

ROSANNE W. FORTNER

Professor Emeritus
School of Environment and Natural Resources
College of Food, Agricultural, and Environmental Sciences
The Ohio State University
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Education

EdD. 1978 Virginia Polytechnic Institute and State University
Dissertation title: Experiences related to marine knowledge and attitudes of tenth grade students in coastal and inland high schools of Virginia

M.S. 1973 Oregon State University
Major: Earth Sciences

B.A. 1967 West Virginia University
Major: Biology

Academic and Professional Experience

2013-2016 Member, National Sea Grant Advisory Board

2010-present Co-Chair, Oak Island Beach Preservation Trust Advisory Board

2005-2011 Director, COSEE Great Lakes

2005-Present Professor Emeritus, School of Environment and Natural Resources, The Ohio State University

1999-2004 Associate Director, Franz Theodore Stone Laboratory

1999 (Winter) Senior Fulbright Scholar, Republic of Cyprus

1995-2005 Coordinator, Earth Systems Education Program

1991 (Winter) Education Liaison, National Oceanic and Atmospheric Administration, Washington, DC (Research leave)

1983-2005 Coordinator, Ohio Sea Grant Education Program

1978-Present The Ohio State University

1991- 2005 Professor of Natural Resources, Environmental Science and Science Education

1985-1991 Associate Professor of Natural Resources and Science Education

1979-1985 Assistant Professor of Natural Resources

1978-1979 Visiting Assistant Professor, College of Education

1976-1978 College of Education, VPI & SU. Graduate Teaching Assistant in Science Education

1971-1976; Middle School teacher, Roanoke, VA
1967-1969 Life science, earth science, Department Chairperson

1969-1970 Oregon State University, Corvallis, OR
Research Assistant in Radiation Biology

Publications

Books and Chapters

Fortner, R. W., Manzo, L., and Arvai, J. L. 2005. Rationale for and evaluation of a structured decision-making framework for teaching about Great Lakes environmental issues. Ohio Sea Grant Technical Report.

Fortner, R.W., Bircher, L, White, S., Duan, H., Genzman, P., Lippman, B., and Simons, M. 2004. Teacher Education at Stone Laboratory: Program description, literature setting, and impact on educators. Ohio Sea Grant Technical Report TB-067. 43 pp.

Fortner, R. W. 2001. Cooperative Learning: A Basic Instructional Methodology for Global Science Literacy. In: Mayer. Global Science Literacy. Dordrecht, Netherlands: Kluwer. Chapter 6 pp 79-92.

Fortner, R. W., and Constantinou, C. 2002. Needs Assessment and Climate for Global Science Literacy: Concerns for Cyprus. In: Mayer, V.J. Implementing Global Science Literacy. Columbus, Ohio: Earth Systems Education Program, Ohio State University: p. 131-140.

Mayer, V. J., and Fortner, R. W. 2001. A Case History of Science and Science Education Policy. In: Mayer, V.J. Global Science Literacy. Chapter 2 pp 25-36.

Fortner, R.W. 2001. The right tools for the job: How can aquatic resource education succeed in the classroom? In: Fedler, A.J. (ed), Defining best practices in boating, fishing, and stewardship education. Alexandria, VA: Recreational Boating and Fishing Foundation, pp 49-60.

Fortner, R.W., V.J. Mayer and E. Hall, 1998. Proceedings: Second International Conference on Geoscience Education -- Learning about the Earth as a System. Columbus: The Ohio State University, Earth Systems Education, 250 pp.

Earth Systems Education Activities for Great Lakes Schools (ES-EAGLS). Five volumes of curriculum activities about the integrated sciences and human interactions in the Great Lakes. Sponsor: Ohio Sea Grant and Great Lakes Protection Fund. Titles of the volumes:

Fortner, R. and H. Miller. 1997. Life in the Great Lakes. 120 pp.

Fortner, R., A. Sheaffer and H. Miller. 1997. Shipping on the Great Lakes. 86 pp.

Fortner, R., A. Sheaffer and H. Miller. 1997. Environmental Issues in the Great Lakes. 180 pp.

Fortner, R., R. Meyer and A. Sheaffer. 1996. Land and Water Interactions. 120 pp.

Fortner, R. and R. Meyer. 1996. Climate and Water Movements. 96 pp.

Fortner, R.W. and Dan Jax. 1997. LAKERS (Lake-Aware Kids Engaged in Relevant Science) observe Coastweeks. Curriculum manual for teaching at the Lake Erie coast. Toledo: Ohio Lake Erie Commission. 90 pp.

Fortner, R.W., H.H. Miller and A. Shaffer. 1995. Great Lakes Instructional Materials for the Changing Earth System (GLIMCES). Columbus, OH: Ohio Sea Grant College Program. 300 pp.

Mayer, V.J. and R.W. Fortner. 1995. Science is a Study of Earth. A resource guide for science curriculum restructure. Columbus, OH: The Ohio State University, Earth Systems Education Program. 246 pp.

Fortner, R.W., ed. 1995. Earth Systems Education Symposium for High School Science. Proceedings and Summary. Columbus, OH: The Ohio State University. 147 pp.

Fortner, R.W., N.J. Smith-Sebasto and G.W. Mullins. 1994. Handbook for environmental communication in development. Washington, DC: The World Bank. Fortner, R.W., V.J. Mayer and A.P. Murphy. 1993. Activities for the Changing Earth System (ACES) Secondary science curriculum modules. Columbus, OH: The Ohio State University. 250 pp.

Mayer, V.J. and R.W. Fortner. 1993. A model program for research and development interaction. In *Alternative Paradigms in Environmental Education Research*, R. Mracek (ed.). Troy, OH: NAAEE.

Fortner, Rosanne W. and Victor J. Mayer (eds.) 1987, 1993. *The Great Lake Erie: A reference text for educators and communicators*. Columbus: The Ohio State University. 155 pp.

Fortner, R.W. 1990. An action agenda for marine and aquatic education. In *Oceanography for Landlocked Classrooms*, G. Madrazo and P.B. Hounshell (eds). Monograph V. Reston, VA: National Association of Biology Teachers. Ch. 2.

Seager, Marcia L., Rosanne W. Fortner and Timothy A. Taylor. 1988. Supplemental curriculum activities to accompany Holling Clancy Holling's Paddle to the Sea. Columbus: Ohio Sea Grant. 168 pp.

