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Introduction

Frequently, the Booth Photography Guild (BPG) asks members to submit image files intended to be viewed on a computer screen or projector. For example, members attending discussion-critique sessions send in images that will be projected or viewed on computer screens. In addition, each year members submit images for the annual Fall Exhibition that are viewed by the judges using a computer projector. To use images in these ways, their image files need to be adjusted for size and optimal viewing.

This document provides guidance on downward resizing your digital images for viewing on computer monitors or projectors. To fully explain the resizing methods, we first need to have a common understanding of some key terms and concepts. Therefore, please read the Background section carefully before trying to tackle the resizing task.

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Background

What is a pixel?

Back in the day, photography was only done using light-sensitive film which was exposed to light when the camera's shutter opened. The coating on the film chemically recorded the patterns and colors of light in a continuous fashion across the entire film surface. Digital photography replaces film with an electronic component known as a "sensor." Unlike film, a camera sensor does not record an image in a continuous fashion. Instead, the sensor is made up of millions of light-sensitive elements that are called pixels (short for "picture element").

When the camera shutter opens, focused light enters through the lens and strikes the sensor surface. Each pixel measures the light that it detects on its part of the sensor and reports a series of three numbers, from 0 to 255, based on the amount of red, green, and blue light, respectively; these are called RGB color codes. So, a pure red would be an RGB code of (255,0,0) and a pure blue would be (0,0,255). Realistic colors are a combination of the three primary colors.

For example, here are three colors and their associated RGB color codes.



This is called the "RGB color space" (note that there are other color spaces a photographer may choose, but here we are limiting discussion to the RGB color space for simplicity). Your raw image file consists of a list of all the millions of individual pixel RGB color codes. Your computer translates those millions of pixel values into a visual image on your computer screen. Even though to the eye it looks like a continuous image, it is still just a mosaic of millions of points of color.

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Below on the left is a color image of a flower which appears to be a continuous image. However, if you look closely, you can see the individual pixels. Below right is a small expanded portion of the image. You can see that the image is indeed made up of small pixels, each with a unique color.



What is “resolution?”

“Image resolution” refers to the number of pixels that make up a digital image—the more pixels the higher the resolution. For example, an image that has dimensions of 5,184 pixels wide by 3,888 pixels high, has a total of 20,155,392 pixels (5184 x 3888)—referred to as 20 megapixels.

Devices used to display digital images also have a form of resolution called “display resolution.” For example, many modern computer monitors have a fixed display resolution of 1920 pixels wide by 1080 pixels high. Depending on the physical size of the monitor, they may have between 70 and 90 pixels per inch (ppi) of monitor surface. Phones and tablets can display at a much higher screen resolution—up to 450 ppi.

Finally, “print resolution” refers to the pixels per inch of a physical print. Prints are measured in inches; however, printing requires enough total pixels to achieve at least 240 ppi to produce a usable level of detail.

We can think of image resolution as the total information contained in an image file. The more original pixels in a captured image—called the “native” resolution—the more information. When we reduce the number of pixels, for example by downward resizing the image to a lower resolution, we reduce the total information. When we crop an image to a smaller size, the information outside the crop is lost, and those pixels are no longer available.

However, the reverse is not true. When we upward resize a digital image to increase the number of pixels, this does not increase the total information. The software tools used for this purpose create new pixels using the existing pixels as a guide. Therefore, upward resizing images does not increase their level of detail—the total information.

Resolution and file size

The higher the image resolution, the larger the digital file. This makes sense when we consider that the image file consists of the list of millions of individual pixel RGB color codes. For example, a 20-megapixel raw image file might be 16 MB in size. Reducing the resolution also reduces the file size. There are certain file types, such as jpg files, that use compression techniques to reduce file size without reducing the pixel resolution. However, the quality of the image is still reduced.

Do you plan to print your image? Make sure you have enough resolution

As mentioned above, to create a usable printed image, you need a digital image with at least 240 ppi. For example, if you want a 16" by 20" print (the minimum area for the BPG Fall Exhibit), you will need a digital image with at least 3840 pixels by 4800 pixels of image resolution (i.e., 16" x 240ppi by 20" x 240ppi). To have sufficient resolution to print your image, you may need to upward resize your image file. This process is beyond the scope of this document, however there are several software programs, such as Photoshop, that do a good job of increasing the number of pixels in your image file.

