

CURRICULUM VITAE

Dr. David E. Cowley

Current Appointment

Professor

Department of Fish, Wildlife, and Conservation Ecology
& Molecular Biology Program
& Water Science and Management Program

New Mexico State University

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Research Interests

Evolutionary and ecological studies of aquatic organisms in rivers and ephemeral desert ponds using field and laboratory experimentation, molecular genetic tools and bioinformatics

Teaching Interests

Quantitative topics in aquatic ecology and evolutionary genetics

Education

Ph.D. 1987, University of Wisconsin-Madison; dissertation: Developmental quantitative genetics of *Drosophila melanogaster*; advisor: William R. Atchley

M.S. 1979, Eastern New Mexico University-Portales, 1979; thesis: Temporal and spatial distributions of fishes in the Black River, Eddy County, New Mexico; advisor: James E. Sublette

B.S. 1977, Wildlife Management, minor in Agriculture, Eastern New Mexico University

Professional Experience

Professor (since 2014), Associate Professor (2007-2014), Assistant Professor (2001-2007), New Mexico State University, Department of Fish, Wildlife & Conservation Ecology, faculty member in Program in Molecular Biology & Program in Water Science & Management

Guest Professor (2010-2011), Technical University of Munich (Weihenstephan)

Owner/Consultant, EnviroStat, Albuquerque, NM (1992-2001) [statistical consulting in genetics and fisheries]

Research Assistant to Postdoctoral Research Associate to Researcher in Genetics, North Carolina State University, Department of Genetics (1986-1992)

Research Assistant, University of Wisconsin-Madison, Departments of Animal Science & Entomology (1979-1980, 1984-1986)

Research Assistant, Eastern New Mexico University, Department of Biology (1977-1979)

Honors & Awards

Brandt Lecturer, 2012, Department of Biology, North Carolina State University

Guest Professor, 2010-2011, Technische Universität München

Texas Environmental Excellence Award, 2008, Rio Grande Basin Initiative (contributing investigator)

Outstanding Integrated Program Water Resources Team Award, 2007, Rio Grande Basin Initiative, USDA-CSREES (contributing investigator)

Distinguished Research Award, 2006, College of Agriculture and Home Economics, New Mexico State University

Mobley Award for Excellence in Research, 2006, College of Agriculture and Home Economics, New Mexico State University
Team Award, 2005, Rio Grande Basin Initiative, College of Agriculture and Home Economics, New Mexico State University (contributing investigator)
Outstanding Contractor, 2001, New Mexico Department of Game and Fish
Young Investigator Prize, 1988, American Society of Naturalists
Outstanding Paper in Biology, 1979, Eastern New Mexico University

Professional Society Memberships

American Association for the Advancement of Science
American Institute of Biological Sciences
American Institute of Fishery Research Biologists
Ecological Society of America
Society for Freshwater Science
International Biogeography Society
Society for the Study of Evolution

Professional Development

Gordon Research Conference on "Quantitative Genetics and Genomics", 1989, 1991, 2003, 2005, 2007, 2009, 2011
Fund-raising development workshop, NMSU College of Agriculture and Home Economics, 2004
Bauer Grant-Writing Seminar, Corbett Center, New Mexico State University, 2002
Leadership Workshop, American Fisheries Society, Phoenix, AZ, 2001

RESEARCH

Papers in Progress

in review:

Lois, S & DE Cowley. Conservation of interacting species in network constrained environments. Diversity & Distributions, major revision in review 19 Feb. 2017.

in revision:

in preparation:

Hatch, MD, MD Porter & DE Cowley. Species persistence or extinction in a human-altered world can be determined by small differences in life history. For Ecology
Hatch, MD, MD Porter & DE Cowley. A simulation model for predicting population fate of a target species under alternate water management strategies.

Journal Papers, Refereed

Horn, RL, N Devitt, T. Ramaraj, FD Shilkey & DE Cowley. 2017. *De novo* assembly of a tadpole shrimp (*Triops newberryi*) transcriptome and preliminary differential gene expression analysis. Molecular Ecology Resources 17:161-171.
Horn, RL & DE Cowley. 2016. Self-fertilization and the role of males in populations of tadpole shrimp (Branchiopoda: Notostraca: *Triops*). Journal of Heredity 107:518-526.
Lois, S, DE Cowley, A Outeiro, E San Miguel, R Amaro & P Ondina. 2015. Spatial extent of biotic interactions affects distribution and abundance in river networks: the freshwater pearl mussel and its hosts. Journal of Biogeography 42:229-240.
Horn, RL & DE Cowley. 2014. Evolutionary relationships within the *Triops* (Branchiopoda: Notostraca) using complete mitochondrial genomes. Journal of Crustacean Biology 34:795-800.

- Horn, RL, R. Kuehn, V. Drechsel, & DE Cowley. 2014. Discriminating between the effects of founding events and reproductive mode on the genetic structure of *Triops* populations (Branchiopoda: Notostraca). PLOS One 9(5):e97473.
- Mayagoitia-González, PE, A Fierro-Cabo, R Valdez, M Andersen, DE Cowley & R Steiner. 2013. Uso de hábitat y perspectivas de *Lontra longicaudis* en un área protegida de Tamaulipas, México. THERYA 4(2):243-256
- Sternecker, K, DE Cowley, & J Geist. 2013. Factors influencing the success of salmonid egg development in river substratum. Ecology of Freshwater Fish 22:322-333.
- Stoeckle, BC, DE Cowley, Y Schaack, KS Macdonald III, R Sallenave, & R Kuehn. 2013. Microsatellites for North American species of *Triops* (Branchiopoda: Notostraca). Journal of Crustacean Biology 33:48-55.
- Stock, M, B Kirchner, D Waibler, DE Cowley, M Reiter, GW Gross, MW Pfaffl, & R Kuehn. 2012. Effect of magnetic stimulation on the gene expression profile of in vitro cultured neural cells. Neuroscience Letters 526:122-127.
- Macdonald III, KS, R Sallenave, & DE Cowley. 2011. Morphologic and genetic variation in *Triops* (Branchiopoda: Notostraca) from ephemeral waters of the northern Chihuahuan Desert of North America. Journal of Crustacean Biology 31:468-484.
- Cowley, DE, JC Alleman, R Sallenave, RR McShane, & PD Shirey. 2009. Effects of salinity on specific gravity and viability of eggs of a North American minnow (Cyprinidae). Scientia Marina 73(S1):47-58.
- Pritchard, VL, JL Metcalf, K Jones, AP Martin, & DE Cowley. 2009. Population structure and genetic management of Rio Grande cutthroat trout (*Oncorhynchus clarkii virginialis*). Conservation Genetics 10:1209-1221.
- Cowley, DE. 2008. Estimating required habitat size for fish conservation in streams. Aquatic Conservation: Marine and Freshwater Ecosystems 18:418-431.
- Shirey, PD, DE Cowley & R Sallenave. 2008. Diatoms from gut contents of museum specimens of an endangered minnow suggest long-term ecological changes in the Rio Grande (USA). Journal of Paleolimnology 40:263-272.
- Cowley, DE, RC Wissmar, & R Sallenave. 2007. Fish assemblages and seasonal movements of fish in irrigation canals and river reaches of the middle Rio Grande, New Mexico (U.S.A.). Ecology of Freshwater Fish 16:548-558.
- Metcalf, JL, VL Pritchard, SM Silvestri, JB Jenkins, JS Wood, DE Cowley, DK Shiozawa, & AP Martin. 2007. Across the great divide: genetic forensics reveals misidentification of endangered cutthroat trout populations. Molecular Ecology 16:4445-4454.
- Pritchard, VL, K Jones, & DE Cowley. 2007. Estimation of introgression in cutthroat trout populations using microsatellites. Conservation Genetics 8:1311-1329.
- Pritchard, VL, K Jones, & DE Cowley. 2007. Genetic diversity within fragmented cutthroat trout populations. Transactions of the American Fisheries Society 136:606-623.
- Pritchard, VL, K Jones, JL Metcalf, AP Martin, Y Paroz, K Patten, P Wilkinson, & DE Cowley. 2007. Characterization of tetranucleotide microsatellites for Rio Grande cutthroat trout and rainbow trout, and their cross-amplification in other cutthroat trout subspecies. Molecular Ecology Notes 7:594-596.
- Shemai, B, R Sallenave, & DE Cowley. 2007. Competition between hatchery-raised Rio Grande cutthroat trout and wild brown trout. North American Journal of Fisheries Management 27:315-325.
- Cowley, DE. 2006. Strategies for ecological restoration of the Middle Rio Grande in New Mexico and recovery of the endangered Rio Grande silvery minnow. Reviews in Fisheries Science 14:169-186.