McLaren, Sheri, Rosanne W. Fortner and Vanessa J. Steigerwald. 1988. Lake Erie Environmental Studies: A Laboratory Manual for use at F.T. Stone Laboratory. Columbus: Ohio Sea Grant. 200 pp.

Mayer, Victor J. and Rosanne W. Fortner. 1987. *The Ohio Sea Grant Education Program: Development, Implementation, Evaluation*. Columbus: The Ohio State University. 120 pp. ED 232 875

Fortner, Rosanne W. 1988. *Evaluation of the effectiveness of some components of the education program at the Old Woman Creek (Ohio) National Estuarine Research Reserve and State Nature Preserve*. Washington, DC: NOAA. 101 pp.

Fortner, RW., ed. 1986. *Proceedings of the Great Lakes Symposium*. Annual Conference of the National Marine Educators Association. Cleveland, Ohio. 101 pp.

Tassier, Kim. 1988. *Directory of Resources on Acid Deposition for Interpreters and Educators*. Rosanne W. Fortner and Gary W. Mullins, eds. Washington, DC: U.S. Department of the Interior, National Park Service. 27 pp.

Mullins, Gary W. and Rosanne W. Fortner, eds. 1988. *Interpreting critical issues in the National Parks: Air Quality materials for interpreters*. Washington, DC: U.S. Department of the Interior, National Park Service. 192 pp.

Mayer, Victor J. and Rosanne W. Fortner. 1985. Marine and aquatic education. Chapter in *Marine Conservation and Parks: Challenge and Promise*, Jon Lien and Robert Graham, eds. Toronto: Breakwater Books.

Refereed Research Articles

Fortner, R.W. 2012. Database of research in marine and aquatic education. *Current, The Journal of Marine Education* 28(2): 47-50.

Duan, Hongxia, & R.W. Fortner. 2012. A Cross-Cultural Study on Environmental Risk Perception and Educational Strategies: Implications for Environmental Education in China. The Pantaneto Forum, Issue 48. Online at <http://www.pantaneto.co.uk/issue48/fortner.htm>

Fortner, R.W. & L. Manzo. 2011. Great Lakes Literacy: Essential Principles and Fundamental Concepts for Great Lakes Learning. *Current: The Journal of Marine Education* 27 (3): 5-9.

Fortner, R.W. and L. Manzo. 2011. Great Lakes Literacy. *Eos Transactions AGU* 92(13):1-2. March 29.

Rodríguez, Manuel, Eddie Boyes, Martin Stanisstreet, Keith Skamp, Georgios Malandrakis, Rosanne Fortner, Ahmet Kilinc, Neil Taylor, Kiran Chhoka28r, Shweta Dua, Abdullah Ambusaidi, I. Poh-Ai Cheong, Hye-Gyoung Yoon and Mijung Kim. Can Science Education Help to Reduce Global Warming? An International Study of the Links between Students' Beliefs and their Willingness to Act *The International Journal of Science in Society* 2(3): 89-100. 2011.

Malinowski, J. and R.W. Fortner, 2010. The effect of participation in a Stone Laboratory workshop (A place-based environmental education program) on student affect toward science. *Ohio Journal of Science* 110(2): 13-17, 2011

Kim, Chankook, and Rosanne W. Fortner, 2008. Great Lakes Scientists' Perspectives on K-12 Education Collaboration, *Journal of Great Lakes Research*. 34:98–108.

Lee, Jae-Young, Hyonyong Lee and Rosanne W. Fortner, 2007. An application of affective-cognitive ambivalence theory in environmental risk attitude: The case study of Marion County, Ohio, in the U.S. *Journal of The Korean Earth Science Society* 28(5):635-642.

Kim, Chankook, and Rosanne W. Fortner, 2007. Educators' views of collaboration with scientists. *American Secondary Education* 35(3): 29-53.

Lee, Hyonyong & Rosanne W. Fortner, 2006. Elementary students' perceptions of Earth systems and environmental issues. *Journal of The Korean Earth Science Society* 27(7): 705-714.

Lee, Eun Ah, and Rosanne W. Fortner, 2006. Development of the K-12 Science Literacy Education Program focused on the Earth System and Environment. *Journal of The Korean Earth Science Society* 27(7):223-229.

Kim, Chankook and Rosanne W. Fortner. 2006. Issue-specific barriers to addressing environmental issues in the classroom: An exploratory study. *The Journal of Environmental Education* 37(3): 15-24.

Fortner, Rosanne and Katie Fraser. 2006. Fisheries management: Personalizing the story. *Insights on Law & Society* [American Bar Association] 6(3): 24-31.

Duan, H., and Fortner, R. W. 2005. Chinese college students' perceptions and information sources about global vs local environmental issues. *Journal of Environmental Education* 36(4): 23-32.

Lee, H., & R.W. Fortner, 2005. International geoscience educators' perceptions of approaches to science education for the 21st Century. *Journal of Geoscience Education* 53(2): 198-203.

Fortner, R.W., J.R. Corney & V.J. Mayer, 2005. Growth in student achievement as an outcome of inservice environmental education using Standards-based infusion materials. In: *Preparing Effective Environmental Educators, NAAEE Monograph 2*. Washington DC: NAAEE. 73-89.

Fortner, R. W. and Constantinou, C., 2003. Global Science Literacy: Definition, Needs Assessment and Concerns for Cyprus. *Mediterranean Journal of Education Studies* 8(1): 29-41.

Orion, N., and Fortner, R. W. 2003. Mediterranean Models for Integrating EE and Earth Sciences Through Earth Systems Education. *Mediterranean Journal of Education Studies* 8(1): 97-111.

Romanello, S., Dervin, B., and Fortner, R. W. 2003. Sense-Making as a Methodology to Inform Interdisciplinary Communication of Scientific Uncertainty in Global Climate Change. In: *Science as a Way of Life. Proceedings of the AAAS Annual Meeting*. Poster presentations, 39.

Jurin, R. R., and Fortner, R. W. 2002. Symbolic Beliefs as Barriers to Responsible Environmental Behavior. *Environmental Education Research* 8(4):375-397.

Fortner, R. W., and Corney, J. R. 2001. Great Lakes Educational Needs Assessment: Teachers' Priorities for Topics, Material & Training. *Journal of Great Lakes Research* 28(1): 3-14.

Fortner, R. W. 2001. Voices for the Watershed. Book Review. *Journal of Environmental Education* 33(2): 40-41.

