
*i*Plants:
THE WORLD'S PLANTS
ONLINE

**PROCEDURES:
CONSERVATION ASSESSMENT,
IMAGES AND TAXON LINKS**

APPENDIX 3

Final Report of Pilot Project: 1 April to 30 Nov 2004

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Introduction

The *iPlants* project

iPlants aims to produce an index of all the world's plant species together with, where possible, an image and a preliminary conservation assessment. This index will be made available online.

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Purpose of this document

This document aims to :

- 1 Describe the processes to be adopted in the *iPlants* project for
 - a generating conservation assessments for 20% of the world's flora based upon specimen records at the participating institutions
 - b documenting digital images to link to the accepted species and illustrate the species page of the online *iPlants* system
 - c documenting digital information resources to link to the species page of the online *iPlants* system
- 2 Point out those issues which still require resolution by the Steering Committee
- 3 Provide a framework for a Procedural Manual and a functional specification of the software tool set required.

Outstanding Issues

1. This document is not complete.
 - a. Some tasks – particularly at a lower technical level – still lack an entry in the “Who” column. This will need to be completed and the whole then compared against the Staffing chart.
 - b. Tasks covered by other, more detailed, procedural manuals (e.g. for georeferencing and conservation assessment) are only outlined here. Details are to be defined within those other manuals.
 - c. Procedures 5 (Publishing) and 6 (Reviewing and closing this Phase of *iPlants*) are only included in outline. They await detailed definition of the mechanisms to be used for publishing of the whole Online System.
 - d. An older procedural description for handling links to the Default Information Sources (to be included for ALL species) is included as an Appendix. The tasks described there will be split between Procedure 0 (Planning) and Procedure 5 (Publishing). This awaits completion of the latter.
2. The involvement of collaborators beyond the three initial institutes has only been partially covered.

This document

This document sets out to describe the activities and the sequence of activities which need to be completed in the full iPlants project to pull together all of the additional information required to complete the species accounts in the online system once compilation of a draft checklist has been completed.

Within each section this document provides:

- a. a description of each of the major procedures.
- b. a description of the sub-procedures and sub-sub procedures that in combination describe all of the activities/tasks necessary to complete each major procedure.
- c. a flow diagram linking the sub-procedures.

The overall structure of this document

The following main procedures are recognised and the document describes each in turn.

Procedure 0) Produce and establish controls for the next Phase of the project.

Procedure 1) Initiate procedures for a given set of taxa.

Procedure 2) Generate conservation assessments for 20% of the world's flora based upon specimen records at the participating institutions

Procedure 3) Document the digital images required to link to the accepted species and illustrate the species page of the online iPlants system

Procedure 4) Document the digital information resources required to link to the species page of the online iPlants system

Procedure 5) Pull all resources together and update the iPlants online system.

Procedure 6) Review progress against the agreed plan. Draw lessons. Return to planning of the next phase of the project.

Nomenclature and how procedures are nested.

The procedures can be nested to any number of levels. The procedures are numbered according to their nested position.

Thus "Procedure 3.4.1" would be the first task within the fourth sub-procedure of Procedure no. 3.

The components of each procedural description

Each procedure and sub-procedure is described in the following way with a discrete number of sections.

Purpose:

A simple statement of what each procedure is intended to achieve.

Assumptions:

This section lists the assumptions made when completing the procedural description. Procedures inherit the assumptions made for their parent procedure (and these are only repeated in rare cases where to do so may help achieve clarity).

Inputs:

This section describes what must be in place and provided to the “owner” of that procedure before they can instigate activities.

Owner:

The person responsible for managing and delivering the procedure

Steps:

A tabular description of the tasks which must necessarily be completed for this procedure to be completed and the sequence in which they must be undertaken

The table has the following structure

Task	Activity	Who?
------	----------	------

Column

“Task”	gives the name of the task
“Activity”	describes the activity necessary
“Who”	indicates who will undertake this task

Outputs:

This section describes the products and outcomes of the procedure once complete.

Issues Resolved:

Records, for future reference, details of those issues which have been discussed and resolved.

Outstanding Issues:

Describes those questions which remain to be answered about HOW the procedure will be delimited, structure, ordered etc.

The actors

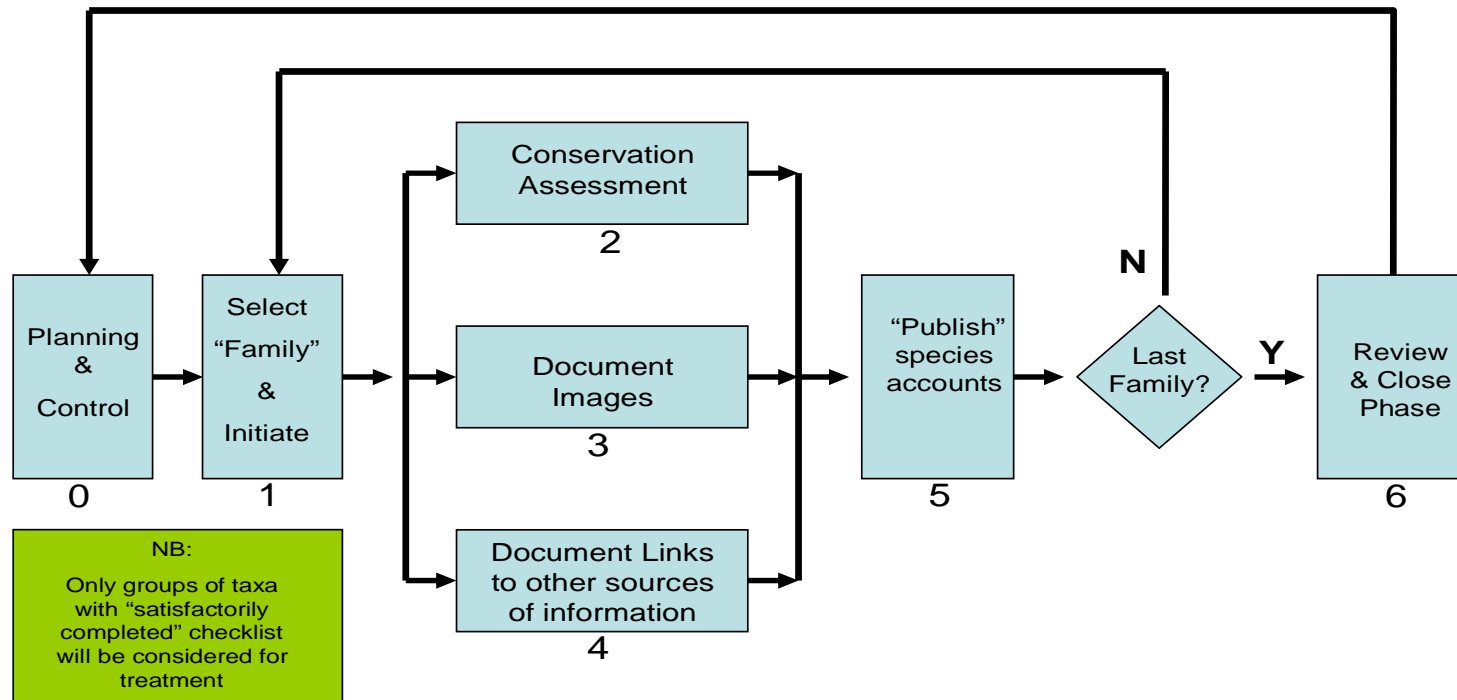
Who is to undertake a particular task? An important aspect of managing these procedures will be to know who is responsible for each task.

In the procedural descriptions that follow I have included, where possible, the likely candidate. Many of the tasks – particularly at a lower technical level – still lack an entry. I sought, however, to complete this column on who will undertake the various management tasks.

Actors currently recognized within this document are:

PM	Project Manager	SM	Site Manager at any one Institution
SC	Steering Committee	SMG	Site Manager at that Institute taking responsibility for a particular GEOGRAPHIC region
		SML	Site Manager at that Institute taking the Lead for a particular TAXONOMIC group

Overview of Procedures



OVERVIEW OF PROCEDURES

Purpose:

For a pre-defined set of taxa these procedures will generate:

- A) for each taxon included
 - i. a set of data records detailing the images available within the partner institutions and their location
 - ii. a set of links to sources of significant further information
 - iii. a set of links to available electronic texts

- B) for a subset of the taxa included (where this subset may be 0% to 100%)
 - i. a conservation assessment
 - ii. a set of geo-referenced specimen records

Assumptions:

1. For the purposes of compiling checklists iPlants has divided the world's plants into sets of non-overlapping taxa. Such groups will ordinarily be a plant family but may, in some cases, be either a subset of one family or two or more families combined together.
2. For the purposes of calculating conservation assessments and for collating both images and taxon links iPlants will work with "manageable" sets of non-overlapping taxa.
3. These subsets will be called "Families" throughout this document regardless of whether they actually contain all species of a single family.
4. "Families" will be defined on taxonomic grounds and will ordinarily be identical to the groupings used for checklist compilation.
5. The following procedures will be undertaken
 - a. only once a checklist has been completed to a "satisfactory" level for the taxa included in this "Family".
 - b. once only for each "Family".
 - c. simultaneously for any number of "Families".
6. Responsibility for implementing the procedures for any one "Family" will be assigned to a single institute from among the partners. This will be termed the Lead Institute
7. Any one institute may be carrying out procedures for more than "Family" simultaneously.
8. The checklist of any one "Family" (as published on the iPlants Online System) will be updated whenever conservation assessments, images or taxonomic links become available.

Inputs:

1. Name and delimitation of the "Family" to be included
2. Checklist for that "Family" is completed and of "satisfactory" quality.
3. Lead institute assigned
4. Set of agreed defined procedures.
5. Procedural manual available.
6. Management system agreed and implemented.

