Australian Association of Bush Regenerators (WA) Inc

Volume 17 Issue 2 NEWSLETTER May 2009

FORUM REPORT

Seed collecting in the 21st Century

Use of best practice and technology

The following is a summary of talks from guest speakers Anne Cochrane and Todd Erickson following the March 11 Annual General Meeting. Questions and answers are included at the end.

Best Practice

A talk by Anne Cochrane;
Senior Research Scientist Threatened Flora Seed Centre; Department of Environment & Conservation

Anne has worked for 15 years in her position as Senior Research Scientist with the Department of Environment & Conservation (DEC), and in this talk she outlined the importance of strategic planning for seed collection.

There are a number of reasons for collecting seed: for revegetation; safe keeping as an insurance policy for the future (e.g. the *Millennium Seed Bank Project*, which aims to store for safe keeping 10% of the world's dryland species); display and education; and research.

In Western Australia all native flora is protected and it is illegal to collect any plant material (fruits, seeds, herbarium specimens, or cuttings etc) without a licence. To obtain one contact the DEC on (08) 6467 5000 or visit flora licensing website at http://www.dec.wa.gov.au/management-and-protection/plants/flora-licensing.html

Identifying target species

Good planning for any seed collection projects is essential, and one of the first steps before collecting is to correctly identify the target species. Information to assist in this is available from existing herbaria, field guides, surveys, taxonomic keys, images, and local expertise. An excellent web source is DEC's *FloraBase* (http://www.dec.wa.gov.au/florabase). General species information is available to the public, although users need to register for access to specific specimen information on FloraBase. Plant descriptions and other information such as the time of flowering, population locations and size and even health, can be sourced. Although, as yet, FloraBase does not give time of seed set this information may be available in some publications and from local knowledge.

Location of target species

Information on where to locate target species can come from local knowledge, and there may be maps available. Another excellent source is DEC's *NatureMap* (http://naturemap.dec.wa.gov.au), which includes locality descriptions and GPS coordinates. Users need to register to use NatureMap. Other maps will give details such as land tenure. See Fig. 1 on page 4.

(Continued on page 4)

in this issue:

Mistake in last issue:
The March newsletter should have read Volume 17 Issue 1, not Volume 16 Issue 5

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There is no forum in May

The next will be held in July

members are requested to offer feedback on the following suggested topics for the July & future forums:

1. Monitoring for sustainability – how can you tell if your regeneration efforts have become sustainable?
2. Fire – this could cover related aspects regarding fire frequency & significance for regenerators etc
3. Direct seeding – why it does/doesn't work
4. If the optimum time to plant is late May/early June, why can't nurseries supply plants in time?
5. Can volunteers survive in today's climate?

If you have feedback or other suggestions please contact

Dave Bright :
mobile 0412 405 730 or
e-mail aabrwa@westnet.com.au

AABR (WA)'s New Management Committee

There was no change
in the committee following the AGM

Vice President
Bob Dixon

Vice President
Dave Bright : 0412 405 730
regen4@primus.com.au

Treasurer
Rob Davies

Minutes Secretary
Bill Betts

Correspondence Secretary
Cat Williams

Memberships
Jan King
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Non-committee members

Webmaster
Steve May

Newsletter Editor
Kirsten Tullis
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Vice-Presidents report to 2009 AGM

