

Quarterly Newsletter

Issue 11, July 2015

SuperSite and OzFlux Update

Welcome to Issue #11 of the SuperSites/OzFlux newsletter. The major issue this quarter is the NCRIS 2015-16 funding allocation and the effects of the budget reduction on TERN Facility activities.

The TERN board has decided to mothball the eMAST and the Australian Coastal Ecosystems Facilities while the remaining facilities will have to find a way to continue on a much reduced budget. Both OzFlux and Supersites have done well within the constraint of the total TERN budget, but the next two years won't be easy.

On Friday (9/6/2015) TERN has received the draft "deed of variation" to the current NCRIS 2013 agreement. This instrument effects delivery of the \$5.925 M increase in funding for TERN to allow operations to continue for next financial year and sets up the new reporting requirements. TERN is endeavouring to implement the required variations to relevant sub-agreements in the near future with the target to have most in place before the end of July. Supersites and OzFlux are looking at getting the contracts with the Site PI's in place as soon as we have the agreement with TERN.

SuperSite Central Update

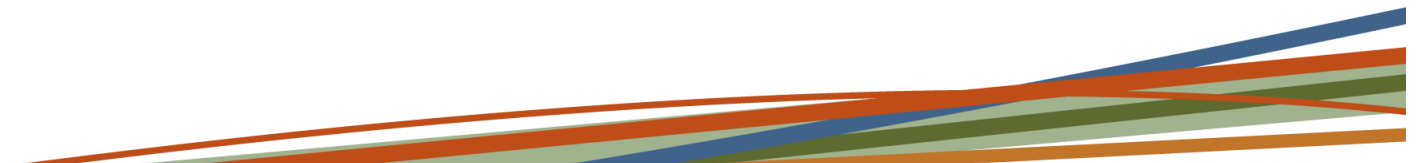
The annual SuperSites face-to-face meeting was held in Melbourne on June 10. At this meeting there was a consensus that the Australian SuperSite Network will continue under the substantially reduced NCRIS funding. The NCRIS-2015 funding will allow only a subset of field monitoring activities to be undertaken and it seems likely that equipment failures will begin to result in data gaps. Sub-contracts will be sent to the SuperSites as soon as possible, at present UQ is waiting on a signed contract to be returned from the Federal Government.

Personnel changes

The NCRIS funding uncertainty in May has led to the loss of the Data Manager position at LTERN which was so ably filled by Ivan Hanigan. We thank Ivan for all his hard work for both SuperSites and LTERN and wish him the best for the future. In the short term Ivan will be working with Guru on a different project and he will then switch to finishing off writing up his PhD. Alvin Sebastian has taken over many of the tasks that Ivan carried out for the SuperSites (attending IIDDG, working with the other Facilities) along with continued management of the website and development of the database systems. Shiela Lloyd will continue as the Data Librarian and provide database, webpage, administrative and newsletter support at a reduced FTE of 0.3, Tammy Shmueli will continue working on finance and assist with education/outreach web page development at a reduced FTE of 0.1. The change in the team roles and reduction in staffing levels will mean that the wheels will continue to turn but they are likely to run a bit slower on occasion.

Databases

The SuperSites Bioacoustic Data Portal is completed with the Bioacoustic Data portal open to the public to listen to and download recordings (<http://bioacoustics.supersite.net.au/>). The SuperSites Image Database on the NCI server has been loaded with the available phenocam images from the image upload directory using a script developed by Tim Brown. Public access and image download capabilities for the Image Database are in the final stages of development.



OzFlux Central Update

Funding

As with everyone else OzFlux has had cuts in their funding. In the upcoming financial year we will still benefit from some carry-over but what is already a much tighter budget this year will be even tighter in 2016-2017. We will have to find ways to get through 2016-2017 on a much lower budget and / or get extra funding. Unfortunately this means that the positions of the data manager (Peter Isaac) and the technical support (Ian McHugh, Emma White and Caecilia Ewenz) while ongoing will be reduced. To get additional funding we are exploring the avenue of Crowd Funding and hope to launch a campaign towards the end of the year. Additional funding raised will be used, as a first priority, to pay towards larger FTEs of our wonderful staff and then to fractionally increase contributions to all sites.

