4b

Editing for Size and Resolution

There's nothing inherent in a photo that forces it to be a given size. However any photo editor will let you define a size for the photo to print. If you're not particular about how the photo looks, you can simply set the size and let it go at that. Just find out where you change the size in the program—in a size dialog box, in a text box when you print, or elsewhere.

Unfortunately, there's a small complication. When you change the size you may change the quality of the printed output. Say you have a photo that's 800 pixels across. If you print it at 4 inches across, you'll get 200 pixels per inch (ppi), which will give you reasonably good output quality. Print it at 10 inches across, however, and you'll get 80 ppi, which won't give you the same quality. Resample the image to 200 ppi at the new size, and you'll gain a (usually) small, but noticeable increase in quality.

It's this relationship between size and resolution that you need to be concerned about. The two are linked in a way that can be confusing. But it doesn't have to be. Read on.

Sorting Out Some Tangled Threads

The secret to knowing your way around size and resolution is to compartmentalize your thinking. First, understand that resizing an image for viewing on screen is a completely different issue than resizing for printing. Keep the two firmly separated in your mind, each in its own pigeon hole. We'll talk about resizing for printing first, and then come back to the issue of resizing for viewing on screen later.

Second, don't try to change size and resolution at the same time, if you can avoid it. Some programs will let you do that, but until you have a firm grasp of the relationship between the two, we advise against it. It's better to adjust the size and resolution in two steps, and go through the process without a mistake, rather than try to do both at once and have to start over.

There are two basic variations on how to set size and resolution, depending on the photo editor you're using. Virtually any photo editor will include a command called Size, Resize, or something similar. Alas, it doesn't always mean the same thing. In some editors, the command lets you specify a size for printing the photo—4 × 6 inches, 8 × 10 inches, or whatever you like. You can then find another option for changing resolution. In other editors, however, the size command changes the photo's size in pixels—what we've called pixel resolution in this book. That's really a resolution setting rather than a size setting. Typically in those programs you specify a size to print the photo when you give the Print command.

Most high-end photo editors aimed at professionals and serious amateurs use the first approach. Most low-end photo editors—the kind you most likely got with your camera—use the second approach. To keep from getting confused in either kind of program, however, it's essential that you understand what happens when you *resample* a photograph to change the number of pixels. It also helps to know why you would want to.

Sampling, Resampling, and Resolution

When you take a photo, your camera's sensor doesn't simply record the image coming though the lens. The technically correct description for what it's doing is called *sampling*. The camera divides the scene into a grid, with so many cells across and so many cells down, based on the resolution you told it to use. It then essentially looks at each cell as a single, indivisible unit, or sample, of the image. Each sample becomes a pixel in the photograph. Set the resolution higher, and the camera takes more samples; set it lower, and it takes fewer samples.

Once you get the photo onto your computer, you may decide that you want a different resolution—which means a different number of samples. As we've discussed elsewhere in this book, if the resolution is too low—with too few samples—you'll see pixelization. If the resolution is too high—with too many samples—you may not be able to see the photo at its best on screen, or you may be wasting disk space on extra information that won't improve the quality of your printed photo. In either of these cases, you'll want to change the resolution, which means you have to resample the photo.

There are different ways that a program can resample an image. To resample to a lower resolution, for example, it could simply throw out some pixels. However, a better approach is for it to examine the pixels in the original image and replace them with new pixels that effectively split the difference in color between two or more pixels in the old image. Similarly, to resample to a higher resolution, a program can simply add pixels by duplicating some that are already there, or it can create new pixels by looking at the pixels that are nearby the new pixel, and, once again, effectively splitting the difference.

Whether adding or subtracting pixels, the process of splitting the difference, or interpolating pixels, is the more sophisticated approach, and we can't imagine anyone creating a photo editor that doesn't use some variation on interpolation. The point is that when you change the pixel resolution of a photo, you're actually resampling the image, and that's true no matter what the command is called. Armed with that information, let's get back to talking about how to change size and resolution.

Size and Resize Your Photos as Needed

To put this more simply: If you can set the image size in width and height, do so. This is a better choice than setting the actual pixel resolution.

Remember the watchword for resizing and resampling photos: compartmentalization. We already suggested that you should set size separately from resolution. You should also compartmentalize the way you think about resolution.

As we've discussed, there are two ways to talk about the resolution of a photo: the pixel resolution, which tells you how many pixels are in the photo, and pixels per inch (ppi). The two are related by the size photo you plan to print. The pixel resolution divided by the number of inches across or down tells you the number of ppi. Alternatively, the ppi setting times the size for printing tells you the number of pixels.