- Cowley, DE & R Sallenave. 2006. Preface: Conservation and management of aquatic resources in arid lands. *Reviews in Fisheries Science* 14:25-27.
- Cowley, DE, PD Shirey, & MD Hatch. 2006. Ecology of the Rio Grande silvery minnow (Cyprinidae: *Hybognathus amarus*) inferred from specimens collected in 1874. *Reviews in Fisheries Science* 14:111-125.
- Sallenave, R & DE Cowley. 2006. Science and effective policy for managing aquatic resources. *Reviews in Fisheries Science* 14:203-210.
- Sallenave, R, J Alleman, J Padilla, & DE Cowley. 2005. First record of *Daphnia lumholtzi* (Sars) in the Rio Grande Basin, New Mexico. *Journal of Freshwater Ecology* 20(4):775-776.
- Sallenave, R & DE Cowley. 2004. Aquatic resources in arid lands: issues and opportunities. *Aquatic Sciences* 66(4):343-345.
- Cowley, DE, FW Ward, R Deitner, & MD Hatch. 2003. Optimizing the allocation of hatchery-produced fish among multiple stocking sites. *North American Journal of Fisheries Management* 23:216-229.
- Atchley, WR, S Xu & DE Cowley. 1997. Restricted index selection for altering developmental trajectories in mice. *Genetics* 146:629-640.
- Vogl, C, WR Atchley, DE Cowley, P Crenshaw, JD Murray, & D Pomp. 1993. The epigenetic influence of growth hormone on skeletal development. *Growth, Development, and Aging* 57:163-182.
- Cowley, DE & WR Atchley. 1992. Quantitative genetic models for development, epigenetic selection, and phenotypic evolution. *Evolution* 46:495-518.
- Cowley, DE & WR Atchley. 1992. Comparison of quantitative genetic parameters. *Evolution* 46:1965-1967.
- Atchley, WR, DE Cowley, C Vogl & T McLellan. 1992. Evolutionary divergence, shape change and genetic correlation structure in the rodent mandible. *Systematic Biology* 41:196-221.
- Atchley, WR, T Logsdon, DE Cowley, & EJ Eisen. 1991. Uterine effects, epigenetics, and postnatal skeletal development in the mouse. *Evolution* 45:891-909.
- Cowley, DE. 1991. Genetic prenatal maternal effects on organ size in mice and their potential contribution to evolution. *Journal of Evolutionary Biology* 4:363-381.
- Atchley, WR, DE Cowley, EJ Eisen, H Prasetyo, & D Hawkins-Brown. 1990. Correlated response in the developmental choreographies of the mouse mandible to selection for body composition. *Evolution* 44:669-688.
- Cowley, DE & WR Atchley. 1990. Development and quantitative genetics of correlation structure among body parts of *Drosophila melanogaster*. *American Naturalist* 135:242-268.
- Cowley, DE, D Pomp, WR Atchley, EJ Eisen, & D Hawkins-Brown. 1989. The impact of maternal uterine genotype on postnatal growth and adult body size in mice. *Genetics* 122:193-203.
- Pomp, D, DE Cowley, EJ Eisen, & WR Atchley. 1989. Donor and recipient genotype and heterosis effects on survival and prenatal growth of transferred mouse embryos. *Journal of Reproduction and Fertility* 86:493-500.
- Atchley, WR, S Newman, & DE Cowley. 1988. Genetic divergence of mandible form in relation to molecular divergence in inbred mouse strains. *Genetics* 120:239-253.
- Cowley, DE & WR Atchley. 1988. Quantitative genetics of *Drosophila melanogaster*. II. Heritabilities and genetic correlations between sexes for head and thorax traits. *Genetics* 119:421-433.
- Cowley, DE & JE Sublette. 1987. Distribution of fishes in the Black River, Eddy County, New Mexico. *Southwestern Naturalist* 32:213-221.
- Cowley, DE & JE Sublette. 1987. Food habits of *Moxostoma congestum* and *Cycleptus elongatus* (Catostomidae: Cypriniformes) in Black River, Eddy County, New Mexico. *Southwestern Naturalist* 32:411-413.

- Cowley, DE, WR Atchley, & JJ Rutledge. 1986. Quantitative genetics of *Drosophila melanogaster*. I. Sexual dimorphism in genetic parameters for wing traits. *Genetics* 114:549-566.
- Atchley, WR, JJ Rutledge, & DE Cowley. 1982. A multivariate statistical analysis of direct and correlated response to selection in the rat. *Evolution* 36:677-698.
- Atchley, WR, JJ Rutledge, & DE Cowley. 1982. Direct and correlated response to selection in osteometric traits in the rat. *Bioscience* 32:684.
- Atchley, WR, JJ Rutledge, & DE Cowley. 1981. Genetic components of size and shape. II. Multivariate covariance patterns in the rat and mouse skulls. *Evolution* 35:1037-1055.
- Atchley, WR, JJ Rutledge & DE Cowley. 1979. Multivariate statistical analysis of directional selection. *American Zoologist* 19:963.

