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Education

Ph.D. Environmental Science, Policy & Mang., University of California, Berkeley, CA 2005
B.A., Environmental Science, University of Virginia, Charlottesville, VA 1998

Research Experience

Wildlife Health Researcher, U.S. Geological Survey	2005-present
Faculty Affiliate, Montana State University	2006-present
Graduate Student Researcher, U.C. Berkeley	1999-2005

Publications

In review

Brandell, E, E. S. Almberg, P. C. Cross, A. Dobson, D. Smith, and P. Hudson (2020).
“The invasion, dynamics, and consequences of infectious diseases in Yellowstone’s wolves”.
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chronic wildlife disease”. In: *Journal of Applied Ecology* In Review, pp. 000-000.

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Rayl, N. D, J. A. Merkle, K. M. Proffitt, E. S. Almberg, J. D. Jones, J. A. Gude, and P. C.
Cross (2020). “Elk migration influences the risk of disease spillover in the Greater
Yellowstone Ecosystem”. In: *Journal of Animal Ecology* In review, pp. 000-000.

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Cassirer, E. F, K. R. Manlove, E. S. Almberg, P. L. Kamath, M. Cox, P. Wolff, A. Roug, J. Shannon, R. Robinson, R. B. Harris, B. J. Gonzales, R. K. Plowright, P. J. Hudson, P. C. Cross, A. Dobson, et al. (2017). “Pneumonia in bighorn sheep: Risk and resilience”. In: *The Journal of Wildlife Management*. ISSN: 0022541X. DOI: [10.1002/jwmg.21309](https://doi.org/10.1002/jwmg.21309).

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Almberg, E, P. C. Cross, and D. Smith (2010). “Persistence of canine distemper virus in the Greater Yellowstone Ecosystem’s carnivore community”. In: *Ecological Applications* 20.7, pp. 2058-2074. DOI: [10.1890/09-1225.1](https://doi.org/10.1890/09-1225.1).

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South Africa”. In: *Ecology* 90.9, pp. 2467-2479. DOI: [10.1890/08-1532.1](https://doi.org/10.1890/08-1532.1).

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2008

Conner, M. C, M. Ebinger, J. A. Blanchong, and P. C. Cross (2008). “Infectious disease in cervids of North America: Data, models, and management challenges”. In: *Annals of the New York Academy of Sciences* 1134, pp. 146-172. DOI: [10.1196/annals.1439.005](https://doi.org/10.1196/annals.1439.005).

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2007

Conner, M. M, J. Gross, P. C. Cross, M. D. Samuel, D. McKinnon, and M. Miller (2007). *Scale-dependent approaches to modeling spatial epidemiology of chronic wasting disease*. Utah Division of Wildlife Resources. URL: <http://wildlife.utah.gov/diseases/cwd/e-book/>.

Cross, P. C, W. H. Edwards, B. Scurlock, E. Maichak, and J. Rogerson (2007). “Effects of management and climate on elk brucellosis in the Greater Yellowstone Ecosystem”. In:

Ecological Applications 17.4, pp. 957-964. DOI: [10.1890/06-1603](https://doi.org/10.1890/06-1603).

Cross, P. C, P. L. Johnson, J. O. Lloyd-Smith, and W. M. Getz (2007). “Utility of R_0 as a predictor of disease invasion in structured populations”. In: *Journal of the Royal Society Interface* 4, pp. 315-324. DOI: [10.1098/rsif.2006.0185](https://doi.org/10.1098/rsif.2006.0185).

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Getz, W. M, S. Fortmann-Roe, P. Cross, A. Lyons, S. Ryan, and C. Wilmers (2007). “LoCoH: nonparametric kernel methods for constructing home ranges and utilization distributions”. In: *PLoS ONE* 2.2, p. e207. DOI: [10.1371/journal.pone.0000207](https://doi.org/10.1371/journal.pone.0000207).

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Cross, P. C. and W. M. Getz (2006). “Assessing vaccination as a control strategy in an ongoing epidemic: Bovine tuberculosis in African Buffalo”. In: *Ecological Modelling* 196, pp. 494-504. DOI: [10.1016/j.ecolmodel.2006.02.009](https://doi.org/10.1016/j.ecolmodel.2006.02.009).

