

**Brevard County
Environmentally Endangered Lands (EEL) Program
Selection and Management Committee Volunteer Application**

First Name: Mark Last Name: Bush
Mailing Address: 2738 School Dr NE
City: Palm Bay State: FL Zip: 32905
Cell Phone: 321 456 6313 Alternate Phone: 321 674 7166
Email: mbush@fit.edu

The EEL Selection and Management Committee serves as an expert volunteer scientific advisory committee to the County Commission on all issues involving the acquisition and management of environmentally endangered lands with the EEL Program protected area network in Brevard County.

*Please complete the following information and **include your resume as an attachment** when submitting this application for consideration as a volunteer member of the Selection and Management Committee.*

Please confirm your willingness to serve on the committee for a minimum term of two (2) years.

I am willing to serve on the committee for two years: Yes

Please confirm your ability to attend meetings in-person.

I am available to attend in-person meetings: Yes

Please provide a brief overview AND resume of your background and expertise related to the following committee member requirements:

- Four-year postsecondary academic degree (B.S. or equivalent) in biological or environmental sciences or demonstrated professional expertise (minimum of 6 years) in a closely related conservation field such as ecosystem management, natural resources conservation, aquatic biology, field ecology, marine biology, botany, geology, hydrology, fire ecology, natural areas management, human use and recreation in natural areas, science education, or natural area sanctuary design.

I am a Professor of Biology at the Florida Institute of Technology and have an MS in environmental economics, and a Ph.D. in Geography. I have lived in Palm Bay for 25 years. I have taught Conservation Biology and Ecology at Florida Tech for 25 years and at Duke for 4 years before that. I have authored over 150 peer-reviewed papers on ecology. I previously served on the EELs committee from 1998 until 2014.

Please provide an overview of your knowledge of Brevard County ecosystems, habitat types and conservation land management techniques.

I am a keen ornithologist and outdoors person. I visit the EELs sits in southern Brevard regularly. Through my prior experience with EELs I became familiar with many of the issues faced by the land managers and the various stakeholder interests. I have led teams of volunteers on pepper busts on EELs and other protected lands in Brevard.

Email SMC Volunteer Scientist Application

Curriculum Vitae: Mark Bennett Bush

Work address: Department of Biological Sciences, Florida Institute of Technology, Florida 32901.

Tel: (321) 674-7166

Email: mbush@fit.edu

Experience

Interim Head, Department Biological Sciences, Florida Tech	2007-2009.
Professor: Florida Tech	2004-
Associate Professor: Florida Tech	1999-2004.
Chair Ecology Program, Dept. Biological Sciences, Florida Tech	2003-
Assistant Professor: Florida Tech	1996-1999.
Program Director: Duke-in-Australia	1996-1997.
Adjunct Assistant Professor: Duke University	1996-1997.
Assistant Professor in the Practice of Botany: Duke University	1994-1996.
Assoc. Director of Undergraduate Studies: Duke University	1994-1996.
Lecturer: Duke University	1992-1994.
Mellon Fellow: Smithsonian Tropical Research Institute, Panama	1991-1992.
Adjunct Assistant Professor: The Ohio State University	1990-1991.
Research Associate IIB/H: The Ohio State University	1987-1991.
Regional Officer: British Trust for Conservation Volunteers	1980-1982.

University degrees

Masters in Environmental Management, Duke University	1994-1996.
Ph.D. (Geography) University of Hull, U.K.	1982-1986.
Post-Graduate Certificate of Education, University of Hull, U.K.	1985-1986.
B.Sc. (Botany and Geography), University of Hull, U.K.	1976-1979.

Outside Service

Editorial Board of The Holocene	2017-
Board of the American Quaternary Association (elected office)	2013-2015.
Editorial Board Frontiers in Ecology and Evolution	2013-
Editorial Board Journal of Biogeography	2007-
Editor: Journal of Biogeography	2004-2007
Environmentally Endangered Lands Committee, Brevard County,	1998-2012.
Board of Directors: Organization for Tropical Studies	1996.
Sigma Xi Grants-in-aid committee member	1994-1996.
Staff Career Development Award, The Ohio State University	1991.
Editorial Board: Global Ecology and Biogeography Letters	1990-1997.

