

Rapid Digitisation Project:
Final Report

South Australian Museum
2011



ATLAS OF **LIVING**
AUSTRALIA
sharing biodiversity knowledge



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1 Introduction

The South Australian Museum (SAMA) Rapid Digitisation Project (RDP) aims to use volunteers to rapidly create digital images and records of terrestrial invertebrate holotype specimens for publication online through the Atlas of Living Australia (ALA).

The goals of the SAMA project include:

- Creation of high quality digital images of our terrestrial invertebrate holotype specimens
- Rapid databasing of our terrestrial invertebrate holotype specimens
- Improved discoverability of our terrestrial invertebrate holotype collection through online publication
- Quantification of the challenge of digitisation of invertebrate specimens
- Development of digital image creation, management and storage standards
- Exploration of equipment options for digital image creation and storage
- Exploration of the use of volunteers to achieve rapid, high quality digitisation
- Comparison and sharing of information with complementary projects associated with the ALA, especially the Australian Museum Rapid Digitisation Project
- Establish digitisation standards and encourage organised digitisation and data management as part of normal business at SAMA.

SAMA has undertaken sporadic digitisation in diverse parts of the museum over recent years, including the roll out of KE EMu as the collections management software in vertebrate zoology and earth sciences, a discrete GBIF funded project to photograph mollusca and vertebrate types in 2004, and our semi-regular delivery of data online through OZCAM. None of these initiatives has resulted in organised digitisation across the institution. The invertebrate collections are not documented appropriately for online publication or for easy migration to new collections management software.

The ALA funded Rapid Digitisation Project has made it possible for SAMA to investigate and purchase high quality digital imaging equipment and conduct assessments of the compatibility of existing data and images with the standards necessary to make online publication and sharing possible. The employment of a project manager has also made it possible to explore best practice in this area and to recruit, train and evaluate the option of using volunteers to undertake such work.

To date, the project has generated images of approximately 2 000 specimens and created database records for many that were not previously databased. The project has given us the opportunity to examine existing database records and prepare them for sharing using the Darwin Core schema. We have generated nearly 1 500 hours of volunteer work and volunteers presently commit 80 to 85 hours, photographing 100 to 150 specimens, per week.

The project has unearthed other challenges within the museum as it has progressed. It has given us the opportunity to review our copyright policy in line with the SA Government commitment to open access licensing and investigate our readiness to digitise legacy image collections associated with the terrestrial invertebrates and other collections. The knowledge and experience gathered through this project will prove invaluable when planning future digitisation activities in the museum and will inform SAMA's Digital Imaging Strategy.

2 Equipment

The SAMA RDP has established four workstations for volunteers, described below. Further information about equipment procurement is available in the report *Case Study: Equipment Options for Imaging by Volunteers*, available online via the ALA website.

2.1 Microphotography workstation



2.1.1 Key components and costs

Equipment	Details	Cost (excl GST)
Computer	Dell Optiplex 980 CPU: Core i7-870 (quad core) RAM: 16GB HDD: 300GB 10k RPM Nvidia NVS 420 video card Monitor: 24" U2410	\$2 414.50
Microphotography equipment	Leica M205c microscope Motorised focus drive AX Carrier LED5000HDI Illuminator Leica Application Suite software (including additional modules Montage Multifocus and Interactive Measurement)	\$35 230.50
Other imaging equipment	Nikon D70 camera, 100mm macro lens Copy stand	Already owned by SAMA
Software	Zerene Stacker	\$278.31 (=US\$289)
Furniture, other	Bench, chair Anti-vibration mounts	Already owned \$60
Total		\$37 983.31

2.1.2 Notes on equipment purchase

Selection of equipment for this project was informed by two key goals:

- Creating high quality digital images for our holotype specimens
- Suitability for use by a volunteer team – paying particular attention to consistency of images and ease of use.

The Leica Microsystem was selected due to its demonstrated success in the entomology department of Museum Victoria and because it has several components that aid consistency and rapid digitisation.

Components of note include:

- LED5000HDI illumination hood allowing for consistent, replicable lighting of a subject by operators with limited training
- AX Carrier, which directs a single beam of light from the stereomicroscope directly to the camera sensor
- Leica Application Suite (LAS) which makes it possible to capture, montage and apply a scale bar to an image with a single piece of software.

The computer specifications outlined above should be noted. Both imaging workstations have been designed with higher computing specifications so that images can be captured, processed and saved as quickly as possible, meaning that volunteers are not frustrated by delays.

The full procedure manual for this workstation, including recommended settings and troubleshooting hints, is available via the ALA website.



2.1.3 Observations on equipment

Despite early delays in the delivery and implementation of this equipment, it is now working well. The highest magnification of 160x is more than sufficient for all pinned, many wet specimens and some dissected material. The workstation is able to photograph specimens up to 18 mm.

The illuminating hood performs as expected, providing replicable, consistent, diffused light for most specimens. The hood minimises reflection, but does not eliminate it altogether. Reflective specimens, such as certain Coleoptera, still suffer from some reflection on their surfaces.