- We welcomed two new members onto the committee last year but were unable to fill the vacancy of President. We continued to operate with both Vice Presidents alternately acting in that role. We are grateful for the assistance and support that the other committee members have given.
- During the year we have had some excellent speakers at our forums and we continued the practice of jointly funding some day-time forums (two this year) with NAMN (Local Government 'Natural Area Management Network'). However, due to lack of ongoing funding for NAMN, it is likely that AABR will have to seek other joint contributors in the coming year. Attendance at the meetings/ forums varied considerably which may reflect the choice of venue, subject matter and or time of day? We would appreciate any feedback in this respect.
- Thanks need to go to Kirsten for her continuing involvement as Newsletter Editor. We believe the Newsletter is of the highest quality, achieved through the input of a not inconsiderable amount of time and resources. Its content continues to be of interest to members particularly those unable to attend forums. Thank you to those who have contributed articles throughout the year and we invite all members to submit anything that may be of interest to bush regenerators.
- The AABR website has unfortunately been stagnant during the year. It is our intention (assisted by our Webmaster, who resides in Albany) to completely overhaul the content of the website during the coming months.
- We have a paid-up membership of 32 and our finances are in great shape, thanks to our treasurer Rob Davies, which enables us to continue to function and fund our usual activities.
- The planned publication of the document "Guidelines for Growing Greenstock for Revegetating Local Natural Areas" had to be delayed again due to the busy work load of committee members. However, the draft text is complete and has gone out for the first peer-review. We are working toward a mid 2009 publication date.
- The Vice Presidents continue to promote AABR in a formal/ informal manner whenever the opportunity exists, especially when networking with other organisations.

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Whose Coast is it? Adapting for the Future

5th WA State Coastal Conference 7 - 9 October

Perth Region Natural Resource Management is hosting the 5th Western Australian State Coastal Conference at Fremantle's Esplanade Hotel from 7th - 9th October. The theme is ***Whose Coast is it? Adapting for the Future.***

Keynote Speakers: Dr Stephen Leatherman (AKA Dr Beach) USA
Professor Rodger Tomlinson (Queensland)
Kingsley Dixon (Western Australia)
Dr Simon Thrush (New Zealand)

http://www.keynotewa.com/wacoastal2009 gives further information on making a submission and a list of topics.

WANTED

Bush Regeneration Items

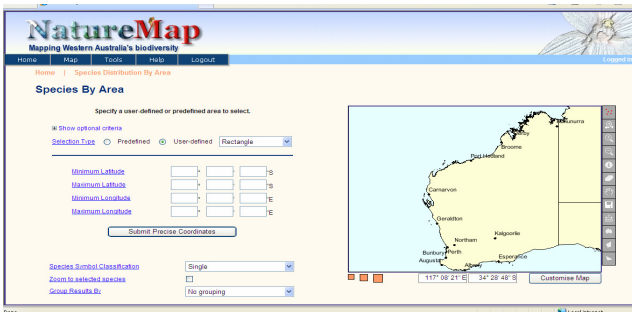
We'd love some more interesting bush regeneration items or helpful hints for the newsletter. Please send them to the Editor

see details on page 8

WANTED

Seed collecting in the 21st Century Continued from page 1

Fig. 1. DEC's NatureMap



Timing

Understanding plant phenology (flowering/fruiting and reproductive biology) is important. Knowing time of flowering, time to seed maturity, and how and when the seed are released is useful. Seed may be stored on the plant all year round or released to the soil or wind, often over a short period. Some plants might only release seed following a fire. Gathering climatic data is also useful.

Time of seed maturity can vary within a species. This may depend on geographical location and even local topography. For instance, plants in the Albany region usually flower and set seed later than plants in Perth because of the cooler, wetter climate further south. Locally, plants growing on a north-facing slope are likely to set seed earlier than others because of the greater sun exposure. Week to week changes in the weather, including the wind, will affect the time seed takes to ripen. Thus, seed collecting times will vary from year to year.

Some plants fruit and flower over long time periods. These include some *Stylidium, Levenhookia,* and *Anigozanthus* spp. In a small number, ripe seed may be available when the last flowers are blooming.

Bradyspory is when the seed is stored in the canopy such as in *Allocasuarina, Hakea, Banksia,* and *Eucalyptus* spp. Many of these store their seed all year round, and so collections can be made at any time. Seed dispersal can be passive where seeds drop to the ground, or through wind (members of the Asteraceae), animals (birds, mammals, insects), or water. The post-fire flowering response is also a factor as some plants only seed 1-2 years later (e.g. *Kingia* and *Xanthorrhoea*) and some may not fruit for five or more years (e.g. many *Banksia* species).

