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CALM SIDNEWS

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Next *SIDNews* *CALMWeb* '97

Editorial

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I wasn't going to edit another one, but here it is! This is the 3rd *SIDNews* for 1997, and the last in this form. *SIDNews* will probably next appear as a 'live' newsletter on the *CALMWeb;* readily accessible to all in CALM, easier to print a hard-copy and updated bi-monthly by section editors. Watch for developments and contact myself or Alex Chapman with ideas on how you can contribute.

Many thanks to all contributors over the past 2 years and of course Happy Christmas to everyone.

Directorate

The SID management team will be meeting at Woodvale on Monday, 25 November, and SIMC will be meeting at manjimup on Wednesday, 27 November.

The position of Director was advertised in the national press on Saturday 9th November.

Group and Centre notes

BIO-CONSERVATION GROUP

Woodvale

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Bushland weeding

To improve the weed problem on the reserve, three weed walks/battoos were held at Woodvale to remove gladiolus and lupin seed heads. Participation from staff made the walks a success.

Family additions

Congratulations are passed on to Alan Clarke, Neil Thomas and their wives on the arrival of their new baby daughters Samantha and Peta.

Big Brook Relay

The 10th Anniversary Big Brook relay was held on Saturday the 16th of November. Nineteen teams participated, with Woodvale entering a record three of these. The competition was tough, but the testosterone charged "super" team (team 1) had a hormonal surge from the start and won the day for Woodvale.

Our teams 2 and 3 did not disappoint either, coming in ninth and thirteenth respectively. The crosscut saw started off the days events with our Executive Director manning one of the saws. A heart monitor was presented to him at the start, fortunately it was not required!

It was an exciting finish for the "super" team, who with only the canoe and swim legs to go were in fifth position. With a winning margin of more than 5 minutes the Woodvale team gratefully handed over the derrier award received last year in exchange for the winners trophy. Thanks to all the organisers who helped make it such a great day.

Congratulations also to the other SID participants including the fabulous 'Herbies' who improved on their placing last year. Ed.

BIO-RESOURCES GROUP

Herbarium

Pam's prattles

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Boy, are we late this time....sorry folks. Excuses are too boring, however, so let's just get right into what's been going on at the Herbarium.

We said a sort-of-goodbye to Judy Wheeler a couple of months back when she and Stu moved to Albany. Judy seems to have settled in quite nicely now at the Albany CALM office, keeping in touch with us frequently as she is carrying on in her role as Species Resources Section Manager (Bio-Resources Group). But there is no doubt that the place is just plain different without Judy's voice in the hallway and her marvellous sense of humour. We all miss you, Judy!

And who will be working in Judy's old office space? No less a personage than Greg Keighery, and us "girls" at the front desk will be much relieved to have him permanently here for his multiple phone calls which always (it seems) occur just when he's left the building for Woodvale or else hasn't quite arrived from Woodvale.

We have also welcomed Kate Brown and Maggie Byrne to the Herbarium - please read Anne Cochrane and Dave Coates' contributions for more details!

I'm delighted to say that our plans to have John Eygenraam come once a week to work at the Herbarium are now finalised. A few months ago I went along to visit John with Phil Spencer who brings John's work to him at his home at the Shenton Park Rehabilitation Centre. John was very enthusiastic at the prospect of learning some new skills and having a change of venue, so plans were laid to see if this could be achieved. Happily, the technicians who previously arranged for John's computer keyboard (and other specialised gear) were able to prepare for John to work from the undercroft at the Herbarium. We've also now got a wheelchair ramp so he can arrive for work at our front door, and at the time of this writing his first "dry-run" is imminent. I'd also like to let it be known that Dr. Syd Shea offered to underwrite the costs incurred to provide John with these facilities for

his work here. At any rate, it will be nice to have John with us on Wednesday mornings.

For your information, our Reference Herbarium will no longer be open for general use on Fridays. This was seen as desirable in order to provide that space as a venue for special seminars. So, the new days for public usage will be Monday through Thursday only.

Oh yes, and welcome home, Matt Williams! The trip to America seemed to have been quite a success (see Matt's own contribution for details), and Matt has discovered that he has a definite affinity for Yank rattlers.

I'm officially on leave until January, so Happy Christmas, everybody and see you next year!

