

Module 1: Imaging, Fluid-preserved

Module 1C: Recording images of specimens

Task ID	Task Name	Explanations and Comments	Resources
T1	Select and retrieve specimens, lots, and/or containers from storage location.	Some institutions record images of labels and specimens simultaneously, combining relevant tasks from M1B and M1C.	<ul style="list-style-type: none"> Institutional specimen imaging policy or project guidelines. Technician.
T2	Transport selected collection objects to staging or preparation area.	A staging or preparation area should be of adequate size and proximity to the imaging station.	Cart.
T3	Find specimen(s) in lot or container	<p>Institutional strategies vary. In some instances, specimens are ordered by size to optimize imaging efficiency by reducing or eliminating frequent lens changes and copy stand and lighting adjustments. In other instances, specimens are selected by taxonomic group.</p> <p>Decisions to be made include:</p> <ul style="list-style-type: none"> whether to image multiple or single specimens from a single lot, selecting the best quality specimen for exemplar images, deciding the size(s) of specimens to image from a single lot (e.g., smallest, largest, average, 	Institutionally specific guidelines clearly defining specimen selection criteria.

		<p>representatives of several size classes, etc.),</p> <ul style="list-style-type: none"> deciding whether to include several specimens from varying lots in a single composite image. 	
T4	Record or mark label(s) and their associated specimen(s) to ensure the two do not get separated during the imaging process.	<p>This step ensures that the association between label and specimen or container is maintained.</p> <p>Imaging multiple lots or specimens simultaneously is not recommended to avoid the possibility of mixing labels from separate containers. Safest practice is to image labels from a single container and return those labels to the container before opening succeeding containers.</p>	Materials and equipment for marking specimens and containers.
T5	Transport specimens to appropriate imaging station.	Imaging stations vary. For institutions that maintain two or more permanently configured imaging stations based on specimen size, wet/dry exposure, etc., determine which station is appropriate for the specimen being imaged and transport to that station.	<ul style="list-style-type: none"> Cart. Technician.
T8	Set up camera/imaging station.	This might include a vertical or horizontal “wet box”, tank, ePhotobox, vial rack, etc.	

		<p>For institutions with limited space or with a single imaging station, select and set up the appropriate imaging station components for the specimens being imaged. The requirement for various sized stations underscores the efficiencies achieved by selecting specimens of uniform size and imaging requirements.</p> <p>This step may require disassembling following each session for security, removal of tanks for field imaging, etc.</p>	
<p>T9</p>	<p>Set up or adhere to institutionally specific image-file naming conventions.</p>	<p>File naming conventions should be controlled by institutionally specific guidelines.</p> <p>Protocols for assignment of file names vary and may include:</p> <ul style="list-style-type: none"> • retaining the file name assigned by the image recording equipment (camera, scanner, etc.), • setting a camera or scanner to produce a file name matching pre-determined 	<p>See https://www.idigbio.org/content/idigbio-image-file-format-requirements-and-recommendations</p>

		<p>institutionally specific file naming conventions,</p> <ul style="list-style-type: none"> • using a barcode or other value that can be sensed by an electronic scanner to rename or assign names, • scripting an automated process that joins images and data records based on electronic examination of image file metadata (such processes may be used to reduce or eliminate the need for re-naming image files). 	
T6	<ul style="list-style-type: none"> • Extract, clean, and position specimen. • Compose image. • Insert color checker with white/black points and scale into imaging frame. 	<p>This task may include:</p> <ul style="list-style-type: none"> • cleaning specimen, • removal of bubbles, • preparing immersion in tank. <p>Strategies vary. Some institutions limit image composition to specimen only, others include some or all associated labels as well as additional labels denoting details of the imaging process (technician, date, camera type, preparation type, etc.). In cases where individual specimens are imaged from lots, additional label(s) might need to remain with the specimen after imaging. The preparation type could influence how these labels are prepared. With fish, for example,</p>	<p>Color checker references:</p> <p>http://store.rmimaging.com/digitalgraycard-100.aspx</p> <p>http://www.munsellstore.com/default.aspx/MenuGroup/Home.htm</p> <p>http://www.amazon.com/CameraTrax-24ColorCard-2x3-White-Balance-Guidebook/dp/B004QXU8VI/ref=sr_1_3?ie=UTF8&qid=1342555441&s</p>

