

# A PRACTICAL APPROACH TO COLLECTION PHOTOGRAPHY

Definition of terms and Background Information

Acquiring, Archiving and Providing Digital Images

Joseph P. Rudinec, PE

Rudinec and Associates / RequestAPrint

## Pixels Per Inch and Dots Per Inch

A **Pixel** is a color element defined by color and tone.



**PPI** (pixels per inch) is commonly referred to as dots per inch (DPI) when talking about a digital image.



**DPI** (dots per inch) is a carryover from the printing industry putting CMYK (cyan, magenta, yellow, black) dots on paper to represent a color.

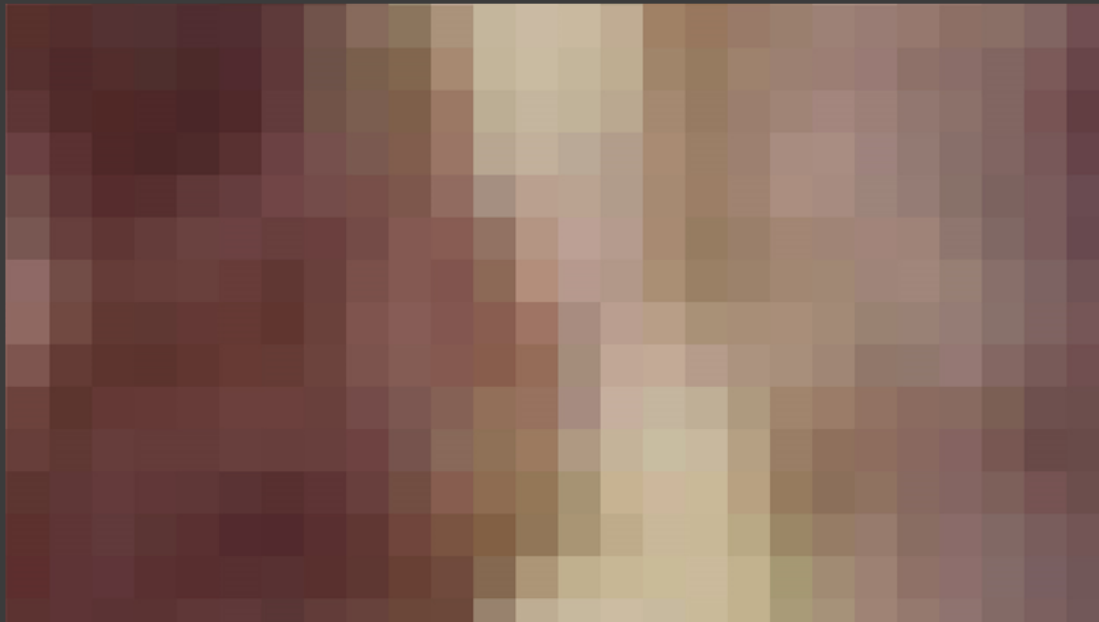


## Color Space, Color Depth and Color Profile

**Color Space** defines the number of colors available for a pixel.

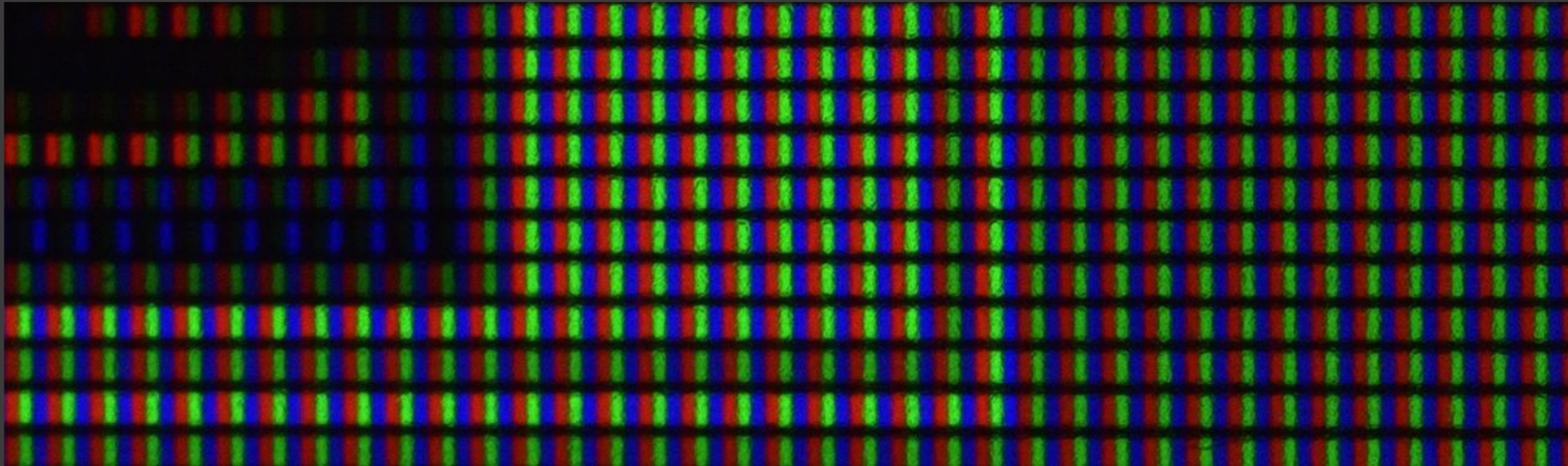
In sRGB Color Space, at 8 bits/rgb channel each pixel records 256 shades of any color. Its **Color Depth** (tone value) range is from 0,0,0 (black) to 255, 255, 255 (white). This produces about 17 million colors (16,777,216). It's said that the human eye can see 10 million colors. Do you need a colorspace with values outside of the visual range?

A **Color Profile** calibrates a device to display a color.



## RGB

Digital images live in a RGB (red, green, blue) world. Cameras, monitors and most software programs use RGB. RGB bars plus tone value equals color.



