

HRRC



Annual Report 1999

HAZARD REDUCTION & RECOVERY CENTER
A UNITED NATIONS COLLABORATIVE CENTRE
TEXAS A&M UNIVERSITY

Annual Report

1999

Hazard Reduction & Recovery Center

The Hazard Reduction & Recovery Center (HRRC) was established within the College of Architecture at Texas A&M University in the fall of 1988. This annual report covers the HRRC's activities for the calendar year of 1999. This year marked the eleventh anniversary of the HRRC's existence.

HRRC now has three senior staff (Director, Michael Lindell; Founding Director and Senior Scholar, Dennis Wenger; and Extension Division Coordinator, David Bilbo); five technical staff members (Research Scientist, Carla Prater; Senior Research Associates, Gregory Schumann and William Sanderson; Systems Analyst, Rong Hu; and Staff Assistant, Ruth Yeager. In addition, there are four senior Faculty Fellows (Benigno Aguirre, Dale Perry, George Rogers, and Norris Stubbs), a Research Librarian (Brian Carpenter), and eight Faculty Fellows (Sherry Bame, David Ekroth, John Giardino, Charles Graham, Jon Rodiek, Daniel Sui, John Thomas, and Paul Woods). The faculty fellows have appointments (some of them joint appointments) in the departments of Landscape Architecture and Urban Planning (5), Construction Science (3), Architecture (3), Geography (2), Civil Engineering (1), and Sociology (1).

Other members of the HRRC include six Associate Faculty Fellows (Philip Berke, University of North Carolina, Chapel Hill; Bruce Hull, Virginia Polytechnic Institute & State University; Jack Kartez, University of Southern Maine; Rocky Lopes, American Red Cross; Ronald Perry, Arizona State University; and David J. Whitney, California State University at Long Beach). There were four graduate students affiliated with HRRC from the Master's program in Urban Planning (Jeff Bryan, Laurie Cummings, Choong-hyun Jeong, and Ju Chul Jung) and two from the Master's program in

Construction Management (Ting-Shiuan Kwei and Jong-Tae Kim). There also were four students from the Ph.D. program in Urban and Regional Science (Kevin Grady, Seong Nam Hwang, Hee Min Lee, and Jie Ying Wu) and one from the Ph.D. program in Architecture (H. Gene Robertson).

HRRC has a ten member National Advisory Panel consisting of Raymond Burby, University of New Orleans; Thomas Drabek, University of Denver; David Gillespie, Washington University; Myra Lee, Oregon Emergency Management; Peter May, University of Washington; Kishor Mehta, Texas Tech University; Joanne Nigg, University of Delaware; William Riebsame, University of Colorado; Patrick Lavalla, The Emergency Response Institute; and Mary Fran Myers, University of Colorado.

HRRC Research Projects

HRRC continued its relationship with the United Nations Department of Humanitarian Affairs as a *Collaborating Centre*, and undertook projects for the National Science Foundation, and the Texas Department of Public Safety Division of Emergency Management.

Continuing Projects

Bame, S., Autenrieth, R., Donnelly, K.C., Morgan, R., Ramos, K., Richardson, B., Rogers, G., Sherman, M. *ESRD and Exposure to Nephrotoxins in Drinking Water*. National Institutes of Health/National Institute for Environmental Health Sciences. 06/98-06/99. \$15,000.

Lindell, M.K., Principal Investigator, *Adoption of Earthquake Hazard Adjustments by Households and Complex Organizations*, sponsored by the National Science Foundation. 09/96-12/01, \$399,775.

Stubbs, N., Principal Investigator, *Evaluating the Impact of Alkali-Silica Reactive Aggregation of Bridges Using Modal Parameters*, sponsored by the California Department of Transportation. 7/97-6/99, \$78,000.

Wenger, D.E., Co-Principal Investigator, *Organization-based Post Disaster Sheltering and Housing of Low Income and Minority Groups*, sponsored by the National Science Foundation. 06/97-12/00, \$290,000.

Lindell, M.K. and Graham, C.W., Co-Principal Investigators, *Texas Hurricane Shelter Survey*, sponsored by the Texas Department of Public Safety, Division of Emergency Management. 10/98-09/99, \$228,542.

Schumann, G.C., Principal Investigator, *Hurricane Contingency Study for the Brownsville Study Area*, Sponsored by the Texas Department of Public Safety, Division of Emergency Management. 10/98-09/99, \$72,500.

