

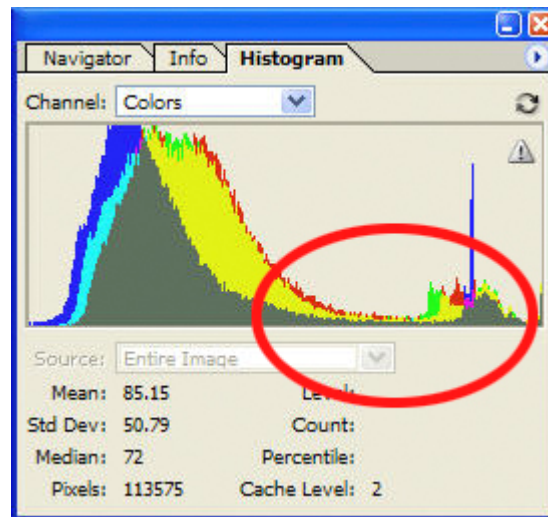
# Developing Photos That “Pop”

## *Fixing Contrast and Tone Problems*

### **Part 1: Understanding Tonal Range, Contrast, and Brightness**

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Let’s begin our discussion on improving problem images with a look at a typical problem image. The photo to the left was taken at the Linn of Dee in Aberdeenshire, Scotland. My wife and I spent a week in Scotland during May and the weather was against us. The weather was rainy and dreary.



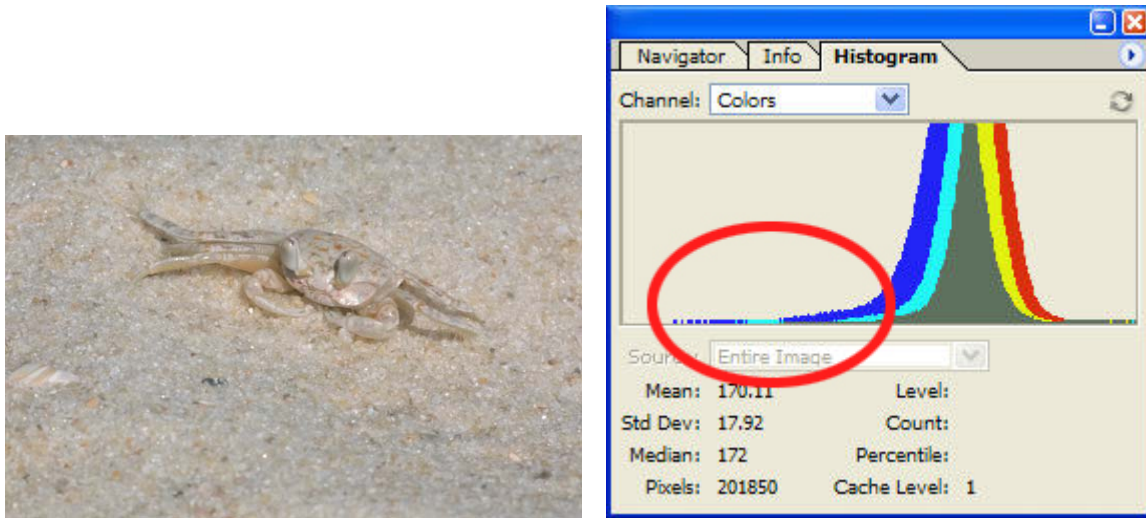
*Figures 1a and 1b. A “low key” photograph and its histogram.*

The histogram in **Figure 1b** tells the tale here. Nearly all of the pixels in the image are dark tones. A few shadows and middle tones: predominantly three-quarter tones. Few pixels are brighter than middle gray.

Histograms are graphs of the pixels in an image. They plot the tone of the pixel, from dark to light (left to right) on the x-axis and the number of pixels with that tone on the y-axis. Histograms in Photoshop also contain other useful information. For example, the median value for the image above is 72. Half of the pixels in the image will be lighter than the median and half will be darker. Since the individual data values in any RGB image can range from 0 to 255 (black to white), a median value of 72 means half of the information falls in the three-quarter tones and the shadows. This is consistent with the somber colors we see in the image.