Labbe, C. & Fortner, R.W., 2001. Perceptions of the concerned reader: An evaluation from the readership of 'E: The Environmental Magazine'. *The Journal of Environmental Education* 32(3):41-46.

Fortner, R.W. 2001. Climate change in school: Where does it fit, and how ready are we? *Canadian Journal of Environmental Education* 6:18-31.

Murphy, T.P. & Fortner, R.W. 2001. The case of the missing anurans. *American Biology Teacher* 63(8):524-530.

Fortner, R.W. & Meyer, R.L. 2000. Discrepancies among teachers' priorities for and knowledge of freshwater topics. *The Journal of Environmental Education* 31(4): 51-53.

- Lee, Jae-Young and R.W. Fortner. 2000. Classification of environmental issues by perceived certainty and tangibility. *International Journal of Environmental Education and Information* 19(1): 11-20.
- Fortner, R.W., J-Y. Lee, J.R. Corney, S. Romanello, J. Bonnell, B. Luthy, C. Figuerido & N. Ntsiko. 2000. Public understanding of climate change: Certainty and willingness to act. *Environmental Education Research* 6(2): 127-141.
- Fortner, R.W. 1999. Using cooperative learning to introduce undergraduates to professional literature. *Journal of College Science Teaching* 28(4):261-265.
- Fortner, R.W. 1998. Sea Grant: Enhancing K-12 Education. *Current: The Journal of Marine Education*. 15(1): 8-13. [Invited paper].
- Meredith, Joyce E., R.W. Fortner and G.W. Mullins. 1997. A model of affect in nonformal education. *Journal of Research in Science Teaching*. 34(8):805-818
- Meyer, Rick and R. W. Fortner. 1997. Temperature over time in the Great Lakes. *Science Scope*, middle school journal for the National Science Teachers Association. 20(4):28-31.
- Fortner, R.W. 1995. Earth system changes: Using environmental data for science teaching. *International Journal of Geographical and Environmental Education* 4(1):107-115.
- Roush, D. and R. Fortner. 1995. Newspaper coverage of zebra mussels in North America: A case of "Afghanistanism?" *Electronic Green Journal* 3(1). 8 pp.
- Mayer, V.J., R.W. Fortner and W.H. Hoyt. 1995. Using cooperative learning as a structure for Earth Systems Education workshops. *Journal of Geological Education* 43(4):395-400.
- Meredith, J.E., G.W. Mullins and R.W. Fortner. 1994. Interpretation and affective learning -- a model for practice and research. *The Interpreters Sourcebook*. Ft. Collins, CO: National Association of Interpreters.
- Smith-Sebasto, N.J. and R.W. Fortner. 1994. The Environmental Action Internal Control Index. *Journal of Environmental Education* 25(4):23-29.
- Mayer, V.J., R.W. Fortner et al. 1992. The role of Planet Earth in the new science curriculum. *Journal of Geological Education* 40(1):66-73.
- Fortner, R.W., R. Pinnick, E. Shay, P. Barron, D. Jax, W. Steele and V.J. Mayer. 1992. Biological and Earth Systems Science: Curriculum restructure from within. Part 1. How it happened. *The Science Teacher* 59(9):32-37.
- Fortner, R.W. 1992. Down-to-Earth biology: A planetary perspective for the life sciences. *The American Biology Teacher* 54(2):76-79.
- Brothers, C.C., R.W. Fortner and V.J. Mayer. 1991. The impact of television news on public environmental knowledge. *Journal of Environmental Education* 22(4):22-29.

- Mayer, V.J. and R.W. Fortner. 1991. Internationalizing science education: A Korean example. *School Science and Mathematics* 91(3):111-115.
- Fortner, R.W. and V.J. Mayer. 1991. Repeated measures of students' marine and Great Lakes awareness. *The Journal of Environmental Education* 23(1):30-35.
- Fortner, R.W., V.J. Mayer, C.C. Brothers and F.R. Lichtkoppler. 1991. Knowledge about the Great Lakes environment: A comparison of publics. *Journal of Great Lakes Research* 17(3):394-402.
- Fortner, R.W. and V.J. Mayer. 1991. Making global change research data available to educators. In *Earth observations and global change decision making*, 1990, I.W. Ginsberg and J.A. Angel (eds.). Malabar, FL: Krieger Publ. p. 313-318.
- Fortner, R.W. 1990. What research says to marine education: Impact of an estuary visit. *CURRENT, The Journal of Marine Education* 10(1):25-27.
- Fortner, R.W. and A.C. Lahm. 1990. Research program outreach into the classroom: An Estuarine Research Reserve program. *Journal of Environmental Education* 21(1):7-12.
- Fortner, Rosanne W. and Michelle Wigginton. 1989. Natural history programming on television: A comparison of markets. *The Journal of Environmental Education* 21 (1):15-18.
- Fortner, Rosanne W. and Victor J. Mayer. 1989. Marine and aquatic education--A challenge for science educators. *Science Education*, 73(2): 135-154.
- Fortner, Rosanne W. 1989. Form and function of microcomputer software for precollege environmental education. In *Environmental Education: Transition to an Information Age*. J.M. Stone, ed. Troy, OH: NAAEE. pp.70-74.
- Fortner, Rosanne W. and Gary W. Mullins. 1989. Interpretive design for "Clearing the Air" in U.S. National Parks. In L.A. Iozzi and C. L. Shepard, eds. *Building multicultural webs in environmental education*. Troy, OH: NAAEE. pp 105-107.
- Taylor, Timothy A. and Rosanne W. Fortner. 1989. Environmental education in Ohio high schools: An update. *The Ohio Journal of Science* 89(4): 97-100.
- Fortner, Rosanne W. and Victor J. Mayer. 1988. Oceanic and Great Lakes awareness among fifth and ninth grade Ohio students: A continuing study. *The Ohio Journal of Science* 88(5):106-109.
- Kauffeld, Judy A. and Rosanne W. Fortner. 1987. Newspaper coverage of acid deposition in five North American dailies, 1979-1982. *The Journal of Environmental Education* 19(1): 16-24.
- Mayer, Victor J. and Rosanne W. Fortner. 1987. Relative effectiveness of four modes of curriculum dissemination. *The Journal of Environmental Education*. 19(1):25- 30.
- Fortner, Rosanne W. 1986. Environmental education adoption potential of inservice workshop participants in developing vs. developed countries. In *Environmental Education Monograph III: International Aspects of Environmental Education*, ed. John H. Perkins, pp. 2-24. Troy, Ohio: NAAEE.

