadow detail. You can then correct your image prior to printing to ensure that all the highlight and shadow detail in your photo will be present in the finished print.

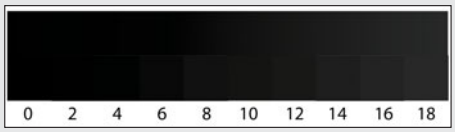


A good print target contains a combination of synthetic tests to assess specific image attributes, such as shadow detail or gray balance, and a handful of images to see how the printer reproduces actual images. I've created this test target to assess the black and white printing capabilities of various papers and ICC profiles.

On the Web

The white and gray swatches at the bottom of the target are designed to test a printer's ability to hold detail in extreme highlights and shadows. If you'd like to incorporate these patches into your test target, you can download the target at www.perfectdigitalphotography.com/printing.php.

Examining the target closely, you'll find both a numbered swatch corresponding to a specific print density and a continuous gradient to help you assess the smoothness of transitions between tones.



Step 1

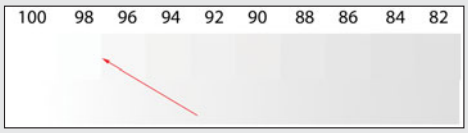
Print the test target exactly the same way you would any other print, and look for the darkest two blocks containing visible separation between them. Ideally, this will be between 0 and 2 percent. More often, you'll find separation between 4 and 6 percent. Note this on the file.

Step 2

Examine the corresponding gradient, looking for any abrupt transitions or breaks in the continuity of the gradient. There should be a smooth transition from one tone to the other.

Step 3

Repeat steps 1 and 2 for the highlight blocks, making a note of the first highlight block separate from paper white.

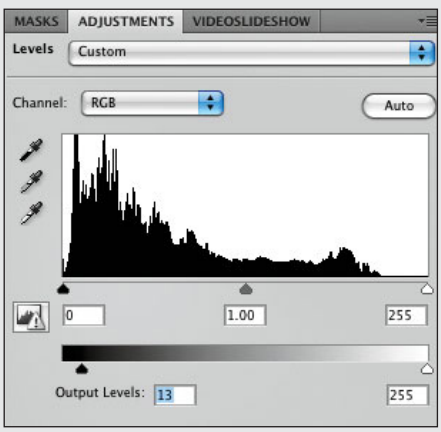


Step 4

In Photoshop, use the soft proof feature to proof your test target using the ICC profile you use for printing. Check to see whether or not the preview correctly displays the loss of detail at the highlight and shadow ends. If not, you will need to adjust the tonal range of the image to match the printable range of your printer.

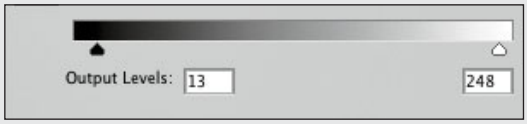
Step 5

Switch from the test target to the photo you want to print. Select the topmost layer in your document and then create a new Levels Adjustments layer. Here, you'll adjust the Output Levels to contract the tonal range of your photo to match your printable tonal range. Unfortunately, this requires a little math. Calculate the difference between the absolute highlight or shadow end and the actual end of the tonal range, and then multiply by 2.5 to translate the percentages used in the charts to the 0–255 scale used in Photoshop. For example, if your first shadow appears between 4 and 6 percent, average the two numbers and then multiply that by 2.5 to calculate the correction needed. In this example 5 × 2.5 = 12.5, or 13, since Photoshop works only in whole numbers. Enter 13 in the Shadows portion of the Output Levels field.



Step 6

Repeat the calculations for the highlights and enter the difference in the highlight field to the right of the Output Levels field of the Levels dialog. In my example, the print showed highlight detail between 96 and 98 percent, so I set my highlight levels adjustment at 248. The average of 96 and 98 = 97. 100 – 97 = 3, and 3 × 2.5 = 7.5. In this case, I rounded down to allow a few highlights to print as pure white to preserve some of the contrast range of the photo.



After performing this correction, I could see that my image lost a little midtone contrast. I restored this by adding a Curves adjustment to boost contrast in the midtones, being careful not to adjust the deep shadows or extreme highlights.

You may wish to experiment with di erent numbers in the Output Levels correction depending on image content. If you have bright specular highlights or deep silhouetted shadows, you'll want those to print as pure white or full black. Go ahead and leave the Output Levels set at 0 for those images. Most other images fall somewhere in between. Use the images included on your test target as a guide for your corrections.

Feel free to apply an Output Levels correction to the test target and reprint it. Compare the quality of the corrected images in the second target to the uncorrected images in the first. T is will help you determine what, if any, correction is necessary for your printer and paper. I find this technique most useful when printing to a watercolor or other highly absorbent matte paper, where the loss of shadow detail is significant. As you continue to develop as a photographer, you'll be better able to predict the corrections necessary for creating a great print every time.

MULTIMEDIA EXPLORATIONS

e World Wide Web has become more than a bulletin board for posting simple galleries of text and images. It has evolved into a rich, experimental platform for combining still photos with video, text, audio, and graphics to create complex visual stories. ese multimedia presentations challenge our conventional notions of photography while simultaneously allowing photographers great freedom to tell broader, more dynamic stories than a single still image can convey. Although a print is still considered the purest presentation of photography, multimedia is deeply engaging, informing and entertaining audiences around the world.

Dubois Badlands, Dubois, Wyoming. Olympus E-3, 12 60mm lens 1/25 second at f22, ISO 100