

# THE DIGITAL NEGATIVE



Raw Image Processing in Lightroom, Camera Raw, and Photoshop  
**SECOND EDITION**

**JEFF SCHEWE**

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## **THE DIGITAL NEGATIVE:**

### **RAW IMAGE PROCESSING IN LIGHTROOM, CAMERA RAW, AND PHOTOSHOP**

Second Edition

**Jeff Schewe**

Peachpit Press

[www.peachpit.com](http://www.peachpit.com)

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ISBN-13: 9780134033174

ISBN-10: 0134033175

9 8 7 6 5 4 3 2 1

Printed and bound in the United States of America

*Dedicated to the lasting memory and substantial contributions of Bruce Fraser.  
Thanks, Bruce, from all of us.*

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# INTRODUCTION

*The Digital Negative, 2nd Edition* is about raw image processing of digital camera captures. It details what makes for a really good digital negative and how to harness the massive power of Lightroom and Camera Raw to extract the best-possible raw rendering of that digital negative. It's also about when and how to deploy Photoshop to take your rendered digital negatives further using the power of Photoshop to perfect the images that need and deserve the attention.

I drill down on the Lightroom Develop module and the Camera Raw plug-in extensively—that's the meat of this book. While *parametric image editing* (editing the parameters instead of the image pixels in Lightroom and Camera Raw) has advanced considerably since Camera Raw was first introduced, there is still a use for that venerable old lady, Photoshop.

I wrote this book because there didn't seem to be an optimal source of information that suitably covered the main topic without being relegated to covering everything about a single application. The world doesn't need yet another Lightroom or Photoshop book. What I thought was needed, though, was a book about the essence of raw image processing, regardless of the imaging application. I set out to write a book about cross-application integration that addressed the needs of photographers who want to optimize their images for the best-possible image quality.

I called the book *The Digital Negative* for a reason. In my formative years as a young photographer, I read a series of books by Ansel Adams that formed the genesis of my infatuation with and addiction to photography. Ansel's books—*The Camera*, *The Negative*, and *The Print*—had a huge impact and greatly helped advance my knowledge of photography. Time will tell if I can have even a minute fraction of the impact on others that his books had on me.

Who am I and why should I write this book? Well, I'm a graduate of Rochester Institute of Technology (RIT), with two degrees in photography. I was a commercial

advertising photographer in Chicago for over 30 years (yeah, I won a few awards). I was an early adopter of digital imaging—my first photo assignment that was manipulated on a computer was in 1984 (the year the first Macintosh computer shipped). No, I didn't do the digital imaging—a pioneering company called Digital Transparencies, Inc., in Houston, Texas, did.

In 1992, I started doing my own Photoshop digital imaging using Photoshop 2.0. I was one of the first off-site Photoshop alpha testers (*alpha* meaning way before any sort of final coding is done and before it's really usable). I got to know and work with many of the Photoshop engineers because of this testing. When I mention names like Thomas Knoll (the co-author of Photoshop) or Mark Hamburg (the No. 2 Photoshop engineer and founding engineer of Lightroom), it is not to drop names, but because these guys are friends of mine. I've worked with them a lot over the years. I want people to know their names and give them the respect they deserve.

I was significantly involved in the early development of both Camera Raw and Lightroom—not because Adobe was paying me tons of money (alpha testers work for free), but for the selfish motive of advancing and improving the tools I personally wanted to use.

I've also had the good fortune to meet a lot of the leading experts in the field: I want to express my sincere appreciation of one dearly departed friend, Bruce Fraser, noted author and educator, for taking me under his wing. I had the singular honor of joining Bruce and some other friends in forming a company named Pixel Genius, which developed Photoshop plug-ins. I also fulfilled Bruce's wish that I take over and act as co-author of two of the books he authored, *Real World Camera Raw with Adobe Photoshop* and *Real World Image Sharpening with Adobe Photoshop, Camera Raw, and Lightroom*. I've also co-authored a book with another good friend and colleague, Martin Evening, titled *Adobe Photoshop for Photographers: The Ultimate Workshop*. So, now, with this book, I'm a full-fledged solo author!

By way of disclosure, let me just say that I am not and never have been an employee of Adobe (even though, over the years, I've worked with Adobe on software development). I don't have any contracts or testimonials with any camera companies. In the book, I frequently mention specific cameras and lenses I used for image captures. I do so to provide a provenance of how and with what gear an image was captured, not to promote any specific camera. I used those cameras because, well, those are the cameras I bought and paid for (although I've been known to get some really good deals). My opinions are my own, and anybody who knows me knows that no company could influence me. So, when I write something, you can be assured my motives are pure (even if my tone can be a bit, uh, verbally aggressive).

I owe a large debt of gratitude to many people, and since it's my book, I'll take the time to mention them. First, we all owe a huge debt of gratitude to two guys, John

Knoll, and his brother, Thomas, who really started this whole digital image revolution by co-authoring Photoshop. I also send sincere thanks to Mark Hamburg for his willingness to put up with my quirky ways and sometimes actually listen to me when I told him what he should do. There are a ton of people at Adobe to thank: Russell Preston Brown for being a co-conspirator, Chris Cox for a lot of sneaky things he put into Photoshop, Russell Williams for striving for Photoshop excellence, and John Nack (and most recently Bryan Hughes) for being Photoshop product managers who really care about the end user. On the Camera Raw team, special thanks go to Eric Chan, who will always listen and do the right thing (even if it's a pain), and the gone but not forgotten Zalman Stern (he didn't die—he just went to work for Facebook).

I also thank my good friends and partners at Pixel Genius—Martin Evening, Mac Holbert, Mike Keppel, Seth Resnick, and Andrew Rodney—and our gone but not forgotten members, Mike Skurski and Bruce Fraser. We all miss them and so does the industry. I'll also give a shout-out to the Pixel Mafia—you know who you are....

Thanks to the Peachpit “Dream Team” (that’s what Bruce used to call them, and I wholeheartedly agree): Valerie Witte, who was the newly appointed acquisitions and project editor (which means she had to put up with my foolishness and tardy submissions); my production editor, Lisa Brazieal, who conspired with me to allow me to do what I thought was best; and my development and copy editor, Anne Marie Walker, who had the unenviable job of reading and rereading all my terrible writing and correcting me to make me sound like I have half a clue. Thanks also to the book compositor, Kim Scott of Bumpy Design, who did an excellent job of laying out the book and making my figures work. Thanks to my proofreader, Patricia Pane, for catching all the small stuff, and indexer, Emily Glossbrenner, for making stuff easy to find. Big thanks also go to Mimi Heft, for the cover and interior design excellence (and for putting up with my histrionics)—seriously, I never would’ve picked *that* image for the cover, but it really works! And a special debt of gratitude to Rebecca Gulick who was my first acquisitions and project editor who helped me get my two titles to print.

I also owe a huge debt of gratitude and massive appreciation to my long-suffering wife, Rebecca (Becky), who is always the first person to read the drivel I write (and tell me how to make it sound intelligible, which always makes me look good to my copy editor). She stoically puts up with all my inattention and bad habits when I’m writing and seems to genuinely love me in spite of myself. Thanks also to my loving daughter, Erica, who suffers the loss of her dad while I’m under deadline. She gets back at me by being one my harshest critics, which, I think, makes us even.

My thanks also go to you, the reader, for taking the time to at least get this far. I hope you’ll find this book beneficial in advancing your image-processing excellence. You can find additional information on the book’s companion website at [www.thedigitalnegativebook.com](http://www.thedigitalnegativebook.com).

—Jeff Schewe, July 2015

## THE CREATIVE CLOUD SAGA

When Adobe announced the cessation of the Creative Suite and the release of the Creative Cloud, some users were less than completely satisfied (read they were pretty upset). I understand their dissatisfaction even if I don't agree.

Back when Adobe released Creative Suite 5.5 (meaning Photoshop 5.5), the company started down the path of offering subscription licenses to its software as well as perpetual licenses (perpetual meaning for the perpetuity of the software or until hardware and operating system ceased to support the software).

With the launch of Creative Cloud (such as Photoshop CC and all the other apps), Adobe changed the game plan. It stopped producing the Creative Suite—which killed perpetual licenses and forced users into a subscription-only license. This was done for sound technical reasons, even though a lot of people claimed it was for purely business reasons: this is incorrect.

The main reason is that there are a lot of applications included in the Creative Suite/Creative Cloud—by last count over 25 applications. To provide both a perpetual license and a subscription license was virtually impossible. Running dual code bases for 25 apps was technically unfeasible. Adobe made the difficult (and unpopular) decision to kill off perpetual licenses.

