

# Stanford

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## Carol Boggs

Bing Director in Human Biology, Emerita

 Curriculum Vitae available Online

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### Bio

#### BIO

Please note that I have moved to the University of South Carolina, as Director of the School of the Earth, Ocean & Environment and Professor of Biological Sciences.

#### ACADEMIC APPOINTMENTS

- Emeritus Faculty, Acad Council, Biology
- Member, Bio-X

#### ADMINISTRATIVE APPOINTMENTS

- Bing Director, Program in Human Biology, (2006-2012)

#### HONORS AND AWARDS

- Fellow, California Academy of Sciences (2000)
- Fellow, American Association for the Advancement of Science (2001)
- Stanford Friends University Fellow in Undergraduate Education, Stanford University (2010-)

#### PROFESSIONAL EDUCATION

- PhD, University of Texas at Austin , Zoology (1979)

#### LINKS

- <http://boggs.stanford.edu>: <http://boggs.stanford.edu>

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### Research & Scholarship

#### CURRENT RESEARCH AND SCHOLARLY INTERESTS

PLEASE NOTE THAT I HAVE MOVED TO THE UNIVERSITY OF SOUTH CAROLINA.

We are exploring how environmental variation affects life history traits, population structure and dynamics, and species interactions in ecological and evolutionary time, using Lepidoptera. Current interests include (1) how resource allocation strategies interact with foraging and life history in variable environments to affect fitness and population dynamics; (2) the ecological and evolutionary dynamics of small populations, including population re-introductions; and (3) invasion biology, particularly the evolutionary and ecological effects of non-native species' invasion into co-evolved systems.

## Teaching

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### GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Biology (School of Humanities and Sciences) (Phd Program)

## Publications

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### PUBLICATIONS

- **Structure and function of the bacterial and fungal gut microbiota of Neotropical butterflies** *ECOLOGICAL MONOGRAPHS*  
Ravenscraft, A., Berry, M., Hammer, T., Peay, K., Boggs, C.  
2019; 89 (2)
- **No evidence that gut microbiota impose a net cost on their butterfly host** *MOLECULAR ECOLOGY*  
Ravenscraft, A., Kish, N., Peay, K., Boggs, C.  
2019; 28 (8): 2100–2117
- **No evidence that gut microbiota impose a net cost on their butterfly host.** *Molecular ecology*  
Ravenscraft, A., Kish, N., Peay, K., Boggs, C.  
2019
- **Meta-Lay Theories of Scientific Potential Drive Underrepresented Students' Sense of Belonging to Science, Technology, Engineering, and Mathematics (STEM)** *JOURNAL OF PERSONALITY AND SOCIAL PSYCHOLOGY*  
Rattan, A., Savani, K., Komaraju, M., Morrison, M. M., Boggs, C., Ambady, N.  
2018; 115 (1): 54–75
- **The fingerprints of global climate change on insect populations** *CURRENT OPINION IN INSECT SCIENCE*  
Boggs, C. L.  
2016; 17: 69-73
- **Effects of larval dietary restriction on adult morphology, with implications for flight and life history** *ENTOMOLOGIA EXPERIMENTALIS ET APPLICATA*  
Boggs, C. L., Niitepold, K.  
2016; 159 (2): 189-196
- **Nutrient acquisition across a dietary shift: fruit feeding butterflies crave amino acids, nectivores seek salt** *OECOLOGIA*  
Ravenscraft, A., Boggs, C. L.  
2016; 181 (1): 1-12
- **Fine-Grained Distribution of a Non-Native Resource Can Alter the Population Dynamics of a Native Consumer** *PLOS ONE*  
Nakajima, M., Boggs, C. L.  
2015; 10 (11)
- **Effects of Increased Flight on the Energetics and Life History of the Butterfly *Speyeria mormonia*** *PLOS ONE*  
Niitepold, K., Boggs, C. L.  
2015; 10 (10)
- **Resource allocation as a driver of senescence: Life history tradeoffs produce age patterns of mortality** *JOURNAL OF THEORETICAL BIOLOGY*  
Davison, R., Boggs, C. L., Baudisch, A.  
2014; 360: 251-262
- **Resource allocation as a driver of senescence: life history tradeoffs produce age patterns of mortality.** *Journal of theoretical biology*  
Davison, R., Boggs, C. L., Baudisch, A.  
2014; 360: 251-262
- **Insights from Stable Isotopic Tracers on Reproductive Allocation under Stress** *INTEGRATIVE AND COMPARATIVE BIOLOGY*  
Boggs, C. L., Niitepold, K.  
2014; 54 (5): 880-889