Schumann, G.C., Principal Investigator, *Hurricane Contingency Study for the Lake Sabine Study Area*, Sponsored by the Texas Department of Public Safety, Division of Emergency Management. 10/98-09/99, \$72,500.

Schumann, G.C., Principal Investigator, *Hurricane Evacuation Study for the Corpus Christi Study Area*, Sponsored by the Texas Department of Public Safety, Division of Emergency Management. 10/98-09/99, \$72,500.

Schumann, G.C., Principal Investigator, *Update to the Hurricane "Damage Estimate Ranges & Casualties (DERC)" Computer Model*, Sponsored by the Texas Department of Public Safety, Division of Emergency Management. 10/98-09/99, \$10,000.

Schumann, G.C., Principal Investigator, *Development of a Hurricane Planning Website*, Sponsored by the Texas Department of Public Safety, Division of Emergency Management. 10/98-09/99, \$12,000.

Schumann, G.C., Principal Investigator, *Publication of a Spanish Hurricane Awareness Brochure*, Sponsored by the Texas Department of Public Safety, Division of Emergency Management. 10/98-09/99, \$7,500.

Schumann, G.C., Principal Investigator, *Update to the Hurricane "Estimated Safe Time for Evacuation Decisions (ESTED)" Computer Model*, Sponsored by the Texas Department of Public Safety, Division of Emergency Management. 10/98-09/99, \$600.

Schumann, G.C., Principal Investigator, *Integration of Storm Surge Penetration Data into a GIS Database*, Sponsored by the Texas Department of Public Safety, Division of Emergency Management. 10/98-09/99, \$14,000.

Schumann, G.C., Principal Investigator, *Publication of Hurricane Evacuation Host Area Maps*, Sponsored by the Texas Department of Public Safety, Division of Emergency Management. 10/98-09/99, \$9,200.

Schumann, G.C., Principal Investigator, *Publication of Coastal Hurricane Risk Area Maps*, Sponsored by the Texas Department of Public Safety, Division of Emergency Management. 10/98-09/99, \$4,375.

Schumann, G.C., Principal Investigator, *Participation in the Activation of the State Emergency Operations Center in Response to Hurricanes*, Sponsored by the Texas Department of Public Safety, Division of Emergency Management. 10/98-09/99, \$25,000.

Lindell, M.K., Principal Investigator, *Texas Hazard Analysis Information Website: Phase I*, sponsored by Texas Division of Emergency Management, 07/99-09/99, \$10,340.

New Projects

Bame, S., Autenrieth, R., Donnelly, K.C., Morgan, R., Ramos, K., Richardson, B., Rogers, G., Sherman, M. *Drinking Water Nephrotoxins and ESRD Risk in Texas*. Southern Arizona Foundation. 06/99-06/00. \$24,953.

Bame, S. & Richardson, B. *Cancer Risk in Texas*. TAMU College of Architecture. 06/99-06/00. \$5000.

Lindell, M.K., Principal Investigator, *Texas Hazard Analysis Information Website: Phase II*, sponsored by Texas Division of Emergency Management, 10/99-09/00, \$66,412.

Schumann, G.C., Principal Investigator, *Update to the Hurricane Contingency Studies for all Jurisdictions on the Texas Coast*, Sponsored by the Texas Department of Public Safety, Division of Emergency Management. 10/99-09/00, \$95,000.

Schumann, G.C., Principal Investigator, *Evacuation Response Behavioral Study for all Jurisdictions on the Texas Coast*, Sponsored by the Texas Department of Public Safety, Division of Emergency Management. 10/99-09/00, \$95,000.

HRRC Publications and Presentations

During 1999, HRRC staff produced 1 book, 1 scientific journal special issue, 9 articles in scientific journals, and 20 technical reports. In addition, the staff made 16 presentations at scientific and professional meetings.

Books, Monographs, and Book Chapters

Tierney, K.J., Lindell, M.K. & Perry, R.W. (in press). *Facing the Unexpected: Disaster Preparedness and Response in the United States*. Washington DC: Joseph Henry Press.

Journal Articles and Conference Proceedings

Lindell, M.K. & Brandt, C.J. (1999). Assessing interrater agreement on the job relevance of a test: A comparison of the CVI, T, $r_{WG(j)}$ and r_{WG}^* indexes. *Journal of Applied Psychology*, 84, 640-647.

Lindell, M.K., Brandt, C.J. & Whitney, D.J. (1999). A revised index of agreement for multi-item ratings of a single target. *Applied Psychological Measurement*, 23, 127-135.