What is "aspect ratio?"

Aspect ratio refers to the relation between the width and height of an image. A "full-frame" sensor, used in most advanced DSLRs, produces images with an aspect ratio of 4:3, meaning the ratio of the pixels (or inches) in images it produces is 4 to 3. This is also true of micro four thirds sensors—hence the name. For example, an image produced by a 20-megapixel micro four thirds camera might have a native resolution of 5184 x 3888—a ratio of 4 to 3. The cropped sensor known as APS-C, has an aspect ratio of 3:2.

Print-size aspect ratios do not necessarily match those of digital images, requiring photographers to adjust their images for printing. Common print sizes used in the BPG Fall Exhibition are 16" by 20" (4:5 aspect ratio), 20" by 20" (1:1 aspect ratio), and 16" by 24" (2:3 aspect ratio).

Why downsize your image files?

Most digital image files have much higher resolution than needed for projection or viewing on a computer screen. While the computer can handle higher resolutions, the file sizes tend to be too large to easily send via email. In addition, since the computer screen or projector is limited to a relatively low maximum resolution, higher-resolution image files are not displayed with any more detail than downward-resized images.

Consequently, we ask that members downward resize their digital images before submitting them for the Fall Exhibit or to digital critique sessions. What follows are two sets of instructions for downsizing your digital image file using Photoshop and Lightroom Classic, respectively.

----- Go to page 5 for Photoshop Instructions or page 7 for Lightroom Instructions -----

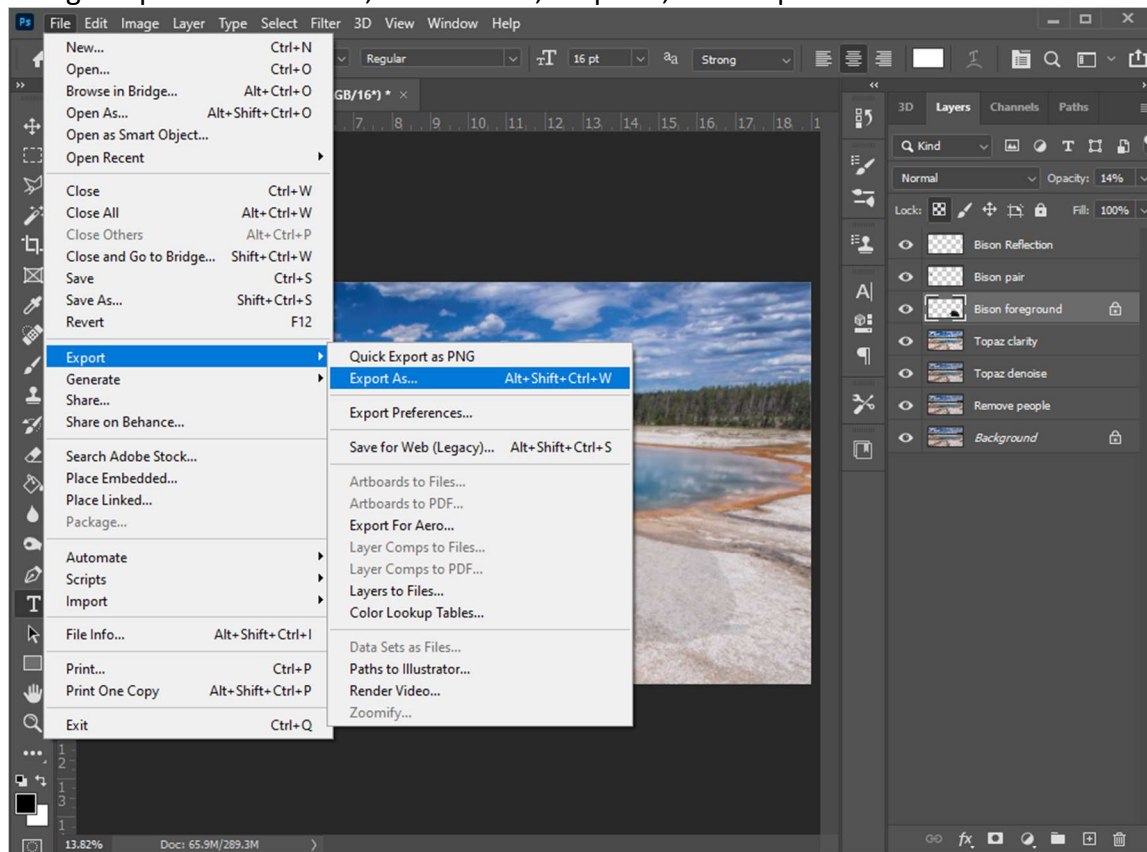
Instructions for Downward Resizing—Photoshop

It is most important that you not downsize your original image file; leave it at its maximum resolution. The method demonstrated here will allow you to save the downsized file to a new name.

