# BRUCE A. SCHULTE, Ph.D.

*Biology Department Head*

Department of Biology / Western Kentucky University
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## EDUCATION

**Doctorate of Philosophy in Biology (1989 - 1993).** Thesis title, "Chemical communication and ecology of North American beaver (*Castor canadensis*)," State University of New York, College of Environmental Science and Forestry, Syracuse, NY.

**Master of Science in Biology (1982 - 1985).** Thesis topic on allelopathy and chemical predation defense of tropical marine sponges, University of Southern California, Los Angeles, CA.

**Bachelor of Science in Biology (1978 - 1982).** Seniors honors thesis on foraging strategies of dragonfly nymphs, *Anax junius*, College of William and Mary, Williamsburg, VA.

**New York State Regents Diploma (1978).** Newark Valley High School, Newark Valley, NY.

## EXPERIENCE

DEPARTMENT HEAD AND PROFESSOR (2009-PRESENT), Western Kentucky University.

PROFESSOR OF BIOLOGY (2008-2009), Georgia Southern University.

DIRECTOR, BIOLOGY GRADUATE PROGRAM, (2008-PRESENT), Georgia Southern University.

DIRECTOR, COLLEGE OF SCIENCE & TECHNOLOGY (COST) - COLLEGE OFFICE OF UNDERGRADUATE RESEARCH (COUR) (2005-2008), Georgia Southern University.

ASSOCIATE PROFESSOR OF BIOLOGY (2003-2008) Georgia Southern University.

ASSISTANT PROFESSOR OF BIOLOGY (1999-2003, TENURED 2002**)** Georgia Southern University. *Research Focus*: Mammalian behavior, conservation & ecology -- Primary study animals: elephants, manatees and beavers.

ASSOCIATE & TENURED PROFESSOR OF BIOLOGY (1998-99) Providence College, Providence, RI.

ASSISTANT PROFESSOR OF BIOLOGY (1994-1998), Providence College.

POSTDOCTORAL RESEARCH SCIENTIST (1993-1994), Dr. L.E.L. Rasmussen, Portland, OR.

INSTRUCTOR FOR FIELD MAMMALOGY (SUMMER, 1993), State University of New York, College of Environmental Science and Forestry (SUNY-CESF), Syracuse, NY.

TEACHING ASSISTANT IN BIOCHEMISTRY (FALL, 1992), SUNY-CESF, Syracuse, NY.

INSTRUCTOR, BOCES ADIRONDACK FIELD STUDIES (AUGUST 1992), Cranberry Lake Biological Station, Cranberry Lake, NY.

RESEARCH BIOLOGIST (1989 - 1992), SUNY-CESF, Syracuse, NY.

RESEARCH BIOLOGIST (1984 - 1986), University of Southern California, Los Angeles, CA.

PROGRAMS DIRECTOR (1986 - 1989), Roundup Ranch Resort, Downsville, NY.

MARINE FISH CULTURIST (1984), County Museum of Natural History, Los Angeles, CA.

TEACHING ASSISTANT FOR PHYSIOLOGY AND INTRODUCTORY BIOLOGY (1982 - 1984), University of Southern California, Los Angeles, CA.

RESEARCH INTERN (SUMMERS 1980, 1981), Gunnison National Forest, CO.

# SCHOLARSHIP

## Grant & Awards

*External Funding*

2014 **Kentucky Science & Engineering Foundation**, Kentucky Commercialization Fund, *Automated Estrous Detection in Cattle*, F. DeGraves (Lead PI) $ 70,774.
2011 **Kentucky Academy of Sciences**: *Leadership and Personality Attributes in African Elephants* $ 4,800.
2010 **NSF-BREAD Grant**: *Development of Automated Systems to Increase Crop Yield by Reducing Group Foraging Intensity by Crop Pests*, M. Stokes (Lead PI) $452,924.
2007 **University of Florida**, Manatee Endocrinology and Behavior $ 7,500.
2007 **International Elephant Foundation** $ 9,983.
2006 **NSF-STEP Grant**: *Advisement and Scholarship Promoting Inquiry-based Research Experiences in STEM (ASPIRES)*, Co-PI's: Mary K. Boyd (Lead PI), Amy R. Heaston, Bret S. Danilowicz, Bruce A. Schulte, David R. Stone $1,000,000.
2005 **The National Science Foundation**, RET Award $ 9,000.
2005 **National Fish & Wildlife Centennial Scholarship** (with Ryan Berger) $ 5,000.
2003 **The State of Florida Marine Mammal Grant**, sub-award. $ 10,997.
2002 **The National Science Foundation**, *Development and Identity of Sexually Dimorphic Reproductive Signals and Responses by African Elephants*. $469,418.
Collaborative Grant (Goodwin & Rasmussen) IBN-0217062, 2002-2008. {$842,251}
2001 **The Eppley Foundation** for study on manatee behavior. $ 13,500.
2000 **Jane Smith Turner Foundation** grant for study on manatee behavior. $ 10,000.
2000 **Feld Entertainment, Inc.** grant for study of elephant behavior. $ 4,000.
1994 **Biospherics Research Corporation**, Postdoctoral Fellowship. $ 24,000.
1991 **Theodore Roosevelt Memorial Fund**, American Museum of Natural History. $ 1,000.
1984-85 Biomedical Research Support & USC Marine & Coastal Studies Grant. $ 3,500.

*Internal Funding(WKU-FUSE not included – awarded to students)*

2011 Research & Creative Activities Program (RCAP), WKU $ 8,000.
2007 **Award for Excellence in Service**, Georgia Southern University $ 4,000.
2006 Faculty Development for Teaching Award with Dr. Alan Harvey $ 2,200.
2006 Faculty Development & Welfare Travel Award $ 1,545.
2004 **Award for Excellence in Scholarship**, Georgia Southern University $ 4,000.
2003 Faculty Development & Welfare Professional Travel Award. $ 662.
2003 Faculty Research Stipend Award, Georgia Southern University. $ 7,500.
2002 Research Committee Grant Award, Georgia Southern University. $ 2,500.
2000-02 Awarded annual funds from Graduate Office for Professional Development. $ 300.
2001 Summer Faculty Research Award, Georgia Southern University. $ 5,000.
2001 Faculty Development & Welfare Professional Travel Award. $ 1,900.
2000 Summer Faculty Research Committee Award, Georgia Southern University. $ 1,000.
1999 Research Committee Grant Award at Georgia Southern University. $ 1,100.
1999 Faculty Development & Welfare Professional Travel Award. $ 690.
1998, '97, '95 Committee for Aid to Faculty Research Grants, Providence College. $ 18,580.
1992 Annual Memorial Scholarship Award, SUNY-CESF Alumni Association. $ 1,000.

## Publications

52. York, C.A. & **Schulte, B.A.** 2014. The relationship of dominance, reproductive state and stress in female horses (*Equus caballus*). Behavioural Processes 107, 15-21.
51. Freeman, E.W., Meyer, J.M., Addendorf, J., Bird, J., **Schulte, B.A.** & Santymire, R.M. 2014. Impacts of environmental pressures on the reproductive physiology of subpopulations of black rhinoceros (*Diceros bicornis bicornis*) in Addo Elephant National Park, South Africa. Conservation Physiology,2, doi:10.1093/conphys/cot034.
50. Freeman, E.W., Meyer, J.M., Addendorf, J., **Schulte, B.A.** & Santymire, R.M. 2014. Scraping behavior of black rhinoceros is related to age and fecal gonadal metabolite concentrations. Journal of Mammalogy, 95(2), 340-348.
49. Freeman, E.W., Meyer, J.M., Putman, S.B, **Schulte, B.A.** & Brown, J.L. 2013. Ovarian cycle activity varies with respect to age and social status in free-ranging elephants in Addo Elephant National Park, South Africa. Conservation Physiology, 1, 1-15. http://conphys.oxfordjournals.org/content/1/1/cot025.full.pdf
48. **Schulte, B.A.**, Bagley, K.R., Castelda, S., Loizi, H., Nasseri, N., Vyas, D.K. & Goodwin, T.E. 2013. From exploration to selective information gathering: the development of chemosensory investigation in male African elephants (*Loxodonta africana*). In: *Chemical Signals in Vertebrates 12* (M. East & M. Dehnhard, eds), pp. 135-145, Springer, New York.
47. Goodwin, T.E., Broederdorf, L.J., Burkert, B.A., Hirwa, H.H., Mark, D.B., Waldrip, Z.J., Kopper, R.A., Sutherland, M.V. , Freeman, E.W., Hollister-Smith, J.A., and **Schulte, B.A.** 2012. Chemical signals of elephant musth: I. Temporal aspects of microorganism-mediated modifications. Journal of Chemical Ecology, 38, 81-87 (DOI 10.1007/s10886-011-0056-8).
46. Freeman, E.W., Meyer, J.M., Putman, S., **Schulte, B.A.** & Brown, J.L. 2011. Using a simplified field progestagen method to assess ovarian activity in female African elephants. Biological Conservation, 144, 2105–2111.
45. Castelda, S., Napora, E., Nasseri, N., Vyas, D. & **Schulte, B.A.** 2011. Diurnal co-occurrence of African elephants and other mammals at a Tanzanian waterhole. African Journal of Ecology, 49, 250-252. DOI: 10.1111/j.1365-2028.2010.01249.x
44. Nasseri, N.A., McBrayer, L.A. & **Schulte, B.A.** 2011. The impact of tree modification by African elephant (*Loxodonta africana*) on herpetofaunal species richness in northern Tanzania. African Journal of Ecology, 49, 133-140. DOI: 10.1111/j.1365-2028.2010.01238.x
    Note - Covered by BBC: http://www.bbc.co.uk/news/science-environment-11607299
43. Freeman, E.W., **Schulte, B.A**. & Brown, J.L. 2010. Using behavioral observations and keeper questionnaires to assess social relationships among captive female African elephants. Zoo Biology, 29, 140-153. 10.1002/zoo.20249.
42. Freeman, E.W., **Schulte, B.A.** & Brown, J.L. 2010. Investigating the impact of rank and ovarian activity on the social behavior of captive female African elephants. Zoo Biology, 29, 154-167. 10.1002/zoo.20235
41. Freeman, E.W., Abbondanza, F.N., Meyer, J.M., **Schulte, B.A**. & Brown, J.L. 2010. A simplified method for monitoring progestagens in African elephants under field conditions. Methods in Ecology and Evolution, 1, 86-91. doi: 10.1111/j.2041-210X.2009.00004.x
40. Riddle, H.S., **Schulte, B.A.**, Desai, A.A. & van der Meer, L. 2010. Elephants – a conservation overview. Journal of Threatened Taxa, 2, 653-661.
39. Merte, C.E., Goodwin, T.E. & **Schulte, B.A**. 2010. Male and female developmental differences in chemosensory investigations by African elephants (*Loxodonta africana*) approaching waterholes. Behavioral Ecology & Sociobiology, 64, 401-408. DOI 10.1007/s00265-009-0856-9.
38. Merte, C.E., Gough, K.F. & **Schulte, B.A.** 2009. Investigation of a fresh African elephant carcass by conspecifics. Pachyderm, 45, 124-126.
37. Goodwin, T.E. & **Schulte, B.A.** 2009. Prospecting for mammalian chemical signals via solventless extraction techniques: an elephantine task. ChemoSense 11(2), 9-15.