Lindell, M.K. & Whitney, D.J. (in press). Correlates of seismic hazard adjustment adoption. *Risk Analysis*.

Lindell, M.K. (in press). Assessing and testing interrater agreement on a single target using multi-item rating scales. *Applied Psychological Measurement*.

Lindell, M.K. & Brandt, C.J. (in press). Climate quality and climate consensus as mediators of the relationship between organizational antecedents and outcomes. *Journal of Applied Psychology*.

Lindell, M.K. & Perry, R.W. (in press). Household adjustment to earthquake hazard: A review of research. *Environment & Behavior*.

Lindell, M.K. & Whitney, D.J. (in press). Accounting for common method variance in cross-sectional research designs. *Journal of Applied Psychology*.

Prater, C.S. & Lindell, M.K. (in press). The politics of hazard mitigation. *Natural Hazards Review*.

Whitney, D.J. & Lindell, M.K. (in press). Member commitment and participation in Local Emergency Planning Committees. *Policy Studies Journal*.

Other Publications

Bame SI, Brizzolara J, Borek C, Head J, Kutil C, & Norris R. (1999). *Cancer: Need, Supply, Technology, Cost*. College Station TX: Texas A&M University Department of Urban Planning and George Bush School of Government.

Conklin, C. & Edwards, J. (1999). *Selection of Protective Action Guides for Nuclear Incidents*. College Station TX: Texas A&M University Hazard Reduction & Recovery Center.

- Ekroth, David C. (1999). *Flood mitigation for homeowners: A guideline on elevating residential buildings*. College Station TX: Texas A&M University Hazard Reduction & Recovery Center.
- Ford, J.K. & Schmidt, A. M. (1999). *Emergency Response Training: Strategies for Enhancing Real-World Performance*. College Station TX: Texas A&M University Hazard Reduction & Recovery Center.
- Hwang, Seong Nam, (1999). *An Analysis of State emergency management agencies' Hazard Analysis Documents on the Internet*. College Station TX: Texas A&M University Hazard Reduction & Recovery Center.
- Kwei, Ting-Shiuan. (1999). *Wind damage mitigation: Structure Adjustments for Wood-frame Construction in Hurricanes*. College Station TX: Texas A&M University Hazard Reduction & Recovery Center.
- Lindell, M.K. (1999). *An Overview of Protective Action Decision Making for a Nuclear Power Plant Emergency*. College Station TX: Texas A&M University Hazard Reduction & Recovery Center.
- Lindell, M.K. (1999). *Indexes of Agreement for Polytomous Ratings of a Multi-rater, Multi-Target Matrix*. College Station TX: Texas A&M University Hazard Reduction & Recovery Center.
- Lindell, M.K. & Prater, C.S. (1999). *Household Adoption of Seismic Hazard Adjustments: A Comparison of Residents in Two States*. College Station TX: Texas A&M University Hazard Reduction & Recovery Center.
- Lindell, M.K. Graham, C.W. & Sanderson, W.G. (1999). *Hurricane Evacuation Shelter Project: Final Report*. College Station TX: Texas A&M University Hazard Reduction & Recovery Center.
- McKenna, T. J. (1999). *Protective Action Recommendations Based Upon Plant Conditions*. College Station TX: Texas A&M University Hazard Reduction & Recovery Center.
- Mileti, D. S. & Peek, L. (1999). *The Social Psychology of Public Response to Warnings of a Nuclear Power Plant Accident*. College Station TX: Texas A&M University Hazard Reduction & Recovery Center.
- Schumann, G.C. (1999). *Contra-Flow Strategies for Hurricane Evacuation on Interstate 37*. College Station TX: Texas A&M University Hazard Reduction & Recovery Center.
- Schumann, G.C. (1999). *Hurricane Contingency Planning Guide – Lake Sabine Study Area*. College Station TX: Texas A&M University Hazard Reduction & Recovery Center.
- Schumann, G.C. (1999). *Official's Guide for Hurricane Preparedness - Lake Sabine Study Area*. College Station TX: Texas A&M University Hazard Reduction & Recovery Center.
- Schumann, G.C. (1999). *Hurricane Contingency Planning Guide – Brownsville Study Area*. College Station TX: Texas A&M University Hazard Reduction & Recovery Center.
- Schumann, G.C. (1999). *Official's Guide for Hurricane Preparedness - Brownsville Study Area*. College Station TX: Texas A&M University Hazard Reduction & Recovery Center.
- Urbanik, T. (1999). *Evacuation Time Estimates for Nuclear Power Plants*. College Station TX: Texas A&M University Hazard Reduction & Recovery Center.
- Whitney, D.J., Dickerson, A. & Lindell, M.K. (1999). *Non-structural Seismic Preparedness of Southern California Hospitals*. College Station TX: Texas A&M University Hazard Reduction & Recovery Center.
- Wenger, D. E. (1999). *The Enabling Project: Final Report*. College Station TX: Texas A&M University Hazard Reduction & Recovery Center.