There was a good reason for this even if many users failed to grasp it. The way Adobe accounts for its development costs of applications precludes it from adding new features to applications with perpetual licenses after the end of the quarter that application was shipped. Adobe is limited to bug fixes and maintenance releases only. This is not a problem for subscription licenses. An application licensed under a subscription license can be updated at any time a new feature is ready.

So, this is where the disconnect becomes evident. Adobe can update and add new features to subscription-based licenses but cannot do so for perpetual licensed products.

For all of the Creative Cloud applications, once you subscribe, you get free updated versions with new features for as long as you keep the subscription active—and this is where users get a bit cranky. Users need to keep paying for continual access to their applications.

Personally, I don't have a problem with this. I use a lot of Adobe's applications: Photoshop, InDesign, Illustrator, and Lightroom (I don't use any video apps). So paying for a subscription to Creative Cloud is a no-brainer. For me, it's a deal.

As a direct result of the negative reaction, Adobe came out with a special *Photographer's Package* that bundled both Photoshop and Lightroom as a package for \$9.99/month (USD—price may vary by region). I know exactly who helped push this package: he had a little bit to do with starting this whole digital image processing industry.

Do I love the Creative Cloud? Not really, but although it's a bit of a pain, I've come to appreciate it. I like getting more frequent feature updates. Do I understand why Adobe did it? Yes, and I tend to agree—in general. Do I hate the Creative Cloud application? Absolutely. When I recently had an issue with the Photoshop CC 2015.1 update, I couldn't run Batch processing. My only recourse was to uninstall Photoshop CC 2015 and re-install Photoshop CC 2015.1. It sucked. Of course, with my new faster Internet it sucked less.

When Lightroom CC 2015.1 was released, a lot of the perpetual Lightroom 6.1 users were upset because Dehaze wasn't included with Lightroom 6.1. It should not have surprised users since Dehaze didn't make the cut for the End-Of-Quarter cutoff. But, to be honest, regular users shouldn't be expected to know this stuff and Adobe didn't really explain the issue well.

Camera Raw 9.1 will continue to work in Photoshop CS6 for now (which is still available as a perpetual license), but with no new features added to the CC versions. However, there are no certainties how

long that will be true with future versions of Camera Raw. If future versions of Camera Raw will not work, users will need to either use the free DNG Converter or upgrade to Photoshop CC for new camera support. Lightroom 6 will be available for the foreseeable future. Adobe has gone on record stating it has no plans to kill the perpetual license, but Lightroom 6 will not get new features, only new camera support and bug fixes. How long Adobe will continue to release new perpetual versions of Lightroom is unknown.

Adobe is still selling Photoshop CS6, although all it will receive are bug fixes and maintenance releases; no new features will be added. Camera Raw 9.1 will work in Photoshop CS6, but you won't have access to the new features. Ironically, Camera Raw 9.1, when hosted inside of Photoshop CS6, will actually process the image adjustments that may have been made using Camera Raw 9.x in Lightroom CC or Camera Raw when hosted by Photoshop CC. So, if somebody sends you a file from Photoshop CC or Lightroom CC, you can still process the image in Photoshop CS6.

Adobe has changed one aspect of Lightroom CC (and subscription users of Lightroom 5.x) that addresses users' access to their images and adjustments. Lightroom CC (and 5.5 or later) will continue to launch even after the subscription expires. You won't have access to the Develop or the Maps modules, and Lightroom Mobile will cease to work. The desktop application will continue to launch and provide access to the photographs managed within Lightroom Library as well as the Slideshow, Web, Book, or Print modules, and you can use the Export function as well.

For Photoshop CC, when your subscription ends, the application will no longer launch.

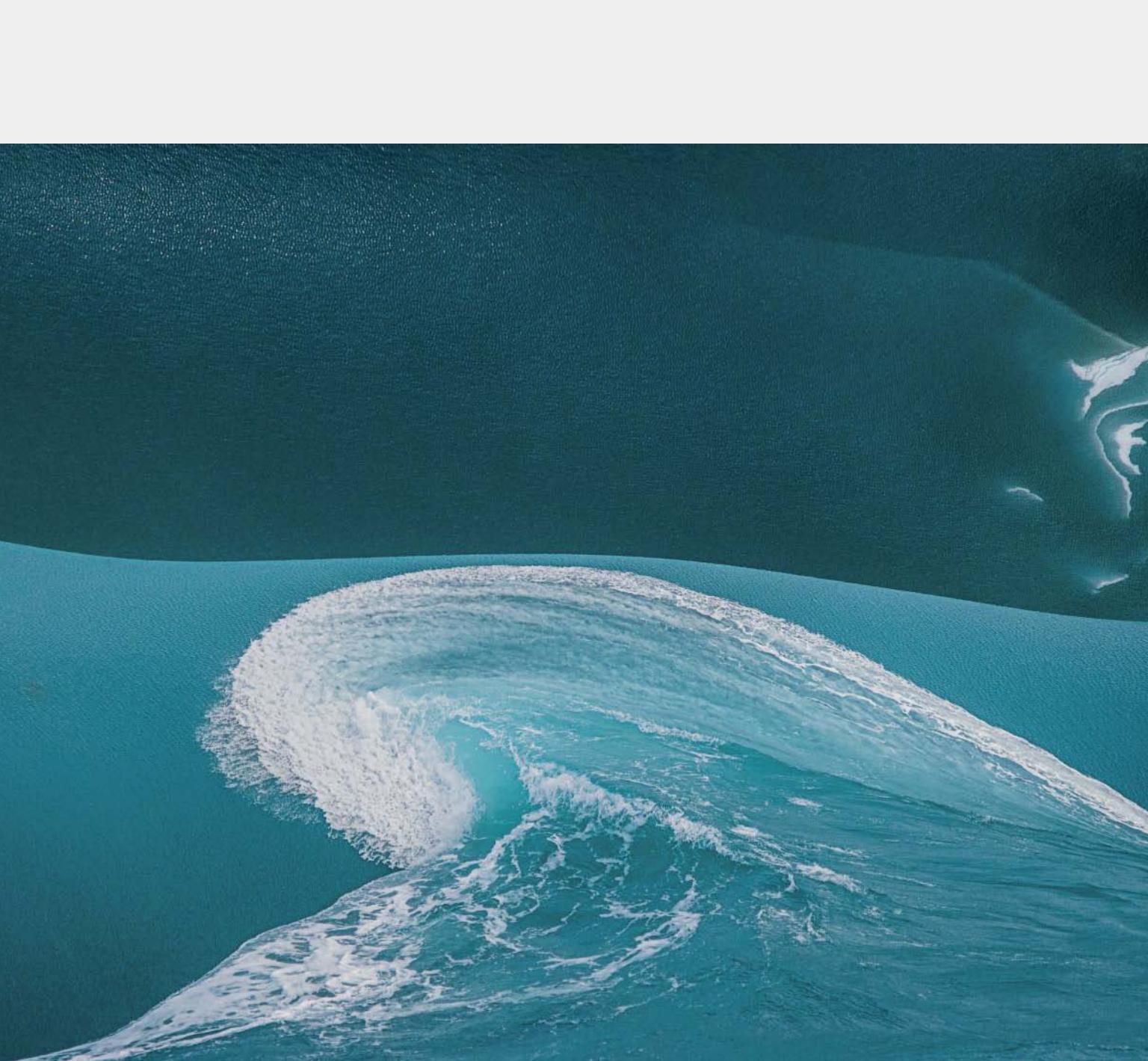
I've mentioned Lightroom Mobile, and you might wonder if I've included a section about it in this book. Nope. From my point of view, Lightroom Mobile doesn't really address my raw processing workflow. At this

point, Lightroom Mobile needs to grow a lot before I incorporate it into my workflow.

I do encourage continued development of Lightroom Mobile. Some of the things I would like to see are further features for selection editing and key wording. I would also like to be able to sync the desktop and mobile device using a local area network and not have to rely on the cloud syncing. I go to some pretty remote places where getting a cell signal or Internet access is impossible, which renders mobile syncing useless.

