

Aspect Ratio, Pixels and Projection

Understanding Image Sizing for Clinics

One of the requirements for the submission of images to Trillium clinics is re-sizing the image for our projector. This is done for two reasons:

- To make them a manageable size (the Clinic Committee deals with hundreds of images with each clinic).
- To achieve the best possible quality with our projector.

Our projector has a native resolution of 1400 by 1050 pixels. This means that it has 1400 pixels in the horizontal dimension and 1050 pixels in the vertical for a total of a little less than 1.5 megapixels. Any modern digital camera, even a cellphone camera, has more than enough resolution for clinic images. The pixel dimensions of the projector, 1400x1050, also determine its aspect ratio, which is the ratio of width to height. The aspect ratio for most A/V equipment, our projector included, is 4:3.

COMMON ASPECT RATIOS



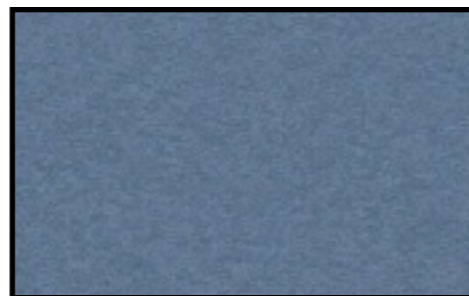
3:2 Traditional 35mm Film Format
Applies to Most Full-Frame and
Crop Sensor DSLRs