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Michel, A. L, R. G. Bengis, D. F. Keet, M. Hofmeyr, L. M. de Klerk, P. C. Cross, A. E. Jolles, D. Cooper, I. J. Whyte, P. Buss, and J. Godfroid (2006). “Wildlife tuberculosis in South African conservation areas: Implications and challenges”. In: *Veterinary Microbiology* 112.2-4, pp. 91-100. DOI: [10.1016/j.vetmic.2005.11.035](https://doi.org/10.1016/j.vetmic.2005.11.035).

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Cross, P. C, J. O. Lloyd-Smith, and W. Getz (2005). “Disentangling association patterns in fission-fusion societies using African buffalo as an example”. In: *Animal Behavior* 69.2, pp. 499-506. DOI: [10.1016/j.anbehav.2004.08.006](https://doi.org/10.1016/j.anbehav.2004.08.006).

Cross, P. C, J. O. Lloyd-Smith, P. L. Johnson, and W. M. Getz (2005). “Duelling timescales of host mixing and disease recovery determine disease invasion in structured populations”. In: *Ecology Letters* 8, pp. 587-595. DOI: [10.1111/j.1461-0248.2005.00760.x](https://doi.org/10.1111/j.1461-0248.2005.00760.x).

Lloyd-Smith, J. O, P. C. Cross, C. J. Briggs, M. Daugherty, W. M. Getz, J. Latta, M. S. Sanchez, A. B. Smith, and A. Swei (2005). “Should we expect population thresholds for

wildlife disease?” In: *Trends in Ecology & Evolution* 20.9, pp. 511-519. DOI: [10.1016/j.tree.2005.07.004](https://doi.org/10.1016/j.tree.2005.07.004).

2004

Cross, P. C, J. O. Lloyd-Smith, J. Bowers, C. Hay, M. Hofmeyr, and W. M. Getz (2004). “Integrating association data and disease dynamics in a social ungulate: bovine tuberculosis in African buffalo in the Kruger National Park”. In: *Annales Zoologici Fennici* 41, pp. 879-892. URL: <http://www.jstor.org/stable/23736148>.

Macandza, V, N. Owen-Smith, and P. C. Cross (2004). “Forage selection by African buffalo (*Syncerus caffer*) through the dry season in two landscapes of the Kruger National Park”. In: *South African Journal of Wildlife Research* 34.2, pp. 113-121.

2003

Caron, A, P. C. Cross, and J. du Toit (2003). “Ecological implications of bovine tuberculosis in African Buffalo herds”. In: *Ecological Applications* 13.5, pp. 1338-1345. DOI: [10.1890/02-5266](https://doi.org/10.1890/02-5266).

Grey Literature

Rayl, ND, Proffitt, KM, Almberg, ES, Merkle, JA, Jones, JH, Gude, JA & Cross, PC. 2018 Modelling elk-to-livestock transmission risk to identify hotspots of brucellosis spillover. pp. 1-56, Montana Fish, Wildlife and Parks.

Ebinger, MR & PC Cross. 2008. Surveillance for brucellosis in Yellowstone bison: The power of various strategies to detect vaccination effects. National Park Service, Mammoth, WY, YCR-2008-04. 69 pages.

Databases

van Manen, F.T., Smith, D.W., Haroldson, M.A., Stahler, D.R., Almberg, E.S., Whitman, C.L., and Cross, P.C., 2018, Canine distemper virus antibody titer results for grizzly bears and wolves in the Greater Yellowstone Ecosystem 1984-2014: U.S. Geological Survey data release, <https://doi.org/10.5066/P96E4UCK>.

Merkle, JA, PC Cross, BM Scurlock, EK Cole, AB Courtemanch, SR Dewey, MJ Kauffman, and KE Szcudronski, 2017, Elk movement and predicted number of brucellosis-induced abortion events in the southern Greater Yellowstone Ecosystem (1993-2015): U.S. Geological Survey data release, <https://doi.org/10.5066/F7474803>.

Brennan, A., Courtemanch, A.B., Cole, E.K., Dewey, S.R., and Cross, P.C., 2018, Elk GPS collar data from National Elk Refuge (2006-2015): U.S. Geological Survey data release, <https://doi.org/10.5066/F7FF3RNW>.