- Fortner, Rosanne W. 1985-6. Public information conferences as tools for environmental communications training. *The Journal of Environmental Education*. 17(2): 14-19.
- Fortner, Rosanne W. 1985. Influence of an environmental documentary on knowledge and attitudes: Three studies. *Human Dimensions in Wildlife* 4(1): 13-17.
- Fortner, Rosanne W. and Anne E. Lyon. 1985. Effects of a Cousteau television special on viewer knowledge and attitudes. *The Journal of Environmental Education*. 16(3):12-20.
- Fortner, Rosanne W. 1985. Relative effectiveness of classroom and documentary film presentations on marine mammals. *Journal of Research in Science Teaching*. 21 (2):115-125.
- Fortner, Rosanne W. 1984. Sea Grant Marine Education: Historic Perspective and Future Design. A Preliminary Report. In *Proceedings, OCEANS '84 Conference Record*, pp. 831-837. Marine Technology Society. Washington, DC: MTS.
- Fortner, Rosanne W. 1983. Knowledge, attitudes, experiences: The aquatic connection. *CURRENT, The Journal of Marine Education*. 5(1):7-11.
- Fortner, Rosanne W. and Victor J. Mayer. 1983. Ohio students' knowledge and attitudes about the oceans and Great Lakes. *The Ohio Journal of Science*. 83(5): 218-224.
- Fortner, Rosanne W. 1981. Providing resource information through radio public service announcements. *Agriculture Communicators in Education (ACE) Quarterly*. 64 (4):19-34.
- Fortner, Rosanne W. and T.M. Wildman. 1980. Marine education: Progress and promise. *Science Education*. 64(5):717-723.
- Fortner, Rosanne W. and Thomas G. Teates. 1980. Baseline studies for marine education: experiences related to marine knowledge and attitudes. *The Journal of Environmental Education*. 11(4):11-19.
- Kimeldorf, D.J. and R. W. Fortner. 1971. The mortality responses of three invertebrate species to single X-ray exposures. *Radiation Research*. 47(7):300.
- Kimeldorf, D.J. and R.W. Fortner. 1971. The prompt detection of ionizing radiations by a marine coelenterate. *Radiation Research*. 46(1): 52-63.

Publications for Professionals in Environmental Education

- Fortner, R.W. and Mayer, V.J. 2009. How is coastal temperature influenced by the Great Lakes and the ocean? *Science Activities*, Special Issue on Ocean Literacy. 46(3): 20-26.
- Fortner, R.W. 2009. Ocean Literacy [Editorial]. *Science Activities*, Special Issue on Ocean Literacy. 46(3): 4.
- Fortner, R.W. and D. B. Jenkins. 2009. Simulated sampling of estuary plankton. *Science Activities* 46(1): 26-32.

- Lee, E.A. and R.W. Fortner. 2007. Mystery Lines: A technique to enhance student understanding of differences between science theories and laws. *Science Activities* 43(4): 22-26.
- Fortner, R.W. 2007. COSEE Great Lakes. *Current, The Journal of Marine Education*, 23(1): 37
- Parsons, Stewart, Fortner and Lichtenwalner, 2007. COSEE and Ocean Observing Systems: The wave of the future. *Current, The Journal of Marine Education*. 23(1): 26-28.
- Fortner, Rosanne, Marcia Swan, and Bruce Munson, May-June 2007. Introducing the Great Lakes: Fourth Coast of the U.S. *Connect for Teachers*. Pp 7-9.
- Fortner, R. W. 2005. A long walk to the water's edge. *Science Activities* 42(2): 30-35.
- Fortner, R. W., Arvai, J. L., Malinowski, J., and Froschauer, A. 2003. Instructional materials for environmental decision making. *Proceedings of the North American Association for Environmental Education, Annual Conference, Anchorage*. [on CD-ROM].
- Fortner, R. W., Merry, C. J., Lin, J., and Duan, H. 2003. Combining Digital Techniques and Field Data to Teach Interdisciplinary Coastal Studies. *Proceedings of the 6th International Conference on Computer Based Learning in Science*. Nicosia, Cyprus: University of Cyprus. 1:894-897.
- Fortner, R. W., and Jax, D. 2003. What is the Impact of Beach Debris? *Science Activities* 40(1): 27-31.
- Fortner, R. W. 2003. Teaching About the Ocean As a System. [Guest editorial] *Science Activities* 40(1): 3.
- Fortner, R. W., Merry, C., Duan, H., and Lin, S. 2002. Field Study Course for the People and Tools of Environment and Engineering. *NAAEE Proceedings*. (CD-ROM).
- Fortner, R. W., and Dudley, J. 2002. Effect of Participation in Experiential EE Programs on Student Attitude Toward Science. Dudley & Fortner. *2002 Interpretive Sourcebook*, pp 89-90.
- Fortner, R. W., and Lee, H. 2002. Resources for Teaching and Learning About Exotic Species. ERIC Digest EDO-SE-0106.
- Fortner, R. W. 2001. The Coming Storm. Book Review. *Science Activities* 40(1).
- Fortner, R.W. 1999. Education in Ohio Sea Grant. (Fact Sheet) Columbus: Ohio Sea Grant.
- Fortner, R.W. and H.H. Miller. 1998. Training the trainers -- Are expectations realistic? In, *Proceedings of North American Association for Environmental Education Annual Conference*.
- Fortner, R.W. 1996. Constructing Earth System Science learning through interdisciplinary studies of global change. *International Geoscience and Remote Sensing Symposium Proceedings*. II:1166-1168.
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- Fortner, R.W. 1995. Ups and downs of Earth changes. In *Integrating Environmental Education and Science*, D. Cantrell and P. Barron, eds. Columbus, OH: Environmental Education Council of Ohio. pp 85-88.
- Fortner, R.W. and S. Boyd. 1995. Infusing Earth Systems concepts throughout the curriculum. ERIC document ED 386 391.
- Mullins, G.W., R.W. Fortner and T.A. Schretter. 1994. A model for formative evaluation of the USDA Forest Service Urban Tree House. Final Report. Asheville, NC: USDA Forest Service.
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- Visualizing the impacts of deforestation. *Science Activities* 29(1):25-30
 - How high's the water? *Science Activities* 29(1):31-33.
- Fortner, R.W. 1991. A place for EE in the restructured science curriculum. In, Baldwin, J.H. (ed.), *Confronting Environmental Challenges in a Changing World* Troy, OH: NAAEE.
- Fortner, R.W. (ed.) 1991. Abstracts of Research in Marine and Aquatic Education. Columbus, OH: Ohio Sea Grant. 25 pp.
- Fortner, R.W. 1991. Guest editor of special issue of *Science Activities* 28(1). Topic: Earth Systems Education. Winner of 1991 EdPress award for best special issue of an education magazine. Included two articles:
- Back to Earth for science education. *Science Activities* 28(1):1-2
 - There must be a-way (to deal with solid waste). *Science Activities* 28(1):11-13.
- Fortner, R.W. 1990. Teacher education and curriculum development for global change education. *CURRENT, The Journal of Marine Education* 10(3):18-21.
- Fortner, Rosanne W. 1989. Ocean and Great Lakes Awareness Survey. Columbus: ERIC/SMEAC, 27 pp. ED 309 072.
- Fortner, Rosanne W. 1988. *The role of the media in public perception of Lake Erie*. School of Natural Resources Report 88/1, 13 pp.
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- Fortner, Rosanne W. and Marjorie Pless. 1987. Multiphased assessment of visitor center impact. *Visitor Behavior* 11(3):4-5.
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Multimedia Production