Our goal is to create a downward resized version of your original image with the same aspect ratio, but at a pixel resolution that matches the screen/projector resolution of the display device being used by BPG. When you are happy with your image and are ready to submit a downsized version, open it in Photoshop.

Step 1: Opening the export dialog box

Using the pull-down menus, select “File”, “Export”, and “Export As...”



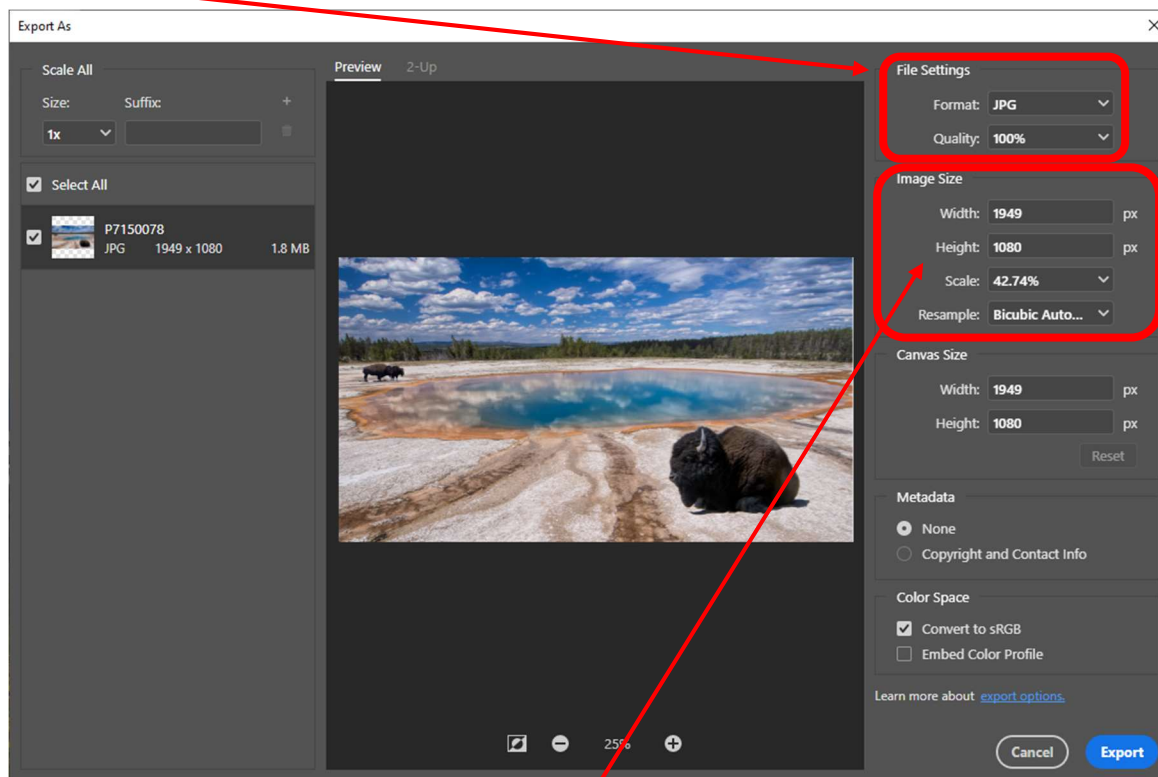
This will open a dialog box that will allow you to select the correct pixel resolution for a newly named version of your image file.

Continue to the next page for Step 2...



Step 2: Downward resizing your image

Select “JPG” as the format, and “100%” as the quality.



Next, adjust the image size by filling in “1080” in the Height cell, and then hit the Tab key. The Width cell will automatically adjust to maintain the same aspect ratio. The Scale cell will also adjust to reflect the percentage reduction in size. Leave the Resample cell on “Bicubic Auto....” Finally, select “Export.”

