

Brian J. McGill

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US Citizen

Positions

- 2008-present Associate Professor, School of Natural Resources, Univ of Arizona
affiliate member of Statistics GIDP
- 2005-2008 Assistant Professor, Department of Biology, McGill University
member McGill Center for Bioinformatics
member McGill NEO (Neotropical Environment Option)
associate member McGill School of the Environment
member Quebec Center for Study of Forests

Education and training

- 2003-2005 NSF Interdisciplinary Informatics Postdoctoral Fellowship
Michigan State University, Brian Maurer host
- 1997-2003 University of Arizona - PhD in Ecology and Evolutionary Biology; Major
advisor: Mike Rosenzweig; Committee: Brian Enquist, Larry Venable,
Wayne Madison, Leticia Aviles, Jim Cushing (Math department)
- 1984-1988 Harvard University – BA in Mathematics, Cum Laude general studies

Papers

Published/In Press/Accepted

2003

1. **McGill, Brian J** - "A test of the unified neutral theory of biodiversity" (*Nature* 2003 vol 422(24 April): 881-885)
2. **McGill, Brian J** and Cathy D. Collins - "A unified theory for macroecology based on spatial patterns of abundance" (*Evolutionary Ecology Research* 5(4):469-492)
3. **McGill, Brian J** – “Does Mother Nature really prefer rare species or are log-left-skewed SADs a sampling artifact?” (*Ecology Letters* 2003 6:766-773)
4. **McGill, Brian J** - "Strong and weak tests of macroecological theory" (*Oikos* 2003 vol 102(3):679-685)

2004

5. Maurer, Brian A and **Brian J. McGill** – “Non-neutral macroecology” (*Basic and Applied Ecology* 2004 5:413-422)

2005

6. **McGill, Brian J** - "A mechanistic model of a mutualism and its ecological and evolutionary dynamics " (*Ecological Modeling* 2005 187:413-425)

7. **McGill, Brian J**; Hadly, Elizabeth A; Maurer, Brian A “Community inertia of Quaternary small mammal assemblages in North America” (*Proceedings of the National Academy of Science* 2005 102:16701-16706)

2006

8. **McGill, Brian J**; Brian Enquist, Evan Weiher and Mark Westoby – “Rebuilding community ecology from functional traits” (*Trends in Ecology and Evolution* 2006 21(4):178-185)
9. **McGill, Brian J** and Gary Mittelbach – “Allometric scaling of optimal foraging” (*Evolutionary Ecology Research* 2006 8:691-701)
10. **McGill, Brian J**; Brian A. Maurer, Michael D. Weiser – “Empirical evaluation of the neutral theory” (*Ecology* 2006 87(6):1411-1423)
11. Gotelli, Nicholas J. and **Brian J. McGill** – “Null versus neutral models: what's the difference?” (*Ecography* 2006 29(5):793-800)
12. **McGill, Brian J**; Brian Enquist; Evan Weiher and Mark Westoby – “Response to Kearney and Porter: Both functional and community ecologists need to do more for each other” (*Trends in Ecology and Evolution* 2006 21(9):482-483)
13. **McGill, Brian J** – “A Renaissance in the study of abundance” (*Science* 2006 314:770-771)

2007

14. Ugland, Karl I; P. John D. Lamshead; **Brian McGill**; John S. Gray; Niall O’Dea; Richard J. Ladle; Robert J. Whittaker – “Modelling dimensionality in species abundance distributions: description and evaluation of the Gambin model” (*Evolutionary Ecology Research* 2007 9:313-324)
15. Bahn, Volker[†] and **Brian J. McGill** – “Can niche-based distribution models outperform spatial interpolation” (*Global Ecology and Biogeography* 2007 16:733-742)
16. **McGill, Brian J**; Rampal S. Etienne; John S. Gray and 15 other authors – “Species Abundance Distributions: moving beyond single prediction theories to integration within an ecological framework” (*Ecology Letters* 2007 10:995-1015)
17. **McGill, Brian J** and Joel S. Brown - "Evolutionary Game Theory and Adaptive Dynamics of Continuous Traits" (*Annual Review of Ecology, Evolution and Systematics* 2007 20:403-435)