## CMYK

Printers put ink on paper, CMYK , cyan, magenta, yellow, black inks.





## COLOR PROFILE

A color profile calibrates a device to display a color.



### Camera

RGB - Assigns a color profile - sRGB or Adobe 1998 or...  
The “s” stands for standard.



### Monitor / Display

RGB – The monitor profile takes the camera profile and converts it to display on the monitor.  
Most programs and monitors will display sRGB properly.



### Printer

CMYK – The printer profile takes what you see on the screen and adjusts it for proper printing in CMYK.

## SUMMARY



Dots per inch (DPI) is commonly used when referring to pixels per inch (PPI)

sRGB will keep you out of trouble

8 bits per pixel is just fine



*Lookout Post, USS Napa*

Sgt. Theodore Hios, USMC

The National Museum of the Marine Corps





## *Lookout Post, USS Napa*

Sgt. Theodore Hios, USMC

1910-1999

Accession Number: 60-1-11

Medium: Watercolor on Paper

Size: 13 x 20 inches

Date: 1945

Portrait of Arthur Rivira S 2/C

The National Museum of the Marine Corps

Photographed by: J. Rudinec

Date: 11 Sept 2018

File: Hios\_6-1-11

## Specifying Image Size

**5440 x 7264 Pixels**

**76 x 101 inches at 72 ppi**

**36 x 42 inches at 150 ppi**

**18 x 24 inches at 300 ppi**

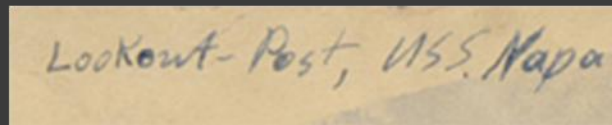
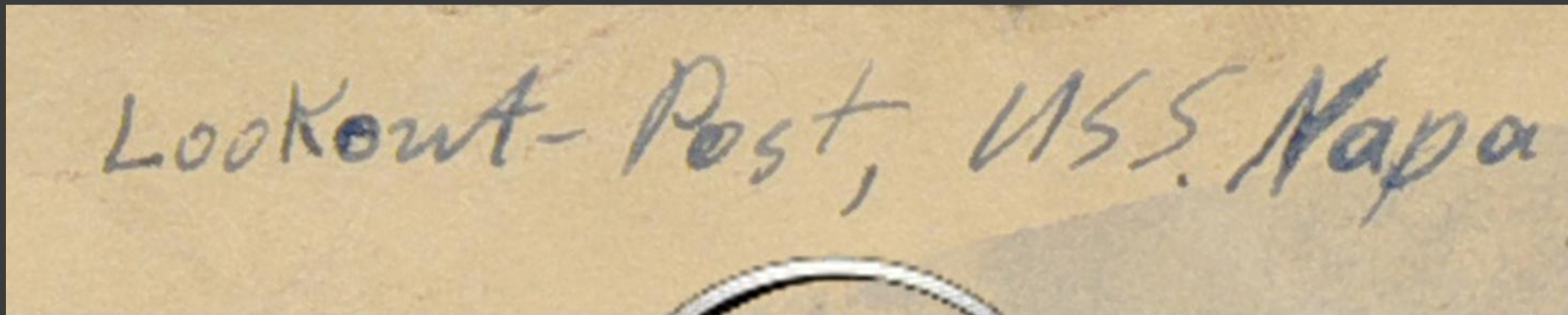
**3.4 x 4.5 inches at 1600 ppi**