Site reconnaissance

Pre-collecting reconnaissance trips to gather information are extremely useful to:

- Locate site & species (wild sources)
- Determine population extent/ health and identify changes in topography (swales v dunes) where different populations (with genetic variation) might be growing
- Determine whether there is sufficient material available for later collection
- Tag plants with coloured tape for easy re-location
- Collect flowering voucher specimen to confirm identity of species
- Check for hybrids
- Estimate the time when seed can be collected

The how – developing a seed collection strategy

Collecting from a population

To ensure healthier seed and better genetic variability it is best to collect:

- widely & randomly from a range of plants (minimum of 50)
- from large & small plants to represent diversity
- across different microsites within the population, i.e. gathering from different areas of the topography
- from healthy plants

Checking quality & maturity

It is important to check the quality and maturity of the seed, which can be done in the field or in the lab. Fruits and seeds should be checked that they are filled, undamaged (e.g. by insects), and that they are mature.

Evidence of insect damage may appear as frass, which looks like sawdust, or there may be holes or webbing in the fruit or seed (see below).

Fig. 2. Seed pods & seeds with insect damage.

Seed maturity

There is likely to be a variation in ripeness of fruits and seed on single plants, and maturity can be monitored through:

Seed collecting in the 21st Century

- colour changes in the fruits and pods (green seed/fruit is usually immature, brown or black seed/fruit is usually ripe)
- fruits splitting/breaking
- fruits hard and dry
- seeds rattling (e.g. *Daviesia* spp.)
- some seeds already dispersed
- fleshy fruits going soft

Only ripe fruits and seed should be collected. Take account of natural seed storage and dispersal mechanisms, and sample at the point of natural dispersal. It may be necessary to revisit the site over several weeks to make a good collection.

Valves and capsules should be checked to see if they are still closed and the seed hasn't been released.

Collection size & safe limit

Consider attrition as not all the fruits will contain seeds, not all seeds will germinate, and not all the seedlings will grow to maturity.

Enough seed should be collected for the purpose, BUT never collect more than 10-20% of the available fruits/seeds. Seeds must be allowed to remain in the ecosystem for natural regeneration.

How to collect seed

There is a range of methods available depending on the type of seed to be collected:

- hand picking of individual seed/ fruits. This would be the most common and flexible method for most species. The ripest and healthiest fruits and seed can be selected by eye, and collections can be made directly into bags or buckets
- pruning with secateurs
- placing bags made of stockings & muslin over branches (e.g. *Grevillea, Daviesia, Gastrolobium* spp. & orchids).
- using extended pole pruners for out of reach seed
- stripping (e.g. used for seed heads of grasses)
- shaking or bashing branches
- collecting from the ground (be aware of the possibility of identifying the wrong species, insect damage, & seed that is not fresh)
- seed traps
- pole sling shot

Fig. 3. Some of the equipment recommended for seed collection: collection bags, drop sheets, buckets, containers, secateurs, extended pole pruner, hard hat, gloves, first aid kit, GPS, mobile phone, camera, pens, notebook, labels, methylated spirits for dieback health.

Fig. 4. Long-handled pruner

Fig. 5. Pole sling-shot for propelling sandbags over branches

Fig. 6. A seed trap of nylon flywire supported by four poles around *Adenanthos* sp. This method is useful in collection of seed from this genus as finding seeds is difficult and time consuming. *Adenanthos* species exhibit differential fruiting (that is, they flower and fruit over a long period of time)

(Continued on page 6)

Seed collecting in the 21st Century Continued from page 5

Hygiene

Avoid spreading dieback by treating footwear and vehicle tyres with methylated spirits or other suitable products. To avoid spreading other diseases such as canker, sterilise cutting implements between going to the next tree or shrub.

