

CURRICULUM VITAE: Robert A. Desharnais

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Biographical Information

Born 29 March 1955 in Cambridge, Massachusetts
Marital Status – married, no children
Citizenship – United States

Education

Ph.D., Zoology, May 1982, University of Rhode Island, Kingston
M.S., Zoology, May 1979, University of Rhode Island, Kingston
B.A., Biology, June 1976, University of Massachusetts, Boston

Positions

Professor, 9/97 to present, Department of Biology and Microbiology, Cal State LA
Associate Professor, 9/92 to 8/97, Department of Biology and Microbiology, Cal State LA
Assistant Professor, 9/88 to 8/92 present, Department of Biological Sciences, Cal State LA
Assistant Professor, 9/87 to 8/88, Laboratory of Populations, Rockefeller University, NYC
Research Associate, 9/85 to 8/87, Laboratory of Populations, Rockefeller University, NYC
Postdoctoral Associate, 9/83 to 8/85, Laboratory of Populations, Rockefeller University, NYC
Killam Postdoctoral Fellow, 9/82 to 8/83, Biology Department, Dalhousie University, Nova Scotia

Teaching Experience

Lower Division: Human Physiology, Human Anatomy (labs), Principles of Biology III (majors),
Natural History of Animals (GE, labs)
Upper Division: Advanced Biometry, Biological Modeling, Biometrics, General Ecology, General
Genetics, Internet Resources in Biology, Population Genetics
Graduate Level: Biology Seminar, Topics in Animal Ecology, Seminar in Ecology

Research Interests

Nonlinear population dynamics including applications of chaos theory to ecology
Spatially-mediated dynamics in benthic communities
Natural selection and population dynamics
Application of mathematics and statistics to problems biology and chemistry

Professional Affiliations

American Association for the Advancement of Science
American Society of Naturalists
Association for Biology Laboratory Education
Beta Beta Beta Biological Honor Society

Ecological Society of America
 Genetics Society of America
 National Center for Science Education
 Phi Kappa Phi Honor Society
 Sigma Xi Honor Society
 Society for Mathematical Biology
 Southern California Academy of Sciences

Awards and Honors

Outstanding Professor Award, California State University, Los Angeles, Academic Year 1998-1999.
 Cal State LA “Million Dollar Club” for exceeding \$1M in external grant awards, October 1998
 Izaak Walton Killam Postdoctoral Fellowship, September 1982
 URI Graduate Research Fellowship, September 1980
 Rhode Island Chapter Sigma Xi award for best MS thesis in the biological sciences, November 1979
 Graduated Summa Cum Laude from University of Massachusetts, Boston, June 1976
 Environmental Internship, Audubon Society, Summer 1974
 Valedictorian, Notre Dame High School, June 1972

Publications

1. **Desharnais, R.A.**, and Costantino, R.F. 1980. Genetic analysis of a population of *Tribolium*. VII. Stability: Response to genetic and demographic perturbations. *Canadian Journal of Genetics and Cytology* **22**: 577–589.
2. Costantino, R. F., and **Desharnais, R.A.** 1981. Gamma distributions of adult numbers for *Tribolium* populations in the region of their steady states. *Journal of Animal Ecology* **50**: 667–681.
3. **Desharnais, R.A.**, and Costantino, R.F. 1982. Approach to equilibrium and the steady-state probability distribution of adult numbers in *Tribolium brevicornis*. *American Naturalist* **119**: 102–111.
4. **Desharnais, R.A.**, and Costantino, R.F. 1982. Natural selection and fitness entropy in a density-regulated population. *Genetics* **101**: 317–329.
5. **Desharnais, R.A.**, and Costantino, R.F. 1983. Natural selection and density-dependent population growth. *Genetics* **105**: 1029–1040.
6. **Desharnais, R.A.**, and Costantino, R.F. 1985. Genetic analysis of a population of *Tribolium*. VIII. The stationary stochastic dynamics of adult numbers. *Canadian Journal of Genetics and Cytology* **27**: 341–350.
7. **Desharnais, R.A.**, Foltz, D.W., and Zouros, E. 1985. Maintenance of genetic polymorphism under conditions of genotype-dependent growth and size-selective mortality. *Canadian Journal of Genetics and Cytology* **27**: 279–288.
8. **Desharnais, R.A.** 1986. The advantages of APL for population modeling. Pages 14–27 in “APL as a Tool of Thought” (D. McCormick and J. Freeman, eds.). Association for Computing Machinery Special Interest Group on APL, New York.
9. **Desharnais, R.A.** 1986. Natural selection, fitness entropy, and the dynamics of coevolution. *Theoretical Population Biology* **30**: 309–340.
10. **Desharnais, R.A.**, and Cohen, J.E. 1986. Life not lived due to disequilibrium in heterogeneous age-structured populations. *Theoretical Population Biology* **29**: 385–406.