The application of a scale bar to images using LAS is easy, making a part of the process that could be very complicated extremely simple.

2.1.4 Montaging

The integration of the automated focus drive and LAS make the capture of stacks of images for focussing very easy, including specimens that are very small, which occasionally require stacks of more than 100 images.

LAS montaging software is a version of Syncroscopy's Auto-Montage, used under licence. The controls are not user-friendly, and require some trial and error to perform montaging to an acceptable quality.

Considering the quality of the microscope and the camera, SAMA believes that the montaging software in LAS is a weakness in this system. SAMA persisted with protracted negotiations with the supplier and reached a satisfactory standard of output. This time was worth investing due to the benefit of the integrated system in which a volunteer can go from capture to montaging and applying a scale bar within the same program, but we hope that future upgrades will include improvements. SAMA's experience was complicated by the failure to provide an AX Carrier in the initial set-up. This is an integral part of the system if it is to be used for imaging.

The SAMA RDP has purchased a licence for Zerene Stacker, as a fall back when LAS is not performing to expectations.

2.1.5 Suitability for use by volunteer team

The Leica Microsystem is the appropriate system for our team of volunteers, as the integrated process has made it possible to develop and train volunteers in a repeatable process.

The speed of capture is slower than anticipated, but adjusting settings to make the capture process faster will reduce the quality of the resulting images and not make the best use of this system's high specifications.

2.1.6 Photographing labels

The SAMA RDP has set up a second camera dedicated to photographing labels. This Nikon D70 and 100mm macro lens were purchased by SAMA in 2004, as part of the GBIF funded digital imaging project. It is mounted on a basic copy stand.



2.2 Macrophotography workstation



2.2.1 Key components and costs

Equipment	Details	Cost (excl GST)
Computer	Dell Optiplex 980 CPU: Core i7-870 (quad core) RAM: 16GB HDD: 300GB 10k RPM Nvidia NVS 420 video card Monitor: 24" U2410	\$2 414.50
Camera and associated equipment	Canon EOS 5DMkII Canon EF 100mm F2.8 macro IS UISM L Macro lens 2x Canon 430EX Speedlites Canon ST E2 Speedlite Transmitter 16 rechargeable batteries and charger	\$5 090.00
Other equipment	Kaiser RT1 copy stand and tilting arm Stackshot automated focussing rail	\$1128 US\$636.50
Software	Zerene Stacker Canon EOS Utility Digital Photo Professional Photoshop CS5	\$284.02 (=US\$289) With camera With camera \$910
Furniture, other	Bench, chair	Already owned
Total		\$10463.02

2.2.2 Notes on equipment purchase

The full frame Canon EOS 5D Mk II, paired with the 100mm macro lens and Stackshot automated focussing rail creates excellent images of larger specimens. It is primarily used for

specimens that are larger than 18mm, which is the upper limit of the Leica Microsystem, but the resolution of this camera means that it is useful down to approximately 10mm.

The SAMA RDP considered the use of fixed light, soft boxes or fibre optic lights for this workstation. Flash was preferred for several reasons: the short exposure limits the noise or risk of vibration in the image, the intensity of that light is able to flood out most ambient light and ease of use for a volunteer.

Despite the versatility of the untethered flash units, the use of rechargeable batteries has had an impact on workflow and budget. Battery changes in the flash units cause a minor interruption to volunteers' work around once each day. The Speedlite transmitter uses Lithium 6V 2CR5 batteries, which are non-rechargeable. These batteries need to be changed every five weeks and can be found for approximately \$7 each. (Individual batteries from mainstream electronics retailers can cost up to \$20 each, but SAMA was able to make a bulk purchase at a discounted rate from a photographic supplier). Other projects might consider a small set of studio lights that would not need battery changes.

Most components of this workstation were also selected for versatility, so they can be re-purposed for photographing larger specimens or other objects from the collection in the future.

The full procedure manual for this workstation, including recommended settings and troubleshooting hints, is available online via the ALA website.

2.2.3 Observations on equipment

All equipment and software has proven very easy to use and approachable for volunteers with differing levels of experience and confidence.

Canon EOS Utility and Digital Photo Professional were provided free of charge with the Canon EOS 5D MkII, making it possible to use remote live view in tethered shooting. This gives the user the opportunity to set up the image on screen, rather than trying to do so through the viewfinder.

It should be noted that this workstation creates image files of approximately 120MB. The associated computer has been designed to view and process images of this size and the ALA has supported increased data storage associated with this project, so this does not impact on workflow within the SAMA RDP. However, the file sizes must be reduced before being opened or manipulated on other 'lower spec' computers in the museum.

All images produced on this workstation are post-processed using Photoshop. This is discussed further in our *Workflow and Procedures* section, but involves cropping, adding a scale bar and cleaning and brightening the images ready for publication.



2.3 Additional workstations: Post-processing, scanning, databasing and other activities

The project uses two additional non-imaging workstations. One of these has a 24" monitor and is used for Photoshop post-processing, databasing and other tasks. The other is a re-conditioned second-hand computer from another part of the museum which is suitable for databasing and other administrative tasks.