## HIGH RESOLUTION

High resolution is anything that meets or exceeds your expectations.

When someone asks for a high resolution file, ask their application.





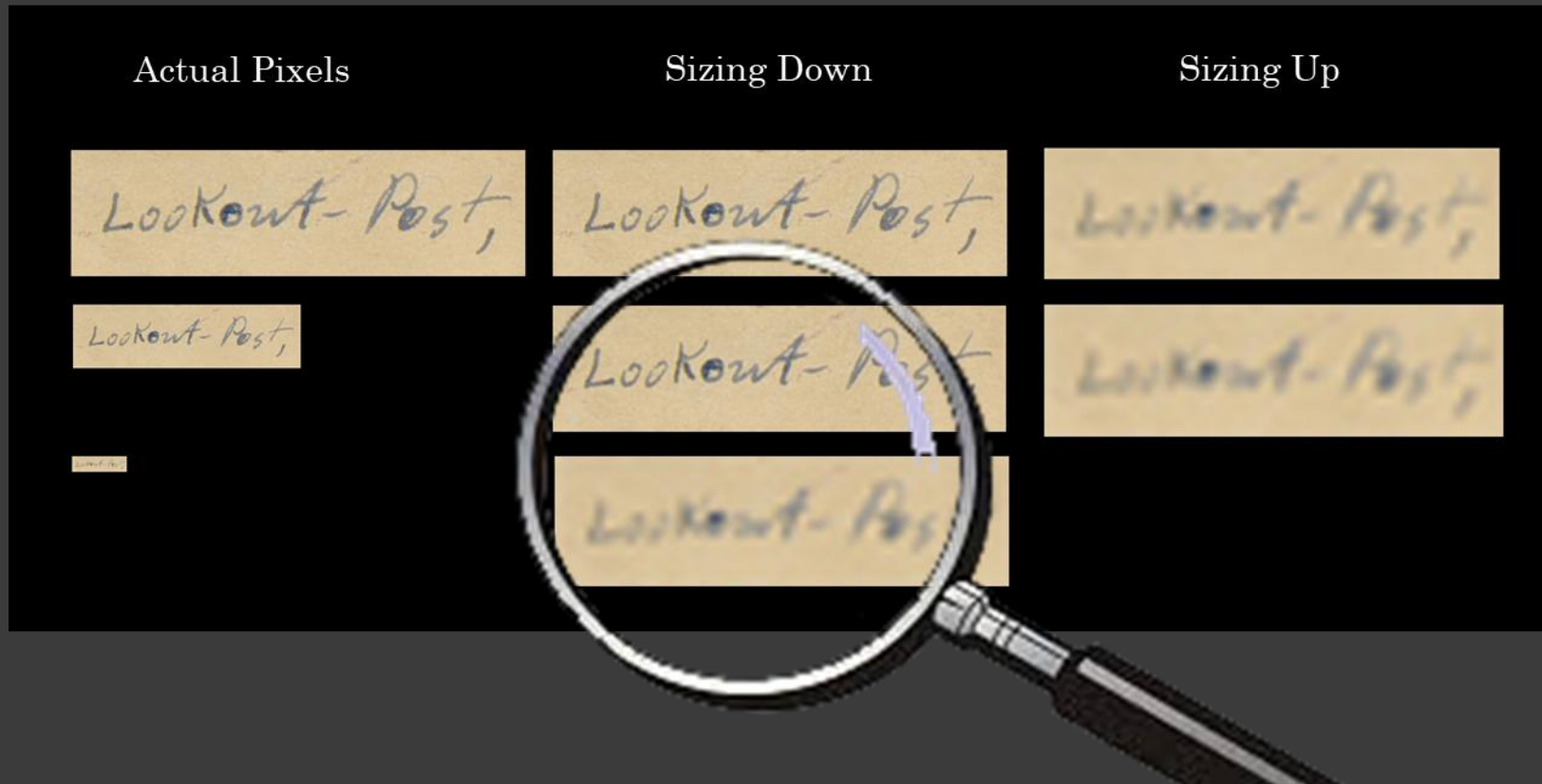
## THE UPS AND DOWNS OF RESOLUTION

You can go down, but you can't go up.

When it's gone... it's really gone...

Resizing is a lossy process.

Never save over an image master.





## Popular File Formats

Keep it simple

- **RAW, DNG, NEF...**  
Raw data from the camera. It requires a specific program to convert the data into something useful. Use **Caution** when you ask for raw files.
- **TIF**  
A lossless , uncompressed file where each pixel is saved individually.
- **JPG**  
A compressed file. You can select the level of compression for a high quality (large file) or a low quality (small file). Compression is a one way street. Files are compressed by removing data (lossy).
- **PNG**  
A lossless file, generally smaller than a TIF but larger than a JPG.





# POP QUIZ

What is the **BEST** file Format?



## PICK YOUR FAVORITE

Here's a selection of images. It's a jumble of file formats, each at actual pixels on top and enlarged to start showing pixels below.





## PICK YOUR FAVORITE

Here's a selection of images. It's a jumble of file formats, each at actual pixels on top and enlarged to start showing pixels below.