New staff *annec & davec@herb.sid*

Kate Brown has been seconded from Kings Park and Botanic Gardens for a year to work in the Threatened Flora Seed Centre genebank at the Herbarium. She will be assisting with seed collecting, as well as with the testing and storage of seed of rare and priority species. Kate looked after the rare garden at KPBG for 3 years before completing her Degree in Biological Science at Murdoch University. Her expertise in seed biology is a very welcome skill for the TFSC. We all wish her a good year.

Welcome to Dr Margaret Burn who has just joined SID from the Division of Forestry CSIRO. Margaret is originally from Perth and returns after spending over 5 years in the molecular genetics laboratory in Forestry to run the new DNA facility at the Herbarium. Margaret has considerable expertise in a range of plant molecular genetic techniques and their application in forestry genetics and conservation genetics.

This week Mike Hislop and Adrian Bowden have also started work at the Herbarium. Mike will assist Ray Cranfield with identifications for the RFA Project and Adrian will be seed and specimen collecting fro Neville Marchant.

SUSTAINABLE RESOURCES GROUP

Como

Sandalwood Research *johnb@como.sid@calm*

A recent Western Australian sandalwood (*Santalum spicatum*) germination assessment on three stations near Paynes Find provided some encouraging results. Long term sandalwood regeneration trials have been established on Burnerbinmah, Thundelarra and Ninghan stations.

Burnerbinmah station is a CALM reserve, while Thundelarra and Ninghan stations are managed for sheep grazing. Over 10,000 sandalwood seeds were sown on these stations between March and June 1996. The seeds were sown beneath a range of host trees growing on different soil types. In early October 1996 between 40 to 50 % of the sandalwood seeds sown had germinated. Initial growth was also good with sandalwood seedlings up to 30 cm in height.

Manjimup

Staff

Per Christensen retires

After a long and distinguished career with the Forests Department and more recently CALM, Dr Per Christensen formally retired in mid July. Per began his career in forestry in Kenya, then moved to Manjimup in 1967 to commence work on silviculture in the karri forest. He was involved in the development of seed forecasting techniques for karri and together with Barney White established several important regeneration experiments in karri-marri forest. Per soon branched out into the then largely unexplored territory of forest ecology in Western Australia, and initiated a series of important benchmark studies into the ecology of the woylie and the tammar wallaby and their response to fire. This work formed the basis for a PhD study which was subsequently published as Forests Department Bulletin No 91.

Observations of declining numbers of native mammals in south-west forests led Per to investigate the role played by fox predation. Subsequently, fox predation has come to be recognised as one of the major factors determining the current distribution and population size of many mammal species, and is now being addressed by major operational programs including Operation Foxglove, Western Shield and Project Eden.

Per supervised an extensive program of biological survey in the south-west forests during the late 1970's and early 1980's, and together with Peter Kimber undertook some innovative initial reseach into fire ecology of forests and woodlands. This work included studies of the response of native legumes to soil heating, and characterisation of plants according to their regenerative mechanisms.

For the last 15 years or so Per has been involved in research management and administration, culminating in his appointment as Head of Group for Sustainable Resources. This involved management of staff, budget, and other resources for the group, as well as liaison with other groups within CALM. A hallmark of Per's career in management has been an emphasis on putting research results into practice and ensuring that managers and operational staff are kept abreast of the latest technical and scientific information. Per has also represented the Department on a number of external committees and working groups.

Per has published an extensive array of scientific papers, books, popular articles and internal discussion papers and has been recognised nationally for his contribution in the field of forest ecology. Throughout his career he has maintained an active involvement in field work on various projects, most recently on the Peron Peninsula in conjunction with Project Eden. He intends to maintain an involvement in forest ecology issues by undertaking some consultancy work for CALM.

Science and Information Division, and in particular the staff at the Manjimup Research Centre, would like to thank Per for his major contribution to forestry and ecology in Western Australia over the years, and wish him and wife Helen all the best for the future.

New pathologist

Richard Robinson has joined SID at the Manjimup Research Centre as a forest pathologist. Rich has recently returned from four years in British Columbia where he undertook a PhD study into the ecology of *Armillaria* root rots in conifer forests. He is originally from Tasmania and has worked there with the CSIRO Division of Forestry. Initially, he will be conducting investigations into the spread and impact of *Armillaria* within the karri forest, particularly in the context of young regrowth stands. Further research on wood rots and decay will also be initiated next year. Richard also has a general interest in the ecology and taxonomy of fungi. These projects will be undertaken within the Natural Products Section of the Sustainable Resources Group.