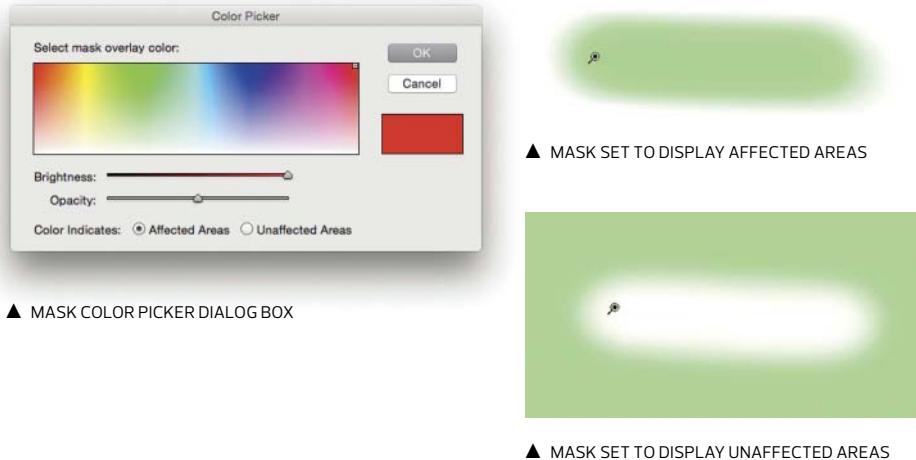
All in all, the last couple of years have seen a lot of changes to the way people work and how software developers are adapting their business models. Many people like the subscription model with the ability to get new features more quickly. Another advantage is that the subscription model allows cross-platform application use. I know many people have a Windows desktop and an Apple MacBook Pro for the field. Will Adobe lose some users because of subscription? Sure, I suspect Adobe knows that. Will this give some other enterprising developer incentive to develop new applications? Yep, it already has. Competition breeds excellence, and it's good for the industry—I like that!

Rather than deal with this issue in the chapters, I chose to write about it in the Introduction of the book and not clutter the working chapters. So now, on to the book!



Water swirling over a blue iceberg in Antarctica. The blue iceberg is made of glacial ice resulting from a high concentration of color, microorganisms, and compacted ice with little or no air. Shot with a Canon EOS 1Ds MII as ISO 200 with a 400mm lens at F5.0.

**FIGURE 3.80** Mask Color Picker and display options.



There is a nice little addition to the Camera Raw version of this tool. When you want to check the mask in Camera Raw (keyboard shortcut: Y), you can have complete control over the color of the mask overlay rather than being limited to the colors shown in Lightroom. You also have what I think is a pretty big thing: the ability to control whether the mask preview is of the affected areas or the unaffected areas in the image. **Figure 3.80** shows the Camera Raw mask Color Picker and the ability to change how the mask is displayed.

## MERGE TO HIGH DYNAMIC RANGE (HDR) AND MERGE TO PANORAMA IN LIGHTROOM AND CAMERA RAW

In the old days (before Lightroom CC/6 and ACR 9), if you wanted to do an HDR or pano merge, you had to first take your images into Photoshop. Now you can do that directly in Lightroom and Camera Raw.

Both Lightroom and Camera Raw use the same functionality and UI. The manner of accessing those features is different. However, both Preview windows behave the same way with the same options and limitations. There are some limitations: the preview is limited to 2048 pixels in the long dimension if you're using a Retina-type, high-resolution display or 1024 pixels when using a normal display. At this point the engineers have said this is due to performance issues, and you can't zoom into

the preview. Hopefully, that will change in the future. It should also be noted that the UI functionality offers very little control compared to third-party applications dedicated to HDR and pano merging. However, the results are actually very good.

## HDR Merging in Camera Raw

To do an HDR merge in Camera Raw, you must first select multiple images in Bridge and open the images in the Filmstrip mode in Camera Raw. Once in Camera Raw, select the images you want to merge and use the flyout menu at the top of the filmstrip, as shown in **Figure 3.81**. You'll see that the “most selected image” is at the bottom. The merge function produces a new DNG based on the most selected image's filename and appends a –HDR to the filename. If you do multiple HDR merges, the later merges receive a number to avoid overwriting the previous –HDR file. The most selected image is also the one used to propagate EXIF metadata.

Once you select the option, a preview window comes up allowing a selection of various functions. **Figure 3.82** shows the HDR Merge Preview window.



**FIGURE 3.81** Flyout menu in Camera Raw.

**FIGURE 3.82** The HDR Merge Preview window for Camera Raw.



▲ THE MAIN PREVIEW WINDOW

► DETAIL OF THE OPTIONS

**TIP** From within Camera Raw you can use the shortcut key Option+M (Mac) or Alt+M (Windows) to access the Merge to HDR. Command+M (Mac) or Ctrl+M (Windows) will bring up the Merge to Panorama. However, if you add the Shift key to the preceding commands, you can bypass the Preview window and Camera Raw will do the merge with whatever settings you used last. This is handy if you are doing a lot of merges!

There are various options to choose from:

- **Auto Align** attempts to align images prior to merging. I use this all the time, even if I've shot the bracket on a tripod. If you handhold the bracket, you really should use this option.
- **Auto Tone** applies the default auto-exposure corrections for the image. This can be useful, but since the settings are parametric, you can always change them later.
- **Deghost Amount** uses an algorithm to determine which of the bracketed shots to use if there is any movement (ghosts) between exposures. In this image of redwood trees in a forest, the breeze moved some of the branches. There was also a problem with a slow shutter speed, which introduced some motion blur in the longest exposure.
- **Show Deghost Overlay** shows a preview of where the deghosting will occur.

**Figure 3.83** shows the various deghosting options and the Deghost Overlay for each option. In the first figure, I've selected the option to use Auto Tone to lighten the image for better previewing.

How well did Camera Raw do with the deghosting? I'll show you in a moment, but first I wanted to cover some of the details of using Camera Raw's DNG HDR. First, the resulting file is a Linear DNG, which means it's not a completely raw file;



◀ THE IMAGE  
WITHOUT  
DEGHOSTING

► THE NONE OPTION  
SELECTED

HDR Options

Auto Align

Auto Tone

Deghost Amount

Show Deghost Overlay



◀ THE IMAGE WITH  
LOW DEGHOSTING

► THE LOW OPTION  
SELECTED

HDR Options

Auto Align

Auto Tone

Deghost Amount

Show Deghost Overlay



◀ THE IMAGE WITH  
MEDIUM DEGHOSTING

► THE MEDIUM  
OPTION SELECTED

HDR Options

Auto Align

Auto Tone

Deghost Amount

Show Deghost Overlay



◀ THE IMAGE WITH  
HIGH DEGHOSTING

► THE HIGH  
DEGHOSTING OPTION  
SELECTED

HDR Options

Auto Align

Auto Tone

Deghost Amount

Show Deghost Overlay

**FIGURE 3.83** The Deghosting Amount options and overlay previews.

**NOTE** If the discussion about floating-point and integer formats makes your head spin (like it does mine), just Google it if you want the full story. Just be sure you have your propeller beanie hat on.

it's what I call a half-baked raw file. The image has been demosaiced, but it's still a linear gamma (1.0). Next, the resulting DNG file is stored as a 16-bit floating-point image, but the processing applied is done in 32-bit floating-point. Don't confuse 16-bit floating-point to 16-bit integer images; it's still a floating-point image. You can use all the processing tools in Camera Raw to adjust the image. However, one thing to note is instead of the normal Exposure range of  $\pm 4$  stops, the HDR range is expanded to  $\pm 10$  stops. The other adjustments remain the same.

Also, when doing an HDR merge, Camera Raw ignores all the tone adjustments you may have already made, as well as any local adjustments, including spot healing. So, you may as well save your time by working on the HDR image after merging and not bother working on your original raw files. The adjustments you can (and should) make are lens corrections, image sharpening, and noise reduction. Applying these before the merge will aid in the production of an optimal merge result.

Okay, back to the results. I've zoomed way into the four HDR DNG files I produced. They show extreme detail of an area in the upper right of the trees. **Figure 3.84** shows the results.