Other Peer-Reviewed Publications

- Dormody, TJ, KH Mandabach, DE Cowley, R Acharya, R Goss, & D VanLeeuwen. 2016. A college-wide project to improve student writing. *NACTA Journal*, Supplement 1, 13 pp.
- Cowley, DE. 2011. Irrigation management strategies to foster conservation of endangered native species. pp. 107-119, In: Skaggs R and SS Anderson (eds.), *Emerging Challenges and Opportunities for Irrigation Management*, U.S. Committee on Irrigation and Drainage, Denver, CO.
- Sallenave, R, CP Carrasco, & DE Cowley. 2010. Fishes in the middle and lower Rio Grande irrigation systems of New Mexico. New Mexico Agricultural Extension Service, Circular 653.
- Wesche, TA, LB Wesche, S. Broderick, DE Cowley, & B Wyman. 2010. Development of Rio Grande silvery minnow refugia at drain outfalls in the Isleta Reach of the middle Rio Grande, New Mexico. Project Completion Report No. 05-FG-40-2436, Middle Rio Grande ESA Collaborative Program, US Bureau of Reclamation, Albuquerque.
- Cowley, DE, J. Alleman, and R. Sallenave. 2008. Studies on Eggs of *Notropis simus pecosensis* (Pecos Bluntnose Shiner) and Other Minnows of Concern to Water Managers in New Mexico. Final Report, US Bureau of Reclamation Contract No. 04-CS-40-8082.
- Pritchard, VL & DE Cowley. 2006. Rio Grande cutthroat trout (*Oncorhynchus clarkii virginalis*): A technical conservation assessment. USDA Forest Service, Rocky Mountain Region, Species Conservation Project, (<http://www.fs.fed.us/r2/projects/scp/assessments/riograndecutthroatrout.pdf>), 75 pp, invited, peer reviews managed by the American Fisheries Society.
- Boren, J, TT Baker, D Cowley, G Mason, S Eaton, & B Hurd. 2005. Terrestrial vegetation inventory of water delivery systems between San Acacia Diversion and the Bosque del Apache National Wildlife Refuge. New Mexico Water Resources Research Institute, WRI Technical Completion Report No. 333, 6 pp, <http://wri.nmsu.edu/publish/techrpt/tr333/tr333.pdf>.
- Cowley, DE, J Alleman, R McShane, PD Shirey, & R Sallenave. 2005. Effects of salinity and suspended sediment on physical properties of the egg of the Rio Grande silvery minnow (*Hybognathus amarus*). New Mexico Water Resources Research Institute, WRI Technical Completion Report No. 334, 13 pp, <http://wri.nmsu.edu/publish/techrpt/tr334/tr334.pdf>.
- Cowley, DE. 2003. Water requirements for endangered species - Rio Grande silvery minnow (*Hybognathus amarus*). 47th Annual New Mexico Water Conference, "There's No Doubt We're in a Drought", WRI Report No. 326: 97-107, <http://wri.nmsu.edu/publish/watcon/proc47/cowley.pdf>.
- Cowley, DE, P Shirey, & C Hohman. 2003. Agriculture Irrigation Systems and Conservation of Native Fishes: Issues in the Rio Grande Valley of New Mexico. NMSU Water Task Force Report 1:49-55, <http://cahe.nmsu.edu:16080/pubs/taskforce/water/WTFRpt1.pdf>.
- Boren, J, TT Baker, DE Cowley & BJ Hurd. 2002. Pond culture of trout in New Mexico. NMSU Cooperative Extension Service, Guide L-108 (http://www.cahe.nmsu.edu/pubs/_/L-108.pdf).

- Utah Division of Wildlife Resources. 2000. Cutthroat Trout Management: A Position Paper. 12 pp. (manuscript contributor with members of state game and fish agencies from Idaho, Montana, Nevada, Utah, Colorado, and New Mexico), <http://www.wildlife.utah.gov/pdf/cuttpos.pdf>
- Cowley, DE. 1991. Prenatal effects on mammalian growth: Embryo transfer results. Pp. 762-779, in: EC Dudley, (ed.). The Unity of Evolutionary Biology: Maternal Effects in Evolutionary Biology Symposium, 4th International Congress of Systematic and Evolutionary Biology. Dioscorides Press, Portland, OR.
- Cowley, DE. 1990. GB-STAT. Quarterly Review of Biology 65:267-268 (Software Review).
- Cowley, DE. 1988. Population genetics and fishery management. Genetical Research 51:251-252 (Book Review).

Symposia Presentations

- Cowley, DE. 2011. Irrigation management strategies to foster conservation of endangered native species. Emerging Challenges and Opportunities for Irrigation Management, U.S. Committee on Irrigation and Drainage, Denver, CO.
- Cowley, DE. 2007. Irrigation drainage canals and biodiversity of fishes in the middle Rio Grande of New Mexico. Symposium on River Terrace and Floodplain Hydrology: Connecting surface water and groundwater along the Rio Grande and other large rivers, Las Cruces, NM, March 2007 (oral, invited).
- Cowley, DE, RC Wissmar, & R Sallenave. 2006. Responses of native and nonnative fish assemblages to water management in an arid river ecosystem. Symposium on Ecology of Stream Fish: State of the Art and Future Prospects – II, Leon, Spain, June 2006 (oral, invited).
- Cowley, DE. 2004. Defining viable habitat size for conservation in streams. Fourth World Fisheries Congress, Vancouver, British Columbia (oral, invited).
- Cowley, DE. 2003. Aquatic resources in arid lands: issues and opportunities. Aquatic Resources in Arid Lands Conference, Las Cruces, NM (Oral, introduction to conference, conference organizer).
- Cowley, DE. 2002. Water and Wildlife. Joint Annual Meeting, American Fisheries Society and The Wildlife Society, Safford, AZ (oral, Plenary Session Introduction, session organizer).
- Cowley, DE. 1990. Prenatal Effects on Mammalian Growth: Embryo Transfer Results. Symposium on Maternal Effects, 4th International Congress of Systematic and Evolutionary Biology, University of Maryland-College Park (oral).
- Cowley, DE. 1988. Quantitative Genetics of Holometabolous Development. Young Investigator Symposium, American Society of Naturalists, Asilomar, CA (oral).

Research Presentations (since 2001)

- Lois, S & DE Cowley. 2014. Integrating parasite-host interactions in distribution and abundance models to understand spatial patterns and to address conservation in river ecosystems. Joint Aquatic Sciences Meeting, Portland, OR (poster)
- Cowley, DE & R Kuehn. 2011. Experimental design: Essential for ecological genomics with non-model organisms. Gordon Conference on Quantitative Genetics & Genomics, Galveston, TX (poster)
- Cowley, DE. 2009. NMSU Task 6 - Ecology & Environment. Rio Grande Basin Initiative Project Meeting, McAllen, TX (oral).
- Wyman, B., T. Wesche, DE Cowley, L. Wesche, S. Grogan & Y. Najmi. 2009. Large wood creates dynamic fish habitats under variable flow regimes. Western Division of the American Fisheries Society, Albuquerque, NM (oral).
- Cowley, DE, VL Pritchard, J Metcalf, & AP Martin. 2008. Population genetics of southern Rocky Mountain cutthroat trout. University Research Council, Research and Creative Activities Fair, New Mexico State University (poster).

- Cowley, DE, VL Pritchard, J Metcalf, & AP Martin. 2008. Population genetics of southern Rocky Mountain cutthroat trout. XX International Congress of Genetics, Berlin, Germany (poster).
- Cowley, DE. 2007. Required habitat size for fish conservation. University Research Council, Research and Creative Activities Fair, New Mexico State University (poster).
- Cowley, D.E. 2007. Task 6 - Environment, Ecology & Water Quality - NMSU. Rio Grande Basin Initiative Annual Project Meeting, South Padre Island, Texas (oral).
- Cowley, D.E. & P.D. Shirey. 2007. Long-term ecological changes in the Rio Grande since 1874. Society for Range Management, New Mexico Section, Albuquerque (oral).
- Metcalf, JL, VL Pritchard, DE Cowley, SM Silvestri, JS Woods, JB Mitton, & AP Martin. 2007. Human movement of fish obscures evolutionary history: Colorado's native trout and their non-native genes. Evolutionary Change in Human Altered Environments: An International Summit, University of California-Los Angeles (poster).
- Pritchard, V.L. & D.E. Cowley. 2007. Detecting introgression in Rio Grande cutthroat trout populations. Cutthroat Trout Taxonomy Symposium, Denver, Colorado. (oral)
- Pritchard, VL, K Jones, & DE Cowley. 2007. Human impacts on the population genetic structure of cutthroat trout populations. Evolutionary Change in Human Altered Environments: An International Summit, University of California-Los Angeles (poster).
- Sallenave, R. & D.E. Cowley. 2007. Refugial habitats on irrigation drains could ease conflicts with endangered species. National Water Quality Conference, Savannah, GA (poster).
- Shirey, P.D. & DE Cowley. 2007. River paleolimnology using diatoms from the gut contents of Rio Grande silvery minnows collected in northern New Mexico in 1874 and 1978. American Society of Limnologists and Oceanographers, Santa Fe, NM. (oral)
- Cowley, DE & R Sallenave. 2006. Agricultural irrigation systems and conservation of native fishes. Joint Rio Grande Basin Initiatives Project Meeting, Ruidoso, NM (oral).
- Cowley, DE. 2005. Effects of salinity and suspended sediment on early life history stages of the endangered Rio Grande silvery minnow (*Hybognathus amarus*). U.S. Bureau of Reclamation, Albuquerque, NM (Oral).
- Andersen, MC & DE Cowley. 2003. Metapopulation models for endangered fish populations. Aquatic Resources in Arid Lands Conference, Las Cruces, NM (poster).
- Cowley, D.E. 2003. Water requirements for Rio Grande silvery minnow. Governor's Symposium on Rio Grande Silvery Minnow, Santa Fe, NM (Poster, invited).
- Cowley, DE. 2002. Defining Habitat Requirements for Population Viability: Rio Grande Cutthroat Trout. Cutthroat Trout Population Viability Workshop, Salt Lake City, UT (oral).
- Cowley, DE. 2002. Water Requirements for Endangered Species – Rio Grande Silvery Minnow. 47th Annual New Mexico Water Conference, Ruidoso, NM (oral).