NASA-JPL SMAP

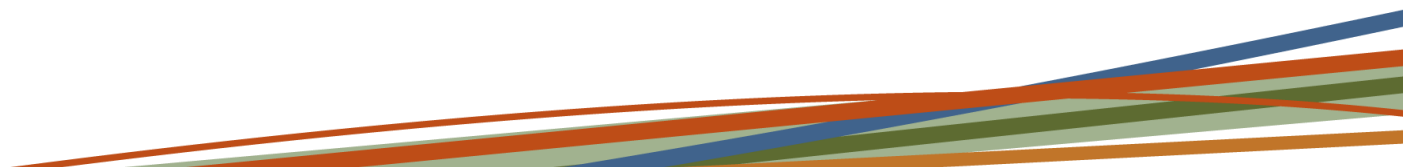
Ten OzFlux sites are delivering data into NASA's soil moisture active passive (SMAP) mission at the Jet Propulsion Laboratory. The satellite was launched in January 2015. The radiometer is operating normally, but they are working toward sorting a problem with the radar, which is integral in their estimation of soil moisture. We are involved with the calibration and validation phase, which began in April 2015. In this phase, they compare values of NEE and GPP between tower measurements and satellite estimates.

Special Issue

The Special Issue at Biogeosciences has received its first submission, "Combining two complementary micrometeorological methods to measure CH₄ and N₂O fluxes over pasture" by Johannes Laubach, Matti Barthel, Anitra Fraser and John E. Hunt. Be on the lookout for publication of the discussion paper. Contributors are encouraged to join the Trello board to access abstracts of the other contributions for opportunities to cite across papers in the Special Issue. For information on accessing the Trello board, contact James.Cleverly@uts.edu.au.

OzFlux meeting and workshop

Due to the above mentioned financial carry over from last year, we have enough funds for a 2015 OzFlux meeting and workshop. So, we will meet as scheduled at CSIRO in Hobart (Battery Point, Tasmania). The meeting is scheduled for 16–18 November 2015 and the workshop for the week before (9–13 November). Registration and accommodation details are forthcoming, so watch the OzFlux website for registration information.



News from around the SuperSite and OzFlux networks

Alice Mulga

Operations have been progressing smoothly with activities including:

- 1) Ecophysiology measurements (photosynthesis; stomatal conductance; pressure-volume analyses of 8 species)
- 2) Stable isotopes collections
- 3) Collection of data from acoustic recorders
- 4) LAI measurements
- 5) Presentation by James Cleverly at UTS: "Productivity and ecohydrology in the Ti Tree catchment"
- 6) Monthly data sharing to NASA JPL from both OzFlux towers on the SuperSite

There has been no substantial rainfall or productivity at Alice since the big wet in January.

Calperum Mallee

Operations at Calperum Mallee SuperSite (five site visits in 2015 so far) have included standard monitoring as well as setting up a plant canopy IR detection system and soil respiration measurements by Qiaoqi. Leaves were collected for SLA and leaf density.

A range of measurements were carried out at the burnt and unburnt sites including some destructive sampling of trees (burnt trees with regrowth and from an unburnt site). Biomass and leaf area were measured.

Projects/Visits

Two honours students completed their projects recently:

Isabel Telfer completed a project on "Uncertainty in water sources of mallee and floodplain vegetation". The aim of this project was to determine the water sources of the floodplain vegetation species *Eucalyptus camaldulensis* and *Eucalyptus largiflorens* as well as the mallee species *Eucalyptus socialis*. The water sources were to be determined using stable isotope methods.

Sylvia Bretherton completed a project on "Determining the interaction between surface conditions and groundwater on Calperum floodplain and consequences for salinity". This study examined eight years of well data observing the level and salinity of the local water table on the Calperum floodplain. The aims were: to determine the water table response to wetting and drying hence the interaction between surface conditions and groundwater; and to examine how water table salinity varies over space and time in response to wetting and drying of the floodplain ephemeral lakes.

Dr Elena Kondrlova from Slovak University of Agriculture, Nitra, will spend 5 months (May to September 2015) looking at soil water data and water balance.

The University of Adelaide ecology field camps held their first camp in April, at Calperum.

The National Australia Bank support for Earthwatch sponsored 12 of their employees for a study and research assisting experience at Calperum from 27 April to 6 May. The title of the program was "Valuing ecosystem services along the Murray". Peter Cale was heavily involved in setting up a comprehensive intensive monitoring and information exchange program with participants who were housed at the Station for the duration.

