

# Thomas Norman Buckley

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## AFFILIATION

Department of Plant Sciences, University of California, Davis, One Shields Ave, Davis, CA 95616  
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## EDUCATION

- 1994-1999    **PhD in Biology**, Utah State University, Logan, Utah  
Major Professor: Keith A. Mott  
Dissertation: "Mechanisms and implications of stomatal interactions"
- 1990-1994    **BS in Biology**, James Madison University, Harrisonburg, Virginia  
Highest honors (*summa cum laude*)  
Botany Concentration, Minors in Mathematics and Chemistry
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## CAREER SUMMARY

- 2019-*present*    **Associate Professor**, University of California, Davis  
2017-2019    **Assistant Professor**, University of California, Davis  
2013-2017    **GRDC Senior Lecturer**, The University of Sydney  
2013-2013    **Associate Professor** (awarded tenure), Sonoma State University  
2008-2013    **Assistant Professor**, Sonoma State University  
2006-2008    **Senior Research Fellow**, University of New South Wales  
2005-2006    **Research Assistant Professor**, Utah State University  
2004-2005    **Research Fellow**, The Australian National University  
2000-2002    **Postdoctoral Fellow** and **Lecturer**, Utah State University  
1999-2003    **Postdoctoral Fellow**, The Australian National University
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## SUMMARY OF CAREER ACCOMPLISHMENTS

Author of 90 journal articles (37 as first or co-first author, 14 as last) and two book chapters  
h-index 45/35, 6914/3950 citations (GS/WoS), six Highly Cited Papers, one Hot Paper  
Instructor for 20 university courses, supervisor or co-supervisor of 25+ research students  
PI or co-PI on competitive external research grants totaling over USD \$11M since 2009

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## EXPERTISE

*Biophysics and ecology of plant responses and adaptations to environmental stress and change:*  
leaf and plant water relations; photosynthesis; respiration; field physiological phenotyping; gas exchange; sap flow; pressure probe; psychrometry; mathematical and computational modeling.

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**RESEARCH GRANTS AS PI OR CO-PI**

22. Foundation for Food and Agriculture Research (FFAR) (2021-2024) USD 1,300,000. "Compact, low power, and machine-learning-based in vivo terahertz leaf sensor for precision irrigation." PI: Omeed Momeni (UC Davis). Co-PI: **Tom Buckley** (UC Davis).
21. USDA National Institute of Food and Agriculture (NIFA) (2020-2023) USD 475,000. "A synoptic approach to physiological breeding for drought resilience in bean." PI: **Tom Buckley** (UC Davis). Co-PIs: Troy Magney, Matthew Gilbert and Paul Gepts (UC Davis).
20. National Science Foundation (NSF) (2020-2023) USD 689,929. "Collaborative research: The critical importance of diverse leaf 'hairstyles': integrative quantification of anatomy, function, evolution and ecology of trichomes." PI: Lawren Sack (UCLA). Co-PIs: **Tom Buckley** (UC Davis), Kailen Mooney (UC Irvine), Jeremy Beaulieu (University of Arkansas).
19. USDA NIFA (2021-2023) USD 166,164. "The Phenotyping Mobile Optical Platform (PhenoMOP)." PI: Troy Magney (UC Davis). Co-PIs: **Tom Buckley**, Christine Diepenbrock, Ed Blumwald, Charlie Brummer, Gail Taylor, Mallika Nocco (UC Davis).
18. Save the Redwoods League (Apr-Sep 2020) USD 191,755. "Redwood Genome Project (Extension)." PI: David Neale (UC Davis). Co-PIs: **Tom Buckley** (UC Davis), Jill Wegrzyn (University of Connecticut), Steven Salzberg, Winston Timp (Johns Hopkins University).
17. USDA NIFA (2020-2022) USD 279,000. "Interdisciplinary training in digital agriculture innovation." PI: Brian Bailey, co-PIs: **Tom Buckley**, Isaya Kisekka, Heiner Leith (UC Davis).
16. Australian Research Council (ARC) (2020-2023) AUD 500,000 (~USD 335,000). "Leaves in 3D: photosynthesis and water-use efficiency." PIs: Margaret Barbour (University of Waikato), John Evans (Australian National University), Lamiae Azizi (University of Sydney). Co-PIs: **Tom Buckley** (UC Davis), Andrew McElrone (UC Davis), Craig Brodersen (Yale), Danny Tholen (BOKU, Vienna).
15. 4R Research Fund (2019-2024) USD 503,429. "Nitrate-sensitive salinity management: an advanced 4R practice to optimize nutrient and water uptake under microirrigation." PIs: Patrick Brown and **Tom Buckley** (UC Davis).
14. Almond Board of California (ABC) (2019-2020) USD 15,144. "The effect of early post-harvest irrigation on tree health." PIs: **Tom Buckley** and Patrick Brown (UC Davis).
13. ABC (2019-2020) USD 58,047. "Data driven physiological modeling of canopy photosynthesis for precision irrigation management." PI: **Tom Buckley** (UC Davis).
12. Seed Grant for International Activities, UC Davis (2019-2021) USD 19,574. "Applying a revolutionary new method to measure leaf water potential in intact, functioning leaves." PI: **Tom Buckley** (UC Davis). Co-PIs: Andrew Merchant (University of Sydney), Carel Windt (Forschungszentrum Jülich).
11. ABC (2018-2019) USD 59,076. "Data driven physiological modeling of canopy photosynthesis for precision irrigation management." PIs: **Tom Buckley** and Matthew Gilbert (UC Davis).