		the labels are small triangles that are inserted beneath the gill covers.	<p>r=8-3&keywords=macbeth+color+checker</p> <p>http://www.bhphotovideo.com/c/product/286652-REG/QP_Card_GQP201.html</p> <p>http://www.bhphotovideo.com/c/product/26662-REG/Kodak_1527654_Color_Separation_Guide_and.html</p> <p>http://www.imagescienceassociates.com/mm5/merchant.mvc?Screen=PROD&Store_Code=ISA001&Product_Code=CANT&Category_Code=TARGETS</p>
T7	Adjust hardware and software.	Adjust viewfinder or live view to fill frame (when using a camera). Adjustments might include:	Software to adjust might include: <ul style="list-style-type: none"> • Adobe Lightroom, • Camera Control Pro 2,

		<ul style="list-style-type: none"> • exposure, • camera height, • shooting mode, • focus method, • focus, • aperture setting, • zoom intensity, • metadata presets. <p>Using cameras and camera control software that support live view (e.g., Nikon Camera Control Pro 2, Canon EOS Utility) from a computer can reduce or eliminate camera handling.</p> <p>Tethered cameras with camera control software (e.g. Canon Digital Photo Professional or Nikon Camera Control Pro 2) can streamline transfer of image to computer or other storage media.</p>	<ul style="list-style-type: none"> • Capture NX2, • Canon Digital Photo Professional, • Canon EOS Utility, • Helicon Focus, Zerene Stacker, or other stacking software, • Voice recognition software for recording image data.
T8	Record image(s).	<p>It is strongly recommended that a color checker with white and black reference bars, spots, or squares and a scale be included within the image frame (T6).</p> <p>The number of images to record per specimen is governed by digitization</p>	<p>See T6 for color checker references.</p> <p>Software to adjust might include:</p> <ul style="list-style-type: none"> • Nikon Camera Control Pro 2,

		<p>guidelines specific to an institution. Hence, the imaging process per specimen/container might be iterative until all images for a particular specimen or container are recorded.</p> <p>Multiple images from varying focal points may be recorded where focal plane merging and z-axis stacking is imperative (see M1D), in which case the specimen position within the frame must be precisely equal for each exposure. Focus and z-axis stacking is used when the depth of the object being recorded exceeds the camera's effective depth-of-field capabilities, or when attempting to record clearly focused images of very small specimens. Often, these images must be stored in a single folder that does not include other images. (Note: specific workflows for Helicon Focus and Zerene Stacker are in process.)</p> <p>Multiple images of the same specimen might also be recorded for display of varying aspects, e.g., dorsal, ventral, lateral, or for other post-imaging processing operations.</p>	<ul style="list-style-type: none"> • Canon Digital Professional and EOS Utility, • Helicon Focus (remote shooting feature), • Automontage
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T9	Capture specimen data or image metadata.	<p>Institutions that record specimen data as part of the imaging workflow, or those that capture image metadata as images are recorded would do so here.</p> <p>Data capture might happen by keyboard entry or through the use of voice recognition software.</p>	<p>Voice recognition software.</p> <p>See M1A for techniques associated with label imaging and M2 for data entry techniques.</p>
T10	Check image quality immediately following recording; re-image as necessary.	<p>This is a potentially iterative step that might involve immediate re-takes of poor quality images. This is an initial quality control check and is not the only step at which quality control occurs.</p> <p>Quality control benchmarks at this stage might include:</p> <ul style="list-style-type: none"> • clear focus, • adequate depth of field, • framing, • unwanted items in frame, 	

		<ul style="list-style-type: none"> • accurate color balance, • accurate saturation. 	
T11	Mark or notate processed containers.	Some institutions mark, often with a tag inserted into the container, specimens or specimen containers as they are imaged. This tag usually includes how and when the image was recorded and the technician who recorded it.	
T12	Re-store specimens	Re-shelving follows strict rules. Technicians assigned this task should be carefully selected.	<ul style="list-style-type: none"> • Cart. • Policy or plan for collection organization and shelving.
T13	Archive raw images	<p>RAW or TIF images destined for archive and that will not be destructively edited can be moved to archival storage at this point.</p> <p>This step usually occurs at the termination of an imaging session rather than as each image is recorded and may be better placed in the post-imaging processing workflow.</p>	