NSF panel member multiple times for P2C2 and Community and Population Ecology

NSF reviewer (multiple panels)

Reviewer for NERC (UK equivalent to NSF), NWO (Dutch equivalent to NSF), ERS (European Union equivalent), and Chilean Govt.

Journal Reviewer for Nature, Science, Nature Ecology and Evolution, Journal of Ecology, Ecology, Ecological Monographs, Quaternary Science Reviews, Global Change Biology, Quaternary Research, Journal of Biogeography, Frontiers in Ecology and Evolution, The Holocene.

Outside Ph.D. examiner for Oxford University, School of Geography 2010, University of Amsterdam, IBED 2020.

Florida Tech Service since 2011

Faculty Senate 2019-

Senate Ethics Special Committee 2020

Departmental Visioning Committee Chair 2019

College of Engineering and Science Promotions Committee 2018-

Chair Marine Conservation Program 2014-2019

University Research Council 2014- (Chair 2016 and 2017)

Advisor to the Conservation Technology MS students 2011-

Summer Field Programs coordinator for Biology 2010-

Chair Conservation Biology Program 2009-2014

One-week tropical ecology field course taught for Holy Trinity Episcopal Academy (Ages 14-17) each year 2012-2020, Costa Rica or the Galapagos alternating years.

Honors

Excellence in Research Award, Florida Tech 1999.

Excellence in Teaching Award, Florida Tech 1998.

Major Funding (all amounts are Florida Tech share to MBB)

Pending

NSF-DEB Collaborative Research: Are Amazonian and Andean ecosystems close to a tipping point?
\$488,000.

NSF-HEGS: Amazonian pre-Columbian populations. \$300,000

Awarded

NASA Smoke on the water: Lake-based calibration of Amazonian fire histories \$220,000 (2020-2023)

NSF-ATM Collaborative Research: P2C2--Unravelling the Signals in Tropical Pacific Lake Archives:
Towards Improved Holocene Hydroclimate Reconstructions. \$79,750 (7/1/2020-6/30/2023)

National Geographic Society- The last millennium of fire in Amazonia. \$28,000 (6/1/2020-5/31/2021)

National Geographic Society - Human impacts on mid-elevational forests. \$32,990 (6/1/2018-5/31/2019)

MITRE - Development of pollen identification and geolocation (PIGLT) Database. \$800,000 (10/1/2016 -
9/30/2018)

NSF - P2C2 Deep Drilling of Lake Junin \$130,000 (5/1/2014-4/2020)

ACOE Everglades Paleoecology Project \$86,085 (2/1/2014-8/1/2014).

NSF - Belmont: Are microrefugia the key to ecosystem sustainability in montane ecosystems under
projected climate change? \$450,000 (6/1/16-5/31/21)

NSF - P2C2 Collaborative proposal: Amazonian Megadroughts in the Holocene. \$351,000 (1/1/2014-
12/31/2017).

MITRE - Development of pollen identification and geolocation (PIGLT) Database. \$2.4M (8/1/13-
9/30/2016)

NSF - The timing and cause of megafaunal population collapse in the Neotropics. \$405,000 (4/1/13-
3/30/2016)

NSF - FDSB: Origins of Andean Biodiversity. \$300,000 (4/13-4/18)

NSF - Graduate training award trophic cascades and climate change in Florida wetlands. \$120,000
(8/1/2012-7/31/2015).

NSF - IDBR: Development of an app and web interface for automated anuran recognition and mapping. \$348,000. (3/1/12-2/28/15).

NASA: Detection of Terra Preta soils using hyperspectral imaging: \$64,000. (8/1/10-7/31/13)

National Geographic Society: Expedition grant to investigate the paleoecology of the Chachapoya. \$18,600. June 2010.

NSF - P2C2: Paleoclimatic history of MIS 5e from Central American lake records. \$375,200. (10/1/09-9/30/12).