Owner:

1. Steering Committee

Steps:

	Task	Activity	Who?
0.	Planning	a Establish strategy, methods, controls to be used for all taxa b Develop and manage plan establishing which groups of taxa are to be processed and when c Assign lead institute and resources available for each group of taxa	SC
1.	Initiation	a Formally instigate procedures (2), (3) and (4) for given set of taxa	PM
2.	Preliminary Conservation Assessment	a Gather necessary specimen data from participating institutions b Georeference specimen records c Undertake GIS analysis and calculation of conservation assessments	SML
3.	Document Images	a Review and document existing digital image resources b Digitise new images as necessary	SML
4.	Document Sources of information about taxa	a Review and document existing digital resources b Collate new sources of information as necessary	SML
5.	Publication & Closure	a Make Preliminary Conservation Assessments, Images and Taxon Source links for this group of taxa available on the iPlants Online System b Provide statistics about this set of taxa for inclusion in publication and for management purposes c Document completion of procedures for this group of taxa. d Instigate review and maintenance procedures for this group of taxa.	PM
6.	Review	a Review progress against agreed plan and return to planning of next phase of iPlants.	SC

Outputs:

1. Updated iPlants Website with ALL species pages in that “Family” containing
 - a. links to images of that taxon at the partner institutions
 - b. links to sources of significant information about the taxon where these are available
 - c. Links to available electronic texts for that taxon where these are available
2. Updated iPlants Website with some (zero to all) species pages in that “Family” containing
 - a. Conservation assessment of that taxon
3. Updated iPlants checklist database or central set of data records.
4. Counts of the specimens held at each institution for all taxa in the “Family”.
5. Statistics of the overlap in collections between the three institutions for all taxa.
6. A set of specimen records gathered and stored locally in each of the institutional collection databases for all of the specimens in that institution for a particular subset of the taxa. These will include duplicate records where duplicate collections exist.
7. A set of geo-referenced database records for all specimens housed at one or more of the participating institutions for a chosen subset of the taxa in the “Family”. This set will not include duplicate records for the same specimen.
8. Images digitised for the project to fill gaps

Issues - resolved:**Definition of taxon subsets**

1. Several alternative approaches could be used to define the subsets of taxa (“Families”) to be managed. Adopting more than one alternative would make the procedures unmanageable. The alternatives identified are:
 - a. ALTERNATIVE 1: subsets are identical to those used during compilation
 - b. ALTERNATIVE 2: subsets to be worked are decided independently from the subsets used for the compilation exercise (although obviously depending upon the existence of a draft checklist for all the taxa included in the subset)
 - i. ALTERNATIVE 2a: subsets are decided upon taxonomic grounds
 - ii. ALTERNATIVE 2b: subsets are decided upon geographic grounds
 - iii. ALTERNATIVE 2c: subsets are decided upon geographic and taxonomic grounds

The SC meeting October 2004 concluded that the taxon subsets to be managed during the procedures described in this document will be divided along taxonomic grounds and, normally, follow the groupings used for compilation. This decision was based upon the following considerations:

- a) that there are benefits in dividing institutional responsibilities for SOME TASKS (georeferencing and possibly conservation assessment) on geographic grounds (to acquire and manage maps, data, etc) based upon existing institutional regional strengths.
- b) it does not, however, make sense to divide responsibilities for gathering specimen data on geographic grounds – this is far better organised taxonomically.
- c) That once the specimen data is gathered for a set of taxa then the responsibility for later (geographically related) tasks can be divided differently.
- d) the disadvantage of this approach is that uneven geographical spreads of specimen data might cause bottlenecks. Careful monitoring will be required.

Conservation assessment - terminology

2. The conservation assessments derived using the described procedures are satisfactory for iPlants’ stated purpose and can be offered to the public. The term “preliminary” should be used and adequately reflects their nature.

Meta data

3. The iPlants policy is to avoid storing meta data for taxon links and for images wherever possible. The assumption is that this can be largely be avoided and that the iPlants Online System will actively manage live links to images and sites (using some form of “harvester” tool). In this scenario meta data about images will be stored within the host image databases and the necessary fields will be delivered to iPlants when the link is activated. Where it is NOT possible to avoid storing meta data (for less technically advanced sites for example) then the records would be stored within files linked by taxon ids to the iPlants checklist database.

“Publishing” the results

4. The checklist for any given “Family” published on the iPlants Online System will be updated whenever conservation assessments, images or taxonomic links become available. Discussion at the SC meeting October 2004 concluded that: iPlants would NOT require that the three steps were complete before publishing new pages.

Managing the process

5. To manage the procedures described here effectively there is a need for a 'master list' or 'central exchange' which would contain all of the names/species being processed, the status of species at any point and all other information necessary for management and communication.
6. The Project Manager would need to have database administrator rights but Site Leaders at each of the institutions would need to be able to edit and update records.
7. The Project Manager would generate reports and statistics and check progress against agreed deadlines.

Outstanding Issues:

1. Where will the geo-referenced specimen data records be stored?
2. Management System. How do we keep the need for communication down to minimum? It is necessary to identify the key control points within each procedure and the precise information that needs to be available to the Project Manager at any one time.
3. Additional Procedures need to be defined for undertaking periodic revision and maintenance of the information and web pages generated for each "Family".

PROCEDURE 0: Planning

Purpose:

To formally approve the strategies and methods to be adopted when completing these procedures

To establish the overall priorities and the sequence in which the various “Families” will be dealt with and to provide a provisional schedule to be followed for each.

To establish what resources will be made available to help complete these procedures for any particular “Family”.

Assumptions:

1. The iPlants project will operate in “Phases”. Each phase will be bounded by time and resource constraints and will tackle an agreed set of taxa. At the end of each phase the SC will review progress against the agreed plan for that phase and the lessons learnt during that phase before planning the next Phase.
2. That the procedures and data standards to be adopted in Phase 1 and the outputs expected for each “Family” are largely defined and documented. These may nevertheless undergo periodic review by the SC.
3. That a single “Lead institute” will be assigned to manage the procedures for each “Family”.
4. That the same institute will take the lead in managing the procedures for calculating preliminary conservation assessments, gathering images and documenting taxon links.
5. The SC may appoint an institution other than one of the partners to take the lead for a particular “Family” for which the partners do not have strength and experience.
6. The main resource required to complete these procedures will ordinarily be the human resources available within the institutions involved. We do not contemplate that iPlants staff will be re-locatable. Work plans therefore need to be established within the constraints of available staffing levels. The SC & PM will need to periodically review the work plan.
7. The SC may offer additional resources either
 - a. to attract third party institutions to participate
 - b. to help a partner institution complete particular tasks
8. The work schedules established by the SC will seek to make best use of human resources available within the three partner institutions – to ensure an equitable division of tasks during any period.
9. Tasks and decision making will be as automated as far as possible to reduce effort. Examples include:
 - a. use of a software tool to periodically “harvest” available images from the partner institutions image libraries and use the image links found to update the iPlants Online System.
 - b. Automation of embedding links in ALL species pages to a set of predefined information sources available on the internet (assuming that those sites hold information for that species – under at least one of its names). Again some periodic “harvesting” of the default sites will permit identification of those species for which links to that data source can be embedded and those which have no information (and therefore should have no link).

Inputs:

1. A complete list of the “Families” of the world identifying
 - a. those which already have compiled checklists,
 - b. those which could have a completed checklist in a reasonable period.
 - c. those which have already been processed by iPlants for conservation assessment, images and taxon links
 - d. those which remain to be processed by iPlants for conservation assessment, images and taxon links
 - e. the approximate no. of taxa in each “Family”.
2. The sum of the staff and other resource available within each institution to calculate conservation assessments, gather images and document taxon links.

Owner:

1. Steering Committee

Steps:

0.1.	Methodologies		
		a. Review procedural manuals, data standards & approve for use – including lessons from previous phase	SC
		b. Formally approve documents for use in next phase of iPlants	SC
0.2.	Priority groups		
		a. Review list of “Families” for which checklists are available now or in foreseeable future and which have not been processed for conservation assessments (CA), images and taxon links	SC
		b. From this list select a priority set of “Families” for carrying out CA, Image and Taxon link procedures in the next Phase of iPlants	SC
0.3.	Lead Institutes		
		a. Assign Lead Institute for each “Family” on this priority list	SC
0.4.	Establish strategies		
		a. Review resources available for the next Phase of iPlants	SC
		b. Decide for how many taxa preliminary conservation assessments are to be calculated during the next phase & what % of each priority “Family” this will include	SC
		c. Confirm how many taxa are to be processed for images and taxon links in this phase of iPlants	SC
		d. Confirm no. of images or digital resources sought for each taxon in this phase of iPlants	SC

0.5.	Define standard set of “information links” to be included for all species		
		a. Research general information resources available on the internet for possible inclusion in the next Phase of iPlants	PM
		b. Review potential internet information resources	SC
		c. Select list of standard information links to be included for ALL species included within the iPlants Online System	SC
		d. Classify the list of standard links according to the level of intelligence (automation) which that site offers for linking.	SC
0.6.	Resource management		
		a. Establish approx. effort (person months) required to complete procedures for each “Family” in priority list	SC
		b. Agree any additional resources to be provided by iPlants for <ul style="list-style-type: none"> i. Conservation Assessment ii. Image collation iii. Documenting taxon information resources 	SC
0.7.	Work Plan		
		a. Agree sequence in which “Families” to be completed	SC
		b. Agree deliverables for each “Family”	SC
		c. Agree deadlines for completion of each “Family” treatment	SC
		d. Document plan and distribute	PM

Outputs:

1. The % of the world’s plants for which Preliminary Conservation Assessments are to be calculated by iPlants (during the next phase).
2. The % of the world’s plants for which iPlants intends to collate images and taxon links (during the next phase).
3. Over arching targets and deadlines for next phase of iPlants project.
4. A work plan for the next phase containing a list of the priority “Families” to be tackled and for each of these
 - a. the Lead Institutes formally assigned
 - b. the deadline for delivery of each agreed product
 - c. any additional resources to be provided by iPlants
 - d. the % of these resource that will go to the lead institute and the % that will go to any other institution involved.

Issues Resolved:

1. That any additional resources (possibly necessary to attract partner institutions for example) will be assigned to “Families” by the SC in accordance with the relative size of the task. The lead institute would therefore ordinarily expect to receive a higher share of the resource than any other.

Outstanding Issues:

1. The SC are yet to agree an overall strategy as to how to best to achieve the target percentage of the world’s taxa for conservation assessment (currently set at 20%). Which strategy is most appropriate, however, will depend upon the size of the resource available. The strategy may vary from one Phase of iPlants to the next according to resourcing levels and any lessons learnt during earlier Phases. The SC might for example select X% of each and every “Family” in one Phase and then opt to exclude some “Families” totally while including all of the taxa from “Families” of particular interest to conservationists.
2. The resource available for calculating preliminary conservation assessments is still unknown. Once this is known, however, the SC will be able to decide for what percentage of the world’s plants we will be able to calculate these assessments. The current assumption is that it will be for 20% of the world’s plants (based on an estimate of 10 specimens / species).
3. Need to agree the final form of the IPR agreements for the use of information made available to iPlants by third parties, for the provision of iPlants’ own information to others and over joint ownership of the information gathered through an appendix to the MOA between the partner institutions.

PROCEDURE 1: Initiation

Purpose:

To formally instigate the Conservation Assessment, Image and Taxon link procedures for a given “Family”.

Assumptions:

1. The procedures and data standards to be adopted have been previously defined and approved by the SC.
2. That any additional resources to be provided by iPlants to help the Lead Institute complete the procedures for this “Family” will have been previously approved by the Steering Committee.

Inputs:

1. The Lead institute defined for this “Family”.
2. A checklist for this “Family” that is considered “satisfactory” by the Lead Institute (see issues below).
3. Statistics of the total no. of taxa in this “Family” and a list of those which are recorded from only one TDWG Geographical Unit.
4. The % of the taxa in this “Family” which are to be included in the Conservation Assessments.
5. Any additional resources to be made available for this “Family”.