Data collection

Taking good records and field descriptions is essential and should include:

- genus, species, subspecies
- exact location (GPS if possible)
- collector, date & collecting number
- number of plants sampled
- additional information (e.g. pollinators, plant and ecosystem health, ecology, associated species, soils, topography, & phenology)
- photographs (including of habit and habitat)
- herbaria (including voucher specimens)

The more information about the populations and plants you have sampled from, the more useful is the collection. If seed doesn't appear to germinate or store well, taking notes on the plant's health or evidence of drought stress at the time of collecting may help provide a reason.

Post harvest seed handling

Care of any seed collected is important. Individual collections should be labelled and seeds treated with care. They should be kept cool and dry, and plastic bags should be avoided except for fleshy fruits.

Seed quality assessment

Seeds should be cleaned well. To assess their viability use cut tests or TZ (tetrazolium solution), and carry out germination tests. Seeds should be stored appropriately.

Planning a Seed Collecting Trip : Databases, GPS & OziExplorer

A talk by Todd Erickson; *(Research Scientist and PhD Candidate); Kings Park and Botanic Garden*

Todd has been collecting seed professionally since 2004, initially in South Australia (Botanic Gardens of Adelaide; Department for Environment and Conservation) and then with Anne Cochrane from the Department of Environment and Conservation (DEC). His collecting trips have covered most botanical districts in SA, the central Wheatbelt and South West of WA. For the past eight months he has been working with Kings Park and Botanic Garden. Currently he is working on a project funded by BHP to rehabilitate mine sites in the Pilbara. Todd makes regular collecting trips to the Pilbara and, as well as accessing the DEC's FloraBase databases for information, continues to build upon the extensive personal information he has collected.

A great deal of work over many years by the WA State Herbarium has gone into gathering information and compiling useable databases that are now available through FloraBase*. Today it presents an invaluable resource that gives users rapid access to relevant information suited to particular projects. The Herbarium has collecting details of over 683,540 vouchered herbarium specimens from across the State (http://florabase.calm.wa.gov.au/intro).

In his talk Todd outlined how he uses the resource for seed collecting trips to the Pilbara that involve hundreds of different species. He is able to download GPS localities and information on target species within any given location or region. He can build flexible datasets and enter his own observations, such as seed set times. Todd has compiled a dataset for each individual seed-collecting trip that includes the flowering periods for plants he is targeting.

Gathering the information

The following image shows FloraBase information for *Acacia bivenosa* which gives plant description, vegetation (of the site), site description, frequency (of the plant in the location), other notes, locality, latitude/longitude, collection, collection date, and origin.

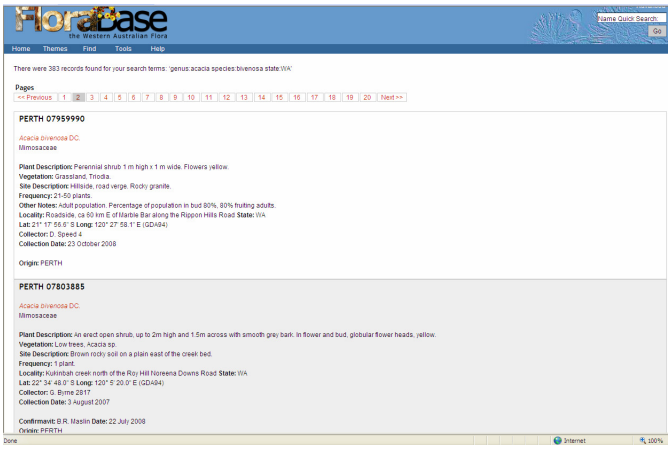


Fig 1.

Fig. 2 gives additional information including when *Acacia bivenosa* flowers as well as a distribution map and images of the plant in the wild.