10. ABC (2017-2018) USD 29,266. "An improved heat ratio method sap flow sensor for providing continuous physiological data for decision support for almond grower and researchers." PIs: Matthew Gilbert and **Tom Buckley** (UC Davis).
9. International Wheat Yield Partnership (2016-2018) AUD 1,286,122 (~USD 900,285). "Increasing carbon capture by optimising canopy resource distribution" PI: **Tom Buckley** (University of Sydney). Co-PIs: Richard Trethowan, Helen Bramley, Peter Sharp, Andrew Merchant, David Fuentes (University of Sydney), Matthew Gilbert (UC Davis).
8. NSF (2016-2019) USD 916,736. "Integrated adaptations to moisture supply and crossover in whole-plant growth among Eucalyptus species along an Australian rainfall gradient." PIs: Tom Givnish and Kate McCulloh (University of Wisconsin), **Tom Buckley** and Mark Adams (University of Sydney).
7. Grains Research and Development Corporation (2015-2020) AUD 3,697,159 (~USD 2,588,011). "Introgression of heat-tolerant genes to broaden genetic variation in current wheat breeding populations." PIs: Richard Trethowan, Helen Bramley, Daniel Tan, **Tom Buckley** (University of Sydney).
6. Phillip Bushell Foundation (2015-2018) AUD 260,000 (~USD 182,000). "Future of forest research and education." PIs: Mark Adams, **Tom Buckley**, Tarryn Turnbull, Tina Bell (University of Sydney).
5. ARC (2015-2017) AUD 313,900 (~USD 291,730). Discovery Grant: "Are plants wasting water in the dark?" PIs: Margaret Barbour and **Tom Buckley** (University of Sydney).
4. ARC (2014-2017) AUD 541,581 (~USD 379,107). Linkage Grant: "Optimisation of catchment management: stable isotope studies of water storage and yield." PIs: Mark Adams, **Tom Buckley**, Willem Vervoort, Kevin Simonin and Claudia Keitel (University of Sydney), and Christopher Hepplewhite (ACTEW Corporation).
3. Bushfire & Natural Hazards CRC (2014-2017) AUD 1.259M (~USD 881,300). "Optimisation of fuel reduction burning regimes for fuel reduction, carbon, water and vegetation outcomes." PIs: Tina Bell, Mark Adams, Malcolm Possell, Tarryn Turnbull, **Tom Buckley** (University of Sydney).
2. NSF (2012-2015) USD 913,892. "Mechanisms for the decline of leaf hydraulic conductance with dehydration, and plant- and environment-level impacts." PIs: Lawren Sack (UCLA), **Tom Buckley** (Sonoma State University), Diane Pataki (University of Utah).
1. ARC (2009-2012) AUD 785,000 (~USD 549,500). Linkage Grant: "Testing climatic, physiological and hydrological assumptions underpinning water yield from montane forests." PIs: Mark Adams (University of Sydney), **Tom Buckley** (Sonoma State University), Tarryn Turnbull and Willem Vervoort (University of Sydney), Nathan Phillips (Boston University), David Tissue (University of Western Sydney), Christopher Hepplewhite (ACTEW Corporation).

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**PEER-REVIEWED JOURNAL PUBLICATIONS**

90. Verslues P, Bailey-Serres J, Brodersen C, **Buckley TN**, Conti L, Christmann A, Dinneny J, Grill E, Hayes S, Heckman R, Hsu P-K, Juenger R, Mas P, Munnik T, Nelissen H, Sack L, Schroeder J, Testerink C, Tyerman S, Umezawa T, Wigge P (2023) Burning questions for a warming and changing world: 15 unknowns in plant abiotic stress. *The Plant Cell* (in press) (10.1093/plcell/koac263)
89. He N, Yan P, Liu C, Xu L, Li M, van Meerbeek K, Zhou G, Zhou G, Liu S, Zhou X, Li S, Niu S, Han X, Violle C, **Buckley TN**, Sack L, Yu G (2022) Predicting ecosystem productivity based on plant community traits. *Trends in Plant Science* (in press) (10.1016/j.tplants.2022.08.015)
88. Vinod N, Slot M, McGregor I, Ordway E, Smith M, Taylor T, Sack L, **Buckley TN**, Anderson-Teixeira K (2022) *Tansley Review*: Thermal sensitivity across forest vertical profiles: patterns, mechanisms, and ecological implications. *New Phytologist* (in press) (10.1111/nph.18539)
87. Fletcher L, Scoffoni C, Farrell C, **Buckley TN**, Pellegrini M, Sack L (2022) Testing the association of relative growth rate and adaptation to climate across natural ecotypes of *Arabidopsis*. *New Phytologist* 236:413-432 (10.1111/nph.18369)
86. Wong CYS, Bambach N, Alsina M, McElrone A, Jones T, **Buckley TN**, Kustas W, Magney TS (2022) Detecting short-term stress and recovery events in a vineyard using tower-based remote sensing of photochemical reflectance index (PRI). *Irrigation Science* (10.1007/s00271-022-00777-z)
85. Trueba S, Theroux-Rancourt G, Earles JM, **Buckley TN**, Love D, Johnson DM, Brodersen C (2022) The 3D construction of leaves is evolutionarily coordinated with water use efficiency in conifers. *New Phytologist* 233:851-861 (10.1111/nph.17772)
84. De La Torre AR\*, Sekhwal MK, Scott AD, Allen B, Neale DB, Chin ARO, **Buckley TN\*** (2022) Genome-wide association identifies candidate genes for drought tolerance in coast redwood and giant sequoia. *The Plant Journal* 109:7-22 (\*equal contributions) (10.1111/tpj.15592)
83. **Buckley TN** (2021) Optimal carbon partitioning helps reconcile the apparent divergence between optimal and observed canopy profiles of photosynthetic capacity. *New Phytologist* 230:2246-2260 (10.1111/nph.17199)
82. Adams MA, **Buckley TN**, Binkley D, Neumann N, Turnbull TL (2021) CO<sub>2</sub>, nitrogen deposition and a discontinuous climate response drive water use efficiency in global forests. *Nature Communications* 12:1-9 (10.1038/s41467-021-25365-1)
81. Wong CYS, Young DJN, Latimer AM, **Buckley TN**, Magney TS (2021) Importance of the legacy effect for assessing spatiotemporal correspondence between interannual tree-ring width and remote sensing products in the Sierra Nevada. *Remote Sensing of Environment* 265:112635 (10.1016/j.rse.2021.112635)
80. Deng Z\*, Vice H, Gilbert ME, Adams MA, **Buckley TN\*** (2021) A double-ratio method (DRM) to measure fast, slow and reverse sap flows. *Tree Physiology* 41:2438-2453 (10.1093/treephys/tpab081) (\*equal contributions)
79. Ely K et al. [81 authors] (2021) A reporting format for leaf-level gas exchange data and metadata. *Ecological Informatics* 61:101232 (10.1016/j.ecoinf.2021.101232)
78. Adams MA, **Buckley TN**, Turnbull TL (2020) Diminishing CO<sub>2</sub>-driven gains in water use efficiency of global forests. *Nature Climate Change* 10:466-471 (10.1038/s41558-020-0747-7)