A tribute to the Great Lakes. 2006. Instructional music for teaching, featuring songs by Pat Dailey, Lee Murdock and Alex Bevan. Columbus, OH: COSEE Great Lakes.

COSEE Great Lakes internet site, 2006. Multiple pages with information about educational programs in NSF Center for Ocean Sciences Education Excellence in the Great Lakes region. Access at <http://coseegreatlakes.net>

Fortner, R. W., Dudley, J., Froschauer, A., and Arvai, J. L. 2003. Decision Making for the Great Lakes. Interactive instructional activities for secondary schools using structured decision making process. <http://earthsys.ag.ohio-state.edu/decision/> .

Exotic Aquatics on the Move. Web site for geography teachers in conjunction with studies of aquatic nuisance species worldwide. <http://www.iisgcp.org/EXOTICSP/> . Established in 1999 and updated through 2003.

Fortner, R.W., R.L. Meyer and A. Lewandowski. 1996. Great Lakes Solution Seeker. Columbus, OH: Ohio Sea Grant College Program. CD-ROM.

Earth Systems Education internet site [<http://earthsys.ag.ohio-state.edu>]. Established in 1995 for continuing support of teachers in Earth Systems Education. Contains publication and project information, and concept map links to Ohio Sea Grant Education materials.

Other creative works to 1990

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Pflaumer, Susan E. and Rosanne W. Fortner. 1990. *Great Lakes Pursuit*. (Family or classroom game). Columbus: Ohio Sea Grant Education.

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Klisz, Ann, R.W. Fortner, and V.J. Mayer. 1989. *Lake Erie Guide and Game*. Cleveland: WJW- TV8.

Fortner, R.W. and Daniel W. Jax. 1989. *The Great Lakes in My World*. Curriculum materials for K-8. Chicago: Lake Michigan Federation. 94 pp.

Fortner, Rosanne W., John F. Schar and Victor J. Mayer. 1986. Effect of microcomputer simulations on computer awareness and perception of environmental relationships among college students. Columbus: OSU Office of Learning Resources. ED 270 311.

Fortner, Rosanne W. 1986. The Coral Conservation Game. In *Coral Reef Teaching Kit*, pp. 57-64 + game board in English and Spanish. Washington, DC: World Wildlife Fund and RARE, Inc.

Fortner, Rosanne W. 1986. Ohio's Year of the Lake (Radio Tape). Columbus: Ohio Cooperative Extension Service.

Fortner, Rosanne W. 1985. Artificial reefs. In: E. Darrow, ed., *Science Workbook of Student Research Projects in Food, Agriculture, and Natural Resources*. OSU College of Agriculture. pp.27-29.

James, Carlton and Rosanne W. Fortner. 1984. *Resource manual for environmental communications, workshop manual for the wider Caribbean*. Barbados: United Nations Environment Programme, Caribbean Conservation Association, and The Ohio State University. 83 pp.

Roth, Robert E., Gary W. Mullins, and Rosanne W. Fortner. 1984. *Barbados environmental education workshop manual for social studies and the environment*. School of Natural Resources, The Ohio State University, and Caribbean Conservation Association, Barbados. 118 pp.

Disinger, John F. and Rosanne W. Fortner. 1982. *Marine and aquatic education*. ERIC Environmental Education Fact Sheet #2. Columbus, OR: ERIC/SMEAC

Fortner, Rosanne W. 1981. The Ohio Hazardous Waste Symposium: Environmental communication through a public meeting. *The Environmental Communicator*. 10(1):9-10.

Fortner, Rosanne W. 1981. *Hazardous Waste: Two Games for Teaching about the Problem*. Columbus: Ohio Cooperative Extension Service. 29 pp.

Fortner, Rosanne W. 1981. Experiences related to oceanic knowledge and attitudes of tenth grade students in Virginia. ERIC Document Reproduction Service No. ED 159023.

Fortner, Rosanne W. 1980. Marine and aquatic education in Ohio: An update. *Ohio Woodlands/Conservation in Action*. 18(2):19.

Fortner, Rosanne W. and Victor J. Mayer. 1980. Teaching about the Great Lakes. *Ohio Woodlands/Conservation in Action*. 19(2):1-12.

Fortner, Rosanne W. 1977. Black gold (Simulation game). In *Award Winning Energy Education Activities*. Washington, DC: National Science Teachers Association.

International Experience

2007 Fortner, R.W., B. Munson and P. Tuddenham, 2007. "Regional science education workshop online through the College of Exploration." In Proceedings: Conference on Computer Based Learning in Science, Heraklion, Crete, June 30-July 6.

2006 Hyonyong Lee and RW Fortner. "International Earth Science Educator's Perceptions of Approaches to K-12 Science Education," NSTA/ICASE International Conference in Anaheim, CA, April 6

2006 Invited team teacher at University of Cyprus: Graduate course in Inquiry Learning for Science Education. Also Keynote presentation at International Conference on Developing an Environmental Education Program for Cyprus. Topic: Infusing EE into the Curriculum.

2004 Invited Presentation. Environmental education status in the United States, 2004. National Institute for Education Research, Tokyo, Japan.