16 bit TIF



7264 x 5440 Pixels  
226 mb file

8 bit PNG



7264 x 5440 Pixels  
51.9 mb file

8 bit TIF



7264 x 5440 Pixels  
113 mb file

8 bit JPG



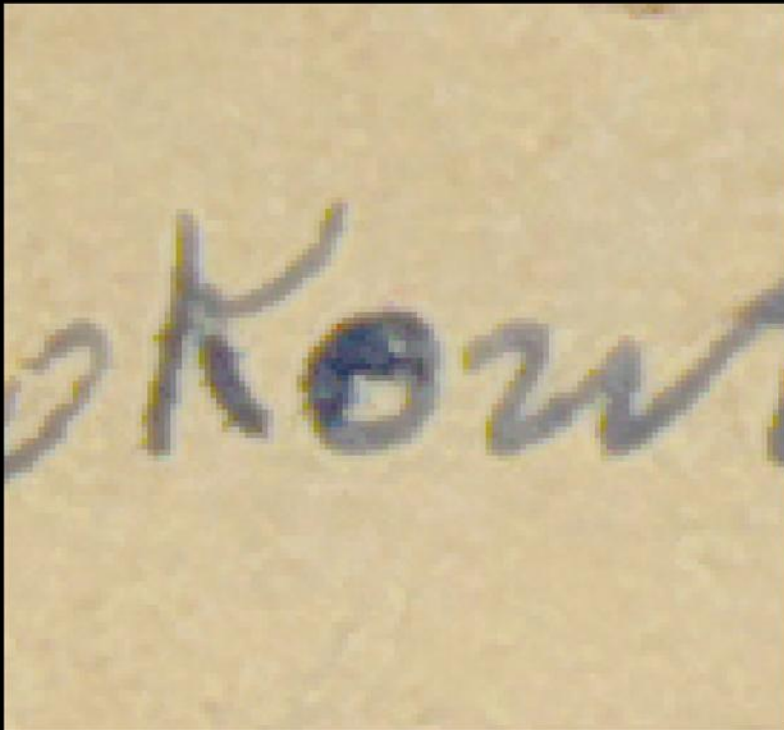
7264 x 5440 Pixels  
30.7 mb file



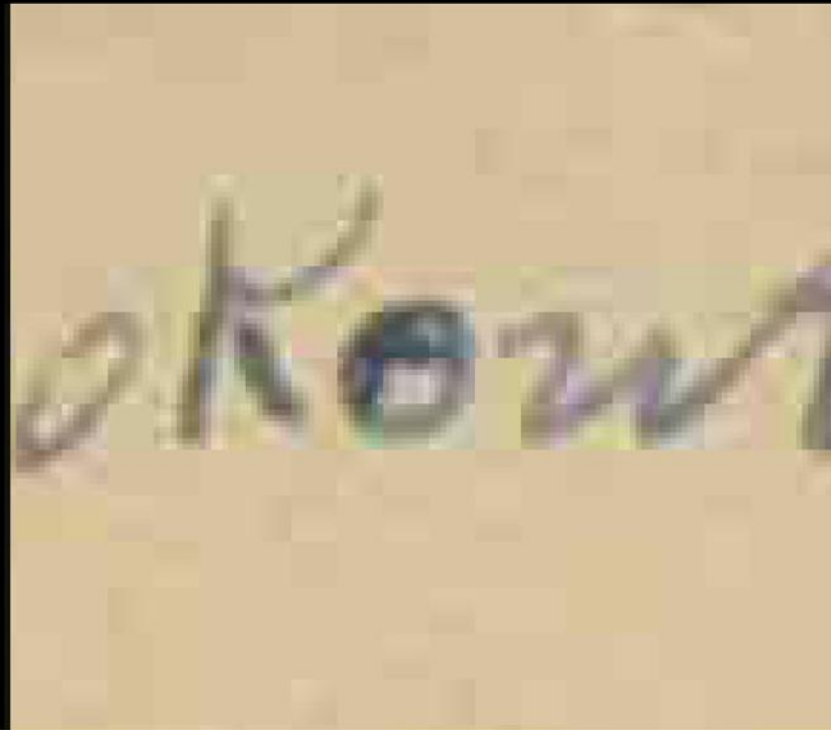
## JPG Compression

Here's a selection of images enlarged to show the pixels

Quality Level 12 JPG



Quality Level 1 JPG







## SUMMARY

- Resolution is expressed by:  
pixel x pixel or pixel x dimension  
 $300 \text{ ppi @ } 10" = 150 \text{ ppi @ } 20" = 3000 \text{ pixels}$   
They are the same amount of pixels.
- High Resolution is whatever you say it is. How big is “big”
- Pick a common file format:  
TIF and JPG are the most common and are universally accepted.
- A high quality JPG works just as good as a TIF.

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## Reasons To Do Photography

### 1. Documentation

A quick reference for the database, hard copy for reports.  
Nothing fancy, just a “snap” for the records

### 2. Access

Images for the website, reproduction in publications, prints  
More than just a “snap”  
Good image clarity and color fidelity.  
Resolution suitable for books, posters and research.

### 3. Preservation

Insurance value, condition assessment  
Best image clarity showing minute details in areas of concern  
Different light sources and specialized equipment may be needed.



Let's talk  
"Access"

The objective is to have good perceptual images  
that closely represent the original, organized  
in way that is secure, easy to access and  
easy to dissimilate.



# You Need...



*Book Cover: "Second Thoughts"*

*Sarah Dunnigan*

## A Plan of Action

What

Where

When

How

Who

Post Production -----

## A Plan Of Action ...

### What do you need to photograph?

What are the sizes, 2 or 3 dimensional works, weight

### Where are you going to do it?

Can the works be moved

Do you have the space

Can you control the lighting

### When are you going to do it?

Are there any time constraints, on the people, artwork, space, or need for the images

### How are you going to do it?

Are you jobbing out the photography or doing it in-house

Do you have the skills or the time and desire to learn. Suitable equipment?