NSF - Geography: A landscape-scale analysis of paleoclimatic and vegetation change in the Andes applying the concept of shifting baselines. \$298,800. (10/1/09-9/30/12).

NSF - DEB: Collaborative Research: determining the ecological legacy of pre-Columbian human impacts on Amazonian ecosystems. \$458,000 (3/1/08-2/18/11).

NSF - Graduate training award high resolution precipitation and vegetation records from the Andes. \$120,000 (8/1/2007-4/30/2012).

Blue Moon Foundation: Potential of Andean ecosystems for carbon sequestration. \$18,000 (4/1/09-3/31/10).

Gordon And Betty Moore Foundation: Climatic controls on an Andean ecosystem: \$220,000 (3/1/2007-11/15/2009).

NOAA: High-resolution record of the last 2000 years of climate change on the Galapagos Islands. \$120,000 (6/1/07-5/31/09).

NSF - DBI: Acquisition of an ESEM and TEM. \$364,000 (8/1/04-7/31/07).

NSF - Ecology: Collaborative Research: Vegetation and paleoecology of an Amazon-Andean elevational transect \$357,000 (04/01/03-03/31/07)

NSF - ESH: Collaborative Research: Lake Peten-Itza Drilling Project, Guatemala: A terrestrial archive of northern Neotropical climate and environmental change for the last climate cycle. \$22,000. (09/01/05-08/31/06).

NSF - ATM: A 140,000-year history of climate change in the Andean Altiplano. \$281,000 (09/01/03-08/31/06)

NSF - CCLI: Teaching Inquiry-based ecology to undergraduates. \$204,000 (08/01/02-07/31/04).

NSF - ATM: A high-resolution deglacial paleoecological record from Lake Titicaca, Peru/Bolivia. \$135,000. (09/01/02-08/30/04).

NSF - DBI: Design and implementation of a Neotropical pollen database. \$148,700 (03/01/2001-02/28/2003).

NASA: A fire History of the Kennedy Space Center \$20,000 (08/01/99-07/31/00).

National Park Service: Population ecology of the horseshoe crab (*Limulus polyphemus*) in the Indian River Lagoon, Florida. \$40,000 (06/01/ 99 – 05/31/01).

NSF - DBI CAREER Grant: Holocene histories of El Niño events in the Amazon Basin. (03/01/98-02/28/01) \$450,000.

NOAA: An investigation of the modern pollen rains of Central America. 130,000 (06/1/93-05/31/95).

Publications

H-index = 69; I10 index = 165; Citations > 15589 (Google Scholar accessed 6/19/20)

Peer-Reviewed publications authorships highlighted since 2011 (i.e. last 10 years)

Graduate or post-doc members of my lab in red, undergraduate members in blue. * denotes corresponding author if other than first author.