2008

18. **McGill, Brian J** – “Exploring predictions of abundance from body mass using hierarchical comparative approaches” (*American Naturalist* 2008 172:88-101)
19. Gordon, Caleb; **Brian J. McGill**; Guillermo Ibarra-Nuñez; Russell Greenberg and Ivette Perfecto – “Simplification of a coffee foliage-dwelling beetle community under low shade management” (*Basic and Applied Ecology* 2008 in press, published online Sep 18, 2008)
20. Jarema, Stacey I; Jason Samson; **Brian J. McGill** and Murray M. Humphries – “Variation in abundance across a species’ range predicts climate change responses in the range interior will exceed those at the edge: a case study with North American beaver.” (*Global Change Biology* 2008 in press, published online Oct 15, 2008)

In Review

21. Bahn, Volker^γ and **Brian J. McGill** – “Assessing the predictive power of distribution models” (*Ecography* in second review)
22. Karl I. Ugland, P. John D. Lamshead, Jorge M. Lobo, Carsten Rahbek, Joaquin Hortal, Klaus Høiland, Maria Dornelas, Anne E. Magurran, Paul Somerfield, Paulo A.V. Borges, Rosalina Gabriel, Brian J. McGill, Trond Inge Kvernevik, Rune H. Økland, Anders Bjørgesæter, John S. Gray, Marti J. Anderson, and David L. Roberts “Darwin’s “Grand game of chess” - a universal attractor” (*PNAS* in review)
23. Messier, Julie^β; **Brian J. McGill** and Martin Lechowicz – “How do leaf traits vary across ecological scales?” (*Science* sent out to full review)

In Revision after review at a journal

24. McGill, Brian J - "The SAASR pattern (structure of abundance across species' ranges): synthesis, evidence and mechanisms"
25. McGill, Brian J & Volker Bahn^γ – “Ecoinformatics: skipping the fad phase”

α – undergraduate student under my supervision

β – graduate student under my supervision

γ – postdoctoral fellow under my mentorship

Software developed and provided to research community

- 2008 SAD toolkit (a variety of tools for exploring species abundance distributions) (in beta testing by 6 researchers) (currently by email to author, to be published on web)
- 2006 A numerical solution to the analytical form of the zero sum multinomial (requested from me by over a dozen researchers, also available at <http://www.esapubs.org/archive/ecol/E087/080/>)
- 2005 Monte Carlo simulation of an assemblage of local neutral communities (used by 2 other researchers) (email to author)
- 2003 Monte Carlo simulation of neutral communities for the estimation of parameters (downloaded by over 70 researchers) <http://www.brianmcgill.org/zsm>.
- 2004 Matlab dataframe (implements R-like dataframes and models in Matlab) (downloaded by dozens of users) (<http://www.mathworks.com/matlabcentral/fileexchange/6657>)
- Cheatsheets (quick 1-2 pages summaries of syntax) for Matlab, R, PHP, SQL (downloaded hundreds of times) (<http://www.brianmcgill.org/labnotes.html>)

Grants and fellowships

Total Amount	Duration	Role	Agency	Title
in review (not awarded) \$1,290,860	3 years	PI (1 coPI)	NSF Advances in Biological Informatics	STREAM: a multidimensional database optimized for analysis of biological data
in review (not awarded)	3 years	PI (4 coPIs)	NASA ROSES Biodiversity	Can space-based sensing enable or facilitate monitoring of plant

