PB Works e-portfolio

Optimizing Photographs using Paintshop Pro 9

Digital camera resolution is rated in megapixels. Consumer class digital cameras purchased in 2002-05 typically were rated at 3.1 megapixels while most cameras now are 12 megapixels. Consumers have been confused over the megapixel rating in that they assume that the higher the megapixel rating the better quality photographs that the camera can produce. Actually, a higher megapixel rating only allows the user to produce larger sized "photographic prints" without losing print quality. A wallet size photo taken with a 3.1 megapixel or a 12 megapixel camera will be identical quality in final printed form. However, there is a huge difference in digital file sizes between the two photographs.

This information can be stated in a different way. A pixel is short for **pi**cture **el**ement and it holds data (position and color data - Red, Green and Blue) to display miniscule points of the image. When many thousands of pixels are viewed together the image is formed. A 3.1 megapixel camera will capture an image that is 2,048 pixels wide and 1,536 pixels in height (2048 x 1536 = 3,145,728 / 1,000,000 = 3.1 megapixels) while a 12 megapixel camera will capture an image that is 4,000 pixels wide and 3,000 pixels in height (4,000 x 3,000 = 12,000,000 / 1,000,000 = 12 megapixels).

Digital cameras may "capture" images up to 300 pixels per inch (which is different than dots per inch that is used with printing devices). A 3.1 megapixel camera will allow a quality photograph to be printed up to dimensions of 5" x 7" and will have an average file size of 1 megabyte. A 12 megapixel camera will allow a photograph to be printed that is 9" x 14" and will have an average file size of 2.5 megabytes. Settings on the camera allow the user to take photographs that are less than 300 pixels per inch and this can also be accomplished through using graphic editing software such as Paintshop Pro to alter image files.

The medium in which the photograph is to be displayed must be carefully considered. At least 150 pixels per inch is required for printing photographs but 72 pixels per inch is the maximum quality that will display on a computer monitor. Photographs displayed on web pages are frequently no larger than 2"x 3". Using high quality images of 300 pixels per inch with 9" x 14" dimensions and file sizes of 2.5 megabyte for web publishing is a tremendous waste of computing resources! The use of large files will also effect the time it takes to upload files to the web server or wiki and the time it takes to view pages over the Internet.

Finally, a compression algorithm is used for .jpg image files in order to make the file size smaller. This is done so that the file takes up less storage space and is able to be transferred over networks more quickly. The degree of compression can adjusted allowing a trade-off between image quality and file size. The file is compressed when it is saved and de-compressed when it is opened or read.

The .jpg format is said to be "lossy" compression because some information making up the image is lost each time the image is altered and re-saved. A good practice is to maintain the original image of the file and save altered images with different file names. The altered files are uploaded to the web server or wiki. The original file can be used should a better quality image be required in future or if an error is made when altering the copies. Images may be saved as .png files to prevent resolution loss.

It is a requirement that photographs be optimized for presentation in the PB Works e-portfolio. Paintshop Pro 9 will be used to alter photographs before they are uploaded to the PB Works portfolio (Adobe Fireworks and Photoshop are also well known graphics programs). Several online image editing applications are available that may be used if Paintshop Pro is not readily available. As an aside online social networking, sites such as Facebook, automatically optimize image files upon upload based upon "average" settings and maximum file size limits.

The following actions will be demonstrated to optimize images in Paintshop Pro 9:
- crop the image to focus on the theme or object(s)
- resize the image to the space allotted on the web page (e.g.: 200 pixels by 250 pixels)
- change the colour depth (from 16.6 million to 2, 16, 256, 32K, or 64K)
- apply compression to the image

Performing these actions will reduce the average file size to below 200 kilobytes which is transferred relatively quickly over the Internet.