Seminar Lectures (since 2001)

- Cowley, DE. 2012. Life on the Edge: Playas & Ponds in the Chihuahuan Desert. Brandt Lecture, Department of Biology, North Carolina State University.
- Cowley, DE. 2011. Genetic studies of tadpole shrimp (Notostraca). New Mexico State University, Molecular Biology Program.
- Cowley, DE. 2010. Population genetics of Rio Grande cutthroat trout and tadpole shrimp in New Mexico, USA. University of Vienna, Vienna, Austria.
- Cowley, DE. 2010. Effects of salinity on freshwater fish eggs: implications for conservation under climate change. NMSU Water Lecture Series.
- Cowley, DE. 2008. Population genetics of southern Rocky Mountain cutthroat trout. Department of Genetics, North Carolina State University, Raleigh.

- Cowley, DE. 2007. Conservation and genetics of cutthroat trout (*Oncorhynchus clarkii*). Fischbiologie, Dept. Tierwissenschaften, Technische Universität München, Freising, Germany.
- Cowley, DE, PD Shirey, and R Sallenave. 2007. Long-term ecological changes in the Rio Grande (USA) inferred from diatoms consumed by endangered minnows. Limnologische Station, Technische Universität München, Iffeldorf, Germany.
- Cowley, DE. 2005. Ecology and conservation of the endangered Rio Grande silvery minnow. División de Ciencias Biológicas, Universidad de la Sierra, Moctezuma, Sonora, Mexico.
- Cowley, DE. 2005. Effects of salinity and suspended sediment on early life history stages of the endangered Rio Grande silvery minnow (*Hybognathus amarus*). Departmental Seminar, Fishery & Wildlife Sciences, NMSU.

Research Presentations by Students & Postdoctoral Associates (since 2001)

- Lois, S., DE Cowley, A Outeiro, E San Miguel, R Amaro & P Ondina. 2014. Integrating parasite-host interactions in distribution and abundance models to understand spatial patterns and to address conservation of an endangered freshwater mussel and its hosts. International Biogeographic Society, Canberra, Australia (oral, S. Lois presenter)
- Horn, RL, R Sallenave & DE Cowley. 2013. Hatching response of *Triops* resting eggs in relation to temporary pond water characteristics. Functional Genomics Symposium, National Center for Genome Resources, Santa Fe, NM (poster)
- Horn, RL, KS Macdonald III, R Sallenave & DE Cowley. 2012. Links between genetic population structure and morphology in a tadpole shrimp, *Triops newberryi*, in southern New Mexico. NMSU Graduate Student Symposium (poster)
- Horn, RL, KS Macdonald III, R Sallenave & DE Cowley. 2012. Links between genetic population structure and morphology in a tadpole shrimp, *Triops newberryi*, in southern New Mexico. Functional Genomics Symposium, National Center for Genome Resources, Santa Fe, NM (poster)
- Macdonald III, KS, R. Sallenave & DE Cowley. 2010. Morphological and genetic variation in tadpole shrimp of the northern Chihuahuan Desert, 2010 New Mexico Water Research Symposium, Socorro, NM.
- Macdonald III, KS, R. Sallenave & DE Cowley. 2010. Morphological and genetic variation in tadpole shrimp of the northern Chihuahuan Desert, North American Benthological Society, Santa Fe, NM.
- Trujillo, D, KS Macdonald III & DE Cowley. 2009. New Mexico AMP Fall Semester Student Research Conference, (oral).
- Trujillo, D, KS Macdonald III & DE Cowley. 2009. New Mexico AMP Student Research Conference, **(Dan received a Third Place Award for this presentation)** (poster).
- Alleman, J, DE Cowley, & R. Sallenave. 2008. Salinity affects diameter and specific gravity of non-adhesive semi-buoyant eggs of four North American minnow species. Larval Fish Conference, Kiel, Germany.
- Alleman, JC & DE Cowley. 2008. Effects of salinity on specific gravity and diameter of eggs of five minnow species in New Mexico. AZ/NM AFS Joint Annual Meeting, Prescott, Arizona. **(Janelle received the AFS Chapter graduate student award for this presentation)** (oral)
- McShane, RR & DE Cowley. 2007. Direct effects of predatory invertebrates versus indirect effects of benthic fishes on the trophic structure of a dryland stream. NMSU Graduate Student Symposium, **(Ryan received a first place award for this presentation)** (oral)
- McShane, RR & DE Cowley. 2007. Competition between native and introduced fishes modifies the trophic interactions within refugia in an intermittent stream. American Society of Limnologists and Oceanographers, Santa Fe, NM. (oral)

- McShane, RR & DE Cowley. 2006. Competition between native and exotic fishes alters the community dynamics of refugia in an intermittent stream. North American Benthological Society Annual Meeting, Anchorage, AK. (oral)
- Finkbeiner, KA & DE Cowley. 2006. Use of geographical information systems in the spatial modeling of fish community and assemblage in central New Mexico irrigation drainage systems. AZ/NM AFS Joint Annual Meeting, Flagstaff, Arizona. (**Kenton received the AFS Chapter graduate student award for this presentation**) (oral)
- Shemai, B & DE Cowley. 2004. Effects of nonnative brown trout on growth and fitness of Rio Grande cutthroat trout in experimental stream enclosures in the Rio Cebolla, New Mexico. Poster presentation, Wild Trout Symposium VIII, West Yellowstone, Wyoming (poster).
- Shemai, B & DE Cowley. 2004. The effects of nonnative brown trout on growth and fitness of Rio Grande cutthroat trout in headwaters of the Jemez Mountains, New Mexico. NMSU Graduate Student Symposium. (**Barak received a Second Place award for this presentation**) (oral)
- Shemai, B & DE Cowley. 2004. The effects of nonnative brown trout on growth and fitness of Rio Grande cutthroat trout in headwaters of the Jemez Mountains, New Mexico. AZ/NM AFS Joint Annual Meeting, Safford, Arizona. (**Barak received the AFS Chapter graduate student award for this presentation**) (oral)
- Paroz, YM, VL Pritchard, & DE Cowley. 2004. Genetic purity vs genetic diversity: an example from Rio Grande cutthroat trout. Wild Trout Symposium VIII, West Yellowstone, Wyoming (poster).
- Pritchard, VL, K Jones, & DE Cowley. 2004. Population genetics of Rio Grande cutthroat trout: Introduction, colonization and fragmentation. Fourth World Fisheries Congress, Vancouver, British Columbia (poster).
- Pritchard, VL & DE Cowley. 2003. Population genetics of Rio Grande cutthroat trout. Southwestern Association of Biologists Annual Meeting, Portal, AZ (oral).
- Pritchard, VL & DE Cowley. 2003. Population genetics of Rio Grande cutthroat trout: introduction, colonization and fragmentation. Society for the Study of Evolution Annual Meeting, Chico, CA (poster).
- Pritchard, VL & DE Cowley. 2003. Population genetic structure in Rio Grande cutthroat trout. 36th Joint Annual Meeting, Gallup, NM (oral).
- Grants & Contracts, 2001-2012 (career: \$2,714,883; since 2001: \$1,720,431)**
- U.S. Army Corps of Engineers = Evaluation of Rio Grande silvery minnow population modeling alternatives, 2015-2017, \$66,290
- U.S. Department of Agriculture, NIFA (Hatch project) - Conservation Ecology of Aquatic Systems in Arid Lands, 2014-2018, \$35,000
- New Mexico Interstate Stream Commission - Studies at the Los Lunas Silvery Minnow Refugium, 2009, \$50,000
- U.S. Department of Agriculture, CSREES (Hatch project) - Conservation Ecology of Aquatic Systems in Water-Stressed Regions, 2008-2013, \$35,000
- Rio Grande Basin Initiative, USDA – Ecology of Irrigation System Drainage Canals and Ephemeral Wetlands Along the Rio Grande of New Mexico (Co-PI Rossana Sallenave), 2008-2011, \$179,658
- U. S. Bureau of Reclamation – Early Life History of Pecos Bluntnose Shiner and Other Minnows (Principal Investigator), 2007-2008, \$86,428
- New Mexico Interstate Stream Commission - Upper Gila River Science Forums, 2006-2007, \$50,000
- U.S. Department of Agriculture, CSREES (Hatch project) - Agriculture and management of aquatic ecosystems, 2003-2008, \$35,000