Owner:

1. Project Manager.

Steps:

	Task	Activity	Who?
1.1.	Target no. of taxa for Conservation Assessments		
		a. Calculate the target number of taxa to be assessed based upon agreed strategy and the no. of taxa in this “Family”	PM
1.2.	Initiate		
		a. Write to Lead Institute to formally request that they initiate procedures for Preliminary Conservation Assessments, Images and Taxon Information defining <ol style="list-style-type: none"> a. Methods to be adopted b. Outputs expected c. Deadline for delivery d. Institutions to be involved e. Volume of additional resources to be provided to each institution involved 	PM
		b. Reply to PM formally accepting task, deadlines and conditions	SML

Outputs:

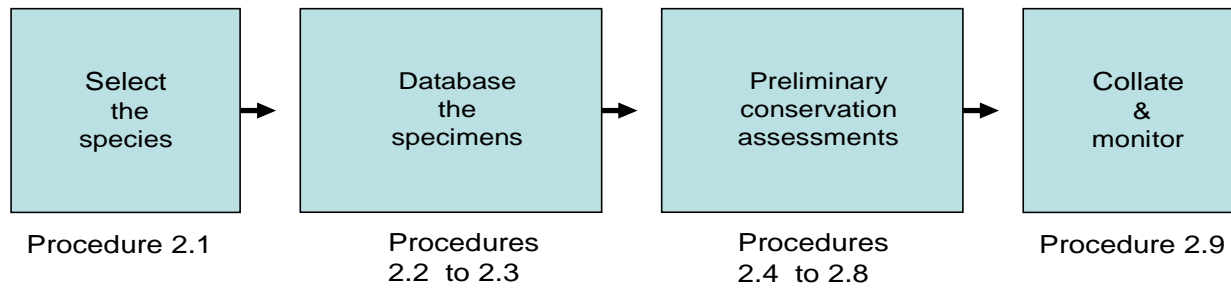
1. No. of taxa in this “Family” for which Conservation assessments are to be calculated.
2. Formal acceptance of outputs, dates and conditions.
3. Definition of the institutions to be involved in processing this “Family”.

Issues resolved

1. What will constitute a checklist of a “satisfactory” level to continue with conservation assessment, image and taxon link documentation? A draft checklist will in most cases be considered satisfactory. The taxonomy should be as complete and as stable as possible since subsequent changes would introduce errors in the procedures described in this document and require staff to go back to the herbarium to repeat tasks undertaken. Ultimately, the decision on whether a particular checklist is in good enough state for iPlants to initiate conservation assessment, image and taxon link procedures will be left to the discretion of the Lead Institute.
2. It will be necessary for the resources to be made available and the timescales for delivery to be negotiated and agreed between the SC and the Lead Institute prior to initiation of these procedures for any single “Family”. There will be efficiencies to be made if these scheduling negotiations were undertaken for as many “Families” at one go as is possible.

Outstanding Issues:

PROCEDURE 2: Conservation Assessment



PROCEDURE 2.1: Selecting taxa for conservation assessment

Purpose:

To select those species with this “Family” for which Preliminary Conservation Assessments are to be calculated.

Assumptions:

1. iPlants resources are to be used for conservation assessment of species & not of infraspecific taxa.

Inputs:

1. Defined selection criteria or algorithms from SC
2. No. of species to have conservation assessments calculated for this “Family”.
3. Checklist with distribution data.

Owner:

1. Site Manager of Lead Institute

Steps:

	Task	Activity	Who?
2.1.1.	Preparation		
		a. Assign tasks and deadlines	SML
		b. Define the no. of specimens required in our collections for a species to be rejected from further analysis	
2.1.2.	Species Selection		
		a. List all species in “Family” [List A]	SML
		b. Discard from this list all those species which occur in more than one TDWG3 unit [List B]	SML
		c. For all species in List B count how many specimens occur within Lead institution (including accepted names and synonyms)	SM
		d. Advise SML of counts	
		e. Discard from List B all species found to have more than the cut off number of specimens in the Lead Institution [List C]	SML
		f. For all species in List C count how many specimens occur within Partner institution A (including accepted names and synonyms)	SM
		g. Advise SML of counts	
		h. Discard from List C all species found to have more than the cut off number of specimens in the Partner Institution A [List D]	SML
		i. For all species in List D count how many specimens occur within Partner institution B (including accepted names and synonyms)	SM
		j. Advise SML of counts	

		k. Discard from List D all species found to have more than the cut off number of specimens in the Partner Institution B [List E]	SML
		l. Inform PM of provisional selected list of species.	SML
2.1.3.	Review		
		a. Match no of taxa in List E against the target no. of species to be assessed in this “Family”. – too large or too small?	SML
		b. Send provisional list for review seeking recommendations for exclusion or inclusion of taxa based upon field knowledge	SML
		c. Reviewer returns edited list to SML with recommended changes	Reviewer
2.1.4.	Finish		
		a. IF no. of species in list is significantly greater than the agreed target then i. EITHER reduce list of species further using local criteria ii. OR negotiate with iPlants for increasing %. OR IF no. of species in list is significantly fewer than the agreed target then i. EITHER add species using local criteria ii. OR leave list alone.	SML
		b. Supply PM with final list of species for which conservation assessments are to be calculated	SML

Outputs:

- List of taxa within this “Family” to be assessed for conservation assessment

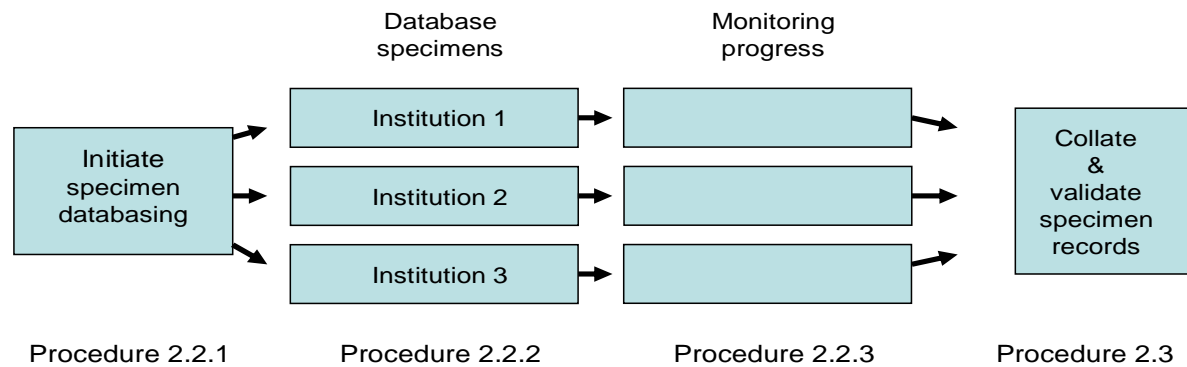
Issues Resolved:

- The precise overall strategy as how iPlants will meet its specimen digitisation targets will depend on the resourcing levels available (see Procedure 0 above).
- Assuming that the percentage taxa for which conservation assessments are to be calculated will remain the same for all “Families” then the following criteria will be used to select taxa
 - Endemism in a single level 3 TDWG area will be our initial selection criterion (which it is anticipated will in general reduce the list by about 40%)
 - Counts of the specimens housed within the participating institutions will then be used to reduce this list further. Justin and Kehan's graphs support the notion that specimen numbers relate to likely conservation status and that a good cut-off point would be somewhere between 5 and 20 specimens.
 - Applying a standard cut-off point (“x” specimens) across all “Families” will presumably reduce the number of candidate species to a variable degree depending upon the “Family”.
 - Any further reduction of the list of candidate species in order to meet the target no of species will be under the discretion of the Lead Institution in discussion with specialist and conservationists.

3. Counting specimens before starting databasing, rather than during databasing, has up front costs but would save time since no species which has more specimens than our agreed cut-off point would be databased.
4. It is recognized that “counting specimens” involves some complexity since specimens must be counted for ALL of the names (including synonyms) and then add these up to get a grand total per species. Software, a synonymised list of names and possibly PDA's for use in the herbaria would help automate this.
5. One of the big advantages of the chosen route for selecting taxa it should not be necessary for there to be any modification of this list once databasing has begun. To allow such modifications would complicate subsequent databasing procedures significantly adding to the management overhead and creating further work. NO such modification will therefore be allowed.
6. Once data collation has been completed for a species then Preliminary Conservation Assessments will be calculated regardless of the discovery of new material that would have excluded that species from inclusion in our list had it been discovered at the outset

Outstanding Issues:

PROCEDURE 2.2: Databasing the Specimens



Records are split among the participating institutions on taxonomic grounds for specimen databasing.

Procedure 2.2.1: Instigate specimen databasing

Purpose:

To instigate the sequence of procedures associated with gathering the specimen data necessary for calculation of preliminary conservation assessments for a given "Family".

To assign responsibilities to each of the participating institutions for implementing these procedures.

Assumptions:

1. A mechanism has been defined and implemented by which institutions can access specimen data records at the other institutions when necessary.
2. That the taxa for which Preliminary Conservation Assessments were selected at a previous stage and this list will not change during databasing. Databasing for these species, therefore, can occur simultaneously at all institutions involved.

Inputs:

1. Checklist for "Family"
2. Selected set of taxa for which conservation assessments are to be calculated.
3. Lead Institute authorised by PM to proceed with Conservation Assessments for this "Family".

Owner:

1. Site Manager of Lead Institute

Steps:

	Task	Activity	Who?
2.2.1.	Initiate data collation		
		a. Confirm which institutions are to participate in this exercise	SML
		b. Ensure that all participating institutions have access to procedures manuals	SML
		c. Inform participating institutions i. to start databasing ii. for which species data are to be collated iii. the date by which databasing is to be completed.	SML

Outputs:

1. A work plan and formal instructions for institutions to database specimens.
2. Central management tracking system updated.

Issues Resolved

1. It had been originally been assumed that data entry would be undertaken by each institution in sequence, one after the other. This approach, however, has been rejected since it only had merit when the set of taxa to be assessed (databased) was being decided at the same time as specimens were being databased. In that scenario

- a. The lead institution would have undertaken data gathering first.
 - b. There would have been an agreed default order in which institutions would always gather data (e.g. K will always pass baton to MO, MO always passing to NY and NY always passing to K)
 - c. The set of taxa to be processed would have reduced at each stage
2. The data standards will be described within the business rules document and will include, for example, details of the “federation schema” adopted. The host systems must be capable of exporting to the federation schema, so the latter would dictate the standard of acceptability.
3. Where possible, data errors should be detected as soon as possible to avoid work at a later stage and the need for complex management as subsets of data are returned for reworking. Validation rules should be applied
 - a. basic validation will be expected of each institutional database system. These rules are documented.
 - b. the SML should then undertake additional checks on the completeness and accessibility of the data sets provided by each institution before signing off on this stage and proceeding to the next.

Outstanding Issues:

Procedure 2.2.2: Specimen databasing**Purpose:**

To ensure that each institution has a database record within its own institutional database system for each specimen in its own collection from the selected taxa

Assumptions:**Inputs:**

1. Checklist for “Family” including synonymy
2. Selected set of taxa for which conservation assessments will be calculated.

