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UWA School of Agriculture and Environment
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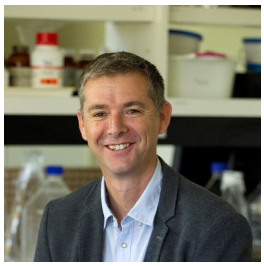

Biography

I'm a generalist hydrologist. With a background in Environmental Engineering my research focuses on quantifying dynamical interactions in environmental systems with a large focus on hydrological processes and solute trasport. My research spans geomorphology, landscape evolution, pesticide and nutrient leaching to rivers, human settlement of river basins, and self-organisation of eco-hydrological systems.

Qualifications

Hydrology/Soil Physics, PhD, An evaluation of the climate controls on pesticide transport via fast flow processes, The University of Western Australia
2002 → 2006
Award Date: 1 Jul 2007

Environmental Engineering, Bachelor (Honours), The University of Western Australia
Award Date: 31 Dec 1998

Employment

Adjunct Research Fellow
Doctor
UWA School of Agriculture and Environment
11 Jan 2017 → present

Research Scientist
Department of Biodiversity, Conservation and Attractions (Western Australia)
Kensington, Australia
7 Jan 2019 → present

Research outputs

Gamma Rays Signal the Vulnerability of Forest to Extreme Drought
McGrath, G. S., Fontaine, J. B., Van Dongen, R. & Ruthrof, K. X., 16 Aug 2026, In: Geophysical Research Letters. 53, 15, 9 p., e2026GL122182.

Characterising soil microbial communities in thinned and unthinned eucalyptus forest in southwestern Australia
Brace, A. J., Dugal, L., Hyde, J., Fernandes, K., Hopkins, A. J. M., Stevens, E., McGrath, G. S. & Ruthrof, K. X., Apr 2026 , In: Applied Soil Ecology. 220, 14 p., 106829.

Subsurface constraints amplify vegetation stress during extreme heat and drought in a Mediterranean forest
Wang, H., Xie, Q., Thompson, S. E., Moore, C. E., Mcgrath, G. S. & Ruthrof, K. X., 1 Dec 2025, In: Environmental Research Letters. 20, 12, 11 p., 124029.

An application of finite element analysis predicts unique temperatures and fates for flatback sea turtle embryos
Gammon, M., Fossette, S., Karrech, A., McGrath, G., Alkhatib, S. & Mitchell, N. J., Dec 2025, In: The Journal of Experimental Biology. 228, 23, p. 1-12 12 p., jeb250238.

Ecohydrological adaptation: A research and management framework for ecosystems in Australia's drying and warming climate
Thompson, S. E., Moore, C. E., Xie, Q., Ruscadella-Alvarez, J., McGrath, G. & Ruthrof, K. X., Dec 2025, In: Journal of Hydrology. 663, Part B, 17 p., 134210.

Distinguishing salinization from desiccation induced salinity increases in shallow lakes affected by climate drying and land-use change
McGrath, G. S., Nov 2025, In: Journal of Hydrology. 661, 9 p., 133467.

Variation of salinity with water level in shallow lakes is complex and rich in information
McGrath, G. S., Huntley, B. & Venarsky, M. P., Oct 2025, In: Journal of Hydrology. 660, p. 1-9 9 p., 133347.

Australian non-perennial rivers: Global lessons and research opportunities
Shanafield, M., Blanchette, M., Daly, E., Wells, N., Burrows, R. M., Korbel, K., Rau, G. C., Bourke, S., Wakelin-King, G., Holland, A., Ralph, T., McGrath, G., Robson, B., Fowler, K., Andersen, M. S., Yu, S., Jones, C. S., Waltham, N., Banks, E. W. & Flatley, A. & 11 others, Leigh, C., Maxwell, S., Siebers, A., Bond, N., Beesley, L., Hose, G., Iles, J., Cartwright, I., Reid, M., de Castro Tayer, T. & Duvert, C., May 2024, In: Journal of Hydrology. 634, 19 p., 130939.