SCIENCE SERVICES GROUP

BIOMETRICAL SERVICES

Study trip to the USA *mattw@como.sid*

While I will be preparing an "official" report on my US trip later in the year, Pam asked that I contribute an "unofficial" report for SID News. So here goes!

I spent the first 2 weeks in Providence, Rhode Island, attending the annual Ecological Society of America general meeting. With more than 2000 attendees and up to 16 parallel sessions, this was quite an event! For me, the two highlights of the conference were 1) hearing the inside story on native conservation in the US (after a few Sam Adams or Anstel lights people opened up a bit!); and 2) being told repeatedly how much the Americans admired what is being done in Australia and New Zealand.

The next 4 weeks I spent working with Dr. Mike Palmer at Oklahoma State University. I won't bore you with the statistical voodoo, but Mike kindly took me on a few field trips, where we encountered both chiggers and rattlesnakes. Given a choice, I would prefer to spend my time with the latter. I also heard a good joke about twisters, but can't repeat it here - ask me in person!

The next week I spent with Mike Rosenzweig and his graduate students at the University of Arizona in Tucson. You may recall that Mike spent some time in WA (including CALM) a couple of years ago. By a quite remarkable coincidence, one of Mike's graduate students, Wade Leitner, had quite independently developed a model of the species-area relation that was remarkably similar to the extreme-value model I have worked on. It was certainly good to meet someone who spoke my language! We were also able to compare notes on how difficult it proved to be for both of us to get our (some say weird) ideas accepted for publication.

Rather than fly to my final 2 destinations (Santa Cruz, California and Eugene, Oregon), I had arranged to hire a car in Tucson and drive that leg of the trip (on the wrong side of the road, whilst sitting in the passenger's seat, mind). This proved an interesting experience - more so for some startled Yanks who were astonished to see me driving towards them on the wrong side of the road. The only driving habit I found difficult to adjust to was the indicators being on the left - I kept putting the windscreen wipers on before turning! The long drive was certainly the highlight of my trip. The diversity of landscapes in this part of the US is spectacular. And I've got ten rolls of film to prove it - just stop by my office sometime and I'll be happy to show them to you!

Workwise, I managed to sort out a suitable topic for my PhD which I intend to begin early next year. Overall, meeting and working with academics in the US really opened up my eyes to how good Australian biological science is and just how far ahead we are in many aspects of both statistical and mathematical ecology.

INFORMATION SCIENCE SECTION

Network

CALMWeb

The *CALMWeb* (CALM's intranet) is under construction on a new server Authors of previous material found on the *Internet Service* drive are asked to update their pages according to the standards recently emailed out by Alex Chapman. All staff are encouraged to participate in this project.

Network servers and drives

Network servers at Woodvale and Herbarium (inc. Como Research) will be upgraded soon, hopefully by the end of the year. Please do some housekeeping to reduce the volumes on the *Shared Data* and *User Data2* drives. The Herbariums' *Shared Data* drive is nearly full and close to crashing!

Software licenses

Please read Nicholas Lander's recent emails about current requirements and benefits of software registration, particularly Microsoft products.

PERTH OBSERVATORY

1996 Christmas function

The Observatory is holding a Christmas BBQ, including telescope tours and stargazing, on Saturday December 14 starting at 6pm. Please RSVP by 6 December on 293 8255.

For more details see your notice board.

SCIENCE PUBLICATIONS

Science prize

Congratulations to Kevin Kenneally, Daphne Edinger and Tim Willing, who have been awarded The CSIRO Medal for Research Achievement for their book *Broome and Beyond - Plants and People of the Dampier Peninsular, Kimberley.* Of 4 gold medals presented this year, this is the only one to be awarded outside CSIRO. Another outstanding CALM publication. Well done.

FORTHCOMING SEMINARS

CALM Lunchtime Seminar Series

26 Nov. (Tuesday) Como Training Centre:

Jim Sharp and Tracy Churchill *'We'll take the high road'* - Valley of the Giants and Tree Top Walk - A model for the future of CALM's Recreation and Tourism Program.