Owner:

1. Site Manager

Steps:

	Task	Activity	Who?
2.2.2.1.	Initiation		
		a. Assign tasks	SM
		b. Assign deadlines	SM
2.2.2.2.	Check existing digital records		
		a. Locate all existing relevant specimen electronic records within own institute (in however many places/formats they may be)	
		b. Ensure that records meet iPlants criteria and data standards	
		c. Ensure that records available within central institutional database and accessible to iPlants collation tool	
2.2.2.3.	Database novel records		
		a. Detect and locate any specimens in own institute that are not in existing digitised set	
		b. Append new specimen data records to existing records using iPlants data standards.	
2.2.2.4.	Internal Validation		
		a. Detect and resolve multiple records of a single collection in institutional db	
		b. Run quality control checks	
		c. Run any tools to conform to iPlants data standards	
2.2.2.5.	Close		
		a. Inform SML that updated data records completed and available	SM
		b. Provide SML with stats including breakdown on existing data records vs. novel records entered here	SM

Outputs:

1. Set of data records completed for all specimens of the selected taxa in “Family” from this institute in their institutional database and following agreed iPlants data standards.
2. Stats and reports generated on above.

Issues resolved

1. New specimen data records created will be stored in the local institutional system rather than a central separate iPlants pool.
2. A mechanism will be provided by which relevant specimen records from the local institutional databases will be available to partners. This mechanism is currently assumed to be DiGIR but the precise method is not important here. We assume that partners will be able to access and use this data.
3. iPlants requires that an institution provide a breakdown of the number of new specimen records that were databased as part of this exercise. This information will help track the use of resources and future planning.
4. There are no advantages in migrating datasets around among the partners rather than storing within our institutional databases.
5. Any standardisation of data records across all institutional systems (e.g. the order in which collectors are cited or the format adopted for the name of the first collector) would benefit subsequent data validation phases (particularly in identifying duplicates ACROSS institutes) when data records from all institutions are brought together.
6. When data to complete georeference fields is already available (either digitally in an institution's own database or on a herbarium specimen label) then this should be entered now.

Outstanding Issues:

1. What are the precise format and contents of any stats / reports to be generated for management purposes?
2. Would there be advantages of checking for duplicate records of the same specimen (2.2.2.4a) or any other data validation task before new data are entered?
3. What are the precise data validation rules and data standards (e.g. establishing the order in which collectors are cited or the format to be adopted for the first collector's name) which iPlants wishes to impose upon specimen data records collated?
4. Could algorithms/filters be applied to a data set to facilitate detection of in house duplicates?
5. Will it be possible for each of the institutional database systems to implement in a consistent fashion all of the data validation and data standardisation rules? What are the consequences of them not being able to do so?

Procedure 2.2.3: Monitor and review specimen databasing**Purpose:**

To monitor progress with specimen databasing.

To check the accessibility of the specimen data records provided by each of the participating institutions and to undertake basic validation of these records.

Assumptions:**Inputs:**

1. Agreed work plan.
2. Reports from SM of institution Y that data records for “Family” are complete and available.

Owner:

1. Site Manager for Lead Institute.

Steps:

	Task	Activity	Who?
2.2.3.1.	Monitor progress		
		a. monitor progress with databasing of specimens at each institution involved i. prompt before deadline ii. remind at deadline iii. maintain records in central tracking system	SML
2.2.3.2.	Review		
		a. Evaluate report from each Institute	SML
		b. Verify that can access relevant data records from Institute Y and that statistics match those in report provided.	SML
		c. Is data set complete?	SML
		d. Run basic validation checks on each data set individually.	SML
		e. Inform institutions of errors found in data sets provided.	SML
2.2.3.3.	Document		
		a. Update central list with stats on data records completed by Institute “Y”	SML
2.2.3.4.	Close		
		a. Report to PM when ALL institutions have completed specimen databasing for “Family”	SML

Outputs:

1. Central register updated with progress and statistics on specimen records available to iPlants.
2. Documentation on completion of specimen databasing for “Family”
3. Documentation of errors found in data sets provided.

Outstanding Issues:

1. Are there advantages in undertaking validation checks on the data sets one at a time or is it best to wait until these are collated together in the next phase?

PROCEDURE 2.3: Collate and Validate specimen records**Purpose:**

To bring together completed specimen records from all institutes for the selected taxa within this “Family”.

Assumptions:

1. A data collation tool will be provided which is able to access records from the institutional herbarium databases and capable of bringing the relevant records into a central iPlants data store. It is currently assumed that the underlying technology will be based upon the use of DiGIR but recognised that this may change.
2. It is assumed that the iPlants data store will be made available to partner institutions via the Web.
3. It will be more efficient to validate specimen records before georeferencing starts and requires the input of the institution which generated that record.
4. Software tool(s) will be available to
 - a. Validate combined data records and generate reports of the errors found
 - b. Detect and flag records which are of duplicate specimens found in more than one herbarium
 - c. Generate stats on the combined data set including any overlaps between the collections from different institutions.

Inputs:

1. Checklist for “Family”
2. Selected set of taxa for which conservation assessments will be calculated.
3. List of institutes which have completed specimen database records for this “Family”.
4. Stats from all Institutes to complete task 2.2.2.
5. Sets of specimen records for this “Family” included in appropriate format within all Institutional databases and these available to iPlants.

Owner:

1. Site Manager for Lead Institute

Steps:

	Task	Activity	Who?
2.3.1.	Collate records		
		a. Use data collation tool to extract all records from the relevant institutional databases for the selected taxa and place these into a central iPlants data store	SML
2.3.2.	Validate entire data set and detect duplicates		
		a. Run data validation tool to generate error report	SML
		b. Run tool to detect and flag duplicate rows	SML
		c. Provide final stats on existing data records and duplication between institutes	SML
2.3.3.	Correction Loop		
		a. If data errors found then report these to the institution(s) of origin and request that the errors be corrected and the data set resubmitted. Return to step 2.2.3	
		OR	
		b. If No data errors reported then go to next step.	
2.3.4.	Finalise		
		a. Archive final documentation of resolution of problems re duplicate records.	SML
		b. Make this available for Geo-referencing purposes and as specimen data archive for iPlants	

Outputs:

1. Set of data records corrected for reported errors and ready for geo-referencing.
2. Statistics about this set of records including overlaps in the institutional collections.
3. Documentation describing any corrections/ amendments made to the original data set during the correction loop.

Issues resolved:

1. The product of data collation tool will be a final set of combined specimen data records (“the archive”).
2. The data archive will be stored in such a way as to be accessible to all institutions and not locally available only to the Lead Institute.
3. Archives will need to be date-stamped. They will need to be kept once a new (revised) set of data records (and conservation assessments) are created for this “Family” in the future since we will need to be able to return to see how previous conservation assessments were derived. i.e. once a conservation rating is calculated, the dataset

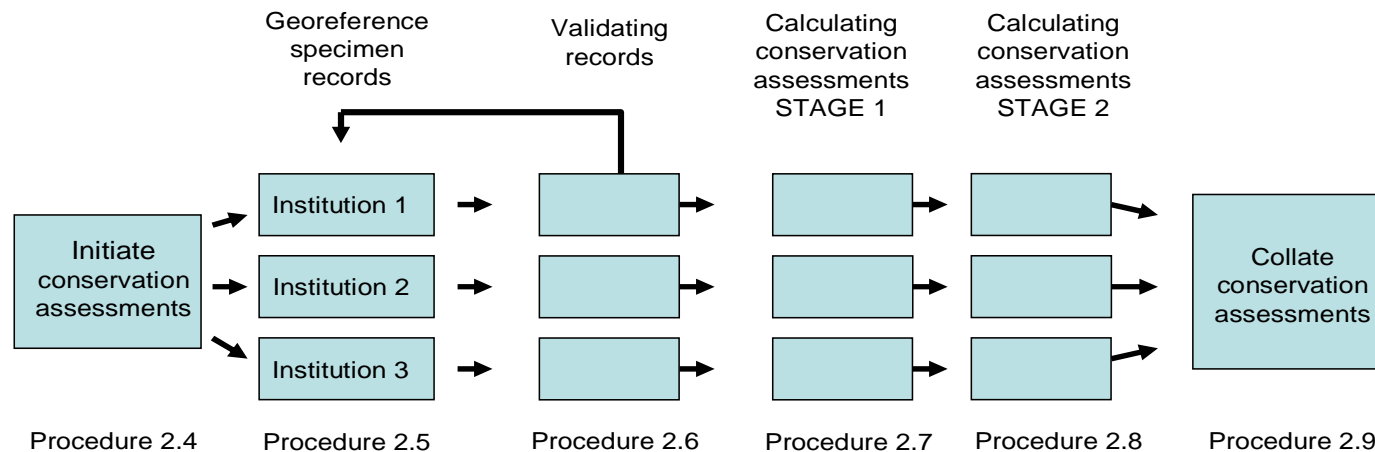
upon which it is based should be preserved as part of the iPlants website data, in order to voucher the rating.

4. Responsibility for the management of these archives lies with the Site Manager for the Lead Institute (SML).
5. Georeference data that already exists in the specimen data records will be conserved and passed on to the next stage.
6. Records from different institutes which are of duplicates of the same specimen housed at different institutions can only be detected once the records from all institutes have been brought together and standardised. Each of these “duplicate” records may carry different information about the specimen which may prove to be useful during georeferencing. “Duplicate records” therefore should be identified and flagged as such for later use in geo-referencing. They should NOT be deleted.
7. It is NOT necessary at this stage for one of the duplicate records to be “selected” (e.g. as that containing most relevant information) for georeferencing purposes. All duplicate records should be treated identically.

Outstanding Issues:

1. The precise mechanism by which each institute will make its records available to partners and by which these will be collated is still to be defined. Is DIGIR to be used or are we to use GBIF or BioCase tools?
2. What precise mechanism do we intend to use to flag duplicate records?

PROCEDURES 2.4 to 2.9: Calculating Conservation Assessments



Records are now split among the participating institutions on geographical grounds for the purposes of georeferencing and calculation of preliminary conservation assessments.

PROCEDURE 2.4: Instigate Conservation Assessment

Purpose:

To initiate the sequence of procedures for georeferencing and calculation of preliminary conservation assessments for a particular “Family”.

To assign responsibility for carrying out these procedures for each species included among the various participating institutions.

Assumptions:

1. Responsibility for geo-referencing the specimen records for a given “Family” will be split among the participating institutions on geographical grounds.
2. The participating institutions will have been previously assigned responsibilities for particular (non-overlapping) regions of the world.
3. Management responsibility remains with the Lead Institute for this “Family” for ensuring that all species selected for Conservation Assessment are georeferenced, validated and have conservation assessments calculated.
4. All taxa included for Conservation Assessments are endemic to a single TDWG Botanical Country (Level 3).

Inputs:

1. A pre-validated set of data records for each of the specimens found in at least one of the partner institution’s collections for species in this “Family” for which Conservation Assessments are to be calculated. The data set will contain duplicate records referring to the same specimen housed at more than one herbarium and these will be labelled as duplicates. The data set will contain data fields for georeference data but these will be mostly blank.