- Åkesson, C.M., McMichael, C.N.H., Raczka, M.F., Huisman, S.N., Palmeira, M., Vogel, J., Neill, D., Veizaj, J. & **Bush, M.B.** 2020. Long-term ecological legacies in western Amazonia. *Journal of Ecology*.
- Bush, M.B.** 2020. New and repeating tipping points: the interplay of fire, climate change and deforestation in Neotropical ecosystems. *Annals of the Missouri Botanical Garden*.
- Bush M. B.**, Correa-Metrio A., van Woesik, R., Collins A., Hanselman, P., Martinez, J.A & McMichael, C.N.H. 2020. Modern pollen assemblages of the Neotropics. *Journal of Biogeography*.
- Cacciapaglia, C., **Bush, M.B.** & van Woesik, R. 2020. Legacies of an ice-age world explain modern biogeographical provinces of corals. *Journal of Biogeography*.
- Nascimento, M., Mosblech, N.A.S., Rackzka, M.F., Baskin, S., Manrique, K.E., Wilger, J., Giosan, L., Benito, X., & **Bush, M.B.** 2020. The adoption of agropastoralism and increase in ENSO frequency in the Andes. *Quaternary Science Reviews*.
- van der Sande, M. T., **M. B. Bush**, D. H. Urrego, M. Silman, W. Farfan-Rios, K. García Cabrera, A. Shenkin, Y. Malhi, C. H. McMichael, & Gosling, W. 2020. Modern pollen rain predicts shifts in plant trait composition but not plant diversity along the Andes-Amazon elevational gradient. *Journal of Vegetation Science*.
- Åkesson, C.M., Matthews-Bird, F., Bitting, M., Fennell, C.J., Church, W.B., Peterson, L.C., Valencia, B.G. & **Bush, M.B.** 2020. 2100 years of human adaption to climate change in the High Andes. *Nature Ecology and Evolution*, 4: 66–74.
- de Oliveira, P.E., Raczka, M., Pinayad, J.L.D., McMichael, C.N.H. & Bush, M.B. 2020. Climate change and biogeographic connectivity across the Brazilian cerrado. *Journal of Biogeography*, 47: 396-407.
- Sarmiento, F.O., Bush, M.B., Church, W., VanValkenburgh, P. Oliva, M, Delgado, E., Fernandez, S. & Rojas, N. 2020. Mountain science poised to help ecotourism in Peruvian cloud forests. *PAGES*, 28: 22-24.
- Bush, M.B.**, Whittaker, R.J., & Morley, R. 2019. John Roger Flenley: In memoriam. *Journal of Biogeography* 45: doi.org/10.1111/jbi.13539.
- Cárdenes-Sandí G.M, Shadik, C.R., Correa, A., Cheddadi, R., Gosling, W., & **Bush, M.B.***, 2019. Central American climate and microrefugia: a view from the Last Interglacial. *Quaternary Science Reviews* 205: 224-233.
- Huisman, S., McMichael, C.H. & **Bush, M.B.** 2019. Four centuries of local-scale vegetation change in a fire-free mid-elevation Andean forest. *Vegetation History and Archaeobotany*, 28: 679-689.
- Nascimento, M. N., Martins, G. S., Cordeiro, R. C., B., T., Moreira, L. S. & **Bush, M. B.** 2019. Vegetation response to climatic changes in western Amazonia over the last 7,600 years. *Journal of Biogeography*, 46: 2389-2406.
- Nascimento, M.N., Laurenzi, A.G., Valencia, B.G., & **Bush, M.B.** 2019. A 12,700-year history of paleolimnological change from an Andean microrefugium. *The Holocene*, 29: 231–243.
- Pinaya, J.L.D., Cruz, F.W., Ceccantini, G.C.T., Corrêa, P.L.P., Pitman, N. and 20 others incl. **Bush, M.B.** 2019. Brazilian montane rainforest expansion induced by Heinrich Stadial 1 event . *Scientific Reports*, 9: 1-14.
- Piperno, D.R., McMichael, C.N.H., & **Bush, M.B.** 2019. Finding forest management in prehistoric Amazonia. *The Anthropocene*, 26: doi.org/10.1016/j.ancene.2019.100211
- Raczka, M.F. Mosblech, N.A., Giosan, L., Folcik, A.M., Valencia, B.G., Kingston, M. Baskin, S., & **Bush, M.B.** 2019. A human role in Andean megafaunal extinction? *Quaternary Science Reviews*, 205: 154-165.