This opens a dialog box to save the file—choose a new file name and folder location in the way appropriate for your operating system (Windows or Mac). The resulting image file will contain a downsized version of your original image that can easily be sent via email and will also fully display on computer devices.

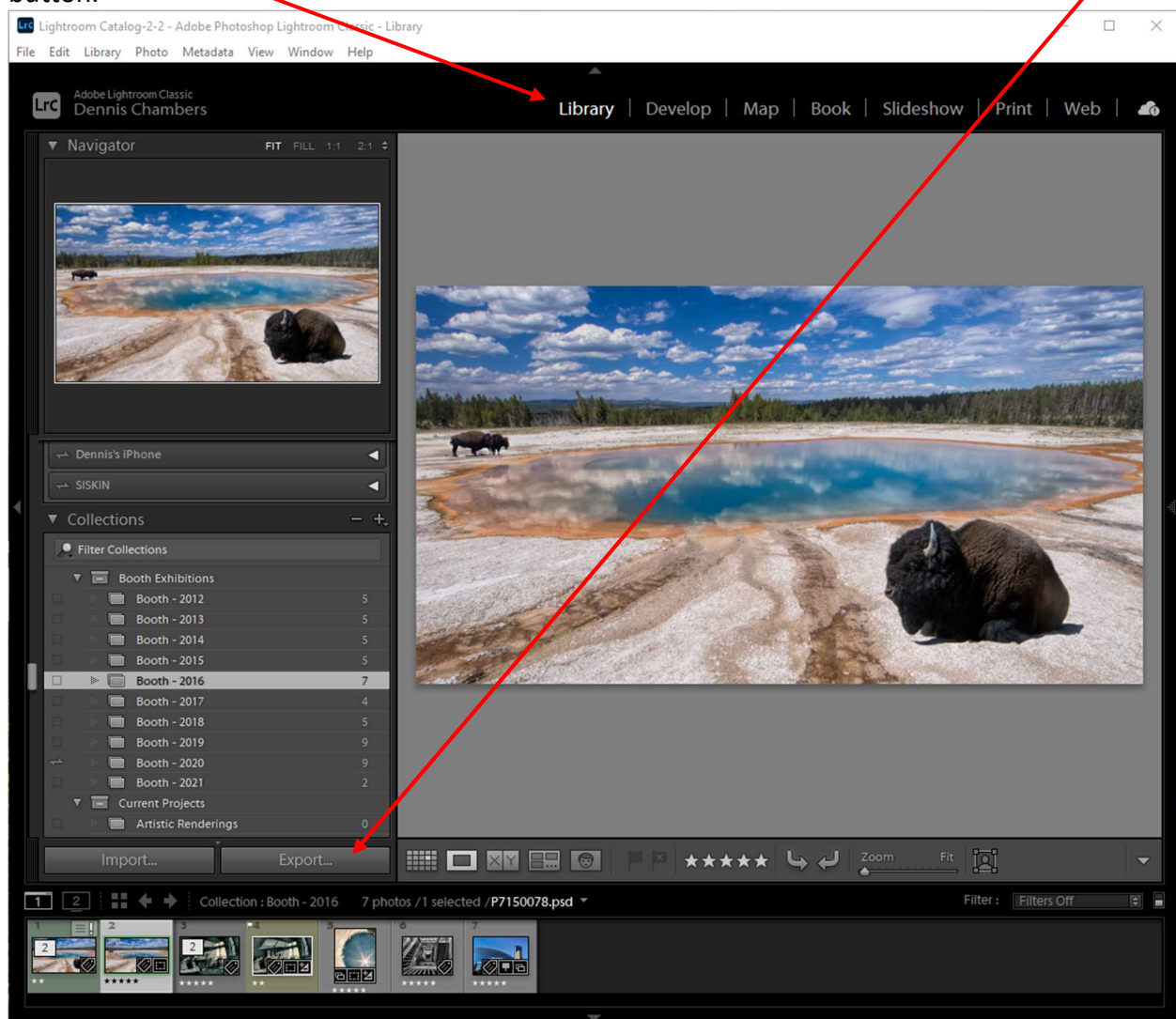
Instructions for Downward Resizing—Lightroom Classic

It is most important that you not downsize your original image file; leave it at its maximum resolution. The method demonstrated here will allow you to save the downsized file to a new name.