\$729,642					population dynamics in arid ecosystems?
\$2,000	1 year	coPI (with Greg Mikkelson)	McGill School of the Environment – Seed money for interdisciplinary grants	Relationships between Diversity and Stability in North American Bird Communities	
\$374,000	3 years 2007-2010	coPI (PI Dominique Berteaux, 3 other coPIs)	NSERC – industry partners include Ouranos, Parks Canada, Nature Conservancy, Quebec Environment Ministry	Effects of climate change on Quebec biodiversity	
\$20,000	1 year 2007-2008	PI, 4 other coPIs	TLS T-Pulse Biology Redesign project	Increasing student engagement and learning in three large, introductory lecture classes using clicker technology	
\$79,350	2 years 2006-2008	PI, co-PIs are Rampal Etienne, John Gray & Jessica Green	NCEAS Working group	Tools and fresh approaches for species abundance distributions	
\$539,700	3 years 2006-2009	co-PI, PI is Fangliang He	Sustainable Forest Management	Developing biodiversity benchmarks for the boreal mixedwood forests of Alberta	
\$324,671	1 year 2007-2008	PI & Sole investigator	Canadian Fund For Innovation LOF	Clima-dispersatron experimental apparatus and database of abundances across space to provide infrastructure for the study of species ranges	
\$116,000	5 years 2006-2011	PI & Sole investigator	NSERC Discovery Grant	Mechanisms and consequences of variation in abundance across a species range	
\$100,000	2 years 2003-2005	PI & Sole investigator	NSF Bioinformatics Postdoctoral Fellowship	Measuring spatial variation in vital rates and stochasticity at the scale of a species range	

\$54,500	3 years non-consecutive 1998-2002	Fellowship recipient	NSF Graduate Fellowship	
\$13,000	1 year 1997-1998	Fellowship recipient	U of A Flinn Biomathematics Fellowship	
\$8,000	2 years 1998-2000	Fellowship recipient	Flinn biomathematics	
\$500	2002	Sole investigator	Dept of Biology, U of Arizona	Small grant for research
\$950	2001	Sole investigator	Biodiversity RTG, Dept of Biology, UofA	Small grant for meeting attendance
\$135	2001	Sole investigator	British Ecological Society	Grant to attend meeting
\$850	2000	Sole investigator	Dept of Biology, U of Arizona	Small grant for research
~\$1,000	1999	Participant	NSF conference attendance grant to Simon Levin	“Mathematical Problems Arising from Biology” conference

Press coverage

1. “The end of the beginning for neutral theory” by Sean Nee and Graham Stone in *Trends In Ecology and Evolution* "Research Focus" section 2003 18(9):433-34 (covers my manuscript #1)
2. Faculty of 1000 Biology, by John Pandolfi, 16 Dec 2005
<http://www.f1000biology.com/article/id/1023404/evaluation> (covers my manuscript #7)
3. “An ecologist ponders the pendulum of natural history's paradigm” by Shahid Naeem in *Nature's Journal Club* 2006 440:1093 (covers my manuscript #8)
4. “Ecologisch nihilisme” –by Menno Schilthuizen *Bionieuws* 2006
(<http://www.bionieuws.nl/index.php?reframe=artikel.php?id=2619>)
5. “Beyond Neutrality – ecology finds its niche” by Virginia Gewin *PLOS Biology* 2006 (mentions my manuscripts #1, #7, #8 above)
6. “The cost of leafing” by John Whitfield in *Nature* 2006 444(30 Nov):539-541 (covers my manuscript #8)
7. Manuscript #11 selected by journal editors for a press release as one of their highest profile pieces. The 3rd most frequently downloaded publication for that journal for most of its first year.
8. Manuscript #15 highlighted in a commentary (News & Views style piece by the editor of GEB, David Currie, in *Journal of Biogeography*)
9. Manuscript #16 appeared as the most downloaded publication in *Ecology Letters* for a good part of the year after its publication