- van der Sande, M. T., W. Gosling, A. Correa-Metrio, J. Prado-Junior, L. Poorter, R. S. Oliveira, L. Mazzei, & **Bush, M.B.** 2019. A 7000-year history of changing plant trait composition in an Amazonian landscape; the role of humans and climate. *Ecology Letters*, 22:925-935.
- Bush, M.B.** & Gosling, W.D., 2018. In search of the ice age tropics, a tribute to Prof. Daniel Livingstone and Prof. Paul Colinvaux. *Quaternary Research*, 89: 1-6.
- Nolan, C., Overpeck, J.T., Allen, J.R., Anderson, P.M., Betancourt, J.L., Binney, H.A., Brewer, S., **Bush, M.B.**, Chase, B.M., & Cheddadi, R.J.S., 2018. Past and future global transformation of terrestrial ecosystems under climate change. *Science*, 361: 920-923.
- Parsons, L.A., LeRoy, S., Overpeck, J.T., **Bush, M.B.**, Cárdenes-Sandí, G.R., & Saleska, S. 2018. The Threat of Multi-Year Drought in Western Amazonia. *Water Resources Research*, 54: 5890-5904.
- Raczka, M.F., De Oliveira, P.D., & **Bush, M.B.**, 2018. Megafaunal extinction in south-eastern Brazil. *Quaternary Research* 89: 103-118.
- Sarmiento, F. O., Vázquez, A., Aguilar, G., Cheddadi, R. **Bush, M.B.**, Donoso, M., Palacios, E., & Kong, I. J. T. R.. 2018. Tree microrefugia and community-based conservation in Tropandean mountainscapes: A bio-cultural approach for heritage management of "El Collay" protected forest in Southeastern Ecuador. *Satoyama Review* 4: 95-109.
- Schiferl, J.D., **Bush, M.B.**, & Silman, M.R., 2018. Vegetation responses to late-Holocene climate changes in an Andean forest. *Quaternary Research* 89: 60-74.
- Valencia, B.G., **Bush, M.B.**, Coe, A.L., Orren, E., & Gosling, W.D., 2018. *Polylepis* woodland dynamics during the last 20,000 years. *Journal of Biogeography*. 45: 1019-1030.
- Bush, M.B.** 2017. The resilience of Amazonian forests. *Nature* 541: 167-168.
- Bush, M.B.**, Correa-Metrio, A., Woesik, R., Shadik, C. R. & McMichael, C. N. 2017 Human disturbance amplifies Amazonian El Niño–Southern Oscillation signal. *Global Change Biology* 23: 3181-3192
- Cheddadi, R., Henrot, A.-J., François, L., Boyer, F., **Bush, M.B.**, Carré, M., Coissac, E., De Oliveira, P.E., Ficetola, F., Hambuckers, A., Huang, K., Lézine, A.-M., Nourelbait, M., Rhoujjati, A., Taberlet, P., Sarmiento, F., Abel-Schaad, D., Alba-Sánchez, F., Zheng, Z., 2017. Microrefugia, Climate Change, and Conservation of *Cedrus atlantica* in the Rif Mountains, Morocco. *Frontiers in Ecology and Evolution* 5: 114.
- Holden, P. B., H.J.B. Birks, S.J. Brooks, **Bush, M.B.**, G.M. Hwang, F. Matthews-Bird, B.G. Valencia, & van Woesik, R. 2017. BUMPER v1.0: A Bayesian user-friendly model for palaeo-environmental reconstruction. *Geoscientific Model Development* 10: 483-498.
- Matthews-Bird, F., Valencia, B., Church, W., Peterson, L., & **Bush, M.B.**, 2017. A 2000-year history of disturbance and recovery at a sacred site in Peru's northeastern cloud forest. *The Holocene* 27, 1707-1719.
- McMichael, C.H., Piperno, D.R. & **Bush, M.B.** 2017. Response to Levis et al.: Persistent effects of pre-Columbian plant domestication on Amazonian forest composition. *Science* 358 (6361), ean8347
- Palace, M., McMichael, C., Braswell, B., Hagen, S., Bush, M., Neves, E., Tamanaha, E., Herrick, C., Frolking, S., 2017. Ancient Amazonian populations left lasting impacts on forest structure. *Ecosphere* 8: doi/full/10.1002/ecs2.2035
- Piperno, D. R., McMichael, C.H. & Bush, M.B. 2017. Response to Watling et al.: Impact of pre-Columbian "geoglyph" builders on Amazonian forests. *PNAS*.
- Shadik, C.R., Cardenes-Sandi, G., Correa-Metrio, Y.A., **Bush, M.B.**, 2017. Glacial and interglacials in the Neotropics: a 130,000 – year diatom record from Central Panama. *Journal of Paleolimnology* 58: 497-510.

