

Contact Information	Harvard Forest, Harvard University, Petersham, MA, 01366 USA - gbreed@fas.harvard.edu http://www.people.fas.harvard.edu/~gbreed/index	
Education	Dalhousie University , Halifax, Nova Scotia, Canada 2009 Ph.D., Biology Thesis: <i>State-space analyses indicate experience, prey availability, competition, and reproductive status drive foraging behaviour in a top marine predator.</i> Advisors: Ram Myers, W. Don Bowen, & Marty Leonard Texas A&M University , College Station, Texas, USA 2002 M.S., Biological Oceanography Thesis: <i>Ecosystem dynamics in the Mississippi River plume described by inverse analysis.</i> Advisor: George Jackson University of Minnesota , St. Paul, Minnesota, USA 1998 B.S. Ecology, Evolution and Behaviour (EEB) B.S. Plant Biology	
Professional Experience	Postdoctoral Fellow (3/2011 - current) Harvard University. Quantitative and empirical investigations of butterfly movement and its relationship to life history, distribution and conservation. Supervisor: Dr. Elizabeth Crone. Postdoctoral Fellow (1/2009 - 2/2011) UC Santa Cruz (2/3) and Dalhousie University (1/3). Analysis of marine animal tracking data. Supervisor: Dr. Dan P. Costa. Research Associate (2002 - 2003) Louisiana Universities Marine Consortium. Coastal plankton ecology and ecosystem dynamics. Supervisor: Dr. Mike Dagg. Graduate Research Assistant (2000 - 2002) Texas A&M University. Field Technician (Summer 2000) Virginia Polytechnic Institute. Piping plover ecology. Research Assistant (Summer 1999) Northern Arizona University. Desert butterfly habitat use. Field Technician (Summer 1998) MBL, Woods Hole. Eutrophication of eelgrass ecosystems. Lab Technician (1995-1998) University of Minnesota. Insect Ecology Laboratory.	
Other Field Experience & Cruises	<i>May-June & Sept-Oct 2004; Jan. 2005, 06, 07, 08 & 11.</i> Field work on Sable Island grey seals. <i>Spring and Autumn 2006-2008.</i> Passerine bird and raptor surveys for wind farm developments. <i>June 2003.</i> Seven days aboard the R/V Eugenie (<i>Chief Scientist</i>). Mississippi River survey cruise. <i>April - May 2003.</i> Four weeks aboard the R/V Alpha Helix. GLOBEC cruise HXT 271: MOCNESS tows, fractionated Chl extractions, water chemistry sampling. <i>March 2002.</i> Four days aboard the R/V Pelican. Grazing measurements by dilution bioassay. <i>May 2001.</i> One week aboard the R/V Pelican. Mississippi River plume monitoring cruise to understand the evolution of river water biogeochemistry as it enters the Gulf of Mexico. <i>July-August 2000.</i> Four weeks aboard the R/V Gyre. NEGOM Cruise in the N. Gulf of Mexico, CTD and niskin sampling, chlorophyll extraction, water chemistry analysis.	
Teaching	Teaching Assistantships - Marine Diversity. Fall 2004; Entomology. Summer 2005.	
Scholarship & Awards	Dalhousie Scholarship, Dalhousie University 2003-07 Regents Fellowship, Texas A&M University 2000-01 Undergraduate Research Opportunities Grant, University of Minnesota 1998 Undergraduate Research Fellowship, University of Georgia 1997	

Other Experience

President (2005-2006) - Biology Organization of Graduate Students; Dalhousie University.
Treasurer (2004-2005) - Biology Organization of Graduate Students; Dalhousie University.
Secretary (2001-2002) - Oceanography Graduate Council (OGC), Texas A&M University.
Certified Scientific Diver (1998). Marine Biological Laboratory, Woods Hole.
Computing Platforms: Linux, Matlab, R, WinBUGS, \LaTeX & most standard Microsoft programs.

Professional Societies

Ecological Society of America; Society for Marine Mammalogy; Statistical Society of Canada

Publications

Luque, S. P., S. H. Ferguson and **G. A. Breed**. 2011. Age- and sex-related differences in spatial behaviour of ringed seals in Hudson Bay. *Submitted to Mar. Eco. Prog. Ser.*

Breed, G. A., D. P. Costa, P.W. Robinson, I. D. Jonsen and J. Mills-Flemming. 2011. State-space methods for better inference of behavioral dynamics in tracked animals. *Submitted to Ecological Modelling*.