Cross, PC, DM Heisey, JA Bowers, CT. Hay, J Wolhuter, P Buss, M Hofmeyr, A Michel, R Bengis, T Bird, IJ Whyte, JT Du Toit, and WM Getz. 2009. Buffalo herd tracking with VHF and GPS data. <http://www.Movebank.org>.

Cross PC, Heisey DM, Bowers JA, Hay CT, Wolhuter J, Buss P, Hofmeyr M, Michel AL, Bengis RG, Bird TLF, Du Toit JT, Getz WM (2008) Data from: Disease, predation and demography: assessing the impacts of bovine tuberculosis on African buffalo by monitoring at individual and population levels. Dryad Digital Repository.
<http://dx.doi.org/10.5061/dryad.5hh3h>

Gorsich EE, Ezenwa VO, Cross PC, Bengis RG, Jolles AE (2015) Data from: Context-dependent survival, fecundity, and predicted population-level consequences of brucellosis in African buffalo. Dryad Digital Repository
<http://dx.doi.org/10.5061/dryad.p6678>.

Students

Gavin Cotterill. In progress. Managing disease in the supplemental feeding grounds of Wyoming. Utah State University. Co-supervisor: JT Du Toit
Ellen Brandell. In progress. Disease impacts on wolves in Yellowstone National Park. Penn State University. Co-supervisor: PJ Hudson
Angela Brennan. 2014. Broad-scale determinants of elk aggregation and brucellosis seroprevalence. Montana State University. Co-supervisor: S Creel.
Tyler Creech. 2011. Heterogeneity in the fine-scale contact patterns of elk as determined by proximity collars. Montana State University. Co-supervisor: S Creel
Victoria Forristal (formerly Patrek). 2009. Masters. Fat but not happy: The Effects of Supplemental Feeding on Stress Hormone Levels in Elk. Montana State University. Co-supervisors: M Taper, S Creel
Craig Hay. 2006 Choice of Social environment of male buffalo (*Syncerus caffer*) in the Kruger National Park, South Africa. Tshwane University of Technology. South Africa. Co-supervisor: P Funston
Chris Oosthuizen. 2006. Honour's thesis: Chemical immobilization of African buffalo (*Syncerus caffer*) in Kruger National Park: Evaluating effects on survival and reproduction. University of Pretoria. South Africa. Co-supervisor: E Cameron

Post-docs

Alynn Martin. 2019-present. USGS. Brucellosis and bighorn sheep disease.
Nathaniel Rayl. 2016-2018. USGS. Montana livestock risk assessments.
Kezia Manlove. 2016-2018. Washington State University. Bighorn sheep pneumonia. Co-supervisor: Tom Besser. USDA funding.
Angela Brennan. 2015-2016. Montana State University. Livestock-wildlife risk assessments. USDA funding.
Julio Benavides. 2014-2015. Montana State University. Epidemiology of elk brucellosis. Co-supervisor: Scott Creel.

Aaron Foley. 2014-2015 USGS and Montana State University. Elk migration and cow-calf ratios in western Wyoming. Co-supervisor: Scott Creel. Partially funded by the U.S. Fish and Wildlife Service.

Pauline Kamath. 2011-2015. USGS. Population genetics and wildlife disease.

Field Supervisor

Manlove, K. 2017. Penn State University. Supervisor: PJ Hudson

Almberg, ES. 2015. Penn State University. Supervisor: PJ Hudson

Bowers, JA. 2006. Master's thesis: Feeding patch selection of African Buffalo (*Syncerus caffer*) in the central region of the Kruger National Park. Tshwane University of Technology. South Africa

Tania Bird. 2004. Master's thesis: Influence of bovine tuberculosis (*Mycobacterium bovis*) on condition and reproductive success of females African buffalo (*Syncerus caffer*) in Kruger National Park. University of Pretoria. South Africa

Shane Abeare. 2004. Master's thesis: Dry season habitat and patch selection by African buffalo herds: test of a new home range estimator. University of Pretoria. South Africa

Valerio Macandza 2002. Master's thesis: Forage selection by African buffalo in the late dry season in two landscapes. Witwatersrand University. South Africa

Alex Caron. 2001. Master's thesis: Ecological implications of bovine tuberculosis in African Buffalo. University of Pretoria. South Africa

Teaching

Data Analysis and Multi-level / Hierarchical Modeling in Ecology (1 credit) Fall 2009. MSU.