36. Brzyski, J.R. & **Schulte, B.A**. 2009. Beaver (*Castor canadensis*) impacts on herbaceous and woody vegetation in southeastern Georgia. American Midland Naturalist, 162, 81-93.
35. Loizi, H., Goodwin, T.E., Rasmussen, L.E.L., Whitehouse, A.M. & **Schulte, B.A**. 2009. Sexual dimorphism in the performance of chemosensory investigatory behaviours by African elephants (*Loxodonta africana*). Behaviour, 146, 373-392.
34. Slade-Cain, B.E., Rasmussen, L.E.L. & **Schulte, B.A.** 2008. Estrous state influences on investigative, aggressive, and tail flicking behavior in captive female Asian elephants. Zoo Biology, 27, 167-180.
33. Meyer, J.M., Goodwin, T.E. & **Schulte, B.A.** 2008. Intrasexual chemical communication and social responses of captive female African elephants, *Loxodonta africana*. Animal Behaviour, 76, 163-174.
32. **Schulte, Bruce A.**, Bagley, Kathryn R., Groover, Matthew, Loizi, Helen, Merte, Christen, Meyer, Jordana M., Napora, Erek , Stanley, Lauren, Vyas, Dhaval K., Wollett, Kimberly, Goodwin, Thomas E. & Rasmussen, Lois E.L. 2008. Comparisons of state and likelihood of performing chemosensory event behaviors in two populations of African elephants (*Loxodonta africana*). In: *Chemical Signals in Vertebrates 11* (J.L. Hurst, R.J. Beynon, S.C. Roberts & T.D. Wyatt, eds.), pp. 81-90. Springer, New York.
31. **Schulte, B.A**., Freeman, E., Goodwin, T.E., Hollister-Smith, J. & Rasmussen, L.E.L. 2007. Honest signaling through chemicals by elephants with applications for conservation and care. Applied Animal Behaviour Science 102, 344-363.
30. Goodwin, Thomas E., Brown, Patrick A., Eggert, Mindy S., Evola, Maria G., House, Sam J., Morshedi, R. Grant, Weddell, Margaret E., Chen, C. Joi, Jackson, Stephen R., Aubut, Yves, Eggert, Jeff, **Schulte, B.A.** & Rasmussen, L.E.L. 2007. Use of automated solid phase dynamic extraction (SPDE)/GC-MS and novel macros in the search for African elephant pheromones. In: *Chemical Signals in Vertebrates 11* (Eds J.L. Hurst, R.J. Beynon, S.C. Roberts & T.D. Wyatt), pp. 25-35. Springer, New York.
29. Horikoshi-Beckett, C. & **Schulte, B.A**. 2006. Activity patterns and spatial use of facility by a group of captive female manatees (*Trichechus manatus latirostris*). Zoo Biology 25, 285-301.
28. Bagley, K.R., Goodwin, T.E., Rasmussen, L.E.L. & **Schulte, B.A.** 2006. Male African elephants (*Loxodonta africana*) can distinguish oestrous status via urinary signals. Animal Behaviour 71, 1439-1445.
27. Goodwin, T.K., Eggert, M., House, S.J., Weddell, M.E., **Schulte, B.A.** & Rasmussen, L.E.L. 2006. Insect pheromones and precursors in female African elephant urine. Journal of Chemical Ecology 32, 1849-1853.
26. Vyas, D.K., Goodwin, T.E., Rasmussen, L.E.L. & **Schulte, B.A.** 2005. Elephant death, possibly by constipation. Pachyderm 39, 93-96.
25. Harper, J.Y. & **Schulte, B.A**. 2005. Social interactions in captive female Florida manatees. Zoo Biology 24, 135-144.
24. **Schulte, B.A.**, Bagley, K., Correll, M., Gray, A., Heineman, S.M., Loizi, H., Malament, M., Scott, N.L., Slade, B.E., Stanley, L., Goodwin, T.E. & Rasmussen, L.E.L. 2005. Assessing chemical communication in elephants. Pp. 140-151. In: *Chemical Signals in Vertebrates 10* (R.T. Mason, M.P. LeMaster and D. Müller-Schwarze, eds.). Springer Press, NY.
23. Goodwin, T.E., Rasmussen, L.E.L., **Schulte, B.A.**, Brown, P.A., Davis, B.L., Dill, W.M., Dowdy, N.C., Hicks, A.R., Morshedi, R.G., Mwanza, D. & Loizi, H. 2005. Chemical analysis of preovulatory female African elephant urine: A search for putative pheromones. Pp. 128-139. In: *Chemical Signals in Vertebrates 10* (R.T. Mason, M.P. LeMaster and D. Müller-Schwarze, eds.). Springer Press, NY.
22. Rosell, F. & **Schulte, B.A**. 2004. Eurasian beaver (*Castor fiber*) scent gland structure and function. Journal of Mammalogy 85, 1138-1144.
21. Slade, B.E., **Schulte, B.A.** & Rasmussen, L.E.L. 2003. Oestrous state dynamics in chemical communication by captive female Asian elephants. Animal Behaviour 65, 813-819.
20. **Schulte, B.A.** 2003. Scientific writing and the scientific method: parallel structure in form and content. American Biology Teacher 65, 582-585.

19. **Schulte, B.A.** 2000. Social structure and helping behavior in captive elephants. Zoo Biology 19, 447-459.
18. **Schulte, B.A**., Feldman, E., Lambert, R., Oliver, R. & Hess, D.L. 2000. Temporary ovarian inactivity in elephants: relationship to status and time outside. Physiology & Behavior 71, 123-131.
17. Sun, L., Müller-Schwarze, D. & **Schulte, B.A**. 2000. Dispersal pattern and effective population size of the beaver, *Castor canadensis*. Canadian Journal of Zoology 78, 1-6.
16. **Schulte, B.A.** & Rasmussen, L.E.L. 1999. Signal-receiver interplay in the communication of male condition by Asian elephants. Animal Behaviour 57, 1265-1274.
15. **Schulte, B.A.** & Müller-Schwarze, D. 1999. Understanding North American beaver behavior as an aid to management. In: *Beaver Protection, Management, and Utilization in Europe and North America* (PE Busher and RM Dziecidowski, eds.), pp. 109-127. Plenum Press, NY.
14. Müller-Schwarze, D & **Schulte, B.A.** 1999. Behavioral and ecological characteristics of a "climax" population of beaver (*Castor canadensis*). In: *Beaver Protection, Management, and Utilization in Europe and North America* (PE Busher & RM Dziecidowski, eds.), pp. 161-177. Plenum Press, NY.
13. **Schulte, B.A.** & Rasmussen, L.E.L. 1999. Musth, sexual selection, testosterone and metabolites. In: *Advances in Chemical Communication in Vertebrates* (RE Johnston, D Müller-Schwarze, and P Sorensen, eds.), pp. 383-397. Plenum Press, NY.
12. Rasmussen, L.E.L. & **Schulte, B.A.** 1999. Ecological and biochemical constraints on pheromonal signaling systems in Asian elephants and their evolutionary implications. In: *Advances in Chemical Communication in Vertebrates* (RE Johnston, D Müller-Schwarze, and P Sorensen, eds.), pp. 49-62. Plenum Press, NY.
11. Rasmussen, L.E.L. & **Schulte, B.A.** 1998. Chemical signals in the reproduction of Asian and African elephants. Animal Reproduction Science 53, 19-34.
10. **Schulte, B.A.** 1998. Scent marking and responses to male castor fluid by beavers. Journal of Mammalogy 79, 191-203.
9. **Schulte, B.A.**, Müller-Schwarze, D., Tang, R. & Webster, F.X. 1995. Bioactivity of beaver castoreum constituents using principal components analysis. J. Chem. Ecol. 21, 941-957.
8. **Schulte, B.A.**, Müller-Schwarze, D. & Sun, L. 1995. Using anal gland secretion to determine sex in beaver. Journal of Wildlife Management 59, 614-618.
7. **Schulte, B.A.**, Müller-Schwarze, D., Tang, R. & Webster, F.X. 1994. Responses by beaver (*Castor canadensis*) to major phenolic and neutral compounds in castoreum. J. Chemical Ecology 20, 3063-3081.
6. Müller-Schwarze, D., **Schulte, B.A.,** Sun, L., Müller-Schwarze, A. & Müller-Schwarze, C. 1994. Beaver (*Castor canadensis*) and red maple (*Acer rubrum*). J. Chemical Ecology 20, 2021-2034.
5. **Schulte, B.A.** & Bakus, G.J. 1992. Predation deterrence in marine sponges: Laboratory versus field studies. Bulletin of Marine Science 50 (1), 205-211.
4. **Schulte, B.A.**, de Nys, R., Bakus, G.J., Crews, P., Eid, C., Naylor, S. & Manes, L.V. 1991. A modified allomone collecting apparatus. Journal of Chemical Ecology 17, 1327-1332.
3. Bakus, G.J., **Schulte, B.**, Jhu, S., Wright, M., Green, G. & Gomez, P. 1990. Antibiosis and antifouling in marine sponges: laboratory vs. field studies. Pp. 102-108 in: New Perspectives in Sponge Biology. Proc. 3rd Int. Sponge Conf. (K Ruetzler, ed.). WHOI, Woods Hole, MA
2. Bakus, G.J., Targett, N. & **Schulte, B**. 1986. Chemical ecology of marine organisms: an overview. J. Chemical Ecology 12, 951-987.
1. Zimmerman, M., Cibula, D.A. & **Schulte, B.** 1984. Oviposition behavior of *Hylemya* (*Delia*) sp. (Diptera: Anthomyiidae): Sub-optimal host plant choice? Env. Ent. 13(3), 696-700.