What are your expectations? “Standards”

## Who ....

Will keep records of what is to be photographed, the photo sequence and comments

Who is responsible for **post production**? Prepping the files – Archiving the files



*Primary Compass*

Don Glummer

# Standards

Prints and Photographs				
Performance Level:				
	1 Star	2 Star	3 Star	4 Star
Master File Format	TIFF	TIFF	TIFF	TIFF
Access File Formats	All	All	All	All
Resolution	100 ppi	200 ppi	400 ppi	600 ppi <sup>1</sup>
Bit Depth	8	8	8 or 16	16
Color Space	Grey Gamma 2.2 SRGB Adobe 1998 ProPhoto ECIRGBv2	Grey Gamma 2.2 SRGB Adobe 1998 ProPhoto ECIRGBv2	Adobe 1998 ProPhoto, ECIRGBv2	Adobe 1998 ProPhoto, ECIRGBv2
Color	Grayscale or Color	Grayscale or Color	Color	Color

Establish “YOUR” standards  
based your needs and capabilities

- **Published Standards – Provide Reference Points**  
They try to quantify the perceptual and encompass all situations.
- **Your Standard - What you require**  
How “You” do things - A dynamic document  
If it’s not **in writing**... It’s not a standard

## Suitable Equipment

### Camera:

Digital SLR – ability to accurately square and crop and check for  
Glare and reflections. Ability to turn of automatic functions such as auto color  
balance and auto sharpening. The ability to shoot raw or a high quality jpg.  
Can you white balance the camera? Do you have a suitable lens?  
A 24 mp camera shoots a 4000 x 6000 pixel image – that's 13 x 20" at 300 ppi

### Lights:

Hot lights – 3200k – professional lighting.  
LED – 5000k, Color Rendering Index (cri) of 92+  
Florescent Tubes – Natural Light bulbs 5000k cri of 92+  
Electronic Flash – Consistent power and color output

### Other Stuff:

A solid tripod, a solid easel, color bar, background paper if needed, black cloth,  
light meter, notebook, polarizer for the lights and camera, extension cords.  
A little bit of luck.



## Finishing Touches

**Never** erase your camera card before you have at least 2 backups.



All the camera files in the format they were photographed. **No Cuts**



Backup Disk

2019\_04\_01  
Original  
Camera Files

Your selected files, named and in TIF format. Balance and crop. These become your Archive Masters.



Working Disk

Selected TIFF  
Named Files

## Finishing Touches

Never erase your camera card before you have at least 2 backups.

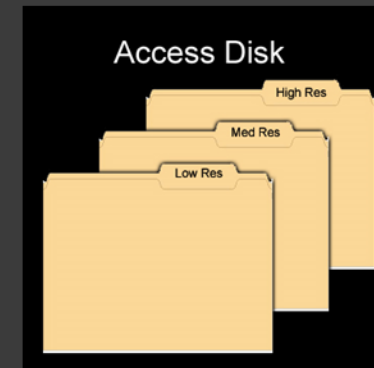


Copy your prepped files.  
You may want to do 2 copies  
and store in multiple  
locations.



High Res  
Medium Res  
Low Res

Access Folders - All files  
have the same names. Each  
folder contains different  
resolutions.



## Recommendations

- **Archive** as a **TIF** file, even if your camera doesn't shoot it.  
Less chance of getting mixed up with access files and corrupted
- **Access** files should be in a **JPG** format at the highest quality level  
Biggest misconception is that TIF is better
- My definition of Resolution, is based on my experiences.
  - High Res** – The original file size. The best you have.
  - Med Res** – 300 ppi at 10 inches – This is your go to file for books, publications, news release. It's easy to email and will satisfy just about all requests.
  - Low Res** – 150 ppi at 6 inches – For website work and reports. It's plenty of resolution for a database.
- **Don't resize** your files when you release them. Let the requester do it.
- File Naming – ArtistLastname\_AccessionNumber - Easy to identify.
- Windows will not accept anything but a character or number at the start of a filename. Invalid characters “ \* : / \ ? < > |

## High Resolution ?



*Valley Irrigation in California* Henry Sandham

Original Image Size 5 x 5 Inches

Resolution: 2200 ppi

File Size: 708 mb, TIF - 16 bit sRGB

354 mb, TIF - 8 bit sRGB

113 mb, TIF – Greyscale

5" x 2200 ppi = 11,000 pixels

That's looking at a segment of a 73 inch print  
more closely than your 8x10 family portrait

No advantage to a very large file size.  
It will be difficult to transport, difficult  
to open and to work with.