Owner:

1. Site Manager for Lead Institute (SML)

Steps:

	Task	Activity	Who?
2.4.1.	Initiate		
		a. Review geographical range of all taxa selected. Decide which Institutions need to be involved in geo-referencing & Conservation Assessment of these species.	SML
		b. Assign each species to an institution for conservation assessment purposes based upon their pre-assigned geographical responsibilities.	SML
		c. Assess no. of records being assigned to each institution	SML
		d. Assign to Lead Institution responsibility for geo-referencing and conservation assessment any species not already assigned on agreed geographic lines.	SML
		e. Advise Site Managers at each of those institutions	SML

		that validated data set available for geo-referencing	
		f. Assign deadlines for completion of georeferencing and conservation assessments.	SML

Outputs:

1. An agreed work plan.

Issues Resolved:

1. Dividing specimen records up among the participating institutions on geographical grounds (according to their geographical strengths and experience) will make georeferencing both more efficient and more effective.
2. It will always be possible to split the specimen records (for a set of species grouped taxonomically) unambiguously and without duplication since the taxa chosen to have Conservation Assessments calculated are all endemic to a single TDWG botanical country (level 3).
3. Since responsibility for Georeferencing is now to be divided along geographical grounds it makes sense for
 - a. subsequent data validation to be divided similarly.
 - b. conservation assessment to be divided similarly.
4. Creation of a central gazetteer is part of the iPlants vision. It should be available over the web. It will become an enormously powerful tool in its own right (for both the conservation and botanical communities). In time, the presence of a central gazetteer will make geo-referencing more efficient within iPlants.

Outstanding Issues:

1. We need agreement on a precise definition of the format and functionality of the central gazetteer.
2. A useful first step toward creation of a central gazetteer would be for the institutions involved to merge their existing institutional gazetteers into the agreed iPlants format. When and how will this be achieved?
3. Over time the central gazetteer will grow and contain information of use to the participating institutions. These institutions may simultaneously be developing their own gazetteers within their own institutional specimen database systems. Will iPlants define mechanisms by which the central gazetteer can be regularly refreshed from the institutional host systems – and vice versa?
4. How and when will responsibility for particular geographic regions be assigned to the partner institutions? How will this list of regional responsibilities be maintained? What procedures are envisaged for reassessing these responsibilities when a new institution with particular geographic strengths joins the consortium?

PROCEDURE 2.5: Geo-referencing

Purpose:

To add Georeference data to one record for each unique specimen found in one or more institute for the selected subset of taxa.

Assumptions:

Inputs:

1. A georeferencing procedural manual stipulating
 - a. an agreed set of data fields that must be completed for geo-referencing
 - b. an agreed set of data standards
 - c. the procedures to be adopted

Owner:

1. Site Manager for Institute with Geographical responsibility (SMG)

Steps:

	Task	Activity	Who?
2.5.1.	Geo-reference		
		a. Assign tasks	SMG
		b. Georeference data records assigned to this institute	
		c. Advise SML that task complete	SMG

Outputs:

1. The set of specimen records provided at the outset of this procedure will be have been edited such that:
 - a. as far as possible, each record will have date entered for the geo-reference data fields.
 - b. duplicate records for the same specimen from different institutions will all have their geo-reference data fields completed.
 - c. records which it was not possible to geo-reference (for any reason) will be labelled in some way so that they can be ignored during Conservation Assessment.

Issues Resolved:

1. It is recognised that cost benefit analysis plays an important part when geo-referencing: The practitioner must make a judgement call as to when to stop seeking more obscure data. This ability to make these judgements comes with experience and laying down hard and fast rules will be difficult. Guidelines will nevertheless be included in the Georeferencing procedural manual. Site Manager must also clearly establish and stick firmly to deadlines for completion of the task.
2. Precise business rules are documented in the Georeferencing procedural manual.
3. Georeference data fields should be completed for ALL duplicate specimen records so that this information is available for return to each of the institutions from which these records originate.

4. The geo-referenced data set will be stored centrally. The data records (without the georeference data) will be available to the public via the iPlants web page. iPlants staff will need to have access to all of it for following up enquiries and maintaining the information. Collaborators and bona fide conservation agencies will probably also have access to these full records.

Outstanding Issues:

1. It has been previously assumed that feeding the georeferenced data sets gathered and collated in iPlants back to the 3 partner institutional specimen databases is “off project” and will remain the responsibility of the institution to resolve. Is this supportable? Each institution will need to do this. We need to ensure therefore that resources are available to do it. Once third-parties become involved (e.g. other herbaria with specimens we wish to database) then particularly the smaller or poorer institutions will require as part of the 'deal' that they can subsequently have access to their own improved data records. This apparently brings the return of such data records within the scope of the project.

PROCEDURE 2.6: Validation of georeferenced data records

Purpose:

To validate the georeferenced data records prior to calculation of Conservation Assessments.

Assumptions:

1. Data validation needs to be done as pre-cursor to Conservation Assessment and will be done by the same institute.
2. Data validation rules are established in the Georeference procedural manual.
3. A validation tool will be available either on the web OR as distributed software tool available to each institutional partner.
4. Errors detected at this stage will mostly be detected in the geo-referenced fields but may possibly also point to errors in other fields in the specimen records that were gathered before georeferencing began and were not picked up in previous validation steps.
5. That while errors detected in the geo-referencing data fields can be solved in-house (by the institute that did the georeferencing) errors in other fields may require interaction with the institute(s) that provided those records initially.

Inputs:

1. A set of geo-referenced specimen data records for all specimens found in the partner institution’s collections for all taxa from “Family” that have been selected for Conservation Assessment.

Owner:

1. Site Manager for Institute with Geographical responsibility (SMG)

Steps:

	Task	Activity	Who?
2.6.1.	Initiate		
		a. Assign tasks	SMG
		b. Assign deadlines	SMG
		c. Ensure training and access to validation tool provided	SMG
		d. Provide access to geo-referenced data records for specimens for this “Family”	SMG
2.6.2.	Validation		
		a. Validate data set	
		b. Determine whether errors exist	
		c. Identify geo-referencing errors (GRE) and write report.	
		d. Identify specimen record errors (SRE) (other than in geo-referencing) and write report	
		e. Provide SML with validation report(s)	
		f. Instigate Error Correction Procedures (3) if necessary otherwise go to Finish (7)	SMG
2.6.3.	Error Correction		
		a. If there are SRE errors go to Correct Specimen Records (4). If there are only GRE errors go to Correct Georeference Errors (5)	

2.6.4.	Correct Specimen Records		
		a. Pass set of specimen records and Error reports to institute where they originated.	
		b. Ask target institute to provide missing information & correct records	
		c. If there are GRE errors go to Correct Georeference Errors (5) otherwise go to Retest (6)	
2.6.5.	Correct Georef data		
		a. Ensure specimen records and error reports available	
		b. Correct specimen records where possible.	
		c. Where not possible to get georef data then remove these records from the data set and report that this is the case.	
		d. go to Retest (6)	
2.6.6.	Retest		
		a. Resubmit data set to Validation Procedures (2)	
2.6.7.	Finish		
		a. Document all errors found and corrected	SMG
		b. Document all errors found and for which no solution was encountered and data rows removed	SMG
		c. Make final corrected geo-referenced data set available to iPlants	SMG
		d. Instigate Conservation Assessment Procedures	SMG

Outputs:

1. A set of VALIDATED geo-referenced specimen data records for all specimens found in the partner institution’s collections for all taxa from “Family” that have been selected for Conservation Assessment.

Issues resolved:

1. It will be more efficient if errors are detected as early as possible. Inclusion of this validation procedure, consequently, does not mean that previous validation steps should be precluded.
2. Data validation will be undertaken using a software tool available to all on the Web rather than one run locally at every institute.
3. Validation of records requires access to a GIS package in order to avoid having to reject outliers and/or incorrect data at a later stage. The software tool provided on the Web will include these features.
4. Solving errors in specimen records will normally require interaction with the institute that provided those records to start with. This interaction will be to return the ENTIRE DATA SET and then repeat all stages for this “Family” (i.e. it is NOT intended that these errors be handled on a case by case basis).

Outstanding Issues:

1. We may treat 'error records' in different ways depending on the nature and effect of the errors found. The extent that this is an issue or not awaits findings from Melissa/Emily.

PROCEDURE 2.7: Calculating Conservation Assessments: STAGE 1**Purpose:**

To calculate conservation assessments for selected subset of taxa.

Assumptions:

1. Methodology for calculating conservation assessment agreed and documented in the GIS procedural manual.
2. Assessments will be calculated in a two stage process.
3. Calculation of Conservation Assessments during this Stage 1 can be largely automated. A software tool will be made available for use on the Web to this purpose.
4. Stage2 is optional and requires that the results of Stage 1 be reassessed in more detail. Stage 2 will require human input.

Inputs:

1. A set of validated geo-referenced specimen data records for all specimens found in the partner institution’s collections for all taxa from “Family” that have been selected for Conservation Assessment.

Owner:

1. Site Manager for Institute with Geographical responsibility (SMG)

Steps:

	Task	Activity	Who?
2.8.1.	Initiate		
		a. Assign tasks	SMG
		b. Assign deadlines	SMG
		c. Ensure training and access to validation tool provided	SMG
		d. Provide access to geo-referenced data records for specimens for this “Family”	SMG
2.8.2.	Conservation Assessment		
		a. Follow procedures in Conservation Assessment Manual	
2.8.3.	Finish		
		a. Report finished	SMG
		b. Make outputs available	SMG

Outputs:

1. Conservation assessments for each selected taxon in “Family” with
 - a. Overall assessment
 - b. Details of component assessments
 - c. Map

Issues resolved:

1. A standardised tool will be made available to all on the Web rather than distributing a tool to be run at each institute.

2. The Conservation Assessments derived from these automated procedures will be termed “Preliminary Conservation Assessments” and will be placed on iPlants labelled as such.

Outstanding Issues:

1. What additional requirements are there for the tool for calculating conservation assessments in order for it to also serve end-users of the iPlants Online System to enable them to enter their own specimen records and recalculate the conservation assessments?
2. If this service to end-users was provided then would iPlants provide a means by which these new specimen records were to be appended to its central specimen data set and the conservation assessments for that plant amended?
3. Is provision of the end-user service to be provided in Phase 1 of the iPlants project proposal?

PROCEDURE 2.8: Calculating Conservation Assessments: STAGE 2**Purpose:**

To use more sophisticated techniques and expert opinion to review and modify the Preliminary Conservation Assessments derived in the previous procedure.

Assumptions:

1. Methodology for calculating conservation assessment agreed and documented in the GIS procedural manual.
2. Assessments will be calculated in a two stage process.
3. Calculation of Conservation Assessments during Stage 1 are automated.
4. This Stage2 is OPTIONAL and requires that the results of Stage 1 be reassessed in more detail. The decision as to when to use these procedures rests with the SMG.
5. This procedure requires more expertise and manual input.

Inputs:

1. A set of validated geo-referenced specimen data records for all specimens from the selected taxa.
2. A set of Preliminary Conservation Assessments for these taxa calculated in Stage 1.