## Special interest group articles, editor-reviewed & book chapters editor reviewed

Devous, Angie. 2013. Researching the researcher: Bruce Schulte, PhD. Journal of the Elephant Managers Association, 24(3), 28-29.

**Schulte, B.A.** 2012. A decade of The Conservation Behaviorist and a 15 year perspective on the ABS Conservation Committee. The Conservation Behaviorist, 10, 3-4.

Wisniewska, M., Pridgen, L., Eldridge, J., Yates, J., Hook, M., Kem, D. & **Schulte, B.A.** 2012. Review of A Primer of Conservation Behavior. Biological Conservation, 148, 219-221.

Swaisgood, R. & **Schulte, B.A.** 2010. Applying Knowledge of Mammalian Social Organization, Mating Systems and Communication to Management. Pp. 329-343, in *Wild Mammals in Captivity: Principles and Techniques for Zoo Management*, 2nd ed., ed. Devra Kleiman, Katerina Thompson, and Charlotte Kirk Baer. Chicago: University of Chicago Press.

**Schulte, B.A.** 2010. Elephants. Pp. 212-213, *in* Mills, D.S., J.N. Marchant-Forde, P.D. McGreevy, D.B. Morton, C.J. Nicol, C.J.C. Phillips, P. Sandøe and R.R. Swaisgood (eds) "The Encyclopedia of Applied Animal Behaviour and Welfare", CABI, Wallingford, UK.

Paz-y-Mino, Guillermo, C. 2009. Conversation with **Bruce Schulte**. 2009. The Conservation Behaviorist 7(1), 5-8.

Karimi, B. 2009. Transformations: a young researcher's transition from animal behavior to conservation behavior. The Conservation Behaviorist 7(1), 9-10. (*Graduate Student*)

Broederdorf, L., Meyer, J., Freeman, E., Goodwin, T. & **Schulte, B.A**. 2009. The elephants of Addo: an undergraduate research experience. Journal of the Elephant Managers Association, 29 (2), 27-31.

Meyer, J., Freeman, E., Goodwin, T. & **Schulte, B.A**. 2009. Monitoring African elephant chemical communication and hormone activity in Addo Elephant National Park, South Africa. Journal of the Elephant Managers Association, 29 (2), 32-36.

Castelda, S.M., Goodwin, T.E. & **Schulte, B.A**. 2008. Investigating chemical signals in African elephants for convergence with insects and similarities with Asian elephants. Pp. 81-91, in: Proceedings of the 2007 International Elephant Conservation & Research Symposium, Orlando, FL.

Freeman, E.W., Abbondanza, F.N., Meyer, J.M., **Schulte, B.A**. & Brown, J.L. 2007. Use of a fecal kit to monitor hormone activity in free-ranging elephants. pp. 165-167. Proceedings of the 2007 International Elephant Conservation & Research Symposium, Orlando, FL.

Goodwin, T.E. & **Schulte, B.A.** 2008. A tribute to L.E.L. "Bets" Rasmussen (1938-2006). In: *Chemical Signals in Vertebrates 11*, Hurst, J.L., Beynon, R.J., Roberts, S.C. & Wyatt, T.D., eds., pp. 1-9. Springer, New York.

**Schulte, B.A**. 2006. Elephant Behavior. Chp 4. In: The Biology, Medicine and Surgery of Elephants, Fowler, M.E. & Mikota, S.K., eds. Ames, Iowa, Blackwell Publishing. Pp. 35-43.

**Schulte, B.A**., Napora, E., Vyas, D.K., Goodwin, T.E. & Rasmussen, L.E.L. 2006. African elephant chemical communication and humans in Tanzania. Journal of the Elephant Managers Association (JEMA), 17(1), 28-36.

Vyas, D.K., Goodwin, T.E., Rasmussen, L.E.L. & **Schulte, B.A**. 2005. African elephant births and post-partum events in West Kilimanjaro, Tanzania. Journal of the Elephant Managers Association (JEMA). 16(3): 30-37.

**Schulte, B.A.,** Rasmussen, L.E.L. & Goodwin, T.E. 2005. The secrets in secretions: a search for African elephant pheromones. Pachyderm Periodical 15, 1-2.

Loizi, H., Correll, M., Gray, A., Goodwin, T.E., Rasmussen, L.E.L. & **Schulte, B.A.** 2004. A study of chemotactile behaviors by male and female African elephants in Addo Elephant National Park, South Africa. Pp. 55-57, in (ed) Jayewardene, Jayantha. Endangered elephants past, present and future. Proceedings of the Symposium on Human Elephant Relationships and Conflicts, Sri Lanka, September 2003. Biodiversity & Elephant Conservation Trust, Colombo. Pages 228.

**Schulte, B.A.** 2004. Review of *Pheromones and Animal Behaviour: Communication by Smell and Taste* by Tristram Wyatt for Entomological Society of America in American Entomologist. Winter 2004. Volume 50(4): 238-239.

**Schulte, B.A**., Loizi, H., Bagley, K., Gray, A., Stanley, L., Correll, M., Goodwin, T.E., Brown, P.A., Davis, B.L., Dill, W.M., Dowdy, N.C., Hicks, A.R., Morshedi, R.G., Mwanza, D. & Rasmussen, L.E.L. 2004. Elephant chemotactile communication and conservation. Journal of the Elephant Managers Association (JEMA) 15: 16-23.

**Schulte, B.A.** & Rosell, F. 2003. Beavers. In Mammals V. Vol. 16 of Grzimek's Animal Life Encyclopedia, edited by Devra G. Kleiman, Valerius Geist, Michael Hutchins, and Melissa C. McDade, 16, 177-184. Farmington Hills, Mich.: Gale Group.

**Schulte, B.** 1998. The benefits of behavioral research to elephants and people. Journal of the Elephant Managers Association 9(3): 216-221.

**Schulte, B**. & Rasmussen, B. 1996. Conservation and management of elephants: a symposium. Journal of the Elephant Managers Association 7(1): 12-14.

Rasmussen, B. & **Schulte, B**. 1996. A medley of chemical signals. Journal of the Elephant Managers Association 7(1): 61-64.

**Schulte, B.A.** 1993. Chemical Communication and Ecology of the North American Beaver (*Castor canadensis*). Ph.D. Thesis.

Bakus, G.J., Wright, M., **Schulte, B.,** Mofidi, F., Yazdandoust, M., Naqvi, W., Jagtap, T., Goes, J. & Naik, C. 1994. Coral Reef Ecosystems. Oxford & IBH Publ. New Delhi. 232 pp.

### Publications in Review or Preparation

Hoffmeier-Karimi, R.R. & **Schulte, B.A.** An assessment of perceived crop damage in a Tanzanian village impacted by human-elephant conflict. Pachyderm, in review.

Esposito, R.M.M. & **Schulte, B.A.** Matriarchs influence fitness and resource access of African elephant (*Loxodonta africana*) families. In prep.

Wisniewska, M., Freeman, E.W. & **Schulte, B.A.** Age and reproductive condition impacts on female African elephant activity and the trade-offs between risk-prone and risk-averse behaviors. In prep.

Goodwin, T.E., Broederdorf, L.J., Burkert, B.A., Hirwa, I.H., Mark, D.B., Waldrip, Z.J., Kopper, R.A., & **Schulte, B.A**. Chemical signals of elephant musth: II. Biosynthesis and Proximate Causes. In prep.

Berger, R.W., Larkin, I.V. & **Schulte, B.A.** Florida Manatee (*Trichecus manatus latirostris*) seasonal dispersion influenced by natural and anthropogenic factors in the Crystal River National Wildlife Refuge. In prep.

Berger, R.W., Larkin, I.V. & **Schulte, B.A.** Seasonal behavioral activity patterns of the Florida manatee (*Trichecus manatus latirostris)* in the Crystal River National Wildife Refuge. In prep.

Horikoshi-Beckett, C., Larkin, I.V. & **Schulte, B.A.** Shaping captive Florida manatee *(Trichechus manatus latirostris)* behavior for biological sample collection using positive reinforcement. In prep.