11. **Desharnais, R.A.**, and Liu, L. 1987. Stable demographic limit cycles in laboratory populations of *Tribolium castaneum*. *Journal of Animal Ecology* **56**: 885–906.
12. McCabe, J.T., **Desharnais, R.A.**, and Pfaff, D.W. 1989. Graphical and statistical approaches to data analysis for in situ hybridization. Pages 822–848 in “Methods in Enzymology, Vol. 168, Hormone Action, Part K: Neuroendocrine Peptides.” (P. M. Conn, ed.). Academic Press, New York. [Reprinted as pages 107–133 in “Selected Methods in Enzymology, Neuroendocrine Peptides” (P. M. Conn, ed.). Academic Press, New York.]
13. Romanko, K.A., and **Desharnais, R.A.** 1990. Confessions of a technophile. *ComputerEdge* **8**: 56–58.
14. **Desharnais, R.A.** 1990. Review of “Population Harvesting: Demographic Models of Fish, Forest, and Animal Resources” by W.M. Getz and R.G. Haight. *Quarterly Review of Biology* **65**: 375.
15. McCabe, J.T., Kawata, M., Sano, Y., Pfaff, D.W., and **Desharnais, R.A.** 1990. Quantitative *in situ* hybridization to measure single-cell changes in vasopressin and oxytocin mRNA levels after osmotic stimulation. *Cellular and Molecular Neurobiology* **10**: 59–71.
16. **Desharnais, R.A.**, Dennis, B., and Costantino, R.F. 1990. Genetic analysis of a population of *Tribolium*. IX. Maximization of population size and the concept of a stochastic equilibrium. *Genome* **33**: 571–580.
17. Costantino, R.F., and **Desharnais, R.A.** 1991. “Population Dynamics and the *Tribolium* Model: Genetics and Demography.” Springer-Verlag, New York (258 pages).
18. **Desharnais, R.A.**, and Jefferson, M. 1994. “Lecture Notes for Principles of Biology III.” Burgess Publishing, Edina, Minnesota (146 pages).
19. Novak, G.A., and **Desharnais, R.A.** 1994. Integrating the electronic desktop into the science curriculum. *Selected Papers from the National Conference on Teaching and Learning* **5**: 121–127.
20. **Desharnais, R.A.** 1995. “Spreadsheet Exercises in Biometrics.” Burgess Publishing, Edina, Minnesota (50 pages).
21. Dennis, B., **Desharnais, R.A.**, Cushing, J.M., and Costantino, R.F. 1995. Nonlinear demographic dynamics: mathematical models, statistical methods, and biological experiments. *Ecological Monographs* **65**: 261–281.
22. Costantino, R.F., Cushing, J.M., Dennis, B., and **Desharnais, R.A.** 1995. Experimentally induced transitions in the dynamic behavior of insect populations. *Nature* **375**: 227–230.
23. Wilson, W.G., Nisbet, R.M., Ross, A.H., Robles, C., and **Desharnais, R.A.** 1996. Abrupt population changes along smooth environmental gradients. *Bulletin of Mathematical Biology* **58**: 907–922.
24. **Desharnais, R.A.** 1996. Strange attractors: chaos theory as a catalyst for the collaboration of science and art. *Collaborative Inquiry in a Postmodern Era: A Cat’s Cradle* **2**: 27–35.
25. Cushing, J.M., Dennis, B., **Desharnais, R.A.**, and Costantino, R.F. 1996. An interdisciplinary approach to understanding nonlinear ecological dynamics. *Ecological Modelling* **92**: 111–119.
26. **Desharnais, R.A.** 1997. Population dynamics of *Tribolium*. Pages 303–328 in “Structured Population Models in Marine, Terrestrial, and Freshwater Systems,” S. Tuljapurkar and H. Caswell (editors), Chapman & Hall, New York.
27. Costantino, R.F., **Desharnais, R.A.**, Cushing, J.M., and Dennis, B. 1997. Chaotic dynamics in an insect population. *Science* **275**: 389–391.
28. **Desharnais, R.A.**, Costantino, R.F., Cushing, J.M., and Dennis, B. 1997. Estimating chaos in an insect population. Reply to Perry et al. *Science* **276**: 1881–1882.