U. S. Bureau of Reclamation – Early Life History of Pecos Bluntnose Shiner and Other Minnows (Principal Investigator), 2006-2007, \$78,925

T & E, Inc., Effects of nonnative predators in irrigation canals (with Ariel Muldoon, graduate assistant), 2006-2007, \$1,800

Rio Grande Basin Initiative, USDA – Agricultural Irrigation Systems and Conservation of Native Fishes (Co-PI Rossana Sallenave), 2004-2007, \$257,896

NMSU Water Task Force - Naturalized fish habitat on a drainage canal: a win-win project for agriculture and the environment, 2005-2006, \$34,994

Rio Grande Basin Initiative, USDA - Photo essay for the silvery minnow controversy (Co-PI Michelle Marusek), 2005-2006, \$18,785

U. S. Bureau of Reclamation – Early Life History of Pecos Bluntnose Shiner and Other Minnows, 2004-2006, \$78,316

U. S. Forest Service – Conservation Assessment for Rio Grande Cutthroat Trout, 2004-2006, \$11,853

New Mexico Department of Game and Fish – Rio Grande Cutthroat Trout Genetics, 2004-2006, \$78,000

New Mexico Department of Game and Fish – Elephant Butte Fishery Studies (Co-PIs G. Roemer and D. Caccamise), 2002-2005, \$260,200

U.S. Fish and Wildlife Service/U.S. Geological Survey, Biological Resources Division – Native Fish Community Restoration in Rio Grande Cutthroat Trout Management, 2002-2006, \$75,000

U.S. Bureau of Reclamation – Water Conveyance Habitat Assessment for the Middle Rio Grande Conservancy District (Co-PIs J. Boren and S. Grogan), 2002-2004, \$35,591

U.S. Bureau of Reclamation – Early Life History Studies of Rio Grande Silvery Minnow (*Hybognathus amarus*) Related to Downstream Fish Passage, 2002-2004, \$70,442

Rio Grande Basin Initiative, USDA – Aquatic Resources in Arid lands Conference. (PI and conference organizer), 2002-2004, \$40,000

Rio Grande Basin Initiative, USDA – Agricultural Irrigation Systems and Conservation of Native Fishes (Co-PI J. Boren), 2001-2004, \$110,438

Rio Grande Basin Initiative, USDA – Additional salary support (R. Sallenave) added to Agricultural Irrigation Systems and Conservation of Native Fishes. (Co-PI J. Boren), 2002-2003, \$39,690

New Mexico Department of Game and Fish – Rio Grande Cutthroat Trout Genetics, 2001-2003, \$76,125

New Mexico Department of Game and Fish, New Mexico Environment Department, and other clients - Research consultancy funding for various projects, 1992-2001, \$797,452

National Science Foundation - Studies on Maternal and Epigenetic Selection Models", (Co-PI with W.R. Atchley), \$207,000

TEACHING

Courses Taught

Molecular Ecology for Nonmodel Organisms (MOLB 550/FWCE 535, 3 credits, graduate), Fall semester 2012, 2014. Methods of molecular ecology applied in perspectives from population and quantitative genetics to genomics. Course theme focuses on integrating ecology, evolution and development .

Management of Aquatic and Terrestrial Systems (FWCE 464, 4 credits, undergraduate & graduate), Fall semesters 2009, 2011-2015, Spring semester 2017. Concepts of social-ecological systems with varied case studies of sustainable natural resource management in terrestrial, freshwater, and oceanic systems, with laboratory exercises in ecological statistics

Aquatic Ecology (FWCE 459, 4 credits, undergraduate & graduate) (*formerly Ecology of Inland Waters, WLSC 458/458L*), Fall semesters 2000-2008, Spring semesters 2011, 2013, 2015. Quantitative concepts in aquatic ecology including competition, organic drift, food webs and energy flow, analysis of environmental factors, studies of animal movements, quantifying biodiversity, and responses of aquatic biota to human interventions

Advanced Management of Aquatic Systems (WLSC 465/565, 3 credits, undergraduate & graduate), Spring 2005, 2007. Course presented ecological modeling approaches for managing fisheries, including population estimation, optimized allocation of resources, endangered species monitoring, estimating required habitat size, assessing what anglers want, surveys to estimate fish harvest

Wildlife Law, Policy & Administration (WLSC 447/547, 3 credits, co-instructor, undergraduate & graduate), Spring semesters 2002-2009, 2016. United States and International laws, conventions, and treaties for wildlife and quantitative concepts of risk in endangered species management

Ichthyology (FWCE 482/582, 4 credits), Spring semester 2017, biology of fishes, identification of New Mexico fishes.

Graduate Seminar (WLSC 515, 1 credit), Fall semesters 2003, 2009, Spring semesters 2006 (topic - "Sustainable Human Societies"), 2013 (topics - "Community Genetics", "Current Conservation Literature")

Special Topics-Lake Ecology (WLSC 450/535, 3 credits, co-instructor), Spring 2003. Trophic interactions between aquatic organisms in a warm water reservoir and included presentation of stable isotope analyses and mixing models for inferring trophic interactions

Undergraduate Seminar (WLSC 402, 1 credit), Fall 2002 (topic - Wildlife Literature), Spring 2007 (topic - Invasive Species), Spring 2011 (topic - wildlife law & endangered species), Spring 2016 (topic - current journal papers on wildlife ecology)

Field Techniques in Natural Resources Management (WLSC 356, 2 credits, co-instructor), Summer 2002

Undergraduate Problems (WLSC 448, 1-3 credits) - Directed 10 students in individualized topics including fishery statistics, analysis of survey data, and other topics.

Graduate Problems (WLSC 548, 3 credits) - Directed six students in individualized topics such as telemetry study of fish movement, population genetics, and early life history of fish.