## Presentations (109 at Professional Meetings (1995 - 2014) (44 from 2009-14)

*Kentucky Innovation and Entrepreneurship 2014 Conference, Louisville, KY (September 2014)*

Duvall, A., Moss, K., Ford, A., Salihovic, A., Budlove, D, Stewart, P., Rizzo, R., Wilson, S., Todd, P., Schulte, B., DeGraves, F. Automated estrus detection in cattle.

*Animal Behavior Society, Princeton, New Jersey (August 2014)*

Hook, M., Freeman, E.W. & Schulte, B.A. Demographic differences in responses of African elephants (*Loxodonta africana*) to lion calls.

Schulte, B.A., Felton, S.K., Merte, C.E. & Collyer, M. Examining personality via behavioral plasticity in female African elephants (*Loxodonta africana*).

Wisniewska, M., Freeman, E.W. & Schulte, B.A. Risk-sensitive behaviors as influenced by age and reproduction in female African elephants.

*Chemical Signals in Vertebrates, Urbana-Champaign, IL (August 2014)*

Schulte, B.A. Learning and applications of chemical signals in vertebrates for conservation and management.

*WKU Student Research Conference, Bowling Green, KY (March 2014)*

Derham, K., Henley, M.D. & **Schulte, B.A**. African elephant (*Loxodonta africana*) impact to marula (*Sclerocarya birrea)*, knobthorn *(Acacia Nigrescens)*, and false marula (*Lannea schweinfurti)* in the Associated Private Nature Reserves, South Africa.

Edge, A.C., Henley, M.D., Daday, J. & **Schulte, B.A.** Examining human perception of African elephants (*Loxodonta africana)* and large trees for insights into conservation of an African savanna ecosystem.

Hall, L., Sartin, A. & **Schulte, B.A.** Elephant behavior and grouping at the Nashville Zoo. (poster)

*Midwest Ecology & Evolution Conference (March 2014)*

Derham, K., Henley, M.D. & **Schulte, B.A**. African elephant (*Loxodonta africana*) impact to marula (*Sclerocarya birrea)*, knobthorn *(Acacia Nigrescens)*, and false marula (*Lannea schweinfurti)* in the Associated Private Nature Reserves, South Africa.

*Society for Integrative and Comparative Biology, Austin, Texas (January 2014)*

Felton, S.K., Merte, C.E. & **Schulte, B.A**. Exploration of the behaviors defining personality in African elephants.

*Kentucky Academy of Sciences, Morehouse University, Kentucky (November 2013)*

Derham, K., Henley, M.D. & **Schulte, B.A**. African elephant (*Loxodonta africana*) impact to marula (*Sclerocarya birrea)*, knobthorn *(Acacia Nigrescens)*, and false marula (*Lannea schweinfurti)* in the Associated Private Nature Reserves, South Africa.

*The Wildlife Society (October 2013)*

Felton, S.K., Merte, C.E. & **Schulte, B.A**. Exploration of the behaviors defining personality in African elephants.

*Animal Behavior Society, Boulder, Colorado (July 2013)*

Co-organizer (with Dr. E. McPhee) of Workshop on Conservation Behavior and co-organizer (with Dr. E. Fernandez-Juricic) on Trends in Conservation Behavior.

**Schulte, B.A.** & Blogg, R.W. Conservation behavior implications for understanding behavioral patterns of African elephants.

*26th International Congress for Conservation Biology, Baltimore, Maryland (July 2013)*

Freeman, E., Meyer, J., Addendorf, J., **Schulte, B.** & Santymire, R. Scraping behavior of black rhinos (*Diceros bicornis bicornis*) is related to age and fecal progestagen metabolite concentrations

*American Chemical Society, New Orleans, LA (April 2013)*

Davenport, S.A., Yin, Q., Mark, D.B., Harelimana, I.H., **Schulte, B.A.** & Goodwin, T.E. Urinary chemical signals of musth in immature male African elephants.

Umuhire-Juru, A., Yin, Q., Broederdorf, L.J., Kopper, R.A., Sutherland, M.V., **Schulte, B.A.**, Engman, J. & Goodwin, T.E. Bacterial metabolism produces exogenous urinary chemical signals of elephant musth.

Yin, Q., Harelimana, I.H., Goodwin, T.E., Shoemaker, J.D. & **Schulte, B.A.** Identification and quantitation of fatty acids in male elephant urine that may be metabolized to produce chemical signals of musth.

*Living with Animals, Eastern Kentucky University, Richmond, KY (March 2013)*

**Schulte, B.A.** & Stokes, M. Conservation behavior: approaches to reduce human-wildlife conflict and human-elephant conflict.

*International Wildlife Management Congress, Durban, South Africa (July 2012)*

Duvall, M., Stokes, M., Cambron, M. & **Schulte, B.A.** Testing the effect of a wildlife deterring scarecrow device on the feeding behavior of African ungulates.

*Basic Research to Enable Agricultural Development, Arlington, VA (July 2012)*

**Schulte, B.A**., Stokes, M., Cambron, M., Duvall, M., Kasaine, S. & Kimwele, C. BREAD: Development of automated systems to increase crop yield by reducing group foraging intensity by crop pests. (Oral presentation)

Stokes, M., **Schulte, B.**, Cambron, M., Duvall, M., Hook, M., Kasaine, S. & Kimwele, C. BREAD: Development of automated systems to increase crop yield by reducing group foraging intensity by crop pests. (Poster presentation)

*Animal Behavior Society, Albuquerque, New Mexico (June 2012)*

Hazelkorn, R., Cox, T. & **Schulte, B.A.** The effect of human interactions on the behavior of *Tursiops truncates*.

Wisniewska, M., Freeman, E.W. & **Schulte, B.A.** Age & reproductive condition impacts on female African elephant activity.

*American Chemical Society, San Diego, California (March 2012)*

Hirwa, I.H., Broederdorf, L.J., Mark, D.B., Waldrip, Z.J., Burkert, B.A., Kopper, R.A., Goodwin, T.E., Sutherland, M.V. **& Schulte, B.A.** Characterization of male elephant urine metabolites via automated solid phase dynamic extraction (SPDE)/GC-MS and $^{1}$H NMR spectroscopy.

*International Elephant & Rhino Conservation & Research Symposium, Rotterdam, Netherlands (October 2011).*

Freeman, E.W., Meyer, J.M, Putman, S., **Schulte, B.A.** & Brown, J.L. Elephant-sized hot flashes? The relationship between social status and ovarian cycle activity provides evidence for menopause in female African elephants.

*Chemical Signals in Vertebrates, Berlin, Germany (August 2011)*

Goodwin, T.E. & **Schulte, B.A.** Urinary chemical signals of elephant musth: Temporal aspects of microorganism-mediated modifications.

**Schulte, B.A.**, Bagley, K., Blogg, R., Loizi, H. Vyas, D.K. & Goodwin, T.E. From exploration to selective information gathering: the development of chemosensory investigation in male African elephants (*Loxodonta africana*).

*Animal Behavior Society & International Ethological Conference, Bloomington, IN (July 2011)*

Sinderbrand, C.A. & **Schulte, B.A.** Examining dominance and stress relationship in a non-cooperative breeder (*Equus caballus*).

*Association for Tropical Biology and Conservation & Africa Section of the Society for Conservation Biology, Arusha, Tanzania (June 2011).*

†Hoffmeier-Karimi, R. & **Schulte, B.A.** An assessment of perceived crop damage in a Tanzanian village impacted by human-elephant conflict. †Received the Alwyn-Gentry award for best student presentation: http://www.atbc-scbafrica2011.org/grants-awards/awards/

Nasseri, N.A., McBrayer, L. & **Schulte, B.A.** The impact of tree modification by African elephant (*Loxodonta africana*) on herpetofaunal species richness in northern Tanzania.

*American Chemical Society 241$^{st}$ meeting, Anaheim, CA (March 2011)*

Harerimana, I.H., Mark, D.B., Broederdorf, L.J., Burkert, B.A., Waldrip, Z.J., Kopper, R.A., Goodwin, T.E., Sutherland, M.V., Freeman, E.W., Hollister-Smith, J.A. & **Schulte, B.A.** Temporal aspects of bacteria-mediated production of urinary chemical signals of elephant musth.

Mark, D.B., Harerimana, I.H., Goodwin, T.E. & **Schulte, B.A.** Appearance of urinary chemical signals of musth in immature African elephants.

*WKU Student Research Conference, Bowling Green, KY (March 2011)*

Hook, M. & **Schulte, B.A.** Effect of simulated predation risk on African elephant behavior.

Sinderbrand, C.A. & **Schulte, B.A.** Examining the dominance-stress hypothesis in the domestic horse (*Equus caballus*).

*Kentucky Academy of Sciences, Bowling Green, KY (November 2010)*

**Schulte, B.A.**, Hazelkorn, R. & Hecht, M. Aggression, hair whorls and handedness in horses (*Equus caballus*).

Sinderbrand, C.A. & **Schulte, B.A.** Rate of aggressive behaviors in lactating and non-lactating domestic horses (*Equus caballus*).

*Animal Behavior Society, Williamsburg, VA (July 2010)*

Freeman, E.W., Meyer, J.M., Shelby, L., **Schulte, B.A.** & Brown, J.L. Role of elephant matriarchs in Addo Elephant National Park, South Africa.

*Society for Conservation Biology, Edmonton, Alberta, Canada (July 2010)*

**Schulte, B.A.**, Esposito, R.M.M., & Karimi, R.R. Elephant Behavior, Human Perception and Human-Elephant Conflict.

*Center for Integrative Study of Animal Behavior Meeting, Indiana University (March 2010)*

**Schulte, B.A.,** Hazelkorn, R. & Hecht, M. The relationship of facial whorl (trichoglyph) direction to handedness and aggression in horses (*Equus caballus*).