Owner:

1. Site Manager for Institute with Geographical responsibility (SMG)

Steps:

	Task	Activity	Who?
2.8.1.	Initiate		
		a. Assign tasks	SMG
		b. Assign deadlines	SMG
2.8.2.	Advanced Conservation Assessment		
		a. Follow procedures as outlined in the Conservation Assessment Manual.	
2.8.3.	Review		
		a. Check the iPlants Conservation assessment against other existing assessments.	SMG
		b. Send Conservation Assessments to those with regional field experience.	SMG
		c. Report and explain differences found.	SMG
2.8.4.	Finish		
		a. Report finished	SMG
		b. Make outputs available	SMG

Outputs:

1. Revised Conservation assessments for each selected taxon in “Family” with
 - a. Overall assessment
 - b. Details of component assessments
 - c. Map

Outstanding Issues:

1. What guidelines is iPlants establishing to help SML decide when these more detailed analyses are appropriate?
2. Should the conservation assessments be reviewed? By whom?
3. Are there any circumstances under which a conservation assessment data will be withheld from publication while further investigation is carried out? What are they?

PROCEDURE 2.9: Collating Conservation Assessments and monitoring progress

Purpose:

To bring together all of the data and outputs associated with conservation assessment for the selected taxa, to ensure that they are documented and available for iPlants in the future and that the iPlants online system can link to them properly.

To monitor progress against the agreed work plan.

Assumptions:

1. That the Lead Institute will complete this procedure for a “Family” regardless of who undertook geo-referencing and conservation assessment.

Inputs:

1. A set of conservation assessments for all taxa from “Family” that have been selected for Conservation Assessment.
2. A set of validated geo-referenced specimen data records for all specimens found in the partner institution’s collections for all taxa from “Family” that have been selected for Conservation Assessment.
3. A set of statistics and reports generated whilst producing 1 and 2.

Owner:

1. Site Manager for Lead Institution

Steps:

	Task	Activity	Who?
2.9.1.	Monitor		
		a. Monitor progress with georeferencing, validation and calculation of conservation assessments by each of the participating institutions <ol style="list-style-type: none"> i. – prompt before deadline ii. – remind after deadline. iii. maintain records in central tracking system 	SML
2.9.2.	Specimen Archive		
		a. Ensure that the set of geo-referenced specimen records for the selected taxa are placed within the iPlants central store.	SML
		b. That statistics associated with these records are updated and available to iPlants	SML
		c. That any PARTICULAR potential IPR or CBD issues associated with specimen records included are properly documented.	SML

2.9.3.	Conservation Assessments		
		a. Ensure that the conservation assessment files and any other associated documents are linked in to the iPlants central database (used to generate online system)	SML
		b. Ensure that the conservation assessment maps have been generated and are linked in to the iPlants central database (used to generate online system)	SML
2.9.4.	Publish		
		a. Update the iPlants online System	SML
		b. Inform PM that published and all complete	SML
2.9.5.	Finish		
		a. Advise PM that conservation assessment complete for “Family X”	SML

Outputs:

1. iPlants central store/system updated to contain
 - a. Conservation assessments for each selected taxon in “Family” with
 - i. Overall assessment
 - ii. Details of component assessments
 - iii. Map?
 - b. Geo-referenced specimen records used to calculate (a)
 - c. Stats on specimens documented.

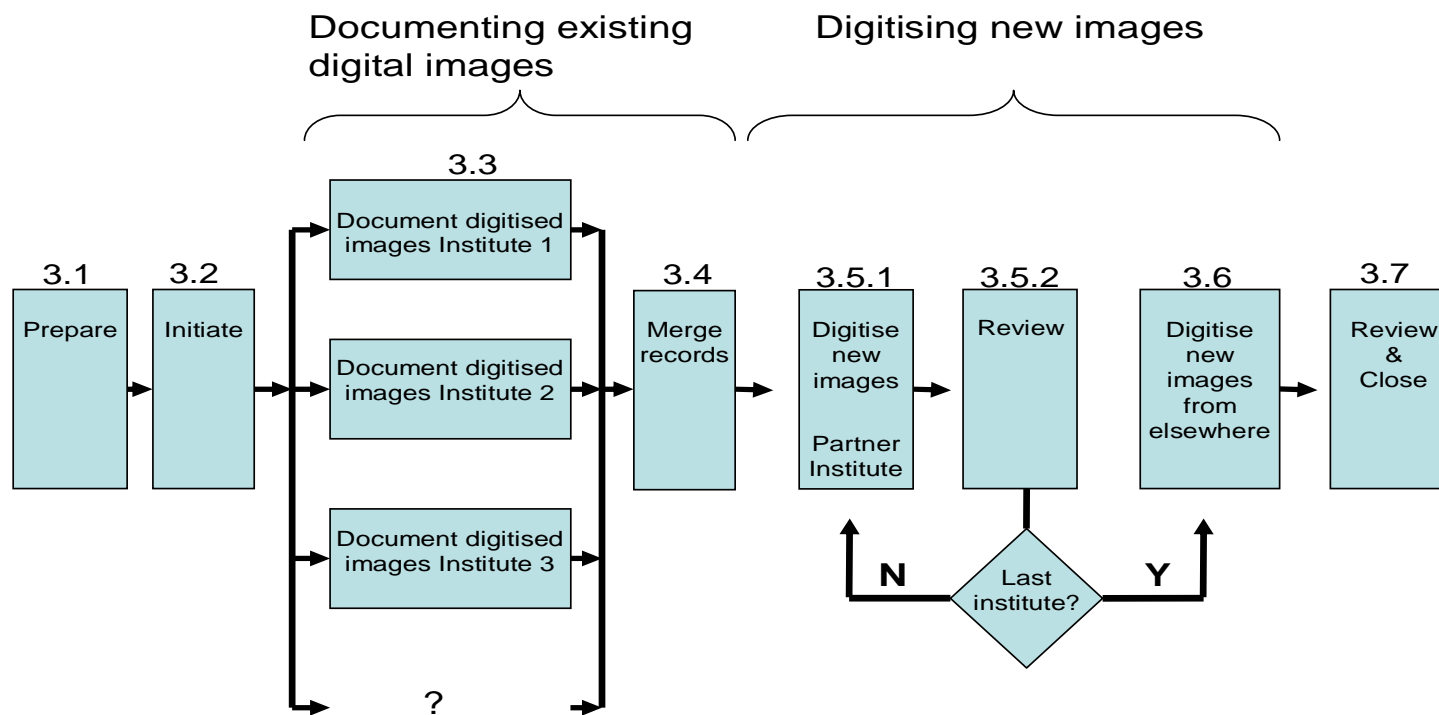
Issues Resolved:

1. Maps, conservation assessments, specimen records (without detailed lat and long data) will be stored so that they are available to software managing the iPlants Online System.
2. Detailed specimen records, statistics generated and the central management data exchange will be stored so as to be available to iPlants management and partners.
3. The Online System be updated with Conservation assessments as they become available for taxa regardless of whether images and taxon links are available.

Outstanding Issues:

1. How will publication be controlled? Will it be under the control of a single site (PM) OR will the Site Manager of any participating institution be able to generate a new release?

PROCEDURE 3: Gathering & Documenting Images



PROCEDURE 3: Gathering & Documenting Images

Purpose:

To identify and collate records of any existing image resources within the participating institutions for each of the species in this “Family”.

To identify species for which none of the participating institutions hold a digital image. Where possible, to obtain one image for each of these species by digitising images held primarily by the participating institutions.

To provide a link to each available image to provide users of the iPlants Online System with some indication of what the plant looks like.

Assumptions:

1. These procedures can only start once a checklist has been completed to a satisfactory level for all plants in this “Family”.
2. Procedures relating to images can be instigated independently of the Preliminary Conservation Assessments and Taxon link procedures.
3. By default the Lead Institute will be the same as that undertaking the Preliminary Conservation Assessments and Taxon link procedures but may be varied by the PM / SC according to circumstance and current work loads.
4. Documenting images of subspecies and varieties is not a priority for iPlants.
5. The Lead Institute holds editorial control for all image documentation gathered for this “Family”.
6. The resources available to complete these procedures for a given “Family” will have been established prior to procedures being initiated (along with the mechanisms for sharing these among partners).
7. That iPlants aims to gather at least 1 image for each species. Resources will be prioritised to achieve this goal. Where more than one digital image of a species already exist then these will all be made available to users.
8. iPlants will predominantly be concerned with digitising and making available images from the resources available within the partner institutions. Only when these have been exhausted will a wider search be instigated since achieving the goal of one or more image for all species will be technically and administratively more feasible (a limited and pre-defined set of partner databases to be searched, reduced headaches with IPR issues etc.).
9. That iPlants Online System will be able to access images (across the web) from the partner institutions own image libraries. iPlants will not store centrally either the images or the meta data associated with them.
10. That iPlants will know where the copyright of each image lies and have the rights to use the images.

Inputs:

1. Checklist and statistics concerning the species in this “Family”
2. A work plan for this “Family” established by the PM (and accepted by the SML) defining
 - a. Resources available
 - b. Outputs expected
 - c. Deadlines
3. Definition of
 - a. the procedures to be adopted and Manual
 - b. the data standards to be adopted within institutional systems (fields to be completed for each image record and the data values to be permitted in each – i.e. fruit/flower/plant or photo – field/ specimen/ type / photo – garden / line drawing / colour illustration in book).

Owner:

1. Site Manager of Lead Institute

Steps:

Task	Activity	Who?
3.1. Preparation		
	a. Confirm receipt of formal request to start	SML
	b. Confirm list of institutions involved	SML
3.2. Initiate		
	a. Contact each institution to seek input, confirm resources available, outputs required and deadlines	SML
	b. Ensure that all information, data standards and procedural manuals available to participants	SML
3.3. Gather records of existing digital images		
	a. Procedure repeated within each institute simultaneously REFER TO PROCEDURE 3.3 for details	SM
	b. Review progress	SML
3.4. Merge and Review		
	a. Ensure that records from all institutes compiled in Central exchange	SML
	b. Review record set and identify gaps	SML
	c. If no gaps go to CLOSE PROCEDURE otherwise go to Procedure 3.5 for First Institute	SML
3.5. Locate new images and digitise	* search restricted to partner institutions	
3.5.1	Set of procedures repeated within each institute	SM

	in sequence - starting with the Lead Institute REFER TO PROCEDURE 3.5 for details	
3.5.2		
	a. Review progress	SML
	b. Ensure that records of new images digitised by last institute compiled in Central exchange	SML
	c. Review records and identify gaps	SML
	d. If no gaps go to CLOSE PROCEDURE otherwise Are any more institutes available and willing to take part in process? If YES then repeat Procedure 3.5 for Next Institute If NO then go to Procedure 3.6	SML
3.6. Search for images elsewhere	* search beyond partner institutions	
	a. Review species for which have no image available	SML
	b. Review resources still available for gathering images for this “Family”	SML
	c. If desired then search for images elsewhere	SML
	d. Document new images in central exchange	SML
	e. Ensure new images available to iPlants	SML
3.7. Close		
	a. Ensure central exchange updated and all records correct	SML
	b. Ensure all outputs available to iPlants	SML
	c. Report completion of task to PM	SML

Outputs:

1. Documented set of records for all images of taxa from this “Family” within each institution. These will be stored in the iPlants central management exchange.
2. Stats on which of the above were existing (prior to iPlants), gathered using resources from iPlants and gathered using other resources.
3. New digital images of species (mostly within one of the partner institutions) for which there had previously been no image available.
4. Regularly updated iPlants Online System providing users with access to the available images of the species included to date.
- 5.

