TOOWOOMBA PHOTOGRAPHIC SOCIETY INC.

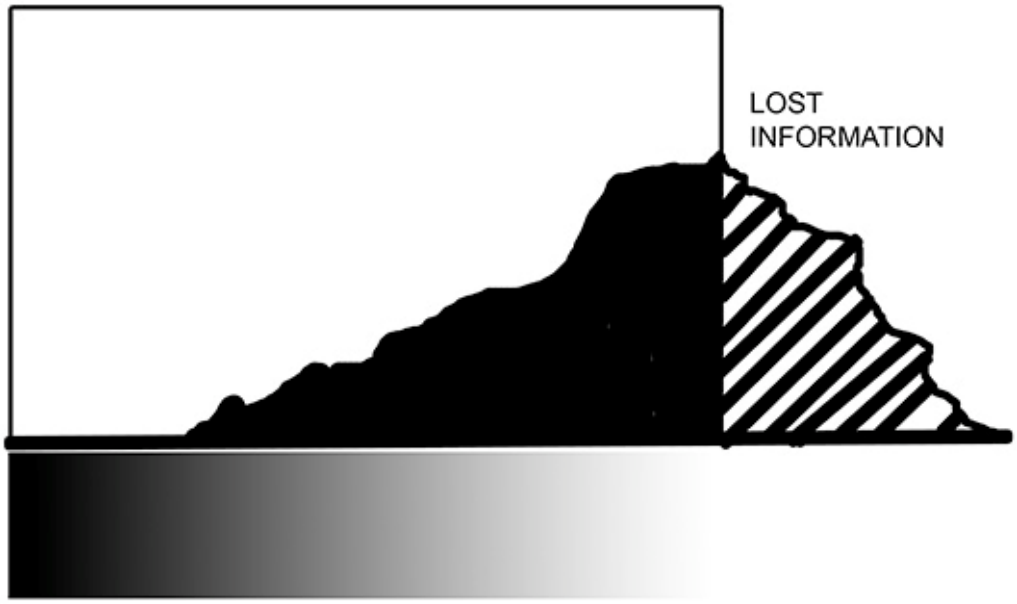
Histogram the Key to Understanding Exposure

