

# Data Management Plan Tips and Examples for Microscopy Data

This document provides tips and examples for writing a data management plan (DMP) for microscopy data. The plan is modeled after the generic NSF format.

*Suggested and example text is italicized*; all other text is informational.

**Disclaimer:** This document is provided to you as an informational service; it is not intended to be a complete or sufficient DMP. Please be sure that your DMP conforms to the requirements of your funding agency. The Data Management Plan Tool (<https://dmptool.org/>) is an excellent interactive resource for creating your DMP (sign-in using your JMU credentials). In addition, Yasmeeen Shorish has a very informative website about many aspects of data management (<http://guides.lib.jmu.edu/data>).

Please contact Kristopher Kubow if you would like additional help with your DMP or if you have suggestions for this document.

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## ***Data and Materials Produced***

*The [software] software will be used to acquire digital images using a [microscope and camera].*

Here is information for the microscopes in our Facility:

- *Nikon Elements / color-camera or Photometrics monochrome camera mounted on an inverted Nikon TE2000 microscope*
- *Nikon Elements / Nikon C2si laser scanning confocal microscope*
- *Axiovision / AxioCam MRC camera mounted on a Zeiss Axioskop*
- *Ocular / Retiga R6 camera mounted on a Zeiss Axioskop*
- *Q-Capture / Retiga EXB mounted on a Zeiss Axioscope A1*
- *Leica Application Suite (LAS) / Leica MacroScope*
- *Spot Advanced / Insight 2 camera mounted on a Zeiss SV6 Stemi Stereo Microscope*

*Images will be saved as [file type].*

Here is information for the microscopes in our Facility:

- *Nikon TE2000 widefield: lossless JPEG-2000 files*
- *Nikon TE2000 confocal: ND2 files—a proprietary Nikon multi-dimensional image file format*
- *Zeiss Axioskop:*
  - *Old Zeiss camera: ZVI files—a proprietary Nikon image file format*
  - *New QImaging camera: uncompressed TIFF files*
- *Zeiss Axioscope A1: uncompressed TIFF files*
- *Leica MacroScope: lossless JPEG-2000 files*
- *Stemi Stereoscope: uncompressed TIFF files*

*The imaging software will include metadata about the experiment within this file type.*

Statement about the amount of data you expect to collect. This will depend not only the number of images you expect to acquire, but also the file type and camera settings. Talk to Kris if you want help estimating

this. Example text: *Each JPEG-2000 image will be 2-3 MB in size. We anticipate acquiring 5 fields-of-view for each slide and imaging 30-45 slides (~10-15 slides per treatment group), for a total of 300-675 MB of data. Data acquired during staining optimization and initial trial experiments will contribute another 100-200 MB.*

### ***Standards, Formats and Metadata***

Talk about what program(s) you will use to view/process/analyze the images. If applicable, you can mention that the Light Microscopy Facility has two image processing workstations with the Nikon Elements software and Adobe Photoshop. I emphasize ImageJ in my suggested text because it is free/open-source and can open nearly any microscopy file type. Mention ImageJ even if you are using a different program to view/process your images because it shows that your data can be made universally accessible.

*The images and their associated metadata, generated using [software – same as first section], can be opened by the Open Microscopy Environment's Bio-Formats java library and can therefore be accessed and processed by open-source programs such as ImageJ.*

*Metadata saved with the image file include [list here].*

Here is information for the microscopes in our Facility:

- Nikon Elements: *pixel size, objective details, time/date, and acquisition parameters*
- Axiovision: *pixel size, objective details, time/date, and acquisition parameters*
- Ocular: *pixel size and time/date of acquisition*
- Q-Capture: *time and date of acquisition*
- LAS: *pixel size, objective details, time/date, and acquisition parameters*
- Spot Advanced: *time and date of acquisition*

Describe policies for how your students will acquire and store their data. Example text: *All research personnel will be instructed to follow a standard file naming and organization procedure including 1) saving images to a new folder for each imaging session, labeled with the date (e.g. 2016-01-01); 2) generating a "read me" text file in each folder to record notes about the experiment, file naming/organization, and image processing/analysis; 3) always saving in the specified file formats (see above); and 4) never performing image processing or analysis directly on original image files.*

*All data will initially be saved locally on the microscope system's computer. Upon completion of the imaging session, data will be moved to the Biology Department's servers, which are regularly backed-up to tape.*

Add additional details for where the data will be stored while you are working on it.

### ***Roles and Responsibilities***

This one is all you. If you are using microscopes in the Microscopy Facility, you can mention that the Director of the Light Microscopy and Imaging Facility will provide initial basic training for the students on how to manage their microscopy data (but it's up to you to continue the training and enforce compliance).

### ***Dissemination Methods***

Here are some ideas for things you could include

- Publication in open-access journals that support full dissemination of data
- Showcase images on the microscopy facility blog (<http://sites.jmu.edu/microscopy>), personal faculty website, and/or other social media forums (e.g. under a Creative Commons attribution non-commercial share-alike license)
- Data hosting: this is a tricky one – talk to Yasmeen and/or Kris for help. Here are some ideas:
  - Small data sets may be hosted "in house" on JMU's Scholarly Commons site (<http://commons.lib.jmu.edu/>) – talk to Yasmeen to determine if this is feasible
  - There may also be a data-specific JMU repository coming soon...
  - CyVerse Data Store (<http://www.cyverse.org/data-store>) or Data Commons (<https://pods.iplantcollaborative.org/wiki/display/DC/Data+Commons+Home>)
  - Open Science Framework (<https://osf.io/>)
  - Search for repositories: <http://www.re3data.org/> and [http://oad.simmons.edu/oadwiki/Data\\_repositories](http://oad.simmons.edu/oadwiki/Data_repositories)
  - **As a last resort**, data will be archived on the JMU servers and the data will be made available through email request.

Indicate what parts of your data you will disseminate. Example text: *Following publication, we will post the associated data sets, including “read me” files and analysis files.*

*The image files generated by [name of imaging program here] can be fully accessed using open-source software such as ImageJ.*

### ***Policies for Data Sharing and Public Access***

*Data will be shared via the methods described in the previous section.*

Here, you can write more specific details about when and under what conditions you will make the data public.

You may wish to restrict access until publication: *Because public posting of data and findings precludes their subsequent publication in many peer-reviewed journals, data will not be made fully public until they are published.*

You may also want to talk about limited dissemination of results, e.g. at conferences, classes, and public posting of interesting images.

### ***Archiving, Storage and Preservation***

*Working research data shall reside on [identify where your working data will be located].*

*Once the project is complete, all data and metadata necessary for making the data understandable and usable by others shall be stored on [identify where you will archive the data – see Dissemination Methods, above].*

Currently, there are no practical permanent storage options for moderate to large data sets at JMU. If you state that data will be archived on the department’s servers, you should specify how long it will be kept post-publication. Note that you could propose a hybrid method. For example, you could store a small summary dataset on JMU’s Scholarly Commons, which will be retained in perpetuity; and deposit the entire dataset on a departmental server, which will be deleted after seven years. To determine the best course of action, contact Yasmeen for a consultation.