

# DALE R. LOCKWOOD

Biology Department  
Colorado State  
University

dale.lockwood@colostate.edu

## Education

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|-----|---|------|
| PhD | Population Biology, University of California, Davis           | 2002 |
| MS  | Population Biology, University of California, Davis           | 1999 |
| MS  | Applied Mathematics, University of Arizona                    | 1992 |
| BS  | Computer Science and Mathematics, New Mexico State University | 1987 |

## Professional Experience

|   |                  |
|---|------------------|
| Instructor, Department of Biology, Colorado State University  | 2008–<br>Present |
| Postdoctoral Fellow, Colorado State University, Program for Interdisciplinary Mathematics, Ecology and Statistics (PRIMES) joint with the USDA National Center for Genetic Resources Preservation | 2004–2008        |
| Post Graduate Researcher / Teaching Assistant / Reader, University of California, Davis   | 1997–2001        |
| Graduate Intern, National Center for Ecological Analysis and Synthesis  | 1999–2000        |
| Consultant, Satellite Science and Engineering   | 1996–1997        |
| Program Manager, Storm Integration Inc.   | 1993–1996        |
| Graduate Teaching Assistant, University of Arizona  | 1990–1992        |
| Programmer, International Business Machines   | 1987–1990        |

## Teaching Experience

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|------------------------|---|
| <i>At CSU</i>          | <ul style="list-style-type: none"><li>– Taught LIFE 320 – Ecology</li><li>– Taught ECOL 695 – Foundations in Ecology Recitation</li><li>– Taught BZ 346 – Population and Evolutionary Genetics</li><li>– Taught BZ 220 – Introduction to Evolution</li><li>– Taught LIFE 103 – Biology of Organisms</li><li>– Co-taught FEScUE Team Research Seminar</li><li>– Co-taught ECOL 505 – Foundations In Ecology</li><li>– Co-taught ECOL 680 – Team Research In Ecology</li><li>– Guest Lectured POCC 101 – American Government and Politics</li></ul> |
| <i>At UC Davis</i>     | <ul style="list-style-type: none"><li>– Taught WFB 122L – Population Estimation and Dynamics Lab</li><li>– Guest lectured WFB 122 – Population Estimation and Dynamics course</li></ul>   |
| <i>At Storm</i>        | <ul style="list-style-type: none"><li>– Developed class and materials and delivered training courses on introductory Unix, and large software packages</li></ul>  |
| <i>At U of Arizona</i> | <ul style="list-style-type: none"><li>– Taught MATH 119 – Finite Mathematics and MATH 115 – Trigonometry</li></ul>  |
| <i>At IBM</i>          | <ul style="list-style-type: none"><li>– Developed and presented course on orbital dynamics and orbit software</li></ul>   |

## Honors and Awards

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|------------------------|--|-----------|
| <i>At CSU</i>          | - Nominated for CSU Teacher of the Year  | 2010      |
|                        | - Lockwood, Richards and Volk (2007) named Outstanding Paper in Genetic Resources by the Crop Science Society of America   | 2008      |
| <i>At UC Davis</i>     | - Received Fellowship from NSF Research Training Grant for Nonlinear Dynamics in Biology   | 1997-2001 |
|                        | - Lockwood & Lockwood (1993) selected as one of the most important papers in the <i>Journal of Range Management</i>  | 2000      |
|                        | - Received California Sea Grant Traineeship (Project Title: Bioeconomic Management Model of a Metapopulation: The Red Sea Urchin)  | 1998-1999 |
| <i>At Storm</i>        | - Received two awards for outstanding program management   | 1995/1996 |
| <i>At U of Arizona</i> | - Received National Needs Fellowship   | 1990-1992 |
|                        | - Awarded scholarship to attend the Rocky Mountain Mathematics Consortium Summer Conference on "Recent Developments in Differential Equations and Applications to Modeling in Population Dynamics" | 1991      |
| <i>At IBM</i>          | - Received award from IBM and letter of appreciation from the U.S. Air Force for technical operations support of the first GPS block II satellite launch   | 1989      |