*National Meeting of the American Chemical Society in San Francisco (March 2010)*

Waldrip, Zach J., Broederdorf, L.J., Burkert, B.A., Hirwa, I.H., Kopper, R.A., Goodwin, T.E., Sutherland, M.V., Freeman, E.W., Hollister-Smith, J.A. & **Schulte, B.A.** Chemical signals of elephant musth: Biosynthesis and microbially-mediated modifications.

*International Elephant Conservation & Research Symposium, South Africa (January 2010)*

**Schulte, B.A.,** Esposito, R.M.M. & Karimi, R.R. Furthering our understanding of elephant behaviour and human perception to facilitate conservation and reduce human-elephant conflict.

*Association of Southeastern Biologists, Birmingham, Alabama (April 2009)*

Nasseri, N.A., McBrayer, L.D., Goodwin, T.E. & **Schulte, B.A.** The impact of African elephants (*Loxodonta africana*) on herpetofauna species diversity and richness in savanna woodlands of northern Tanzania.

*National American Chemical Society Meeting, Salt Lake City, Utah (April 2009)*

Burkert, B.A., Broederdorf, L.J., Christie, J.A., Waldrip, Z.J., Goodwin, T.E. & **Schulte, B.A.** Effects of aging on the volatile organic chemicals in male elephant urine.

Broederdorf, L.J., Burkert, B.A., Christie, J.A., Davis, B.L., Waldrip, Z.J., Goodwin, T.E., Freeman, E.W., Hollister-Smith, J.A. & **Schulte, B.A.** Chemical signals of musth in male elephant urine.

*Animal Behavior Society, Snowbird, Utah (August 2008)*

Esposito, R.M.M., Goodwin, T.E. & **Schulte, B.A.** Matriarchs, group interactions and chemosensory behavior of African elephants (*Loxodonta africana*).

*International Society of Behavioral Ecology, Ithaca, New York (August 2008)*

**Schulte, B.A.**, R. Blogg, R.M.M. Esposito & Goodwin, T.E. Social group interactions and chemosensory behavior by dominant individuals in African elephant (*Loxodonta africana*) society.

*National American Chemical Society Meeting, New Orleans, Louisiana (April 2008)*

Broederdorf, L., Jackson, S.R., Goodwin, T.E., Meyer, J.M. & **Schulte, B.A.** Complementary chemical and biological studies of African elephants in captivity and in the wild: a route to understanding mammalian chemical communication.

Jackson, S.R., Broederdorf, L.J.,Rountree, M.E., Bradley, S.B., Goodwin, T.E.& **Schulte, B.A.** Combination of solid phase dynamic extraction (SPDE), chiral column gas chromatography, and mass spectrometry for analysis of compounds found in African elephant excretions and secretions.

*International Elephant Foundation, Orlando, Florida (November 2007)*

Blogg, R., Goodwin, T.E. & **Schulte, B.A.** Musth as a heightened reproductive condition in African elephants.

Castelda, S., Goodwin, T.E. & **Schulte, B.A.** Convergent evolution among African elephants, Asian elephants and insects.

**Schulte, B.A.**, S. Castelda, S. Groover, M., Napora, E., Vyas, D., Riddle, S., Rasmussen, L.E.L. & Goodwin, T.E. Using a behavior conservation approach to reduce human-elephant conflict.

*Animal Behavior Society, Burlington, Vermont (July 2007)-INVITED SPEAKER*

**Schulte, B.A.** Reducing human-elephant conflict through an understanding of elephant behavior. Symposium on Conservation Behavior: From Implications to Applications.

*Society for Conservation Biology, Port Elizabeth, South Africa (July 2007)*

Esposito, R.M.M., Goodwin, T.E., Rasmussen, L.E.L. & **Schulte, B.A.** Chemical communication in family group interactions of African elephants (*Loxodonta africana*).

*National American Chemical Society Meeting, Chicago (March 2007)*

Chen, C.J., Jackson, S.R., Weddell, M.E., Goodwin, T.E., Drea, C.M. & **Schulte, B.A.** Use of automated SPDE/GC-MS, novel macros, and pattern recognition techniques in a search for African elephant urinary pheromones.

Jackson, S.R., Weddell, M.E., Chen, C.J., Goodwin, T.E., Christ, I.X., Chokshi, K.X. & **Schulte, B.A.** Implementation of a new extraction cooler for analysis of volatiles in African elephant urine

headspace (and other samples) via automated SPDE/GC-MS: a search for pheromones.

*Elephant Managers Association, Albuquerque, New Mexico (October 2006)*

Meyer, J., **Schulte, B.A.**, Goodwin, T.E. & Rasmussen, L.E.L. Sexual dimorphism in the development of young African elephants (*Loxodonta africana*) in Addo Elephant National Park South Africa. [*MSc student and Collaborators*]

Meyer, J., **Schulte, B.A.**, Goodwin, T.E. & Rasmussen, L.E.L. Intrasexual chemical communication and social responses of *ex situ* female African Elephants (*Loxodonta africana*). [*MSc student and Collaborators*]

*Interagency Oceanaria Meeting, Homosassa Springs, FL (September 2006)*

Berger, R., Larkin, I.L.V. & **Schulte, B.A**. Temporal habitat use of the Florida manatee (*Trichechus manatus latirostris*) at a natural water spring in relation to human activity. [*Graduate student & Collaborator*]

*Animal Behavior Society, Snowbird, Utah (August 2006)*

Berger,R., Larkin, I.L.V. & **Schulte, B.A.** Temporal habitat use of the Florida manatee (*Trichechus manatus latirostris*) at a natural water spring in relation to human activity [*MSc student and Collaborator*]

Napora, E., Goodwin, T.E., Rasmussen, L.E.L. & **Schulte, B.A**. Comparison of chemosensory behaviors in African elephants (*Loxodonta africana*) at a Tanzanian waterhole. [*MSc student and Collaborators*]

**Schulte, B.A.**, Merte, C., Bagley, K., Loizi, H., Goodwin, T.E. & Rasmussen, L.E.L. Social dominance and reproductive success as hypotheses for chemosensory behavioral development in African elephant. [*MSc students and Collaborators*]

Vyas, D.K., Goodwin, T.E., Rasmussen, L.E.L. & **Schulte, B.A**. Sexually dimorphic developmental patterns of chemosensory behaviors in African elephants (*Loxodonta africana*). [*MSc student and Collaborators*]

*Chemical Signals in Vertebrates XI, Chester, England (July 2006)*

**Schulte, B.A.,** Bagley, K., Loizi, H., Merte, C., Meyer, J., Napora, E., Vyas, D., Goodwin, T.E. & Rasmussen, L.E.L. Age, sex and population comparisons of chemosensory behaviors in African elephants. [*MSc students and Collaborators*]

Goodwin, T.E., Brown, P., Eggert, M. Evola, M., House, S., Morshedi, G., Weddell, M., Aubut, Y., Eggert, J., **Schulte, B.A.** & Rasmussen, L.E.L. Use of automated solid phase dynamic extraction (SPDE)/GC-MS and novel macros in the search for African elephant pheromones. [*Undergraduate students and Collaborators*]

*Elephant Managers Association, Portland, OR (October 2005)*

Freeman, E.W., **B.A. Schulte**, & J.L. Brown.. Response of female African elephants to bull urine and its relationship to dominance status and ovarian inactivity. [*Doctoral student & Collaborator*]

*Interagency Oceanaria Meeting, Orlando, FL (September 2005)*

Berger, R., **B.A. Schulte**, & I. Larkin. Florida manatee habitat use and behavior in King's Bay, Crystal River [*Graduate student & Collaborator*]

*International Society of Chemical Ecology, Washington, D.C. (July 2005)*

**Schulte, B.A**., K. Bagley, H. Loizi, C. Merte, D. Vyas, T.E. Goodwin & L.E.L. Rasmussen. Pheromones and chemosensory investigative behavior by African elephants [*Graduate students & Collaborators*]

*Zoological Society of Southern Africa, Grahamstown, South Africa (July 2005)*

Merte, C., T.E. Goodwin, L.E.L. Rasmussen & **B.A. Schulte**. Age and sex comparisons of chemosensory investigative behavior by African elephants. [*Graduate students & Collaborators*]

*National American Chemical Society Meeting, San Diego (March 2005)*

Brown, P.A., M.S. Eggert, M.G. Evola, T.E. Goodwin, L.E.L. Rasmussen & B.A. Schulte. Use of SPME, reverse phase SPE, and GC-MS in a search for African elephant urinary pheromones. [*Undergraduate students & Collaborators*]

Eggert, M.S., P.A. Brown, M.G. Evola, T.E. Goodwin, L.E.L. Rasmussen & B.A. Schulte. Comparison of different SPME fibers for the GC-MS analysis of trace organics in a biological matrix (urine). [*Undergraduate students & Collaborators*]

*International Elephant Research Symposium. Fort Worth, TX (December 2004)*

**Schulte, B.A.**, T.E. Goodwin, L.E.L. Rasmussen, K. Bagley & H. Loizi. The development of trunk tip behaviors and chemical signal detection in African elephants. [*Graduate students & Collaborators*]

Goodwin, T.E., L.E.L. Rasmussen & **B.A. Schulte** A search for pheromones in African Elephant Urine [*Collaborators*]

*Elephant Managers Association, 25$^{th}$ annual meeting (October 2004)*

**Schulte, B.A.**, T.E. Goodwin, L.E.L. Rasmussen, K. Bagley & H. Loizi. Investigating chemical communication in African elephants: melding captive and wild elephant studies. [*Graduate students & Collaborators*]