4:3 Most A/V Equipment,
Micro 4/3 Cameras, Some
Compacts

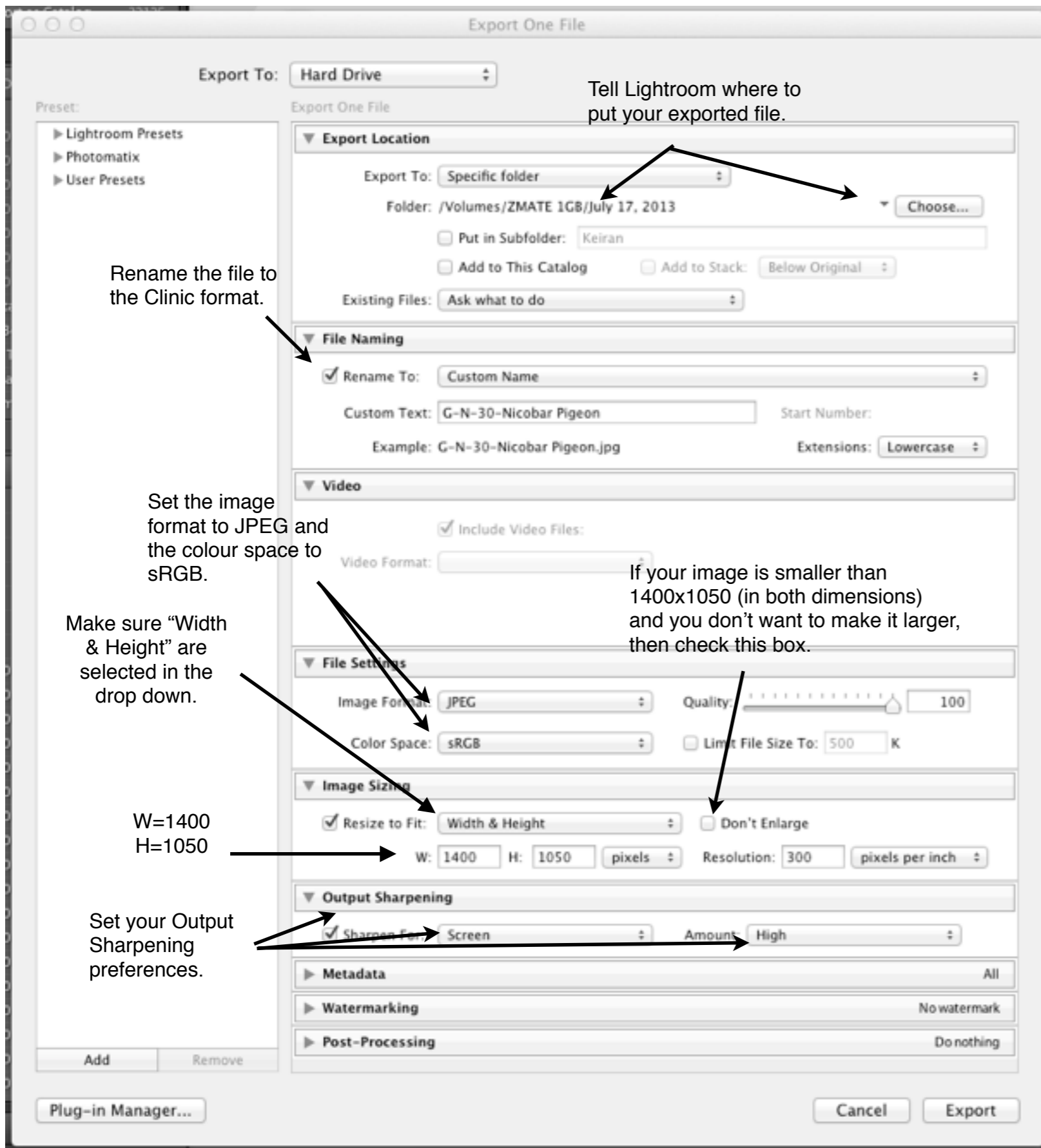


16:9 HD Video



16:10 Widescreen Computers

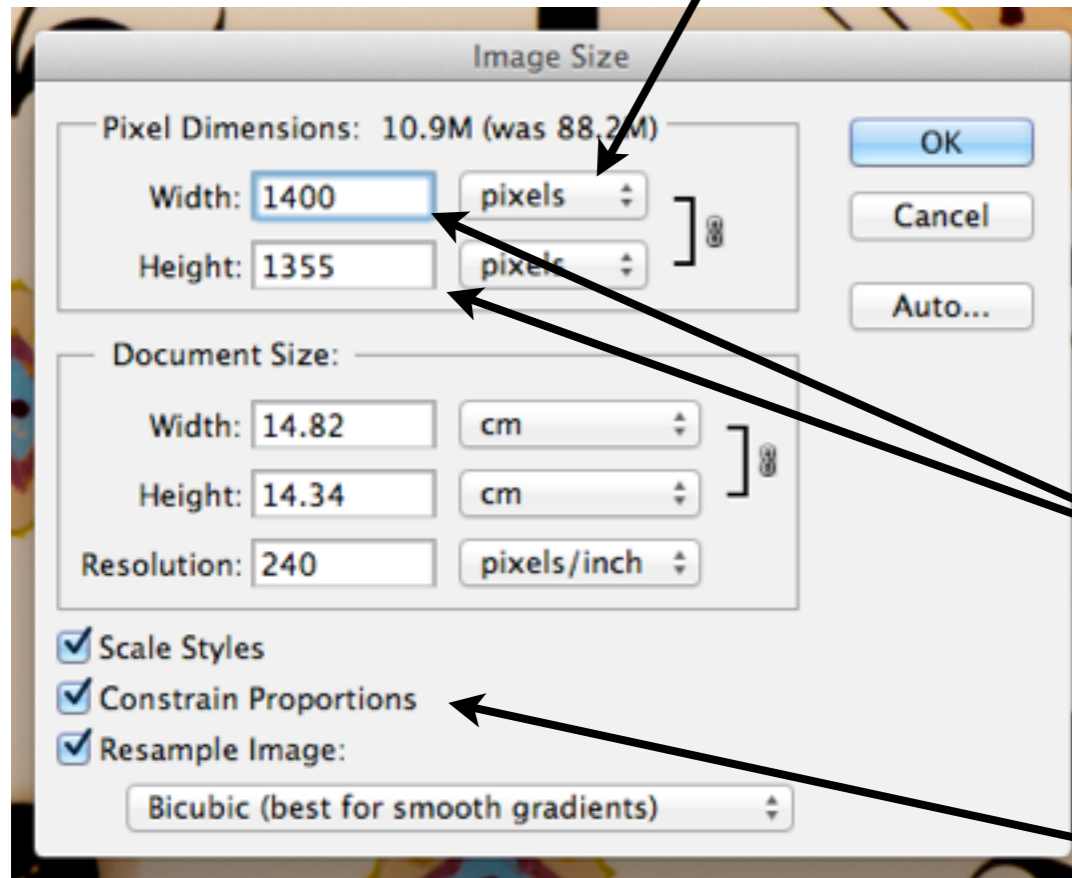
Because the sensor (usually) has a different aspect ratio than the projector, an image will have to be cropped to fill the screen or it will leave empty space at the top and bottom. Uncropped vertical images will have empty space at the sides. Neither situation is a bad thing, just be aware that only 4:3 images will completely fill the screen.



As mentioned earlier, our projector has 1400 pixels horizontally and 1050 vertically. So, no matter how many pixels the image you want to project has, the projector will throw away pixels and interpolate to fit your image onto the screen. The best image quality is obtained when the resizing is done beforehand in an image editor such as Photoshop, Lightroom, or one of a number of others available.

Of them all, Lightroom is probably the easiest to use. To re-size an image in Lightroom, select your image, click "Export" on the file menu, and then fill in the dialog box that appears, specifying where you want the file to go and if you want to rename it. Check "Resize to Fit" and ensure that "Width & Height" are selected in the drop down box. Then, enter 1400 and 1050 respectively in the W and H boxes. The File Settings should be JPEG, sRGB, and 100% Quality. Adjust your Output Sharpening to your taste, then just click "Export" and Lightroom will resize the image to fit inside the 1400x1050 window and save a JPEG copy of it.