Invited Presentations

1. “Large spatial, temporal and taxonomic scales: another place where ecology meets evolution” – January 2008 – Michigan State – Host: Tom Getty
2. “Patterns and processes in the variation of abundance between species and across space” – January 2008 – University of Connecticut – Host: Mike Willig
3. “Variation in abundance across space and between species - towards a general theory” – December 2007 – University of Illinois – Host: Adam Davis
4. “Understanding abundance across large spatial and temporal scales using informatics” –October 2007 - University of Arizona – Host: Dave Breshears
5. “Abundance across space: patterns and consequences” – May 2007 – University of Guelph ESRI Spatial Conference – Host: Madhur Anand/Chris Bauch
6. “Variation in abundance within and between species” – May 2007 – McGill University Natural Resource Department – Host: Murray Humphries
7. “Ecoinformatics” – March 2007 - IABIN Ecosystem Thematic Network (Panama City) – Opening presentation – Host: Ivan Valdespino
8. “Abundance across space: patterns and consequences” – March 2007 – Universite de Montreal – Host: Lael Parrot
9. “Abundance across space and between species: towards an alternative unified theory” – Nov 2006 – University of Guelph– Host: Kevin McCann
10. “Abundance across space and between species: towards an alternative unified theory” – Oct 2006 – University of Ottawa– Host: Jeremy Kerr
11. “Challenges in computational biology”, Co-presentation with Gregor Fussman and Frederic Guichard – Oct 2006 – Computational Group, McGill University – Host: Thomas Wihler
12. “Abundance across space – towards an understanding of species ranges” – Sep 2006 – Department of Geography, McGill University – Host Raja Sengupta
13. “Abundance across space and between species: towards an alternative unified theory” – Sep 2006 – University of Quebec at Montreal– Host: Beatrix Beisner
14. “Abundance across space and between species: an ecoinformatic approach” – Feb 2006 – McGill University – McGill Centre for Bioinformatics
15. “Abundance across space and between species: towards an alternative unified theory” – Feb 2006 – Universite de Sherbrooke – Host: Bill Shipley
16. “Abundance across space and between species: towards an alternative unified theory” – Nov 2005 – University of Missouri at St. Louis – Host: Robert Ricklefs
17. “Unified theories of distribution and abundance” - Jul 2004 – University of Maine at Orono – Host: Volker Bahn
18. “Spatial ecology, community structure, and global change” - Jun 2004 – McGill University – Host: Dan Schoen
19. “Species ranges, community structure and global change” – Apr 2004 – Utah State – Host: Jim Haefner
20. “Do large scale spatial patterns explain local species abundance distributions?” – Apr 2004 – Michigan State
21. “Linking large scale spatial processes with local community structure” – Mar 2004 – Host: Hugh Possingham
22. “Do large scale spatial patterns explain local species abundance distributions?” – Feb 2003 – SUNY Stony Brook – Host: Lev Ginzburg

23. "Explaining species abundance distributions and other patterns" - Nov 2003 – Mt Holyoke – Host: Stan Rachootin
25. "Do large scale spatial patterns explain local species abundance distributions?" – Oct 2003 – Kellogg Biological Station – Host: Gary Mittelbach
26. "From mechanism to test?: a spatial theory of macroecological patterns" – Dec 2002 – Biological complexity seminar, University of New Mexico – Host: James Brown
27. "Spatial processes in macroecology" - May 2002 - Stanford University – Host: Henrique Pereira

Organized symposia and working groups

1. "Beyond endangered, mass gaps and abundance" – presentation at working group on gaps in body mass distributions – December 2003 – Host: Craig Allen and Buzz Holling
2. A 'new' paradigm for community ecology: building from functional ecology" – to be given at Ecological Society of America 2004. Co-organized with Brian Enquist (<http://www.brianmcgill.org/ESA04.htm>)
3. "Tools and fresh approaches for species abundance distributions" - Working group at NCEAS for 2006, 2007, 2008 (PI, Co-PI's Rampal Etienne, John Gray, Jessica Green)
4. "Species spread across landscapes: the integration of theoretical and empirical approaches" Workshop – May 2007 – organized by Madhur Anand/Chris Bauch
5. TraitNET – core participant in an RCN examining building a universal database of traits – December 2007 – PI Shaid Naeem
6. "Grinnellian Niches or Just Statistical Correlates? Opportunities for Ecological Inference From Species Distribution Models" ESA 2008 Organized oral session (co-organizer, Walter Jetz organizer)
7. USA National Phenology Network – an RCN examining the building of a database of phenology for North America - Sep 2008 - PI Mark Schwartz

Other selected Presentations and Posters

1. "What causes species ranges?" - August 2007 - Ecological Society of America
2. "Population dynamics across space – towards mechanism for species ranges" - August 2005 - Ecological Society of America
3. "A 'new' paradigm for community ecology: building from functional ecology" - August 2004 - Ecological Society of America (organizer of symposium of same title)
4. "The energetic equivalence rule revisited" – July 2004 – Gordon Conference on Metabolic Ecology
5. "Spatial processes in macroecology" – January 2003 - Poster at International Biogeography Society
6. "Spatial processes for macroecological patterns" - August 2002 – Presentation at Ecological Society of America
7. "Spatial processes in macroecology" - April 2002 - Poster at British Ecological Society's Macroecology Symposium
8. "A mathematical model of mutualism coevolution and population dynamics" - November 1998 – Presentation at American Mathematical Society Western region meeting