Seed collecting in the 21st Century

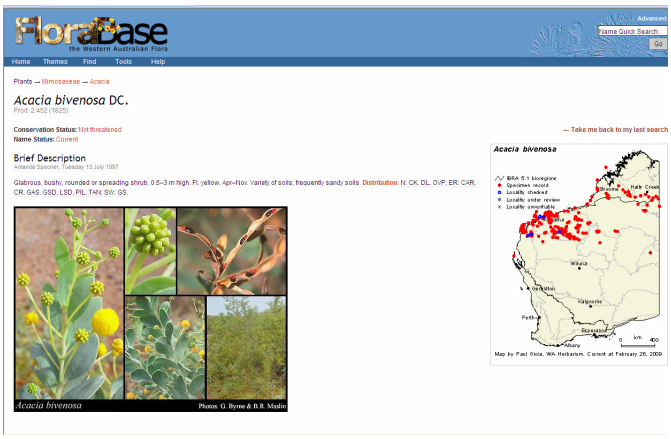


Fig. 2.

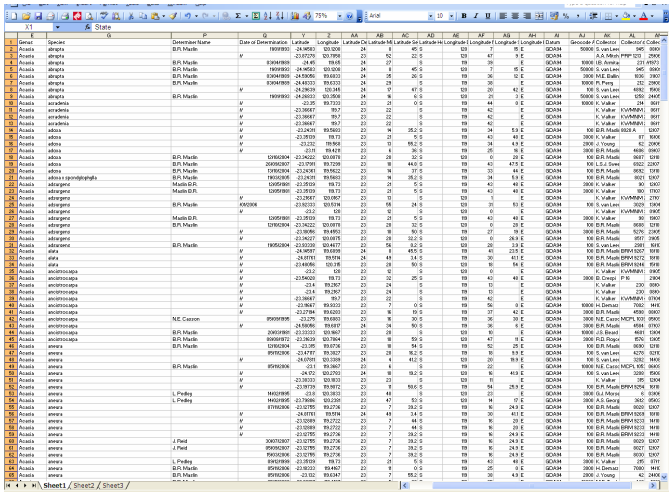


Fig. 3.

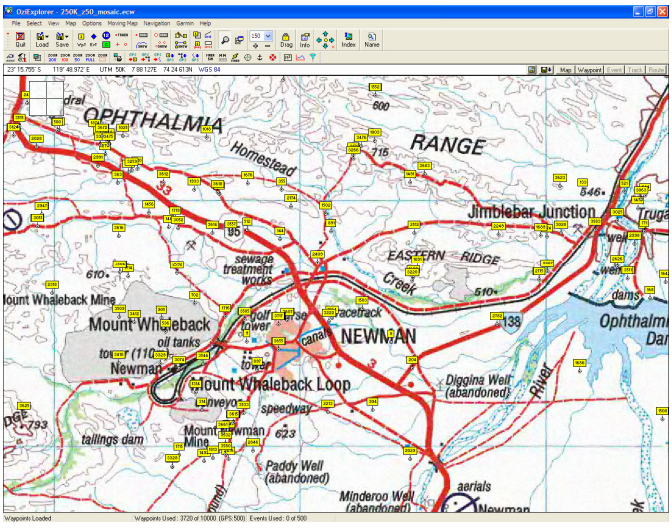


Fig. 4.

What makes good species information for seed collecting?

Seed collecting might involve follow up trips, or visits to sites where the collector has never been before. Thus, it is important for good records to be taken:

- Accurate GPS records are essential for finding populations and even individual plants in the wild. It should be noted that GPS records are generally less accurate prior to 2000.
- Precise written localities; for example '1.3km E of Rock Rd from the Great Northern Highway….'
- Record verified for correct species identification. FloraBase includes the name of the botanist who confirmed the plant identity.
- Plants numbers; for instance '100+ plants seen over 100m^2'.

Once the information is downloaded (see Fig. 3) it can be entered into a mapping program such as *OziExplorer*, which Todd recommends as an excellent choice being easy to use and inexpensive at around $120-140.