Benoît, H. P., D. P. Swain, W. D. Bowen, **G. A. Breed**, M. O. Hammill, and V. Harvey. 2011. Can predation by grey seals explain elevated natural mortality in three fish species in the southern Gulf of St. Lawrence? *Mar. Eco. Prog. Ser.* 442:149-167.

Edwards, A. M., M. P. Freeman, **G. A. Breed**, and I. D. Jonsen. 2011. Marine predator scaling laws questioned. *Submitted to PlosOne*.

Harvey, V., M.O. Hammill, D.P. Swain, **G. A. Breed**, C. Lydersen and K.M. Kovacs. 2011. Winter foraging by a top predator, the grey seal, in relation to the distribution of prey. *Submitted to Mar. Eco. Prog. Ser.*

Maxwell S. M., J. J. Frank, **G. A. Breed**, P. W. Robinson, S. A. Simmons, D. E. Crocker, J. P. Gallo-Reynoso, D. P. Costa. 2011. Benthic foraging on seamounts by a deep diving marine mammal. *Mar. Mamm. Sci.*, Published online Sept 29, 2011. DOI: 10.1111/j.1748-7692.2011.00527.x.

Maxwell, S. M., **G. A. Breed**, B. J. Godley, R. J. Parnell, J. Makanga-Bahouna, E. Pemo-Makaya, S. Nguouesso, B. Nickel, A. Formia, D. P. Costa and M. S. Coyne. 2011. Interesting behavior and movements of olive ridley sea turtles (*Lepidochelys olivacea*) in Gabon, Africa. *Plos One* 6(5):e19905.

Breed, G. A., W. D. Bowen, and M. L. Leonard. 2011. Development of foraging strategies with age in a long-lived marine predator. *Mar. Eco. Prog. Ser.*, 431: 267-279.

Block, B., I. Jonsen, S. Jorgensen, A. Winship, S. Shaffer, S. Bograd, E. Hazen, D. Foley, **G. A. Breed**, A.-L. Harrison, J. Ganong, A. Swithenbank, M. Castleton, H. Dewar, B. Mate, and D. Costa. 2011. Tagging of Pacific Pelagics: Tracking apex marine predator movements in a dynamic ocean. *Nature*, 475:86-90. doi:10.1038/nature10082.

Breed, G. A., D. P. Costa., M. E. Goebel and P. W. Robinson. 2011. Electronic tracking tag programming is critical to data collection for behavioral time-series analysis. *Ecosphere*, 2:art10.

Breed, G. A., I. D. Jonsen, R. A. Myers, W. D. Bowen, and M. L. Leonard. 2009. Sex-specific, seasonal foraging tactics of adult grey seals (*Halichoerus grypus*) revealed by state-space analysis. *Ecology* 90:3209-3221.

Green, R. E., **G. A. Breed**, M. J. Dagg, and T. S. Bianchi. 2008. Modelling ecosystem responses to changing nutrients in the Mississippi River Plume. *Cont. Shelf Res.* 28:1451-1465.

Breed, G. A., W. D. Bowen, J. I. McMillan, and M. L. Leonard. 2006. Sexual segregation of seasonal foraging habitats in a non-migratory marine mammal. *Proc. R. Soc. B* 273:2319-2326.

Green, R. E., T. S. Bianchi, M. J. Dagg, N. D. Walker, and **G. A. Breed**. 2006. An organic carbon budget for the Mississippi River turbidity plume and plume contributions to air-sea CO₂ fluxes and bottom water hypoxia. *Estuaries and Coasts* 29:579-597.

Dagg, M. J., T. S. Bianchi, **G. A. Breed**, W.-J. Cai., S. Duan, H. Liu, B. M. McKee, R. T. Powell, and M. Stewart. 2005. Biogeochemical characteristics of the lower Mississippi River, USA, during June 2003. *Estuaries and Coasts* 28:664-674.