9. "Continuous Game Theory aka Adaptive Dynamics a review of models and biology" - Sep 23, 30, Oct 7 1998- Presentation at Dynamics of Interacting populations seminar at U of A
10. "Mutualism: A population dynamics and coevolution model" - August 1998 – Presentation at Ecological Society of America annual conference

Teaching experience

Courses Taught at McGill:

- Biology 310 – Large-scale ecology ~70 students (Winter 2007, 2008) – 100% (covers landscape ecology, macroecology, paleoecology, plant-climate interface, global warming and other forms of global change from a scientific perspective)
- Biology 331 – Ecology and Behaviour Field Course ~15 students (Fall 2005, Fall 2006) – 25% (one of four professors teaching field methods and supervising independent research projects)
- Biology 111 – Introductory Organismal Biology ~600 students (Fall 2007) – 40% and course coordinator). I have led a successful grant application (\$20,000) to bring the use of “clicker” technology into this course in connection with a redesign of the lectures to lead to a more interactive, stimulating and productive learning experience for the students of this large class.
- Biology 583 – Advanced Biometry ~25 students (Winter 2008) – 100% (covers a wide variety of statistical tools including generalized linear models, modern regression, experimental design, and spatial and temporal statistics in a lecture and lab format)

Courses Taught Previously:

- Fisheries and Wildlife 581 - Quantitative Methods in Ecology at Michigan State (Fall 2004) Provide a graduate-level introduction to statistics, including philosophy of inference, the role of judgment in applying statistics and topics such as advanced experimental design and ANOVA, modern regression, Bayesian analysis, phylogenetic analysis, bootstrapping, multivariate statistics and spatial and temporal statistics

Courses TA'd

- Awarded “Outstanding teaching assistant” by the College of Science and “Outstanding teaching assistant” by the Graduate and Professional Student Association (university wide) in 2003
- Ecology 302 – Ecology for majors at University of Arizona (1999, 2002). Ran weekly lab sessions (mostly field experiments but also computer labs). In 2002 I was head TA responsible for training other TAs. Developed a new field lab on variable recruitment in saguaros and developed two handouts on “The Sonoran Desert” and “Guide and simple key to plants of the Sonoran Desert”. All three are still in use. Gave six lectures to class of 130 for professor who was ill.
- Ecology 335 – Evolution for majors at University of Arizona (2000, 2003). Ran sections that discussed papers every week. Worked with professor to

implement interactive methods in lecture. Served as TA for the honors section 2003.

Student supervision

	Student	Years	Project
Honours Undergraduate	Etienne Low-Decarie	2006-2007	CO ₂ uptake of green roofs
Undergraduate Independent Study	Ilya Hekimi	Winter 2008	Mathematics in ecology
Undergraduate technicians	Kate Robinson Dana Artz Erika Wilson	Winter 2007	Data entry of classic species abundance data
	Nick Fishbane	2007-2008	Programming and analysis of multiple peaks in species abundance data using Expectation Maximization
	Hanah James, Kaven Namdaran	2008	Data entry of ant field notes (with Ehab Abouief)
MSc Supervisor	Julie Messier	Jan 2007-	Components of variance in functional traits of tropical trees (NEO student)
	Sergio Estrada	Jan 2008-	Bat community structure (NEO student)
	Dominic Chambers (co-supervisor with Sylvie De Blois)	Sep 2007-	Prediction of effect of climate change on trees in Quebec
PhD Supervisor	Richard Feldman	Aug 2006-	Community mechanisms of species ranges of hummingbirds
	Peter White	May 2006-	The interaction between disturbance and biogeography of forests in the Monterege and Alberta
	Matthew Vavrek (Co-supervisor with Hans Larsson)	2006-	Beta diversity in the Cretaceous
Postdoc	Volker Bahn	2005-2008	Habitat models, species ranges