Cumberland Plain

The SuperSite has been very wet and flooded for weeks due to heavy rainfall in April.

Operations at Cumberland Plain have included standard monitoring at the core 1 ha as well as reconnaissance for a suitable locations for a ClimateWatch trail.

Instrumentation is being installed on the mobile flux tower (35 m mast & 4WD trailer). The facility is expected to be operational in a few months.

Projects / Visits

Destructive sampling for biomass estimation has been carried out at the Nutrient Network site. Rainout shelters for DroughtNet have been delivered and installed (run by Sally Power and Elise Pendall). A site visit was used for a class of 3rd year UWS students (ecosystem carbon accounting) to discuss carbon fluxes and pools.

Personnel

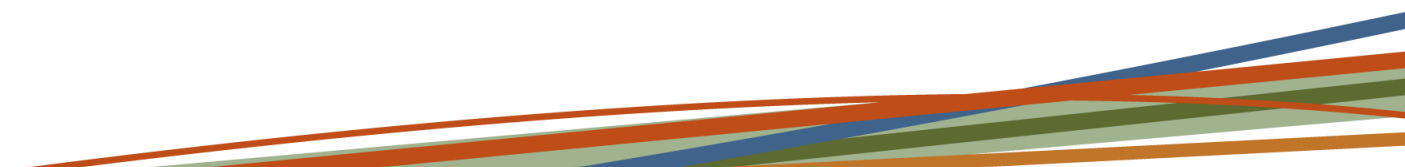
Adrian Bass (postdoc) and Alex Renchon (PhD student) will work with Elise Pendall on the Flux Tower.

FNQ Rainforest

A joint meeting on Future Rainforest Research Investment in the Wet Tropics Planning and FNQ Rainforest SuperSite Meeting was held on 21 April 2015.

FNQ Rainforest - Robson Creek

Operations have included standard monitoring with all equipment working. Fruit phenology surveys have continued. Phenocam images from the real-time display on the website have been quite popular for local push bikers and hikers checking on weather conditions. Voucher (fertile) collections: 188 of 207 tree species collected, 192 of 266 focal hectare species collected, wood density values obtained for 236 of 266 focal hectare species. Installation of 2 new generation Cosmos sensors completed in May to study canopy moisture and biomass. Additional sensors installed on the tower over



the last few months: Skye 4 channel NDVI sensor (SKR1860) and a 6 level profile system for CO₂, T, RH and windspeed. The CO₂ profile system is a modified version of the system that Ian/Jason have deployed at Whroo and Wombat and we are currently figuring out how to keep it operating under very high relative humidity conditions at night time.

Projects/Visits

Visitors to Robson have included Dr Rebecca Miller, University of Melbourne, who was collecting Proteaceae trees for cyanide content and comparison of morphological features. Demétrius Martins (PhD student) from Imperial College London who visited the site in mid-June to collect wood samples.

FNQ Rainforest - Daintree

Daintree Rainforest Observatory - a switch to a new, larger solar power system has caused some issues and there was a lot of data loss (xylem sensors, soil pits) and hardware damage due to power spikes. All TERN gear was fine except for a lost transformer for the acoustic sensor / soil pit with no data lost. Height measurement protocol developed for the dense rainforests using laser rangefinder and two people. This was based on a standard CSIRO method and the time requirements were DRO Core plot (1 ha) measured – time required 7 days: 8h/day: 2 people. All equipment working fine. The ground weather station suffered ant attack (again) and as a result the system lost some rainfall and solar radiation data. This was covered by the back-up system on the tower. There has been a new site manager appointed, Dr Raymond Dempsey.

Fabrication of the drought infrastructure has finished and the drought experiment has started.



Daintree Discovery Tower - systems running fine. Nine months of weekly malaise trap samples have been sent

to University of Guelph for DNA barcoding as part of the Global Malaise Study.

Projects / Visits

Large numbers of US students have been on site at DRO recently, as part of the visiting program that several US colleges are involved with. The Isoprene flux group from Macquarie University were on site for 1 week. Students from Imperial College London have started work on site.