77. Sack L, **Buckley TN** (2020) Trait multi-functionality in plant stress response. *Integrative and Comparative Biology* 60:98-112 (10.1093/icb/icz152)
76. Salter WT, Merchant A, Richards RA, Trethowan R, **Buckley TN** (2020) Wide variation in the suboptimal distribution of photosynthetic capacity in relation to light across genotypes of wheat. *AoBP* 12:plaa039 (10.1093/aobpla/plaa039)
75. Grossiord C, **Buckley TN**, Cernusak LA, Novick KA, Poulter B, Siegwolf RTW, Sperry JS, McDowell NG (2020) *Tansley Review*: Plant responses to rising evaporative demand. *New Phytologist* 226:1550-1566 (10.1111/nph.16485)
74. Albuquerque CP, Scoffoni C, Brodersen C, **Buckley TN**, Sack L, McElrone AJ (2020) Coordinated decline of leaf hydraulic and stomatal conductances under drought is not linked to leaf xylem embolism for different grapevine cultivars. *Journal of Experimental Botany* 71: 7286-7300 (10.1093/jxb/eraa392)
73. **Buckley TN** (2019) *Tansley Review*: How do stomata respond to water status? *New Phytologist* 224:21-36 (10.1111/nph.15899)
72. **Buckley TN**, Sack L (2019) The humidity inside leaves, and why you should care: implications of unsaturation of leaf intercellular airspaces. *American Journal of Botany* 106:618-621 (10.1002/ajb2.1282)
71. Adams MA, **Buckley TN**, Turnbull TL (2019) Rainfall drives variation in rates of change in intrinsic water use efficiency of tropical forests. *Nature Communications* 10:1-8 (10.1038/s41467-019-11679-8)
70. Rodriguez-Dominguez CM, Hernandez-Santana V, **Buckley TN**, Fernandez JE, Diaz-Espejo A (2019) Sensitivity of leaf turgor to air vapour pressure deficit correlates with maximum stomatal conductance. *Agricultural and Forest Meteorology* 272:156-165 (10.1016/j.agrformet.2019.04.006)
69. Salter WT, Merchant A, Richards RA, Trethowan R, **Buckley TN** (2019) Rate of photosynthetic induction in fluctuating light varies widely among genotypes of wheat. *Journal of Experimental Botany* 70:2787-2796 (10.1093/jxb/erz100)
68. Salter WT, Merchant A, Gilbert ME, **Buckley TN** (2019) PARbars: cheap, easy to build ceptometers for continuous measurement of light interception in plant canopies. *Journal of Visualized Experiments* e59447 (10.3791/59447)
67. Liu N, **Buckley TN**, Guan H, He Xinguang, Zhang X, Zhang C, Luo Z, Wang H, Sterling N, Guan H (2019) Improvement of a simplified process-based model for estimating transpiration under water-limited conditions. *Hydrological Processes* 33:1670-1685 (10.1002/hyp.13430)
66. Earles JM\*, **Buckley TN\***, Brodersen CR, Busch FA, Cano FJ, Choat B, Evans JR, Farquhar GD, Harwood R, Huynh M, John GP, Miller ML, Rockwell FE, Sack L, Scoffoni C, Struik PC, Wu A, Yin X, Barbour MM (2019) Embracing 3D complexity in leaf carbon-water exchange. *Trends in Plant Science* 24:15-24 (\*equal contributions) (10.1016/j.tplants.2018.09.005)
65. North M, Stevens J, Greene D, Coppoletta M, Knapp E, Latimer A, Restaino C, Tompkins R, Welch K, York R, Young D, Axelson JN, **Buckley TN**, Estes B, Hagar R, Long J, Meyer M, Ostoja S, Safford H, Shive K, Tubbesing C, Vice H, Walsh D, Werner C, Wyrsh P (2019) Reforestation for resilience in dry western forests. *Forest Ecology and Management* 432:209-224 (10.1016/j.foreco.2018.09.007)
64. Shrestha A, **Buckley TN**, Lockhart E, Barbour MM (2019) The response of mesophyll conductance to short- and long-term environmental conditions in chickpea genotypes. *AoBP* 11:ply073 (10.1093/aobpla/ply073)

