

Yukon Archives Standard for Digitizing Photographs:

Creation of Raster Image Masters

Background

The Yukon Archives Digitization Policy establishes that *digitization is used by Yukon Archives for preservation reformatting of records and to create assets for enhancing access to its collections*. It clarifies this position by adding that *Yukon Archives will digitize records of particular media for preservation reformatting only when the Territorial Archivist is confident that a viable digital preservation management program is sustainable for that media*.

This standard defines the formats, and technical and processing specifications that Yukon Archives adopts for digitizing photograph records within its permanent collections for purposes of both access and preservation reformatting (i.e. to mitigate risk for loss of information).¹ It also addresses other ancillary issues associated with the adoption of these formats and specifications.

Definitions

Source Photograph – Photograph selected by Yukon Archives as a source object for digitization.

Preservation Master File – Faithful digital reproduction of the source photograph to provide essentially the same viewing experience as the source photograph. Its level of quality allows it to substitute for the source photograph if it is damaged or destroyed. This standard is used for purposes of preservation reformatting.

Production Master File – Reasonable digital reproduction of the source photograph without enhancement, optimized to facilitate researcher/user access, including reference and reproduction requests, display on a monitor, hardcopy output, and creation of derivative files. The production master file may be created from the source photograph or by processing the content in one or more preservation master files. It may have levels of quality that rival those of the preservation master file(s). This standard is used for purposes of access.

Enhanced Master File – Files created by processing the content in one or more preservation/production master files. They are not directly created from the source photograph. Enhanced master files do not replace preservation or production master files, but complement them. They are used for purposes that allow increased value or access, including panoramas created from multiple photographs (not panoramas assembled from one photograph) and severed content due to restrictions.

Derivative Files – Files created by sampling the production master file. They are not directly created from the source photograph. Additionally, they are not used to generate further derivative files. They are frequently used for general digital access (i.e. internet or network access). Common image derivatives include the Access image, which is sized to fit within the screen of an average monitor or other delivery mechanism, and the Thumbnail image, which is sized to load quickly.

The Yukon Archives Standard for Digitizing Photographs and Yukon Archives Photographs

The *Yukon Archives Standard for Digitizing Photographs* applies from the time of its completion and sign-off by the Territorial Archivist to the time, at some future date, at which it is superseded by a revised, modified standard. It therefore charts Yukon Archives requirements for digitizing photographs over a fixed period of time. At the time it is implemented, the standard will necessarily change and/or eliminate previously existing Yukon Archives standards and procedures for photograph digitization and for managing the analog and digital assets that are their result. When implemented, it is not a retroactive standard; it does not suggest that photographs digitized according to previous standards should be redone nor their digital files be discarded. Digital files created under previous incarnations of the standard are managed and utilized alongside those created under the current standard.

¹ Yukon Archives may create digital images that do not conform to these specifications in order to meet alternate internal requirements (ex. exhibits) or in response to public reproduction requests; however, these non-standard images are not retained as preservation or production master files.

To accurately apply the *Yukon Archives Standard for Digitizing Photographs* it is necessary to understand the different image carriers that exist at Yukon Archives and the different designation of copies and masters that have been created and designated in the past. Further, it will be necessary, at some point, to make decisions on whether and how to manage these legacy assets.

Key Digitization Standards

Capture Devices

A high quality capture device is critical to the accurate representation of an image, enabling a viewer to see the greatest amount of detail. All digital capture devices (flatbed, scanning back, camera, etc.) used for image digitization must comply with the *Yukon Archives Technical Specification for Capture Devices*. Calibration of the capture device must be verified at the beginning of each digitization initiative or once per month.

Accurate representation of images also depends on ensuring an appropriate work environment. To this end...

- the original is handled appropriately (ex. at edges, use of gloves);
- the capture device is positioned with sufficient space to permit appropriate workflow without causing physical damage to the original;
- the capture device has been cleaned appropriately (ex. use of lens cleaner, cleaning paper, cloth, brush);
- the capture device and original are free of any foreign material; and
- the capture device has been warmed up with a test capture.