Great Western Woodlands

Operations at GWW have included standard monitoring as well as field trialling and development of the Recruitment monitoring protocol and the Coarse Woody Debris protocol. Flux data are all up to date, processed to Level 6 using methods Peter Isaac has progressed. These data are being delivered to the NASA SMAP project on a monthly basis. The faulty IRGA cable was replaced and we have a new IRGA. IRGAs on the short and tall towers will both be changed on the next trip and we now have a spare to avoid data gaps. Third set of soil respiration / evaporation data now completed. Leaf area index data couldn't be collected due to camera failure. Litter traps, sap flow, dendrometer, water depth datasets up to date. Vegetation monitoring data processing completed, a few more identifications to go for the Gimlet plot; 2013 plots now available in AEKOS by searching Credo. These include general vegetation structure descriptions.

Department of Parks and Wildlife works at Credo flux site include establishing a new track to access the flux tower, due to long-term erosion problems on the Charlie Dam track. The new track avoids major drainage lines. Several hundred feral cattle have been removed from Credo by a musterer.

Project / Visits

Gimlet fire-age plots: Carl Gosper has finalized models of tree (Gimlet) size vs age based on tree ring analyses.

Sandplain plots (SWATT, led by Steve van Leeuwen): Rachel Meissner's contract finished at the end of April, she has 30 casual days left to tie up loose ends. The data are now all on AEKOS and downloadable. The transect network has applied for additional funds to do a soil metagenomics survey.

Nutrient Network: Nutrients applied and N deposition monitors installed in May and a new PhD student working on soil carbon in our NutNet site.

The field studies centre is being used every few months. There was a clinical school in February and there will be a survival course in June (GEMG). Kalgoorlie-Boulder High is coming out with 20 PEAC students to do plots and transects for a day. Other activities in the pipeline include a ranger outreach program with young people from Coolgardie.

The DroughtNet team, including Rachel Standish from Murdoch University, have selected 20 plots for the DroughtNet experiment, in the Bluebush shrublands near the airstrip a few km from the homestead

SEQ Peri-urban

Samford

Operations included standard monitoring as well as three 100 m x 5 m flowering and fruiting transects established with winter data currently being finalised. The ongoing observations for the Automated greenhouse gas measurements continue. The Sentek Triscan's, Odyssey Green light red light soil moisture probes and the Sentek Diviners continue to measure volumetric soil water content and electrical conductivity. The Sentek solu Samplers continue to measure nitrates and dissolved organic carbon in the soil water. Ongoing observations for net primary production continue. Stream flow and chemistry continue to be measured with the YSI Sonde's and the Sontek Argonauts.

Karawatha

Terrestrial Lidar research continuing on site with a PhD student comparing biomass estimation techniques and working on papers. ClimateWatch trail being planned with the Pullenvale Environmental Education Centre. Waiting on Council approval. Papers being put together on plant species diversity (PlosOne) and koalas. Student project on ant sampling is continuing.

Tumbarumba Wet Eucalypt

Operations included standard monitoring with the vegetation monitoring and characterisation, and bird surveys completed. Soil samples have been collected for the BioPlatforms BASE soil microbiota metabarcoding project. The Vegetation Height Sensitivity of ICESat/GLAS has been evaluated over multiple ecosystems (including Tumbarumba) and made use of the airborne LiDAR collection from AusCover. A paper has been submitted to Sensors. Data from the hyperspectral scanner has been used to look at in and between tree variability of vegetation indices related to chlorophyll content and the work has been presented at the EARSeL conference.



*Eva van Gorsel with COSMOS sensor at Tumbarumba
(Photo by M. Karan)*

Litchfield Savanna

Operations have started with the flux tower erected and instruments installed. Soil pit installed – CS650 / CS616 to 1.5 m.

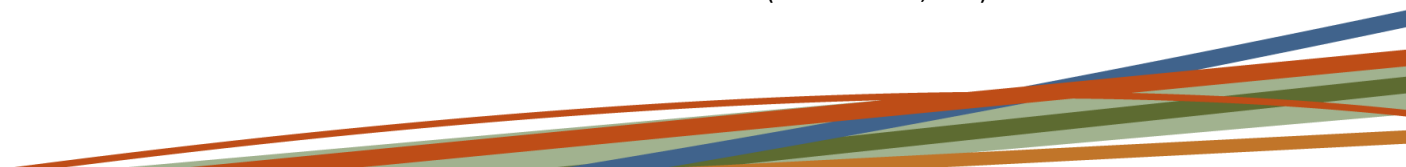
Remote sensing

- 3 channel VIS-NIR spectrometer (up-welling below canopy, up-welling above canopy, down-welling above canopy)
- Automatic cameras (upwards, downwards)
- Wi-Fi access point for spectrometers and cameras
- Phenocams on wireless flash cards (mount construction)
- Skye multi-spectral sensors (up and down)

