

Digital Image Capture

Best Practices

We have moved from the wet film negative process to high resolution image scanning to capture our past images. I believe we owe the same dedicated approach to capturing as much detail as possible as those brave photographers who so many years ago, marched onto smoking battlefields, carried glass plates to prepped with poisonous chemistry into the heartland of America and equally fought to immortalize that one fleeting moment of time for the future viewer.

A compendium of ideas focused on simple question - “What resolution best captures the necessary detail to best serve the mind of the inquisitive researcher of today and tomorrow.”

Compiled by Don Silverek

Photographer, Researcher & Archivist for the movie “Santa Rosa – Chosen Spot of all the Earth”
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Don Silverek – Photographic Solutions / Archivist

Scanning Historical Images: Some Practical Advice

Tanya March, October 2012

Look at the Original

Scanning can be extremely useful in helping to save wear and tear on primary documents, original slides and photographs. Before you start scanning, determine if any dust or ink needs to be removed from original slides and negatives; high-end photography stores and websites sell cleaning products that help remove without scratching the originals. If you are scanning a newspaper or printed photo, you may get a moiré pattern-an accentuation of the original's halftone screen. You can minimize this using the scanner's descreen filter. One trick for scanning newsprint is to place a piece of black paper behind the original to prevent text from the reverse side appearing in your scanned image file.

Take Control of Your Scanner

Now you are ready to begin scanning. First, disable your scanners' automatic settings and scan everything into a "raw" master image file format. Raw files are large, but they contain the highest amount of data and are wonderful for exploring details that the naked eye cannot observe in the original image. This is especially helpful if you are planning on cropping your image. Keep the large raw file and don't edit it, as having to go back and repeatedly scan the same document can place more wear and tear on it. Instead, make copies-which can be converted down into a workable file format such as TIFF or JPEG for printing or web use-and edit those copies to make sure you are scanning the cleanest possible copy. Since you've disabled your scanners' automatic settings, you might want to manually adjust color and contrast before you begin editing copies.

Editing the File: How Big Does It Have to Be?

The resolution of a scanned document is measured PPI and DPI. PPI (pixels per inch) measures the resolution of on-screen photos, and DPI (dots per inch) refers to the resolution of printed photos. The higher the resolution the more real the online image will appear to be to the viewer. I prefer scanning raw files at 800 PPI but if my interest is in a detail of the original shot I scan at 1,200 PPI.

When you edit down, the resolution (and file size) can be much, much smaller. Historic images in web pages, video, and slide shows can be as low as 72 PPI for a static image or 150 PPI if you are going to focus in on the image. If your image is for web use only then resize the image down to anywhere between 72 and 150 PPI; larger PPI images take longer to load and anything above 150 PPI will result in

larger, slower-to-load images. I would also encourage the use of a watermark to avoid theft of your images and to protect copyright.

For printing, the DPI needs to be larger, with images scanned in at least 300 DPI. Some archives scan the original to the highest limit of the original: glass plate negative or lantern slide are 800 DPI, photographic negatives or slides (positives) are 2400 DPI. The DPI standard for and images to be printed within journals and books is 300 DPI and for museum exhibits it's 600 DPI.

Many historical societies offer scanning classes and can assist you in determining which scanner and software is best for you.

Tanya March is a public housing historian and historic preservation activist.

Smithsonian Digitization

Digitization is a crucial aspect of collections care at the Smithsonian Institution Archives. The Archives adheres to international standards and best practices for digitization, for instance the [Federal Digitization Guidelines Initiative](#), and produces high quality archival images, audio, and video useful for researchers, scholars, and the public. Digitization protects original historical documents and analog records from further deterioration and damage because it eliminates repetitive handling.

The Archives employs procedures and specifications to minimize the number of times a collection item undergoes digitization for access or preservation purposes. Other specialized techniques, such as spectral imaging, are used when performing diagnostic digitization as part of a conservation treatment.