- **From global change to a butterfly flapping: biophysics and behaviour affect tropical climate change impacts.** *Proceedings. Biological sciences / The Royal Society*  
Bonebrake, T. C., Boggs, C. L., Stamberger, J. A., Deutsch, C. A., Ehrlich, P. R.  
2014; 281 (1793)
- **DYNAMICS AND STRUCTURE OF A NATIVE PIERIS POPULATION IN THE PRESENCE OF A NON-NATIVE, TOXIC LARVAL HOST** *PLANT JOURNAL OF THE LEPIDOPTERISTS SOCIETY*  
Nakajima, M., Boggs, C. L., Chew, F. S., Cummings, A., Bowsher, J. H.  
2014; 68 (3): 175-184
- **Aging, Life Span, and Energetics under Adult Dietary Restriction in Lepidoptera** *PHYSIOLOGICAL AND BIOCHEMICAL ZOOLOGY*  
Niitepold, K., Perez, A., Boggs, C. L.  
2014; 87 (5): 684-694
- **Genomic inference accurately predicts the timing and severity of a recent bottleneck in a nonmodel insect population.** *Molecular ecology*  
McCoy, R. C., Garud, N. R., Kelley, J. L., Boggs, C. L., Petrov, D. A.  
2014; 23 (1): 136-150
- **Fitness costs of butterfly oviposition on a lethal non-native plant in a mixed native and non-native plant community** *OECOLOGIA*  
Nakajima, M., Boggs, C. L., Bailey, S., Reithel, J., Paape, T.  
2013; 172 (3): 823-832
- **Food limited butterflies Resting and flight metabolic rate, fecundity and longevity** *Annual Meeting of the Society-for-Integrative-and-Comparative-Biology (SICB)*  
Niitepold, K., Perez, A., Boggs, C. L.  
OXFORD UNIV PRESS INC.2013: E156–E156
- **Comparative Effects of Adult Food Limitation on Butterfly Life Histories** *Annual Meeting of the Society-for-Integrative-and-Comparative-Biology (SICB)*  
Boggs, C. L., Niitepold, K., Perez, A.  
OXFORD UNIV PRESS INC.2013: E19–E19
- **A single climate driver has direct and indirect effects on insect population dynamics** *ECOLOGY LETTERS*  
Boggs, C. L., Inouye, D. W.  
2012; 15 (5): 502-508
- **Native and Non-Native Community Assembly through Edaphic Manipulation: Implications for Habitat Creation and Restoration** *RESTORATION ECOLOGY*  
Bonebrake, T. C., Navratil, R. T., Boggs, C. L., Fendorf, S., Field, C. B., Ehrlich, P. R.  
2011; 19 (6): 709-716
- **One variable species or multiple cryptic? Mitochondrial phylogeny of Central and North American Chlosyne lacinia (Lepidoptera: Nymphalidae)** *EUROPEAN JOURNAL OF ENTOMOLOGY*  
Bonebrake, T. C., Watt, W. B., Perez, A., Boggs, C. L.  
2011; 108 (4): 529-535
- **Population decline assessment, historical baselines, and conservation** *CONSERVATION LETTERS*  
Bonebrake, T. C., Christensen, J., Boggs, C. L., Ehrlich, P. R.  
2010; 3 (6): 371-378
- **More than just indicators: A review of tropical butterfly ecology and conservation** *BIOLOGICAL CONSERVATION*  
Bonebrake, T. C., Ponisio, L. C., Boggs, C. L., Ehrlich, P. R.  
2010; 143 (8): 1831-1841
- **Oviposition behavior and offspring performance in herbivorous insects: consequences of climatic and habitat heterogeneity** *OIKOS*  
Bonebrake, T. C., Boggs, C. L., McNally, J. M., Ranganathan, J., Ehrlich, P. R.  
2010; 119 (6): 927-934
- **Saliva or Regurgitated Nectar? What Heliconius Butterflies (Lepidoptera: Nymphalidae) Use for Pollen Feeding** *ANNALS OF THE ENTOMOLOGICAL SOCIETY OF AMERICA*  
Eberhard, S. H., Hiki, A. L., Boggs, C. L., Krenn, H. N.