## Determine the image size
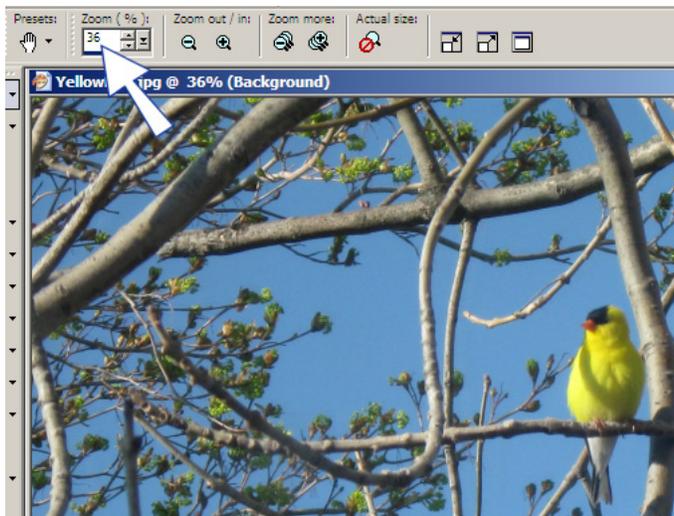
Photo credit: James MacLean

It is assumed that images have been transferred from the digital camera to a storage device such as g: network drive or a portable jump drive.

1. launch Paintshop Pro 9
2. open the image (YellowBird.jpg)

Note that the zoom control above the viewing window provides information regarding the portion of the image that is displayed in the Paintshop Pro viewing window (36% for this photograph).

Should the zoom be set to 100% the user would need to use scroll bars to view the entire photograph. The yellow bird would fill roughly 1/4 of the viewing window area! Perhaps you have received a photograph through e-mail where you had to scroll to see portions of the picture?

3. select **Image - Image Information** from the pull-down menu
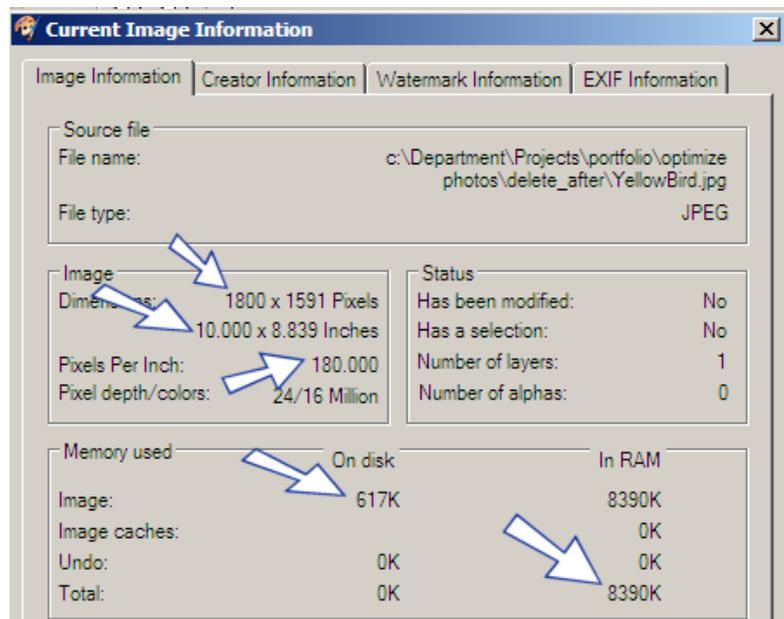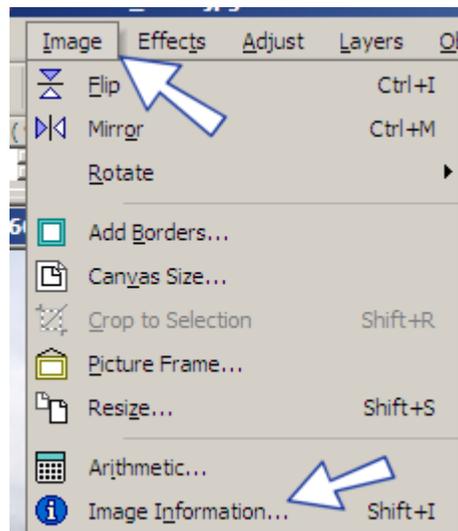
This image was taken with an 8 megapixel camera. Note the image information that is provided:

- the image size in pixels (1800 x 1591) and inches (10.000 x 8.839). This indicates that the camera was set to 3 megapixels when this photograph was taken.
- the pixels per inch (ppi) of 180 (setting of camera when photo was taken - 150 pixels per inch will provide photograph quality when printing. This could have been set as high as 300 ppi).
- 617K file size on disk (compression was applied to the file by the camera)
- 8,390K (8.39 meg) uncompressed data when file was re-opened in Paint Shop Pro

This image that was transferred from the camera is too **LARGE** to use in the PB Works e-portfolio. If it were to be used there would be lengthy wait times for the image to upload and to display in the web browser. No difference in screen quality would be recognized between this file and one that is much smaller. When done optimizing this photograph it will be well less than 200k in file size!