Monitors

A high quality monitor is critical to the accurate representation of colour, enabling a viewer to see both a wider range of colours and smoother gradations of tone. All workstations used for image digitization must include a monitor that complies with the *Yukon Archives Technical Specification for Monitors and Monitor Calibration*. Calibration of the monitor must be verified at the beginning of each digitization initiative or once per month.

Accurate perception of images on the monitor also depends on ensuring appropriate viewing conditions. To this end...

- the monitor must not be placed directly in front of or across from a window;
- low level task lighting must be used rather than overhead lighting;
- window blinds must be used to reduce the amount of light near the monitor; and
- brightly coloured materials, including clothing, must not be placed near the monitor.

Photograph Significant Properties

A photographic original consists of more than its image. When digitizing photographs for the creation of masters, Yukon Archives captures numerous physical characteristics beyond the image itself. Some of these characteristics include inscriptions, markings, artistic effects, borders, supports, colours, etc. Doing so, allows for a greater visual understanding of the image, by placing the image within the context of its entire record. This information rich master is thereby capable of supporting a wider range of users' needs.

When digitizing through reflective scanning, the entire side containing the image is copied.² This includes borders and supports if they are present. Additionally, a small margin is left around the copied area, in order to identify its edge (i.e. loosely cropped).

When digitizing through transmission scanning, the entire area that permits the transmission of light is copied.³ Opaque areas beyond this are not included. Additionally, a small margin is left around the copied area, in order to identify its edge (i.e. loosely cropped). If a portion of the area that permits the transmission of light is not copied due to the use of a film holder, it will be noted in the metadata.

If the original is in a mat, frame, or other mount or container and can/should not be removed, the small margin will be a small portion of that mat, frame, or other mount or container.

If the side which does not contain the image or the opaque area of transmissive originals is required to be copied, it is not digitized according to this photograph standard, but a Yukon Archives digitization standard closer aligned to its media (i.e. Yukon Archives Standard for Digitizing Textual Records).

² The area copied corresponds to the dimensions of the original as would be recorded according to the *Rules for Archival Description* (rule 4.5D1).

³ The area copied corresponds to the dimensions of the original as would be recorded according to the *Rules for Archival Description* (rule 4.5D1) for photographs with no opaque areas, otherwise smaller.

Masters do not include removable areas such as frames or photograph album pages. If these require digitization, they are not digitized according to this photograph standard, but a Yukon Archives digitization standard closer aligned to their media.

Originals are captured in colour if colours exist (i.e. non true black and white) anywhere inside the scanning margin. This includes colour inscriptions, markings, artistic effects, borders, supports, etc. as well as colours resulting from physical condition. Therefore in most cases, originals are captured in colour.

Items such as colour targets, calibration bars, rulers and added identifying numbers are included in preservation masters. Alternatively, if associated preservation masters are being created together, colour targets may be digitized separately for each batch. Colour targets, calibration bars, rulers and added identifying numbers are not included in production masters.

Bit Depth, File Format, Spatial Dimensions, Scan Resolution, and File Dimensions

Table 1 defines Yukon Archives standards for bit depth, file format, spatial dimensions, scan resolution and file dimensions for photographs that are digitally reproduced by Yukon Archives. The standards established for the preservation and production masters are ones which Yukon Archives believes provide reliable digital reproductions which capture the smallest significant details of the photographs for their intended purposes. Whether Preservation or Production Master file, the indicated file format is a commonly accepted preservation file format.

	Bit Depth	File Format	Spatial Dimensions	Scan Resolution⁴	File Dimensions
Preservation Master	16 bit greyscale mode (Gamma 2.2) for shades of black & white 48 bit RGB mode (Adobe RGB 1998) for colour and monochrome	Uncompressed TIFF 6.0 (.tif)	Minimum 4000 pixels across long dimension of image area ⁵ , excluding supports, borders, targets, and margin	Reflection Scanning • 400 ppi or greater if required to meet Spatial Dimension requirement Transmission Scanning • 800 ppi or greater if required to meet Spatial Dimension requirement	Sized to match original, no magnification or reduction
Production Master	8 bit greyscale mode (Gamma 2.2) for shades of black & white 24 bit RGB mode (Adobe RGB 1998) for colour and monochrome	Uncompressed TIFF 6.0 (.tif)	Minimum 3000 pixels across long dimension of photograph ⁶ , including supports, borders, and margin	Reflection Scanning • 300 ppi or greater if required to meet Spatial Dimension requirement Transmission Scanning • 600 ppi or greater if required to meet Spatial Dimension requirement	As above