2009; 102 (6): 1105-1108

- **Does dietary restriction reduce life span in male fruit-feeding butterflies?** *EXPERIMENTAL GERONTOLOGY*  
Molleman, F., Ding, J., Boggs, C. L., Carey, J. R., Arlet, M. E.  
2009; 44 (9): 601-606
- **Understanding insect life histories and senescence through a resource allocation lens** *FUNCTIONAL ECOLOGY*  
Boggs, C. L.  
2009; 23 (1): 27-37
- **Longevity can buffer plant and animal populations against changing climatic variability** *ECOLOGY*  
Morris, W. F., Pfister, C. A., Tuljapurkar, S., Haridas, C. V., Boggs, C. L., Boyce, M. S., Bruna, E. M., Church, D. R., Coulson, T., Doak, D. F., Forsyth, S., Gaillard, J., Horvitz, et al  
2008; 89 (1): 19-25
- **A trade-off between female lifespan and larval diet breadth at the interspecific level in Lepidoptera** *EVOLUTIONARY ECOLOGY*  
Jervis, M. A., Ferns, P. N., Boggs, C. L.  
2007; 21 (3): 307-323
- **When agendas collide: Human welfare and biological conservation** *CONSERVATION BIOLOGY*  
Chan, K. M., Pringle, R. M., Ranganathan, J., Boggs, C. L., Chan, Y. L., Ehrlich, P. R., Haff, P. K., Heller, N. E., Al-Krafaji, K., Macmynowski, D. P.  
2007; 21 (1): 59-68
- **Egg maturation strategy and survival trade-offs in holometabolous insects: a comparative approach** *BIOLOGICAL JOURNAL OF THE LINNEAN SOCIETY*  
Jervis, M. A., Boggs, C. L., Ferns, P. N.  
2007; 90 (2): 293-302
- **Egg maturation strategy and survival trade-offs in holometabolous insects: A comparative approach** *Biological Journal of the Linnean Society*  
Jervis MA, Boggs CL, Ferns PN  
2007; 90: 293-302
- **Delayed population explosion of an introduced butterfly** *JOURNAL OF ANIMAL ECOLOGY*  
Boggs, C. L., Holdren, C. E., KulaHCI, I. G., Bonebrake, T. C., Inouye, B. D., Fay, J. P., McMillan, A., Williams, E. H., Ehrlich, P. R.  
2006; 75 (2): 466-475
- **Demography in an increasingly variable world** *Trends in Ecology & Evolution*  
Boyce MS, Haridas CV, Lee C, Boggs CL, Bruna EM, Coulson T, Doak D, Drake JM, Gaillard J-M, Horvitz CC, Kalisz S, Kendall BE, Knight T, Menges ES, Morris WF, Pfister CA, Tuljapurkar SD  
2006; 21: 141-147
- **Linking nectar amino acids to fitness in female butterflies** *TRENDS IN ECOLOGY & EVOLUTION*  
Jervis, M. A., Boggs, C. L.  
2005; 20 (11): 585-587
- **Age-related changes in thoracic mass: possible reallocation of resources to reproduction in butterflies** *BIOLOGICAL JOURNAL OF THE LINNEAN SOCIETY*  
Stjernholm, F., Karlsson, B., Boggs, C. L.  
2005; 86 (3): 363-380
- **The amino acids used in reproduction by butterflies: A comparative study of dietary sources using compound-specific stable isotope analysis** *PHYSIOLOGICAL AND BIOCHEMICAL ZOOLOGY*  
O'Brien, D. M., Boggs, C. L., Fogel, M. L.  
2005; 78 (5): 819-827
- **Egg maturation strategy and its associated trade-offs: a synthesis focusing on Lepidoptera** *ECOLOGICAL ENTOMOLOGY*  
JERVIS, M. A., Boggs, C. L., Ferns, P. N.  
2005; 30 (4): 359-375
- **Larval food limitation in butterflies: effects on adult resource allocation and fitness** *OECOLOGIA*