Flux measurements

- 40 m guyed mast
- Standard OzFlux installation – mass and energy exchange
- Canopy CO₂ profile system
- Soil moisture monitoring to 2.5 m depth

Acoustic sampling has yet to commence; Bird and Ant surveys have now been completed. Ground based LiDAR (Shaun Levick, MPI) were carried out in June.



The Litchfield Savanna SuperSite was officially opened on 24 July 2015 with very good media coverage from TV, radio, online and print media.



Litchfield SuperSite opening. (Photo by A. Gibson)



Litchfield flux tower under construction. (Photo by Karen Joyce)

Victorian Dry Eucalypt

Whroo

Operations included standard monitoring as well as a soil profile analysis, initial bird surveys and installation of new soil moisture sensors to 1.6m. Currently in the process of comprehensive rewriting of logger programs and rewiring of tower instrumentation and power to fix some long-standing issues. This should be complete following next site visit. Tower work is suspended until new technician with height and tower rescue qualifications is appointed.

Projects / Visits

Met with Whroo Goldfields Conservation Management Network (WGCMN) members and coordinator (Janice Mentiplay-Smith) at Rushworth and took the members for a tour of the site (one of the seats on the Victorian Dry Eucalypt steering committee will be held by a [rotating] member of WGCMN).

Wombat

Operations included standard monitoring as well as installation of the understory phenocamera, initial bird survey completed. Coarse woody debris assessed following DSE protocol for FESA sites. We used two perpendicular 100 m transects intersecting at the plot centre at the Wombat 1ha plot. Soil characterisation and physio-chemical analysis completed. Leaf Area Index - (data and images) (continuous from August 2012, 100 m south of 1ha plot). Songmeter may need to be relocated due to background noise from the profiling system.

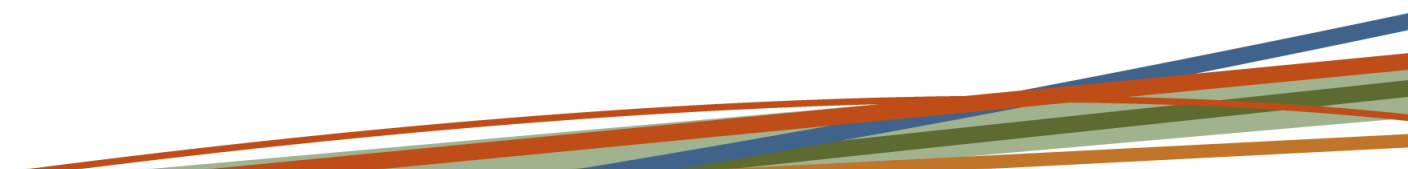


Anne Griebel with VEGNET sensor at Wombat. (Photo by M. Karan)

Warra Tall Eucalypt

Operations included standard monitoring as well as ongoing monthly collection of insects in four flight-intercept traps. Under canopy oblique to be installed mid-June. Above canopy to be installed next tower campaign (mounts constructed and ready).

Flux tower: Despite two tower campaigns (Jan & March) the CPEC200 system is still not capturing data from the



sonic and IRGA. Software issues are being investigated by CS software engineers in US. Meteorological and soil data are still being captured.

Projects / Visits

A full year of weekly malaise trap samples have been sent to University of Guelph for DNA barcoding as part of the Global Malaise Study.

Hydrology – Data collection and quality control proceeded without any issues. Planning commenced for a harvesting operation in Warra coupe 004A (will impact on King and Swanson Cks – Warra Ck to remain as a control pristine catchment).

Wildfire Chronosequence Plots – (0-10 cm and 10-20 cm) soil samples from all WCPs sent to AGRF for metagenomic analysis and to CSBP for chemical / physical analysis (same protocols as Supersites project).

ARC Linkage (LP140100075) "A new integrated approach for ecologically sustainable forest management" – Contracts signed; post-doc (Sue Baker) commenced; honours student (Scott Whitemore) commenced study comparing segmentation algorithms for processing acoustic data; approaching a potential PhD student for study evaluating potential of LIDAR/hyperspectral data for quantifying vegetation structure/composition.