Issues Resolved.

1. The primary purpose of including images is to aid recognition (identification). Which type of image (photo, black and white illustration, scanned image of specimen etc) is most effective for identification purposes will vary from plant group to plant group. A set of photos for example may be the ideal of a flowering tree whilst being of little use for many species of grass. Which class of image, if any, will be prioritised for a given plant group will be left to the discretion of the Lead Institute for that "Family". Resource issues may also influence the choice since some classes of image may be more easily and more cheaply obtained than others.
2. Alternatives routes exist for gathering digital records and digitising new images.
 - A) All institutions document and digitise images simultaneously.
 - B) Institutions document and digitise images one after the other in a predefined sequence starting with the Lead Institute.
 - C) Institutions document existing digital images and these are collated before the institutes then digitise NEW images one after the other in a predefined sequence starting with the Lead Institute.

Alternative A was rejected for: certainty of duplication of images and digitisation of images inferior to ones already in existence, therefore excessive and unjustified resource demands.

Alternative B was rejected as causing delays throughout.

Alternative C was chosen for the following reasons:

- i. Ensures maximum use of existing digital images
 - ii. Image capture using iPlants resources fully focused on iPlants priorities
 - iii. Probably reduces digitisation and therefore costs.
3. Given that Alternative C (see above) was adopted as the route for documenting image records two further alternatives existed:
 - C1) Image documentation ceases only once all institutions have participated
 - C2) Image documentation ceases once the lead institute has identified that iPlants has at least one image available for each taxon, regardless of how many institutes have taken part.

The advantages of Alternative C1 are:

- i. More likely that good images from all institutions found and included
- ii. All institutions involved

The advantages of Alternative C2 are:

- i. Reduced cost where images for all/most species found in Lead institute
- ii. Reduced likelihood of gathering many images for same species.

This is a resourcing issue. Provided sufficient resources were available then Alternative C1 is clearly attractive but the default strategy must be to adopt Alternative C2.

4. The images are assumed to be held within the institutional image libraries. The meta data about those images will also be stored within the institutional libraries.
5. The lead institute will search for images from sources other than the partner institutions only once those institutional resources have been exhausted. It is recognised that a wider search could improve the quality and quantity of images available but resources

are to be prioritised to achieving one image / species. Improving the image library available will be tackled as a subsequent initiative.

6. Where images from sources beyond the participating institutions are to be made available through the iPlants Online System then we will use the same mechanism to link to these libraries.
7. The partner institutions may also not hold IPR of all of the images within their own libraries. It will be the institutions responsibility to ensure that only those images within its collections for which it does hold IPR are made available to the iPlants Online System.
8. A software tool will be provided that automatically “harvests” the images available within the institutional image libraries. This tool will run daily and be used to refresh the links available from the iPlants Online System. For each image found the tool will record centrally
 - a. The presence of the image
 - b. The location of the image (html)
 - c. The type of image
 - d. The plant name associated with the image (synonym or accepted)
 - e. A thumbnail of the image for display on the iPlants Online System

Outstanding Issues:

1. We require a precise definition of the data management records to be stored in the central management exchange for each image found and digitised.
2. How do we assess image quality? What are the minimum standards of quality that we demand before an image be considered adequate for inclusion in the iPlants list? If an image fails to meet these minimum standards then will it be rejected from the list of images displayed on iPlants Online will its inadequacy serve solely as a trigger to continue the search for further images? How do we avoid requiring manual (subjective) assessment of image quality? How do we resolve situations such as which of two images are to be digitised: a decent image in a low priority image category vs a poor (but acceptable) image in a higher priority category.?
3. Where images are used from resources outside those of the partner institutions then how do we validate these (verify the identification?).
4. IPR issues associated with the use of images from outside of the three institutions have yet to be addressed.

PROCEDURE 3.3: Document existing images within institute**Purpose:**

To identify and document existing digitised images for each species in this “Family” held by one of the participating institutions.

Assumptions:**Inputs:****Owner:**

1. Site Manager

Steps:

Task	Activity	Who?
1. Initiate		
	a. Confirm receipt of formal request to start	SM
	b. Assign tasks and deadlines	SM
2. Document existing digital images		
	a. Review and locate existing digital images	
	b. Make any necessary changes to internal image library records to ensure that image accessible to iPlants and with appropriate meta data stored locally.	
	c. Update iPlants Central Exchange to record no. of images and types found for each species in “Family”	
	d. Document species for which no existing image exists within this institutes collection.	
3. Finish		
	a. Inform SML that task complete	SM
	b. Provide documented image record set and stats	SM

Outputs:

1. Set of documented records for all existing digitised images of taxa from this “Family” within this institution.
2. Report on no. of images available for each species in this institute.
3. Stats on which of the above existed prior to iPlants.

Issues resolved:**Outstanding Issues:**

PROCEDURE 3.5: Document new images within institute**Purpose:**

To locate, select, digitise and document any newly digitised image resources for each species in this “Family” held by one participating institutions.

Assumptions:**Inputs:****Owner:**

1. Site Manager

Steps:

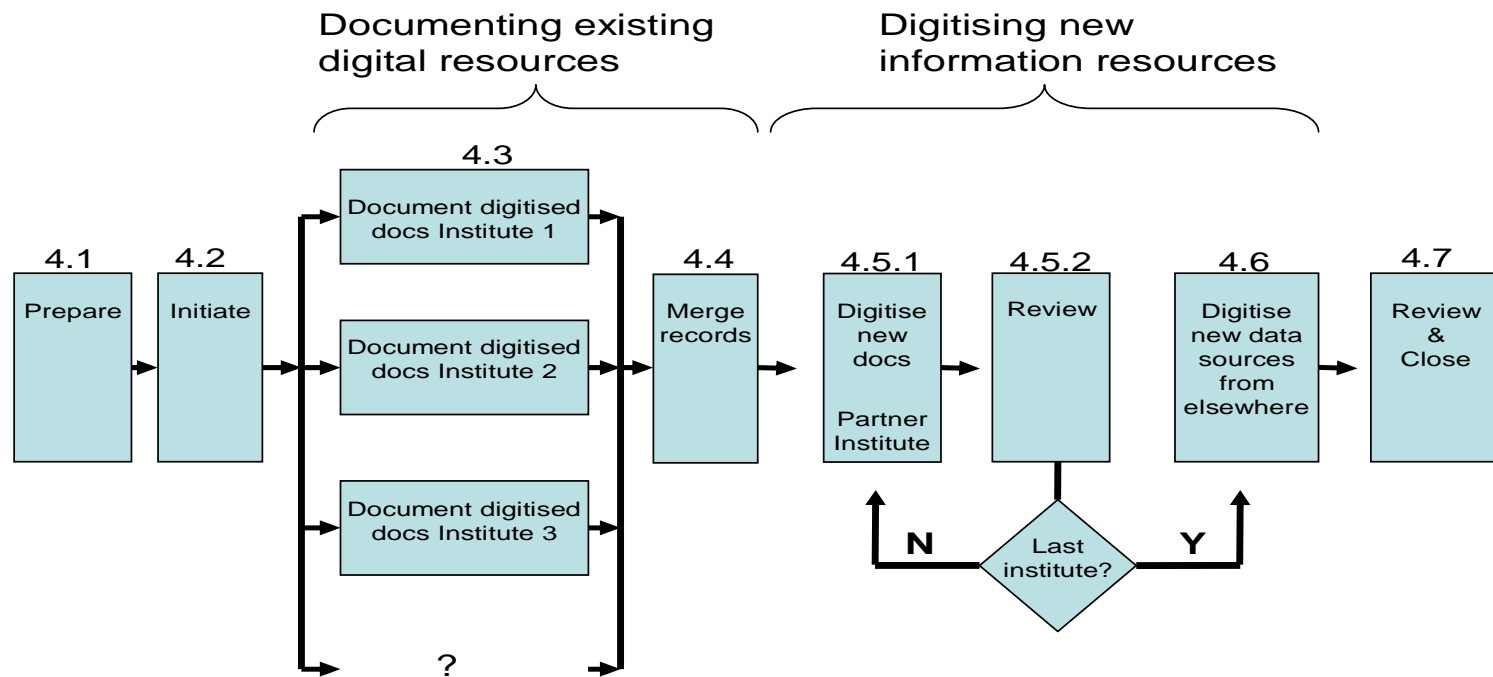
Task	Activity	Who?
1. Initiate		
	a. Confirm receipt of formal request to start	SM
	b. Confirm list of species for which images are missing	SM
	c. Assign tasks and deadlines	SM
2. Locate non digital images		
	a. Search library and image libraries for photographs, line drawings & illustrations of species in “Family”	
	b. List species for which institute has specimens	
3. Digitise new images		
	a. Review available image resources for species with no current image	SM
	b. Select image(s) to be digitised	SM
	c. Digitise selected images and document	
	d. Add images to institutional library so available to iPlants	
	e. Update iPlants Central Exchange to record no. and types of image digitised for each species in “Family”	
	f. Update stats on images digitised for iPlants	
4. Finish		
	a. Inform SML that task complete	SM
	b. Provide documented image record set and stats	SM

Outputs:

1. Set of documented records for all newly digitised images of taxa from this “Family” within this institution.
2. Report on no. of images now available for each species.
3. Stats on images digitised using iPlants resources.

Outstanding Issues:

PROCEDURE 4: Documenting sources of additional information



POCEDURE 4: Documenting sources of additional information**Purpose:**

To identify and document existing useful sources of information ^(*) (electronic texts, Keys, manuals, etc) about each species in this “Family” that are available on the internet so that users visiting the iPlants Online System can easily find these resources.

(*) this refers to information sources other than those included in the standard list of information sources to which all species will be linked.

Assumptions:

1. A set of iPlants standard links has been defined and will be included for all species regardless of what further links may be added through use of the procedures described here.
2. That there is increasing volume of information (Keys, Descriptions, Manuals re Sustainable Use, Nutrition data, etc) available in electronic format that users of the iPlants Online System may wish to link to and which would in many cases be specific to particular groups of species.
3. These additional resources may be found:
 - a. within our own institutions
 - b. elsewhere on the internet
4. The following procedures MAY be adopted got a particular “Family”. They are OPTIONAL. They are NOT intended to be undertaken for all taxa.
5. That for many “Families” the adoption of these procedures will be off project since resources from iPlants will be restricted.
6. Procedures relating to selecting and documenting taxon data sources for particular plant “Families” can be instigated independently of the Conservation Assessment and Image procedures.
7. The Lead Institute hold editorial control for all taxon links documented for this “Family”.
8. The resources available from iPlants to complete these procedures for a given “Family” have been established previously along with the mechanisms for sharing these among partners.
9. Documenting links to information sources describing subspecies and varieties is not a priority for iPlants.
10. That a central exchange will be used to record particular links of interest identified for individual species.
11. That building the links into the iPlants Online System can be automated once these have been documented within the central exchange.