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- Boggs, C. L., Freeman, K. D.  
2005; 144 (3): 353-361
- **Flight muscle breakdown: A possible route to increased reproductive potential in butterflies?** *Biological Journal Linnean Society*  
Stjernholm F, Karlsson B, Boggs CL  
2005; 86: 363-380
  - **Egg maturation strategy and its associated trade-offs: A synthesis focusing on Lepidoptera** *Ecological Entomology*  
Jervis MA, Boggs CL, Ferns PN  
2005; 30: 1-17
  - **Allocation of larval and adult resources to reproduction in a fruit-feeding butterfly** *FUNCTIONAL ECOLOGY*  
Fischer, K., O'Brien, D. M., Boggs, C. L.  
2004; 18 (5): 656-663
  - **Resource specialization in puddling Lepidoptera** *ENVIRONMENTAL ENTOMOLOGY*  
Boggs, C. L., Dau, B.  
2004; 33 (4): 1020-1024
  - **Evolutionary genetics of dorsal wing colour in Colias butterflies** *JOURNAL OF EVOLUTIONARY BIOLOGY*  
Ellers, J., Boggs, C. L.  
2004; 17 (4): 752-758
  - **Functional ecological implications of intraspecific differences in wing melanization in Colias butterflies** *BIOLOGICAL JOURNAL OF THE LINNEAN SOCIETY*  
Ellers, J., Boggs, C. L.  
2004; 82 (1): 79-87
  - **Making eggs from nectar: the role of life history and dietary carbon turnover in butterfly reproductive resource allocation** *OIKOS*  
O'Brien, D. M., Boggs, C. L., Fogel, M. L.  
2004; 105 (2): 279-291
  - **Functional ecological implications of intraspecific differences in wing melanization in Colias butterflies** *Biological Journal Linnean Society*  
Ellers J, Boggs CL  
2004; 82: 79-87
  - **Resource specialization in puddling Lepidoptera** *Environmental Entomology*  
Boggs CL, Dau B  
2004; 33: 1020-1024
  - **Allocation of larval and adult resources to reproduction in a fruit-feeding butterfly** *Functional Ecology*  
Fischer K, O'Brien DM, Boggs CL  
2004; 18: 656-663
  - **Allocation of larval and adult resources to reproduction in a fruit-feeding butterfly** *Functional Ecology*  
Fischer K, O'Brien DM, Boggs CL  
2004; 18: 656-663
  - **Pollen feeding in the butterfly *Heliconius charitonia*: isotopic evidence for essential amino acid transfer from pollen to eggs** *PROCEEDINGS OF THE ROYAL SOCIETY B-BIOLOGICAL SCIENCES*  
O'Brien, D. M., Boggs, C. L., Fogel, M. L.  
2003; 270 (1533): 2631-2636
  - **The evolution of wing color: Male mate choice opposes adaptive wing color divergence in Colias butterflies** *EVOLUTION*  
Ellers, J., Boggs, C. L.  
2003; 57 (5): 1100-1106
  - **Do hypotheses from short-term studies hold in the long-term? An empirical test** *ECOLOGICAL ENTOMOLOGY*  
Hellmann, J. J., Weiss, S. B., McLaughlin, J. F., Boggs, C. L., Ehrlich, P. R., Launer, A. E., Murphy, D. D.  
2003; 28 (1): 74-84