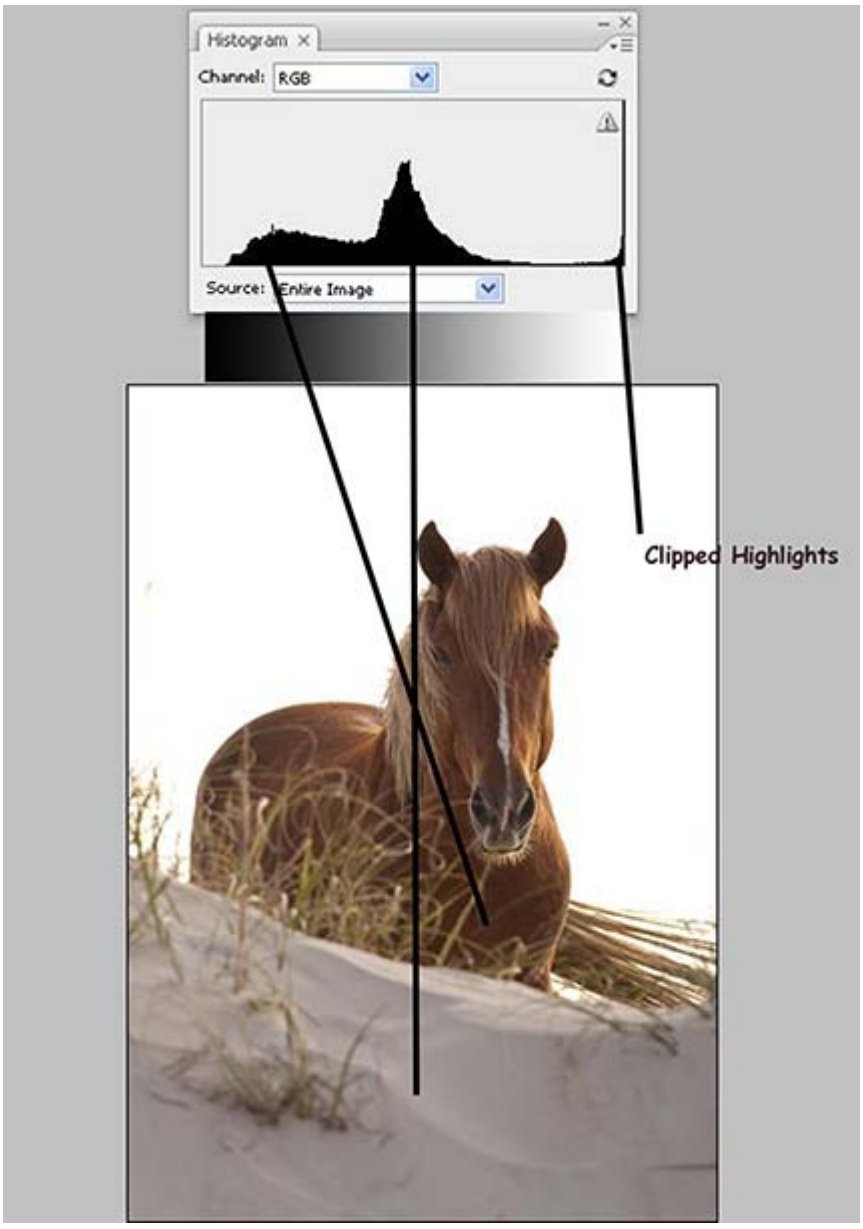
What Is a Histogram

The histogram is the key to understanding exposure in digital photography. It is a simple graphical representation of data collected by the digital sensor. Digital images are made up of millions of tiny square pixels. In every digital image each pixel is assigned a brightness value between 0 and 255. The camera scans each pixel and adds up how many pixels there are at each brightness level. Then it translates that into a graph called a histogram. On the horizontal axis 0 at the left of the histogram represents pure black and 255 at the right is pure white. The vertical axis shows the number of pixels recorded at that brightness value. The more pixels at a specific brightness value the higher the line.

Avoid Clipping Highlights and Shadows

Think of the camera sensor as a shovel and the light as a pile of gravel in front of the shovel. You can see that if you move the shovel to the left and scoop, a lot of the gravel will fall off the right side and not be captured. It works the same way with a digital sensor and light. Sometimes the gravel is so spread out there is no way to scoop it all up. In this case the photographer has to decide which is more important to the image, shadows or highlights and be sure to scoop all of the important data up. Detail can never be recovered when a region becomes so overexposed that it becomes solid white. When this occurs the highlights are said to be “clipped” or “blown out.” It’s best to avoid clipping the highlights if possible. When there are bright reflections, spectral highlights, or a light source within the photo it is often necessary to allow those pixels to be “clipped” or “blown out.” Try not to allow the histogram data to extend past the histogram boundaries or the result is “clipped” or lost information.