**FIGURE 3.84** Comparing the Deghosting Amount options.



▲ IMAGE WITHOUT DEGHOSTING



▲ IMAGE WITH LOW DEGHOSTING



▲ IMAGE WITH MEDIUM DEGHOSTING

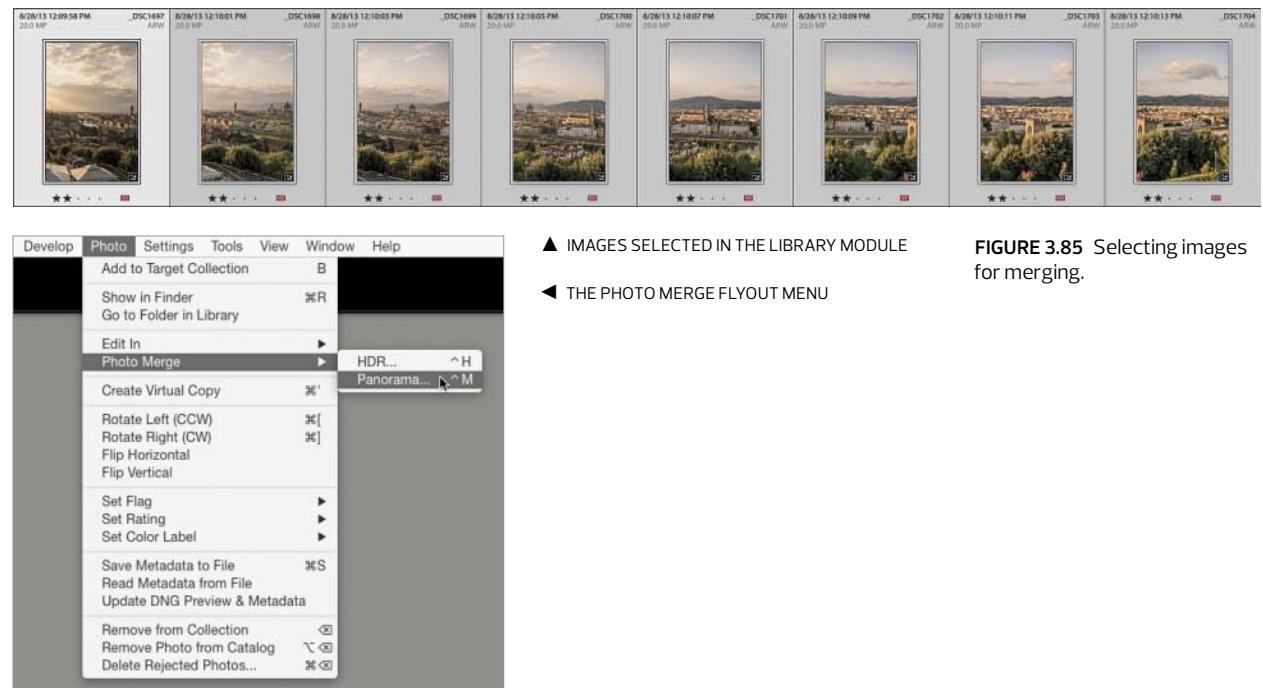


▲ IMAGE WITH HIGH DEGHOSTING

As you can see, merging images that contain movement can lead to anomalies in the merged result. In this case, the only option that did a decent, but not 100 percent perfect job, was the High option. There is still a tiny hint of the anomalies, but depending on the size you need to use the image, they would likely be invisible. Remember, we're pixel-peeping here. If Camera Raw's deghosting isn't up to your standards, you'll need to resort to a special purpose application, such as Photomatix Pro ([www.hdrsoft.com](http://www.hdrsoft.com)), which includes a Lightroom plug-in for improved workflow. You still need to render and export the images in the plug-in and return them to Lightroom as 32-bit TIFF files, but working on them in Lightroom works well.

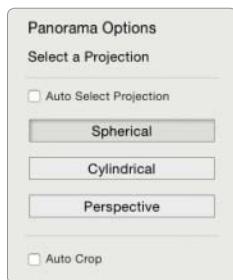
## Pano Merging in Lightroom

The Lightroom HDR and Panorama functions are found in either the Library or Develop modules in the Photo menu under Photo Merge. Select multiple images in the Library or the filmstrip in Develop and choose Panorama. **Figure 3.85** shows the images selected and the flyout menu from Photo Merge. I used eight shots of the city center in Florence, Italy, which I took with my Sony DSC RX 100M2 22 MP camera. I brought that point-and-shoot camera with me when I went to Italy with my wife so I could stay married (she doesn't like it when I drag lots of cameras and lenses along with me).

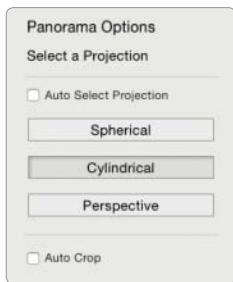


**FIGURE 3.85** Selecting images for merging.

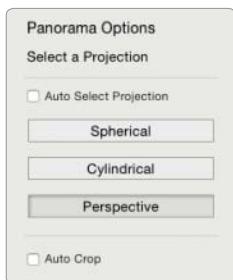
**FIGURE 3.86** Comparing the Projection options.



▲ THE SPHERICAL PROJECTION



▲ THE CYLINDRICAL PROJECTION



▲ THE PERSPECTIVE PROJECTION

The Panorama Merge Preview window offers various options, including the option to Auto Select Projection, three projection options, and an Auto Crop checkbox. I tend not to use the Auto Select Projection because I prefer to see the results and choose for myself. The three projections are

- **Spherical:** This projection treats the pano merge like it was projected on the inside of a sphere. It does not do any corrections to perspective.
- **Cylindrical:** Instead of a sphere, the projection is based on a cylinder. This projection also does not do perspective correction and usually produces a taller merge than Spherical.
- **Perspective:** This projection uses the center image to determine the correct perspective correction and merges the other images to match the perspective.

Which projection you use is really dictated by the subject and what you are trying to accomplish. I generally use Cylindrical for landscape pano merges because I don't care about trying to correct for perspectives out in nature. If you have buildings in your images, Perspective is a better projection choice. You do tend to lose a lot of the image because of the way the Perspective projection accomplishes the corrections for the merge. **Figure 3.86** on the previous page shows the three projection options.

You can see that the Spherical and Cylindrical projections are very similar. They both exhibit problems with distortions, but the merge looks okay. The Perspective Projection has the typical "bow tie" effect, but the buildings are corrected. **Figure 3.87** shows the result of selecting the Auto Crop option. Remember that this is a parametric adjustment so you can always change the crop in the Develop module.



**FIGURE 3.87** Auto Crop turned on.

**TIP** From within Lightroom you can use the shortcut key Control+M (Mac) or Ctrl+M (Windows) to access the Panorama merge. Control+H (Mac) or Ctrl+H (Windows) will bring up the Merge to HDR. However, if you add the Shift key to the preceding commands, you can bypass the Preview window and Lightroom will do the merge with whatever settings you used last. This is handy if you are doing a lot of merges!

The merge functions in Lightroom have the same preview limitations as Camera Raw: 2048 pixels for Retina displays and 1024 pixels for normal displays. The Merge to Panorama does honor and use all global adjustments but not local adjustments, including spot healing, which is a bummer. However, I got an indication from an engineer that not keeping spot healing spots was an oversight, not intentional. So there's hope that in the future spot healing will be honored (yippee). With the HDR merge I recommended applying lens correction before the merge. With Merge to Panorama there's no need because the lens corrections will automatically be applied as long as you have them. If you don't have a lens profile, you can apply manual corrections.

There are some other limitations with Merge to Panorama, primarily relating to the size of the resulting merged image. The maximum pixel dimension on the longest side is 64,000 pixels and a maximum file size of 512 MP. If you are making really long pano merges, you may hit the limit.

There's another limitation, generally only encountered when using the Perspective projection. You may get an error *Unable to merge the photos. Please try a different Projection option*. When this happens, you'll usually be able to use either the Spherical or Cylindrical projections. However, there can be times when none of the projections will work. This is usually caused by not leaving enough image overlap between images. I generally overlap between  $\frac{1}{3}$  to  $\frac{1}{2}$  to ensure enough image area for the algorithms to work with. You also cannot manually arrange the order of the images. If you do a lot of high-end and resolution panoramic imaging, you might want to look into a third-party application called PTGui Pro ([www.ptgui.com](http://www.ptgui.com)). I have a copy and resort to using it if I'm having problems in Lightroom/ACR or Photoshop.

Can you shoot multi-row panoramic images and merge them? You bet, but the criteria for providing enough image overlap becomes even more important. What about merging HDR into a panorama? Yep, that works. You first need to build the HDR DNGs, and then use Merge to Panorama to merge the HDR images. Can you do a focus merge? Not yet, but the engineers have said it's on their to-do list.

Adding both Merge to HDR and Merge to Panorama are arguably the stars of the new features of Lightroom CC/6 and ACR 9. Being able to maintain parametric editing on semi-raw files is a benefit.

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# MAXIMIZING IMAGE DETAIL

Getting the most detail from your images is a complicated subject—heck, somebody could write a whole book on it. Wait, somebody already has! I co-authored the revision of Bruce Fraser's image-sharpening book: *Real World Image Sharpening with Adobe Photoshop, Camera Raw, and Lightroom* (Peachpit Press, 2009). I can't stuff the 360 or so pages of that book in this section, but I'll try to give you the most salient points when adjusting the Sharpening and Noise Reduction settings in Lightroom or Camera Raw.

You want to apply sharpening that enhances image detail but doesn't do harm. Oversharpening is a bigger problem than undersharpening. You can always add additional sharpening down the road, but it's very difficult to undo the undesirable effects of overly crunchy sharpening. Add the complications of sharpening to noise reduction, and you're attempting a balancing act between getting the most image detail while reducing visible noise. Trying to arrive at optimal settings for both is difficult and requires experience and knowledge of the tools.