63. Salter WT, Gilbert ME, **Buckley TN** (2018) Time-dependent bias in instantaneous ceptometry caused by row orientation. *The Plant Phenome Journal* 1:180004 (10.2135/tppj2018.07.0004)
62. Scoffoni C, Albuquerque C, Cochard H, **Buckley TN**, Fletcher L, Caringella M, Bartlett M, Brodersen C, Jansen S, McElrone A, Sack L (2018) The causes of leaf hydraulic vulnerability and its influence on gas exchange in *Arabidopsis thaliana*. *Plant Physiology* 178:1584-1601 (10.1104/pp.18.00743)
61. Salter WT, Gilbert ME, **Buckley TN** (2018) A multiplexed gas exchange system for increased throughput of photosynthetic capacity measurements. *Plant Methods* 14:80 (10.1186/s13007-018-0347-y)
60. Adams MA, Buchmann N, Sprent J, **Buckley TN**, Turnbull TL (2018) Crops, nitrogen and water: are legumes friend, foe or misunderstood ally? *Trends in Plant Science* 23:539-550 (10.1016/j.tplants.2018.02.009)
59. Adams MA, **Buckley TN**, Salter WT, Buchmann N, Blessing C, Turnbull TL (2018) Contrasting physiological responses of crop legumes and cereals to nitrogen availability. *New Phytologist* 217:1475-1483 (10.1111/nph.14918)
58. Sack L, John G, **Buckley TN** (2018) ABA accumulation in dehydrating leaves is associated with decline in cell volume, not turgor pressure. *Plant Physiology* 176:489-495 (10.1104/pp.17.01097)
57. **Buckley TN**, Vice H, Adams MA (2017) The Kok effect in *Vicia faba* L. cannot be explained solely by changes in chloroplastic CO<sub>2</sub> concentration. *New Phytologist* 216:1064-1071 (10.1111/nph.14775)
56. **Buckley TN**, Scoffoni C, John G, Sack L (2017) The sites of evaporation within leaves. *Plant Physiology* 173:1763-1782 (10.1104/pp.16.01605)
55. **Buckley TN** (2017) Update review: Modeling stomatal conductance. *Plant Physiology* 174:572-582 (10.1104/pp.16.01772)
54. **Buckley TN**, Sack L, Farquhar GD (2017) Optimal plant water economy. *Plant, Cell and Environment* 40:881-896 (10.1111/pce.12823)
53. Tcherkez G, Gauthier PPG, **Buckley TN**, Busch FA, Barbour MM, Bruhn D, Heskell MA, Gong X, Crous K, Griffin K, Way D, Turnbull MH, Adams MA, Atkin OK, Farquhar GD, Cornic G (2017) *Tansley Review*: Leaf day respiration: low CO<sub>2</sub> flux but high significance for metabolism and carbon balance. *New Phytologist* 216:968-1001 (10.1111/nph.14816)
52. Bellasio C, Quirk J, **Buckley TN**, Beerling DJ (2017) A dynamic hydro-mechanical and biochemical model of stomatal conductance for C4 photosynthesis. *Plant Physiology* 175:104-119 (10.1104/pp.17.00666)
51. John GP, Scoffoni C, **Buckley TN**, Villar R, Poorter H, Sack L (2017) The anatomical and compositional basis of leaf mass per area. *Ecology Letters* 20:412-425 (10.1111/ele.12739)
50. Scoffoni C, Albuquerque C, Brodersen CR, Townes SV, John GP, Bartlett MK, **Buckley TN**, McElrone AJ, Sack L (2017) Outside-xylem pathways, not xylem embolism, drive leaf hydraulic decline with dehydration. *Plant Physiology* 173:1197-1210 (10.1104/pp.16.01643)
49. Scoffoni C, Albuquerque C, Brodersen CR, Townes SV, John GP, Cochard H, **Buckley TN**, McElrone AJ, Sack L (2017) Leaf vein xylem conduit diameter influences susceptibility to embolism and hydraulic decline. *New Phytologist* 213:1076-1092 (10.1111/nph.14256)

48. Barbour MM, Farquhar GD, **Buckley TN** (2017) Leaf water stable isotopes and water transport outside the xylem. *Plant, Cell and Environment* 40:914-920 (10.1111/pce.12845)
47. Tcherkez G, Gauthier P, **Buckley TN**, Busch FA, Barbour MM, Bruhn D, Heskell MA, Gong XY, Crous K, Griffin KL, Way DA, Turnbull MH, Adams MA, Atkin OA, Bender M, Farquhar GD, Cornic G (2017) Tracking the origins of the Kok effect, 70 years after its discovery. *New Phytologist* 214:506-510 (10.1111/nph.14527)
46. **Buckley TN** (2016) *Commentary*: Stomatal responses to humidity: has the "black box" finally been opened? *Plant, Cell & Environment* 39:482-484 (10.1111/pce.12651)
45. Sack L, **Buckley TN** (2016) The developmental basis of stomatal density and flux. *Plant Physiology* 171:2358-2363 (10.1104/pp.16.00476)
44. Rodriguez-Dominguez CM\*, **Buckley TN\***, Egea G, de Cires A, Hernandez-Santana V, Martorell S, Díaz-Espejo A (2016) Most stomatal closure in moderate drought in woody species can be explained by stomatal responses to leaf turgor. *Plant, Cell and Environment* 39:2014-2026 (\*equal contributions) (10.1111/pce.12774)
43. Sack L, **Buckley TN**, Scoffoni C (2016) Why are leaves hydraulically vulnerable? (*Insight article*) *Journal of Experimental Botany* 67:4917-4919
42. **Buckley TN**, John GP, Scoffoni C, Sack L (2015) How does leaf anatomy influence water transport outside the xylem? *Plant Physiology* 168:1616-1635 (<https://doi.org/10.1104/pp.15.00731>)
41. **Buckley TN**, Díaz-Espejo A (2015) Partitioning changes in photosynthetic rate into contributions from underlying variables. *Plant, Cell and Environment* 38:1200-1211
40. **Buckley TN** (2015) The contributions of apoplastic, symplastic and gas phase pathways for water transport outside the bundle sheath in leaves. *Plant, Cell and Environment* 38:7-22
39. **Buckley TN**, Díaz-Espejo A (2015) Reporting estimates of maximum potential electron transport rate. *New Phytologist* 205:14-17
38. Poorter H, Jagodzinski AM, Ruiz-Peinado R, Kuyah S, Luo Y, Oleksyn J, Usoltsev VA, **Buckley TN**, Reich PB, Sack L (2015) How does biomass allocation change with size and differ among species? An analysis for 1200 plant species from five continents. *New Phytologist* 208:736-749
37. **Buckley TN\***, Martorell S\*, Díaz-Espejo A, Tomas M, Medrano H (2014) Is stomatal conductance optimised over both time and space in plant crowns? A field test in grapevine (*Vitis vinifera*). *Plant, Cell and Environment* 37:2707-2721 (\*equal contributions) (10.1111/pce.12343)
36. **Buckley TN**, Schymanski S (2014) Stomatal optimisation in relation to atmospheric CO<sub>2</sub>. *New Phytologist* 201:372-377
35. **Buckley TN**, Warren CM (2014) The role of mesophyll conductance in the economics of nitrogen and water use in photosynthesis. *Photosynthesis Research* 119:77-88
34. Turnbull TL, **Buckley TN**, Barlow AM, Adams MA (2014) Anatomical and physiological regulation of post-fire carbon and water exchange in canopies of two resprouting *Eucalyptus* species. *Oecologia* 176:333-343
33. **Buckley TN**, Mott KA (2013) Modeling stomatal conductance in response to environmental factors. *Plant, Cell and Environment* 36:1691-1699