2.3.1 Key components

Equipment	Details	Cost (excl GST)
Computer	Dell Optiplex 980 (Standard spec, incl 19" monitor)	\$1 200
Computer	Re-purposed computer from elsewhere at SAMA	No cost to project
Monitor	24" monitor	\$550
Software	Photoshop CS5	\$910
Furniture, other	Bench, chair	Already owned
Total		\$2 660

Over the course of this project these computers have been put to the following uses:

- A jobseeker on a Work for the Dole placement created a Darwin Core compliant Access database for recording new database entries as part of this project.
- A student intern worked on documenting bibliographic references for holotypes that were recorded in our existing terrestrial invertebrates database without that information.
- A student intern has conducted a research report on the challenges of publishing legacy images in the SAMA Entomology department online.
- Volunteers create database records for holotypes that are not presently recorded in the Terrestrial Invertebrates database.
- Volunteers post-process images from the macrophotography workstation using Photoshop.
- In the latter part of 2011 volunteers will use these computers to scan analogue images, including photographs, transparencies and illustrations from the Entomology department. Some volunteers will also create metadata for existing digital images from the same department.

2.4 In-kind support from SAMA

As indicated in the tables above, some furniture and other equipment was supplied by SAMA and should be accounted for, for the information of others setting up such a program. An attempt has been made to enumerate this support in the table below, but all figures should be treated as estimates.

2.4.1 Key components

Equipment	Details	Cost (excl GST)
Camera for	Nikon D70, 100mm macro lens	Equivalent new

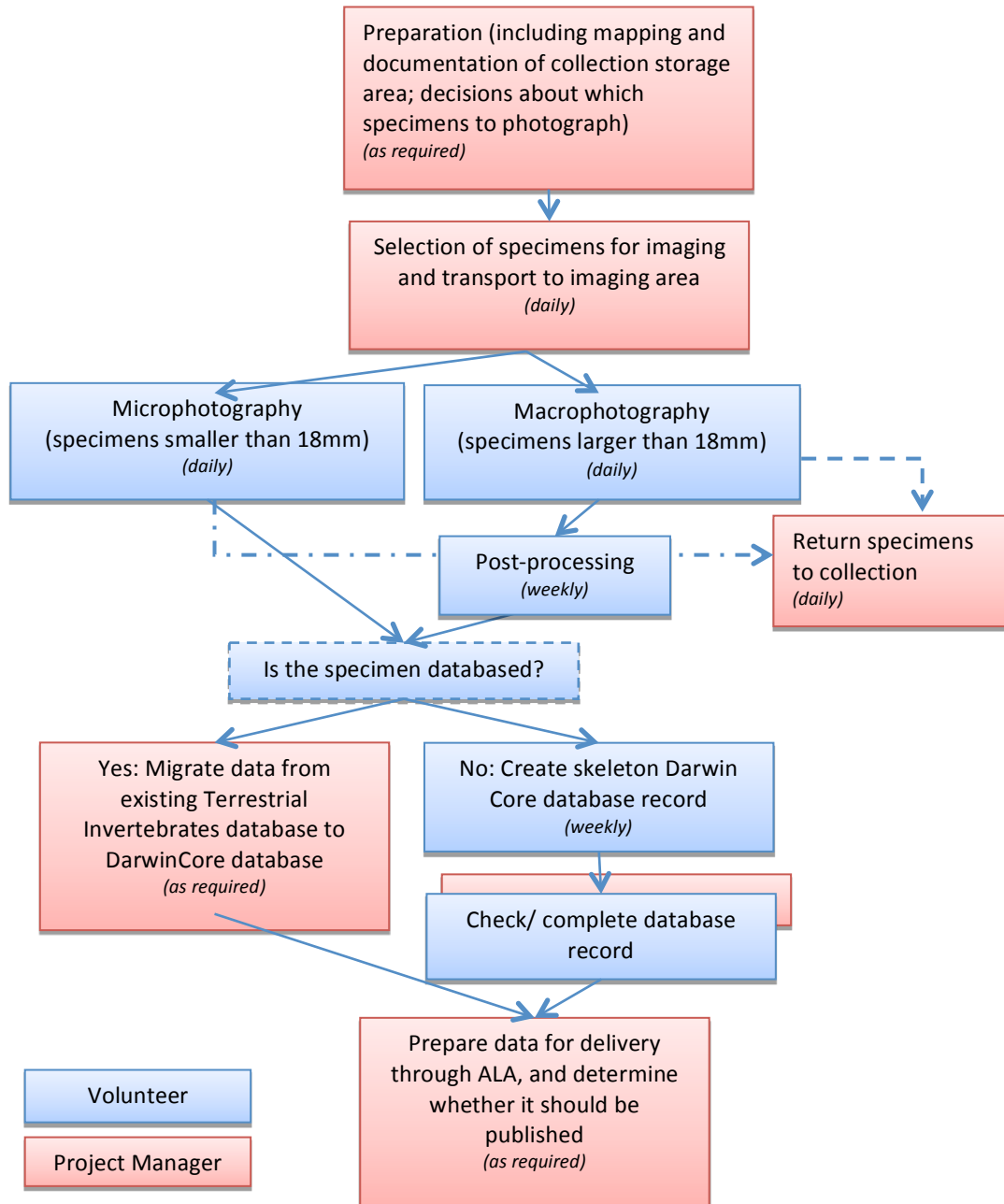
Rapid Digitisation Project: South Australian Museum 2011

Equipment	Details	Cost (excl GST)
photographing labels at microphotography workstation		Nikon D90 with 100mm macro lens ≈ \$2 350
Copy stand (as above)		\$300
Furniture	Desk/workbench (x3)	\$840
	Chairs	\$400
	Shelving for storage of books, volunteers' belongings	\$200
Fit out	Network cabling, power points	\$2 000
Computers	Basic desktop computer, re-purposed from another area of SAMA	\$900
	Project manager's laptop	\$900
IT support	Calculated as 50 hours @\$120/hr	\$6 000
Stationery		\$100
Refreshments, access to facilities		\$100
Total		\$14 090

3 Process/workflow

3.1 Core process: From drawer to digital

The basic workflow from a specimen in a drawer to an image and data ready for delivery online through the ALA is illustrated in the following workflow diagram.



Procedure manuals for key elements of the process have been published online for the photography of specimens using the macro and microphotography equipment, and post-processing using Photoshop. These manuals are available online via the ALA website.

3.2 Core process (described)

3.2.1 Preparation and selection of specimens

The project manager conducts mapping of the collection area, determining which drawers contain holotype specimens, the size of those holotypes (ie larger or smaller than 18mm) and which Order it would be most appropriate to photograph next. This involves occasional advice from the Entomology Collections Manager.

Decisions about which specimens to select for imaging are informed by the skill of the volunteers present on any given day, the fragility of specimens and the availability of information about individual specimens.

At SAMA, any specimen that is kept out of the controlled collection area overnight must be frozen for two weeks before return to the collection. The digitisation area is some distance from the collection storage area. The project manager collects and returns specimens to the collection daily. As the volunteers' productivity has increased and because holotypes are dispersed through the collection, the project manager has found it useful to keep a 'working drawer' of specimens in the collection area, which is filled a couple of times a week, taking 1.5 to 2 hours each time to do so (depending on the concentration of holotypes in the relevant part of the collection).

3.2.2 Micro/macrophotography

Volunteers conduct the following steps:

1. Select a specimen from the drawer and move the whole unit tray to the workstation.
2. Carefully remove the labels and set them aside.
3. Capture and montage a dorsal view of the specimen (all specimens).
4. Capture and montage a lateral view of the specimen (where practical, not suitable for some specimens, notably Lepidoptera).
5. Capture an image of the labels and an image of the obverse side of the labels, if necessary.
6. Return the labels to the specimen.
7. Add a small label to the unit tray to indicate the date that the specimen was photographed.
8. Return the specimen, in its unit tray, to the drawer.

This process is described in greater detail for each workstation in the relevant manuals, available online via the ALA website.

3.2.3 Post-processing

Images of specimens captured by our macrophotography workstation must be post-processed using Photoshop. Certain experienced volunteers have been trained to post-process these images. Steps include:

1. Add a scale bar to the image (and removing our reference object).
2. Crop images to a consistent ratio.
3. Adjust levels, brightening the image and minimising shadow.

4. Clean up blemishes caused by excess pin holes or shadows on the imaging stage.
5. Some sharpening.
6. Setting the resolution of the image.

This process is described in greater detail in the manual, available online via the ALA website.

Arranging for individual volunteers to process batches of images aids consistency and is an opportunity for a first wave of quality control. Post-processing volunteers identify specimens that may need to be re-photographed.

Those volunteers with Photoshop experience can process a photograph in less than one minute. Volunteers who are new to Photoshop average two to three minutes, but can take up to five minutes to process a challenging image.

3.2.4 Databasing (where no database record exists)

Only one fifth of the terrestrial invertebrate holotype specimens have already been databased. Database records must be created for other specimens being photographed.

Selected, experienced volunteers use a Microsoft Access database that has been tailored to be Darwin Core compliant, but compatible with SAMA's existing terrestrial invertebrate database, to create skeleton records of photographed specimens.

This first stage of databasing focusses on verbatim information from labels and checking data against the Australian Faunal Directory. This is not something that all volunteers are able to do because the massive diversity of verbatim data on specimen labels means that some judgement, interpretation and confidence is necessary. We anticipate that only a portion of our volunteer team will ever be involved in creating new database records.

At the time of writing, derived locality data, particularly decimal latitude and longitude and coordinate uncertainty have not been captured and remain to be added to these records. It is likely that this will be done by a particular individual volunteer, with guidance from the project manager.



The SAMA RDP has found that assigning a single volunteer to create a batch of records over a half or full day, using the photographs of the specimens and labels, is more efficient and generates fewer errors than creating database records one at a time as photographs are taken.

Where the specimen has already been databased, the project manager migrates the data from the terrestrial invertebrate database to the Darwin Core database. The project manager will check any problematic data with the Entomology Collections Manager before delivery online.

The state of extant data and the complexity of the work involved in migrating and checking this data means that it is unlikely that volunteers will be able perform this task at any stage in the project.

3.3 Other tasks

3.3.1 Key decisions

The early part of the project involved making key decisions about the goals, practices and benefits for the museum.

Examples of some early decisions include:

- Views to be captured. For the purposes of taxonomy, up to eight views of a specimen can be useful. The SAMA RDP has decided to capture a standard set of three images for each specimen (dorsal, lateral and labels). Key factors in this decision were:
 - this set is satisfactory for the purpose of discoverability
 - no photographers are taxonomists, so may lack the skill to position these views accurately
 - some views (ventral in particular) risk damage when a volunteer is positioning the specimen.
- Archiving images after optimisation. SAMA does not employ photographers or other imaging specialists. The SAMA RDP has created an archive of images optimised in Photoshop, stored at a resolution that would be suitable for most forms of printing, acknowledging that after the conclusion of the project we may not have in-house skills to optimise those stored images.

3.3.2 Quality control

Conveniently, the described process includes naturally occurring opportunities for quality control. This happens in addition to a rough sampling method of quality control undertaken by the project manager.

Each image is viewed on three separate occasions by up to three separate volunteers: once at capture, again at the time of post-processing and finally when the database record is created or checked. The volunteers are asked to watch out for any problem images. Frequently occurring problems include those who have forgotten to add a scale bar to the image, occasional images that are slightly out of focus or have poor colour balance (particularly from the microsystem). The colour balance issue can be rectified in Photoshop but the other problems lead to re-capturing the photo. This has happened fewer than ten times in the first 2 000 specimens. There have been instances where volunteers have identified problems in photographs that they took themselves.

The project manager schedules performance review for volunteers. In preparation for those discussions, she randomly selects a dozen or more images that each volunteer has captured or processed across different days for checking. This happens in addition to occasional observations of their output as they work.

3.3.3 Installation and set-up of equipment

The delivery, installation and set-up of equipment took considerable time. SAMA's Leica Microsystem, in particular, required considerable troubleshooting (see 4.3.4) and arranging equipment to best suit our 'production line' style of imaging involved some trial and error. This needs to be carried out by someone with a clear and well-thought through understanding of the goals and intended processes and the time to dedicate to troubleshooting. Software and hardware settings need to be tried, fixed and documented.

3.3.4 Development of process

As discussed in the *Volunteer Recruitment and Management* section, development of processes and manuals has helped with the training and management of volunteers immensely.

There is enormous diversity in entomological specimens and developing a versatile procedure that allows non-specialist photographers to create high quality images of all kinds of specimens took some time.

3.3.5 Troubleshooting

Commencement of the SAMA RDP was slowed by delayed deliveries and serious equipment problems, particularly with our Leica Microsystem. The time of a dedicated project manager was essential to resolve those issues. In our experience, the situation required considerable problem-solving to isolate and identify the problem and protracted negotiation with suppliers.

The SAMA procedure manuals have been revised several times as problems in the described processes have been identified and ironed out.

Volunteers are not able to conduct this kind of troubleshooting themselves, as some problems are not immediately obvious enough to come to their attention, some overlook obvious problems, assuming it is a part of the process that they don't fully understand, and they don't feel empowered to investigate those problems, especially when it comes to testing expensive and technical machinery.

3.3.6 Internal consultation and advocacy

As discussed in *Introduction*, digitisation has previously happened sporadically at SAMA and certain individuals have implemented digitisation in particular departments, but it has not been embraced in an organised manner across the institution.

The goals of the project include advocating organised digitisation, data capture and management across the institution, so the project manager has worked to build support for the project among staff and other stakeholders.

4 Volunteer recruitment and management



4.1 Recruitment and induction

The SAMA RDP identified people who would have the interest and the time to volunteer in roles as digital photographers. We thus promoted the opportunity to those who had an interest in science, entomology and/or digital media, including the following:

- students of biological sciences at the University of Adelaide and Flinders University
- students of visual arts and new media at University of South Australia (UniSA)
- museum studies students at University of Adelaide
- digital photography students at Adelaide Central School of Art
- through Conservation Volunteers Australia
- Volunteering SA/NT recruitment website
- SA Museum website
- SA Museum Waterhouse Club.

We received more than 90 inquiries and around 60 applications. The majority of applications came from University of Adelaide Science students, UniSA digital media students and through the SA Museum website.

The applicants were asked to return a form (included in Appendix A) with a brief resume. We received *excellent* applications, making it very difficult to choose applicants for interview. Applicants were interviewed (questions included in Appendix A) and a group were chosen to commence the project.

Those that found the opportunity advertised on the SA Museum website were over-represented among the successful applicants. It appears that we sought out people who would be interested, but the most suitable people were seeking this kind of opportunity.