Inputs:

1. Checklist and statistics concerning the species in this “Family”
2. Resources available
3. Outputs expected
4. Deadlines
5. Definition of procedures to be adopted and Manual.

Owner:

1. Site Manager of Lead Institute

Steps:

Task	Activity	Who?
4.1. Preparation		
	a. Confirm receipt of formal request to start and resources available, if any.	SML
	b. Review Demand/Need/Relevance for inclusion of additional links for this “Family”	SML
	c. Review resources available for task – from iPlants and from other sources	SML
	d. Rapid review of information sources likely to be available.	SML
	e. Decide whether these procedures are to be applied to taxa in this “Family”	SML
	f. Inform PM and other institutions of decision to proceed / or not and scope of search for information sources.	SML
4.2. Initiate		
	a. Contact each institution involved to confirm input, resources, outputs required and deadlines	SML
	b. Ensure that all data standards and procedural manuals available to participants	SML
4.3. Gather records of existing digital information sources for one institute	Repeated within each institute	SM
	a. Procedure repeated within each institute simultaneously REFER TO PROCEDURE 4.3 for details	SM
	b. Review progress	SML
4.4. Gather together data sources for all institutes	Undertaken once by Lead Institute	SML
	a. Ensure that records from all institutes compiled in Central exchange	SML
	b. Review record set and identify gaps	SML
4.5. Locate new images and digitise	* search restricted to partner institutions	
4.5.1	Set of procedures repeated within each institute in sequence - starting with the Lead Institute REFER TO PROCEDURE 4.5 for details	SM
4.5.2		
	a. Review progress	SML
	b. Ensure that records of sources digitised by last institute compiled in Central exchange	SML
	c. Review records and identify gaps	SML
4.6. Search	* search beyond partner institutions	

for specific sources of information on internet or elsewhere		
	a. If desired then search for information sources from elsewhere	SML
	b. Document new information sources found in central exchange	SML
4.7. Close		
	a. Ensure central exchange updated and all records correct	SML
	b. Ensure all outputs available to iPlants	SML
	c. Report completion of task to PM	SML

Outputs:

1. Set of document records one for each additional (non-standard) information source with relevant information for a species from this “Family”
 - a. Within institutions
 - b. On internet
2. Stats on which of the above were available digitally (prior to iPlants), gathered using resources from iPlants and gathered using other resources.

Issues resolved:

1. Links to sources of further information or electronic texts are to be stored for all taxa ONLY for a default list of sources (see Procedure 0.5).
2. Links to sources of further information or electronic texts are to be stored for SOME taxa where a particular need has been identified, where high quality digital resources exist and where the resources to complete this task have been identified (from within iPlants or from elsewhere).
3. Procedural alternatives exist. These are analogous to those identified and analysed for collating images. The advantages and disadvantages are similar to those for collating images. The choice among these strategies reflects this and mirrors the decision taken for collating images.
4. The assumption is that iPlants will give priority to resources within the partner institutions.

Outstanding Issues:

1. iPlants needs to define
 - a. The standard list of links to be included in all species pages (if data available)
 - b. The precise structure of the document records to be gathered for each source
 - c. The data standards to be adopted for these records
 - d. Where are these document records to be stored? Centrally? By the lead institute? Why not in the iPlants species database?
2. If resources from the internet are to be linked to by iPlants then how do we handle
 - a. IPR agreements?
 - b. Some controls to verify the id of the plant described?
 - c. Validation of the information presented?
 This is all currently assumed to be left to the discretion of the Lead Institute.

PROCEDURE 4.3: Document digitised information sources within institute

Purpose:

To identify and document any existing digitised information sources for each species in this “Family” held by one of the participating institutions.

Assumptions:

- iPlants wishes where possible for the species pages of the online system to link to digital resources held within the partner institutions

Inputs:

- Any criteria for selecting priority information sources pre-established by iPlants.

Owner:

- Site Manager

Steps:

Task	Activity	Who?
1. Initiate		
	a. Confirm receipt of formal request to start	SM
	b. Assign tasks and deadlines	SM
2. Document existing digital resources		
	a. Review and locate existing digital resources	
	b. Update iPlants Central Exchange to record links found for each species in “Family”	
3. Finish		
	a. Inform SML that task complete	SM
	b. Provide documented record set and stats	SM

Outputs:

- Set of document records for links to digital resources within this institute.
- Stats on digitised resources existing for this “Family”.

Outstanding Issues:

- Would iPlants wish to establish selection criteria for all families? Would selection be left to individual institutions? Would criteria be set for a particular “Family” by Lead Institute?

PROCEDURE 4.5: Document non digitised information resources within institute

Purpose:

To locate and document any non- digitised information resources for each species in this “Family” held by one of the participating institutions.

Assumptions:

Inputs:

Owner:

1. Site Manager

Steps:

Task	Activity	Who?
1. Initiate		
	a. Confirm receipt of formal request to start	SM
	b. Assign tasks and deadlines	SM
2. Locate resources		
	a. Search institutional collections for new resources	
	b. Select those of interest and that meet selection criteria	
3. Digitise selected resources		
	a. Digitise selected resources and document	
	b. Update iPlants Central Exchange to record no. and types of links for each species in “Family”	
	c. Update stats	
4. Finish		
	c. Inform SML that task complete	SM
	d. Provide documented record set and stats	SM

Outputs:

1. Set of documented records for all newly digitised resources relating to this “Family” within this institution.
2. Updated iPlants Central Exchange with new species links included.

Outstanding Issues:

PROCEDURE 4.6 Document information sources from internet

Purpose:

Lead institute to search the internet and other botanical institutions for additional digital information resources for this “Family” that might be linked to the Online System.

Select those of relevance, quality and significance and document them.

Assumptions:

1. iPlants wishes, where possible and appropriate, for the species pages of the online system to link to significant particular digital resources held elsewhere

Inputs:

1. Criteria for selecting priority resources pre-established by iPlants

Owner:

1. Site Manager for Lead Institute

Steps:

Task	Activity	Who?
1. Initiate		
	a. assign tasks	SML
	b. set deadlines	SML
2. Digitise & document internet resources		
	a. Search out and collate list of digital resources available for these species on the internet	
	b. Review these resources and select those to be linked to by iPlants	
	c. Complete documentary records for digitised resources to be made available	
	d. Generate stats on resources available and which selected.	
3. Finish		
	a. Report that stage completed	SML
	b. Make stats and document records available to iPlants	SML

Outputs:

1. Set of document records for links to digital resources available on internet and to be linked to by iPlants

Outstanding Issues:

1. Will iPlants ever provide resources to carry out these searches?
2. What are the selection criteria that iPlants will establish for selection of suitable candidate information resources?
3. How to define quality? Would we seek permission?

PROCEDURE 4.7 Compile and review links

Purpose:

To bring together all links to be made from particular species pages within this “Family” on the iPlants online system. To ensure that all links are documented and available to the software that generates the online system.

Assumptions:

1. Done only once ALL institutions have carried out search for resources available within their collections AND search of internet completed.
2. Validation tool available to check format of all data records

Inputs:

1. Existing iPlants checklist and database
2. Set of document records completed by each individual institute for their own collections.
3. Set of document records completed by Lead institute for
 - a. Default links – managed
 - b. Internet resources

Owner:

1. Site Manager Lead Institution

Steps:

Task	Activity	Alternative?	Who?
1. Preparation			
	a. Confirm that all institutions completed task 4.4		
	b. Validation checks on data records provided.		
	c. Compile all document records into single place <ol style="list-style-type: none"> a. Default links – intelligent b. Default links – managed c. Institutional resources d. Internet resources 		
	d. Generate stats from compiled table		
	e. Review and identify gaps: for which species links missing		
2. Fill gaps			
	a. Contact specialists with possible resources to be digitised for filling gaps		
	b. Review and select resources		
	c. Digitise additional resources		
	d. Update documentation records to include additional resources		
3. Finish			
	a. Report completion of task to SML		

Outputs:

Outstanding Issues:

PROCEDURE 5: Publish

Purpose:

To bring together all of the information (conservation assessments and maps, pointers to images and pointers to sources of additional information) generated for each of the species in this “Family”.

To make this information available in the iPlants Online System.

Assumptions

1. Publication is undertaken by the Lead Institute for that “Family” (i.e. publication may be instigated by any one of the participating institutions).

Inputs:

1. Existing iPlants checklist and database
2. Outputs from Procedures 2, 3 and 4
3. Statistics and reports generated from Procedures 2, 3 and 4.

Owner:

1. Site Manager Lead Institution

Steps:

1.			
	a.		
	b.		
	c.		
	d.		
2.			
	a.		
	b.		
	c.		
3.			
	a.		

Outputs:

1. A new version of the iPlants online system incorporating all of the information available for this plant “Family”
2. A set of back up documents and archives associated with these new information records.

Issues resolved

1. Conservation assessments and the specimen records used to create them will be stored as part of the iPlants central system.
2. Any additional information re images available for each species and details of links to additional (non-default) information sources will be stored within the iPlants central exchange for management purposes and will be available to the iPlants Online System.
3. Old versions of the online system will be automatically backed up.

4. Versioning control is not to be explicit (visible to the user). Mechanisms will be implemented to permit roll-back features (probably for part of the records) to be able to generate a snap shot of particular part of the Online System at a given date and time.

Outstanding Issues:

1. Would there be benefits through controlling publication through one site alone – probably the Project Manager's office?

PROCEDURE 6: Review and Close this Phase

Purpose:

To review progress for this phase against the original plan.

To document lessons learnt a) on resourcing b) procedures adopted.

To feed these lessons into planning of next phase.

Assumptions:

1. Project managed in discrete phases as funding permits

Inputs:

1. Work plan and resource limits established at start of this phase
2. Outputs from this phase
3. Lessons learnt from this phase

Owner:

1. SC

Steps:

1. Document lessons		
	a. Review all reports and stats produced during phase	PM
	b. Document lessons from Specimen databasing, Conservation assessment	PM
	c. Document lessons from Image and Taxon link procedures	PM
	d. Document feedback from User Focus groups during this phase	PM
	e. Produce final management report on this phase	PM
2. Review lessons		
	a. Discussion of documentation and lesson’s learnt	SC
	b. Prioritise lessons for next phase re resource needs	SC
	c. Prioritise lessons for next phase re procedures	SC
3. Close		
	a. Move to Planning stage of Next Phase	SC

Outputs:

1. Final report on Phase highlighting
 - a. Outputs
 - b. Lessons learnt re procedures
 - c. Lessons learnt re resource requirements
2. Recommendations for next phase

Issues Resolved:

Outstanding Issues: