

# UNDERSTANDING IMAGES

## PART 2

### GUIDE TO RESOLUTION, SIZE and PRINTING

Most people are not into graphic design and find the concepts behind image resolution and size somewhat confusing. This is a very complex subject if you delve into it but it can be simplified for most people. The main questions most people (that is people who are not graphic designers) have are listed below.

#### PIXELS

A pixel is a square block of color and is the basic piece that an image is created from. Every digital image is composed of thousands or millions of these pixels and the more pixels an image contains the more detailed the picture. One million pixels make up a megapixel and therefore a 3 megapixel camera takes photographs each containing 3 million pixels. Normally everything pertaining to an image should be referenced in pixels unless you are printing an image in which case DPI is usual.

#### PIXELS PER INCH vs DOTS PER INCH

Though often used interchangeably, pixels per inch (PPI) and dots per inch (DPI) are not technically the same. PPI refers to the number of pixels contained in one inch of the digital image or computer monitor. PPI can affect how any image appears on the Web or in print.

DPI refers to the output or resolution a printer is capable of producing. The more dots per square inch a printer can produce the better the output.

#### IMAGE RESOLUTION

Resolution refers to the amount of information about the image contains usually measured in pixels. For a 5 megapixel camera a high resolution image (the best it can produce) will give an image of say 2592 pixels wide x 1944 pixels high would give you a resolution of 5,038,848 pixels or approximately 5 megapixels of resolution. The same picture taken with a 3 megapixel picture would give an image of 2048 x 1536 pixels or a resolution of 3,145,728 pixels which is approximately 3 megapixels.

#### IMAGE RESOLUTION and FILE SIZE

Usually the higher the resolution (more pixels) the bigger the file size. This relates to the amount of space taken on your hard drive. For instance an image taken with the 3 megapixel camera would take about 600 KB when saved as a jpeg (slightly compressed) image but saved as an uncompressed TIFF file the same image could take 9 MB of disk space. Normally I recommend saving images in either the TIFF format

or if you are working on the image as a .psd (in PhotoShop) until you are ready to either print the image or save it for the web at which time you can convert it to a jpeg. Each time you open and close an image in jpeg format there is some compression and although there are no definitive statements on the degradation of the image some pixels are lost each time.

## **PRINTING IMAGES**

Printers today are far advanced from those of just three years ago and probably a lot cheaper today. There are plenty on the market but I recommend getting one with a six color (minimum) capability which retail from \$50 to \$150. These usually come with individual cartridges in Black, magenta, light magenta, cyan, light cyan and yellow. The combination of these gives crisp and vibrant color and they are comparatively cheap to operate. If you want to go a little higher end there are eight cartridge printers now which command a higher price (\$300+) I use an Epson Stylus Photo R220 which you can get for about \$70 and I am very pleased with it but I must add I always use genuine Epson cartridges which I get from a company in Texas. They are a little cheaper than buying from a local store and the shipping is free and there is no sales tax added. I also use only Epson paper which can be obtained, on sale, quite reasonably at Fry's or CompUSA. I say use original manufacturers products because in my experience buying "compatible" cartridges does not pay. They tend to dry out when not used and consequently require a lot of head cleaning which wastes ink and negate the savings. Plus when used in conjunction with off brand paper the results are always inferior. There are many claims made about the capability of printers especially the dpi (dots per inch) or resolution and I have seen manufacturers state "up to 2400dpi resolution," take this with a grain of salt, in fact with a whole shaker! Most new printers will print at 240 or 300 dpi comfortably (see individual printers for their settings) which is enough for most needs and what is recommended by most experts.

Printers make claims of their capabilities as so many Dots per Inch. This is the "squirt" of color from the cartridge which depends on droplet size. There are so many claims being made that sometimes it is difficult to get a clear picture of what the printer will produce. If you read any of the leading computer magazines they are always testing printers and it seems every time they come up with a new "best buy." My experience is that if you find a printer you like whether it be HP, Canon, Epson, Lexmark etc. and you are satisfied with the results and the cost of supplies doesn't bankrupt you then stick with it!

However having a good printer and paper is not the complete answer. To get the best picture you must first ask the following questions:

How many pixels are there in the photo?

What is the resolution of my printer?

What is the optimum size of print I can obtain from the above?

If you take your pictures at the maximum setting your camera allows (which I recommend you always do) the following table will give you a very good guide to print size.

When printing images there are limits to the size that can be printed without loss of quality. When saving a photograph in image editing software it is always recommended that you save the copy at a minimum of 300 PPI. To find out the maximum size you can print at 300 PPI simply divide the image resolution by 300 which in the 3 megapixel camera example given above would be 5.1" x 6.8". In the case of the 5 megapixel camera this equates to 1944/300 x 2592/300 or 6.5" x 8.6".

This is not to say that you cannot print larger pictures but the crispness of the colors or focus may be slightly compromised. I regularly print 8" x10" pictures from my 5 megapixel camera with good results.

If you are in doubt try using the table below and substituting 240 DPI or even 200 DPI for the printer resolution and see what size picture you get. Anything lower than 200 DPI will definitely give you lesser results but it could be that 200 DPI will be sufficient for the needs of a particular picture.

The table below gives you an idea of what size to expect with a nominal print resolution of 300 DPI. At a resolution of 240 DPI prints can be made about 25% larger..

MEGAPIXEL CAMERA	PHOTO PIXEL COUNT MAX SETTING	PRINTER RESOLUTION	PRINT SIZE INCHES
1	960X1280	300 DPI	3.2 X 4.3
2	1200X1600	300 DPI	4.0 X 5.3
3	1536X2048	300 DPI	5.1 X 6.8
4	1704X2272	300 DPI	5.7 X 7.6
5	1944X2592	300 DPI	6.5 X 8.6
7	2304X3072	300 DPI	7.7 X 10.2
8	2448X3264	300 DPI	8.2 X 10.9

## IMAGES on the WEB

While large, high resolution pictures may be very attractive on the web they are not necessary as the maximum resolution of a computer monitor is 96 PPI and with most CRT monitors 72 PPI. If you are putting pictures onto your website consider using thumbnails with a link to larger images. This allows the web page to load faster and at the same time has the option for people to view a larger image. Generally images for web use should be under 40 kb (preferably under 20 kb) for quick loading of web pages. For those of you who may want to enter photographic contests on the web where there is a strict limit on file size I plan to produce another tip sheet on "Saving Photographs for Contests" which will cover the aspects of saving photographs in compressed format for the highest quality browser display. (I call it "freeze drying" the photograph).