The formal recruitment process was time-consuming but worthwhile. We know that we recruited the best applicants for the position and the experience helped highlight to volunteers that positions at the museum are highly sought after and to be valued. The application, recruitment and induction process included the following stages (with time frames in brackets):

- Information session for interested volunteers, held twice (during the day and in the evening, each session consisting of a 35 minute presentation about the project and volunteer roles and 20 minutes for questions)
- Applications received (over a period of three weeks)
- Interviews held (19 people interviewed for 15 positions, each interview took a half hour, and were held over three half days)
- Induction sessions (two sessions of approximately eight people each, 2.5 hours each session. At these sessions volunteers were introduced to SAMA and the entomology collection, led on a tour of the Science Centre, inducted into the Artlab building and filled out appropriate forms).

The SAMA RDP project sought out mixed demographics to encourage different styles of working and test the suitability of people from different backgrounds to this kind of work, given that this is intended to be a 'demonstration project'. Volunteers were asked to commit to a minimum engagement of three months in recognition of the significant time spent training them.

We were warned against the recruitment of students by others in the museum, with the warning that they would only stay for a short period. As this was a short project, it was considered an acceptable risk. While some students were only able to volunteer for a limited period, they proved to be reliable, enthusiastic and highly-skilled.

4.2 Training

Regardless of their background, volunteers were trained in specimen handling. This gave the project manager an opportunity to observe their attention to detail. This training also gave us the opportunity to casually chat about the work of the entomology department and taxonomy, providing context for the project and giving the volunteers an understanding of the use of the images that they are creating.

The project manager spent considerable time developing and documenting a procedure for each work station, so that volunteers could refer to a manual. All volunteers were encouraged to provide feedback on that procedure and their experience and input informed future editions of the manual. Copies of these manuals are available online via the ALA website.

The 'Troubleshooting' chapter has proven to be the most useful part of this manual. This grew as we documented common problems encountered by volunteers. A copy of the relevant manual is kept near each workstation for volunteers to refer to if something goes wrong. This has reduced the workload of the project manager. The discovery of new challenges means that this



troubleshooting section is occasionally updated.

4.3 Management

Other activities that took place to support and manage volunteers include:

- **Consistent and regular supply of information:** We keep the schedule as consistent as possible so volunteers get into a routine of when they are working and who they are working with. Despite this, every Wednesday the project manager emails the schedule for the following week. We encourage the volunteers to read these emails and keep them engaged by including something interesting with each of these emails, including entomology or biodiversity news or links to interesting blogs or other websites.
- **Inclusion in the museum community:** Volunteers are notified of events that are promoted to the museum staff. These include talks by museum staff, training opportunities and appropriate exhibition openings and other events. Very few volunteers have taken up these invitations, but several have commented positively about receiving them.
- **Occasional adjustment of schedules:** The configuration of workstations means that the SAMA RDP sees three or four volunteers working together. It has been helpful from a management perspective to change the schedule occasionally, which gives volunteers an opportunity to work with different people or try different tasks.
- **Combining skill sets and personality types:** Our project brings together volunteers with a background and interest in science and art. We believe that many volunteers have enjoyed being paired with colleagues who have different interests from them. From a management perspective, doing so combines different approaches and ways of thinking, which can help them in problem-solving as a team.
- **Performance review:** Volunteers were informed at commencement that their performance would be reviewed. Scheduled performance review gives the project manager an opportunity to address any emerging problems with the volunteer's work, productivity or demeanour and also gives the volunteer an approachable environment to raise any problems they might be having. The project manager conducted one-on-one performance review sessions with volunteers during September. These sessions provided an excellent opportunity to identify any performance issues (there were very few), communicate information to the volunteers about the future of the project and elicited a number of good suggestions from volunteers for improvement to our practices.

4.4 Observations on volunteer recruitment and management in the SAMA RDP

The SAMA RDP sought volunteers with experience in science or digital photography and asked them to demonstrate experience working in teams or with delicate handling. On reflection, demonstration of these characteristics was useful but did not cover everything that was necessary.

A straightforward procedures manual means that skills in science or photography are not essential for working on this project, but we found they were helpful in finding volunteers who would be interested in the project and genuinely excited to be part of the ALA.

The most important qualities, which were not specifically articulated in the application form, have been proven to be digital literacy and confidence and a problem-solving approach.

Articulating that delicate handling was required was helpful because it meant that some interested applicants self-nominated that they would prefer not to handle specimens.

5 Cost/benefit analysis

There are three distinct phases to the project, establishment, ongoing, and expansion. The project was initially planned for 12 months, but recent developments have made it possible to continue for at least 18 months. Experience has shown that the establishment phase took 6 months, as we are now in a period of maintenance and planning for future expansion.

Volunteers' productivity has increased exponentially over the period of the project. While all volunteers were being trained during June, the project photographed 177 specimens, while during August, volunteers photographed 459 specimens. Our stable base of volunteers means that we will not have any further periods where *all* volunteers are being trained at the same time. This means that the volunteer team can expect to produce images of around 5 000 further specimens before the end of the project.

Processes developed by the SAMA RDP can be used to make our legacy images available digitally. This issue is being explored, and could result in the publication of at least 3000 further images. It is anticipated that once models are demonstrated in this way, and Morphbank is installed as the image repository, other SAMA departments will be able to publish legacy images as well. This cannot be quantified at present.