## Academic Service

|                        |  |           |
|------------------------|--|-----------|
| <i>At CSU</i>          | - Organized and led PRIMES field trip to Bodega Bay Marine Reserve and Muir Woods National Monument                  | 2008      |
|                        | - Organized and led PRIMES graduate student reading group and seminar series   | 2004-2005 |
|                        | - Internal reviewer for USDA prepared manuscripts  | 2005-2007 |
| <i>At UC Davis</i>     | - Member of Population Biology Graduate Group Admissions Committee   | 1999-2001 |
|                        | - Instructor for RTG in Nonlinear Dynamics in Biology undergraduate seminar, "How to make a scientific presentation" | 2001      |
|                        | - Panelist for RTG in Nonlinear Dynamics in Biology seminar, "Balancing children and your graduate education"        | 2001      |
|                        | - Poster Judge at the 2001 Society of Mathematical Biology Annual Meeting, Hilo, HI                                  | 2001      |
|                        | - Student Representative on RTG in Nonlinear Dynamics in Biology Steering Committee                                  | 1999-2000 |
|                        | - Member of RTG in Nonlinear Dynamics in Biology Undergraduate Admissions Committee                                  | 1998-1999 |
| <i>At U of Arizona</i> | - Member of Mathematics committee to improve graduate teaching assistant training                                    | 1991      |
| <i>At NMSU</i>         | - President of the NMSU Chapter of the Association of Computing Machinery  | 1986-1987 |
|                        | - President of the NMSU Chapter of Pi Mu Epsilon Mathematics Honor Society   | 1986-1987 |
|                        | - Member of NMSU team for ACM Regional Programming Contest   | 1986      |
|                        | - NMSU High School Programming Contest Official  | 1984      |

Reviewer for Hawaii Sea Grant proposals, *Theoretical Population Biology, Ecology and Society, Crop Science and Complexity*

## Outreach / Public Service

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|--|-------------|
| Vice-president of the board of directors of Front Range on Track   | 2011        |
| Coached middle school Science Olympiad team, elementary school Mathematics Olympiad  | 2008-11     |
| Board of directors for Team Vortex, a 503(c) nonprofit   | 2008-2010   |
| – President  | 2009-10     |
| Candidate for Fort Collins City Council, District 3  | 2009        |
| Collaborated with Discovery Science Center, Fort Collins on outreach projects involving marine conservation and satellite systems as well as the redesign of the Colorado exhibit area | 2008        |
| Interviewed about ecological issues in Larimer County for “Community at Work” program on KRFC.   | 2007 & 2008 |
| Participated in roundtable discussion hosted by the Institute of International Education with delegation from Russia to discuss local environmental policy and government action.      | 2007        |
| Appointed member of the Environmental Advisory Board for Larimer County, Colorado.   | 2003–09     |
| – Elected chair  | 2005-08     |
| Presented “How to Fly a Satellite” at the Explorit Science Center, Davis, California as part of the Meet the Scientist Program.  | 1997        |

## Affiliations

Ecological Society of America (Theoretical and Agroecology Sections)  
Society for Conservation Biology  
Sigma Xi

## Research Funding

|   |           |
|---|-----------|
| Bodega Marine Laboratory, University of California Graduate Student Travel Grant Program, Population Dynamics of <i>Tigriopus californicus</i> , \$500.   | 1998–2000 |
| Wyoming Agricultural Experiment Station Competitive Grants Program, Detection and Monitoring of Rangeland Grasshopper Infestations and Damage by Remote Sensing, Coop with J.A. Lockwood, W. Gribb, W. Reiners, R. Zhang, \$24,600. | 1995      |
| United States Department of Agriculture Grasshopper IPM Project, Predictive modeling of grasshopper population dynamics using Catastrophe Theory, Coop with J.A. Lockwood, \$48,580.  | 1990–1992 |

# Dale R. Lockwood

## PUBLICATIONS

### In Prep:

Lockwood, D. R. & C. M. Richards. Applying graph theoretical approaches to associative genetic mapping.

Lockwood, D. R. & J. A. Lockwood. Can Complexity inform Conservation?

Lockwood, D. R. When complexities collide.