2003 Fortner, R. W., Nicolaou, C., Papaevripidou, M., Pieros, G., and Sevastidou, A. 2003. . Fostering Science Education Objectives With Teacher-Made Computer Games. 6th International Conference on Computer Based Learning in Science. Nicosia, Cyprus: University of Cyprus. [Proceedings v. 1, p. 1066-1075]

2001 Fortner, R.W. (Invited Keynote). Science and technology education: Shaping the environment of the future. Proceedings of the First IOSTE Symposium in Southern Europe, April 29-May 2, 2001, Paralimni, Republic of Cyprus. Vol I, 303-313.

2001 Fortner, R.W. (Invited). Shaping the environment of the future: Innovations in thinking and practice for educators. Conference hosted by KICE (Korea Institute of Curriculum and Evaluation): To improve the methods of teaching-learning and assessment in environmental education. Seoul, 9/6/01. Pp. 209-231.

- 2001 Fortner, R.W. (Invited). Nonformal environmental education in the United States: Current programs and practices. Conference hosted by KFEM (Korea Federation for Environmental Movement): Prospects and status on social environmental education. National Assembly, Seoul, 9/7/01. Pp 73-77.
- 2000 Presentation at Third International Conference on Geoscience Education: Fortner & C.P. Constantinou, 3Potential for Earth Systems Education in Cyprus.2 Sydney, Australia, Jan. 17-21.
- 2000 Fortner, R.W. & Camgoz, O. Environmental Issues in Cyprus: Common Cause for Unity. Proceedings of the Annual Conference of the North American Association for Environmental Education, S. Padre Island, TX. (on CD-ROM). Washington, DC: NAAEE.
- 2000 Fortner, R.W. & Constantinou, C.P. Potential for Earth systems education in Cyprus. In: Australian Geological Survey Organization, Proceedings of the 3rd International Conference on Geoscience Education, Sydney, Australia. 22-25.
- 2000 Lee, Hyonyong, Fortner, R.W. & D.L. Haury. New curriculum reform of science education in Korea. In: Australian Geological Survey Organization, Proceedings of the 3rd International Conference on Geoscience Education, Sydney, Australia. 168-172.
- 2000 Lee, Hyonyong, Park, K., Fortner, R.W. & D.L. Haury. New national secondary science curriculum reform in Korea, and trends and issues of international science curriculum for the 21st Century. In Proceedings of the 31st International Geological Congress, Rio de Janeiro, August 16-20. (on CD-ROM)
- 1999 Fortner, R.W., C.P. Constantinou, & O. Camgoz. (Proceedings in 2000). Cyprus teachers' perceptions of Earth systems and ecological education. International Conference on Geology at School and University, Proceedings. St. Petersburg, Russia: Herzen University. 179-181.
- 1999 Mayer, V.J. & R.W. Fortner. 1999. (Proceedings out in 2000). Reforming the representation of science in pre-college curricula. International Conference on Geology at School and University, Proceedings. St. Petersburg, Russia: Herzen University. 16-17.
- 1999 Senior Fulbright Scholar for Lecturing and Research in Cyprus, January - May. 3Development and evaluation of materials and programs in marine and Earth Systems Education.2 Host institutions: University of Cyprus, Cyprus Ministry of Education, CYMEPA, Eastern Mediterranean University.
- 1998 Proceedings Editor and Program Committee Member for Second International Geoscience Education Conference, Hilo, HI. July 28-Aug.1.
- 1997 Invited Rapporteur for UNESCO program on Innovative Practice in Environmental Education, Thessaloniki, Greece, Dec. 9. "Cooperative learning about global change: Prelude to cooperative action?" UNESCO Conference on Environment and Society, Thessaloniki, Greece. Fortner, R.W. and V.J. Mayer. Dec. 9.
- 1997 "Global science literacy programs for a sustainable future." UNESCO Conference on Environment and Society, Thessaloniki, Greece. Mayer, V.J., R.W. Fortner and A. Tokuyama. Dec. 13.

- 1997 Toronto, Ontario. Education representative at Global Change in the Great Lakes conference.
- 1996 Invited speaker (one of six) at International Science Education Symposium, Korean Association for Research in Science Teaching (KARSE). Presented "Science teachers using the internet" and an interactive workshop on "How people learn science from television."
- 1996 Invited lecturer at Chiayi Teachers College, Taiwan. Presented "A model program for science curriculum development, research and teacher education."
- 1996 Invited lecturer at Tainan Teachers College, Taiwan. Presented "Science teachers using the internet: A global perspective."
- 1995 Invited speaker at Science Teachers Association of Ontario (STAO). Presented "Global climate change in the Great Lakes."
- 1994 Co-Presenter of "Arts and the Earth System" (with V.J. Mayer) and "A preliminary model of evaluation in nonformal EE" (with T. Shretter). NAAEE annual meeting, Cancun, Mexico.
- Author of book with N.J. Smith-Sebasto and G.W. Mullins. Handbook for environmental communication in development. The World Bank, Washington, DC.
- 1993 Presenter of "Innovative teaching approaches in U.S. geoscience education." International Geological Congress, University of Southampton, UK.
- 1992 Consultant to The World Bank. Featured presenter for Environmental Communications Workshop held for the Mediterranean National Environmental Agencies (MEDNEA). Hammamet, Tunisia. (14 countries in attendance.)
- 1992 Represented NAAEE and OSU at the UN's 1992 Global Forum in Rio (NGO component of UNCED).
- 1992 Reviewed environmental programs in formal and nonformal education in Costa Rica national parks, Ministry of Education, Fundacion Neotropica, and La Selva Reserve.
- 1991 Environmental education consultant to Pacific Island Network in Territories of Guam and Saipan.
- 1989-1990 Faculty counterpart for six visiting Indonesian professors as they worked on development of textbooks for use in their college classrooms: environmental health, environmental physics, teacher education.
- 1988 Faculty exchange program, USSR. Presented lectures in chemistry departments of Moscow State University and University of Leningrad. Topic: Toxic chemicals in the Great Lakes of North America.
- 1988 Lecture tour, Republic of Korea. Invited presentations in three cities on topic of "Global Environmental Issues: An agenda for science teachers."

1987-91 Editor of *The Biosphere*, newsletter of the International Society for Environmental Education, circulation 1200.

1987-8 Faculty counterpart to four Indonesian scholars on sabbatical to US to write textbooks in environment, ecology, marine biology

1987 Korean Science Teachers Institute: 31 Korean biology teachers at Ohio State for one month to update science content and demonstrate alternative teaching techniques.