SID

29 Nov. (Friday) Woodvale:

2:00 pm, David Pearson Squeezing the best out of life: The biology of Carpet Pythons

3:00 pm; Paul de Tores The Western rintail possum, Pseudocheirus occidentalis: release and management of rehabilitated orphaned and injured possums and relocation of displaced populations.

SID STAFF IN THE MEDIA janr@crawley.sid

The work of a number of staff have appeared in Perth and rural media since June 1996.

Dave Pearson 31 Jul *Avon Valley Advocate* Python Survey Kit.

Norm McKenzie 1 Aug *The Busselton - Margaret River Times* Learn about bats.

Peter Orell 7 Aug *Avon Valley Advocate* Monitoring the Chuditch

Justine Edwards Sep *Australian Farm Journal* Soil types that best suits bluegum plantations

Bob Prince Oct *The West Australian - Big Weekend* Dugong hunting

Kevin Kenneally and Daphne Edinger 21 Nov *The West Australian* Top End book wins medal for scientists.

APPROVED FOR PUBLICATION christinef@wood.sid

Here is a list of SID approved publications July - November 1996.

Algar, D. and Sinagra, J.
Pen trials examining bait preference by cats

Algar, D. and Sinagra, J.A.
The use of iophenoxic acid to label feral cats consuming baits

Behnke, H.D., Kiritsis, U., Patrick, S.J. and Kenneally, K.F.
Form-pfs plastids, stemanatomy and systematic affinities of Stylobasium Desf. (Stylobasiaceae) A contribution to...

Burbidge, A.H.
Cape Arid National Park

Chalmers, L and Wheeler, J
Native vegetation of estuaries and saline waterways of south Western Australia

Chalmers, L and Wheeler, J
Native vegetation of freshwater rivers and creeks in south Western Australia

Coates, D.J. and Atkins, K.
Threatened flora of WA: A focus for conservation outside reserves

Cochrane, A., Kelly, A. and Robinson, N.
Report to Anaconda Nickel on the germination of Hemigenia Exilis

Friend, J.A.
Numbat recovery plan implementation - Progress Report

Friend, J.A.
Entries for Readers Digest Enclyclopaedia of Australian Wildlife

George, E., Keighery, G.J. and Muir, B.
Moore River National Park/Badgingarra

Gibson, N., Keighery, G.J., and Keighery, G.J.
N.H. Speck's contribution to the understanding of Proteaceae biogeography in WA

Groves, R.H., Bishop, A., Carter, R., Coreys, Csurhess, Hosking, J. and Keighery, B.J.
Recent incursions of Weeds into Australia; 1971-1995

Halse, S.A.
Lake Gregory:a semi-permanent arid zone lake in north-western Australia

Keighery, G.J., N. Gibson and Keighery, B.J.
Floristics of reserves and bushland areas in the Perth region Part XV:Floristics of seabird bushland

Keighery, B.J., Keighery, G.J. and Gibson, N.
Floristics of reserves and bushland in the Perth region (system 6) Part XIII:Floristics of the Neerabup National Park

Keighery, B.J., Keighery, G.J. and Gibson, N.
Floristics of reserves and bushland areas in the Perth region (system 6) Part XIV:Floristics of the Lakes Cooloongup and Walyungup

Keighery, B.J., Keighery, G.J. and Gibson, N.
Floristics of reserves and bushland areas in the Busselton region (system 1) Part IV:Floristics of the Capel Nature Reserve

Keighery, B.J., Keighery, G.J. and Gibson, N.
Floristics of reserves and bushland areas in the Busselton region (System 1) Part II:Floristics of the Ambergate Reserve

Kingsford, R.T. and Halse, S.A.
Waterbirds as the 'flagship' for the conservation of arid zone wetlands?

Patrick, S.
The plants collected by JAL Preiss in 1839 from Mt Bakewell, an important remnant of natural vegetation in the York area

Pigott, J.P.
Remnant vegetation at Yilliminning Rock

Wheeler, J.
Wildflowers of the south coast

FEATURES

A PARADOX: SOME EUCALYPTS ARE NO LONGER *EUCALYPTUS*

Terry Macfarlane terrym@manj.sid

Late last year a new genus, *Corymbia*, was established for a part of the genus *Eucalyptus* (Hill & Johnson 1995). The species concerned are those known colloquially as bloodwoods, ghost gums and spotted gums. The name *Corymbia* comes from the word corymb, a technical botanical word for a particular arrangement of flowers. Changes of this sort occur frequently as a result of taxonomic research, but they do not often affect a national icon. It would be natural for such questions to arise as why? is it necessary? isn't it premature? do taxonomists have the right to impose such inconvenience? who cares (or, does it affect me)? And what of the paradox in the title? I hope that I can satisfactorily answer these questions.