Scott Whitemore (Maths Dept – UTas) commenced an honours study comparing the performance of different segmentation algorithms to detect vocalisations in acoustic data.

Meredith Adams (Edinburgh University) commenced honours study documenting the natural disturbance regime and resultant patterns in above-ground biomass of the Core 1 ha plot at Warra.

The Warra Science Meeting was held on 18th February, and was attended by: Tim Brodribb, Sam Woods (UTas); Pat Mitchell, Tony O'Grady, Libby Pinkard (CSIRO Land & Water); Kathy Allen (UMelb), Peter McIntosh (Forest Practices Authority).

Steve Read, Ian Ruscoe (C'wealth Dept. Ag.); Michael Battaglia (CSIRO); Mark Hunt (UTas); Penny Wells (Dept. State Growth); Pavel Rusika (Huon Valley Council); Amy Koch (Forest Practices Authority); Simon Grove, Cathy Burne (Tasmanian Museum and Art Gallery); Mirko Karan (SuperSites) attended the Warra Policy Committee field day on 3rd June.



Warra field day attendees. (Photo by Ian Ruscoe)

Recent Publications

Chen C, Cleverly J, Zhang L, Yu Q, Eamus D. (2015) Modelling seasonal and inter-annual variations in carbon and water fluxes in an arid-zone Acacia savanna woodland, 1981–2012. *Ecosystems* (in review).

Cleverly J, Eamus D, van Gorsel E, Chen C, Rumman R, Luo Q, Restrepo Coupe N, Li L, Kljun N, Faux R, Yu Q, Huete A. (2015) Productivity and evapotranspiration of two contrasting semiarid ecosystems following the 2011 carbon land sink anomaly. *Agricultural and Forest Meteorology* (in review).

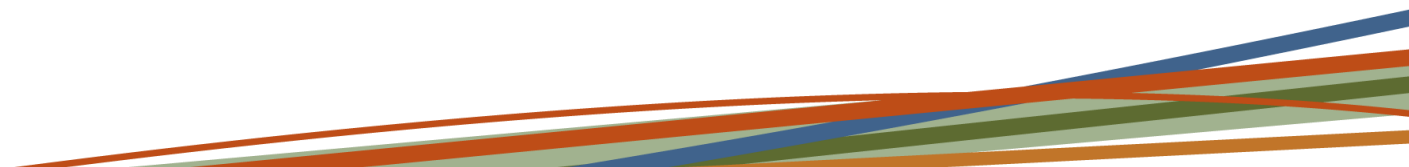
Koerber, G. (2015) Use of light-use efficiency functions to describe CO₂ uptake at a semi-arid site, role of leaf-area index and leaf density. Conference abstract. Rhizosphere4, Maastricht, Netherlands, 21-25 June 2015.

Eamus D, Cleverly J. (2015) Australia's role in the 2011 global carbon sink anomaly. Pages 18–19 *Australasian Science. Control Publications Pty Ltd, Victoria, Australia.*

Fay P, Prober SM, Harpole WS, Knops J, Bakker J, Borer E, Lind E, X MacDougall AS, Seabloom E, Wragg P, Adler P, Blumenthal D, Buckley Y, Chu C, Cleland E, Collins S, Davies K, Du G, Feng X, Firn J, Gruner D, Hagenah N, Hautier Y, Heckman R, Jin V, Kirkman K, Klein J, Ladwig LM, Li Q, McCulley R, Melbourne B, Mitchell C, Moore J, Morgan J, Risch A, Schuetz M, Stevens C, Wedin DA, Yang L (2015) Grassland productivity is limited by multiple nutrients. *Nature Plants* (in press).

Fest B.J., Wardlaw, T., Livesley, S.J., Duff, T.J, Arndt, S.K. (2015) Changes in soil moisture drive soil methane uptake along a fire regeneration chronosequence in a Eucalypt forest landscape. *Global Change Biology* (accepted).