*Elephant Management and Owners Association 10$^{th}$ annual meeting (September 2004)*

**Schulte, B.A.**, T.E. Goodwin, L.E.L. Rasmussen, K. Bagley, H. Loizi, C. Merte, A. Whitehouse, G. Kerley, & S. Riddle. The development of chemical communication in African elephants and applications for management. [*Graduate students & Collaborators*]

*Animal Behavior Society, Oaxaca, Mexico (June 2004)*

**Schulte, B.A**., T.E. Goodwin, L.E.L. Rasmussen, K. Bagley & H. Loizi. Chemical signal detection and chemosensory development in the African elephant (*Loxodonta africana*) . [*Graduate students & Collaborators*]

*International Association for Aquatic Animal Medicine, Galveston, TX (April 2004)*

Larkin, I.L.V., C. Horikoshi, J. Warnke, T.S. Gross, **B.A. Schulte** & R.L. Reep. Monitoring hormones and behavior in female Florida manatees (T*richechus manatus latirostris*). [*Graduate students & Collaborators*]

*Student Affiliates Symposium at the National American Chemical Society Meeting, Anaheim, CA (March 2004)*

Morshedi, G.G., P.A. Brown, T.E. Goodwin, L.E.L. Rasmussen & **B.A. Schulte**. Heterocycles (and other compounds) that we have identified in African elephant urine: a search for putative pheromones. [*Undergraduate Students & Collaborators*]

Brown, P.A., R.G. Morshedi, T.E. Goodwin, L.E.L. Rasmussen & **B.A. Schulte**. SPME/GC-MS methodology for chemical analysis of preovulatory female African elephant urine: a search for putative pheromones. [*Undergraduate Students& Collaborators*]

Satterfield, G.L., R.G. Morshedi, R.A. Kopper, T.E. Goodwin, C.F. Lichti, L.E.L. Rasmussen & **B.A. Schulte**. Use of SDS PAGE, HPLC-MS/MS, and SPME, GC-MS to study female African elephant urinary proteins. [*Undergraduate Students & Collaborators*]

*Georgia Academy of Sciences, Berry College, Mount Berry, Georgia (March 2004)*

Bagley, K., L. Stanley, T.E. Goodwin, L.E.L. Rasmussen & B.A. Schulte. Male African elephant assessment of conspecific female urine and development of chemo-tactile behaviors. [*Graduate & undergraduate students & Collaborators*]

*Society for Integrative and Comparative Biology (SICB), New Orleans, Louisiana (Jan 2004)*

Gray, A., H. Loizi, M. Correll, T.E. Goodwin, L.E.L. Rasmussen & **B.A. Schulte**. Social group association patterns by young male and female African elephants. [*Graduate & undergraduate students & Collaborators*]

*15th Biennial Conference, Biology of Marine Mammals, Greensboro, NC (December 2003)*

**Schulte, B.A.** & J.S.Young. Captive Manatee Activity and Social Behavior: Considerations for Rehabilitation. [*Graduate student, completed*]

Horikoshi, C., I. Larkin & **B.A. Schulte**. Estrous cycle and behavior of the female Florida manatee. [*Graduate student & Collaborator*]

*International Elephant Research Symposium. Columbo, Sri Lanka (September 2003)*

Loizi, H., M. Correll, A. Gray, T.E. Goodwin, L.E.L. Rasmussen & **B.A. Schulte**. 2003. The Development of Sexually Dimorphic Chemotactile Behavior in African Elephants. [*Graduate & undergraduate students & Collaborators*]

*Gordon Conference, Newport, RI. (July 2003)*

Goodwin, T.E., B.L. Davis, W.M. Dill, A.R. Hicks, P.A. Brown, G.G. Morshedi, L.E.L. Rasmussen, H. Loizi, **B.A. Schulte**, J. Hollister-Smith & S.C. Alberts. Heterocycles (and other compounds) that we have identified in African elephant urine: a search for putative pheromones. [*Graduate & undergraduate students & Collaborators*]

*Chemical Signals in Vertebrates X, Corvallis, Oregon (July 2003)*

**Schulte, B.A.**, K. Bagley, M. Correll, A. Gray, S.M. Heineman, H. Loizi, M. Malament, N.L. Scott, B.E. Slade, L. Stanley, T.E. Goodwin & L.E.L. Rasmussen. Measuring chemotactile communication in elephants: detection and response. [*Graduate & undergraduate students*]

Goodwin, T.E., L.E.L. Rasmussen, **B.A. Schulte**, B.L. Davis, W.M. Dill, A.R. Hicks, P.A. Brown, R.G. Morshedi & H. Loizi. Chemical analysis of preovulatory female African elephant urine: a search for putative pheromones. [*Graduate & undergraduate students*]

*International Elephant Research Symposium, Orlando, Florida (November 2002)*

**Schulte, B.A**., B.E. Slade, H. Loizi, S. Harralson & L.E.L. Rasmussen. Estrous State Dynamics in Communication by Captive Female Asian Elephants [*2 graduate students*]

Loizi, H., T.E. Goodwin, L.E.L. Rasmussen. & **B.A. Schulte**. Search for the African Elephant Estrous Pheromone: Communication and Conservation. [*Graduate student*]

*Animal Behavior Society, Indiana University, (July 2002)*

Young, J.S. & **B.A. Schulte**. A comparison of Florida manatee (*Trichechus manatus latirostris*) activity and social interactions in different captive environments. [*Graduate student*]

*Florida Marine Mammal Health Conference, Gainesville, FL (April 2002)*

Young, J.S. & **B.A. Schulte**. A comparison of manatee behavior in different captive environments. [*Graduate student*]

*Zoos and Aquariums: Committing to Conservation Conference, Cocoa Beach, FL (Nov 2001)*

**Schulte, B.A.** & J. Young. 2001. Social and foraging behavior of captive and wild Florida manatees. [*Graduate student*]

**Schulte, B.A.** & H. Loizi. Understanding elephant demographics and behavior as an aid to resolving elephant-human conflicts. [*Graduate student*]

*International Elephant and Rhinoceros Research Symposium, Vienna, Austria (June 2001)*

**Schulte, B.A**., B.E. Slade & L.E.L. Rasmussen. 2001. The trunk and tail of elephant communication: studies on captive Asian elephants. [*Graduate student*]

**Schulte, B.A**. 2001. Examining ideas on the evolution of musth.

Bane, K. & **B.A. Schulte.** 2001. Object manipulation in captive Asian elephants. [*Graduate student*]

*Eighth International Theriological (Mammal) Congress, Sun City, South Africa, invited speaker to two symposia, the first on chemical signals and the second on elephant biology (Aug 2001)*

**Schulte, B.A**., B.E. Slade and L.E.L. Rasmussen 2001. Estrous state influences on behavior in female Asian elephants. [*Graduate student*]

**Schulte, B.A.** 2001. Proboscidean musth: has sexual selection created a unique rut?

*Georgia Academy of Sciences, Brunswick, GA.*

Young, J. and **B.A. Schulte.** 2001. Activity levels over feeding periods by captive Florida manatees. [*Graduate student*]

*Animal Behavior Society, Morehouse College, GA.*

**Schulte, B.A.**, R. Lambert, E. Feldman, R. Oliver & D.L. Hess. 2000. Influence of status and time outside on estrous cyclicity in captive elephants. [*3 Undergraduate students*]

*Society for Conservation Biology, Univ. MT, Missoula*

**Schulte, B.A.** & D. Müller-Schwarze. 2000. Reversing extinction by reconciling coexistence with a habitat restorer.

*Animal Behavior Society, Bucknell University, PA.*

**Schulte, B.A.**, B. Slade & L.E.L. Rasmussen. 1999. Estrus influences on signal sending and assessment by Asian elephants. [*Graduate student*]

*Fourth International Elephant Research Symposium, Atlanta, GA*

**Schulte, B.A.**, B. Slade, R. Lambert & L.E.L. Rasmussen. 1999. Comparison of social interactions over estrus in captive African and Asian elephants. [*Graduate & Undergraduate students*]

*Euro-American Mammal Congress, Santiago de Compostela, Spain*

**Schulte, B.A.** & D. Müller-Schwarze. 1998. Understanding North American beaver behavior as an aid to management.

Müller-Schwarze, D. & **B.A. Schulte.** 1998. Characteristics of a "climax" population of beaver (*Castor canadensis*).

*Third International Elephant Research Symposium, Springfield, MO*

**Schulte, B.A.** & E. Feldman. 1998. African elephant behavior monitored by keepers and the relationship to progesterone levels. [*Undergraduate student*]

*Northeast Regional Animal Behavior Society Meeting, Woods Hole, MA*

Lambert, R. and **B.A. Schulte.** 1997. Feeding and social behavior in a group of captive female African elephants. [*Undergraduate student*]

**Schulte, B.A.** 1997. Proximate and ultimate aspects of musth.

*Second annual Elephant Research Symposium, Pittsburgh Zoo, Pittsburgh, PA*

**Schulte, B.A.**, D. Burba, E. Feldman & L.E.L. Rasmussen. 1997. Social behavior, movement, and feeding in a group of captive African elephants. [*2 Undergraduates*]

*Chemical Signals in Vertebrates 8, Cornell University, Ithaca, NY*

**Schulte, B.A.,** & L.E.L. Rasmussen. 1997. Musth, testosterone and sexual selection.

*Animal Behavior Society, University of Maryland, College Park, MD*

**Schulte, B.A.**, D. Burba, E. Feldman & L.E.L. Rasmussen. 1997. Social behavior, activity and estrus in a group of captive African elephants. [*2 Undergraduate students*]

*American Society of Mammalogists (ASM), Oklahoma State University, Stillwater, OK*

**Schulte, B.A.**, B. Slade & L.E.L. Rasmussen. 1997. Do female Asian elephants (*Elephas maximus*) chemosensorily prefer musth males? [*Graduate student*]

Scott, N.L., **B.A. Schulte**, J.D. Mellen & L.E.L. Rasmussen. 1997. Do male Asian elephants, *Elephas maximus*, advertise musth in their urine? [*Graduate student*]

Slade, B., J.D. Mellen, **B.A. Schulte** & L.E.L. Rasmussen. 1997. Female to female communication of estrous cycle status and reproductive social behaviors in captive Asian elephants, *Elephas maximus*. [*Graduate student*]

*American Society of Mammalogists. University of North Dakota. Grand Forks, ND*

**Schulte, B.A.** & L.E.L. Rasmussen. 1996. Responsiveness of female Asian elephants (*Elephas maximus*) to chemosignals from conspecific males.