32. **Buckley TN**, Cescatti A, Farquhar GD (2013) What does optimisation theory actually predict about crown profiles of photosynthetic capacity, when models incorporate greater realism? *Plant, Cell and Environment* 36:1547-1563 (10.1111/pce.12091)
31. **Buckley TN**, Turnbull TL, Adams MA (2012) Simple models for stomatal conductance derived from a process model: cross-validation against sap flux data. *Plant, Cell and Environment* 35:1647-1662 (10.1111/j.1365-3040.2012.02515.x)
30. **Buckley TN**, Turnbull TL, Pfautsch S, Gharun M, Adams MA (2012) Differences in water use between mature and post-fire regrowth stands of subalpine *Eucalyptus delegatensis* R. Baker. *Forest Ecology and Management* 270:1-10
29. Díaz-Espejo A, **Buckley TN**, Sperry JS, Cuevas MV, de Cires A, Elsayed-Farag S, Martin-Palomo MJ, Muriel JL, Perez-Martin A, Rodriguez-Dominguez CM, Rubio-Casal AE, Torres-Ruiz JM, Fernández JE (2012) Steps toward an improvement in process-based models of water use by fruit trees: a case study in olive. *Agricultural Water Management* 114:37-49
28. Merchant A, **Buckley TN**, Pfautsch S, Turnbull TL, Samsa GA, Adams MA (2012) Site-specific responses to short-term environmental variation are reflected in leaf and phloem-sap carbon isotopic abundance of field grown *Eucalyptus globulus*. *Physiologia Plantarum* 146:448-459
27. **Buckley TN**, Sack L, Gilbert ME (2011) The role of bundle sheath extensions and life form in stomatal responses to leaf water status. *Plant Physiology* 156:962-973
26. **Buckley TN**, Turnbull TL, Pfautsch S, Adams MA (2011) Nocturnal water loss in mature subalpine *Eucalyptus delegatensis* tall open forests and adjacent *E. pauciflora* woodlands. *Ecology and Evolution* 1:435-450
25. **Buckley TN**, Adams MA (2011) An analytical model of non-photorespiratory CO<sub>2</sub> release in the light and dark in leaves of C3 species based on stoichiometric flux balance. *Plant, Cell and Environment* 34:89-112
24. **Buckley TN** (2008). The role of stomatal acclimation in modelling tree adaptation to high CO<sub>2</sub>. *Journal of Experimental Botany* 59:1951-1961
23. Phillips NG, **Buckley TN**, Tissue DT (2008) Capacity of old trees to respond to environmental change. *Journal of Integrative Plant Biology* 50:1355-1364
22. Barbour MM, **Buckley TN** (2007) The stomatal response to evaporative demand persists at night in *Ricinis communis* plants with high nocturnal conductance. *Plant, Cell and Environment* 30:711-721
21. **Buckley TN**, Roberts DW (2006) DESPOT: a tree growth model that allocates carbon to maximize carbon gain. *Tree Physiology* 26:129-144
20. **Buckley TN**, Roberts DW (2006) How should leaf area, sapwood area and stomatal conductance vary with tree height to maximize growth? *Tree Physiology* 26:145-157
19. Messinger SM, **Buckley TN**, Mott KA (2006) Evidence for involvement of photosynthetic processes in the stomatal response to CO<sub>2</sub>. *Plant Physiology* 140:771-778
18. Powles JE, **Buckley TN**, Nicotra AB, Farquhar GD (2006) Dynamics of stomatal water relations following leaf excision. *Plant, Cell and Environment* 29:981-992
17. **Buckley TN** (2005) Tansley Review: The control of stomata by water balance. *New Phytologist* 168:275-292 (10.1111/j.1469-8137.2005.01543.x)



16. Roxburgh SH, Berry SL, **Buckley TN**, Barnes B, Roderick ML (2005) What is NPP? Inconsistent accounting of respiratory fluxes in the definition of net primary productivity. *Functional Ecology* 19:378-382
15. **Buckley TN**, Farquhar GD (2004) A new analytical model for whole-leaf potential electron transport rate. *Plant, Cell and Environment* 27:1487-1502
14. **Buckley TN**, Mott KA, Farquhar GD (2003) A hydromechanical and biochemical model of stomatal conductance. *Plant, Cell and Environment* 26:1767-1785 (10.1046/j.1365-3040.2003.01094.x)
13. **Buckley TN**, Farquhar GD, Miller JM (2002) The mathematics of linked optimisation for water and nitrogen use in a canopy. *Silva Fennica* 36:639-669
12. **Buckley TN**, Mott KA (2002) Dynamics of stomatal water relations during the humidity response: implications of two hypothetical mechanisms. *Plant, Cell and Environment* 25:407-419 (10.1046/j.0016-8025.2001.00820.x)
11. **Buckley TN**, Mott KA (2002) Stomatal water relations and the control of hydraulic supply and demand. *Progress in Botany* 63:309-325
10. Farquhar GD, **Buckley TN**, Miller JM (2002) Optimal stomatal control in relation to leaf area and nitrogen content. *Silva Fennica* 36:625-637
9. Mäkelä A, Givnish TJ, Berninger F, **Buckley TN**, Farquhar GD, Hari P (2002) Challenges and opportunities of the optimality approach in plant ecology. *Silva Fennica* 36:605-614
8. Franks PJ, **Buckley TN**, Shope JS, Mott KA (2001) Guard cell volume and pressure measured concurrently by confocal microscopy and the cell pressure probe. *Plant Physiology* 125:1577-1584
7. **Buckley TN**, Mott KA (2000) Stomatal responses to non-local changes in PFD: evidence for long-distance hydraulic interactions. *Plant, Cell and Environment* 23:301-309
6. Mott KA, **Buckley TN** (2000) Patchy stomatal conductance: emergent collective behaviour of stomata. *Trends in Plant Science* 5:258-262
5. **Buckley TN**, Farquhar GD, Mott KA (1999) Carbon-water balance and patchy stomatal conductance. *Oecologia* 118:132-143
4. Mott KA, Shope JS, **Buckley TN** (1999) Effects of humidity on light-induced stomatal opening: evidence for hydraulic coupling among stomata. *Journal of Experimental Botany* 50:1207-1213
3. Mott KA, **Buckley TN** (1998) Stomatal heterogeneity. *Journal of Experimental Botany* 49:407-417
2. **Buckley TN**, Farquhar GD, Mott KA (1997) Qualitative effects of patchy stomatal conductance distribution features on gas-exchange calculations. *Plant, Cell and Environment* 20: 867-880
1. Haefner JW, **Buckley TN**, Mott KA (1997) A spatially explicit model of patchy stomatal responses to humidity. *Plant, Cell and Environment* 20: 1087-1097