Fountain-Jones, N.M.; Jordan, G.J.; Baker, T.P.; Balmer, J.M.; Wardlaw, T. and Baker, S.C. (2015) Living near



- the edge: Being close to mature forest increases the rate of succession in beetle communities. *Ecological Applications* 25(3): 800-811.
- Griebel, A., Bennett, L.T., Culvenor, D.S., Newnham, G.J., Arndt, S.K. (2015) Reliability and limitations of a novel terrestrial lidar scanner for continuous monitoring of forest canopy dynamics. *Remote Sensing of Environment* (minor revision)
- Lisa Guia (2014) Factors affecting the regeneration of the rainforest species, *Nothofagus cunninghamii* at the Warra Flux Site in Tasmania. *Unpublished student report for KPA378 Plant Science Research. University of Tasmania.*
- Meyer, W.S., Kondrlova, E. and Koerber, G.R. (2015) Evaporation of perennial semi-arid woodland in south eastern Australia is adapted for irregular but common dry periods. - *Hydrological Processes*, Published online in Wiley Online Library DOI: 10.1002/hyp.10467
- Popular science article "Hot and wet and here to stay". Autumn edition *Adelaidean* (p10 – 13. <https://www.adelaide.edu.au/adelaidean/issues/76665/news76684.html>)
- Santini NS, Cleverly J, Faux R, Lestrangle C, Rumman R, Eamus D. (2015) Xylem traits and water-use-efficiency of co-occurring woody species from the Ti Tree Basin arid zone. *Trees - Structure and Function* (in review).
- Seabloom E, Borer ET, Buckley Y, Cleland E, Davies K, Firn J, Harpole WS, Hautier Y, Lind E, MacDougall A, Orrock JL, Prober SM, Adler P, Anderson TM, Bakker JD, Biederman LA, Blumenthal D, Brown CS, Brudvic LA, Cadotte M, Chu C, Cottingham KL, Crawley MJ, Damschen EI, D'Antonio CM, DeCrappeo, NM, Du G, Fay PA, Frater P, Gruner DS, Hagenah N, Hector A, Hillebrand H, Hofmockel KS, Humphries HC, Jin VL, Kay A, Kirkman KP, Klein JA, Knops JMH, La Pierre KJ, Ladwig L, Lambrinos JG, Leakey ADB, Li Q, Li W, Marushia R, McCulley R, Melbourne B, Mitchell CE, Moore JL, Morgan J, Mortensen B, O'Halloran LR, Pyke DA, Risch AC, Sankaran M, Schuetz M, Simonson A, Smith M, Stevens C, Sullivan L, Wolkovich E, Wragg PD, Wright J, Yang L. (2015) Species origin determines dominance and response to nutrient enrichment. *Nature Communications* (in press).
- Shanafield M, Cook P, Gutiérrez-Jurado HA, Faux R, Cleverly J, Eamus D. (2015) Field comparison of multiple methods of characterizing groundwater discharge by evaporation and evapotranspiration: Stirling Swamp, Ti Tree Basin, Australia. *Journal of Hydrology* (in press).
- Shi H, Li L, Eamus D, Huete A, Cleverly J, Tian X, Yu Q, Wang S, Montagnani L, Magliulo V, Rotenberg E, Pavelka M, Carrara A. (2015) Assessing the ability of MODIS EVI to estimate terrestrial ecosystem gross primary production of multiple land cover types. *Agricultural and Forest Meteorology* (in review).
- Steane DA, Potts BM, McLean E, Collins L, Prober SM, Stock WD, Vaillancourt RE, Byrne M (2015). Genome wide scans reveal cryptic population structure in a dry-adapted eucalypt. *Tree Genetics and Genomes* (in press).
- Togashi H, Prentice IC, Atkin OK, Macfarlane C, Prober SM, Bloomfield KJ, Evans BH (2015) Thermal acclimation of leaf photosynthetic traits in an evergreen woodland consistent with the co-ordination hypothesis. (in review).
- Togashi HF, Prentice IC, Evans BJ, Forrester DI, Drake P, Feikema P, Brooksbank K, Eamus D, Taylor D. (2015) Morphological and moisture availability controls of the leaf area-to-sapwood area ratio: Analysis of measurements on Australian trees *Ecology and Evolution* 5(6):1263-1270.
- Villeneuve S, Cook PG, Shanafield M, Wood C, White N. (2015) Groundwater recharge via infiltration through an ephemeral riverbed, central Australia. *Journal of Arid Environments* 117:47-58. DOI: 10.1016/j.jaridenv.2015.02.009.