*The Wildlife Society Second Annual Conference. Portland, OR*

**Schulte, B.A.** 1995. Elephant conservation and management: problems, perspectives, and possibilities. *Symposium Co-organizer with L.E.L. Rasmussen: Elephant Conservation and Management: Wild & Captive Populations.* Speakers: I. Douglas-Hamilton, J. Eisenberg, T. Goodwin, R. Lande, F.V. Osborn, H. Riddle, M. Schmidt, J. Shoshani, & R. Sukumar.

# TEACHING

## Courses Taught

*Western Kentucky University*

Animal Behavior Biol 530, Biol 334
Conservation Behavior Biol 503
Environmental Science Biol 280
Advanced Topics Biol 675
Behavioral Ecology Biol 532 & Lab Biol 533
General Biology Biol 113

*Study Abroad*

Ecology, Behavior & Conservation of Manatees & Dolphins: A Unique Field Course in the Drowned Cayes, Belize 2009, 2010

*Georgia Southern University*

Animal Behavior BIOL 3635/5099/G
Evolution & Ecology Lab BIOL 3113
Animal Consciousness BIOL 7610
Environmental Biology BIOL 1230
Pheromones & Anim Beh BIOL 7610
Chemical Ecology BIOL 5099/G
Behavioral Ecology BIOL 5645/G/7090
Induced Defenses BIOL 7610
Directed Study BIOL 4890 / 7890
Selected Topics BIOL 7890
Graduate Research / Thesis BIOL 7895 / 7999

*Providence College*

Animal Behavior 350: 1997-99
Biology Seminar 430: 1996
Contemporary Biology 101-102: 1994-95, 1998
Biology 112: A Human Approach: 1995-96
Ecology 401: 1994-98
Environmental Biology 121: 1999
Introductory Biol Lab 103L: 1994-95
Internship & Research
Comparative Vertebrate Anatomy 201: 1995, 1996 (spring and fall), 1997

## Supervision of Research

*WKU Undergraduate Students*

Ashley Sartin (13-14)
Adam Edge (12-14)*†‡
Lydia Hall (13-14)†
Meghan Ryckeley (14-15)†‡
†Honors College
*Biodiversity Student of Year (2014)
‡FUSE recipient

*GSU Undergraduate Students*

Biology 4890 Research
Rebeccah Hazelkorn (08-09)
Mallori Hecht (08-09)
Amber Johnson (Su&F 08)
Brittany Todd (S 07)
Josh White (S 07)
Matthew Groover (F 05)
Kimberly Wollett (F 05)
Matthew McBride (F 04)
Lauren Stanley (F 03)
Joe Scott (02, w/ Dr. Pung)
Darlinda Douglass (Sp 02)
Claire Erlacher (F 01)
Maggie Mitchell (F 01)
Chris O'Neil (Su 01)
Erik Lunsford (S 01)
Biology 4730 Internship
Lauren Stanley (F 03)
Christa Rayl (F 03)
Kathryn Bagley (Sp 02)
Ashley Kirkley (Su 00)
McNair Advisor
Amy Gray (2003)
Honors Students
Brittany Todd (S 07)
Joseph Waddell (F 06)
Andrew Quesada (F 04)
Claire Erlacher (Sp 01)

**Member of Steering Committee for the following 22 MSc thesis graduate students**:

2001: Tiffany Neu, Adam Safer and Stephanie Schopmeyer
2002: Joel Fleming and Jan Mackinnon
2003: Alyssa Kunz
2004: Ann Marie LeBlanc
2005: Nyron Bovell and Rob Ruzicka
2006: Chris Freeman
2007: Linsey Cozzie, Tina Davis and Cameron Storey
2008: Leslie Bates, Timothy Gowan and Charles R. Chad Hubbard
2009: Heather Cason
2011: Simon Kasaine
2011: Molly Duval, Andrea Falcetto, Rebeccah Hazelkorn (Savannah State University)
2012: Merrie Richardson

Non-thesis: Marcia Fuller (chair), Rachel Johnson, Sarah Mortzfeldt, Ann Yaroch

## Member of Steering Committee for PhD graduate students:

2005: Elizabeth Freeman, George Mason University
2011: Meghan Bills, University of Florida

## MSc Graduate Students Research Advisor [GSU 1-15; WKU 16-present ]

1) Jennifer Young, 2001. An Investigation of Captive Florida Manatee (*Trichechus Manatus Latirostris*) Behavior and Social Interactions.
2) Helen Loizi, 2004. Development of Chemosensory Behaviors in African Elephants (*Loxodonta Africana*) and Male Responses to Female Urinary Compounds.
3) Chifuyu Horikoshi, 2004. Effect of Hormonal and Temporal Factors on Captive Female Manatee (*Trichechus Manatus Latirostris*) Behavior.
4) Kathryn R. Bagley, 2004. Chemosensory Behavior and Development of African Male Elephants (*Loxodonta Africana*).
5) Jessica R. Brzyski, 2005. Beaver (*Castor Canadensis*) Impacts on Herbaceous and Woody Vegetation in Southeastern Georgia.
6) Christen E. Merte, 2006. Age Effects on Social and Investigative Behaviors in a Closed Population of African Elephants.
7) Dhaval K. Vyas, 2006. Sexually Dimorphic Developmental Patterns of Chemosensory Behaviors in African Elephants (*Loxodonta Africana*).
8) Jordana M. Meyer, 2006. Sexually Dimorphic Social Development and Female Intrasexual Chemical Signaling of African Elephants (*Loxodonta Africana*).
9) Ryan Berger, 2007. Seasonal Habitat Use of the Florida manatee (*Trichecus Manatus Latirostris*) in the Crystal River National Wildlife Refuge with Regards to Natural and Anthropogenic Factors.
10) Erek Napora, 2007. Chemical Signaling and Resource Use by African Elephants (*Loxodonta Africana*).
11) Rhea M. M. Esposito, 2008. Effect of Matriarchs on Group Interactions, Kinship Fitness, and Differences in Chemosensory Behavior of African Elephants (*Loxodonta Africana*).
12) Stacie Castelda, 2008. Waterhole Dynamics and Chemical Signals of African Elephants (*Loxodonta Africana*).
13) Nabil Naseeri, 2009. The Relationship of Herpetofaunal Community Composition to an Elephant (*Loxodonta Africana*) Modified Savanna Woodland of Northern Tanzania, and Bioassays with African Elephants.

14) Rebekah Karimi, 2009. An Assessment of Perceived Crop Damage in a Tanzanian Village Impacted by Human-Elephant Conflict and an Investigation of Deterrent Properties of African Elephant (*Loxodonta Africana*) Exudates Using Bioassays.
15) Russell Blogg, 2012. Patterns of Chemosensory Behavior in a Closed Population of Wild African Elephants (*Loxodonta Africana*)
16) Carly Sinderbrand, 2011. The Relationship of Dominance, Reproductive State and Stress in a Non-Cooperative Breeder, The Domestic Horse (*Equus caballus*).
17) Malgorzata Wisniewska, 2011. Factors Influencing Travel Order as Proxy for Leadership and Trade-offs in Activity Budgets in Lactating and Nonlactating African Savanna Elephants.
18) Margaret Rose Hook, 2012. Effect of Lion Calls on African Elephants (*Loxodonta Africana*) in Addo Elephant National Park, South Africa.
19) Kelly Derham, 2014. Effectiveness of Wire Netting in Reducing Damage by African Elephants (*Loxodonta Africana*) to Marula (*Sclerocarya Birrea*), Knobthorn (*Acacia Nigrescens*), and False Marula (*Lannea Schweinfurti*) in the Associated Private Nature Reserves, South Africa.
20) Emily McIntre, 2010-present. Elephant Leadership and Personality in Response to Conspecific Cues.
21) Charlotte Hacker, 2013-present. Elephant Enrichment and Management in Captivity.
22) Caroline Jones, 2013-present. Dominance Among Captive Male African Elephants and Its Relationship to Testosterone, Corticosterone, and Semen Quality.
23) Sarah Goodyear 2013-present. Habituation in Elephants and How It Applies to Human-Elephant Conflict Mitigation.
24) Chase LaDue, 2014-present. Chemical Signal Thresholds in Elephants.