The term of art for an image with a large clump of dark pixel and few bright pixels is *low key*. Low key images tend to look dim, flat, and uninteresting. They are sometimes described as muddy. This picture of water shooting through the rocks should be inspiring. Because of the reduced brightness, it is not.

The opposite is evident in the histogram for the image of a freshly molted ghost crab. The crab is hard to distinguish from the sand and shell fragments on the beach. Wonderful camouflage for the crab, but it will be a challenge to make the crab stand out against the background.

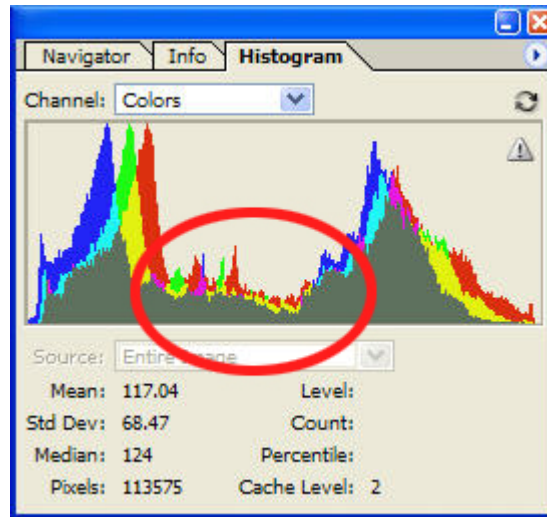


**Figures 2a and 2b.** A “high key” photograph and associated histogram.

Nearly all of the pixels are brighter than average. A few middle tones and lots of one-quarter tones and not much else. The median of 172 indicates that one-half of the information is in the quarter-tones and highlights. *High key* images often appear washed out rather than muddy. The effect is again a dull and uninspiring image.

Sometimes an image can have lots of information in the highlights the shadows and still appear dull and muddy. Dreary, overcast days can drain an image of middle tones. You need more than high contrast to make an image interesting. Just look at the image from the Bay of Firth, Scotland in **Figures 3a** and **3b**.

**Figure 3b** has plenty of what we look for in an image: plenty of tonal range, plenty of contrast between shadows and highlights, plenty of saturated colors. What the image does not have plenty of is “pop.” The highlights would improve with a bit of careful brightening, but it is those flat middle tones drain all of the interest from the image.

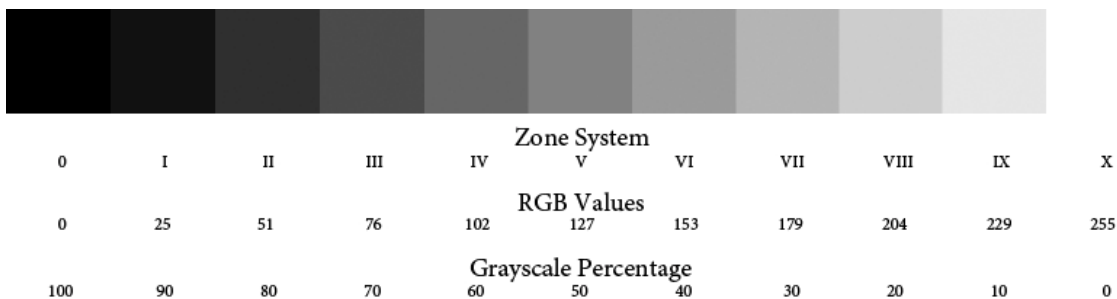


*Figures 3a and 3b. Flat midtones can leave the interest for an image equally flat.*