Changing processes flooding a salt marsh in a microtidal estuary with a drying climate
McGrath, G. S., Harding, C. & Matte, P., 5 Dec 2023, In: Estuarine, Coastal and Shelf Science. 295, 11 p., 108573.

Geophysics reveals forest vulnerability to drought
McGrath, G. S., Fontaine, J. B., Van Dongen, R., Hyde, J., Leopold, M., Matusick, G. & Ruthrof, K. X., Dec 2023, In: Ecohydrology. 16, 8, 13 p., e2596.

Herbicide residues in Australian grain cropping soils at sowing and their relevance to crop growth
Rose, M. T., Zhang, P., Rose, T. J., Scanlan, C. A., McGrath, G. & Van Zwieten, L., 10 Aug 2022, In: Science of the Total Environment. 833, 155105.

Data for assessment of sediment, soil, and water quality at Ashfield flats reserve, Western Australia
Rate, A. W. & McGrath, G. S., Apr 2022, In: Data in Brief. 41, 107970.

The Impact of Soil Water Repellency and Slope upon Runoff and Erosion
Lowe, M. A., McGrath, G. & Leopold, M., Jan 2021, In: Soil and Tillage Research. 205, 104756.

Thermal imaging of a hydrophobic soil's response to surfactant application at the Avon River Catchment Critical Zone Observatory
Alsih, A., Leopold, M., Murphy, D. & McGrath, G., 1 Jun 2020, In: Geoderma. 368, 114309.

Paradoxical impact of sprawling intra-Urban Heat Islets: Reducing mean surface temperatures while enhancing local extremes
Shreevastava, A., Bhalachandran, S., McGrath, G. S., Huber, M. & Rao, P. S. C., 1 Dec 2019, In: Scientific Reports. 9, 1, 19681.

Network Topology and Rainfall Controls on the Variability of Combined Sewer Overflows and Loads
McGrath, G., Kaeseberg, T., Reyes Silva, J. D., Jawitz, J. W., Blumensaat, F., Borchardt, D., Mellander, P. E., Paik, K., Krebs, P. & Rao, P. S. C., 14 Oct 2019, In: Water Resources Research. 55, 11, p. 9578-9591 14 p.

Emergent self-similarity and scaling properties of fractal intra-urban heat islets for diverse global cities
Shreevastava, A., Rao, P. S. C. & McGrath, G. S., 27 Sept 2019, In: Physical Review E. 100, 3, 032142.

Bacillus subtilis and surfactant amendments for the breakdown of soil water repellency in a sandy soil
Lowe, M. A., Mathes, F., Loke, M. H., McGrath, G., Murphy, D. V. & Leopold, M., 15 Jun 2019, In: Geoderma. 344, p. 108-118 11 p.

Spatial controls on the distribution and dynamics of a marginal snowpack in the Australian Alps
Bilish, S. P., Callow, J. N., McGrath, G. S. & McGowan, H. A., 15 Jun 2019, In: Hydrological Processes. 33, 12, p. 1739-1755 17 p.

Real-time forecasting of pesticide concentrations in soil
McGrath, G., Rao, P. S. C., Mellander, P. E., Kennedy, I., Rose, M. & van Zwieten, L., 1 May 2019, In: Science of the Total Environment. 663, p. 709-717 9 p.

Global warming in the context of 2000 years of Australian alpine temperature and snow cover
McGowan, H., Callow, J. N., Soderholm, J., McGrath, G., Campbell, M. & Zhao, J.-X., 1 Dec 2018, In: Scientific Reports. 8 , 1, 8 p., 4394.

Globally Universal Fractal Pattern of Human Settlements in River Networks
Fang, Y., Ceola, S., Paik, K., McGrath, G., Rao, P. S. C., Montanari, A. & Jawitz, J. W., 1 Aug 2018, In: Earth's Future. 6, 8, p. 1134-1145 12 p.