## Optimization Strategies

Crop the Image

Determine the orientation of the photograph in the PB Works page. Will it be portrait or landscape? What will be it's dimensions in pixels or inches? In the example, the bird will be cropped in portrait orientation and the final image will be re-sized later to 200 pixels by 250 pixels. (To get the bird cropped in the image, a larger area needed to be selected in the ratio of 400 by 500 which can be reduced to 200 by 250 in the same aspect ratio. If the aspect ratio is not maintained the image of the bird will skew. It will not look natural as it will appear too wide or too tall).

1. save the image with an alternate name e.g.: g:/YellowBird1.jpg
2. select the crop tool (found in the tool palette at the far left)
3. draw an outline around the bird
4. monitor the size at the top of the viewing window (it should be roughly 400 by 500 pixels)
5. key the values of 400 and 500 in the width and height input boxes
6. drag the selected area with the mouse so that it frames the bird exactly, as required
7. double click the selected area to crop it
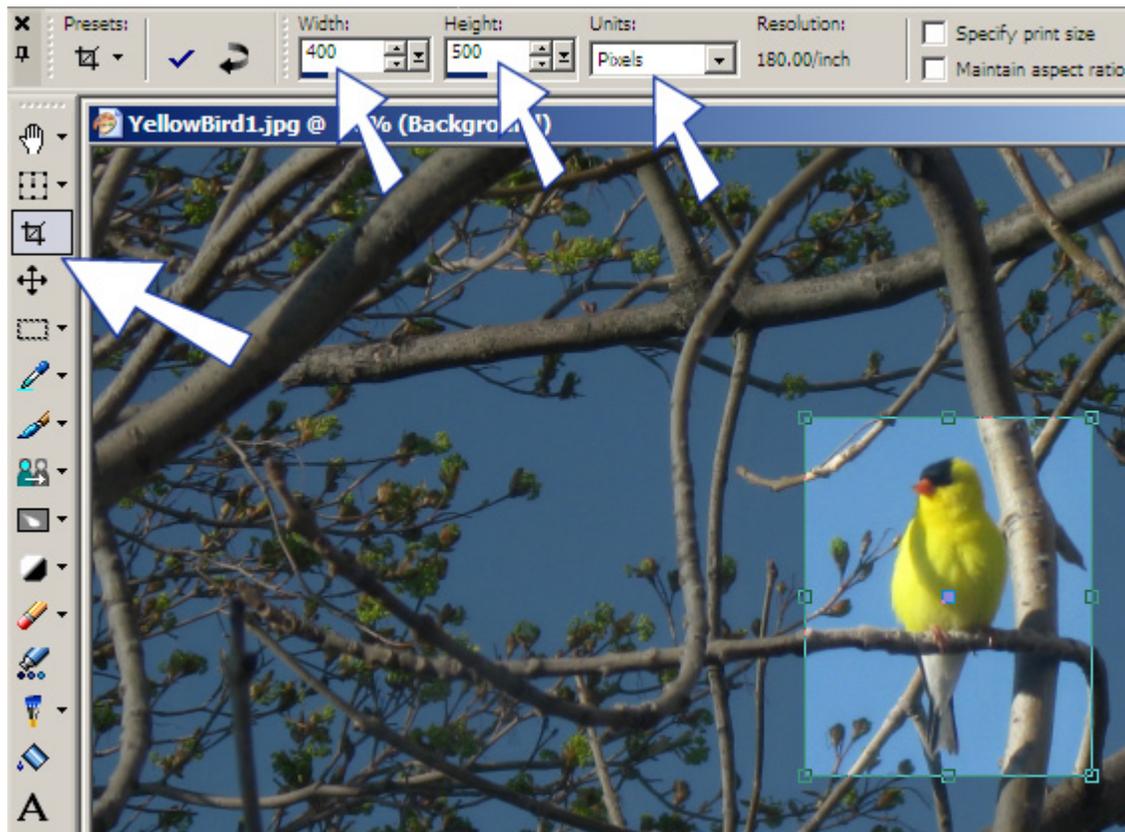
After cropping the image is shown at 100% size and the yellow bird is framed as the dominate object in the photograph.