- **Countryside biogeography of tropical butterflies** *CONSERVATION BIOLOGY*  
Horner-Devine, M. C., Daily, G. C., Ehrlich, P. R., Boggs, C. L.  
2003; 17 (1): 168-177
- **Countryside biogeography of tropical butterflies** *Conservation Biology*  
Horner-Devine MC, Daily GC, Ehrlich PR, Boggs CL  
2003; 17: 168-177
- **Butterflies: Ecology and Evolution Taking Flight** *University of Chicago Press*  
Boggs CL, Watt WB, Ehrlich PR  
2003
- **Testing short-term hypotheses with a long-term study of a butterfly population** *Ecological Entomology*  
Hellmann JJ, Weiss SB, McLaughlin JH, Boggs CL, Ehrlich PR, Launer AE, Murphy DD  
2003; 28: 74-84
- **The route to extinction: population dynamics of a threatened butterfly** *OECOLOGIA*  
McLaughlin, J. F., Hellmann, J. J., Boggs, C. L., Ehrlich, P. R.  
2002; 132 (4): 538-548
- **The route to extinction: population dynamics of a threatened butterfly.** *Oecologia*  
McLaughlin, J. F., Hellmann, J. J., Boggs, C. L., Ehrlich, P. R.  
2002; 132 (4): 538-548
- **Assessing the roles of patch quality, area, and isolation in predicting metapopulation dynamics** *CONSERVATION BIOLOGY*  
Fleishman, E., Ray, C., Sjogren-Gulve, P., Boggs, C. L., Murphy, D. D.  
2002; 16 (3): 706-716
- **Climate change hastens population extinctions** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
McLaughlin, J. F., Hellmann, J. J., Boggs, C. L., Ehrlich, P. R.  
2002; 99 (9): 6070-6074
- **Renewable and nonrenewable resources: Amino acid turnover and allocation to reproduction in lepidoptera** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
O'Brien, D. M., Fogel, M. L., Boggs, C. L.  
2002; 99 (7): 4413-4418
- **The evolution of wing color in Colias butterflies: Heritability, sex linkage, and population divergence** *EVOLUTION*  
Ellers, J., Boggs, C. L.  
2002; 56 (4): 836-840
- **The route to extinction: Population dynamics of a threatened butterfly** *Oecologia*  
McLaughlin JF, Hellmann J, Boggs CL, Ehrlich PR  
2002; 132: 538-548
- **Amino acid metabolism in adult Lepidoptera: from biochemistry to life history evolution.**  
O'Brien, D. M., Fogel, M. L., Boggs, C. L.  
SOC INTEGRATIVE COMPARATIVE BIOLOGY.2001: 1542-42
- **Physiological constraints on reproductive nutrient allocation in Lepidoptera: The dietary origins of individual egg amino acids.**  
O'Brien, D. M., Boggs, C. L., Fogel, M. L.  
SOC INTEGRATIVE COMPARATIVE BIOLOGY.1999: 95A-95A
- **Reproductive allocation from reserves and income in butterfly species with differing adult diets** *ECOLOGY*  
Boggs, C. L.  
1997; 78 (1): 181-191
- **Community composition in mountain ecosystems: climatic determinants of montane butterfly distribution** *Symposium on Mountain Ecology - Organism Responses to Environmental Change, at the VI International Congress of Ecology*