The reason for image sharpening in Lightroom and Camera Raw is to recover and improve the image detail lost when converting the continuous tone light of a scene into pixels captured by the sensor. The act of demosaicing introduces softness due to interpolation. The sensor itself can cause softness because of the use of aliasing filters. Lenses may have defects and can suffer from diffraction at small apertures. As a result, you'll need to apply sharpening to improve the apparent sharpness or *acutance* (edge contrast). That edge part is important to understand. You want to sharpen the edges, not the non-edge surfaces in the image. Edge frequency is the determining factor of what Sharpening Radius you want to apply to your image—and is arguably one of the more difficult things to determine. I'll break down sharpening for three common edge type images: high-frequency, low-frequency, and mixed-frequency edges.

## HIGH-FREQUENCY EDGE SHARPENING

To show an example of high-frequency edge sharpening, I chose this image from Bryce Point in Bryce Canyon National Park. It was shot with a Phase One P65+ camera back using a 45mm lens, which has excellent performance. At the final cropped size, the image is 29.6 x 18.8 inches at 300 PPI. **Figure 4.71** shows the entire image (only cropped top and bottom a bit). Do you see the tiny white rectangle? That's the area of the image I'll be showing zoomed to 4:1 in Lightroom.

**FIGURE 4.71** The full Bryce Point image as cropped, showing the zoomed area.



Normally, I would use a screen zoom of 1:1 in Lightroom (100 percent in Camera Raw) while adjusting the sliders, but I'm showing you this portion at 4:1 so detail will show in the halftone reproduction of the book. The aim of the Sharpening and Noise Reduction is to extract as much usable detail in the image while avoiding any oversharpened artifacts. **Figure 4.72** shows the image with four sets of Sharpening and Noise Reduction settings.

Obviously, with a Sharpening of 0 the image appears very soft at 4:1 zoom, but at the default settings there's little improvement in the apparent sharpness. Once the Sharpening settings have been optimized, you can clearly see the improvement in the image detail. Yes, there are visible halos—but remember, we're at 4:1 zoom so it's overenhanced; viewed at 1:1, those halos are invisible. The issue with the settings in the third optimized image is that increasing the Detail setting to 90 and Amount to 60 has done some undesirable work on the Luminance. The last image has a Luminance Noise Reduction setting of 25 to help mitigate that noise bloom.

So, how did I arrive at those settings? I worked out of order. Yes, generally, you should work from the top down, but I think a case could be made that the first adjustment for Sharpening should be setting the Radius. This image obviously has a lot of small edges, and the Radius should be set to less than the 1.0 default. **Figure 4.73** shows the default Radius of 1.0 and adjusted to 0.7 while previewing the settings holding down the Option key (Mac) or Alt key (Windows).



▲ IMAGE WITH SHARPENING AND NOISE REDUCTION TURNED OFF

▲ IMAGE WITH THE DEFAULT SETTINGS: SHARPENING AMOUNT 25; RADIUS 1.0; DETAIL 25; MASKING 0; LUMINANCE NOISE REDUCTION 0



▲ IMAGE WITH OPTIMIZED SETTINGS: SHARPENING AMOUNT 60; RADIUS 0.7; DETAIL 90; MASKING 20; LUMINANCE NOISE REDUCTION 0



▲ IMAGE WITH OPTIMIZED SETTINGS AND LUMINANCE NOISE REDUCTION 25



▲ DEFAULT RADIUS SETTING OF 1.0



▲ ADJUSTED RADIUS SETTING OF 0.7

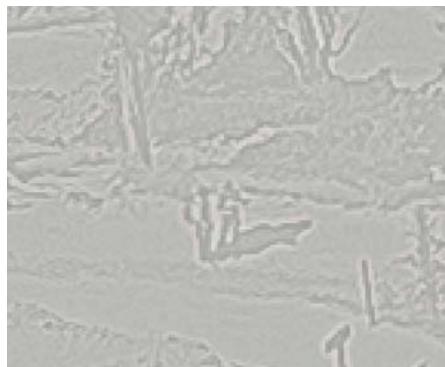
**FIGURE 4.72** Comparing various Detail panel settings at a 4:1 screen zoom.

**FIGURE 4.73** Adjusting the Radius setting.

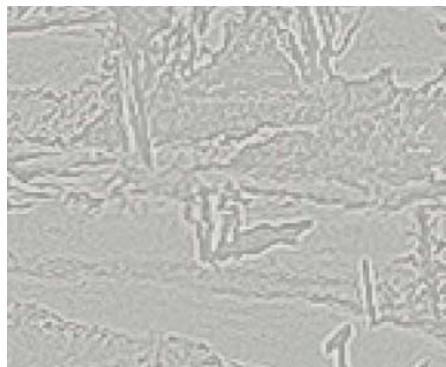
Reducing the Radius setting reduced the width of the halos and tightened up the sharpening of the edges. You might be tempted to simply use the lowest Radius of 0.5 in a case such as this, but that isn't really optimal: it would undersharpen the edges because the Radius would be too small. There isn't a lot of difference between 0.5 and 0.7, but the impact will be visible when adjusting the Amount and the Detail sliders. This is the part of fine-tuning that requires experience. Setting the optimal Radius is critical. The next setting to adjust is the Detail slider, shown in **Figure 4.74**.

The default setting of 25 has very little deconvolution sharpening and a lot of halo suppression. For high-frequency images, I always increase the Detail slider to reduce the suppression and enhance the fine detail. The setting of 90 is pretty high, but this image could withstand the strong setting. You can see the inevitable increase in the sharpening of the noise, which will be addressed with the Luminance Noise Reduction setting (this preview is before the addition of Noise Reduction). The next step will be to fine-tune the Amount and Masking settings, as shown in **Figure 4.75**.