The largest portion of the image has been cropped away. Check the **image information** to see how this operation has changed the image file size.
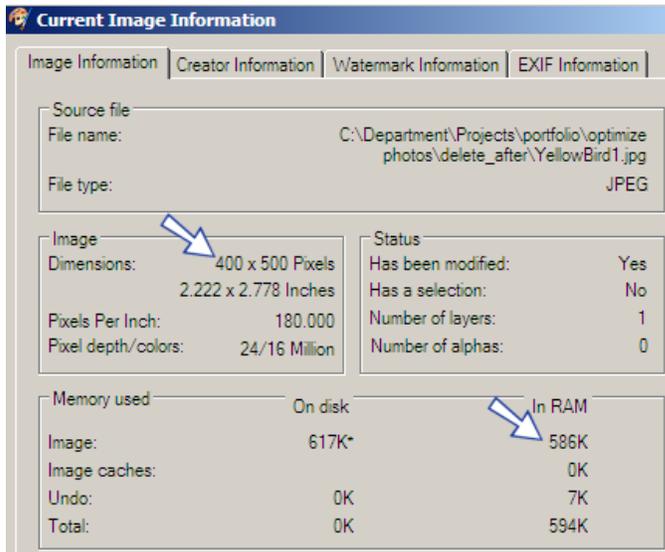

The uncompressed file size has been reduced in size from 8.39 megabytes to 586 kilobytes!

Resize the Image to 200 by 250 Pixels

The photograph will be displayed in PB Works at 200 by 250 so the image is still twice as large as it needs to be. After cropping, the second optimization strategy is to re-size the image.

1. select the **image** pull-down menu
2. select **resize** from the pull-down menu
3. check the **Lock aspect ratio box**
4. change the values of the **width** and **height** in the pixel dimension dialogue boxes
5. choose **Ok**

Check the file information after re-sizing the image. What is the file's size? (My file is showing 147K uncompressed; save the file. What is now the size of the file **On Disk**? [the left number] Mine is 22K after saving!)
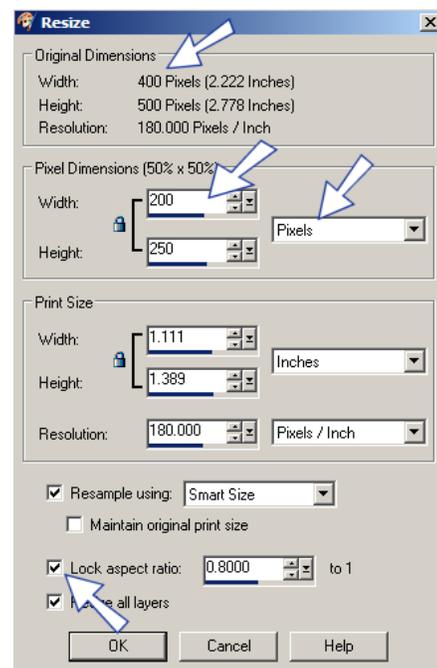
Decrease the Colour Depth

A file size of 22K is excellent for use on a web site and most people would not take the time to optimize the image further. However, there are occasions where large images may be required on the web site and changing their colour depth and compression will greatly improve viewing performance.

1. resave the file with a new name e.g.: g:/YellowBird2.jpg (remember that resolution is lost every time a .jpg image is saved after a major change. This resolution can never be regained except by using the original version of the image)
2. choose the **image** pull-down menu
3. select **Decrease colour depth**
4. choose **256 colours**
5. choose **Optimized Octree** and **error diffusion** in the resulting dialogue box
6. **save** the file
7. check the **image information**. What is the new file size? (Mine was 49K uncompressed and on disk remained at 22K) An explanation for this is that there were not many different colours in this photograph and it is relatively small in physical size. Therefore, file size did not decrease substantially.
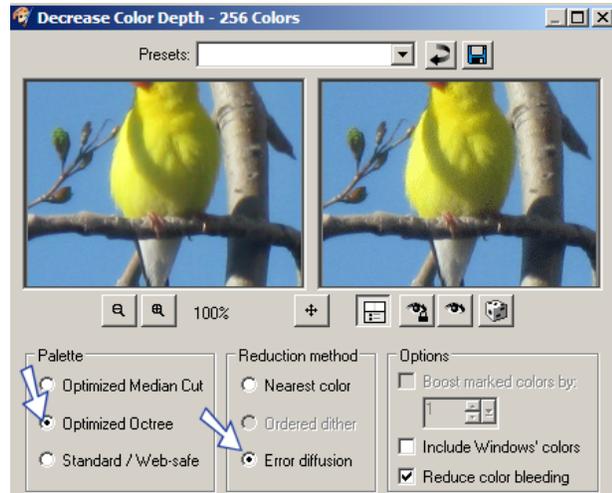
Apply Compression to the Image

The compression algorithm will allow .jpg images to be split into like streams of "bytes" when they are saved. This allows some data to be removed in the saved file and reassembled when the file is reopened. However, some resolution is lost in the process. Higher file compression values will result in more resolution loss.