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**BOOK CHAPTERS**

- Brodribb TJ, **Buckley TN** (2018) Leaf water transport: a core system in the evolution and physiology of photosynthesis. *In* The leaf: a platform for performing photosynthesis and feeding the plant (*Advances in Photosynthesis and Respiration* series), ed. W Adams III and I Terashima. Springer, New York, pp 81-96
- Sack L, Scoffoni C, Johnson DM, **Buckley TN**, Brodribb TJ (2015) The anatomical determinants of leaf hydraulic function. *In* Functional and Ecological Xylem Anatomy, ed. UG Hacke. Springer, New York, pp 255-271

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**MANUSCRIPTS IN REVIEW OR REVISION**

- Scoffoni C, Albuquerque C, **Buckley TN**, Sack L. The dynamic multi-functionality of leaf water transport outside the xylem. *New Phytologist* (in review; submitted Nov 2022)
- Ma Z, **Buckley TN**, Sack L. Rules of life trade-offs constrain the development of leaf size. *Nature* (in review; submitted Oct 2022)
- Wong CYS, Gilbert ME, Pierce MA, Parker TA, Paklovic A, Gepts P, Magney TS, **Buckley TN**. Hyperspectral remote sensing for phenotyping the physiological drought response of common and tepary bean. *Plant Phenomics* (in review; submitted Oct 2022)
- Wong CYS, Jones T, McHugh D, Gilbert ME, Pets P, Palkovic A, **Buckley TN**, Magney TS. PhenoSpec: A mobile tower-based remote sensing system for continuous high-throughput phenotyping of vegetation physiology. *Plant Methods* (in review; submitted May 2022)
- Buckley TN**, Frehner EH, Bailey BN. Kinetic factors of physiology and the dynamical light environment influence the economic landscape of short-term hydraulic risk. *New Phytologist* (in revision; reviews received Oct 2022)
- Zailaa J, Trueba S, Browne M, Fletcher L, **Buckley TN**, Scoffoni C, Sack L. Sensitive hydraulic and stomatal decline contribute to extreme drought tolerance in species of California *Ceanothus*. *New Phytologist* (in revision; reviews received May 2022)
- Pierce MA, Sack L, **Buckley TN**. Leaf trichomes reduce boundary layer conductance. *Plant, Cell and Environment* (in revision; reviews received Mar 2022)
- Buckley TN**. Modeling stomata. *In*: Modeling photosynthesis and growth (*Advances in Photosynthesis and Respiration* series), ed. X-G Zhu and TD Sharkey. Springer, Cham (in review, submitted Dec 2018) (book chapter)

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**SERVICE***DEPARTMENT-LEVEL*

**Vice-Chair**, Department of Plant Sciences, UC Davis (2022-25)

**Chair, Search Committee, Agroecology Endowed Chair**, Dept of Plant Sciences, UC Davis (2020-21)

**Department Executive Committee (PSEC)**, Dept of Plant Sciences, UC Davis (2019-2025)

**Faculty Mentoring Skills and Training Committee**, Dept of Plant Sciences, UC Davis (2021-2022)

**Search Committee, Communication Coordinator**, Dept of Plant Sciences, UC Davis (2021-2022)

**Search Committee, Communication Coordinator**, Dept of Plant Sciences, UC Davis (2020-2021)  
**Search Committee, Digital Agriculture position**, Dept of Plant Sciences, UC Davis (2018-2019)  
**Graduate Research Assistantship Committee**, Dept of Plant Sciences, UC Davis (2018-2022)  
**Social and Seminar Series Committee**, Dept of Plant Sciences, UC Davis (2018-2019)  
**Jastro Award Review Committee**, Graduate Group in Horticulture and Agronomy, UCD (2019)  
**Controlled Environments Facility Committee**, PBI Narrabri, University of Sydney (USyd) (2014-17)  
**Graduate Program Committee**, Dept of Biology, Sonoma State University (SSU) (2010-13)  
**Curriculum Committee**, Dept of Biology, SSU (2013)  
**Chair, Budget, Space and Equipment Committee**, Dept of Biology, SSU (2009-10)

*COLLEGE/SCHOOL-LEVEL*

**Chair, College of Ag and Env Sci (CAES) Rules and Jurisdiction Committee**, UC Davis (2021-2023)  
**Chair, CAES Undergraduate Program Review Committee**, UC Davis (2019-2020)  
**CAES Undergraduate Program Review Committee**, UC Davis (2020-2022)  
**CAES Undergraduate Majors and Courses Committee**, UC Davis (2018-2021)  
**Local Promotions Committee, Division of Natural Sciences**, USyd (2015)  
**Research Data Management Committee, Faculty of Agriculture & Environment**, USyd (2014)  
**Elections Committee, School of Science and Technology**, SSU (2010-12)

*UNIVERSITY-LEVEL*

**Senate Graduate Council Program Review Subcommittee**, UC Davis (2020-2022)  
**Senate Undergraduate Instruction and Program Review Committee**, UC Davis (2018-2022)  
**Graduate Studies Faculty Review Committee**, UC Davis (2019-20, 21-22)  
**Senator for the School of Science and Technology**, Academic Senate, SSU (2010-13)  
**General Education Subcommittee of the Academic Senate**, SSU (2010)  
**Copeland Creek Committee**, SSU (2010-11)  
**Faculty Advisor and founding sponsor, SSU Cycling Team**, SSU (2009-12)

*EDITORIAL*

**Chief Editor, *AoB PLANTS*** (2018-2023)  
**Associate Editor, *Functional Plant Biology*** (2018-2019)  
**Associate Editor, *AoB PLANTS*** (2016-2018)  
**Editorial Review Board Member, *Plant, Cell & Environment*** (since 2006)  
**Communicating Editor, *Trees: Structure and Function*** (2006-09)

*COMMUNITY SERVICE AND SYNERGISTIC ACTIVITIES*

**Organizer for international workshop** on 3D leaf imaging and modeling, Sydney (2017)  
**Co-organizer for international workshop** on the leaf pressure chamber, Davis (2018)

**Co-organizer for international conference** on respiration in the light, Angers, France (2016)

**Volunteer High School Science Tutor**, Narrabri HS (2015)

**Author of newspaper columns on science and society**, Narrabri Courier (2014)

**Mentor for High School Research Scholars**, SSU (2010-2012)

*PEER REVIEWING*

**Ad hoc referee** for 41 journals (370 manuscripts reviewed since 2000), ten funding agencies (69 proposals), four textbooks, three PhD theses, and five promotion/tenure reviews.

Peer-reviewed journals: *Agricultural and Forest Meteorology, American Journal of Botany, Annals of Botany, AoBP, Aquatic Botany, Australian Forestry, Biogeosciences, Canadian Journal of Botany, Ecology, Ecology Letters, Ecological Research, Ecosphere, Field Crops Research, Frontiers in Plant Science, Functional Plant Biology, Functional Ecology, Global Change Biology, International Journal of Thermal Sciences, Journal of Experimental Botany, Journal of Zhejiang University-Science B, Nature Climate Change, Nature Plants, New Phytologist, Oecologia, PeerJ, Photosynthesis Research, Physiologia Plantarum, Plant Biology, Plant, Cell & Environment, Plant Methods, Plant Physiology, Plant Science, PLoS ONE, PNAS, Science Advances, Scientific Reports, Silva Fennica, The Plant Journal, Tree Physiology, Trees: Structure and Function, Weed Research.*

Funders: Agreenium, Australian Research Council, BBSRC, German Research Foundation, Land and Water Australia, National Environment Research Council, National Science Foundation, Science Foundation Ireland, University of Hawaii Water Resources Research Center, LabEx NUMEV-University of Montpellier.

Textbook publishers: Elsevier Publishing, Sinauer Academic Publishing, Springer.

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**TEACHING EXPERIENCE**

**Plant Propagation.** University of California, Davis, Spring 2019, 2020, 2021, 2022. I taught an upper division majors' lecture and lab course covering the biology and physiology of plant propagation, and numerous practical techniques.

**Leaves From the Outside In.** University of California, Davis, Spring 2022. I taught a graduate course in leaf biophysics, covering how operational leaf-scale measurements relate to processes and properties within leaves.

**Plant Stress Physiology.** University of California, Davis, Spring 2018, 2020, 2022. I created and taught an upper division majors' course covering the mechanisms and implications of plant responses to environmental stress.

**Plant Systems Biology.** University of Sydney, S2 2014-17. I co-created and co-taught a second-year majors' course covering integrative plant biology, with an emphasis on the relationship between theory and technique.

**Plant Physiology.** Sonoma State University, Fall 2008, F09, F10. I created and taught an upper division biology majors' lecture and laboratory course in integrative plant physiology, covering metabolism, water and nutrient relations and whole-plant and eco-physiology.

**Global Change Biology.** SSU, F08, F11. I created and taught a graduate seminar course in the biology and ecology of global change, in which students led discussions of recent primary literature articles on various salient topics.

**Environmental Physiology.** SSU, F09, S11, F11, F12. I created and taught an upper division biology majors' lecture and laboratory course in environmental physiology of animals and plants, covering adaptations to resource constraints and environmental change.

**Differential and Integral Calculus II.** SSU, S12. I created and taught a lecture and laboratory calculus course covering integration methods, ordinary differential equations, sequences, series and multivariable calculus, emphasising applications to biology and using Excel & Mathematica.

**Diversity, Structure and Function.** SSU, S09, F09, S10, F10, S11, F11, S12, F12, S13. I created and taught half of a lower division biology majors' course covering the scientific method and the phylogenetics, evolution, structure and function of all non-animal life.

**Genetics, Evolution and Ecology.** SSU, S09. I created and taught half of a lower division biology majors' course covering general ecology.

**The Biology of Excel.** SSU, S13. I created and taught a graduate course in which students learned how to use Microsoft Excel, including VBA, for intensive data analysis and simulation.

**Introduction to Biology.** SSU, S10, S13. I created and taught a non-majors biology course covering all aspects of biology, emphasising how biology relates to modern civic life.

**Introductory Biology.** Utah State University, F00. I created and taught a first-year biology majors' course with 40 students, covering general science, general plant biology, genetics, and metabolism. I also taught two accompanying laboratory courses.

**Biology and the Citizen.** USU, F00, Summer 98. I created and taught two non-majors' biology courses, with 50-90 students. The Fall 2000 course was also broadcast by satellite to remote campus locations throughout the state of Utah.

**Graduate Ecology.** USU, F01. I created and taught the Physiological Ecology unit of a team-taught ecology course for graduate students, emphasizing current debates.

**Plant Ecosystem Processes.** University of New South Wales, March 06, 07, 08. I presented guest lectures in an upper division majors' course on photosynthesis, respiration, stomatal function, stable isotope discrimination and ecophysiology.

**General Ecology.** USU, F98. I presented guest lectures about the carbon cycle, global climate change, and thermodynamics for an undergraduate nonmajors' ecology course.

**Applied Environmental Biology.** University of Sydney, S2 2013. I served as Deputy Coordinator for a first-year majors' course covering all aspects of plant environmental biology.

**Plant Physiology.** USU, F97, W98, F98, F05. I taught laboratory courses for an upper-division plant physiology course, created a new simulation-based lab exercise about energy balance and gas exchange, and presented guest lectures on water relations, photosynthesis and gas exchange.

**Plant Taxonomy.** USU, S98. I taught laboratory courses for an upper-division taxonomy course.

**Introductory Biology.** USU, F97. I taught laboratory courses for a first-year biology majors' course.

**Advanced Excel Workshop.** University of Sydney, S1 2015. I taught a two-day workshop for PhD students and colleagues on advanced use of Excel, including VBA and Forms.