**FIGURE 4.74** Adjusting the Detail slider.



▲ DETAIL SETTING AT DEFAULT OF 25



▲ DETAIL SETTING ADJUSTED TO 90

**FIGURE 4.75** Adjusting the Amount and Masking settings.



▲ ADJUSTING THE AMOUNT TO 60

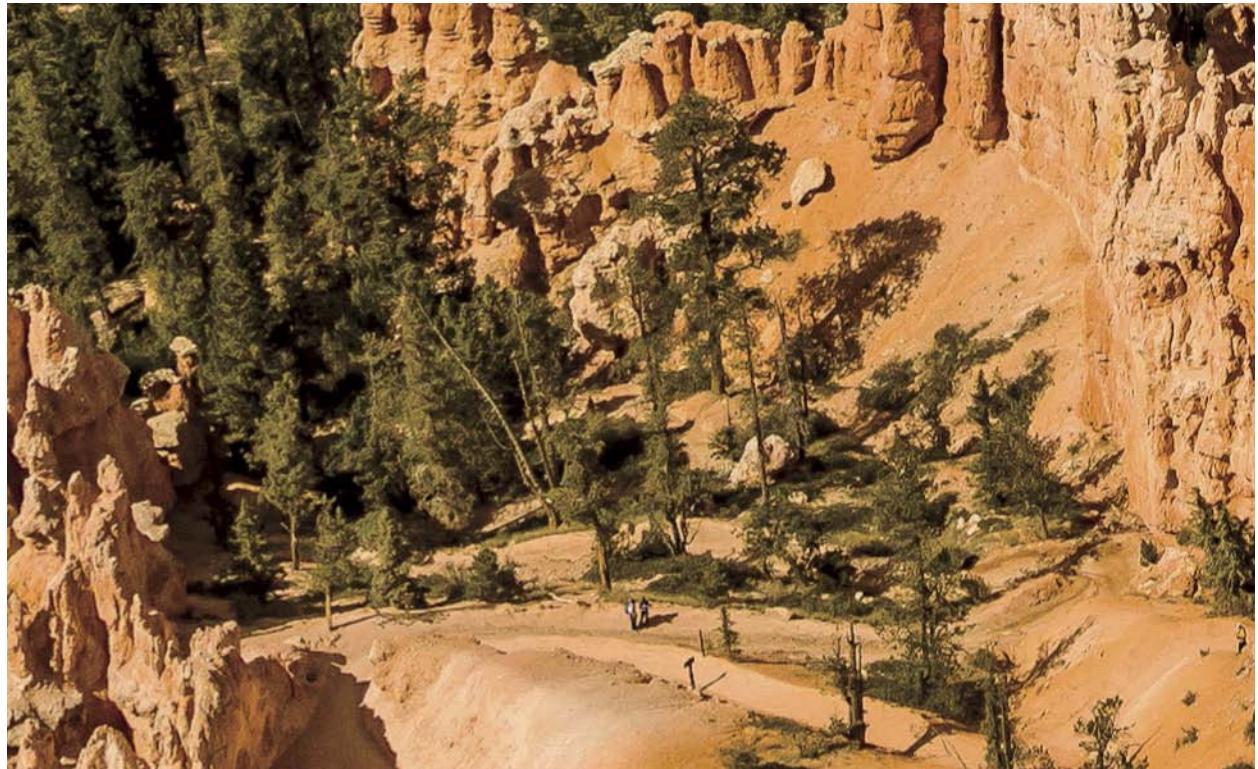


▲ ADJUSTING THE MASKING TO 20

After setting the Radius and Detail sliders, I went back to the top to adjust the Amount. The Amount is a simple “volume” control, and it’s pretty easy to see how far you can go up to the point you’re doing harm by oversharpening. Also, remember that if the overall Amount setting is good for the majority of the image but produces some suboptimal areas of oversharpening, you can use the local minus Sharpening settings in the Graduated Filter or Adjustment Brush to locally reduce the global settings made in the Detail panel. This ability to mitigate oversharpening is an important consideration, because it can change your global sharpening strategy. The Masking was adjusted so that surface areas (non-edge) didn’t receive the full sharpening. Where the mask is white, the full sharpening is applied; where it’s black, the sharpening is substantially reduced. If you use a very high mask setting, the sharpening in the black areas is almost eliminated. Be careful not to use a really high Masking setting when applying strong sharpening to an image with a lot of noise. You can get an unfortunate rippling effect, where no sharpening is applied to the surfaces and high sharpening is applied to the edges.

The Detail panel adjustments would normally be judged at 1:1. **Figure 4.76** is a screen zoom at 1:1 (100 percent). However, due to the halftone screen, you won’t

**FIGURE 4.76** The optimized Detail panel settings at a 1:1 screen zoom.

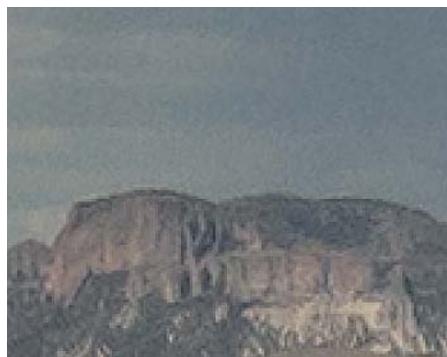


see what I saw in Lightroom when I made the adjustments. But it should give you an idea of what things should look like when optimally adjusted.

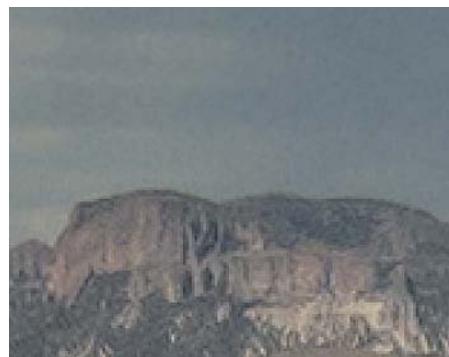
You might think that would wrap up this section, but no. I mentioned that optimal Detail panel settings might not be optimal for the entire image. In this case, the Sharpening and Noise Reduction were fine for most of the image but not for the sky. To adjust the global settings in the Detail panel, I used a local adjustment brushed in with the Adjustment Brush to modify the settings being applied in the sky. **Figure 4.77** shows the masked image area and “before” and “after” detail figures at a 4:1 screen zoom.

**FIGURE 4.77** The masked area with local settings and a 4:1 zoomed view of the image before and after adjustment.

► THE ADJUSTMENT BRUSH MASK WITH SETTINGS: SHARPNESS -30; NOISE +50



▲ 4:1 ZOOMED VIEW BEFORE



▲ 4:1 ZOOMED VIEW AFTER

The differences are subtle but relevant if the maximum image detail and image quality are the goal (which they always are for me). This sort of local modification doesn't need extreme precision when creating the mask. Unlike making tone and color adjustments, locally fine-tuning the Sharpening and Noise Reduction settings only requires moderate accuracy of the mask. Because the full-size image is way too large to be reproduced in the book without substantial downsampling (which would make the image detail adjustments invisible), go back and take a look at Figure 4.71 to see the entire image and Figure 4.76 to see the results of the Sharpening and Noise Reduction at 1:1.

## LOW-FREQUENCY EDGE SHARPENING

When sharpening an image with low edge frequency, you want to increase the Radius so small areas of texture and noise don't get overly sharpened. For example, on a person's face, you want to sharpen the eyes and lips but avoid oversharpening the skin (unless you want to go for that "weathered" look). The image I'm using as an example is a shot of my friend Daniel Ortiz's wife, Roxana Cházaro, in San Miguel de Allende, Mexico. Daniel is an avid photographer, so I asked his permission to photograph his wife. **Figure 4.78** shows the full frame of the image and a 2:1 zoom detail image of Roxana's eye. The image was captured with a Canon EOS REBEL T1i with an 18–135mm zoom lens at 113mm zoom. The ISO was set to 800 to get a fast enough shutter speed (1/60 second with image stabilization) to avoid camera shake.



▲ FULL IMAGE

► DETAIL AT 2:1 ZOOM WITH THE DEFAULT SHARPENING APPLIED



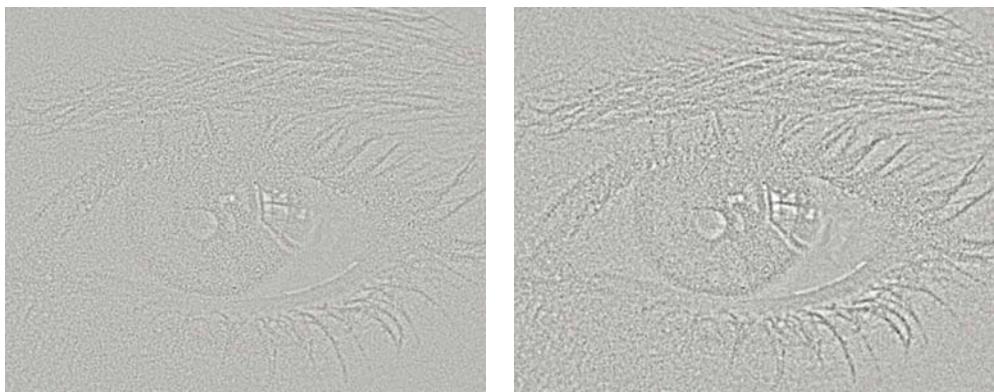
**FIGURE 4.78** Low-frequency example image.

The Radius is again the first slider I adjusted. I knew I wanted to increase the Radius to avoid sharpening her skin and the sensor noise visible at ISO 800. I moved from the default 1.0 Radius setting to a setting of 2.0. **Figure 4.79** shows the preview of both Radius settings.

By increasing the Radius, I increased the sharpening on the strong edges in the eye while mitigating the noise and skin texture. The preview shows a slightly increased sharpening of the noise, but that will be adjusted later when adjusting the edge masking and adding noise reduction. The next adjustment was to adjust the Detail slider (**Figure 4.80**).

Adjusting the Detail slider will probably be difficult to see in the book's halftone reproduction, but let me explain what you're looking at (even if it's hard to see). At

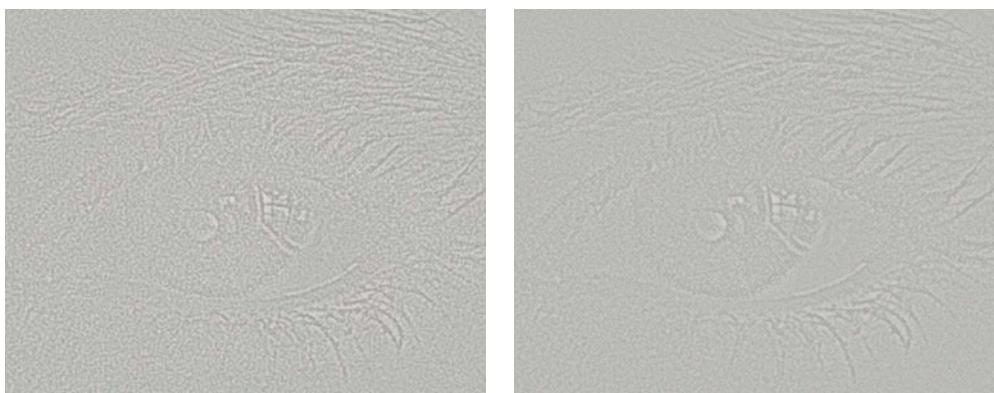
**FIGURE 4.79** Adjusting the Radius setting.