Modeling Infectious Disease (3 day workshop) 2009. Univ. of Montana.

EcoLunch Seminar (1 credit) Fall 2008. MSU.

Plant-Disease Invasion Seminar (graduate seminar). Fall 2006. MSU.

Wildlife Ecology (4 credits with lab) Spring 2005. Co-Lecturer UC Berkeley.

Disease Ecology (1 credit) 2004. Co-supervised graduate seminar on disease ecology, UC Berkeley

Modeling Infectious Disease (1 week short-course) 2001. Univ. of Witwatersrand, South Africa

Grants/Awards

USGS Performance Award (2018-2012, 2010-2007)

USGS Cyclical \$30,000 Chronic wasting disease 2018

USGS Environmental Health Mission Area \$120,000 Chronic wasting disease

NSF GRIP Supervisor: *Fusobacterium* and the elk microbiome

USDA grant to Univ of Washington, PI. \$96,000 Livestock-wildlife disease modeling 2016

USGS Grade Promotion to GS-15

MT Fish Wildlife and Parks: \$90,000 Brucellosis risk assessment 2015

USGS \$133,000 Greater Yellowstone ecosystem disease research.	
NIMBioS Workshop (Co-PI) ~\$60,000	2013
NSF Dissertation Improvement Grant (Co-PI) \$19,343	
USGS, PI \$ 98,000 Greater Yellowstone ecosystem disease research	
USGS Powell Center Grant, Co-PI (declined)	2012
USGS, PI \$75,000, Disease effects on Yellowstone Wolves.	
USFWS, PI\$45,000, Elk space-use of the National Elk Refuge.	
Morris Animal Foundation, Co-PI \$ 75,000.	
USGS Best Paper in Biology	2011
USGS Grade Promotion	
NSF-NIH Ecology of Infectious Disease Program, co-PI \$1,971,033,	2010
USGS, PI \$75,000, Park Oriented Biological Support Grant	
USGS, PI \$39,000, Modeling environmental transmission of Chronic Wasting Disease	2009
USGS, Co-PI \$320,000, Global Climate Change Initiative	2008
Co-PI \$112,180, Wyoming Livestock-Wildlife Disease Initiative	
Co-PI \$281,000, Wyoming Game and Fish Department: Tracking elk movements.	
USGS, Co-PI \$750,000 with Mary Poss (Penn State): Viral tracking of mule deer and elk.	
2007	
NPS, PI \$10,000: Brucellosis in Yellowstone National Park	2006
USGS, PI \$210,000 for chronic wasting disease research.	2005
NSF-NIH Ecology of Infectious Disease Grant. \$1.8 million. Initiated, co-authored, and developed the research program with Dr. Wayne Getz.	1999

Invited Presentations

Greater Yellowstone Coordinating Committee. CWD review.	2019
MSU Institute on Ecosystems Seminar.	2018
SERDP workshop on emerging infectious disease. Emigrant, MT.	
Brucellosis review for state wildlife and livestock agency partners. Bozeman, MT.	
Plenary: International Deer Congress, Estes Park, CO.	
Invited Panelist. Linking science and management. GYE Biennial Meeting, Big Sky MT.	
Virginia Tech workshop on mange.	
Univ. of Minnesota Veterinary Medicine Seminar.	
Glasgow University Ecology Seminar, Glasgow, UK.	2017
Chile, Universidad Andres Bello, Santiago.	
University of California at Berkeley, Wildlife Seminar	
Plenary, 12th Western States and Provinces Deer and Elk Workshop. Sun Valley, ID.	
Penn State University, Center for Infectious Disease Dynamics Seminar.	
USDA/APHIS Briefing on the National Academy of Sciences Report.	
Utah State University Ecology Seminar. Logan, UT	2016
UCLA Ecology Seminar, Los Angeles, CA.	
Patuxent USGS Seminar.	
Georgetown Ecology Seminar, Washington, D.C.	
South Africa, 50th Anniv. Mammal Research Institute, South Africa	