But first, a little history. *Eucalyptus* has been regarded as a single, readily recognisable genus since early last century. A different view was introduced by Carr & Carr (1962), who considered that two genera should be recognised, *Eucalyptus* and *Symphyomyrtus*. Then, twenty five years ago, Pryor & Johnson (1971) published a new classification of the species of *Eucalyptus* into seven subgenera. Subsequently Johnson indicated an intention to make the subgenera into independent genera. One of these subgenera was called *Corymbia*, and it is this, plus the ghost and spotted gums (comprising another of the 1971 subgenera, *Blakella*) which has now been given the rank of genus. Thus, the question as to whether the change is premature can be disposed of: the notion of subdividing *Eucalyptus* has been around for many years, additional information has accrued in the meantime, and a generation of botanists, and more particularly of foresters, have grown up aware of the 1971 classification, and therefore the change can be no great shock for many people. To finish the history with a look to the future, Hill & Johnson indicate that the separation of *Corymbia* deals with the major problem in the content of *Eucalyptus*, and that further subdivisions of the genus are not planned. The largest of the 1971 subgenera, *Symphyomyrtus*, has proven to be less worthy of separation than *Corymbia*.

So why was the change made? Scientific classifications group organisms according to their relationships, as perceived by taxonomists according to whichever method they employ. When new data or new methods show the existing classification to be inadequate, changes are proposed. But was it necessary? Yes, if a classification is found to be inadequate or wrong, then changes should be proposed, because classifications are our means of understanding, summarising and working with biodiversity. A poor or outdated classification would result in bad science in other subject areas and could be economically wasteful. Changing classifications, and perhaps more importantly the changing of names that accompanies it, are undoubtedly inconvenient, so do taxonomists have the right to impose such inconvenience? Unfortunately our system of biological classification is expressed through names, which therefore change when the classification is changed. Practical convenience is not a scientific criterion, but taxonomists do consider the factor when proposing changes. In the case of *Eucalyptus* and *Corymbia*, it is certain that this aspect was considered by the authors, because several years ago there was a campaign in newspapers against the mooted change. Ultimately it has been their belief in the importance of a sound classification based on evolutionary principles that has led them to over-ride that aspect.

The differences between *Corymbia* and *Eucalyptus* involve various parts of the plant and are often obscure, because they are small in size. They include leaf veining, wood structure, presence of crystals in young leaves, types of hairs on leaves, arrangement of the leaves on the twigs, and the structure of the bud cap. However the familiar shape of the nuts of Marri trees ("honky nuts"), are the best way of recognising species of *Corymbia* in south western Australia.

The final question posed above is: who cares (or, does it affect me)? The Herbarium staff care, because they are responsible for keeping the physical arrangement and labelling of the plant specimen collections and associated database WAHERB in step with the currently accepted classification, and also for the updating of databases such as WACENSUS. Scientists ought to care, because they should use the current, most accurate name and concepts of taxa. Fortunately we in CALM have Paul Gioia's computer program SEDIT which uses WACENSUS to update scientific names in research databases. Another reason that scientists should care is that alternative classifications may reveal new relationships in their data, or suggest new hypotheses. It should be pointed out that new classifications are not adopted instantly and uncritically by the Herbarium, although eventually most are followed. *Corymbia* has been accepted by the W.A. Herbarium, according to its head, Neville Marchant.

Already there are indications that the recognition of *Corymbia* and the particular concept (i.e. the species that are included) is being supported by new evidence. Hill & Johnson employed cladistic analysis, which emphasises phylogenetic relationships as a principle for classifying, and used morphological and anatomical information. It is therefore of interest that the authors mention in a footnote that an independent study ("of which we had no prior knowledge") employing DNA analysis as well as morphological data (Ladiges et al. 1995), supports the concept of *Corymbia*. Very recently another independent paper employing a different DNA analysis appeared (Sale et al. 1996) citing Hill & Johnson ("of which we had no prior knowledge") in a footnote, and again there is support for their concept of *Corymbia* and their general classification structure of the eucalypts.