LOST
INFORMATION

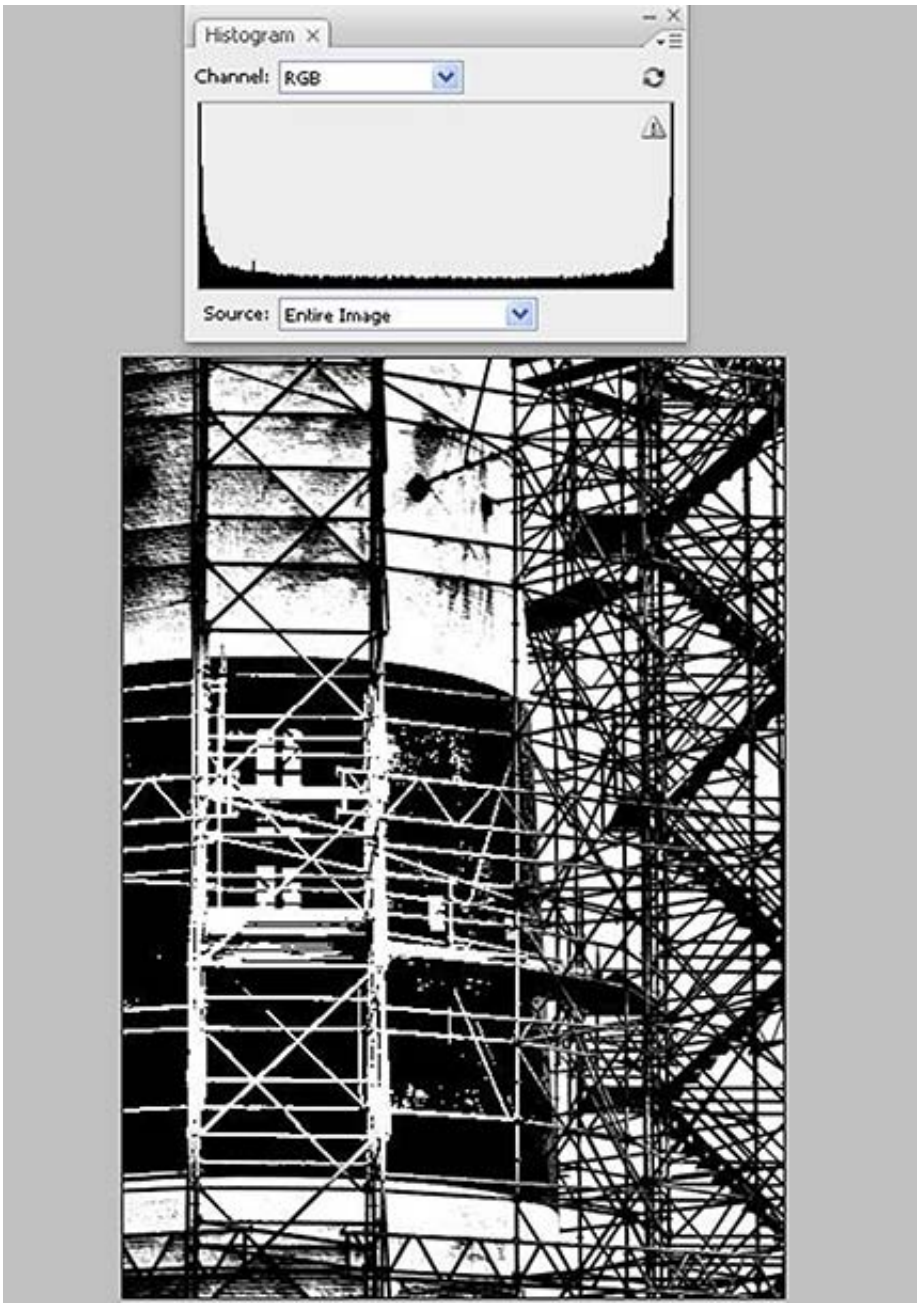

Histogram
Channel: RGB
Source: Entire Image
Clipped Highlights

Sometimes it's necessary to clip or blowout the highlights in order to scoop up the important information in the shadows. In this photo the horse and dunes are much more important than the sky. I expose for them and let the sky go white.