Breed, G. A., G. A. Jackson, and T. L. Richardson. 2004. Sedimentation, carbon export, and food web structure in the Mississippi River plume described by inverse analysis. *Mar. Eco. Prog. Ser.* 278:35-51.

Dagg, M. J., and **G. A. Breed**. 2003. Biological effects of Mississippi River nitrogen on the Northern Gulf of Mexico: A Review and Synthesis. *J. Mar. Sys.* 43:133-152.

Buck, T. L., **G. A. Breed**, S. C. Pennings, M. E. Chase, M. Zimmer, and T. H. Carefoot. 2003. Diet choice in an omnivorous salt marsh crab: Different food types, claw allometry, and habitat complexity. *J. Exp. Mar. Bio. Ecol.* **292**:103–116.

Technical Reports

Benoît, Hugues P., D. P. Swain, W. D. Bowen, **G. A. Breed**, M. O. Hammill, and V. Harvey. 2010. Can predation by grey seals explain elevated natural mortality in three fish species in the southern Gulf of St. Lawrence? DFO Can. Sci. Advis. Sec. Res. Doc., 2010/0XX.

V. Harvey, M.O. Hammill, D.P. Swain, **G. A. Breed**, C. Lydersen and K.M. Kovacs 2010. Winter foraging by a top predator, the grey seal, in relation to the distribution of prey. DFO Can. Sci. Advis. Sec. Res. Doc., 2010/124.

Papers in Progress

Breed, G. A., E. E. Crone and S. Stitcher. Citizen scientist data suggest widespread climate driven changes in North American butterfly communities. 20XX. *In prep for submission to Science.*

Breed, G. A., P. M. Severns and E.E. Crone. A theoretical framework for predicting the expected patchiness of butterfly populations from female reproductive allocation. 20XX. *In prep for submission to American Naturalist.*

Breed, G. A., W. Don Bowen and M. L. Leonard. Seasonal prey movement causes intraspecific competition in a top marine predator. 20XX. *In prep for submission to ICES Journal of Marine Science.*

pdf's of published papers may be found online at:

http://www.people.fas.harvard.edu/~gbreed/gbreed_files/publications.html

Invited Talks

Breed, G. A. (2011) Developing better statistical methods for tracking data. Ecological Modelling Workshop, 19th Biennial Conference on the Biology of Marine Mammals. Tampa Florida, USA. 26 November 2011.

Breed, G. A. (2011) Practical and ecological lessons learned collecting and analyzing the world's largest animal tracking datasets. Faculty Interview Seminar, Dept. of Biology, Dalhousie University. 21 March 2011.

Breed, G. A. (2010) Using movement models to understand the life history and behaviour of marine predators. Harvard Forest, Harvard University. 13 October 2010.

Breed, G. A. (2010) Estimating parameters of animal movement models using SIR particle filter methods. Departmental Seminar, Department of Mathematics and Statistics, Dalhousie University. 30 Sept 2010.

Breed, G. A. (2009) State-space models as tools to understand movement in marine animals observed by satellite. Departmental Seminar, Department of Ecology and Evolutionary Biology, UC Santa Cruz. 29 April 2009.

Breed, G.A., I. D. Jonsen, W.D. Bowen, M.L. Leonard, and R. A. Myers (2007) State-space models as tools to understand movement in marine animals observed by satellite. Southwest Fisheries Science Center, La Jolla, CA, USA. 13 August 2007.

Breed, G.A., I.D. Jonsen, H.K. Lotze, and B. Worm (2007) Future of Marine Animal Populations: Predicting abundance, distribution, and diversity of marine life in the global ocean. 6 June 2007. NOAA Office of Ocean Exploration, Silver Spring, MD.

Breed, G.A., W.D. Bowen, M.L. Leonard, and R. A. Myers (2007) Getting the most of animal tracking data: State-space models as tools to understand behaviour from satellite telemetry data. 14 May 2007. Department of Natural Resources, Cornell University.

Breed, G.A., I.D. Jonsen, W.D. Bowen, D. Austin, and R.A. Myers (2005) Using state-space models to discriminate behavioural state from ARGOS satellite telemetry data. Ecological Modeling Workshop, 16th biennial conference on the Biology of Marine Mammals. December 2005, San Diego, USA.