It might be of interest to list the more important contents of Hill & Johnson's paper, as follows.

1. A case for subdividing the eucalypts based on phylogenetic (i.e. cladistic) analysis.
2. Description of the new genus *Corymbia* K.D. Hill & L.A.S. Johnson.
3. A classification of the species of *Corymbia*.
4. Identification keys for the species of *Corymbia*.
5. New nomenclatural combinations for many species.
6. Thirty three new species and nineteen new subspecies described.
7. A table of comparison of the species names used in Brooker & Kleinig's (1994) "Field Guide to Eucalypts," Volume 3, with the Hill & Johnson names. It is complicated: there are numerous differences of concept, there are the lettered (un-named) species in the Field Guide that now have names, and there are the entirely new species of Hill & Johnson, to take into account.

Some well known or otherwise interesting species of eucalypt are affected by this study. Southwestern species now placed in *Corymbia* include Marri (*C. calophylla*), Red Flowering Gum (*C. ficifolia*), Mountain Marri (*C. haematoxylon*), and the new species *C. chlorolampra*, representing the Mt Leseuer populations formerly included in *Eucalyptus haematoxylon*. Familiar cultivated species include Lemon Scented Gum (*C. citriodora*), Spotted Gum (*C. maculata*) and Yellow Bloodwood (*C. eximia*). Most species of *Corymbia* occur in northern Australia and in the arid regions of the northern half of the continent; there are a number of species in the Pilbara for example. One species of note is the newly described *C. aparrerinja*, "the much-publicised 'Ghost Gum' of central Australia" - refer to Namatjira paintings for illustrations. One little conundrum relevant to CALM that may have been solved is the identity of the venerable group of trees that shade CALM's campsite at Eagle Bore in the Gibson Desert Nature Reserve. Several unsuccessful attempts have been made to identify them, but it is apparent from this paper that the difficulties were because they belong to a previously un-named species. The correct name appears to be *C. candida* subspecies *dipsodes* (both species and subspecies being new). The name dipsodes means "thirsty", and although allegedly based on the dry environment, it may also have something to do with the rapid emptying of drinking vessels often to be observed in the vicinity.

Finally, the explanation of the paradox in the title. The vernacular name eucalypt has traditionally been equivalent to the genus *Eucalyptus*. However with the re-naming of many *Eucalyptus* species as *Corymbia*, it would be preferable to retain eucalypt as a handy collective term without having to decide to which genus a given species or forest make-up belonged. Since *Eucalyptus* (in the new strict sense), *Corymbia*, and *Angophora* (Apple or Apple Box trees) are together considered to comprise a single higher level grouping, we can, as Hill & Johnson recommend, call them all eucalypts. To us in W.A., this means business as usual since we have no native *Angophora*.

References

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Carr, S.G.M. & Carr, D.J. (1962). Convergence and Progression in *Eucalyptus* and *Symphyomyrtus*. Nature 196: 969-972.

Hill, K.D. & Johnson, L.A.S. (1995). Systematic studies in the eucalypts. 7. A revision of the bloodwoods, genus *Corymbia* (Myrtaceae). Telopea 6: 185-504.

Ladiges, P.Y., Udovicic, F. & Drinnan, A.N. (1995). Eucalypt phylogeny - molecules and morphology. Australian Systematic Botany 8: 483-497.

Pryor, L. D. & Johnson, L.A.S. (1971). A Classification of the Eucalypts. (ANU Press: Canberra).

Sale, M.M., Potts, B.M., West, A.K. & Reid, J.B. (1996). Relationships within *Eucalyptus* (Myrtaceae) using PCR-amplification and Southern Hybridisation of chloroplast DNA. Australian Systematic Botany 9: 273-282.

APPLYING SCIENCE TO CONSERVATION AND LAND MANAGEMENT: A DISCUSSION PAPER

Neil Burrows A/Director SID

The mission of the Science and Information Division, as espoused in the Division's strategic plan, is to;

"provide up-to-date and scientifically sound information to underpin effective conservation and land management in W.A."

For the Division to achieve it's mission, the research must be **applied, practical, aligned** with CALM's corporate mission, **scientifically sound** and **transferable** to operations.