### Getting Our Terms Straight

Ansel Adams codified his Zone System in the 1940s. It divides an image into 11 zones. Sometimes his zones are referred to as tones, although it would be more accurate to say each zone is a discrete range of tones. (See especially, *The Negative* by Ansel Adams, [http://www.amazon.com/exec/obidos/tg/detail/-/0821221868/qid=1088975174/sr=8-1/ref=sr\\_8\\_xs\\_ap\\_i1\\_xgl14/102-3409681-5295349?v=glance&s=books&n=507846](http://www.amazon.com/exec/obidos/tg/detail/-/0821221868/qid=1088975174/sr=8-1/ref=sr_8_xs_ap_i1_xgl14/102-3409681-5295349?v=glance&s=books&n=507846))

Zone 0 is the darkest shadows: maximum black with no evident detail. Zone X is the brightest highlights: white with tone but no evident detail. Zones I through IX represent tones with detail, going progressively from very dark to very light.

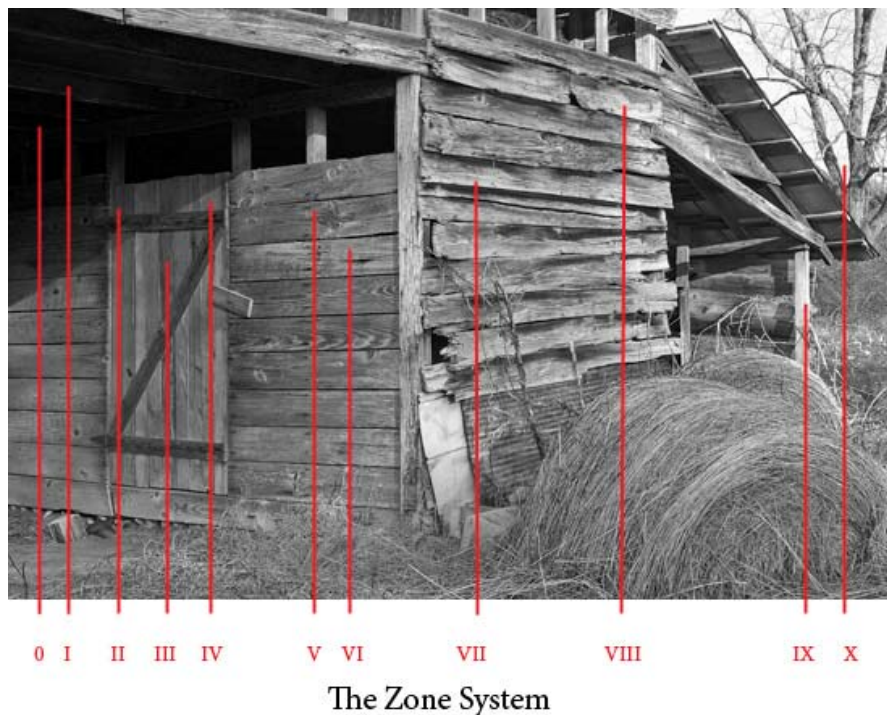


*Figure 4. A grayscale wedge with corresponding values*

Zone V is middle gray (127 in RGB, 50% in grayscale). It was the key measurement in Ansel Adams' Zone System. Zone V represents normal tones under normal lighting. With

film photography, you typically set the exposure so middle tone objects are exposed according to the meter. If you need to preserve highlight detail, you compensate by subtracting stops or reducing the length of the exposure. This keeps the highlights from “burning out” and reduces the brightness of the rest of the image. If “stopped up shadows” was the likely result, you added stops or lengthened the exposure. This increased brightness not only for the shadows but for the rest of the image as well.

With typical camera metering and auto exposure, the subject is automatically rendered as a middle tone. A brighter than middle tone subject will be darkened unless exposure compensation is applied. Highlights, like snow can become a dingy gray, without positive exposure compensation. Darker than middle tone subjects need negative exposure compensation to avoid lightened shadows.



**Figure 5. The zones identified in a B&W image.**

Ansel Adams urged photographers to *previsualize* how the photograph will appear prior to making an exposure. This forces the photographer to be deliberate during exposure.

While digital photography can still benefit from many of Ansel Adams insights, the way light affects photoreceptors on a CCD or CMOS imaging chip is not the same as how light affects photographic emulsions.

This is especially evident in Ansel Adam’s advice, “Expose for the shadows and develop for the highlights.” Michael Reichmann argues that with digital photography it is important for photographers to expose for the highlights and develop for the shadows. (See his comments at <http://www.luminous-landscape.com/tutorials/expose-right.shtml>.) “Expose to the Right” ensures the best signal-to-noise ratio.

Film photographers, especially slide film photographers, are accustomed to underexposing images to increase saturation and avoid burning out highlights. Digital photographers have one enormous advantage unavailable to film photographers (unless they shoot Polaroid film). Digital SLRs provide the photographer with immediate visual feedback about their shot.

I am not referring to the tiny LCD preview of the image. Lighting in the field and LCD displays do not mix well, especially when trying to make fine determinations about exposure. Digital SLRs and the better digicams also provide a histogram of the exposure values, and those histograms are a critical tool for “postvisualizing” your digital images while out in the field. If we stick to Ansel Adams meaning of previsualization, which occurs before exposure, then postvisualization is the process of imagining how the image will appear once we get back from the field and start to work with it in our image editing software. Did we expose correctly? Do we need to shoot again?

With Expose to the Right (ETTR), you aim for a histogram that approaches the right edge of the histogram but does not clip any highlights. You are exposing for the highlights.

Previsualization is an essential step for most DSLRs and digicams when using ETTR. Current digital cameras typically measure only average luminosity for the three channels rather than displaying each channel individually. It is therefore possible to clip a single channel and see no evidence on the histogram or a highlight warning. So, care is required in the application of the technique: especially with highly saturated colors in bright light. You either need to back away from the right a bit or bracket your exposures.

ETTR is a technique that brightens the image. This is critical for reducing noise in digital images. While CCD and CMOS imagers are linear devices over most of their operating range, noise is a common problem, especially in deep shadows. Slight differences in sensitivity among the photoreceptors become increasingly noticeable under low light conditions. If you magnify the shadows of many digital images, you will see evidence of luminosity noise. It is sometimes described as splotchiness.

ETTR reduces noise, but once you have exposed for the highlights, you then need to develop for the shadows. This is done during photo editing, typically through adjustments to tonal range, contrast, and brightness.

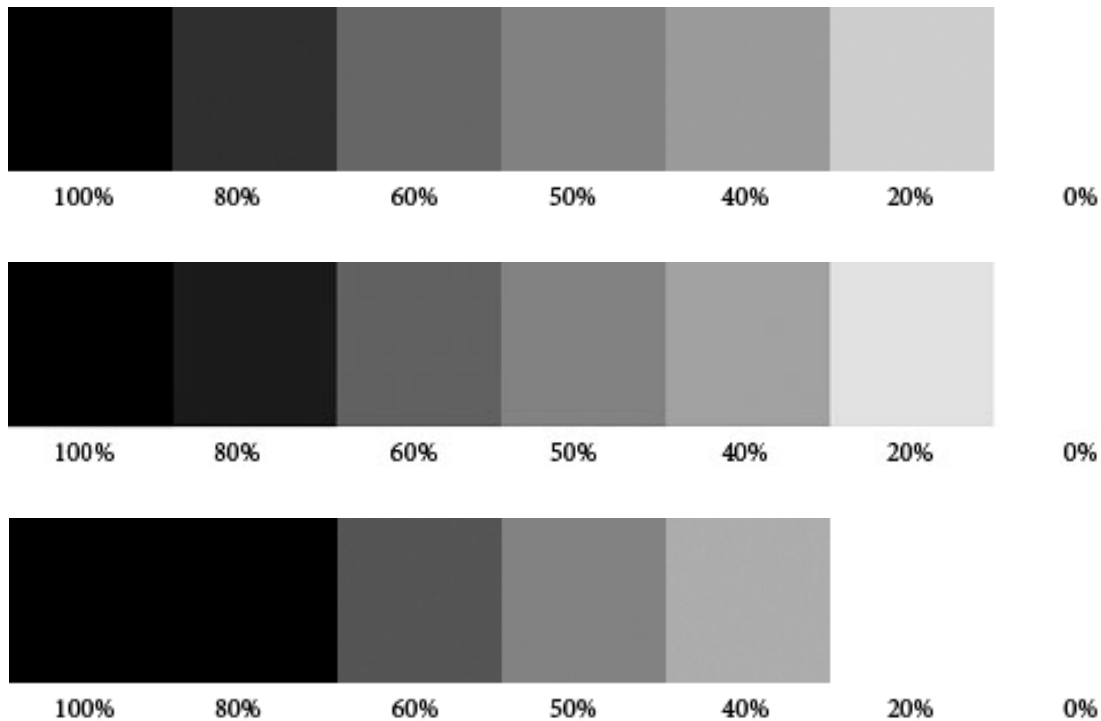


**Figure 6. Reduced tonal range typically results in a flat, dull image.**

Dynamic range is the difference between the darkest tone that a photographic medium can capture and still hold detail and the lightest tone that can display detail. To capture detail, tones need to be distinct.

The left half of **Figure 6** above shows less tonal range than the right. The tonal range of a particular image is just the numeric difference between its maximum highlight and its minimum shadow. Extending the tonal range makes the darkest pixel darker and the lightest pixel lighter and moves all of the intermediate pixels corresponding amounts to fill out the new tonal range. Details in the sand stand out more from the background as a result of a quick adjustment in Photoshop with the Levels control. The starfish has more “pop.”

There are exceptions, like the black cat in a cave or a polar bear on the snow, but having a full tonal range is generally a good thing for photographs. The darker the darkest areas, and the brighter the brightest areas, the more contrast the image will have. A full tonal range ensures that the image has the fullest possible overall contrast. Images that are almost exclusively highlights and/or shadows, while posing special challenges, are the exception.



**Figures 7a – 7c. A grayscale wedge before/after contrast adjustments.**

Contrast is a related concept. When you increase contrast, dark pixels become darker and light pixels become lighter. Middle gray is unaffected. Since the human eye finds details by looking at differences in luminosity and color, increasing contrast nearly always makes fine details more evident.

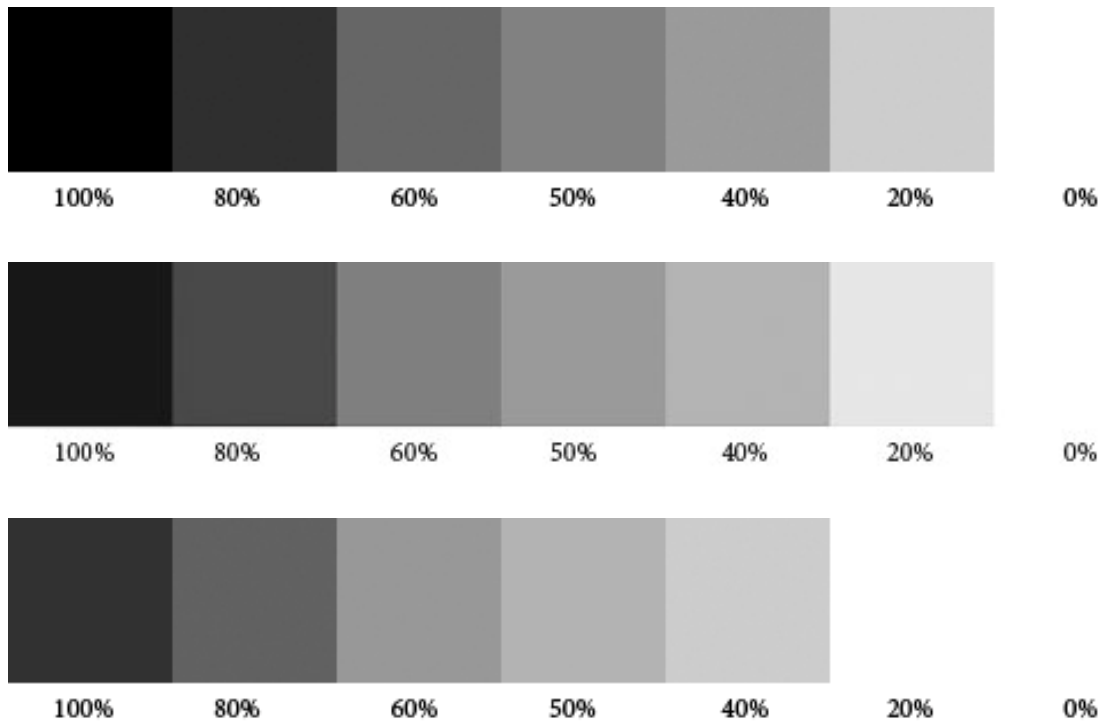
**Figures 7b** and **7c** show the result of increasing contrast to a grayscale wedge. This was done with the Photoshop Brightness/Contrast control. **Figure 7b** is the result of a +20 increase made to the Contrast slider. Notice how the 80% patch has darkened and the 20% patch has lightened. **Figure 7c** is more extreme: a +40 increase to the Contrast slider. Both the 80% and 20% tone clipped. The 80% tone became indistinguishable from the 100% tone, and the 20% became indistinguishable from 0% tone.

It is also important to notice that the 60% and 40% tones were only slightly affected by even the aggressive +40 contrast adjustment. The tonal range for the image would remain exactly the same. Lighter shadow tones and darker highlight tones tend to disappear when contrast adjustments are overly-aggressive. This causes the highlights and shadows to posterize, leading to a loss of detail.

Controlling contrast is critical to image editing. For an image to appear life-like, it must contain a wide range of brightness values. Place two versions of the same image side-by-side, most people will prefer the print with higher contrast.

Brightness is another related concept. When you adjust brightness, you affect every pixel equally. When you increase brightness, all of the pixels lighten – dark and light pixels

alike. Highlights can clip, if you are careless when increasing brightness. When you decrease brightness, all of the pixels darken. Shadows can stop up when decrease in brightness is extreme.



**Figures 8a -8c. A grayscale wedge before/after brightness adjustments.**

“Linear” is the jargon for a change that affects every pixel in the same way. Brightness takes the existing histogram and slides it to the right when brightness is increased and to the left when brightness is decreased. “Nonlinear” changes affect some pixels more than others. They compress some of the information displayed in a histogram and/or expand some of it.

All of the pixels in **Figure 8b** brightened, except for those that were already 0%. Those pixels had no additional values to assume. They were already at maximum brightness. The Brightness slider was set at +25.

**Figure 8c** has clipped highlights. A more aggressive +50 setting for the Brightness slider caused the 20% tones to clip completely. Once highlights (or shadows) clip, their information is lost forever. You can move a wide range of pixels to 255, but they will move back from 255 as one large clump. Clipping compresses all of their previous information into one single value. Protecting highlights and shadows from clipping is an important consideration when adjusting tonal range, contrast, and brightness.

## **Where Do We Go From Here?**

When faced with a dull, muddy picture, you might be tempted to reach for the Brightness and Contrast control. Most pros advise against its use altogether. I tend to agree. The only time I can recall using them is the simple adjustments for this tutorial. They are not part of my digital workflow. The Levels and Curves tools give you more flexibility. Not only can you adjust brightness and contrast, you can also adjust the overall tonal range, middle tones, color balance, and even adjust the highlights separately from the shadows.

The rest of this tutorial series will explore the wide range of options in Photoshop CS for handling problems with tonal range, contrast, and brightness. The next tutorial will discuss the features in Adobe Camera RAW II for making basic adjustments to tonal range, contrast, and brightness.