

ALL THE NOISE, NOISE, NOISE, NOISE!

Noise Reduction in Lightroom 3 By Gene McCullagh

"That's one thing I hate! All the noise, noise, noise, noise!"
—The Grinch

Ah, if only the Grinch had Lightroom 3 with its new and greatly improved noise reduction features, things might have been easier on the residents of Whoville all those years.

The Grinch was complaining about a different kind of noise. But we photographers deal with noise that can be just as annoying—digital noise. We've all seen it at some point. In film days we used to call it grain. It's like that but without the charm and nostalgia we now attribute to film grain. (Hey, even Lightroom 3 now has a feature to add grain!) Digital noise stands between us and our perfect image. We see it in speckled shadows and blotchy skies. In some cases it's unavoidable if you want to get that killer shot. So what's a photographer to do?

Before we look at how to reduce noise in our images, perhaps it's best to look at what this noise is and where it comes from. After all, if we can reduce it when we capture the image, there's that much less left for us to do in Lightroom 3 when we process the image. So let's get started.

Digital noise

Whenever we talk about things digital we think of clear sounds and crisp images—none of the messy artifacts of the analog world. For the most part that's true. But remember that the sensor in our digital camera is there to convert the analog information from the scene into a digital image, not unlike how a microphone converts analog sounds to a digital signal.

There are a lot of physics and technical explanations behind the question of where digital noise comes from. We'll skip all that and explain it in plain terms at the expense of complete accuracy.

The sensor in a digital camera has small receptors to pick up the light coming in through the lens. Bright light and a low ISO make the job easier. As the available light gets less and we turn up the ISO to compensate, we introduce noise. Think about turning up the volume when playing music through a speaker. The higher the volume the more you start to hear noise in the playback.

That's what's going on with the ISO level in the camera. When we amplify the signal from the sensor by turning up the ISO, we also amplify the noise. Instead of hisses and pops in a speaker, this noise shows up in our image as speckles and blotches.

Another source of noise comes from the temperature on the sensor. The longer we have the sensor gathering light, the hotter it gets. That heat affects each of the receptors, causing leakage of information between the receptors. Even at a low ISO this can happen. Think of long exposures of a night sky. The light from the stars is so dim we need to leave the shutter open much longer. That's why the dark parts of the sky look so noisy when we first open those images for processing.

The size of your sensor and the number of megapixels that are crammed onto it also affect the amount of noise that will wind up in your image. As the number of megapixels increases and the size of the sensor decreases, each of the receptors gets proportionally smaller and closer to its neighbor. Smaller receptors have to work harder to gather light, generating more heat and picking up extraneous signals. The closer they are to each other, the higher the chance of electrical cross-contamination.

Digital noise comes in two distinct varieties: chroma noise and luminance noise. Chroma noise affects color areas of an image, causing them to appear grainy or blotchy because of the introduction of random color pixels. Luminance noise will appear in the brightness data of an image. It looks like snow or traditional grain in black-and-white film.

All of this is relative. Even though you might have that brand new NiCanAsonic LX7 Mark XI with a maximum ISO of 512,000,

there will still be noise. Whenever we push our camera to the upper limits of its ISO range, noise gets in. And we will push. Even though our modern camera will let us take a relatively noise-free image by candlelight, we'll still want to capture the dance floor scene by the light of a single match. It's what we photographers do: We push the limits to create new and exciting images.

Lightroom 3 to the rescue

Up until Lightroom 3, the noise-reduction capabilities of Lightroom were more a promise of things to come than a useful feature. For all but the simplest of noise-reduction tasks, we still turned to third-party noise-reduction software. Sure, Lightroom would remove the noise, but it also removed most of the details in the process.

All of that is behind us now with the introduction of the enhanced noise-reduction features of Lightroom 3. Now Lightroom can handle noise with the best of the third-party applications! It's such an improvement over Lightroom 2 that it's nothing

short of amazing. Yeah. It's that good! So fire up Lightroom 3, load your noisiest image, and let's get started!

A view of the Detail panel

Noise reduction still lives in the same place in Lightroom 3—the Detail panel in the Develop module. Right away you'll see a difference. Instead of a single slider for Luminance and a single slider for Color, we find additional sliders for Detail and Contrast. Don't be fooled by the fact that the main sliders have the same names they did in Lightroom 2. Adobe has



reengineered the algorithms to provide better noise-reduction performance.