Courses Taught in Foreign Countries

Problems in Ecological Modeling & Statistics (Technical University of Munich, 2 credits), summer 2012

Ecological Modeling (sabbatical, Technical University of Munich, 2 credits), winter 2010

Problems in Ecological Modeling (sabbatical, Technical University of Munich, 2 credits), winter 2010

Seminar in Ecological Genomics (sabbatical, Technical University of Munich, 2 credits), winter 2010

Ecological Statistics (sabbatical, Technical University of Munich, 2 credits), summer 2010

Problems in Ecological Statistics (sabbatical, Technical University of Munich, 2 credits), summer 2010

Seminar in Genetical and Ecological Statistics (sabbatical, Technical University of Munich, 2 credits), summer 2010

Lectures, Seminars & Presentations in Foreign Countries

Cowley, DE. 2010. Population genetics of Rio Grande cutthroat trout and tadpole shrimp in New Mexico, USA. University of Vienna, Vienna, Austria.

Cowley, DE, VL Pritchard, J Metcalf, & AP Martin. 2008. Population genetics of southern Rocky Mountain cutthroat trout. XX International Congress of Genetics, Berlin, Germany (poster).

Alleman, J, DE Cowley, & R. Sallenave. 2008. Salinity affects diameter and specific gravity of non-adhesive semi-buoyant eggs of four North American minnow species. Larval Fish Conference, Kiel, Germany.

- Cowley, DE. 2007. "Conservation and genetics of cutthroat trout (*Oncorhynchus clarkii*)." Fischbiologie, Dept. Tierwissenschaften, Technische Universität München, Freising, Germany.
- Cowley, DE, PD Shirey, and R Sallenave. 2007. Long-term ecological changes in the Rio Grande (USA) inferred from diatoms consumed by endangered minnows. Limnologische Station, Technische Universität München, Iffeldorf, Germany.
- Cowley, DE, RC Wissmar, & R Sallenave. 2006. Responses of native and nonnative fish assemblages to water management in an arid river ecosystem. Symposium on Ecology of Stream Fish: State of the Art and Future Prospects – II, Leon, Spain, June 2006 (oral, invited).
- Cowley, DE. 2005. Ecology and conservation of the endangered Rio Grande silvery minnow. División de Ciencias Biológicas, Universidad de la Sierra, Moctezuma, Sonora, Mexico.
- Cowley, DE. 2004. Defining viable habitat size for conservation in streams. Fourth World Fisheries Congress, Vancouver, British Columbia, Canada (May 2004).
- Cowley, DE. 1990. Morphology, evolution and quantitative genetics of development. Seminar, Department of Biology, St. Francis Xavier University, Antigonish, Nova Scotia, Canada (September 1990).

Workshops & Short Courses

- Cowley, DE. 2000. Survey Design in Fisheries Management Workshop. Arizona/New Mexico Chapter of the American Fisheries Society. (3 February 2000).
- Cowley, DE. 1998. Some quantitative and population genetic principles and their application to fisheries management. Genetics Workshop: Use and Misuse in Management, Arizona/New Mexico Chapter of the American Fisheries Society. (5 February 1998).
- Cowley, DE. 1996. Creel Survey Workshop. Native American Fish and Wildlife Society, Southwestern Region Meeting (9-10 August 1996).
- Cowley, DE. 1995. Some study designs for tag/recapture. Fish Tagging Techniques and Strategies Workshop, Arizona/New Mexico Chapter of the American Fisheries Society. (7 February 1995).

Postdoctoral Associates

- Macdonald, Kenneth S. - Nov 2008-May 2012
 Pritchard, Victoria – Apr 2002-Sept 2005
 Sallenave, Rossana - Oct 2002-June 2008

Current Graduate Students

- Michael D. Hatch (Ph.D., Water Science & Management Program), Thesis topic: Simulation of water management alternatives on population dynamics of an endangered fish species.

Former Graduate Students

- Alleman, Janelle (M.S.) 2008, Thesis title: "Effects of incubation salinity on egg properties from North American cyprinids" (current position: recreation specialist, US Bureau of Land Management)
- Carrasco, Carl (M.S.) 2010, Thesis title: "Comparisons of the fish fauna within the lower Rio Grande of New Mexico to the adjacent irrigation system and historical records of occurrence"
- Rebekah Horn (Ph.D), 2015, Thesis title: "The use of a living fossil (*Triops* sp.) as a model organism to explore the integration of ecology, evolution and development"
- McShane, Ryan (M.S.) 2007, Thesis title: "Ecological effects of an invasive detritivorous fish in an intermittent arid-land stream" (current position: PhD student, Biology, Colorado State University)
- Muldoon, Ariel (M.S.) 2007, Thesis title: "Site fidelity and habitat use of a nonnative predatory fish in a manmade canal in New Mexico" (current position unknown, M.S. student, statistics, Oregon State University)

- Paroz, Yvette (M.S.) 2005, Thesis title: "Population Attributes and Landscape Scale Habitat Associations of Rio Grande Cutthroat Trout (*Oncorhynchus clarki virginalis*)" (current position: fishery biologist, US Bureau of Reclamation)
- Schaack, Yves (Master, Technical University of Munich, co-advisor) 2011, Thesis title: A Molecular Toolbox for the Living Fossil *Triops* spec. [Notostraca].
- Shirey, Patrick (M.S.) 2004, Thesis title: "Foraging habits and habitat utilization of Rio Grande silvery minnow (*Hybognathus amarus*) as inferred by diatom frustules" (J.D., current position: PhD student, Biology, Notre Dame)
- Shemai, Barak (M.S.) 2004, Thesis title: "Competitive interactions between *Oncorhynchus clarki virginalis* (Rio Grande cutthroat trout), *Catostomus plebeius* (Rio Grande sucker), and *Salmo trutta* (brown trout) in experimental stream enclosures: implications for native species restoration" (current position: contractor, National Marine Fisheries Service)

Member of Graduate Committee

- Biddison, Laura (M.S., Geography) Thesis topic: GIS application to waterfowl habitat at Caballo Reservoir State Park - Completion: Spring 2006
- Dropcho, Nina (M.S., Biology) Thesis topic: Epibiosis on marine snails. Completion: Spring 2017.
- Finkbeiner, Kenton (M.S., Fishery and Wildlife Sciences) Non-Thesis Topic: A GIS approach to fish community dynamics in a central New Mexican irrigation drainage system. Completion: Spring 2008
- Galindo, Rene (M.S., Fish, Wildlife & Conservation Ecology) Thesis title: Patterns of genetic diversity in populations of Rio Grande chub (*Gila pandora*) in New Mexico. Completion: Fall 2012
- Jungels, Jeremy (M.S., Fishery and Wildlife Sciences) Thesis title: Habitat influences gene flow despite near genetic homogeneity in the Great Plains toad (*Bufo cognatus*) in the Chihuahuan Desert. Completion: Spring 2008
- Macanowicz, Neeshia (M.S., Fish, Wildlife & Conservation Ecology) Thesis topic: invertebrates in sinkholes at Bitter Lakes National Wildlife Refuge. Completion: Spring 2013
- Marusek, Michelle (M.F.A., Art) Final Project topic: Painting, *Critical habitats*. Completion: Spring 2006
- Mayagoitia, Piedad (M.S., Wildlife Science) Thesis topic: River otters of the Tampico, Mexico wetlands Completion: Spring 2010
- Peters, Sunday (Ph.D., Molecular Biology) Dissertation topic: Genomics of reproductive performance in Brangus cattle. Completion: Spring 2011
- Swaim, Kristin (M.S., Fishery and Wildlife Sciences) Thesis title: Relating fish abundance and condition to environmental factors in desert sinkholes. Completion: Spring 2008
- Smith, Laura (M.S., Animal and Range Sciences) Non-thesis project – Completion: Spring 2004
- Williams, Jack (M.S., Fishery & Wildlife Sciences) Non-thesis project - Completion: Fall 2003