Our goal is to create a downward resized version of your original image with the same aspect ratio, but at a pixel resolution that matches the screen/projector resolution of the display device being used by BPG. When you are happy with your image and are ready to submit a downsized version, open it in Lightroom Classic.

Step 1: Opening the export dialog box

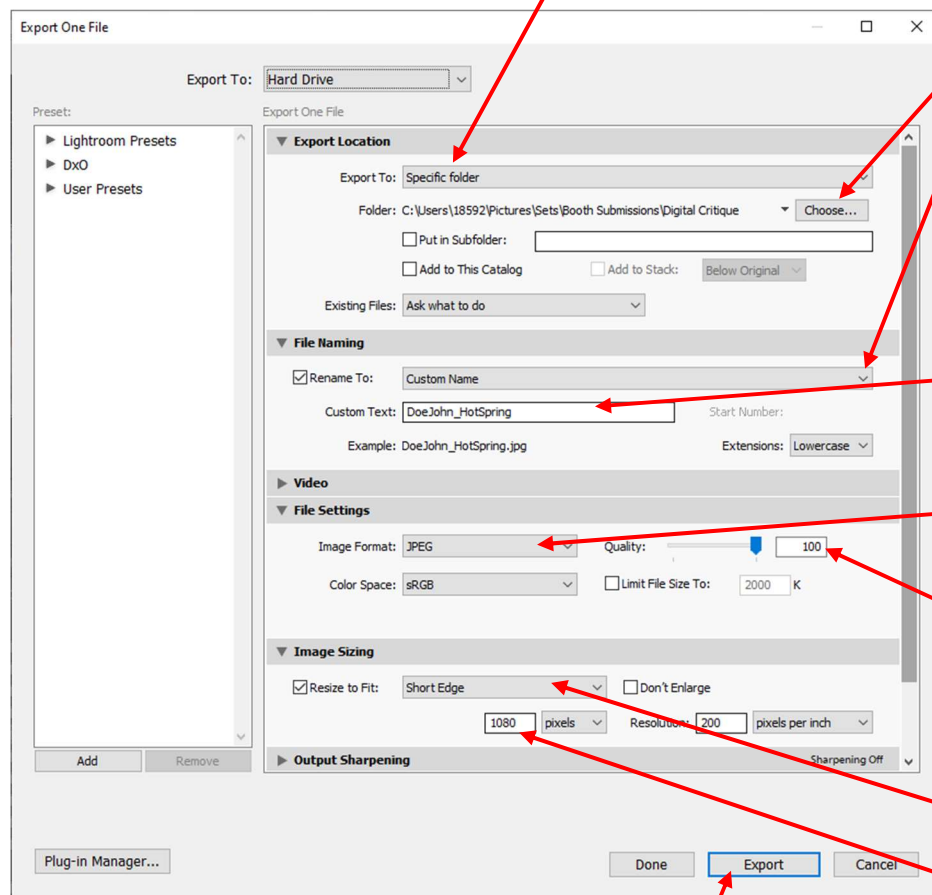
In the “Library” module, select the image you wish to downward resize. Click the “Export...” button.



This opens the Export dialog box where you will select a new file name, export folder, output quality, and pixel resolution.

Step 2: Downward resizing your image

You see below there are several choice boxes in this dialog box. First, choose the export location from the drop-down menu. We suggest “Export To:” a specific folder, and then “Choose...” the folder to receive your new downsized image file.



Second, name the file. We suggest choosing “Custom Name” from the drop-down menu. As you become more skilled with this feature you can explore other naming methods. Fill in the “Custom Text:” which will be the new file name.

Third, choose “JPEG” as the Image Format, and set Quality all the way to the right (100).

Fourth, set up the resizing details. If your image is wider than it is high (i.e., landscape format) choose “Short Edge” from the drop-

down menu. If you have an image that is higher than it is wide (i.e., portrait format), choose “Long Edge.” The idea here is to modify the edge that represents the height of your image. Enter “1080” in the pixels box—you can ignore the “Resolution:” box.

Finally, click on “Export” and the new image file will be created in the folder you selected above. The resulting image file will contain a downsized version of your original image that can easily be sent via email and will also fully display on computer devices.