Boggs, C. L., Murphy, D. D.  
BLACKWELL SCIENCE LTD.1997: 39-48

- **Dynamics of reproductive allocation from juvenile and adult feeding: Radiotracer studies** *ECOLOGY*  
Boggs, C. L.  
1997; 78 (1): 192-202
- **Mating systems and sexual division of foraging effort affect puddling behaviour by butterflies** *ECOLOGICAL ENTOMOLOGY*  
Sculley, C. E., Boggs, C. L.  
1996; 21 (2): 193-197
- **ESTIMATING FEMALE REPRODUCTIVE SUCCESS OF A THREATENED BUTTERFLY - INFLUENCE OF EMERGENCE TIME AND HOSTPLANT PHENOLOGY** *OECOLOGIA*  
Cushman, J. H., Boggs, C. L., Weiss, S. B., Murphy, D. D., Harvey, A. W., Ehrlich, P. R.  
1994; 99 (1-2): 194-200
- **Estimating female reproductive success of a threatened butterfly: influence of emergence time and hostplant phenology.** *Oecologia*  
Cushman, J. H., Boggs, C. L., Weiss, S. B., Murphy, D. D., Harvey, A. W., Ehrlich, P. R.  
1994; 99 (1-2): 194-200
- **THE EFFECT OF ADULT FOOD LIMITATION ON LIFE-HISTORY TRAITS IN SPEYERIA-MORMONIA (LEPIDOPTERA, NYMPHALIDAE)** *ECOLOGY*  
Boggs, C. L., Ross, C. L.  
1993; 74 (2): 433-441
- **RESOURCE-ALLOCATION - EXPLORING CONNECTIONS BETWEEN FORAGING AND LIFE-HISTORY** *FUNCTIONAL ECOLOGY*  
Boggs, C. L.  
1992; 6 (5): 508-518
- **A GENERAL-MODEL OF THE ROLE OF MALE-DONATED NUTRIENTS IN FEMALE INSECTS REPRODUCTION** *AMERICAN NATURALIST*  
Boggs, C. L.  
1990; 136 (5): 598-617
- **Rates of nectar feeding in butterflies: effects of sex, size, age and nectar concentration** *FUNCTIONAL ECOLOGY*  
Boggs, C. L.  
1988; 2 (3): 289-295
- **SPATIAL AND TEMPORAL DISTRIBUTION OF LANTANA MITES PHORETIC ON BUTTERFLIES** *BIOTROPICA*  
Boggs, C. L., Gilbert, L. E.  
1987; 19 (4): 301-305
- **WITHIN POPULATION VARIATION IN THE DEMOGRAPHY OF SPEYERIA-MORMONIA (LEPIDOPTERA, NYMPHALIDAE)** *HOLARCTIC ECOLOGY*  
Boggs, C. L.  
1987; 10 (3): 175-184
- **REPRODUCTIVE STRATEGIES OF FEMALE BUTTERFLIES - VARIATION IN AND CONSTRAINTS ON FECUNDITY** *ECOLOGICAL ENTOMOLOGY*  
Boggs, C. L.  
1986; 11 (1): 7-15
- **Population structure of pierid butterflies IV. Genetic and physiological investment in offspring by male Colias.** *Oecologia*  
Boggs, C. L., Watt, W. B.  
1981; 50 (3): 320-324
- **POPULATION-STRUCTURE OF PIERID BUTTERFLIES .4. GENETIC AND PHYSIOLOGICAL INVESTMENT IN OFFSPRING BY MALE COLIAS** *OECOLOGIA*  
Boggs, C. L., Watt, W. B.  
1981; 50 (3): 320-324
- **PATTERNS OF POLLEN EXPLOITATION BY HELICONIUS BUTTERFLIES** *OECOLOGIA*

Boggs, C. L., Smiley, J. T., Gilbert, L. E.  
1981; 48 (2): 284-289

● **MALE CONTRIBUTION TO EGG-PRODUCTION IN BUTTERFLIES - EVIDENCE FOR TRANSFER OF NUTRIENTS AT MATING** *SCIENCE*

Boggs, C. L., Gilbert, L. E.  
1979; 206 (4414): 83-84

● **OVARIAN DYNAMICS IN HELICONIINE BUTTERFLIES - PROGRAMMED SENESCENCE VERSUS ETERNAL YOUTH** *SCIENCE*

DUNLAPPIANKA, H., Boggs, C. L., Gilbert, L. E.  
1977; 197 (4302): 487-490