Presentations

Bame S., Donnelly K.C., Morgan R., Richardson, B., Ramos K., Autenreith, R., Harriss, R., Rogers G., & Sherman, M. (1999). *ESRD Risk and Environmental Toxins in Texas: Metal Toxins in Environmental Water Systems*. NIH-NIEHS Regional Center Conference. College Station TX.

Bilbo, D.L. (1999). *Community Disaster Education: Innovations and Opportunities*. Red Cross National Leadership Conference, St. Louis MO.

Lindell, M.K. (1999). *Hazard Reduction and Recovery: Foundation for Reconstruction and Transformation*. Conference on Reconstruction and Transformation of Central America. Texas A&M University, College Station TX.

Lindell, M.K. (1999). *Prevention Pays: But How Do We Get People to Invest?* University of North Texas World Disaster Reduction Day, Denton TX.

Lindell, M.K. (1999). *Recent Developments in Assessing Interrater Agreement*. Center for the Advancement of Research Methods and Analysis Mini-Conference on Research Methods for Organizational and Social Psychology. Virginia Commonwealth University, Richmond VA.

Lindell, M. K., Schumann, G., Blakely, C., and Sanderson, W. (1999). *Development of a Hazard Analysis Website for Local Planners and Citizens*. International Workshop on Next Generation Internet Applications sponsored by the U.S. National Science Foundation and the Taiwanese National Science Council at the National Center for High-Performance Computing, Hsinchi Taiwan.

Lindell, M.K. (1999). *A Rapid Approximate Protective Action Decision (RAPAD) Table for Nuclear Power Plant Accident Response*. Federal Emergency Management Agency Technology Partnership for Emergency Management Workshop and Exhibition, Gatlinburg TN.

Lindell, M.K. (1999). *Assessing and Testing Interrater Agreement in Multi-item Rating Scales*. Society for Industrial and Organizational Psychology, Atlanta GA.

Lindell, M. K. (1999). *Correlates of Seismic Hazard Adjustment*. International Workshop on Community Hazards Awareness and Hazards Mitigation Learning sponsored by the Taiwanese National Science and Technology Program for Hazards Mitigation at National Taiwan University, Taipei Taiwan.

Lindell, M.K. and Prater, C.S. (1999). *Household Adoption of Seismic Hazard Adjustments: A Comparison of Residents in Two States*. Hazards Research and Applications Workshop, Boulder CO.

Prater, C.S. (1999). *Politics of Hazard Mitigation*. International Workshop on Community Hazards Awareness and Hazards Mitigation Learning sponsored by the Taiwanese National Science and Technology Program for Hazards Mitigation at National Taiwan University, Taipei Taiwan.

Schumann, G.C. (1999). *Hurricane Evacuation Decision-Making*. Texas Gulf Coast Emergency Management Association Conference, Victoria TX.

Schumann, G.C. (1999). *Impact Assessment for Hurricane Bret*. State Disaster Committee, State Emergency Operation Center, Division of Emergency Management, Austin TX.

Schumann, G.C. (1999). *Hurricane Evacuation Planning*. Calhoun County Emergency Management Conference.

Wenger, D. E. (1999). *Issues in Cross-Cultural Research on Disasters*. American Sociological Association, Chicago IL.

Wenger, D. E. (1999). *Recovery from Disaster: The Current State of Our Research Findings and Future Directions for Investigation*. National Conference on Flood Recovery, San Antonio TX.

Professional Activities and Awards

HRRC staff have been actively involved in professional activities and several individuals have received peer recognition for their work.

Sherry Bame was a member of the NIH/CDC Scientific Review Panel.

David Bilbo accepted an appointment as the Chair of the National Disaster Education Committee for the *American Red Cross*. This committee recently received a \$1,000,000 grant from Allstate Insurance Co. to support the development and evaluation of the "Masters of Disaster" curriculum for the public schools.