Co-authorship analysis of the speleothem proxy-climate community: working together to tackle the big problems
Campbell, M., Callow, J. N., McGrath, G. & McGowan, H., 1 May 2018, In: International Journal of Speleology. 47, 2, p. 165-172 8 p.

A multimethod approach to inform epikarst drip discharge modelling: Implications for palaeo-climate reconstruction
Campbell, M., Callow, J. N., McGrath, G. & McGowan, H., 30 Dec 2017, In: Hydrological Processes. 31, 26, p. 4734-4747 14 p.

Functional topology of evolving urban drainage networks
Yang, S., Paik, K., McGrath, G., Urich, C., Krueger, E., Kumar, P. & Rao, S., Nov 2017, In: Water Resources Research. 53, 11, p. 8966-8979 14 p.

Evaluation of surfactant effectiveness on water repellent soils using electrical resistivity tomography
Lowe, M. A., McGrath, G., Mathes, F. & Leopold, M., 1 Feb 2017, In: Agricultural Water Management. 181, p. 56-65 10 p.

Noise-driven return statistics: Scaling and truncation in stochastic storage processes
McGrath, G., Bolster, D., Aquino, T. & Rao, P. S. C., 2017, In: Scientific Reports. 7, 1, 302.

Plant and environmental factors associated with drought-induced mortality in two facultative phreatophytic trees
Challis, A., Stevens, J., Mcgrath, G. & Miller, B., 1 Jul 2016, In: Plant and Soil. 404, 1-2, p. 157-172 16 p.

The influence of climate teleconnections on streamflow in the snowy mountains
Stutsel, B., Walton, R. S., Callow, N., Mcgowan, H. A. & Mcgrath, G., 2015, *The Art and Science of Water - 36th Hydrology and Water Resources Symposium, HWRS 2015.* Australia: Engineers Australia, p. 242-249

In situ fragmentation and rock particle sorting on arid hills
Mcgrath, G., Nie, Z., Dyskin, A., Byrd, T., Jenner, R., Holbeche, G. & Hinz, C., 2013, In: Journal of Geophysical Research: Earth Surface . 118, 1, p. 17-28

Linking eco-energetics and eco-hydrology to select sites for the assisted colonization of Australia's rarest reptile
Mitchell, N., Hipsey, M., Arnall, S., Mcgrath, G., Tareque, A. M. H. B., Kuchling, G., Vogwill, R., Sivapalan, M., Porter, W. & Kearney, M., 2013, In: Biology. 2, 1, p. 1-25

Microtopography alters self-organized vegetation patterns in water-limited ecosystems
Mcgrath, G., Paik, K. & Hinz, C., 2012, In: Journal of Geophysical Research G: Biogeosciences. 117, p. 19pp

Tropical cyclones and the ecohydrology of Australia's recent continental-scale drought
Mcgrath, G., Sadler, R., Fleming, K., Tregoning, P., Hinz, C. & Veneklaas, E., 2012, In: Geophysical Research Letters. 39 , p. 1-6

Climate and contaminant transport: the role of within-storm variability on contaminant transport by surface runoff
Payraudeau, S., Mcgrath, G. & Hinz, C., 2011, *Water Quality: Current Trends and Expected Climate Change Impacts.* Wallingford, United Kingdom: International Association of Hydrological Sciences Press, Vol. 348. p. 32-37

Climate, soil, and vegetation controls on the temporal variability of vadose zone transport
Harman, C. J., Rao, P. S. C., Basu, N. B., Mcgrath, G., Kumar, P. & Sivapalan, M., 2011, In: Water Resources Research. 47, p. 21pp

Complex landscapes from simple ecohydrological feedbacks
Mcgrath, G., Paik, K. & Hinz, C., 2011, *MODSIM2011, Proceedings of the 19th International Congress on Modelling and Simulation.* Australia: Modelling and Simulation Society of Australia and New Zealand Inc., Vol. MODSIM2011. p. 2528-2534

Assessing the impact of regional rainfall variability on rapid pesticide leaching potential
Mcgrath, G., Hinz, C. & Sivapalan, M., 2010, In: Journal of Contaminant Hydrology. 113, p. 56-65

Identifying a rainfall event threshold triggering herbicide leaching by preferential flow
Mcgrath, G., Hinz, C., Sivapalan, M., Dressel, J., Putz, T. & Vereecken, H., 2010, In: Water Resources Research. 46, W02513, p. Article number W02513, 12pp

A preferential flow leaching index
Mcgrath, G., Hinz, C. & Sivapalan, M., 2009, In: Water Resources Research. 45, W11405, p. Article number W11405, 10pp

Soil-vegetation feedbacks as a driver for early ecosystems development in the context of mine site rehabilitation
Hinz, C., Gwenzi, W., Mcgrath, G., Veneklaas, E. & Scanlan, C., 2009, *Proceedings of the Fourth International Conference on Mine Closure.* Fourie, A. B. & Tibbett, M. (eds.). Perth, Australia ed. Nedlands, Western Australia: Australian Centre for Geomechanics, Vol. 1. p. 431-438

Modeling the effect of rainfall intermittency on the variability of solute persistence at the soil surface
Mcgrath, G., Hinz, C. & Sivapalan, M., 2008, In: Water Resources Research. 44, p. online - approx 5-20pp

Modelling the impact of within-storm variability of rainfall on the loading of solutes to preferential flow pathways
Mcgrath, G., Hinz, C. & Sivapalan, M., 2008, In: European Journal of Soil Science. 59, 1, p. 24-33

An exploration of the rainfall controls on pesticide transport via fast flow pathways
McGrath, G., 2007, (Unpublished)

Rainfall threshold for hillslope outflow : an emergent property of flow pathway connectivity
Lehmann, P., Hinz, C., Mcgrath, G., Tromp-Van Meerveld, H. J. & Mcdonnell, J. J., 2007, In: Hydrology and Earth System Sciences. 11, 2, p. 1047-1063

Temporal dynamics of hydrological threshold events
Mcgrath, G., Hinz, C. & Sivapalan, M., 2007, In: Hydrology and Earth System Sciences. 11, 2, p. 923-938

Towards a Climate Based Risk Assessment of Land Rehabilitation
Hinz, C., Mcgrath, G. & Hearman, A. J., 2006, *Mine Closure 2006: Proceedings of the First International Seminar on Mine Closure.* Fourie, A. & Tibbett, M. (eds.). Australia: Australian Centre for Geomechanics, Vol. 1. p. 407-415

Grants (InfoEd projects)

Biogeomorphology of Pilbara Rivers
Callow, N. (Investigator 01) & McGrath, G. (Investigator 02)
Rio Tinto
15/09/16 → 14/09/20

Do increased herbicide use impact on key soil biological processes?
McGrath, G. (Investigator 01)
Grains Research & Development Corporation
1/07/14 → 30/06/18

Managing ecosystem change requires the integration of above and belowground hydrological processes at relevant scales
Veneklaas, E. (Chief Investigator), McGrath, G. (Chief Investigator), Callow, N. (Chief Investigator), Aitken, A. (Chief Investigator), Miller, B. (Chief Investigator), Malcolm, A. (Chief Investigator) & Dixon, K. (Chief Investigator)
ARC Australian Research Council
1/01/14 → 31/12/16

Managing ecosystem change requires the integration of above and belowground hydrological processes at relevant scales
Veneklaas, E. (Investigator 01), Miller, B. (Investigator 02), McGrath, G. (Investigator 03), Callow, N. (Investigator 04), Aitken, A. (Investigator 05), Stevens, J. (Investigator 06) & Malcolm, A. (Investigator 07)
ARC Australian Research Council
1/01/14 → 30/04/19

Managing ecosystem change requires the integration of above and belowground hydrological processes at relevant scales
Veneklaas, E. (Chief Investigator), McGrath, G. (Chief Investigator), Callow, N. (Chief Investigator), Aitken, A. (Chief Investigator), Miller, B. (Chief Investigator), Malcolm, A. (Chief Investigator) & Dixon, K. (Chief Investigator)
ARC Australian Research Council
1/01/14 → 31/12/16

Polymers for Improving Soil Moisture Management & Cropping Productivity
Murphy, D. (Investigator 01), Bougoure, J. (Investigator 02), Leopold, M. (Investigator 03), Mathes, F. (Investigator 04), McGrath, G. (Investigator 05), O'Donnell, T. (Investigator 06), Barton, L. (Investigator 07) & Gleeson, D. (Investigator 08)
CRC for Polymers
1/07/12 → 30/06/17

The 'Critical Zone Concept' in the southern hemisphere - an international workshop.
Leopold, M. (Chief Investigator), Gleeson, D. (Investigator 02), McGrath, G. (Investigator 03), Banwart, S. (Investigator 04) & Brantley, S. (Investigator 05)
The University of Western Australia
1/01/14 → 31/12/14

UWA Led - Ancient Soils & Modern Land Use - A Challenge for Critical Zone Science - International Workshop & Summer School - Matthias Leopold
Leopold, M. (Investigator 01), Gleeson, D. (Investigator 02), McGrath, G. (Investigator 03) & Rate, A. (Investigator 04)
Worldwide Universities Network (WUN)
2/12/13 → 1/12/14

Datasets

A parsimonius model of the stochasticity of combined sewer overflows reveals contributions of network structure and rainfall variability
McGrath, G. (Creator), Kaesberg, T. (Creator) & David Reyes Silva, J. (Creator), The University of Western Australia, 5 Oct 2018
DOI: 10.26182/5bbbff6fadf94

Changing processes flooding a salt marsh in a microtidal estuary with a drying climate
McGrath, G. (Creator), The University of Western Australia, 10 Apr 2023
DOI: 10.26182/vfjt-st92

Gamma rays and forest vulnerability to drought. Supporting data and code 1
McGrath, G. (Creator), van Dongen, R. (Creator), Fontaine, J. B. (Creator) & Ruthrof, K. X. (Creator), The University of Western Australia, 3 Aug 2026
DOI: 10.26182/rxte-tm83

Gamma rays and forest vulnerability to drought. Supporting data and code 2.
McGrath, G. (Creator) & van Dongen, R. (Creator), The University of Western Australia, 16 May 2026
DOI: 10.26182/eqk9-0z19

Gamma rays signal forest vulnerability to extreme drought
McGrath, G. (Creator), van Dongen, R. (Creator), Fontaine, J. (Creator) & Ruthrof, K. X. (Creator), The University of Western Australia, 31 Jan 2026
DOI: 10.26182/717p-6t65

Gamma rays signal forest vulnerability to extreme drought
McGrath, G. (Creator), van Dongen, R. (Creator), Fontaine, J. (Creator) & Ruthof, K. (Creator), The University of Western Australia, 2026
DOI: 10.26182/0a05-b865

Network topology and rainfall controls on the variability of combined sewer overflows and loads
McGrath, G. (Creator), The University of Western Australia, 8 Aug 2019
DOI: 10.26182/2b2e-9671

Supplementary information for sediment, soil, and surface water data at Ashfield Flats Reserve, Western Australia
Rate, A. (Creator) & McGrath, G. (Contributor), Mendeley Data, 10 Feb 2022
DOI: 10.17632/sz7rwg5p4n.1, https://data.mendeley.com/datasets/sz7rwg5p4n/1

Surface water quality at Ashfield Flats Reserve, Western Australia
Rate, A. (Creator) & McGrath, G. (Contributor), Mendeley Data, 26 Jan 2022
DOI: 10.17632/vphzgjshgm.1

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