Initially, the Detail and Contrast sliders under Luminance and the Detail slider under Color are grayed out. Once you begin to apply either of the main sliders, their supporting sliders will become available.



Before we begin, we need to make sure our image is showing at 1:1 or better, so click on your image or on 1:1 at the top of the Navigator panel. Anything less than a 1:1 or 100% view won't let us accurately see the changes we're making to the noise in the image. You can also use the view window at the top of the Detail panel. This shows a square sample at either 1:1 or 2:1. To change the zoom ratio, Right-click on the Detail preview and choose the ratio from the pop-up menu.



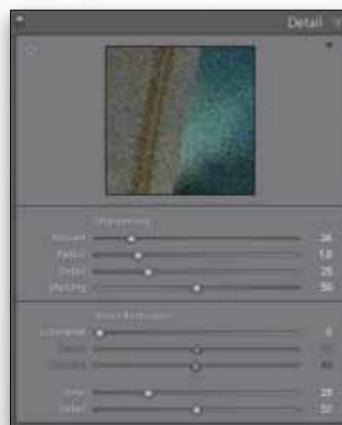
Detail panel's view window

We can choose what shows in the preview using several methods. Use the target tool in the top-left corner of the panel. Click on it to activate the tool. Then as you move the tool around the image, that area shows up in the view window. A second method is to hover over the view window. When the cursor changes to a hand, hold down your mouse button and drag in the view window to find the area of the image you'd like to show. Finally, click once in the view window and the full image will show up. Then click once again on the area to view at 1:1 and the view window will zoom in on that area.

Getting rid of the noise

The challenge Lightroom 3 has is to remove the noise but preserve as much detail as possible. It's easy to remove the noise by blurring the image, but that's not what we want.

You can begin with either the Luminance or Color slider. Let's grab the Color slider first because



that's usually the easier fix. Drag it over to the right. Most images don't require a lot in order to remove the chroma noise. For our JPEG file, 25 seems to do the trick. (Note: RAW files default at 25.)

If you find that some of the detail in the image has been compromised after using the Color slider, then drag the Detail slider to the right to increase edge detail. If the edges are a little too sharp, moving to the left will reduce that effect.

Next we'll tackle the luminance noise. Grab the Luminance slider and start moving it to the right. How much noise is in the image will dictate how far we push this slider. As you apply more and more luminance noise reduction, keep an eye on the details in the image. Move the slider enough to reduce the luminance noise to an acceptable level while not overly blurring all of the details you want to keep. It's okay to blur some of the details because Lightroom 3 gives us two new sliders to fine-tune this process.

So with a simple move of a few sliders, we've already achieved much better results than we could have in Lightroom 2! Amazing. But wait, there's more!

Let's get some of those edge details back by using the Detail and Contrast sliders for Luminance. The Detail slider works in much the same way for Luminance that it does for Color: it helps refine the edge detail in the image. Slide it to the right for more detail, to the left for less.

The Contrast slider is a further edge-enhancement tool. Much of what we recognize as sharpness comes down to how much contrast exists at the edges where lighter and darker portions of an image meet. Here, too, sliding to the right increases contrast and sliding to the left decreases it. Move the sliders until you have recovered an acceptable amount of edge detail back that was lost during the luminance noise-reduction step.

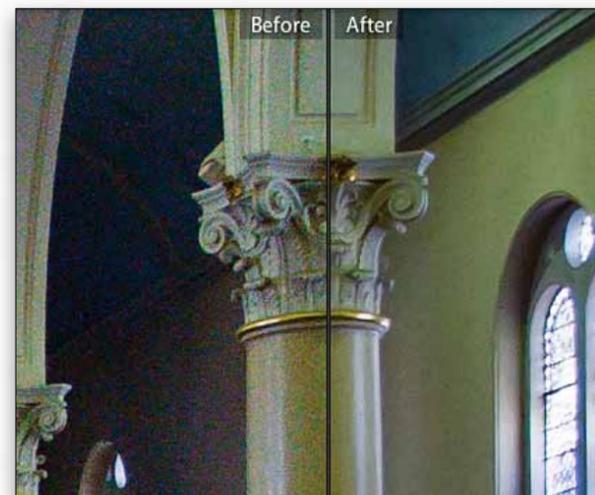
In this example, we're looking at a 2:1 view in the view window. At that magnification we'll tend to still see artifacts from the noise-reduction process. When working on an image, remember that the full preview also responds to the sliders as you work. It's often useful to have the view window at 2:1 while the main preview is at 1:1. That lets you see the overall impact on your image while still observing the changes at a higher zoom view. Between the two views you get a better idea of what's going on.