5.1 Costs

5.1.1 ALA contribution

- Staffing: \$100 000
- Equipment: \$25 000 + \$29 000 = \$54 000

5.1.2 SAMA contribution (cash and in-kind)

- Staffing: \$12 000 (in-kind)
- Equipment: \$10 090
- Volunteer hours: 1411 hours to date @ \$25.00/hr = \$35 275

5.2 Establishment phase

Funds spent on establishment include initial equipment purchases, the first phase of the employment of the project manager and project oversight. This could be estimated to be approximately \$108 000 (\$53 000 equipment, \$55 000 staff and oversight costs). This will not likely to be spent again.

5.3 Ongoing and expansion phases

Based on the present funding arrangements, taking us through to June 2012, continuing this project could involve commitment of approximately \$94 000 per year (\$80 000 salary and on-costs for project manager, \$6 000 oversight, \$8 000 equipment). Funds should continue to be set aside for equipment to allow for replacement, upgrade and expansion of our digitisation capacity based upon the model developed through the first phase of the project.

Cost benefit analysis of this project should consider the number of volunteer hours generated and the number of specimen/legacy images delivered.

Simple analysis indicates that the project, for an overall cost of approximately \$176 000 cash and in-kind, will generate at least 4 000 volunteer hours, worth \$100 000 to the museum. The funds allocated for expansion of our equipment and workstations mean that it is possible we will generate more volunteer hours in 2012 as the project is able to expand into other SAMA collections.

Similarly, simple analysis of the overall cost of the project against the expected number of images to be delivered indicates delivery of at least 10 000 images of specimens for a total cost of \$177 000, costing less than \$18.00 per specimen. This per specimen figure is likely to decrease as SAMA's digitisation program progresses as the same equipment and processes will be used to photograph specimens from other parts of the institution.

5.4 Ongoing impact

Ongoing analysis should also take into account the following achievements, which will have an impact on other areas of SAMA and will enable further digitisation beyond the RDP:

- Implementation of Morphbank image repository system
- Development of a copyright and licensing policy based on Creative Commons and the principles of open access to public information
- Development, demonstration and advocacy of digital imaging standards and practices
- Increased discoverability of SAMA collections through online publication
- Institutional knowledge about the requirements (including time, facilities, equipment) for digitisation to inform future digitisation initiatives.

5.5 Increased data storage

ALA has also supported the installation of increased centralised data storage to the value of \$39 000.

This has made it possible for SAMA to acquire and set up a dedicated digital assets storage area for all multimedia assets, including those that will be delivered to ALA and others. Some of these images will be managed using the Morphbank image repository when the latest software upgrade is delivered in 2012. The SAMA RDP project manager will provide guidance on appropriate use of the storage for other departments.

This is an enormous benefit to the institution as many digital assets are presently stored on portable drives, CDs, DVDs and other risky media. This will centralise that storage, encourage better asset management conventions and help SAMA plan for further digitisation.

6 Recommendations

6.1 Equipment

Equipment purchases for a digitisation project should be informed by an understanding of the operators who will be using the equipment and the workflow requirements of those operators. Equipment decisions for this project were very focussed on two issues: developing repeatable, consistent procedures that could be performed by a team of diverse volunteers and creating the highest quality images possible to avoid re-photographing of holotype specimens.

Equipment decisions should also be informed by organisational capacity to manage that equipment. The allocation of a dedicated project manager meant that SAMA was able to put together an adapted system using consumer elements that can be re-purposed for future digitisation of other collections. An organisation that is trying to integrate digitisation into their work without dedicated staff might need an 'out of the box' system that doesn't require assembly. (Note: ALA support has resulted in the installation of a number of different digitisation systems across the country and many operators are able and willing to provide advice on equipment).

Do not underestimate the computing power and data storage required for high quality imaging.

ALA published documents including *Digital Imaging Requirements Review, Case Study: Equipment Options for Imaging by Volunteers* and discussion of issues such as lighting, post-processing, equipment are available via the ALA site.

6.2 Volunteer recruitment, training and management

By promoting the opportunity to those interested in science or digital media, SAMA successfully identified volunteers who have the time and interest to participate in this project. This creates a volunteer workforce that is engaged, interested and understands the context of the SAMA RDP.

Digital-savvy, flexibility and a problem-solving attitude have been the most important characteristics of successful volunteers, more so than particular experience in entomology or digital photography.

Conducting a formal recruitment process, including formal application, interview and induction has aided ongoing training and management of volunteers.

Regular and predictable supply of information to volunteers, including consistent schedules and regular information about the overall progress of the project has nurtured a reliable team. The success of this has been demonstrated by almost no absenteeism and the retention of nearly all volunteers.

Experienced and highly skilled volunteers can be rewarded by assignment to a particular task. In the SAMA RDP, this has included the selection of a couple of volunteers to conduct all databasing, assigning responsibility for photographing a particularly fragile family of insects to volunteers who have demonstrated careful handling and training outstanding volunteers on *all* workstations and establishing them as a leader, trainer and problem solver for other volunteers.