MSc Committee member: Laura Plourde, Marie Pierre-Prarie, Sophia Akl, Stefanie Kulhane, Kathleen Church, Jay Ploss, Lindsey Sloat

PhD Committee member: Ayez Hadar, Jason Samson, Tarik Gouhier

MSc Thesis reader : Pradeep Pillai, Genevieve Smith, Filip Petrovic, Stacey Jarema, Tim Holland

PhD Qualifying external member: Maria del Carmen Ruiz-Jaen, Sarah Overington

PhD Defense external member: Christian Marks, Tyler Smith, Henri Valles

PhD External Reader: Maria Dornelas (John Cook University), Atila Kilmar (U of Ottawa), Peter Wilson (Macquarie University)

PhD Defense ProDean: Sathesh Bhat (Biochemistry)

Service and other contributions

Research community

Associate Editor: *Global Ecology and Biogeography, Frontiers in Ecology and Environment*

Ad hoc Editor: *Evolutionary Ecology Research*

Reviewer (over 180 in total, not including papers where I was editor) for: *American Journal of Botany, American Naturalist, Annals of Botany, Basic and Applied Ecology, BMC Ecology, Condor, Diversity and Distributions, Ecography, Ecology, Ecology Letters, Global Ecology & Biogeography, Journal of Biogeography, Marine Ecology Progress Series, Nature, Oecologia, Oikos, Plant Ecology, Proceedings of the National Academy of Science, Proceedings of the Royal Society of London B, Science, Proceedings Interface, Public Library of Science Biology, Theoretical Population Biology, Trends in Ecology & Evolution*

Grant proposal reviewer: National Science Foundation, Alberta Ingenuity Fund, NZ Marsden Fund, University of Siena Research Plan, Binational Science Foundation (Israel/US), Veni programme (Innovational Research Incentive Scheme) of the Netherlands

Co-organized "Organized oral session" at ESA 2008 on "Grinnellian Niches or Just Statistical Correlates? Opportunities for Ecological Inference From Species Distribution Models" (Walter Jetz organizer)

Organized symposium at ESA 2004 on "A 'new' paradigm for community ecology: building from functional ecology" (Brian Enquist co-organizer)

University/Faculty

Participant in two McGill University Faculty of Science "Soup or Science" presentations to undergraduates

Member of group launching the university wide "Panama Consortium" to encourage more graduate students from Central America to study at McGill

Departmental

Member of the UofA SNR Academic Program Review (Self-study) committee

Member of the UofA SNR Information Technology Committee

Member of the McGill Dept of Biology Graduate Training Committee (3 years)

Led a discussion and overhaul of qualifying exam process within McGill Department of Biology CEEB subgroup resulting in a document stating expectations clearly

Served as a statistical or informatic consultant for faculty and students (when not on their committees)

Organized the "Dynamics of Interacting Populations" seminar for the University of Arizona Math and EEB departments Spring 2000, Spring 2001

University of Arizona EEB Graduate student association co-president 2000-2001

University of Arizona EEB - Taught a semester long seminar for fellow graduate students - "Mathematical tools for ecologists"

Memberships: Ecological Society of America, American Society of Naturalists, Society, International Biogeography Society

Previous Career

This career is where I learned many of the tools I use in my ecoinformatics approach. In the last 5 years I led a team to create a database that was optimally designed for analysis of data (rather than for storing individual transactions). I also worked with telecommunications companies to develop statistical methods for analyzing customers. Prior to that I did a lot of computer simulation work.

1992-1997 In my last 6 months, I was Executive Director of a business unit. In this role, I Kenan Systems designed a new product, led development, and led a sales and marketing effort which brought in \$2 million in its first year. Prior to this, I was head designer and development manager for a product used to analyze business data, supervising a team of 20. Received Patent #6115714.

1988-1992 Designed discrete event simulations to analyze logistics questions for the US Kenan Systems Postal Service. Project manager of \$1-\$2 million per year projects. One project I managed was one of three components to collectively receive runner up for the Edelman award, the highest recognition for applied work by the operations research professional society (ORSA/TIMS)

1982-1987 Worked part time implementing discrete event simulations of heating, cooling
Volt EMS and other energy consumption dynamics in residential and commercial buildings