Student Mentoring in Special Programs

- Carl Carrasco, Bridges to the Doctorate, Alliance for Minority Participation, 2008-2009
- Salvador Cisneros, MBRS-RISE Program, NMSU, 2002-2003
- Hugo Cobos, USDA Forest Service SCEP, Fall 2011
- Lynda Davis, Howard Hughes Medical Institute-NMSU Undergraduate Research Scholars Program, Fall 2009
- Daniel Trujillo, Undergraduate Research Assistant, Alliance for Minority Participation, Summer & Fall 2009

Awards Won by Mentored Students

- Trujillo, D, 2009, Third Place Award, New Mexico AMP Student Research Conference (poster)

Alleman, JC, 2008, Best Student Paper, AZ/NM Chapter American Fisheries Society (oral)
McShane, RR, 2007, First Place Award, NMSU Graduate Student Symposium (oral)
Finkbeiner, K, 2006, Best Student Paper, AZ/NM Chapter American Fisheries Society (oral)
Shemai, B, 2004, Second Place Award, NMSU Graduate Student Symposium (oral)
Shemai, B, 2004, Best Student Paper, AZ/NM Chapter American Fisheries Society (oral)

Instructional Development

Oct 2003, Peer evaluation of teaching by Dr. Cynda Clary, NMSU
Apr 2003, “Be All You Can Be – Teach! Twelve Steps to Help Teachers Flourish,” The Teaching Academy, NMSU
Feb 2003, “Giving a Lecture Without Equal,” The Teaching Academy, NMSU
Jan 2003, “What Do Students Want? A Panel of Honors Students Tell All,” The Teaching Academy, NMSU
Sep 2002, Honors Workshop, “Teaching Outside the Box,” NMSU
Jul 2002, Workshop, “WebCT: Learning It and Using It,” Scholarly Technology, NMSU

SERVICE

Institutional

NMSU Faculty Senate (2011-2014)
Primary author, BR&R proposal for renovation of Molecular Biology Core Facilities (2012)
NMSU Faculty Senate Leadership Committee (2013-2014)
NMSU Faculty Senate Long Range Planning Committee (2012-2013)
NMSU Faculty Senate University Affairs Committee (2011-2012)
Co-PI, NSF Proposal "IGERT in Post-Genomic Research in Non-Model Organisms (2011)
Undergraduate Research Assistantship Mentor, New Mexico Alliance for Minority Participation, 2010
Video taping on graduate education, YouTube video <http://www.youtube.com/watch?v=P2vsRudLIQ4>
(2010)
Promotion/tenure Mentor for Assistant Professor Sergio Soto-Navarro, NMSU Advance Program, 2008-2010
Lead Author, Proposal to NIH to renovate core facilities for NMSU Program in Molecular Biology, 2009
Member, NMSU Water Task Force (2001-2012)
Advisory Committee member, Environmental Science major, Department of Plant and Environmental Sciences

Departmental

Department of Fish, Wildlife, and Conservation Ecology Committees: Assessment, Undergraduate Curriculum, Graduate Program, Facilities, Aquatics Search Committee Chair, acting department head on occasion
Aquatics Search Committee Chair, 2004

International

Review of promotion credentials for colleague Prof. Dr. Ralph Kuehn, Technische Universität München (2012)
Manuscript reviews for Spanish colleagues (E. San Miguel, S. Lois, 2012)
Question-Answer session for German exchange students accepted for study at American universities, DAI Amerika Haus, Nürnberg, Germany, 8 June 2010

National

Proposal Reviewer, National Geographic Society, Washington D.C. (2012)
Proposal Reviewer, National Fish & Wildlife Foundation (2012)
Proposal Reviewer, Cal-Fed Delta Science Program, San Francisco, California (2010)

State

Gila River Water Planning, January-June, 2009
Co-organizer, Upper Gila River Science Forum, 2006
(<http://www.ose.state.nm.us/PDF/ISC/BasinsPrograms/GilaSanFrancisco/ScienceForum/GilaScienceForumReport.pdf>)
Science Coordinator, New Mexico Interstate Stream Commission, Arizona Water Settlement Act implementation
Member, New Mexico Climate Change Water Work Group

Community

Science Fair Judge, East Picacho Elementary School, 4 March 2010, 15 March 2012
Consulted with Southwest Environmental Center on native fishes & habitats on the Rio Grande, 2009, 2012

Profession

Associate Editor, North American Journal of Fisheries Management, January-July, 2008
Editorial Board, The Open Fish Science Journal, 2008
Guest Editor, Aquatic Sciences 66(4), 2004 (<http://www.springerlink.com/content/101191/>)
Organizer, Aquatic Resources in Arid Lands Conference, Las Cruces, NM, 2003
Plenary session organizer and meeting program chair: "Water and Wildlife", Joint Annual Meeting, AZ/NM Chapter of the American Fisheries Society, Safford, AZ, 2002
Proposal reviews: National Science Foundation, National Fish and Wildlife Foundation, National Geographic Society, UNLV Public Lands Institute, New Mexico Environment Department Surface Water Quality Bureau
Manuscript reviews: Aquaculture Research (2011), Ecology of Freshwater Fish (2006-2008), Environmental Biology of Fishes (2008, 2010), Environmental Management (2012), Evolution, Journal of Arid Environments (2003), Journal of Crustacean Biology (2012), Journal of Environmental Management (2007), Journal of Experimental Marine Biology and Ecology (2009), North American Journal of Fisheries Management (2006, 2007, 2008), Restoration Ecology (2008, 2014), River Research and Applications (2009, 2011), Scientia Marina (2009), Transactions of the American Fisheries Society (2006), Journal of the American Water Resources Association (2016)
Recruitment Committee, American Institute of Fishery Research Biologists
Technical Committee member, ESA Workgroup for Rio Grande Silvery Minnow, 2001-2002
Past-President, AZ/NM Chapter American Fisheries Society
Faculty Advisor, NMSU Student AFS Chapter, 2001-2006
Recruitment Committee, fund-raising activities, Chair and Co-Chair, All College Conference, College of Agriculture and Home Economics, NMSU

OUTREACH

Fine Art Showings

Marusek, M & DE Cowley. 2006. *Critical Habitats - A photographic essay on the endangered Rio Grande silvery minnow and water use in central New Mexico.* Two lunch time showings, PowerPoint show, 63 black & white photographic images with accompanying text, 23 minutes, Joint Rio Grande Basin Initiatives Project Meeting, Ruidoso, NM. (<http://web.nmsu.edu/~marusek/>)

Marusek, M & DE Cowley. 2006. *Critical Habitats: A photo essay on the silvery minnow and the competing demands of man.* Two-day showing of thirty-three 16"x20" black & white photographic prints with accompanying essay, Joint Rio Grande Basin Initiatives Project Meeting, Ruidoso, NM.

Outreach: Oral Presentations

Cowley, DE. 2012. Guest Lecture: Irrigation and Conservation of Native Fishes. NMSU Water Issues Class, C. Rosencranz instructor.

Cowley, DE. 2011. Irrigation management strategies to foster conservation of endangered native species. U.S. Committee on Irrigation and Drainage, Denver, CO.