K-5 science and technology night, Bozeman MT.	
MT Conservation Biology Evening Lecture, Bozeman MT	2015
The National Academy of Sciences, Washington DC	
Wildlife Society Meeting, Winnepeg, Canada	2014
University of Sherbrooke Ecology Seminar, Canada	
NIH Rocky Mountain Lab, Hamilton MT	
Chile, 18th Congreso Chileno de Medicina Veterinaria	
Chile, Univ. Catolica, Dept. Seminar	
Public Talk, Emerging wildlife pandemics, Menlo Park, CA	
Steering Committee & Speaker. Foreign Animal Disease, Shepardstown WV	2013
Interagency Bison Management Plan Meeting. Chico MT	
European Conservation Biology Meeting, Glasgow UK	2012
Wildlife disease management workshop, Penn State Univ.	2011
Ecology and Evolution of Infectious Disease Meeting, Santa Barbara.	
RAPPID-NIH Movement and Mosquito-Transmitted Diseases Meeting, Washington D.C.	
Keynote: Berryman Institute Biennial Meeting, Logan UT.	2010
RAPPID-NIH Movement and Mosquito-Transmitted Diseases Meeting, Washington D.C.	
Kopriva Lecture: MSU College of Arts and Science, Bozeman, MT	2009
Colorado State University, Dept. Seminar, Fort Collins, CO	
10th Biennial Conference of Research on the Colorado Plateau Speaker, ESA,	

Service

Associate Editor, Ecological Applications	ongoing
Chair, USGS Animal Use and Care Committee for NOROCK.	
Northern Yellowstone Cooperative Wildlife Working Group.	
External Review of USDA Cattle Fever Tick Eradication Program.	2018-2019
Associate Editor, Journal of Wildlife Management	2015-2017
National Academy of Science Panel Member: Revisiting Brucellosis in the GYE	
Dept. Homeland Security IPT for outbreak response and assessment tools.	2016
Red Wolf Recovery Implementation Team, USFWS.	2014
Participant, Wildlife Conservation Society Wildlife Health Program, Internal Strategic Workshop for future research.	
Steering Committee, Group Leader & Speaker. Foreign Animal Disease National Preparedness Workshop. USGS/DHS/USDA/CDC.	2013
Member Environmental Health Strategic Science Planning Team	2011
Co-coordinator & originator, NIH & DHS RAPIDD Working group on cross-species transmission. 15 participants	
Participant, NIH & DHS RAPIDD Working group on movement and mosquito-borne diseases.	
USGS representative. Northern Rockies NEON committee.	
Organizer, Greater Yellowstone Brucellosis Research Meeting (2 days), 60 participants, 27 speakers, Bozeman MT	2009
Participant, Dept. of Interior Avian Influenza Preparedness workshop, Madison WI	

Participant, Yellowstone National Park Science Agenda Workshop, Bozeman MT
 Steering Committee, Yellowstone National Park Wildlife Health Program Meeting. 2007
 Participant, USDA workshop: The Science of Surveillance, Control and Eradication of
 Catastrophic Diseases in Wildlife, Pinagree Park CO
 Participant, Disease and conservation of mammals, Conservation International 2006
 USGS representative. Greater Yellowstone Interagency Brucellosis Committee 2005-8

Reviewer

Journals (since 2004): Nature, Ecology, Ecol App, J Anim Ecol, J App Ecol, Proc Roy Soc B, Phil Trans Roy Soc, Biol Letters, Cons Bio, Biol Cons, Anim Cons, Biodiv Cons, Behavior, Envi Cons, J Wildl Dis, Wildl Bio, PloS ONE, EcoHealth, J Theo Bio, SA J Wildl Res, Ann Zoo Fennici, Ecol Mod

Funding Agencies: National Science Foundation, Wildlife Conservation Society, Wellcome Trust, Biotechnology and Biological Sciences Research Council UK, Natural Environment Research Council UK, South African National Research Foundation, Alberta Prion Research Institute, National Institutes of Health

Press and Outreach

[Naturally Speaking](#) Podcast 2017
[Bozeman Daily Chronicle](#). National Academy of Sciences Brucellosis Report. 2016
[Missoulian Billings Gazette](#) Mange in Yellowstone
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[Yellowstone Wolf Citizen Science Webpage](#)

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