Michael Lindell served as a member of a peer review panel for the Environmental Protection Agency, Office of Research and Development and recently completed an appointment as Special Issue Editor for the *Journal of Hazardous Materials*. He also was appointed as a member of the *Policy Committee* and Secretary of the *Executive Committee* of the American Society of Civil Engineers Council on Natural Disaster Reduction.

Carla Prater and Michael Lindell are the Co-Chairs, and Ruth Yeager is the Staff Assistant for the *Natural Hazards Researchers' Summer Workshop*.

Gregory Schumann was selected to attend the *1999 Hurricane Planning Workshop*, appointed to the *Texas Coastal Advisory Committee*, and served as Technical Consultant to State of Texas, Division of Emergency Management during Activation for Hurricane Bret. He also was appointed to the Texas Department of Transportation's *Hurricane Evacuation Committee*, and to its *Subcommittee on Traffic Contra-flow Strategies*. Finally, he was awarded the 1999 Presidential Citation from the *Texas Gulf Coast Emergency Management Association* and elected to the Association's Board of Governors.

HRRC Hazard Analysis Laboratory (HAL)

Under the sponsorship of the Texas Department of Public Safety Division of Emergency Management, HRRC staff have developed a Hurricane Storm Atlas. The Atlas consists of a series of maps depicting storm surge penetration, storm surge MEOWS (Maximum

Envelope of Water), wind fields and high velocity zones indicating areas in which waves over three feet are possible. Also included in the Atlas are impact statements for all facilities determined to be critical or essential in an emergency, location maps illustrating the location of all facilities throughout the study area, and estimated tidal conditions resulting from hurricane landfall at various points along the coast. In addition, a Hurricane Contingency Planning Guide and two computer programs have been developed. The first program, ESTED-TX, is used to estimate the safe time remaining before evacuation decisions must be made for the Texas Coast. Another program, DERC-TX, is used to compute damage estimate ranges and casualties from hurricanes on the Texas Coast. HRRC staff have made an extensive effort to integrate GIS Database capabilities as part of these projects and will continue to do so in the coming year.

HRRC Outreach Activities

During 1999, HRRC staff were actively involved in international outreach activities. HRRC staff hosted a visit by five members of the Taiwanese National Science and Technology Program for Hazards Mitigation (NAPHM) during the Winter of 1999 and HRRC staff reciprocated twice during the Summer of 1999. NAPHM and HRRC are in the process of formalizing their relationship through a Memorandum of Agreement that will be signed by the respective center directors and university presidents.

HRRC staff also participated in the organization of a conference on "The Reconstruction and Transformation of Central America", a conference designed to assist the four countries most severely affected by Hurricane Mitch. Carla Prater and Mike Lindell are collaborating with the TAMU Latin American Studies Program to sponsor a student group to organize relief efforts and provide support to international students when their countries are struck by disasters.

Other Faculty Involvement

During the summer of 1999, HRRC managed a building safety survey of Hurricane Evacuation Shelters throughout the state of Texas. This project needed faculty members with skills in architecture, engineering, or building

construction. Two of the HRRC Faculty Fellows with relevant skills, David Ekroth and Charles Graham, served on the project. In addition, the center recruited Bruce Bateman, Richard Burt, Ifte Choudhury, Nancy Holland, and David Hudson from the Construction Science department to lead inspection teams.

Graduate Student Development

During 1999, two graduate students associated with HRRC completed their dissertations. Dr. Min Sun Eoh returned to Korea, while Dr. Carla Prater became a Research Scientist within HRRC. Dr. Jy-Pyng Sah, who had remained with HRRC for a year after completing his Ph.D., returned to a faculty position in Taiwan. Seong Nam Hwang finished his Master's degree in Urban Planning and continued on into the Ph.D. program.

During Spring Semester, the members of the Disaster Response Planning class conducted an appraisal of emergency preparedness at the NASA Johnson Space Center. This activity was followed up by a paid internship for one of the students (Jeff Bryan) at JSC during the summer.

During the summer, ten graduate and six undergraduate students were recruited to work on the Hurricane Evacuation Shelter Survey. Students gained field experience during their evaluation of over 350 hurricane shelters throughout the state.

Immediately before the beginning of the Fall Semester, the HRRC staff held an orientation for new and returning students. Following a crash course in disaster research and emergency management, the students were formed into teams to solve a practical emergency planning problem.

During December, Bill Sanderson organized and led a group of eight graduate students on a tour of hazards-related agencies in Washington DC and New York City. Students received information about the typical job duties and recommended course preparation for careers in these agencies.