Cowley, DE. 2007. *Minnow research on the Pecos River.* Presentation to the Kiwanis Club of Las Cruces. (oral)

Cowley, DE. 2006. *Research findings on Rio Grande silvery minnow.* Presentation to staff for Congressional representatives of New Mexico. (oral)

Cowley, DE. 2005. *Fishes of the Rio Bonito, Sonora, Mexico.* Mesilla Valley Flyfishers, Las Cruces, NM (Oral)

Cowley, DE. 2005. *Win-win strategies for agriculture and endangered species.* Keys to Keeping New Mexico Agriculture Growing, Mid Region Council of Governments, Albuquerque, NM (Oral)

Cowley, DE. 2005. *River Walk.* Las Cruces Museum of Natural History, Las Cruces, NM (Oral, walking field lecture)

Cowley, DE. 2005. *Win-win strategies for agriculture and endangered species.* New Mexico Agriculture Keys to Survival, Socorro, NM (Oral)

Cowley, DE. 2004. *Fisheries and aquatic ecology research at NMSU.* Presentation to Senator Jeff Bingaman, Las Cruces, NM (Oral, invited)

Cowley, DE. 2002. *Conduct, Analysis, and Application of Harvest Surveys.* New Mexico Game Commission and Public Training Short Course, Las Cruces, NM (Oral)

Cowley, DE. 2002. *Balancing Fishing Opportunity with Native Fish Conservation.* New Mexico Game Commission and Public Training Short Course, Las Cruces, NM (Oral)

Cowley, DE. 2002. *An Overview of Fisheries and Aquatic Habitats in New Mexico.* New Mexico Game Commission and Public Training Short Course, Las Cruces, NM (Oral)

Outreach: Workshop Presentations

Cowley, DE. 2005. *Rio Grande silvery minnow.* A field workshop for the New Mexico Women Press Writer's Association Annual Meeting, Albuquerque, NM (Oral)

Cowley, DE. 2003. *Water: Controversy and Opportunity,* Workshop on Handling Controversial Issues in Water Quality Programming. Southern Region Extension Water Quality Conference, Ruidoso, NM (Oral)

Cowley, DE. 2003. *Fisheries and Their Management.* Bureau of Indian Affairs Water Resources Training Program, NMSU-Las Cruces (Oral)

Cowley, DE. 2002. *Rio Grande Silvery Minnow Biology.* Aquatic Habitat Restoration and Enhancement Workshop, U.S. Bureau of Land Management, Albuquerque, NM (Oral)

Cowley, D.E. 2002. *Defining Habitat Requirements for Population Viability: Rio Grande Cutthroat Trout.* Cutthroat Trout Population Viability Workshop, Salt Lake City, UT (Oral).

Cowley, DE. 2001. *Population Viability*. Rio Grande Cutthroat Trout Working Group, Vermejo Park Ranch, Colfax County, NM (Oral)

Description of Research Program

My research interests lie in gaining a deep understanding of species evolution, especially in how species evolve in response to environmental change. I have worked with many groups of species, from invertebrates, to fish and small mammals although aquatic species have always been most interesting to me. A common theme in different model organismal systems in my research has been early development. As a PhD student I used *Drosophila melanogaster* as a model system to study the influence of development on genetic correlations between body parts and to estimate genetic correlations between sexes for the same trait. As a postdoctoral scientist I used embryo transfer experiments to document the postnatal extent to which genetic prenatal maternal effects were discernable in offspring. An early attempt to integrate development into a quantitative genetics framework arose during my postdoctoral research (Cowley & Atchley 1992) and I also initiated a within-family selection experiment to alter the growth curves of mice by changing early or late developmental rate (Xu et al. 1997). Research by several former graduate students has focused on early development by examining the effects of salinity on viability of eggs and larvae of cyprinid minnows (Cowley et al. 2009). That work demonstrated significant effects on early life history stages of an endangered species (Rio Grande silvery minnow) associated with elevated salinity.

A segment of my research program has investigated various aspects of fish species in the Rio Grande basin of New Mexico. Extensive population genetic analyses of New Mexico's State Fish, Rio Grande cutthroat trout, were published (Pritchard et al. 2007a,b,c, 2008; Metcalf et al. 2007). In spite of nearly 100 years of stocking nonnative trout by the state game agency and hybridization with them or displacement by them, Rio Grande cutthroat trout populations still bear genetic evidence of diversification in different river drainages. Other work has focused on the endangered Rio Grande silvery minnow. Long-term changes in Rio Grande ecology were inferred by assessing the diatom assemblages foraged by silvery minnows in samples 104 years apart (Shirey et al. 2008). In addition, my work demonstrated the contributions of agricultural canals to the fish biodiversity in the middle Rio Grande of New Mexico (Cowley et al. 2007) and suggested ways to manage canals to favor native fishes and agriculture in a sustainable way (Cowley 2011). Presently my PhD student is developing a simulation process by which water managers can assess possible effects of various water management strategies on the population dynamics of an endangered fish.

My recent research has focused on the "living fossil" species of the genus *Triops* (tadpole shrimp) that occur in desert ponds worldwide. This model system nicely integrates a primitive invertebrate developmental system within an environmental and ecological context and further facilitates evolutionary studies of sexual selection, maternal effects, and mating systems differences in facilitating or impeding local adaptation. To date we have developed microsatellite markers for the three forms of *Triops* sp. that occur in southern New Mexico (Stoeckle et al. 2013) and published morphological comparisons between them (Macdonald et al. 2011). My recent PhD student (Horn et al. 2014; Horn & Cowley 2014, 2016; Horn et al. 2017) integrated microsatellite and mtDNA genotypes in quantifying population genetic structure, and published the first transcriptome for *Triops newberryi*. To date we have documented morphological (Macdonald et al. 2011), behavioral (Cowley unpublished) and developmental differences (Cowley et al. in prep.) between the different forms and there is further indication that the occurrence of *Triops* species may in part be determined by pond water chemistry (pH, salinity, nutrient loading) and by the biotic community of other crustaceans that co-occur with *Triops* sp. How does a species essentially unchanged morphologically for 250 million years adapt to new environmental conditions in a local biotic community context? We hypothesize that aspects of early development are one key to local adaptation of *Triops* species and that early developmental rates are important for species success in a particular location.

Recent international collaborations include spatiotemporal genetics of a forest pest species in Bavaria, factors affecting hatching of brown trout eggs in Bavarian rivers, and a study of spatial distribution and abundance of the endangered pearl mussel in Galicia, northwest Spain.

Teaching Interests & Philosophy

My favorite class to teach has been aquatic ecology, because it integrates so many ideas in biology, chemistry, fisheries, ecology, and evolution. I have broad training and interest in teaching quantitative topics in courses on aquatic ecology, population genetics, and ecological genomics. In addition to aquatic ecology, I have taught advanced undergraduate and graduate classes in wildlife law, management of aquatic and terrestrial systems, advanced management of aquatic systems, lake ecology, field techniques in natural resources management, ichthyology, molecular ecology for nonmodel organisms, undergraduate and graduate seminars, and undergraduate and graduate individualized problems courses. I taught six 2-credit courses in ecological and genetic statistics while on sabbatical leave in 2010 at the Technical University of Munich and returned in the summer of 2012 to teach a 2-credit course in Problems in Ecological Modeling and Statistics.

My teaching philosophy is influenced by my desire for students to learn to take responsibility for their own successes and failures and to carry this ethic forward to their professional careers. In my view, education is the forum within which we practice opening our minds to new ideas and assimilating and evaluating information so that we can make informed decisions. Achieving the abilities to think critically and learn independently are arguably the most important skills for students to learn. I require a high level of performance from students to help them gain confidence in their abilities to solve problems and to meet expectations in a professional setting. At the same time, I am sensitive to the needs of individual students and I try to help all students succeed. Teaching is most enjoyable for me when I can bring to students the excitement I find in my own study and research. In the end, I hope to motivate students to learn more about a subject and to develop an appreciation for the utility of science in understanding the natural World, especially in the evolution of its biota, and in sustainably managing natural resources for future generations.