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## HONORS AND AWARDS

**Dean's award for outstanding research achievement**, Faculty of Agriculture and Environment, University of Sydney (2015)

**Graduate Research Assistant of the Year (Robins Award)**, Utah State University (1999)

**Graduate Student Researcher of the Year**, College of Science, Utah State University (1999)

**Willard C. Eccles Foundation Fellowship**, College of Science, Utah State University (1994-1997)

**Vice-presidential scholarship**, Utah State University (declined) (1994)

**Summa cum laude** (highest honors), Bachelor of Science degree, James Madison University (1994)

**Award for Excellence in Botany**, Biology Department, James Madison University (1994)

**Full scholarship** to Old Dominion University, Norfolk, Virginia (declined) (1990)

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## RESEARCH PRESENTATIONS (\*INVITED)

Workshop on gases in plants, Jülich, Germany, September 2022\*

Phyllosphere 2022, Davis, CA, July 2022\*

Gordon Conference on Plant Multiscale Vascular Biology, Newry, ME, June 2022\*

Brookhaven National Laboratory, January 2022\*

University of California, Davis, Department of Plant Sciences, November 2021

European Geophysical Union (virtual meeting), April 2021\*

University of California, Davis, Department of Plant Sciences, FROGS seminar, March 2021

Universidade Federal de Viçosa, Meeting on Plant Physiology, December 2020\*

~~New Phytologist Symposium on Stomata, Kaifeng, China, September 2020\*~~ (postponed)

University of California, Davis, Department of Plant Biology, February 2020\*

American Geophysical Union, San Francisco, Dec 2019

Almond Conference, Sacramento, Dec 2019\*

University of California, Berkeley, Dept of Env. Science, Policy & Management, Dec 2019\*

Sonoma State University (SSU) Biology Colloquium, Rohnert Park, August 2019\*

SEB Costa Del Science Symposium, Sevilla, July 2019\*

University of California, Davis, Department of Plant Sciences, April 2019

Purdue University, Department of Botany and Plant Pathology, February 2019\*

University of California, Davis, Department of Plant Sciences, FROGS seminar, January 2019

Almond Board of California Annual Conference, Sacramento, December 2018

Workshop on the pressure chamber, Davis, September 2018

University of California, Davis, Department of Plant Sciences, FROGS seminar, May 2018

University of California, Davis, Department of Plant Sciences, April 2018

Instituto de Recursos Naturales y Agrobiologia, Sevilla, February 2018\*

Workshop on 3D leaf imaging and modeling, Sydney, July 2017

10th International workshop on sap flow, Fullerton, May 2017

IWYP Annual Research Conference, Obregon, March 2017\*

UC Davis Department of Plant Sciences, December 2016\*

UC Davis Department of Plant Sciences, July 2016\*

Workshop on the Kok effect: beyond the artefact, emerging leaf mechanisms, Angers, July 2016\*

Gordon Conference on Multiscale Plant Vascular Biology, Newry, ME, June 2016\*

Self-organised complexity of shape symposium, Canberra, April 2016\*

IA Watson Grains Research Centre Field Day, Narrabri, September 2015

Ecological Society of America (ESA), Baltimore, August 2015

Wong-Farquhar Workshop, Kioloa, April 2015\*

IA Watson Grains Research Centre, Narrabri, February 2015\*

IA Watson Grains Research Centre Field Day, Narrabri, September 2014

Gordon Conference on CO<sub>2</sub> Assimilation, Waterville Valley, June 2014 (poster)

CSU Program for Education and Research in Biotechnology Meeting, Anaheim, January 2013\*

University of California, Los Angeles, Dept of Ecology and Environmental Biology, October 2012\*

University of Sydney, Faculty of Agriculture and Environment, Sydney, August 2012\*

IAHS Wildfire and Water Quality Conference, Banff, June 2012

James Madison University Bio-Symposium (Keynote Speaker), Harrisonburg, April 2012\*

Montana State University Department of Ecology, Bozeman, March 2012\*

SSU Biology Colloquium, Rohnert Park, December 2011

American Society of Plant Biologists (ASPB), Minneapolis, August 2011

Instituto de Recursos Naturales y Agrobiologia, Sevilla, June 2011\*

SSU Biology Colloquium, Rohnert Park, February 2011

SSU Mathematics Colloquium, Rohnert Park, October 2010\*

American Geophysical Union (AGU), San Francisco, December 2009

ESA, Albuquerque, August 2009

SSU Biology Colloquium, Rohnert Park, February 2009

AGU, San Francisco, December 2008 (poster)

Research School of Biological Sciences, Australian National University (ANU), Canberra, June 2008

SSU Biology Colloquium, Rohnert Park, December 2007\*

Greenhouse 2007 Conference, Sydney, October 2007

14th International Congress on Photosynthesis, Glasgow, July 2007\*

ANU, Canberra, April 2005

ASPB, Orlando, July 2004

ESA, Portland, August 2004  
CRC for Greenhouse Accounting, Murramarang, May 2004\*  
Creswick Forest Science Research Centre, Creswick, June 2004\*  
ASPB, Honolulu, July 2003  
ANU, Canberra, July 2003  
ESA, Savannah, August 2003  
CRC, Murramarang, April 2003  
CRC, Canberra, October 2002  
RSBS, Canberra, September 2002  
ESA, Tucson, August 2002  
CRC, Canberra, May 2002  
RSBS, Canberra, March 2002  
Crop Physiology Laboratory, Utah State University (USU), Logan, October 2001\*  
ESA, Madison, August 2001 (poster)  
RSBS, Canberra, March 2001  
ESA, Snowbird, August 2000  
Optimality Workshop, Hyytiälä, Finland, April 2000  
ESA, Spokane, August 1999 (poster)  
Biology Department, USU, Logan, March 1999  
ESA, Baltimore, August 1998  
ESA, Snowbird, August 1995 (poster)  
Appalachian Regional Electron Microscopy Society, Blacksburg, March 1993  
Virginia Academy of Science (VAS), Norfolk, May 1993  
VAS, Richmond, May 1992