### Peer Reviewed:

Lockwood, D. R., C. T. Webb & J. Moore. 2009. "I eat dead things" – the stability of donor controlled food webs. (submitted)

Richards, C. M., D. R. Lockwood, G. M. Volk, C. Walters. 2010. Modeling demographics and genetic diversity in ex situ collections during seed storage and regeneration. *Crop Science* 50:2440-2447.

Briske, D. D., R. A. Washington-Allen, C. R. Johnson, J. A. Lockwood, D. R. Lockwood, T. K. Stringham and H. H. Shugart. 2010. Catastrophic Thresholds: A Synthesis of Concepts, Perspectives, and Applications. *Ecology and Society* 15 (3): 37. [online] URL: <http://www.ecologyandsociety.org/vol15/iss3/art37/>

Richards, C. M., G. M. Volk, A. D. Henk, A. A. Reilley, D. R. Lockwood, P. A. Reeves & P. L. Forsline. 2009. Genetic diversity and population structure in *Malus sieversii*, a wild progenitor species of domesticated apple. *Tree Genetics and Genomes* 5(2):339-347.

Lockwood, D. R., and J. A. Lockwood. 2008. Grasshopper population ecology: catastrophe, criticality, and critique. *Ecology and Society* 13(1): 34. [online] URL: <http://www.ecologyandsociety.org/vol13/iss1/art34/>

Lockwood, D. R. 2008. When logic fails ecology. *Quarterly Review of Biology* 83(1): 57-64.

Lockwood, D. R., C. M. Richards & G. M. Volk. 2007. Sampling wild plant populations: Comparing two leading strategies. *Crop Science* 47:861-866.

Lockwood, D. R. 2007. Ecology is not rocket science. *Emergence: Complexity and Organization* 9(1-2): 2-11.

MacNeil, M. D., M. A. Cronin, H. D. Blackburn, C. M. Richards, D. R. Lockwood, J. Kantanen & L. J. Alexander. 2007. Genetic relationships between feral cattle from Chirikof Island, Alaska and other breeds. *Animal Genetics* 38(3): 193-197.

Lockwood, D. R., C. M. Richards & G. M. Volk. 2006. Sampling wild plant species: The roles of ecology and evolution. *Plant Breeding Reviews* 29: 285-314.

Wilén, J. E., M. D. Smith, D. R. Lockwood, L. W. Botsford. 2002. Avoiding Surprises: Incorporating fishermen behavior into management models, *Bulletin of Marine Science*, 70(2): 553-575.

Lockwood, D. R., A. Hastings & L. W. Botsford. 2002. The Effects of Dispersal Patterns on Marine Reserves: Does the Tail Wag the Dog? *Theoretical Population Biology*, 61: 297-309.

Lockwood, J. A., Narisu, S. P. Schell & D. R. Lockwood. 2001. Canola Oil as a Kairomonal Attractant of Rangeland Grasshoppers (Orthoptera: Acrididae): an Economical Liquid Bait for Insecticide Formulation, *International Journal of Pest Management* 47: 185-194.

Lundquist, C.J., L. W. Botsford, L. E. Morgan, J. M. Diehl, T. Lee, D. R. Lockwood & E. L. Pearson. 2000. Effects of El Nino and La Nina on local invertebrate settlement in northern California, *CalCOFI Rep.* Vol. 41:167-176.

Botsford, L. W., L. E. Morgan, D. R. Lockwood & J. E. Wilén. 1999. Marine Reserves and Management of the Northern California Red Sea Urchin Fishery, *CalCOFI Rep.* Vol. 40: 87-93.

Lockwood, D. R., J. A. Lockwood, 1997. Evidence of Self Organized Criticality in Insect Populations, *Complexity*, Vol. 2(4):49-58.

Lockwood, J.A. and D.R. Lockwood, 1993. A unified paradigm of rangeland ecosystem dynamics through

the application of catastrophe theory, *Journal of Range Management*, 46:282-288.

Lockwood, J.A. and D.R. Lockwood, 1991. Rangeland Grasshopper (Orthoptera: Acrididae) Population Dynamics: Insights from Catastrophe Theory, *Environmental Entomology*, 20:970-980.