- Thompson, D.M., J.L. Conroy, A. Collins, S. Hlohowskyj, J.T. Overpeck, M. Riedinger-Whitmore, J.E. Cole, **M.B. Bush**, H. Whitney, & T.L. Corley. 2017. Tropical Pacific climate variability over the last 6000 years as recorded in Bainbridge Crater Lake, Galápagos. *Paleoceanography* 32: 903–922.
- Bush, M.B.**, Correa-Metrio, Y.A., McMichael, C.H., Sully, S., Shadik, C.R., Guilderson, T., Steinitz-Kannan, M. & J.T. Overpeck 2016. A 6900-year history of landscape modification by humans in lowland Amazonia. *Quaternary Science Reviews* 141: 52–64.
- Bush, M.B.** & McMichael, C. N. 2016. Holocene variability of an Amazonian hyperdominant. *Journal of Ecology* 104: 1370-1378.
- Bush, M.B.**, Riedinger-Whitmore, M.A., Steinitz-Kannan, M., Miller, M.C. & De Oliveira, P.E. 2016. Paul Colinvaux 1930–2016. *The Bulletin of the Ecological Society of America* 97: 208-212.
- Raczka, M.F., **Bush, M.B.**, Folcik, A.M. & McMichael, C.H. 2016. *Sporormiella* as a tool for detecting the presence of large herbivores in the Neotropics. *Biota Neotropica*, 16. doi.org/10.1590/1676-0611-BN-2015-0090
- Rozas-Davila, A., Valencia, B.G. & **Bush, M.B.** 2016. The functional extinction of Andean megafauna. *Ecology* 97: 2533-2539.
- Valencia, B.G., Matthews-Bird, F., Urrego, D.H., Williams, J.J., Gosling, W.D. & **Bush, M.B.** 2016. Andean microrefugia: testing the Holocene to predict the Anthropocene. *New Phytologist* 212: 510-522.
- Bush, M.B.**, Alfonso-Reynolds, A. M., Urrego, D. H., Valencia, B. G., Correa-Metrio, Y. A., Zimmermann, M. & Silman, M. R. 2015. Fire and climate: contrasting pressures on tropical Andean timberline species. *Journal of Biogeography* 42: 938-950.
- Bush, M.B.**, McMichael, C.H., Piperno, D.R., Silman, M.R., Barlow, J., Peres, C.A., Power, M. & Palace, M.W. 2015. Anthropogenic influence on Amazonian forests in pre-history: An ecological perspective. *Journal of Biogeography* 42: 2277-2288.
- Bush, M.B.**, Mosblech, N.A.S. & Church, W. 2015. Climate change and the agricultural history of a mid-elevation Andean montane forest. *The Holocene* 25: 1522-1532.
- Conroy, J.L., Collins, A.F., Overpeck, J.T., **Bush, M.B.**, Cole, J.E. & Anderson, D.J. 2015. A 400-year isotopic record of seabird response to eastern tropical Pacific productivity. *Geo: Geography and Environment* 2: 137-147.
- Flantua, S.G., Hooghiemstra, H., Grimm, E.C., Behling, H., **Bush, M.B.**, González-Arango, C., Gosling, W.D., Ledru, M.-P., Lozano-García, S. & Maldonado, A. 2015. Updated site compilation of the Latin American Pollen Database. *Review of Palaeobotany and Palynology* 223: 104-115.
- Kular, D., Hollowood, K., Ommojar, O., Smart, K., **Bush, M.B.** & Ribeiro, E. 2015. Classifying Frog Calls Using Gaussian Mixture Models. *Advances in Visual Computing* pp. 347-354. Springer International Publishing.
- Matthews-Bird, F., Gosling, W. D., Coe, A.L., **Bush, M.B.**, Mayle, F. E., Axford, Y. & Brooks, S. J. 2015. Environmental controls on the distribution and diversity of lentic Chironomidae (Insecta: Diptera) across an altitudinal gradient in tropical South America. *Ecology and Evolution* 6: 91-112.
- McMichael, C.H., Piperno, D.R. & **Bush, M.B.** 2015. Comment on Clement et al. 2015 ‘The domestication of Amazonia before European conquest’. *Proc. R. Soc. B*, 282: 20151837.
- McMichael, C.H., Piperno, D., Neves, E., **Bush, M.B.**, Almeida, F., Mongeló, G. & Eyjolfssdottir, M.B. 2015. Phytolith assemblages along a gradient of ancient human disturbance in western Amazonia. *Frontiers in Ecology and Evolution* 3: 141.
- McMichael, C.H., Piperno, D.R. & **Bush, M.B.** 2015. Comment on Clement et al. 2015 “The domestication of Amazonia before European conquest”. *Proceedings of the Royal Society*, 282: DOI: 10.1098/rspb.2015.1837.