# How Much Resolution Do You Need ?

## Banner

Designed to scale 1 ft. = 1 in. 150 ppi

## High Quality Table Top Book

Actual printed dimension by  
600 - 300 ppi

## Magazine Publication

Actual Printed dimension by  
300 ppi

## Fine Art Reproduction

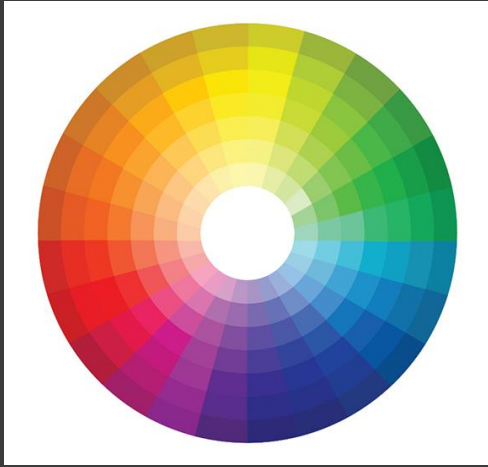
Actual Printed dimension by  
200 – 150 ppi

## Web / Reports

Actual display / printed dimension by  
150 ppi Reports      Monitors are 72 ppi



*Banner Design by Sarah Dunnigan  
54 ft x 24 ft    6600 x 3000 pixels = 6.428 mb jpg*



## How's That Color Looking?

Am I the only person  
who has walked outside and discovered  
the black pants I put on were actually blue?

To see a “true” color we need to view it under a “true” light source.

To accurately match colors we need to view them under the same light source.

Daylight is the accepted norm, to be more specific, a bulb with a color temperature of 5000k and CRI (color rendering index) of 90+.

These bulbs are generally labeled as “Natural Light’.

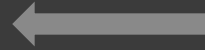
All cameras have a color bias and not all colors will photograph accurately.

Although your camera’s Auto Color Balance isn’t exact, it will work fine for most pictures, but when you need exact color matches, you need to control the light – from the light you photograph with to the light with which you view the print.

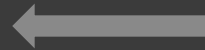
## Color Behaving Badly



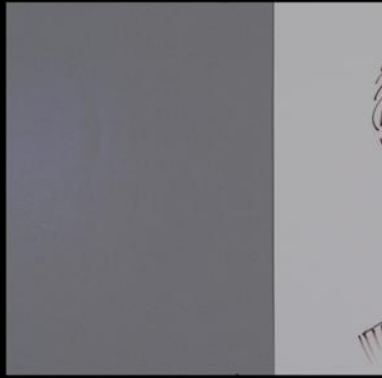
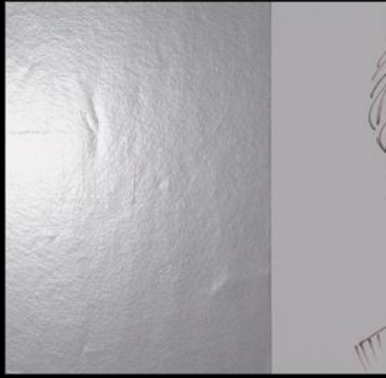
Matched to the color bar



Matched to the original print

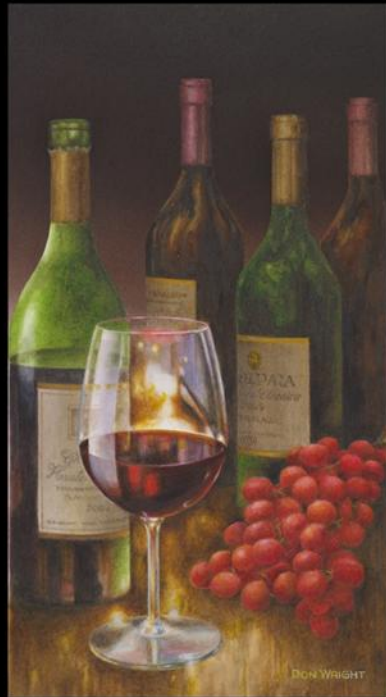


*Guardian Angels Gunship*  
LtCol. A. Michael Leahy, USMCR



## Polarizing an Image

Glare or Specular Highlights



This watercolor painting was photographed without and with polarizers.

Which is the more accurate?  
Which meets your standard?

*Wine Tasting*

Don Wright



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