Fig. 4, a 1:250,000 map of the area surrounding Newman in the Pilbara, shows the GPS locations (waypoints) for an Acacia collecting trip. Information is hidden behind the waypoints, so on-screen the cursor can bring up the specific information for each record.

Maps can be tailored to suit by simply culling certain waypoints/ species that are not needed, for instance to show flowering plants in a particular season. Or, on the same map different colours can be used to separate out species that flower at different times. A dot-to-dot map can be created to help plan the easiest collection route. It is possible to carry a laptop in the car, and link it to a GPS to create a moving map and input more information. All this information can be overlaid on aerial images, or smaller maps that show more detail.

* While some of FloraBase offers free downloads, other levels require registered access that may attract a fee.

Questions and answers

While images of the plant cannot be brought up from behind waypoints on a map Todd keeps his in easily accessible databases. He also finds it useful to include habitat shots.

The Perth Urban Bushland Fungi Project uses a GPS track, digital images, OziExplorer, and OziPhotoTool for generating maps with associated information of fungi walks though Todd hasn't done this.

Todd is able to continually update his information by adding new waypoints, and even upload data to a GPS that can be used in the car or while walking to help find locations. Modern GPS units can be programmed to 'beep' when approaching targeted waypoints, ensuring that vehicle driving is not disrupted.

Having good maps with locations of species helps plan efficient trips by avoiding hard to get to

(Continued on page 8)

Seed collecting in the 21st Century Continued from page 7

places. For instance, one botanist had taken voucher specimens from the tops of inaccessible Pilbara hills with the help of a helicopter.

Accurate GPS records are needed for single plants in the wild, however for larger populations a record to 10 metres is sufficient. Finding annuals, or a plant a few weeks later that had been flowering but now is an inconspicuous twig carrying seed can be a problem, so taking good notes is necessary.

Publicly accessible information, or a forum for sharing notes, on when average time of flowering to seed is definitely needed. This would be useful to local councils which are becoming more attuned to best practice and collecting their own local provenance seed. While FloraBase does not include information of when individual species set seed, voucher specimen information may provide this information if plants were fruiting at the time of collection.

Todd is compiling a Pilbara Seed Atlas combining vegetation and seed information.

The WA State Herbarium will continue to grow its public resource. For instance it has a scanning facility that will add scanned herbarium specimens to species information accessible on FloraBase. Information that is currently accessible only via the database manager via e-mail will become gradually more available. For instance through NatureMap it will be possible to plug in coordinates for a given area, and download a map with a list of species for that area.

Seed set varies from year to year depending on climatic conditions. Anecdotally people are noticing some species are not setting as much seed as in previous years, presumably due to reduced rainfall and drought conditions. Anne says she and others are noticing such a trend in the South West, e.g. in Banksias. Climate may be a factor, along with changes in pollinator behavior. Often, even following good rain, a plant may thrive and look promising however instead of putting energy into seed production has put it into growing.

Frost too can affect seed set. In the Wheatbelt late frosts at the end of October have been known to wipe out many seed crops, including Acacias. Bob Dixon said the Rare and Endangered population of *Grevillea scapigera* at Corrigin experienced a late frost that killed the flowers, however it was able to flower again and set seed.

Some species strongly respond to fire and planning to collect post fire would be more useful if a database of fire events and history were available through NatureMap. Anne says the fire management branch in DEC has GIS (Geographical Information System) on fire but it is not publicly available. Park rangers should have a good knowledge of fire history in their patch. Evidence of past fire can show up in FloraBase specimen information – for instance two years after a fire in Quairading thousands of a species of Jacksonia were recorded in one location.

Seed life can be extended by keeping seeds cool and dry. Standard genebank procedures advocate the reduction of seed moisture content to about 4-7% (slow drying at 15% relative humidity and 15°C for approximately six weeks) and then storing at -20°C. This ensures on defrosting the cell walls do not break.

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