You can avoid all sorts of confusion when you're resizing and resampling your photos by focusing on one kind of resolution or the other, and trying not to go back and forth between the two any more than you must. In fact, it's usually most convenient to

think in terms of ppi, if your program allows it, and leave the pixel resolution for the program to figure out. If you have to deal with both because of the way your program requires you to enter the information, do the conversion when necessary, but stay with a single approach as much as possible. Remember, you'll get to the same result no matter which approach you take.

Keeping all this in mind, here's a strategy for setting size and resolution without getting confused:

- First, decide how large you plan to print the photo. That's the critical piece of information you need before you can do anything else. Don't skip over this step, even if the program you're using won't let you set print size until you print.

- Second, if your photo editor lets you define a size for the photo separately from printing the photo, as in the Photoshop Image Size dialog box shown in Figure 4-8, set the size.
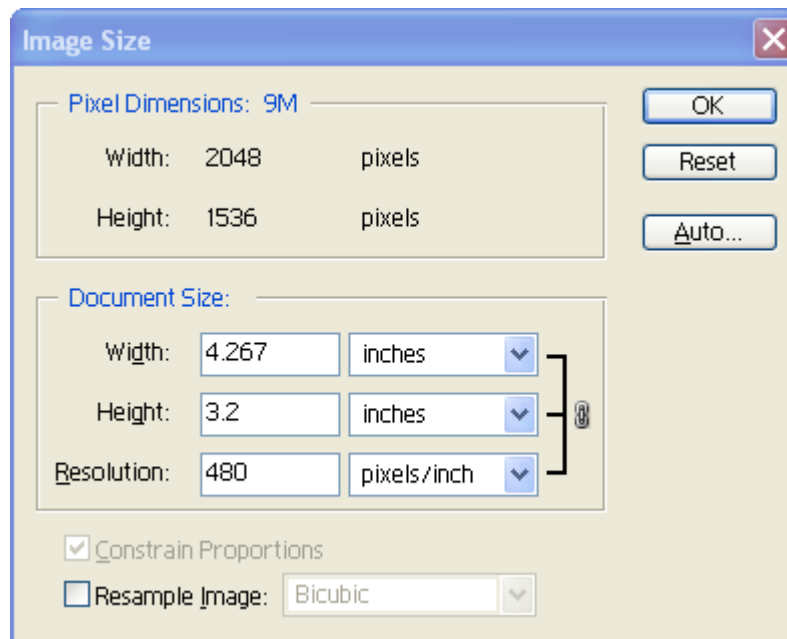
Figure 4-8.
Set the size for the photo first, if you have that option.

- Be careful not to let the program resample the photo at this step. Note that in the figure, we've cleared the Resample Image check box. This tells the program to resize the image without resampling. The pixel resolution will stay the same, and Photoshop will recalculate the ppi setting, based on the new size. If you set just the width or just the height, most programs will automatically set the other to maintain the same proportions—otherwise you'll distort the image. (Your program may refer to the proportions as the aspect ratio.)

- After you set the size, be sure to accept the new size before moving on to the next step, assuming that the program allows that. This may mean choosing an Apply button or choosing the OK button. You might even want to save the file at this point. Having said that, don't let it throw you if the program doesn't let

you accept the new size, but forces you to set a resolution also and then resample.

■   Next, determine the resolution you want to use in ppi. We recommend at least 150 ppi. A higher resolution may improve the image, but keep in mind that it's hard to see any improvement beyond 200 ppi, and anything more than 300 ppi is just using up disk space without improving image quality.

■   If your program requires that you set resolution in ppi, or it gives you the choice, enter the ppi setting in the appropriate place in the program, and let the program resample the image. And that's it. You're done. Don't even think about pixel resolution.

■   If your program requires that you set resolution as the number of pixels in the image, you'll have to calculate it. Multiply either the height or width of the image by the number of pixels you want per inch, and enter the result in the program. Whichever setting you enter—width or height—the program should automatically recalculate the other. If it doesn't, do the calculation yourself and enter the result. Then let the program resample the image.

> Don't resample at the printer, if you can avoid it. Do all resizing in a photo-editing program.

At this point, you're ready to print. If the program let you set the print size earlier, simply give the print command. If it makes you set the size as part of the process of printing, give the command to print, and don't forget to enter the size before actually printing.

Resizing for the Screen

Resizing photos for viewing on screen is much easier than resizing them for printing, because when you're talking about the screen, resolution and size are essentially the same thing. At least that's true in the sense that for any given screen resolution, the photo's pixel resolution tells you how much of the screen it will take up if you don't zoom in or zoom out on the photo.

> If there's enough hard disk space, save the original image and the resampled one. If you decide later that you need the original image, you'll have it. It will look better than a smaller image that's been resampled.

For best viewing, you want to show a photo on screen at 100 percent, meaning one pixel on the screen gets used for each pixel in the photo. To do that and still see the whole photo, you need a pixel resolution for the photo that's less than the resolution for the screen you expect to look at it on. So to resize or resample a photo for the screen, the only thing you need to know is what screen resolution you're expecting to use and how much of the screen will be devoted to the photo. A good rule of thumb that we mentioned in an earlier chapter is to use roughly the next lower standard screen resolution. So for viewing on a 800 × 600 pixel screen, you'll want to resample the photo to 640 × 480 or so.

Resizing—or resampling—for viewing on screen, then, is a two step procedure. First decide on the pixel resolution you want for the photo, and then resample the photo to that resolution. It's that simple.

Oh, one other thing: ignore references to ppi. You'll often hear that screen resolution is 72 or 96 ppi, but that's just a convenient fiction. For any given screen resolution, the actual number of pixels per inch will vary depending on the physical size of the screen. At 800 × 600 resolution, say, the ppi on a 17-inch monitor won't be the same as on a 21-inch monitor.

About Cropping and Resampling

Before we leave the subject of resampling, we should also point out that you'll often need to resample after cropping a photo. Remember the cat we've been using for illustrating much of this chapter. When we last cropped in on it, we mentioned that it was beginning to show some pixelization on screen. That's because the image, which was relatively low resolution to begin with, at 640 × 480 resolution, had reached the point of being only 290 pixels wide. View it at full size on screen, or print it at 8 × 10 inches, and the pixelization is annoyingly obvious, as the enlargement in Figure 4-9 shows.

Figure 4-9.
Crop in on a photo enough, and it will show pixelization.

The fix is to resample the image. Change the resolution to, say, 2000 pixels across, and you can print it at 8 × 10 inches or show it full screen without seeing pixelization, as in the enlargement in Figure 4-10.
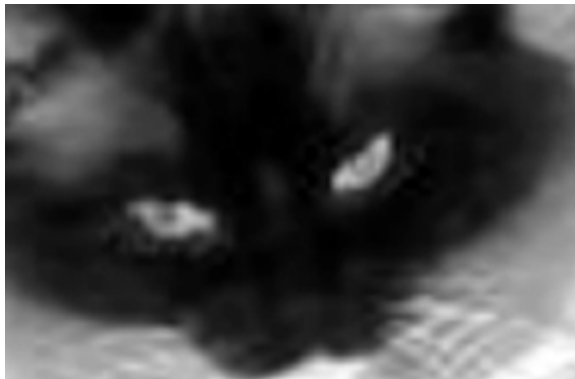
Figure 4-10.
Resampling won't improve resolution, but it will get rid of pixelization.

The result may be a little blurry, but it won't be pixelized. If you don't enlarge the image all that much, the blurriness—or lack of resolution—won't be an issue.

Now let's move on and learn how to correct some of the most common flaws found in photos.

Quick Quiz

1. Name five ways to improve pictures for printing.

2. List as many photo editors as you can.

3. Is a shape a vector graphic or a bitmap?

4. Is Corel Draw a vector program or a bitmapped one? What about Microsoft Paint?

5. What is the most common reason for rotating an image?

6. Name at least three reasons why you would crop a photo.

7. Basically, how does resizing an image differ from changing its resolution?

8. What is a sample? Why is resizing often called resampling?

9. If your program requires that you set resolution as the number of pixels in the image, you'll have to calculate it. How do you do that?

10. If you screen resolution is set to 800 x 600, what is the best size image for viewing on the screen?

Putting It All Together

Exercise 1: Configure your monitor to use 800 x 600 resolution. Navigate to the Lesson04a-b folder and open the image file 04a-b Candy.jpg in Microsoft Paint. Rotate the image 180 degrees so that the image is upside down. Rotate it back to its original state. Flip the image.

Exercise 2: Open the image file 04a-b Beach.jpg, located in the Lesson 04a-b folder, in Microsoft Office Photo Manager, and crop the image to remove the foreground.

Exercise 3: Open the image file 04a and b Beach, located in the Lesson04a-b folder, in Microsoft Office Photo Manager, and resize the image so it is an appropriate size for e-mailing.

Exercise 4: Open the image file 04a and b Beach, located in the Lesson04a-b folder, in Microsoft Paint, and resize the image using the Stretch command so it is an appropriate size for e-mailing.