▲ PREVIEW OF RADIUS 1.0 SETTING AT 2:1 ZOOM

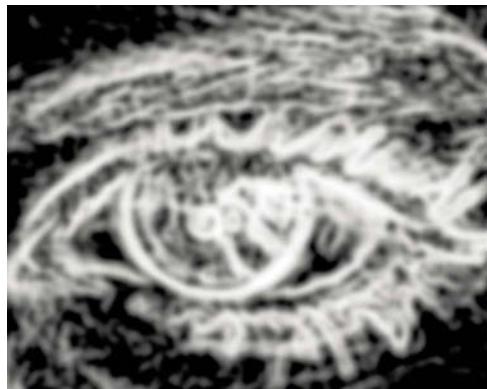
▲ PREVIEW OF RADIUS 2.0 SETTING AT 2:1 ZOOM

**FIGURE 4.80** Adjusting the Detail slider.



▲ PREVIEW OF DEFAULT DETAIL SETTING OF 25 AT 2:1 ZOOM

▲ PREVIEW OF ADJUSTED DETAIL SETTING OF 10 AT 2:1 ZOOM



▲ PREVIEW SHOWING MASKING SET TO 68



▲ PREVIEW SHOWING AMOUNT SETTING TO 88

**FIGURE 4.81** Adjusting Masking and Amount settings.

the default Detail setting of 25, there is still a touch of deconvolution sharpening being blended in, which means the high-frequency texture of skin and noise is getting hit too hard. By reducing the Detail slider to 10, much less of the noise is getting sharpened. The next adjustment, Masking, will cut down on the surface sharpening even further. **Figure 4.81** shows adjusting the Masking and Amount adjustments.

The Amount of 88 may seem high, but consider that the Radius is 2.0 while Detail is down to 10 and the edge Masking is up to 68—all of which alters the overall impact of the Sharpening. The Sharpening amount needed to be pretty high, and I actually increased the Sharpening around the eyes and lips with a local adjustment. After adjusting the final Sharpening settings, I adjusted the Luminance Noise Reduction setting to +50 to smooth out the noise. **Figure 4.82** shows a less-cropped version, still at 2:1 zoom. Yes, it does look a bit crunchy, but remember that you're seeing the results at two times the actual pixel size; it *should* look a bit crunchy.

In addition to the global Sharpening and Noise Reduction settings, I also did a little light-duty retouching and local Sharpening and skin adjustments. The spotting was very minimal—Roxana has good skin, but a little negative clarity never hurt anybody! I also wanted to increase the local Sharpening around the eyes and lighten up a bit under the eyes. **Figure 4.83** shows four of the local Adjustment Brush masks doing the majority of the touchup.

Using a local brush with minus Clarity has the effect of reducing the midtone contrast in the texture of the skin, which is very useful without actually blurring (and destroying skin texture). By adding additional Sharpening just around the eyes and lips, I avoided adding any additional global Sharpening. The +43 Sharpness with the Adjustment Brush is added to the global Detail panel settings. Lightening up the skin under the eyes and an additional touch of minus Sharpness and plus Noise with the

**FIGURE 4.82** Final global Sharpening and Noise Reduction results.



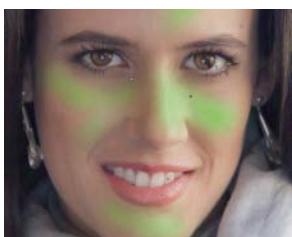
▲ MASK FOR REDUCING CLARITY  
-36



▲ MASK FOR INCREASING SHARPNESS +43



▲ MASK FOR EXPOSURE +0.39;  
CONTRAST -31; SHADOWS +11; AND  
NOISE +22



▲ MASK FOR CLARITY -15 AND  
SHARPNESS -15

**FIGURE 4.83** Local Adjustment Brush masks.

Adjustment Brush finished things up. Well, okay, there were a couple more tweaks: I added a very gentle adjustment to lighten the whites of the eyes while darkening the round highlight over the pupils. I also lightened the teeth and added a touch of color and saturation to the lips. However, this isn't a heavy-duty fashion-magazine type of makeover. The goal was to maintain Roxana's good looks while keeping a natural appearance. **Figure 4.84** shows the final adjusted image at a screen zoom of 1:1 (100 percent).

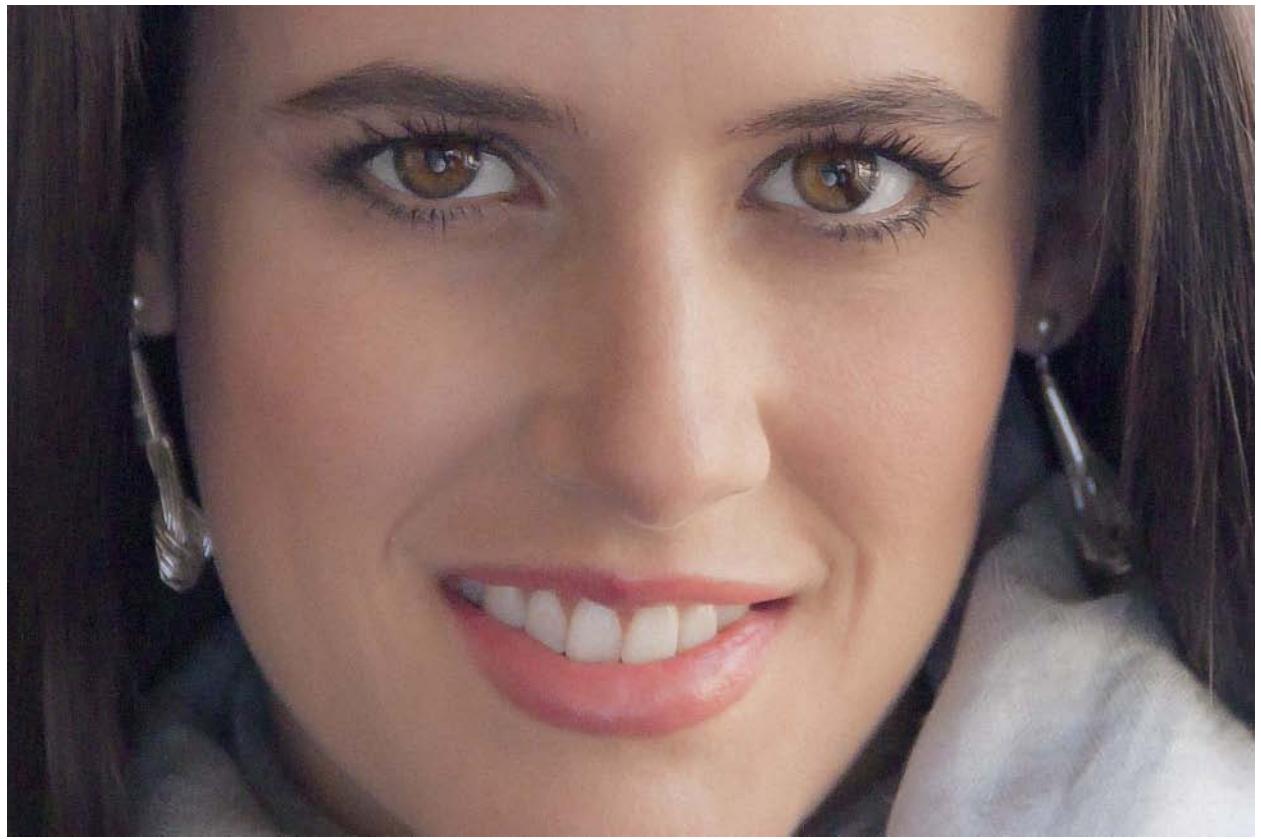


FIGURE 4.84 Final portrait of Roxana at 1:1 zoom.