1987 Evaluator and preface developer for acid rain software developed for the Quebec Ministry of the Environment.

1986 Author of *Coral Conservation Game*, for World Wildlife Fund and RARE, Inc., for the Wider Caribbean. In Spanish and English.

1985 & 1987 Invited lecturer: International Wildlife Filmmakers Symposium, Bath, England

Professional Societies

American Association for the Advancement of Science

Executive Secretary for Education, 2000-2004; Fellow, 1992; Symposium Coordinator 1996 (School Crossings on the Information Superhighway); Symposium Coordinator 2007 (Reaching out for Ocean Science: The COSEE Model)

National Marine Educators Association

President, 1988-1989; Chair, Professional Development Committee, 1986-1988; NAEE Liaison, 1981; AAAS Liaison, 1996-present; Curriculum Committee, 1980-1981; Board of Directors, 1979-1981

International Association for Great Lakes Research

2009 Vallentyne Award for Outreach; Associate Editor for Education, JGLR 2003- 2005

Sigma Xi

Advisory Council Member, 1998-2002

North American Association for Environmental Education (NAAEE)

US Chair, 40th Annual Conference 2011; Jeske Award 2011; Research Award 1992; Commission for EE Research, 1989-present; Board of Directors 1986-1989

Ohio Academy of Science

Fellow, 1992; Executive Committee, 1986-1987; Vice-President of Conservation Section, 1985-1987

Consortium of Aquatic and Marine Educators of Ohio

Board of Directors, 1982-1988

National Science Teachers Association

National Earth Science Teachers Association

Oak Island Beach Preservation Society

Advisory Board, 2008-present

Environmental Educators of North Carolina [EENC]

2008 Conference Committee

Offices and Honors

Fulbright Senior Scholar in Cyprus, 1999

Walter E Jeske Award for contributions to Environmental Education, North American Association for Environmental Education, 2011

Vallentyne Award for Outreach, International Association for Great Lakes Research, 2009 [first living recipient]

Pillars of Environmental Education award, Environmental Education Council of Ohio, 2012

William Arnold Award, Science Education Council of Ohio, 2006

Distinguished Teaching Award, College of Food, Agricultural & Environmental Sciences 2004

Friend of Science Award, Science Education Council of Ohio, 1997

Distinguished Service Award for Research, Leadership and Dedication. Ohio Sea Grant, 1997
Research award, NAAEE, 1992

Distinguished Professor of Natural Resources (1st award by SNR Alumni Association, 1991)

Alumna of the Year, VPI & SU College of Education, 1989

Phi Beta Kappa, Alpha of WV Chapter

Sigma Xi Scientific Honorary

Kappa Delta Pi Education Honorary

Phi Kappa Phi Scholastic Honorary

Gamma Sigma Delta Agriculture Honorary

NMEA President's Award for contributions to marine education, 1986

Listed in Who's Who in Technology, American Men and Women of Science, Who's Who in Education, and Who's Who in the World (Millennial Edition)

Editorships

Associate Editor, Journal of Great Lakes Research, 2000-present

Executive Editor, Science Activities, 1990-2012

Consulting Editor, Journal of Environmental Education, 1987-present

Editorial Board, Ohio Journal of Science, 1986-1988

Editorial Board, Science Activities, 1987-1990

Editor, Middle Sea, Newsletter of Ohio Sea Grant Education Program, 1979-1987

Editor, Sweetwater Seascape, Newsletter of Consortium of Aquatic and Marine Educators of Ohio, 1988 and 2005-present

Funded Research Grants and Contracts

Completed Grants

Great Lakes Center for Ocean Sciences Education Excellence [COSEE Great Lakes]. NSF and NOAA, NSF #0528674 NOAA #NA06OAR4170017. PI Don Scavia, Co-PI and Project Director Rosanne W. Fortner, 12/15/05-12/14/2010, \$2,499,738

Great Lakes Teacher Education: High Tech/High Touch Learning. NOAA, Office of Sea Grant, #NA16RG2252. PI Rosanne W. Fortner. 3/1/05 – 2/28/07. \$110,352.

2001-2006 Expanding delivery modes for education about Great Lakes systems. NOAA, Office of Sea Grant, #NA16RG2252. PIs Rosanne W. Fortner and Joseph L. Arvai. \$151,192.

2002 - 2004 Lake Erie distance education from F.T. Stone Laboratory. US EPA Region V. \$21,762

2001- 2004 ESCAPE from exotics (E/NIS-3). NOAA, ANS Outreach and Education. \$57,054

2005- 2007 Great Lakes teacher education: High-tech, High-touch learning. NOAA, National Sea Grant College Program. \$115,384

2002- 2006 Ohio Sea Grant College Program: Expanding delivery modes for education about Great Lakes systems (E/TER-2). NOAA, National Sea Grant College Program. \$151,171

2001- 2004 Digital and field technologies for coastal environmental studies. NSF-DUE Course, Curriculum and Lab Improvement. \$74,955

2005 A multiscale Bayesian framework for the life cycle inventory of industrial materials – the case of transportation fuels [co-PI for education]. NSF-DMI Materials use, science and society. Co-PI w/Bakshi

2002-2007 Environmental data for teaching about Great Lakes pollution prevention. OARDC. \$5000

1999-2001 Exotic Aquatics on the Move: Materials and training for teachers of Geography. NOAA, Aquatic Nuisance Species Initiative. Ohio Component of a national project.

1998-2000 Development of Internet-linked Instructional Materials and Teacher Education Research for Earth Systems Education about the Great Lakes. NOAA and State of Ohio. \$91,625 and \$26,639

1997-2004 The BRIDGE for marine education. Great Lakes Regional Component of a national project. National Ocean Partnership Program through Virginia Institute of Marine Science. \$6000/Year for internet site development.

1997-2002 Student Centered Learning Initiative (SCLI) for the College of Agriculture. Kellogg Foundation. \$1500 per year, 5 years.

1997-1998

- Lake-aware kids engaged in relevant science. OH environmental Protection Agency. \$7,435
- An ecological communicator's guide to wildland fire--research, development, and peer review. Forest Service. \$29,115 (w/Mullins)
- Ohio Sea Grant College Program. Exotic Species Day Camp: A Regional Teacher Training Initiative. NOAA. \$9,122
- Antarctic Science and Policy - Interdisciplinary Research Education (ASPIRE). NSF. ~\$141,000 (w/Paul R. Berkman)

1996-1998 Development of demonstration schools for Great Lakes education; Ohio Sea Grant Education Program. Fortner and Mayer. NOAA: US Dept. of Commerce. \$89,000 federal and \$14,400 State of Ohio.