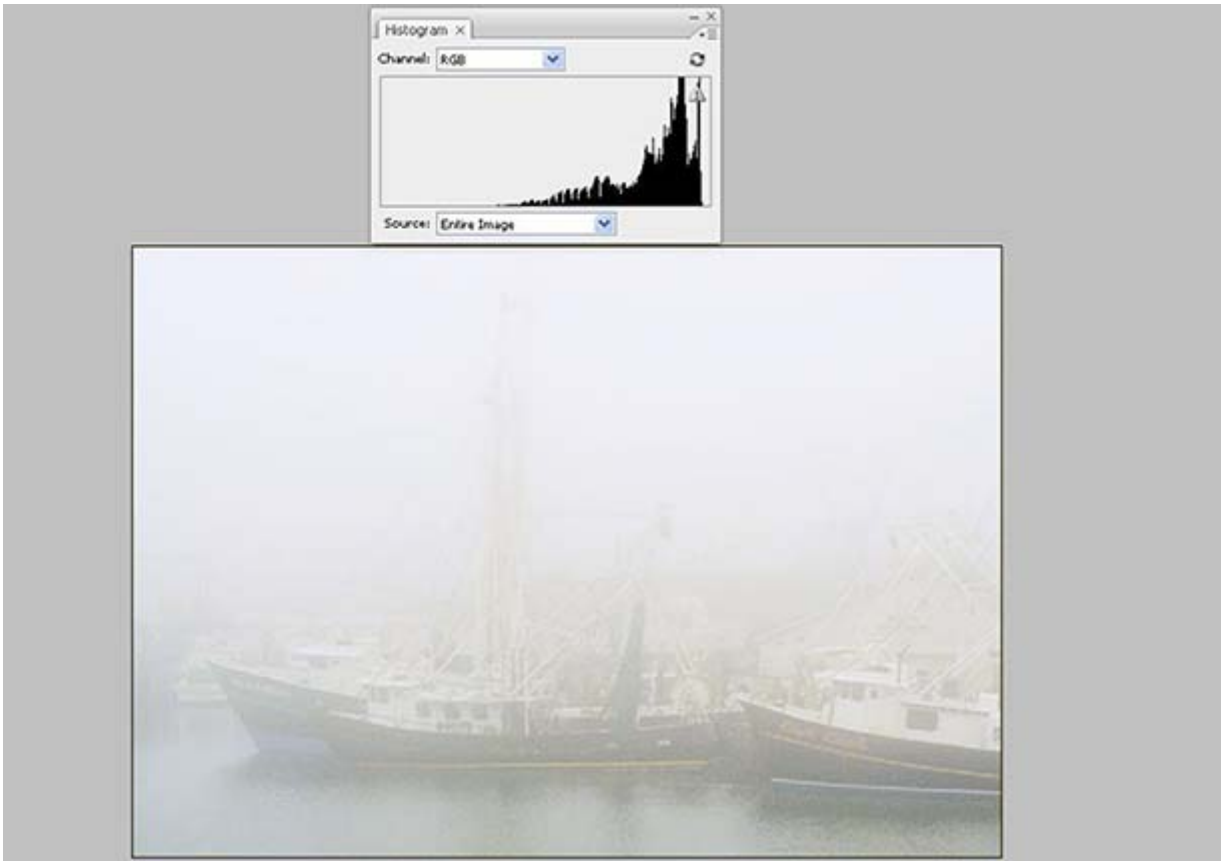
Amount of Contrast

A histogram can also assess the amount of contrast in a photo. Contrast is a measure of the difference in brightness between light and dark areas in a scene. If the histogram has spikes at both ends, 0 "purer black" and 255 "pure white", there is a lot of contrast in the photo.

High Contrast



Low Contrast



If the histogram is all bunched up with little information spread out, the photo has very little contrast.

Using the Histogram

Almost all newer digital cameras have an option to review the photograph and histogram together. While in the play back mode, click the info or display button to scroll through the different screens. One of them should be the photo and histogram. I suggest setting this as your default review screen. After you have taken a photo you can quickly glance and tell if you have clipped any important highlights or shadows. You might ask why can't I just look at the back of my camera and tell if it is too bright or dark. The screen on the back of the camera can be adjusted for brightness. This adjustment has nothing to do with the actual brightness of the photo captured, it just lightens the display. That makes judging exposure with the screen on the back of the camera unreliable.

Expose to the Right

Exposing a digital image is a little like playing blackjack. While playing blackjack you want to get as close to 21 without going over. With a digital exposure you want to get as close to 255 "pure white " on the histogram without going over. Push the histogram as far to the right, or light side, as you can without going over. In post processing, you will end up with a much better photograph by slightly darkening an image compared with having to lighten the image. Digital noise tends to occur in the shadow areas and lightening shadows exaggerates the noise that is already present.

Conclusion

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Today’s digital photographer has a huge advantage over yesterday’s photographer. A digital histogram is one of the greatest advantages. If you understand and use the histogram, all exposure doubts will be a thing of the past. The histogram provides a reliable indication of whether or not an image is properly exposed so that no important detail is lost in the shadows or highlights.