29. Dennis, B., **Desharnais, R.A.**, Cushing, J.M., and Costantino, R.F. 1997. Transitions in population dynamics: equilibria to periodic cycles to aperiodic cycles. *Journal of Animal Ecology* **66**: 704–729.
30. Clark, S.J., and **Desharnais, R.A.** 1998. Honest answers to embarrassing questions: detecting cheating in the randomized response model. *Psychological Methods* **3**: 160–168.
31. Costantino, R.F., Cushing, J.M., Dennis, B., **Desharnais, R.A.**, and Henson, S.M. 1998. Resonant population cycles in alternating habitats. *Bulletin of Mathematical Biology* **60**: 247–273.
32. Cushing, J.M., Dennis, B., **Desharnais, R.A.**, and Costantino, R.F. 1998. Moving toward an unstable equilibrium: saddle nodes in population systems. *Journal of Animal Ecology* **67**: 298–306.
33. Novak, G.A., and **Desharnais, R.A.** 1998. Virtual courseware for science education. *Selected Papers from the Ninth International Conference on College Teaching and Learning* **9**: 99–107.
34. Cushing, J.M., Costantino, R.F., Dennis, B., **Desharnais, R.A.**, and Henson, S.M. 1998. Nonlinear population dynamics: models, experiments, and data. *Journal of Theoretical Biology* **194**: 1–9.
35. **Desharnais, R.A.**, and Novak, G.A. 1998. Virtual courseware for science education. *Syllabus* **12**: 54–60.
36. Henson, S.M., Cushing, J.M., Costantino, R.F., Dennis, B., and **Desharnais, R.A.** 1998. Phase switching in population cycles. *Proceedings of the Royal Society* **265**: 2229–2234.
37. Henson, S. M., Costantino, R. F., Cushing, J. M., Dennis, B., and **Desharnais, R. A.** 1999. Multiple attractors and population dynamics in periodic habitats. *Bulletin of Mathematical Biology* **61**: 1121–1149.
38. **Desharnais, R.A.** 1999. Learning by doing with Biology Labs On-Line. *Strategies for Success* **31**: 4–5.
39. Palladino, M.A., **Desharnais, R.A.**, and Bell, J. 2001. “Student Lab Manual for Biology Labs On-Line.” Benjamin Cummings, San Francisco (165 pages).
40. Palladino, M.A., **Desharnais, R.A.**, and Bell, J. 2001. “Instructor’s Lab Manual for Biology Labs On-Line.” Benjamin Cummings, San Francisco (160 pages).
41. Cushing, J.M., Henson, S.M., **Desharnais, R.A.**, Dennis, B., Costantino, R.F., and King, A. 2001. A chaotic attractor in ecology: theory and experimental data. *Chaos, Solitons, and Fractals* **12**: 219–234.
42. Dennis, B., **Desharnais, R.A.**, Cushing, J.M., Henson, S.M. and Costantino, R.F. 2001. Estimating chaos and complex dynamics in an insect population. *Ecological Monographs* **71**: 277–303.
43. Robles, C.D., Alvarado, M.A., and **Desharnais, R.A.** 2001. The shifting balance of marine predation in regimes of hydrodynamic stress. *Oecologia* **128**: 142–152.
44. **Desharnais, R.A.**, Dennis, B., Cushing, J.M., Henson, S.M., and Costantino, R.F. 2001. Chaos and population control of insect outbreaks. *Ecology Letters* **4**: 229–235.
45. Henson, S.M., Costantino, R.F., Cushing, J.M., **Desharnais, R.A.**, and Dennis, B. 2001. Lattice effects observed in chaotic dynamics of experimental populations. *Science* **294**: 602–605.
46. Robles, C. and **Desharnais, R.** 2002. History and current development of a paradigm of predation in rocky intertidal communities. *Ecology* **83**: 1521–1536.
47. Henson, S.M., Costantino, R.F., **Desharnais, R.A.**, Cushing, J.M., and Dennis, B. 2002. Basins of attraction: population dynamics with two stable 4-cycles. *Oikos* **98**: 17–24.
48. Cushing, J.M., Costantino, R.F., Dennis, B., **Desharnais, R.A.**, and Henson, S.M. 2002. “Chaos in Ecology: Experimental Nonlinear Dynamics.” Academic Press, New York (225 pages).