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- Bush, M.B.**, Restrepo, A. & Collins, A.F. 2014. Galápagos History, Restoration, and a Shifted Baseline. *Restoration Ecology* 22: 296–298
- Conroy, J.L., Thompson, D.M., Collins, A., Overpeck, J.T., Cole, J.E., & **Bush, M.B.** 2014. Climate influences on water and sediment properties of Genovesa Crater Lake, Galápagos. *Journal of Paleolimnology* 52: 331-347.
- McMichael, C.H., M.W. Palace, **Bush, M.B.**, R. Braswell, S. Hagen, E. Neves, M.R. Silman, E. Tamanha, & C. Zarnecki 2014. Predicting pre-Columbian anthropogenic soils in western Amazonia. *Proceedings of the Royal Society B*. 281: 20132475
- Collins, A.F., **Bush, M.B.** & J. P. Sachs 2013. Microrefugia and species persistence in the Galapagos highlands: A 26,000-year paleoecological perspective. *Frontiers in Genetics* 4. 10.3389/fgene.2013.00269
- Correa-Metrio, A., **Bush, M.B.** S. Lozano-García, & S. Sosa-Nájera 2013. Millennial-Scale Temperature Change Velocity in the Continental Northern Neotropics. *PLoS ONE* 8:e81958.
- Correa-Metrio, A., J. Meave S. Lozano-García, & **Bush, M.B.** 2013. Environmental determinism and neutrality in vegetation at millennial time scales. *Journal of Vegetation Science* DOI: 10.1111/jvs.12129.
- McMichael, C.H., **Bush, M.B.**, M.R. Silman, D.R. Piperno, M.F. Raczka, L.C. Lobato, M. Zimmerman, S. Hagen, & M. Palace 2013. Historical fire and bamboo dynamics in western Amazonia. *Journal of Biogeography* 40: 299-309.
- Raczka, M.F., P.E. De Oliveira, **Bush, M.B.**, & C.H. McMichael 2013. Two paleoecological histories spanning the period of human settlement in southeastern Brazil. *Journal of Quaternary Science* 28:144-151.
- Urrego, D. H., Bush, M.B. M. R. Silman, B. A. Niccum, P. De La Rosa, C.H. McMichael, S. Hagan, & M. Palace 2013. Holocene fires, forest stability and human occupation in south-western Amazonia. *Journal of Biogeography* 40:521-533.
- Correa-Metrio, A., **Bush, M.B.**, D. A. Hodell, M. Brenner, J. Escobar, & T. Guilderson. 2012. The influence of abrupt climate change on the ice-age vegetation of the Central American lowlands. *Journal of Biogeography* 39:497-509.
- Correa-Metrio A., **Bush, M.B.**, S. Sully, M. Brenner, D.A. Hodell, J. Escobar, K.R. Cabrera 2012. An 86,000-year history of vegetation response to extreme climatic events in Central American lowlands. *Quaternary Science Reviews* 38: 63–75.
- McMichael, C.H., A. Correa-Metrio, & **Bush, M.B.** 2012. Pre-Columbian fire regimes in lowland tropical rainforests of southeastern Peru. *Palaeogeography, Palaeoclimatology, Palaeoecology* 342-343:72-83.
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Invited Talks

I have never kept track of these, but here is an incomplete list since 2011

Missouri Botanical Gardens Fall seminar (Oct 2019), Belmont workshop Cuenca, Ecuador Plenary on microrefugia (Mar 2019), NSF-Belmont (Italy) workshop DC (Dec 2018), U. Florida (2018 & 2016), Aquatrop Meeting Quito (July 2018), U. Georgia (2017), DFSC Atlanta (Sep 2014), PAGES workshop Montreal (Aug 2014), DHS pollen workshop Houston (May 2013), DHS pollen forensics conference DC (May 2012), U. Amsterdam (Dec 2011).