## MIXED-FREQUENCY EDGE SHARPENING

Not every image can be lumped into just high-frequency or low-frequency categories. Using the wrong sharpening can adversely impact the final image quality. So, what do you do if you have an image that is predominantly in the low-frequency camp but has important image detail that needs high-frequency sharpening? You have to get smart! You need to take a slightly sneaky way around the issue. Lightroom and Camera Raw can apply only one type of sharpening at a time, so when faced with this problem, I turn to Photoshop and open digital negatives as Smart Objects. Yes, the image must be sent to Photoshop, but when it's a Smart Object, you retain the

**FIGURE 4.85**  
A mixed-frequency image.

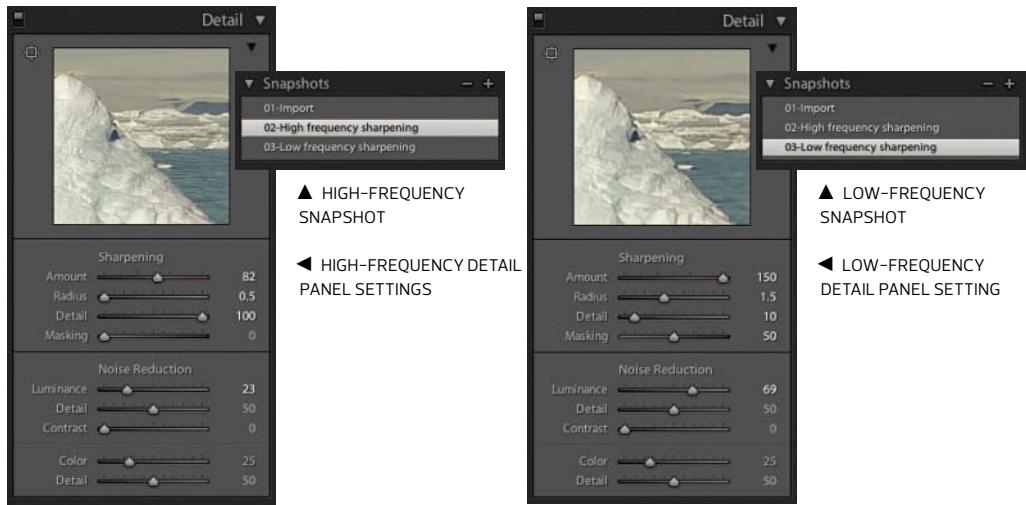


capability of editing raw image-processing parameters. **Figure 4.85** shows an example of an image with lots of low-frequency areas and some high-frequency areas in the center of the image. The iceberg image was shot at the northern tip of the Antarctic Peninsula near the Weddell Sea using a Canon EOS 1Ds Mark II and a 24–70mm lens.

The sky and the water are the low-frequency portions of the image, but the iceberg in the center really needs high-frequency sharpening. To apply a mixed-frequency edge sharpening while retaining the ability to edit raw parameters, I had to take a trip to Photoshop.

First, I'll point out a limitation of Smart Objects: once you take a raw image into Photoshop, you pretty much sever the relationship of the digital negative residing in Lightroom and the raw file that's embedded into a Photoshop file as a Smart Object. Any changes you make to the Smart Object using Camera Raw can't be easily changed back to your original negative in Lightroom. It's pretty much a one-way street from Lightroom to Photoshop. Yes, you can save the Photoshop file and import it into Lightroom, but then it's considered a rendered PSD or TIFF file. You can open the edited TIFF or PSD and re-edit the parameters from inside Camera Raw, but those settings aren't shared with Lightroom. Another slight hiccup regarding editing a Smart Object in Photoshop from Lightroom is that your Lightroom and Camera Raw versions need to be in sync (another good reason to keep Lightroom and Camera Raw up to date).

**NOTE** If this image looks familiar, you might have seen this image on the cover of my other book, *The Digital Print*. However, in this book I'm using the color version; on my other book, it was reproduced as a cool tone black and white.



**FIGURE 4.86** The Snapshots and the Detail panel settings.

One way I work around the issue of severed settings from the digital neg and the Photoshop file is to make all the image adjustments in Lightroom and save Snapshots prior to editing the image as a Smart Object. Because Snapshots travel with the file, Snapshots made in Lightroom will show up in Camera Raw as well. **Figure 4.86** shows the two Snapshots I made and the sharpening settings I used for this image.

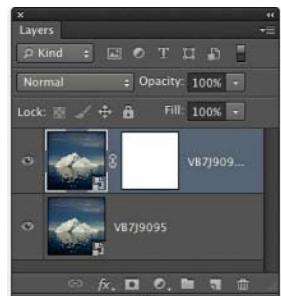
You'll notice a couple of things about the different settings: For the high frequency, Detail is all the way up and the Radius is very small. I did this to really bite into the textural detail of the iceberg ice. For the low frequency, the Sharpening Amount slider is all the way up to 150 (that's rare, but it's sometimes useful), but the Detail slider is way down to +10 and the Masking slider is up to +50. I'll admit that I'm actually pushing this a little bit for the purposes of the example, but as you'll see, the results are very reasonable.

Once the settings are adjusted and the Snapshots are saved, it's time to open the digital negative as a Camera Raw Smart Object in Photoshop. From the Photo main menu in Lightroom, select Edit In and the Open as Smart Object in Photoshop option. This renders the image into Photoshop, and the Smart Object is embedded into the Photoshop file and appears as a special Smart Object layer. **Figure 4.87** shows the single Camera Raw Smart Object layer, as well as the result of copying to a new layer and adding a Reveal All layer mask.

In order to copy the Smart Object layer, you need to do it in a special way: in Photoshop under the Layer menu is a flyout menu called Smart Objects. From the flyout menu, select New Smart Object via Copy. This creates a new Smart Object that can have different parametric adjustments from the original Smart Object layer.



**▲ THE SMART OBJECT LAYER IN PHOTOSHOP**



**▲ COPYING THE SMART OBJECT TO A NEW LAYER**

**FIGURE 4.87** The digital negative opened in Photoshop as a Smart Object.

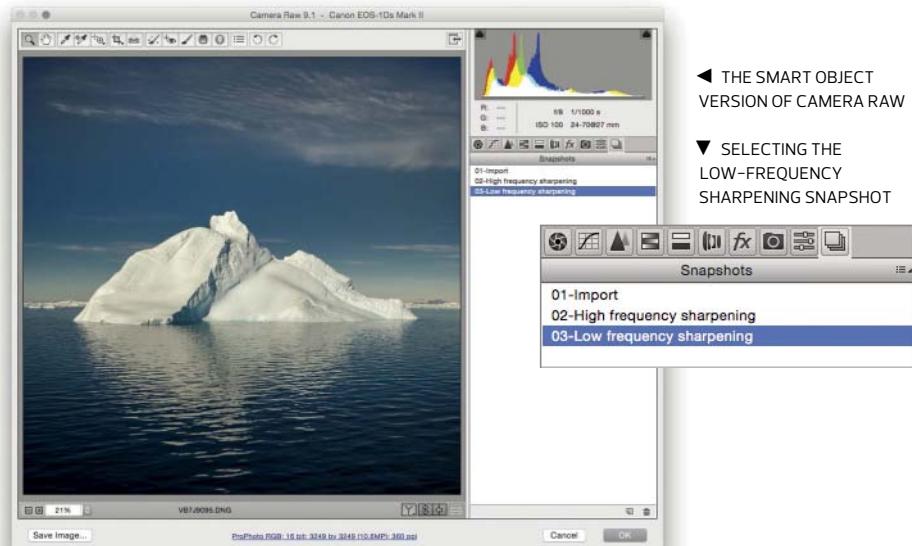
**TIP** When you save a snapshot in Lightroom and then open the image in the Camera Raw Smart Object, those snapshots will be retained.

Simply duplicating the layer won't work; it needs to be a new Smart Object. Once the new Smart Object layer is in place, double-click the layer icon to open the Smart Object version of Camera Raw shown in **Figure 4.88**.

Because I already saved the Snapshots when still in Lightroom, I didn't need to fiddle in the Detail panel. I simply selected the low-frequency Sharpening Snapshot and clicked OK. Camera Raw renders the changes back into the Smart Object layer.

To blend the two edge-frequency sharpened layers, you need to create a layer mask. In this case, because the low-frequency image was on the top of the stack, the layer mask needed to reveal the high-frequency layer on the bottom. **Figure 4.89** shows the layer mask painted in and the resulting layer. Where the image is red, the low-frequency image will be hidden.

**FIGURE 4.88** Opening the Smart Object into Camera Raw.



**FIGURE 4.89** The layer mask for hiding the low-frequency sharpening layer.



The payoff for this mixed-edge frequency sharpening is that it allows you to mix and match the optimal Sharpening and Noise Reduction settings while still retaining the raw editing capabilities of Camera Raw. It's a true blending of the strengths of combining Lightroom, Camera Raw, and Photoshop to optimize your image detail. **Figure 4.90** shows the high-frequency layer and the blended layers.



**FIGURE 4.90** Comparing the high-frequency sharpening to the mixed-frequency sharpening.

◀ THE HIGH-FREQUENCY SHARPENED IMAGE



◀ THE MIXED-FREQUENCY SHARPENED IMAGE



This image from Sunrise Point in Bryce National Park was shot using a Nikon D810 camera with a 28–300mm lens (zoomed to 40mm) at ISO 100. You might notice there are no people in this shot. Read the section titled "Removing People Via Image Stacking" to find out why.

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