49. King, A.A., **Desharnais, R.A.**, Henson, S.M., Costantino, R.F., Cushing, J.M., and Dennis, B. 2002. Random perturbations and lattice effects in chaotic population dynamics: Reply to Domokos and Scheuring. *Science* **297**: 2163a.
50. Dennis, B., **Desharnais, R.A.**, Cushing, J.M., Henson, S.H., and Costantino, R.F. 2003. Can Noise Induce Chaos? *Oikos* **102**: 329–340.
51. Edmunds, J., Cushing, J.M., Costantino, R.F., Henson, S.M., Dennis, B., and **Desharnais, R.A.** 2003. Park's *Tribolium* competition experiments: a non-equilibrium species coexistence hypothesis. *Journal of Animal Ecology* **72**: 703–712.
52. Henson, S.M., King, A.A., Costantino, R.F., Cushing, J.M., Dennis, B., and **Desharnais, R.A.** 2003. Explaining and predicting patterns in stochastic population systems. *Proceedings of the Royal Society of London B* **270**: 1549–1553.
53. Donalson, D.D., **Desharnais, R.A.**, Robles, C.D., and Nisbet, R. 2003. Spatial dynamics of a benthic community: Applying multiple models to a single system. Pages 429–444 in “Scaling Methods in Aquatic Ecology: Measurement, Analysis and Simulation,” L. Seuront and P. Strutton (editors), CRC Press, Boca Raton, Florida.
54. King, A.A., Costantino, R.F., Cushing, J.M., Henson, S.H., **Desharnais, R.A.**, and Dennis, B. 2004. Anatomy of a chaotic attractor: Subtle model-predicted patterns revealed in population data. *Proceedings of the National Academy of Sciences USA* **101**: 408–413.
55. Romanko, K.A., and **Desharnais, R.A.** 2005. The Quantum Casino. *Astropoetica* (in press).
56. **Desharnais, R.A.**, Edmunds, J., Costantino, R.F., and Henson, S.M. 2005. Species competition: uncertainty on a double invariant loop. *Journal of Difference Equations and Applications* (in press).
57. Costantino, R.F., **Desharnais, R.A.**, Cushing, J.M., Dennis, B., Henson, S.M., and King, A.A. 2005. Nonlinear stochastic population dynamics: The flour beetle *Tribolium* as an effective tool of discovery. Chapter 4 in “Population Dynamics and Laboratory Ecology,” R.A. Desharnais (editor), Academic Press, New York (in press).
58. **Desharnais, R.A.** (editor). 2005. “Population Dynamics and Laboratory Ecology.” Academic Press, New York (in press).
59. Brown, A., **Desharnais, R.A.**, Roy, B.C., Malik, S., and Gomez, F.A. 2005. Optimization of conditions for flow-through partial-filling affinity capillary electrophoresis to estimate binding constants of ligands to receptors. *Analytica Chimica Acta* (submitted).