Workshops organized

Co-organizer with Rob van Woesik of NSF-funded NimBios workshops on tropical pollen representation. 3 workshops held at U. Tennessee, Knoxville, 2014-2015.

Special Issues organized

Tribute issue (12 papers) to Paul Colinvaux and Dan Livingstone (*Quaternary Research* 2018)
Tribute issue to John Flenley (*Journal of Biogeography* In progress)

Conferences

Regular attendee and presenter at AGU, ESA, AMQUA, IBS.

Training provided

Post-Doctoral fellows

Dr. Majoi Nascimento	(2019-)
Dr. Masha van der Sande	(2018-2019)
Dr. Fraser Bird	(2015-2016)
Dr. Bryan Valencia	(2015-2017)
Dr. Aaron Collins	(2014-2015)
Dr. Crystal McMichael	(2013-2015)
Dr. Alex Correa-Metrio	(2010-2011)
Dr. Dunia Urrego	(2008-2009)
Dr. William Gosling	(2004-2005)
Dr. Chengyu Weng	(2000-2003)
Dr. Dunia Urrego	(2007-2009)
Dr. Alex Chepstow-Lusty	(2001-2002)

Training provided (cont.)

Ph.D. students

Gina Paduano (2001)
Jennifer Hanselman (2007)
Dunia Urrego (2006)
Mauro de Toledo (2004)
Alexander Correa-Metrio (2010)
Nicole Sublette (2012)
Crystal McMichael (2012)
Aaron Collins (2013)
Guaria Cardenes-Sandi (2015)
Marco Raczka (2017)
Majoi Nascimento (2019)
Christine Akesson (2019)
Angela Rozas-Davila (2020)

In progress
Jacob Schiferl
Courtney Shadik
Rachel Sales

M.S. students

Alejandra Restrepo (2006)
Bryan Valencia (2006)
Jon Shepherd (2002)
Claudia Listopad (2001)
Diana Raper (2008)
Anne Rockholt (M.S. 2011)
Honey Whitney (M.S. 2011)
Andrea Alfonso Manucci (M.S. 2012)
Angela Rozas-Davila (2013)
Nicolette Zahner (2014)
Michelle Luce (2014)
Rachel Sales (2016)

In progress
Molly Kingston
Meghan OConnor
Keegan Shults

Formal courses taught since 2011

MAR 4410 Community Ecology* 4 cr (every spring)
MAR 4030/5030 Conservation Biology* 3 cr (every Fall)
MAR 4413/5413 Applied GIS for biologists* 4/3 cr (2018, 2019, 2020)
MAR 4420/5420 Pre-Columbian ecosystem impacts (2014, 2016, 2018, 2020)
MAR 4100/5200 Tropical Ecology 3 cr (on-line class summer 2020)
BIO 5034 Paleoecology 3 cr (spring 2011, 2014)
BIO 5328 Biogeography of the southeastern flora* 3 cr (2013, 2015, 2017)

Summer field programs (one class taught every year since 1996 except for 2020)

BIO 4421/5421 Andes-Amazon 3 cr (taught in Manu, Peru or Yasuni, Ecuador)

BIO 4904/5904 Galapagos Ecology 3 cr

BIO 2380 Costa Rica 3 Cr (2002)

Duke-in-Australia Program 1996-1998

I have typically had 2-4 students enrolled for undergraduate research credit Bio 499x each semester. Biology Forum (1cr) has been provided as needed.

*Course required for a biology major, catalog descriptions switched from BIO to MAR in 2018.