HRRC Library Development

During 1999, HRRC concluded an agreement to transfer its holdings on hazards and disasters to

the Evans Library as a special collection. Most of the HRRC holdings, currently totalling more than 20,000 items, will be dispersed physically throughout the stacks. Unusual items of historical interest will be transferred to the Cummings historical collection. Regardless of their physical location, all items from the HRRC Library will be listed together as a special intact collection in the Evans Library's electronic catalogue. This transfer to the Evans Library will provide a greater number of faculty and students with access to HRRC holdings.

In addition, the Evans Library established one of its Research Librarians, Brian Carpenter, as the point of contact for HRRC faculty, staff, and students. Brian has been conducting specialized training classes for HRRC and also supports the center with acquisitions of hazards-related books and periodicals.

HRRC Space and Computer Resources

During 1999, HRRC reorganized the space allocated to student workstations. The HRRC Library shelves were moved out and replaced by desks for graduate students and tables for a new conference area. This allowed the previous conference room to be converted to office space for HRRC technical staff. Four new computers, a printer, and a scanner were purchased last year, providing a computer for each of the twelve student workstations.

HRRC Publication List

The HRRC Publication List now includes 24 books and monographs, 218 journal articles and book chapters, 62 research reports, and 53 preliminary papers. In addition, slide collections and computer software are available from HRRC. The Center continues to receive extensive orders from the public, officials and other researchers, as well as to exchange publications with the University of Delaware Disaster Research Center, the University of Colorado Natural Hazard Research and Applications Information Center, and the United Nations Department of Humanitarian Affairs.

HRRC Web Site

The HRRC Web Site continues to undergo extensive revision. The HRRC publication list, summaries of current projects, staff vitae and selected publications are accessible from the Web <<http://hrrc.tamu.edu>>. In addition, we have developed an extensive listing of national and international hazards-related centers and also have established links to all 50 state Emergency Management Agency websites.

HRRC Lecture Series

During 1999, HRRC staff continued to present a series of weekly lectures on the Texas A&M campus. This year's presentations have focussed on the development of graduate students' knowledge of social and political processes relevant to environmental hazard management. In addition, the presentations have addressed the development of technical skills in the areas of interviewing, attitude theory and measurement, and statistical analysis.

Hazard Reduction & Recovery Center Personnel

Administration

Michael K. Lindell, Center Director
Dennis Wenger, Founding Director and Senior Scholar
David Bilbo, Extension Division Coordinator
Carla Prater, Research Scientist
William Sanderson, Senior Research Associate
Rong Hu, Systems Analyst
Ruth Yeager, Staff Assistant

Senior Faculty Fellows

Benigno Aguirre, Sociology
Dale Perry, Architecture
George Rogers, Landscape Architecture and Urban Planning
Norris Stubbs, Civil Engineering

Faculty Fellows

Sherry Bame, Landscape Architecture and Urban Planning
Brian Carpenter, Evans Library
David Ekroth, Architecture
John Giardino, Geography
Charles Graham, Construction Science and Architecture
Jon Rodiek, Landscape Architecture and Urban Planning
Daniel Sul, Geography
John Thomas, Texas Agricultural Extension Service
Paul Woods, Construction Science

Associate Faculty Fellows

Philip R. Berke, University of North Carolina at Chapel Hill
R. Bruce Hull IV, Virginia Polytechnic Institute and State University
Jack D. Kartez, University of Southern Maine
Rocky Lopes, American Red Cross National Headquarters
Ronald W. Perry, Arizona State University
David J. Whitney, California State University at Long Beach

National Advisory Panel

Raymond Burby, University of New Orleans
Thomas E. Drabek, University of Denver
David Gillespie, Washington University
Myra Lee, Oregon Emergency Management
Peter May, University of Washington
Kishor Mehta, Texas Tech University
Joanne Nigg, University of Delaware
Patrick L. Lavalla, The Emergency Response Institute, Inc.
Mary Fran Myers, University of Colorado

Graduate Research Associates

Jeff Bryan
Laurie Cummings
Kiran Darapuriddy
Kim Gallindo
Saritha Goll
Bhargav Goswami
Kevin Grady
Seong-Nam Hwang
Choong-hyun Jeong
Prateek Jetly
Ju Chul Jung
Hee Min Lee
Aloke Mishra
Priyanka Nalithani
Stephen Parker
H. Gene Robertson
Jie Ying Wu

Undergraduate Assistants

Jonathan Bettcher
Robert Castro
Nathan Lowe
Kristen McFadden
Christopher Vasquez