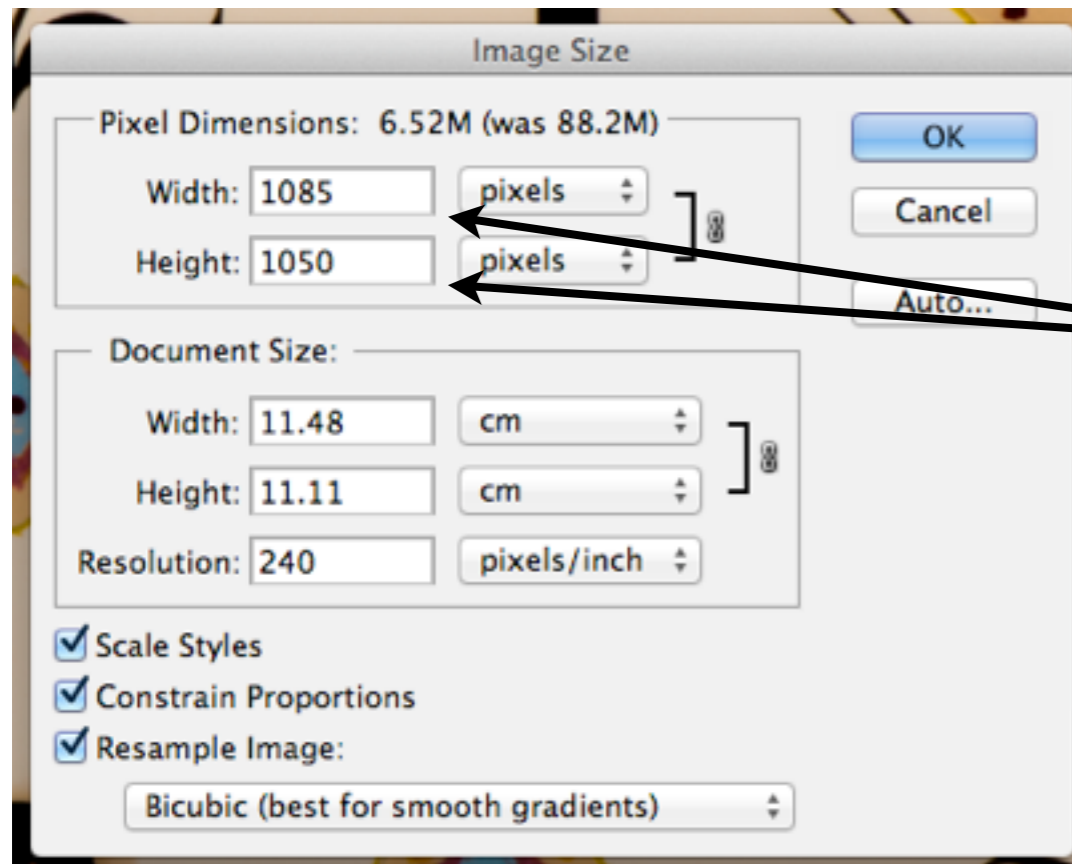
Make sure you select "pixels".



With Photoshop select Image -> Image Size to resize the image. Make sure "Pixels" are selected and "Constrain Proportions" is checked off. Then, change the Width to 1400 pixels. If the Height is greater than 1050 pixels then Height is the number that needs to be set. Set the Height to 1050 pixels and the Width will be something below 1400.

Setting the width to 1400 has resulted in a height greater than 1050. Set the height to 1050.

Make sure "Constrain Proportions" is checked off before adjusting pixels.



With height set to 1050 the width falls where it should be for this particular image.

Cropping vs Image Sizing

When you crop an image, you discard pixels around the edges of your image, but you are not changing any of the pixels remaining in your image. You may or may not change the aspect ratio. When you resize an image you are (usually) reducing the number of pixels that make it up. That is to say, each pixel in the new image is an average, more or less, of 2 or more pixels in the original image. Resizing can preserve the existing aspect ratio but condenses the image into one with fewer pixels (less information). That is why sizing should always be the last thing you do with an image. All editing, adjustments, and cropping should be done with the maximum amount of information (pixels) possible before an image is sized.

Sharpening

Almost all digital images will benefit from some level of sharpening, but, in spite of its name, sharpening can not help a blurry image. A simplified explanation of sharpening is that it takes place at the pixel level and increases the apparent sharpness of an image by detecting light/dark transitions (edges) and increasing the local contrast. (Light pixels get lighter and dark pixels get darker.) Sharpening should be the last thing done to an image before resizing. Because resizing involves creating new pixels by averaging old ones, both Lightroom and Photoshop can apply sharpening when resizing an image. Over-sharpening an image will result in an unnatural appearance that is very easy to spot once you learn to see it - so it should always be done with moderation.