Digitization Standards for Still Images

Resolution

- 6,000 pixels on the long axis of the image (600 pixels per inch (ppi) for an image 10 inches long)
- Minimum value is 600 ppi, increasing resolution in intervals of 25 ppi as necessary to achieve a minimum of 6,000 pixels along the long axis

Digital File Format

- Tagged Image File Format (TIFF) using Windows (PC) byte orientation.
- For color images, a 24 bit RGB setting is used, yielding 8 bits per color channel.
- For black and white images, a 24 bit RGB setting is used. Note: for images from microfilm, a resolution of 300 ppi grayscale is acceptable.

File Compression

- None

Excerpted from Federal Digitization Guidelines Initiative document

Prints and Photographs Includes photographic prints, graphic-arts prints (intaglio, lithographs, etc.), drawings, some paintings, (e.g., water colors), and some maps.

Recommended Technologies • Planetary scanners • Digital cameras • Flatbed scanners

Not Recommended Technologies • Drum scanners • Lighting systems that raise the surface temperature of the original more than 4 degrees F (2 degrees C) in the total imaging process

The intent in scanning photographs is to maintain the smallest significant details. Resolution requirements for photographs are often difficult to determine because there is no obvious fixed metric for measuring detail such as quality index. Additionally, accurate tone and color reproduction in the scan play an equal, if not more, important role in assessing the quality of a scan of a photograph. The recommended scanning specifications for photographs take into account the intended uses of the four star levels. In general, 300 ppi at the original size is considered minimum to reproduce the photograph well at the size of the original. For photographic formats in particular, it is important to carefully analyze the material prior to scanning. Because every generation of photographic copying involves some quality loss, using intermediates, duplicates, or copies inherently implies some decrease in quality and may also be accompanied by other problems (such as improper orientation, low or high contrast, uneven lighting, etc.).

Notes • “Prints and Photographs” encompass a wide range of technologies and processes that have been used to create reflective images. For many of these, subtle texture, tone and color differences are an essential part of their character. While it is not possible to preserve all of these subtle physical differences in digital form, we can approximate some of their unique qualities. It is for this reason that all master files from both color and black and white originals are to be imaged in 16 bit color at or above 3 star performance. • The use of glass or other materials to hold an image flat during capture is allowed, but only when the original will not be harmed by doing so. Care must be taken to assure that flattening a photograph will not result in emulsion cracking, or the base material being damaged. Tightly curled materials must not be forced to lay flat. • There are a variety of visible degradations that occur with photographs, many of which can be minimized using special imaging techniques. The application and use of these techniques are beyond the scope of this document but can be found in contemporary photography literature. If using alternate imaging techniques results in multiple files of the same original, one of the images must conform to the FADGI specifications, and this image must be identified as the base. • FADGI allows the use of flatbed scanners when imaging photographs, but the user should be aware that images may render differently on a flatbed scanner than if imaged using a camera or planetary scanner and traditional copy lighting. Additionally, when using a flatbed scanner, dust and dirt on the scanner glass and optical system can result in dust and dirt in the file. • Dust removal is not allowed on master images, and digital dust removal techniques during the scanning process are also not approved. • Color, tone enhancement or restoration is not allowed on master images.

Summary - Opinion

Establishing scanning options for your particular agency needs is critical to ensure that 100 years from now, the viewer have the same detail perspective and discovery options as evidenced in that first negative, print or hand drawn map.

Over the years, I have been forced to work with a variety of poorly executed processing ranging from continuous tone camera film copy negatives to low resolution scans. The sad end to either is a lack of detail with so often is needed to establish a name, place, or time in history.

My approach is simple. I scan 8x10 sized printed areas at a minimum of 600 dpi. If I am faced with a something smaller, such as a 5x7 inch area, I scan at 1200 and will increase to 1800 or 2400 for smaller printed Images. I always save and store multiple master file images as TIFFs and in three locations usually on my computer, on a stand-alone hard drive away from my office and in the cloud. I reserve the option to scan detailed 8x10 area prints at 1200 if I believe it will benefit retrieval of details.

Don Silverek

silverek@sonic.net