So don't be overly concerned at the residual artifacting in the 2:1 view. With few exceptions, no one will be close enough to your

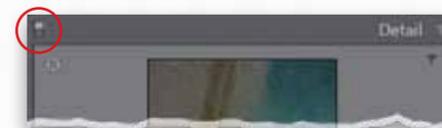


image to see that level of detail. (And if they are, just tell them they'll enjoy your work better if they step back a little and take it all in!)

Looking at the Before and After view, we can see that a few quick moves on the new sliders yielded dramatic results. The noise is gone and much more detail is preserved than was possible before.



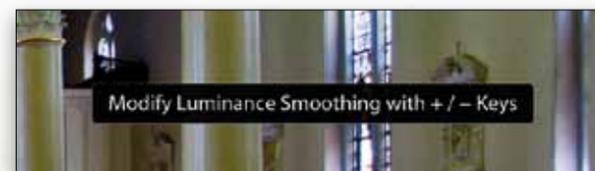
If you'd like to see your image with and without the noise reduction applied, click on the toggle switch on the left in the panel header. Click once to turn off the effects of the Detail panel; click again to turn them back on.



Slider shortcuts

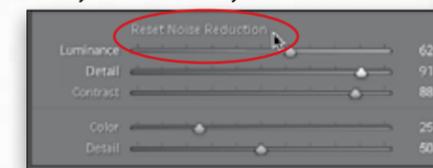
The controls in the Noise Reduction section of the Detail panel also respond to the same general shortcuts as the other panels. If you click on the number to the right of any of the sliders, you can enter the exact amount you want from the keyboard. Once you have a number field active, press the Tab key to jump to the next slider's control. When you see the control highlighted, press the Up Arrow or Right Arrow key to increase the setting in increments of five. Press the Down Arrow or Left Arrow key to decrease the setting in increments of five. Press Tab again to get to the number field to the right of that slider where, again, you can directly enter a value.

If you click once on the name to the left of a slider you can then control it with the Plus (+) and Minus (-) keys. You'll see a pop-up notification in the middle of the main Preview area letting you know that the keys are active. Again, the amount is incremented in units of five.



All of the sliders have scrubby sliders available. Hover your cursor near the number to the right of the slider and it will change to an upward pointing hand with left and right arrows. Hold down your mouse button and drag left or right to decrease or increase the slider value, respectively.

Should you get to a point where you just want to start the noise-reduction process over, hold down the Option (PC: Alt) key and the Noise Reduction title for the panel will change to Reset Noise Reduction. Click on the title to bring all of the noise-reduction sliders back to their default settings. This only affects the noise-reduction sliders, so you won't lose any other changes you've made. Double-clicking the name of any slider resets only that slider to its default value.



If you still want more detail in your image, remember that we've only touched on one half of the controls in this panel. Just above the Noise Reduction section is the Sharpening section. There are some amazing enhancements here as well, and that's where you would go to bring out even more detail. But that's a topic for another day.

The enhancements to the noise-reduction features in Lightroom 3 are amazing. Compare the results to any of the leading third-party noise-reduction applications and I think you'll agree that Lightroom 3 meets or exceeds anything out there. And what really makes this an exciting breakthrough is the fact that all this noise-reduction power is applied nondestructively—no pixels are harmed in the process. There's no need to round-trip out to another application. You don't need to import a processed TIFF or JPEG back into your catalog with noise reduction applied. This alone is worth the price of an upgrade. To top it all off, the new noise-reduction features are just a few of the excellent enhancements this new version of Lightroom has to offer. ■



Gene is an Adobe Community Professional and Adobe Certified Expert in Photoshop Lightroom, Photoshop, and InDesign. He belongs to the Professional Photographers of America (PPA) and the National Association of Photoshop Professionals (NAPP). In addition to running [LightroomSecrets.com](http://www.oreillynet.com/pub/au/3624), Gene also contributes to O'Reilly's media blog (www.oreillynet.com/pub/au/3624), moderates on the Adobe forums (<http://forums.adobe.com/community/lightroom>), and helps out on LightroomForums.net.