Lockwood, D.R. and J.A. Lockwood. 1989. Application of Catastrophe Theory to Population Dynamics of Rangeland Grasshoppers. In *Estimation and Analysis of Insect Populations*, pp 268-277. L.L. McDonald, B.F. Manly, J.A. Lockwood (eds.), Springer Verlag, New York.

#### **Technical:**

Lockwood, J. A. and D. R. Lockwood. 1996. Death, taxes, and grasshopper outbreaks: what self-organized criticality tells us about population dynamics. Proceedings of the Orthopterists' Conference at the National Meeting of the Entomological Society of America, Louisville, Kentucky. *Metaleptea* (abstract) 17:9.

Lockwood, J. A., and D. R. Lockwood. 1996. Catastrophe theory model. *CAMASE Register of Agro-ecosystem Models*, 2:56-57.

Lockwood, D. R., T.C. Probert 1995. Spacecraft Data Access Usability Engineering: A Paradigm Shift, *Proceedings of the International Symposium "Reducing the Cost of Spacecraft Ground Systems and Operations"* Oxfordshire, United Kingdom.

Lockwood, D. R., 1995. In-the-Field-Observer Payload Command and Data Fusion Operations Concept, *Proceedings of the NSIA Satellite Command and Control Conference*. Santa Clara, California.

Probert, T.C., D. R. Lockwood, P. Geroulo & K. Flint, 1994. MSTI Commander in the field Operational Concept, *Proceedings of the 8th Annual AIAA/USU Conference on Small Satellites*. Logan, Utah.

Lockwood, J.A. and D.R. Lockwood, 1992. Understanding and forecasting rangeland grasshopper population dynamics with Catastrophe Theory. United Nations, Food and Agriculture Organization, *Desert Locust Register*, No. 4, p. 119.

Lockwood, D.R. and J.A. Lockwood, 1991. Boldly folding where no model has gone before: application of catastrophe theory to grasshopper population dynamics. Proceedings of the Orthopterists' Society Conference at the National Meeting of the Entomological Society of America, New Orleans, Louisiana, *Metaleptea* (abstract) 13:14.

Lockwood, J.A. and D.R. Lockwood, 1991. Predictive modeling of grasshopper population dynamics using catastrophe theory. Annual report to the USDA-APHIS Grasshopper Integrated Pest Management Project, pp. 49-52.

Lockwood, J.A. and D.R. Lockwood, 1991. Forecasting rangeland grasshopper population dynamics using catastrophe theory. United Nations, Food and Agriculture Organization, *Desert Locust Register*, No. 3, p. 117.

Lockwood, J.A. and D.R. Lockwood, 1990. Catastrophe theory forecast models for rangeland grasshopper population dynamics. USDA-APHIS Grasshopper Integrated Pest Management Project Annual (Final) Report.

Lockwood, J.A. and D.R. Lockwood, 1990. Catastrophe theory models of rangeland grasshopper population dynamics. Proceedings of the Pacific Branch Meeting of the Entomological Society of America, Spokane, Washington (abstract).

Lockwood, D.R. and J.A. Lockwood, 1990. Ecological parameters of grasshopper population dynamics as derived from catastrophe theory. Proceedings of the Orthopterists' Society Conference at the National Meeting of the Entomological Society of America, San Antonio, Texas (abstract).

Lockwood, J.A. and D.R. Lockwood, 1990. Catastrophe theory forecast models for rangeland grasshopper population dynamics. United States Department of Agriculture, Grasshopper Integrated Pest Management Project Annual Report pp. 32-36.

Lockwood, J.A. and D.R. Lockwood, 1989. Catastrophe theory forecast models for rangeland grasshopper population dynamics. United States Department of Agriculture, Grasshopper Integrated Pest Management Project Annual Report pp. 39-44.

#### **Government Reports:**

Lockwood, D.R., D. Gilkey and M. Erickson. 2008. Report on In Situ and Open Pit Uranium Mining prepared for the Larimer Board of County Commissioners.