1. choose the **File** pull-down menu
2. select **Export** from the pull-down menu
3. choose **JPEG Optimizer**
4. enter **33** for a compression value (select different values to observe how the image resolution changes)
5. choose OK
6. save the compressed image with a new name e.g.: g:/YellowBird3.jpg
7. check the image information to determine the new file size.
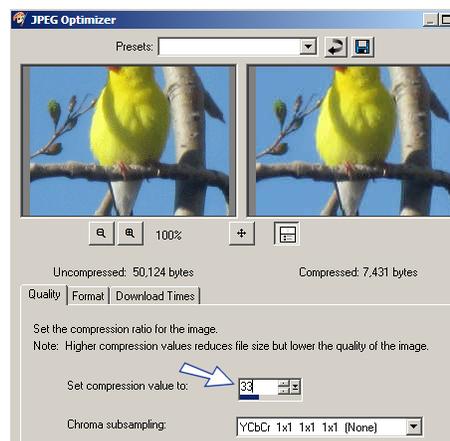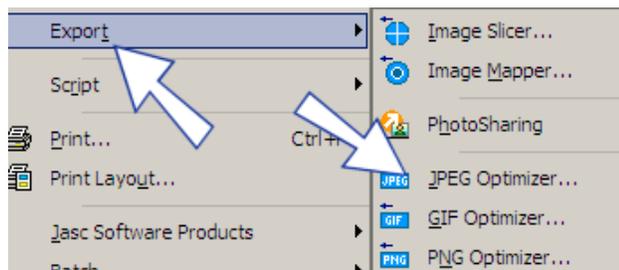
The compressed file value of my image remained at 149K but the "On Disk file" fell to 7K in size! This file size is often used for "thumbnail images" that appear on web sites. They appear very quickly as the web page loads.

Compression may be applied through the use of a wizard. The wizard provides further functionality of estimated download times for the file with various Internet connections and the option of creating progressive .jpg files which start to display on a web page when it first starts opens at low resolution and continues to load until the full image resolution is displayed.
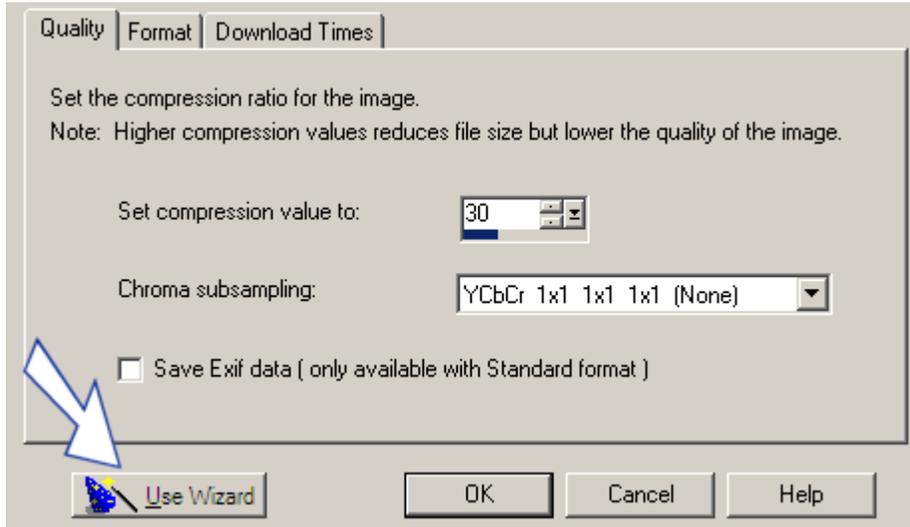
To save time cropping and re-sizing images to their display sizes in PB Works will likely be sufficient for most photographs. Any file that is under 200K in size should not hinder performance of the Wiki site or put undue pressure on the school network.