Table 1. Bit Depth, File Format, Spatial Dimensions, Scan Resolution, and File Dimensions for Raster Images created from Photographs

Tonal Orientation

Yukon Archives creates a preservation master file with the same tonal orientation (positive or negative) as the source photograph. This means that the digital image of a positive original appears positive and the digital image of a negative appears negative. Yukon Archives adopts this approach because it informs users about the nature of the source photograph.

Production master files however, are created with a positive tonal orientation regardless of the orientation of the source photograph.

The implication of this methodology is that negative originals will require inverting the tonal orientation to positive for the creation of production master files. A further implication is that depending on the user’s purpose, preservation master files of photographic negatives may not be initially usable without being inverted to a positive image.

⁴ The scan resolutions have been selected to provide the ability to view smaller elements of a photograph clearly. If minute details (ex. aerial photographs) or individual light sensitive granules need to be viewed, the standard allows for the appropriate increase in resolution.

⁵ Actual pixel dimension to be determined based on a number of factors including photographic format, actual physical size of photograph, photograph quality (ex. generation) and photograph condition.

⁶ As above, plus the ratio of image to non-image content of the photograph.

Image Processing

Yukon Archives adopts and follows industry standards and best practices for all technical aspects (e.g. digital imaging software, colour management, sharpening, etc.) of creating digital versions of analog photograph records⁷. Where appropriate these details are documented and described in Yukon Archives photograph digitization procedures. In general, the following image processing procedures are performed:

<i>Preservation Master File</i>	no image enhancements or editing such as levels, curves or colour balance
<i>Production Master File</i>	no image enhancements, levels and curves adjusted to correct tonal range and contrast, colour balance adjusted to render colors correctly
<i>Enhanced Master File</i>	image processing for the required increased value or access

Metadata

There are three types of metadata that describe digital files:

<i>Descriptive metadata</i>	used in the discovery and identification of a specific digital image
<i>Structural metadata</i>	used to display and navigate a specific digital image for a user, including information on the internal organization of the object
<i>Administrative metadata</i>	includes rights management metadata and preservation metadata represents the management information for the digital image (the date it was created, its file format, rights information, etc.)

When creating metadata for digital images, Yukon Archives maintains explicit, comprehensive, and discrete records of all technical details, data creation and record of changes, including dates and responsibility. These records are updated as is necessary.

Yukon Archives recognizes the importance of creating and managing an explicit metadata framework separate from the digital files themselves. In some cases however, it may be acceptable to integrate metadata and content. The *Yukon Archives Metadata Standard for Digital Image Objects* indicates where metadata and content must be separated and where it may be integrated.

File Naming

The naming of digital files created through digitization is done according to the *Yukon Archives File Naming Conventions for Digital Files of Archival Material*.

Quality Assurance

Yukon Archives conducts quality control and quality assurance relating to digital files, their associated metadata, and the storage of both (including file transfer and data integrity). In most cases quality control and quality assurance is a two phase process, with the digitization technician doing initial quality checks during creation with more detailed inspection and follow-up conducted upon completion by a different person.

The specific technical and procedural areas in which quality control and quality assurance are applied are outlined in the *Yukon Archives Image Digitization Quality Assurance Procedures*. Where appropriate these procedures identify accuracy requirements and acceptable error rates.

Workflow

Prioritizing photographs for digitization is based on criteria established in the *Yukon Archives Digitization Policy*.

Preservation master files are created when the original record is at significant risk due to its physical condition, internal stability, or other such factors. In other words, Yukon Archives does not automatically and routinely create preservation master files for photographs.