## Guest Lecturer in Educational Formats

Marine Mammal Teacher Workshop for K-12 teachers in Brunswick, GA 11/17/06, hosted by Georgia Graves, Workshop Coordinator, Sapelo Island National Estuarine Research Reserve

School of Public Health Senior Seminar Class, "Investigations & Explorations," February 2004

Mammalogy Class, GSU, "Beaver Biology," September 11, 2001, September 17, 2002

Instructor on Elephant Conservation and Behavior at 9$^{th}$, 8$^{th}$, 7$^{th}$, 5$^{th}$ & 2$^{nd}$ Annual Elephant Handler's School at Riddle's Elephant Sanctuary, Ark., 9/02 & 5/02, 5/01, 5/00, 6/98 & 5/95

# **SERVICE** (CV limited to service while at WKU and GSU)

## Western Kentucky University

Department Head at WKU (2009-present)
Member of search committee for Dean of the College of Health & Human Services (2014)
Member of Year of South Africa committee (2013-2016)

## Georgia Southern University

President of Georgia Southern University Chapter of Sigma Xi 2001-2002. Organized Earth Forum (April 23, 2002) with numerous collaborators on campus *"Economics and the Environment: The Tangible Benefits of Greening."*
Secretary of Georgia Southern Environmental Network (GSEN) 2001-2009
Vice-President of GSU Chapter of Sigma Xi 2000-2001: Created web site for local chapter. Organized Forum (March 1, 2001) on "*Science and the Media: Relaying Research to Reporters and the Public*" for which our local chapter won a National Award.

### College of Science & Technology

Graduate Program Director, Department of Biology, 2008-2009.
Director, College Office of Undergraduate Research (COUR), 2005-2008.
Award for Excellence in Research Committee 2007-2008
External Representative on Renewable Energy Endowed Chair Search, 2007-08
College of Science & Technology representative to Faculty Senate Elections Committee (2001-04): Dr. Jean-Paul Carton, Chair 2001-02, Jim Lobue chair 2002-04
Institutional Care and Use Committee, 2002-3

### Department of Biology

Advisory Committee, Representative (elected) of non-tenured faculty, 2000-2001
BioScience Club Committee 1999-2000
Building (new), 2007-2008
Graduate Committee 2000-2001
Natural Areas Committee 2002-03, non-member attendee 1999-2000
Peer Review Committee 2003-6, chair 2004-5: New Peer Review format was adopted by Department in spring 2005.
Personnel Committee 2003-5, 2006-8
Seminar Series Committee 1999-2004, 2007-present
Undergraduate Activities & Research Committee 2000-2004 (chair, 2002-03)
Undergraduate Curriculum & Policy Committee 2001-2008
Undergraduate Curriculum Revision Committee 2004-07, chair 2005-6: formulated new undergraduate curriculum for submission to Department in 2006

### Support of GSU Programs

Biology Representative for Georgia Southern University March 2007 Open House
Part of GSU panel on Office of Research and Sponsored Services Program "Approaching the National Science Foundation" 2/26/04 & Undergraduate Research Roundtable 10/05.
Liaison to South Africa, University of Port Elizabeth, to establish university level scholarly exchange between UPE and Georgia Southern University.
Met with Strategic Planning Council (9/02) to discuss EARTH Initiative.
Met with Dr. Bleicken, Vickie Hawkins and William Ehling to discuss future construction including development of new recreational facilities.

Organized CLEC events on 1) April 10, 2006 by Dr. Thomas Goodwin of Hendrix College – two talks on "Green Chemistry and Gray Elephants" co-sponsored by the Chemistry Department and 2) April 9, 2002: "Making friends and solving problems: how primates navigate social, genetic and environmental landscapes," a seminar by Dr. Susan Alberts of Duke University.

Authored two "radio advertisements" for environmentally friendly behavior at Georgia Southern, aired over the college radio station (Dr. L. Wolfe edited script)

Speaker for SAGE (Student Alliance for a Green Earth) Earth Day event 2001

Judge for 1999 - 2000 Sigma Xi student award competition; organized 2002 competition

EXTERNAL SERVICE

## Associate Editor, Behaviour, 2007-present (70 submissions handled)

5/7-5/8: 10 submissions handled; 5/8-5/9: 8 submissions handled
5/9-5/10: 9 submissions handled; 5/10-5/11: 15 submissions handled
5/11-5/12: 10 submissions handled; 5/12-5/13: 10 submissions handled
5/13-5/14: 8 submissions handled;

## Organizations

Chair of Conservation Committee for Animal Behavior Society (2011-2014): Workshop and Symposium co-organizer at ABS meeting in Boulder CO 2013; workshop 2013 Princeton

Member of Marine Committee for Society for Conservation Biology

Participant in March 2000 Manatee Working Group, Epcot Center, Orlando, FL

2002 River cleanup with Canoochee Riverkeepers, Chandra Brown, Executive Director

## Professional Services

Advisory Council, Asian Elephant Support, http://asianelephantsupport.org/directors-listing.asp

NSF Grant Review Panel 2012; review NSF (pre)proposals annually

Advisory Council, International Elephant Foundation, 2010-present and grant reviewer.

Member of Research Review Board for Lowry Park Zoo, Tampa, FL.

Scientific Review Panel, Riddle's Elephant and Wildlife Sanctuary

Scientific Advisor for "Zambezi Elephant Trust" (William Taylor)

Reviewed National Science Foundation Grant for International Program, 2003

Reviewed student abstracts for Society for Conservation Biology meeting (2010)

Reviewed Student Grants for Animal Behavior Society, 2001 (Dr. James Ha, chair), 2002 (Dr. Shelley Adamo, chair), 2006 (Dr. Lynette Hart, Chair).

Reviewed Grants for the Smithsonian's Scholarly Studies Program, SeaGrant, and US Civilian Research & Development Foundation Cooperative Grants Program

Review Committee for Animal Behavior Society Developing Nations Research Grants 2/99 (Michelle Pellissier Scott, Associate Professor, Department of Zoology, UNH, Chair) and 3/00 (James Ha, University of Washington, Chair)

Reviewed article on Giant Pandas: Biology and Conservation (editors Don Lindburg and Karen Baragona, WWF-US).

Reviewer for Professional Journals: *American Midland Naturalist, Animal Behaviour, Applied Animal Behavior Science, Canadian Journal of Zoology, Journal of Applied Animal Welfare Science, Journal of Chemical Ecology, Journal of Field Ornithology, Journal of Mammalogy, Journal of Wildlife Management, Journal of Zoology, Northeastern American Naturalist, Oecologia, Proceedings of the Royal Society of London* and *Zoo Biology.*

Reviewed chapters in textbooks*: Environmental Science, A Study of Interrelationships*, 7th ed. by Enger & Smith, and in the 11th edition, WCB/McGraw-Hill Publishers; Comparative Review of Brennan/Withgott's *Environment: The Science Behind the Stories*, 1e; *Environmental Science: People*

*and the Natural World* by Friedland, Jones & Weisburg, and in Cunningham *Principles of Environmental Science*, 3rd and 4th editions.
Reviewer (Judge) of student presentations at 2003 15th Biennial Conference, Biology of Marine Mammals, Greensboro, NC

## Community Activities in Statesboro, GA

Chair of Governing Board for Charter Conservatory for Liberal Arts & Technology (CCAT), Statesboro, GA, 2004-5; Board member 2003-6
Judge for Georgia Science and Engineering Fair, January 10, 2004

## Seminars -- Invited Speaker

University of Vermont, 9/15/14, "Behavioral Variation and the Conservation of Elephants"
Zoo Miami, 4/1/14, "Elephant Communication, Conservation and Enrichment"
Florida International University, 3/31/14, "Conservation, Chemical Signals and Behavior – Linkages from Microbes to Elephants"
Miami University of Ohio, 2/27/14, "A Behavioral Approach to Conservation – Pachyderms, Proboscises and Problems"
Lincoln Park Zoo, Chicago, 11/26/13, "Elephant Conservation - A Behavioral Approach"
Univ. of Wisconsin – Oshkosh, 11/25/13, "Conservation Behavior – The Trunk and the Tale"
University of Illinois Urbana-Champaign, 10/2/13 "Microbes, Invertebrates and Elephants – Connecting Chemical Signals and Conservation Behavior"
Purdue University, 11/16/11, "Understanding Elephant Behavior to Facilitate Conservation"
Univ. Cincinnati, Graduate Student Speaker Selection, 4/11/09, "A Behavior Conservation Approach for Studying Elephant Chemical Communication and Social Behavior."
Georgia Southern University, RIG Speaker, Dr. Steve Vives, 12/2/08, "Behavior and Conservation of Three Megaherbivores: Beavers, Elephants & Manatees"
Hendrix College 4/13/07 "Elephant Chemical Communication and Behavioral Development"
GSU Optimist Club 9/20/06 "Conservation and Behavior of Beavers, Elephants & Manatees."
Conservation Research Center, Smithsonian Institution, Front Royal, VA, July 2005. Behavioral Ecology and Conservation of Three Megaherbivores: Beavers, Elephants and Manatees.
Univ. Central Florida, Orlando, 11/04. Elephant Chemosensory Communication and Ecology.
Georgia Southern University Scholarship Award Presentation, November 2004. Soaking Up Smells: Behavioral Studies from Sponges to Elephants.
Sigma Xi, GSU Chapter, February 16, 2004, Elephant Communication and Conservation.
Roger Williams Park Zoo and Museum of Natural History, Providence, RI, 7/15/03, Chemical Ecology of Elephants and Conservation Implications.
Univ. Port Elizabeth, South Africa, 2/19/03, Elephant Communication: Chemosignals and Conservation.
College of Charleston, SC, 10/21/02. The Role of Chemical Communication in Elephant Reproductive Behavior.
College of William & Mary, VA, 10/6/00, Signal-Receiver Interplay: an Elephantine Illustration.
Jacksonville University, Jacksonville, FL, 10/7/99, The Influence of Estrus on Social Behavior in Captive African and Asian elephants.

## Professional Organizations

American Society of Mammalogists
Animal Behavior Society
Elephant Managers Association
International Society for Behavioral Ecology
International Society of Chemical Ecology