Upcoming Events

12-16 July 2015

52nd Annual Meeting of the Association for Tropical Biology and Conservation. Honolulu, Hawaii. See [website](#) for details.

19-24 July 2015

58th Annual Symposium of the International Association for Vegetation Science: Understanding broad-scale vegetation patterns. Brno, Czech Republic. See [website](#) for details.

20-31 July 2015

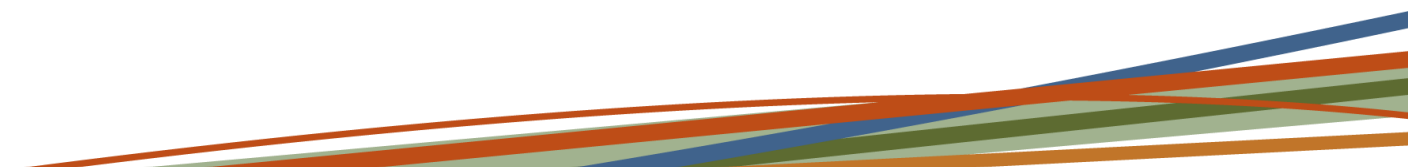
FLUXCOURSE 2015. University of Colorado Mountain Research Station, Niwot Ridge, USA. Conference, Queenstown, New Zealand. Details at: www.fluxcourse.org.

23-24 July 2015

2015 Fenner Conference on the Environment: Maximising the capacity of citizen science for science and society. Canberra. See [website](#) for details.

23-27 August 2015

6th World Conference on Ecological Restoration, Manchester, UK. See [website](#) for details.



6-10 October 2015

Digital Earth Summit 2015. Halifax, Canada. Details at: <http://digitalearth2015.ca/>

19-23 October 2015

eResearch Australasia 2015. Brisbane. See [website](#) for details.

3-5 November 2015

Australian Groundwater Conference 2015, Canberra. See [website](#) for details.

9-13 November 2015

OzFlux Data Workshop, Hobart, Tasmania. See [website](#) for further details.

16-18 November 2015

OzFlux General Meeting, Hobart, Tasmania. See [website](#) for further details.

29 November-3 December 2015

Ecological Society of Australia (ESA) Annual Conference 2015, Adelaide. See [website](#) for details.

The next issue of the Newsletter will be published in November 2015. If you have any news articles, photos, upcoming events, etc that you would like included please email shiela.lloyd@jcu.edu.au

TERN is supported by the Australian Government through NCRIS

NCRIS
National Research
Infrastructure for Australia
An Australian Government Initiative





PhD Scholarship

ARC-Funded Research

The School of Life Sciences at UTS includes, amongst others, three globally-recognised research teams: the Terrestrial Ecohydrology Research Group, led by Professor Derek Eamus, the Remote Sensing Research Group, led by Professor Alfredo Huete and the Terrestrial Productivity Modelling Research Group led by Professor Qiang Yu. Interaction among these three co-located groups is strong, allowing trans-disciplinary approaches to big science questions.

This PhD Scholarship is part of a recently awarded ARC-funded research project awarded to Professor Eamus, within the Terrestrial Ecohydrology Research Group.

Title: Determining the growth and physiological responses of trees to groundwater abstraction from shallow aquifers

Supervisor: Professor Derek Eamus

Project Description: Groundwater dependent ecosystems rely on a supply of groundwater for the maintenance of their structure and function, including growth and rates of water-use. This project will focus on determining the ecophysiological responses of trees to groundwater abstraction and involves close collaboration with three industry partners (Hunter Water Corporation, Mid-Coast Water and the NSW Office of Water). A principle aim of this project is to develop a real-time sensitive indicator of tree responses to groundwater abstraction as an aid to sustainable management of groundwater resources and groundwater dependent ecosystems.

Desirable Skills and Qualifications:

- > A 1st Class Honours degree in plant ecophysiology, plant physiology, ecohydrology or related discipline
- > Expertise in field based plant ecophysiology (for example: plant water relations, stable isotope analyses of plant material, studies of tree growth using dendrometers, field based data-logging) or related disciplines
- > Current manual driving licence
- > Open to Domestic students only for commencement at a mutually agreed date in 2015 or early 2016.

Applications close : August 31st 2015

Send your CV and a ½ page expression of interest to : Derek.Eamus@uts.edu.au