Major Grant Support

Program: NSF Division of Mathematical Biology

Title: “Spectral analysis of population time series using nonlinear stochastic models”

PI's: Desharnais, R.A.

Award: \$400,00; 15 February 2005 to 14 February 2010

Program: NSF Division of Elementary, Secondary, and Informal Education

Title: “Virtual Courseware for Inquiry-Based Science Education”

PI's: Desharnais, R.A., and Mayo, D.

Award: \$1,419,272 (NSF & CSU cost share); 1 March 2004 to 28 February 2007

Program: NSF Centers for Research Excellence in Science and Technology

Title: “Experimental Field Tests of a Model of Intertidal Zonation”

PI's: Robles, C.D., and Desharnais, R.A.

Award: \$615,995; 1 September 2003 to 31 August 2008

- Program: NSF Division of Applied Mathematics
Title: "Stochastic Nonlinear Population Dynamics"
PI's: Desharnais, R.A.
Award: \$47,641; 1 September 2002 to 31 August 2004
- Program: NSF Division of Biological Oceanography
Title: "Modeling spatially-structured dynamics for benthic predation"
PI's: Desharnais, R.A., and Robles, C.D.
Award: \$557,428; 1 July 2001 to 30 June 2005
- Program: NSF Division of Undergraduate Education
Title: "Virtual Courseware for Environmental Science Education"
PI's: Desharnais, R.A., and Novak, G.A.
Award: \$500,000 (NSF & CSU match); 1 February 2000 to 31 January 2003
- Program: NSF Division of Applied Mathematics
Title: "Nonlinear Demographic Dynamics"
PI's: Desharnais, R.A.
Award: \$153,000; 1 September 1999 to 31 March 2003
- Program: NSF Centers for Research Excellence in Science and Technology
Title: "Spatially-Structured Dynamics of a Dominant Seashore Species"
PI's: Robles, C.D., Desharnais, R.A., and Qiu, H.L.
Award: \$1,273,298; 1 September 1998 to 31 August 2003
- Program: NSF Division of Undergraduate Education
Title: "Virtual Courseware for Science Education"
PI's: Desharnais, R.A., and Novak, G.A.
Award: \$525,000 (NSF & CSU match); 1 February 1998 to 31 January 2000
- Program: NSF Division of Applied Mathematics
Title: "Nonlinear Demographic Dynamics"
PI's: Desharnais, R.A.
Award: \$165,000; 1 September 1996 to 31 August 1999
- Program: NSF Division of Undergraduate Education
Title: "Integrating the Electronic Blackboard into the Natural Science Curriculum"
PI's: Desharnais, R.A., and Novak, G.A.
Award: \$200,000; 1 January 1995 to 30 June 1998
- Program: NSF Division of Applied Mathematics
Title: "Nonlinear Demographic Dynamics"
PI's: Desharnais, R.A.
Award: \$157,264; 1 September 1993 to 31 August 1996
- Program: NSF Division of Biological Oceanography
Title: "Size Dependent Feedback in Littoral Predation"
PI's: Robles, C.D., and Desharnais, R.A.
Award: \$259,913; 1 September 1992 to 31 August 1995

Program: NSF Division of Undergraduate Education

Title: "Integrating the Electronic Blackboard into the Natural Science Curriculum"

PI's: Desharnais, R.A., and Novak, G.A.

Award: \$250,000; 1 September 1992 to 31 August 1994

Program: NSF Division of Undergraduate Education

Title: "The Interactive Electronic Blackboard for Natural Science and Math Education"

PI's: Desharnais, R.A., and Novak, G.A.

Award: \$98,934; 1 April 1991 to 30 September 1993

Program: EPA Exploratory Research

Title: "The Effects of Genetic Selection on Population Dynamics"

PI's: Cohen, J.E, and Desharnais, R.A.

Award: \$143,301; 15 October 1985 to 14 October 1987