Occasional rotation of schedules allows volunteers to work with different colleagues and undertake different tasks.

Volunteers should be thanked and regularly shown appreciation. Good management of volunteers can also be aided by an understanding of what motivates them to be there. Examples of the motivation among our current team include:

- learning more about entomology or digital photography
- supporting the museum
- seeking more social engagement
- building CVs for future careers in the sciences, museums or photography
- being interested in biodiversity and sustainability.

Understanding what motivates the volunteers helps reward them appropriately, including providing opportunities for professional development, sharing interesting information about the museum or news from the world of science and making sure that they work with people who share their interests.

6.3 Workflow

Forward planning is essential, so that volunteers have work waiting for them when they arrive. They cannot be expected to generate their own work, their time cannot be wasted and aggravation or disillusionment can be avoided by making sure they are not keep waiting.

Do not underestimate the preparation that a digitisation project requires. In the SAMA RDP, this has included locating holotype specimens, checking extant specimen data, gathering available information that is stored in disparate locations and forms, among many other tasks. Good workflow planning can share these responsibilities across digitisation project staff and collection management staff.

Development and documentation of a sound procedure prior to volunteer training has encouraged reliable, consistent work by volunteers. This is aided by the provision of manuals for each workstation, occasionally updated based on the experiences of volunteers.

6.4 General

Employment of a dedicated project manager has been integral to the success of the RDP. Investing in this position has meant that one person was able to identify and refine the goals of the project, research best practice, make decisions suitable to the needs of the institution and respond to problems that arose in procurement and volunteer management. This kind of project often requires organisational change and a project manager can work as an advocate. This person is able to drive the project, tracking progress and ensuring that productivity and quality is improving from month to month.

Do not under-estimate establishment time frames. The SAMA RDP project manager commenced work in November 2010, equipment started arriving on site from February 2011, and volunteers commenced regular work in May 2011, indicating approximately six months establishment time. Upon review, SAMA does not feel that this could have happened any quicker, especially considering that some pieces of imaging equipment had between eight and 12 week delivery times.

Analysis of existing data and the data requirements to be delivered should be undertaken as one of the earliest stages of any project. The conversion of extant data to the required Darwin Core standards for online publication has proven one of the biggest challenges and requires specialist attention.

Organisational anxieties about the state of data and the condition of the collection can have a crippling impact on the prospects of online publication.

Continual internal advocacy of digitisation is essential. Many museums find the prospect daunting and limits to the resources available for such work leads to scepticism about the success of any such project.



7 Appendix A: Volunteer recruitment documents

7.1 Volunteer Application Form

South Australian Museum

The South Australian Museum is presently recruiting volunteers to create digital photographs of terrestrial invertebrate specimens. This project is expected to commence in February 2011.

Applications that demonstrate the following attributes will be highly considered:

- Attention to detail and manual dexterity
- Experience or interest in entomology, biology, or digital photography
- Good interpersonal skills and experience working in a team environment

Applicants must be able to commit a minimum of half a day per week (4 hours) to this project. Applications that can commit at least one full day will be considered more highly.

Placements are strictly limited within the science department and interest is high, so well thought out supporting comments will increase your chances of gaining a place in your chosen field.

Please note: The project manager will conduct a general information session for interested applicants, and a brief interview will be required as part of the application process. We are also able to consider formal work placements or student projects. If you have any queries or require further information, please contact Alexis Tindall on 8207 7497 or via email alexis.tindall@samuseum.sa.gov.au.

Your details

Title (Dr/Mr/Ms/Miss/Mrs)

Surname

Given name

Postal address

.....

Email address

Contact phone number/s

Date of Birth

What hours/ days per week would you want to give to volunteer work at the S.A. Museum?

Start Time: _____

Finish Time: _____

on which days Monday Tuesday Wednesday Thursday Friday

Total hours per week: _____ (approx.)

Other:

Briefly explain what interests, skills or expertise you would bring to volunteering at the SA Museum by completing the following:

Do you have experience in science or photography?

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Can you explain your speciality and the skills you would bring to the museum?

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Is there anything you would like to add to help support your application? (Indication of experience working in a team, or working with delicate specimens or objects would be helpful).

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Please attach a copy of your resume to your volunteer application form.

Once complete, send this form to: Alexis Tindall, South Australian Museum, North Terrace, Adelaide, SA, 5000 or via email alexis.tindall@samuseum.sa.gov.au.

7.2 Volunteer interview questions

Applicant name:

1. Please describe what prompted you to apply to volunteer at the South Australian Museum, and what you would like to get out of your volunteering experience here?

2. Do you have any particular education, professional or life experience that you would like us to consider in relation to your application?

3. Could you please describe a situation where you have worked in a team to achieve a particular outcome?

4. Could you please tell us where you heard about this opportunity?

5. Signing copyright letter of agreement to SA Museum? Y/N

6. Is there any other information that you would like to share about yourself?

Evaluation:

Skills/Experience	1	2	3	4	5
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Perceptions about ability to work in a team	1	2	3	4	5
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