Breed, G.A (2002) Inverse analysis of carbon and nitrogen flow in the Mississippi River plume ecosystem. Invited speaker. Long-term Estuary Assessment Group (LEAG) workshop, Tulane University. 14 November 2002.

Contributed Presentations

Breed, G. A., Costa, D. P., Jonsen, I. D., Robinson, P. W., Mills-Flemming, J. E. (2011) Particle filter methods for better inference of behaviour in tracking data. Contributed oral presentation. 19th Biennial Conference on the Biology of Marine Mammals. Tampa Florida, USA. 29 November 2011.

Breed, G. A., J. Mills-Flemming, D. P. Costa, and I. D. Jonsen (2011). State-space estimation of time-varying movement parameters from animal tracking data. Poster. Biologging 4, Hobart, Tasmania, 14 March 2011.

Breed, G. A. (2010) Using movement data to understand the life history of grey seals and their impact on the Scotian Shelf ecosystem. Departmental Seminar, Department of Biology, Dalhousie University. 7 October 2010.

Harvey, V., **G. A. Breed**, M. O. Hammill and D. Swain. (2009) Spatial overlap between grey seals and fish in the Cabot Strait area in winter. Poster presentation. 18th Biennial conference on the Biology of Marine Mammals. Quebec, Canada, 14 October 2009.

Breed, G. A., W. D. Bowen, M. L. Leonard, I. D. Jonsen. (2009) Evidence for displacement of juveniles by intraspecific competition in a large population of marine mammals. Ecological Society of America, Albuquerque, NM, USA, 4 August 2009 & 18th Biennial conference on the Biology of Marine Mammals. Contributed oral presentation. Quebec, Canada, 13 October 2009.

Breed, G. A., J. Mills Flemming, M. Dowd, C. Field, D. P. Costa (2009). Parameter augmented particle filter/smoothing methods for animal tracking data. Poster. Statistical Society of Canada Conference, 2 June 2009, Vancouver, BC, Canada.

Breed, G.A., I. D. Jonsen, W.D. Bowen, M.L. Leonard, R. A. Myers (2008) Sex- and age-specific foraging tactics in grey seals (*Halichoerus grypus*) revealed by behaviour discriminating state-space models. 23 September 2008. ICES 2008, Halifax, NS, Canada.

Breed, G.A., W.D. Bowen, M.L. Leonard (2007) Development of movement and foraging strategies in young of year grey seals elucidated by behaviour discriminating state-space modeling. 9 August 2007. Ecological Society of America, San Jose, CA, USA.

Breed, G.A., I.D. Jonsen, W.D. Bowen, D. Austin, and R.A. Myers (2005) Using state-space models to discriminate behavioural state from ARGOS satellite telemetry data. 16th Biennial conference on the Biology of Marine Mammals. December 2005, San Diego, USA.

Breed, G.A., W.D. Bowen, and J.M. McMillian (2005) Seasonal segregation of foraging areas by sex in a size dimorphic marine mammal. Ecological Society of America, August 2005, Montreal, Canada.

Breed, G.A., Dagg, M.J., and G.A. Jackson. (2004) Dynamical modeling of phytoplankton size structure in the Gulf of Alaska: Do copepods relieve grazing pressure on nano- and picophytoplankton? Poster: American Geophysical Union winter meeting, Portland, Oregon.

Breed, G.A., T.L. Richardson, and G.A. Jackson (2002) Planktonic food web dynamics of the Mississippi River plume inferred by inverse analysis. Oral presentation. ASLO 2002, Victoria, Canada.

Referee Services

Journals

Ecology (2)
Ecological Monographs (1)
Ecology Letters (2)
American Naturalist (1)
Proc. R. Soc. B (2)
Proc. R. Soc. Interface (2)
Marine Ecology Progress Series (4)
Continental Shelf Research (2)
Estuarine, Coastal & Shelf Science (2)
Animal Behaviour (1)
Journal of Mammalogy (1)

Endangered Species Research (3)
Marine Mammal Science (4)
Animal Conservation (1)
Mammalian Biology (1)
Methods in Ecology and Evolution (1)
Limnology & Oceanography (1)

Funding Agencies

Mitacs Canada College of Reviewers (Multiple)
National Science Foundation (1)