1997 Using Great Lakes education materials and methods for meeting the Ohio Model for Competency Based science Education. Ohio Board of Regents, Eisenhower Program. \$48,750.

1995-1996 Walter Knauss Legislative Internship for Tony P. Murphy. Reutter and Fortner. NOAA, U.S. Department of Commerce. \$36,000.

1994-1996 Cooperative teacher enhancement and curriculum development for the Earth System: Ohio Sea Grant Education Program. Fortner and Mayer. NOAA, US Dept. of Commerce. \$104,000.

1993-1996 Environmental data for teaching about Great Lakes pollution prevention. Cooperative support from Great Lakes Protection Fund, The George Gund Foundation and Canadian Studies Program of the US. \$310,000.

1994-1995 Metaevaluation of the formative evaluation model for the USDA Forest Service Urban Tree House. Mullins, Fortner and Schretter. USDA Forest Service. \$11,500.

1992-1995 Curriculum development for interdisciplinary global change education. NOAA, Office of Sea Grant. \$94,000.

1990-1995 Program for Leadership in Earth Systems Education. Mayer and Fortner. National Science Foundation. \$1,400,000.

1993-1994 Enhancing high school science teachers' capabilities in Earth Systems Education. Eisenhower Program. \$52,500.

1992-1993 A course providing public information for environmental decision making. Fortner and Heimlich. Ohio Environmental Education Fund, Ohio EPA. \$20,000.

1991-1992 Women and Natural Resources in the 1990s: A decade of opportunity. Floyd and Fortner. OSU Affirmative Action Grant. \$7250.

1990-1992

- Secondary science curriculum modules for global change education. Mayer and Fortner. NSF \$115,000.
- Global Environmental Change in the Great Lakes: Information for Educators and Advisory Services. NOAA, Office of Sea Grant. \$72,800.

1989-1990 "Teacher training and curriculum development using remote sensing and online databases." Fortner. \$52,281. Eisenhower Math and Science Education Program, through the Ohio Board of Regents.

1988-1990 Teacher awareness of Great Lakes issues. Fortner and Mayer. October 1988 - December 1990. NOAA, Office of Sea Grant. \$54,000.

1989-1990 Using television to enhance public information about the Great Lakes. Fortner and Mayer. The George Gund Foundation. \$24,030.

1989 Curriculum development to accompany The Great Lakes Atlas. May - September 1989. U.S. EPA Region V and Lake Michigan Federation. \$8,500.

1987-1988

- Graduate Program in Aquatic Education. September 1987 - December 1988. NOAA, U.S. Dept. of Commerce, \$6,000 plus State of Ohio, \$15,000.
- Adaptation of media for use in Biosphere Reserves. Davis, Mullins, and Fortner. November 1987 - September 1988. U.S. Dept. of State. \$16,000.
- "Internship in U.S. Congress." NOAA support for Marjorie Pless in U.S. House of Representatives. \$30,000.
- 1987-1988 "Interpreting biological diversity issues." Mullins and Fortner. \$10,000. U.S. National Park Service.

1986-1987

- "The Great Lake Erie: A reference text for educators and communicators." Fortner and Mayer. \$15,000. The George Gund Foundation.
- "Evaluation of the effectiveness of some on-site components of the Old Woman Creek National Estuarine Sanctuary education program." Fortner, Mullins, Mayer. \$9999. National Estuarine Sanctuary Program, U.S. Department of the Interior.

1986-1988 Audiovisual preparation for public education. Davis, Mullins, and Fortner. U.S. Dept. of State. \$10,000.

1986-1988 Public education and Biosphere Reserves. Mullins, Davis, and Fortner. U.S. Dept. of State. \$8,000.

1983-1988 The Ohio Sea Grant Education Program, Ohio Sea Grant. 5-year total \$201,087.

1984-1986 "Development of a Lake Erie Visitors Center at F.T. Stone Laboratory." Fortner, Mullins, Roth. \$2000. Ohio Sea Grant.

1983-1984 "A microcomputer for environmental communications." College of Agriculture Grant-in-Aid, The Ohio State University. \$4800.

1983-1984 "Establishment of a microcomputer software library for environmental education." Teaching-Learning Grant, The Ohio State University. \$1970.

1983-1984 "Effectiveness of a curriculum innovation model for statewide marine and aquatic education." Mayer and Fortner. \$17,500. Ohio Sea Grant.

1981-1983 "Marine and Great Lakes education: An infusion program for Ohio schools." Mayer, Hug and Fortner. \$108,600. Ohio Sea Grant.

1981-1982 "Effectiveness and perception of information sources: A comparison of classroom instruction and television." Spencer Foundation. \$2300.

1981-1982 "Effects of a Cousteau television special on environmental knowledge and attitudes." University Small Research Grant, The Ohio State University. \$4850.

1981-1982 "Great Lakes information through museum programming." Fortner and Mayer. \$5100. Ohio Sea Grant.

1980-1981 "Public awareness of Lake Erie: A radio program." \$11,500. Ohio Sea Grant.

1979-1980 "Baseline studies for Marine and Great Lakes Education." \$2500. Ohio Sea Grant.

1979-1980 "Oceanic Education Activities for Great Lakes Schools." Mayer and Fortner. \$36,900 Ohio Sea Grant.

Graduate Advising

Completed PhDs in Natural Resources (Advisor)

2007 Chankook Kim
2005 Hongxia Duan
2003 Samantha J. Romanello
2001 Jeffrey R. Corney
2001 Albert J. Lewandowski
2000 Jae-Young Lee

Completed PhDs in Science Education (Advisor)

2002 Hyonyong Lee (Co-Advisor)
1998 Bao-Lian Chang
1996 Anthony P. Murphy
1995 Richard J. Jurin
1995 David E. Todt
1995 Teresa Coker (Co-advisor)
1994 Carmen E. Trisler
1993 Joyce Meredith-Gill (Co-advisor)
1992 Nicholas J. Smith-Sebasto
1989 Claudia T. Mclear

46 MS programs advised in Science Education, Natural Resources and Environmental Science, 1980-2008