Lockwood D.R. 2004. Chronic Wasting Disease Issue Report. Larimer County Environmental Advisory Board. <http://www.co.larimer.co.us/boards/eab/Issues/CWD.htm>

Lockwood D.R. 2004. West Nile Virus Issue Report. Larimer County Environmental Advisory Board. <http://www.co.larimer.co.us/boards/eab/Issues/WNV.htm>

**Miscellaneous:**

Lockwood, D.R. 1996. Storm Integration Corporation Corporate Graphical User Interface Standards. Storm Integration Inc., San Jose, California. 20 pp.

Lockwood, D.R. 1996. Storm Integration Corporation Corporate Usability Guidelines. Storm Integration Inc., San Jose, California. 19 pp.

Lockwood, D.R. 1996. Earlybird-1 Payload Operating Software Administration Manual (SISJ-EW-MAN002). Storm Integration Inc., San Jose, California. 52 pp.

Lockwood, D.R. and S.R. Lockwood. 1996. Earlybird-1 Payload Operating Software User's Manual (SISJ-EW-MAN001). Storm Integration Inc., San Jose, California. 57 pp.

Lockwood, D.R. and S.R. Lockwood. 1996. Command Builder User Manual (MAN3-ST-12CB0001). Storm Integration Inc., San Jose, California. 63 pp.

Lockwood, D.R. and S.R. Lockwood. 1994. Command Generation Tool User Manual (MAN2-ST-12CGT0003). Storm Integration Inc., San Jose, California. 58 pp.

# Dale R. Lockwood

## PRESENTATIONS

- Lockwood, D. R. 2009. The role of ecology in local governments: The Environmental Advisory Board of Larimer County, Colorado as a case study. ESA Annual Meeting. Albuquerque, New Mexico.
- Lockwood, D. R. 2008. Determination of population structure based on genetic data. Natural Resources Ecology Laboratory, Fort Collins, Colorado (invited).
- Lockwood, D. R. 2008. The genetics of seedbanks. Biology Department Symposium, University of Colorado Denver Health Sciences, Denver Colorado.
- Lockwood, D. R. 2007. Density dependent dispersal: A direct explanation for the complexities of insect outbreaks. ESA Annual Meeting. San Jose, California.
- Lockwood, D. R. 2007. Looking for genes, finding populations and staving off death – the mathematics of genobanking. Mathematics department symposium, Colorado College, Colorado Springs, Colorado (invited).
- Lockwood, D. R. 2007. Ecological Rocket Science: Why the proposed laws of ecology are extremely impractical. Does Philosophy Matter to Science? – Stony Brook University Symposium. New York, New York.
- Volk, G. M., C. M. Richards, A. D. Henk, A. A. Reilley, D. R. Lockwood & P. L. Forsline. 2007. Genetic diversity assessment of wild *Malus sieversii* populations in Kazakhstan. Plant and Animal Genome Conference. San Diego, California (poster).
- Lockwood, D. R. & J. A. Lockwood. 2006. Grasshopper population ecology: Catastrophe, criticality, and critique. ESA Symposium, The Detection of Catastrophic Thresholds: Perspectives, Definitions, and Methods. ESA Annual Meeting. Memphis, Tennessee (invited).
- Lockwood, D. R. & C. W. Richards. 2006. Sampling strategies for wild populations. Preservation of Insect Genetic Resources Workshop, Fort Collins, Colorado (invited).
- Lockwood, D. R. 2005. Sampling genetic diversity for restoration, conservation and agriculture: How many seeds? Plant Sciences Supergroup, Colorado State University, Fort Collins, Colorado (invited).
- Lockwood, D. R. 2004. The role of larval dispersal with respect to the design of marine reserves. United States Department of Agriculture, National Center for Genetic Resources Preservation, Fort Collins, Colorado.
- Lockwood, D. R. 2002. Dispersal, Heterogeneous Habitat and the Design of Marine Reserves. Population Biology Seminar Series, University of California, Davis, California.
- Lockwood, D. R., L. W. Botsford & A. M. Hastings. 2001. Larval Dispersal and Marine Reserves. International Conference on Mathematical and Theoretical Biology and the Annual Meeting of the Society for Mathematical Biology. Hilo, Hawaii.
- Botsford, L. W., A. Hastings, D. Lockwood & F. Micheli. 2001. Uncertainty in dispersal patterns: a challenge for marine reserves. Second Symposium on Marine Conservation Biology. San Francisco, CA.
- Lockwood, D. R. & E. Marland. 2000. Constraints in the Use of Free Amino Acids (FAA) in the Osmoregulation of *Tigriopus californicus*. 83<sup>rd</sup> meeting of the Mathematical Association of America. Washington DC.
- Morgan, L. E., L. W. Botsford, J. E. Wilen & D. R. Lockwood. 1999. Management of the Northern California Red Sea Urchin Fishery Using Marine Reserves. 17th Lowell Wakefield Fisheries Symposium. Anchorage, Alaska.
- Lockwood, D. R., D. Brown, B. Crane, H. Miller, M. Nelsenador & J. Tamaresis. 1999. Copepods in the mist - a multidisciplinary look at *Tigriopus californicus*. Nonlinear Dynamics in Biology and Chemistry: A symposium to honor Joel E. Keizer and his three decades in science. Davis, California.
- Lockwood, J. A. and D. R. Lockwood. 1996. Death, taxes, and grasshopper outbreaks: what self-organized