⁷ See especially:

- Bibliographic Center for Research. [BCR's CDP Digital Imaging Best Practices Version 2.0](#). June 2008;
- United States. National Archives and Records Administration (NARA). [Technical Guidelines for Digitizing Archival Materials for Electronic Access: Creation of Production Master Files – Raster Images](#). June 2004;
- Universal Photographic Digital Imaging Guidelines. (UPDIG). [Image Receiver Guidelines Version 4.0](#). n.d.

Whenever applicable, Yukon Archives creates a production master file for each photograph that it digitizes.

Storage

Once quality assurance has been performed, preservation and production master files are moved to a managed storage environment. These files are then available for long term preservation and/or access requirements.

Yukon Archives stores both preservation and production master files in an uncompressed state. Masters are stored separately from derivatives.

Preservation and production master files are stored with a level of data redundancy, such as a RAID hard-drive system. In addition, checksums are generated and stored and files are regularly backed-up.

Output (Printers)

Digital images as output from inkjet or laser printers may be created for a variety of purposes (ex. public photograph orders, reference prints, etc.). Rarely is the hard copy output from a preservation or production master file considered an archival record requiring permanent preservation. Rather, it is the original record and/or the preservation master file that is determined to be of permanent value.

Nevertheless, Yukon Archives takes care to assure that all prints of digital files, whether for public or internal use, are created according to a high standard that (i) accurately reproduces the digital files and (ii) ensures the images are long-lasting. This aim to generate high quality output requires the use of appropriate printers, printer calibration, colour profiles, papers and inks. As technologies and supplies change frequently, this standard does not specify particular products, but rather stipulates that Yukon Archives conduct ongoing research to ensure that its use of printers, inks, and papers does not compromise the accuracy or longevity of prints of digital images.

Application of Standard beyond Yukon Archives

This standard applies to photograph records that are digitized by Yukon Archives and its contractors for purposes of access and preservation reformatting. It does not and cannot apply to digitized or born digital objects that are created by other agencies or individuals and received by Yukon Archives as either public records transfers or private records donations. Despite this lack of applicability beyond Yukon Archives, the standard is made available and recommended to Yukon Government departments and private individuals as a best practice that they are encouraged to follow.

There are a number of reasons why Yukon Government departments and private individuals are encouraged to follow this standard for digitizing photographs that will eventually come to Yukon Archives:

- bit depth, file format, spatial dimensions, scan resolution, and file dimensions affect the quality of the digital image record potentially received into Yukon Archives collections;
- Yukon Archives limits the number of file type and variations in specifications that it receives into its collections in order to contain the costs and the complexities of digital preservation management;
- Yukon Archives considers the availability and completeness of metadata records accompanying digital objects as essential adjuncts of those objects.

In short, although this standard applies specifically to Yukon Archives digitizing photograph records, it also establishes the context in which digitized and born digital photograph records are appraised for possible acquisition⁸. The specific details of the standard therefore serve as appraisal criteria for all digital photograph records.

Related Documents

Yukon Archives Digitization Policy

Yukon Archives File Naming Conventions for Digital Files of Archival Material

Yukon Archives Image Digitization Quality Assurance Procedures

Yukon Archives Metadata Standard for Digital Image Objects

Yukon Archives Photo Digitization Manual

Yukon Archives Technical Specification for Capture Devices

Yukon Archives Technical Specification for Monitors and Monitor Calibration

References

American Institute for Conservation of Historic and Artistic Works. [The AIC Guide to Digital Photography and Conservation Documentation](#). Washington: American Institute for Conservation of Historic and Artistic Works, 2008.

⁸ There are, of course, numerous other criteria by which records are appraised to determine whether they will be acquired by Yukon Archives.

Bibliographic Center for Research. BCR's CDP Digital Imaging Best Practices Version 2.0. June 2008.

United States. National Archives and Records Administration. Technical Guidelines for Digitizing Archival Materials for Electronic Access: Creation of Production Master Files – Raster Images. 2004.

United States. National Archives and Records Administration. "Expanding Acceptable Transfer Requirements: Transfer Instructions for Permanent Electronic Records." 2003.

Universal Photographic Digital Imaging Guidelines. (UPDIG). Image Receiver Guidelines Version 4.0. nd.

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