CALM's policies and management strategies must have a sound scientific basis if they are to meet contemporary management goals and if they are credible in the public eye. To ensure this, the department has a science directorate comprising some 100 highly qualified scientists and technical assistants. The Division has in place the appropriate protocols to ensure maintenance of scientific standards. These include the Science Project Plan process, annual staff appraisals, scientific seminar series, and internal peer review of manuscripts. While publication of scientific papers is not the end point of CALM's applied research, it is an important component of our activities, for it is largely through the quality and breadth of scientific publications that the soundness of our policies and practices will be judged. For example, in highly controversial management areas such as timber harvesting and prescribed burning, we have been able to scientifically defend our practices by reference to scientific publications. Unlike community based conservation groups, the unsubstantiated opinions of public servants carry little weight in rigorous community and scientific debate. We must continue to advance our scientific understanding of the ecosystems we manage and we must continue to publish our work in reputable scientific journals.

The provision of a sound and relevant scientific and technical service to managers is a primary function of the SID. The Division needs to have in place formal protocols to ensure that the research is applied and relevant to CALM's corporate mission. It is crucial that strong linkages, or alliances exist between the Division and the broader CALM, to facilitate the continuous interaction which is necessary for research to be relevant, applicable and the knowledge readily transferable to operations.

Informal (personal) and formal (institutional) linkages play a key role. Personal networking and linkages take on many forms within the Division and help to ensure that the research meets the above criteria. However, the extent to which this occurs depends on the initiative and "culture" of individuals, both within and outside the Division. In many instances, strong personal linkages are not established and the developing of research priorities has been largely left to the discretion of individual scientists. This has the effect of weakening alliances and linkages with CALM operations and is an impediment to the transfer of knowledge and technology. The result is that CALM has not received full benefit from its substantial investment in research.

To improve both informal and formal linkages between the SID and CALM operations, I propose the following:

1. Develop management alliances by the creation of formal Research and Development (R&D) Action Groups.

These groups should be based on operational entities within CALM. The "terms of reference" of these groups could be to;

- Identify management issues, opportunities and problems requiring technical solutions and to set research priorities to address these.
- Identify new major initiatives of economical and/or ecological benefit to the State.
- Identify potential sources of funding for high priority research (SID appropriation, business units, primary programs, Corporate Executive, external sources, etc.).
- Provide a conduit for information flow between SID and operations activities.
- Facilitate the transfer and implementation of research outcomes to operations.
- Group membership could consist of relevant senior and mid level management staff and relevant SID Group Head and Section Manager. The following table is an **example only** of such groups. Further discussion within SID and with various operations functions is needed to finalise the nature and composition of groups.

Table 1: An **example** of some R&D Action Groups to facilitate the setting of research priorities and implementation of findings.

R & D ACTION GROUP	OPERATIONS REPS.	SID REPS.
Plantations	Seamus Mullholland, Gavin Alice, John Kaye	John McGrath, Richard Harper, Richard Mazanec
Tree Breeders	(This group already exists)	
Native Forests	John Murch, Alan Seymour, Jack Bradshaw	John McGrath, Lachie McCaw, Forest Ecologist
Sandalwood	Ian Keally, Frank Mckinnell,	John McGrath, Lachie McCaw,
Wildlife Conservation	Ken Atkins, Peter Mawson, Andrew Burbidge.	Keith Morris, Dave Coates, Alan Burbidge
Environmental Protecton	Frank Batini, Roger Armstrong, Paul Jones	Dave Algar, Greg Keighery, Dave Coates
Marine Conservation	Chris Simpson, Greg Pobar,	Keith Morris, Bob Prince
Recreation and tourism	Col Ingram, Wayne Schmidt, David Hampton	Neville Marchant, Keith Morris
CALMfire	Rick Sneeuwjagt, Drew Hasswell	Lachie McCaw, Forest Ecologist
Biological Survey and reserves		Neville Marchant, Norm McKenzie, Neil Gibson
Information Systems	Colin Pearce	Nicholas Lander, Paul Gioia
Waterways and Wetlands	Gordon Wyre, ??	Stuart Halse, Jim Lane

2. Put in place performance indicators and reward systems which recognise the importance of both good science and the application/implementation of research findings. I have recently circulated a list of proposed performance indicators for research scientists. This will be refined after taking account of comments from a wide range of people within CALM.

Note: I would appreciate your comments and suggestions on this proposal.