- criticality tells us about population dynamics. Orthopterists' Society Conference at the National Meeting of the Entomological Society of America. Louisville, Kentucky.
- Flint, K. and D. R. Lockwood. 1995. The Phillips Laboratory's Mobile Ground Tracking Station (MGTS). International Telemetry Conference. Las Vegas, Nevada.
- Lockwood, D. R. and T.C. Probert. 1995. Spacecraft Data Access Usability Engineering: A Paradigm Shift. 1st International Symposium on Reducing the Cost of Spacecraft Ground Systems and Operations. Chilton, Oxfordshire, UK.
- Lockwood, D. R. 1995. The In-The-Field-Observer and Data Fusion Demonstration. 1995 NSIA Conference on Satellite Command and Control. Santa Clara, California.
- Probert, T.C., and D.R. Lockwood. 1994. MSTI in the Field Observer Concept. 8th Annual AIAA/USU Conference on Small Satellites. Logan, Utah.
- Lockwood, D. R. 1992. Bifurcations, Catastrophes and Grasshoppers: attempts at understanding and prediction. Brown Bag Graduate Seminar, University of Arizona. Tucson, Arizona (invited).
- Lockwood, J.A. and D. R. Lockwood. 1991. Application of catastrophe theory to forecasting of rangeland grasshopper outbreaks. Grasshopper Integrated Pest Management Meeting. Salt Lake City, Utah.
- Lockwood, J.A. and D. R. Lockwood. 1990. Catastrophe theory models of rangeland grasshopper population dynamics. Rangeland Grasshopper Symposium, Pacific Branch Meeting of the Entomological Society of America. Spokane, Washington (invited).
- Lockwood, J. A. and D. R. Lockwood. 1990. Application of catastrophe theory to forecasting of rangeland grasshopper outbreaks. Grasshopper Integrated Pest Management Meeting. Phoenix, Arizona.
- Lockwood, D. R. and J. A. Lockwood. 1990. Boldly folding where no model has gone before: application of catastrophe theory to grasshopper population dynamics. Orthopterists' Society Conference at the National Meeting of the Entomological Society of America. New Orleans, Louisiana.
- Lockwood, D. R. and J. A. Lockwood. 1989. Ecological parameters of grasshopper population dynamics as derived from catastrophe theory. Grasshopper Workers' Conference at the Entomological Society of America National Meeting. San Antonio, Texas.
- Lockwood, J. A. and D. R. Lockwood. 1989. Mad dogs, falling bridges and locust plagues: understanding our environment using catastrophe theory. Sigma Xi, Laramie, Wyoming (invited).
- Lockwood J. A. and D. R. Lockwood. 1989. Forecasting grasshopper population dynamics using catastrophe theory. United States Department of Agriculture, National Grasshopper Meeting, Albuquerque, New Mexico (invited).
- Lockwood, J. A. and D. R. Lockwood. 1988. Application of catastrophe theory to population dynamics of rangeland grasshoppers. Symposium on Estimation and Analysis of Insect Populations, Laramie Wyoming.