

# New Mexico Geological Society

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## ***Front Matter***

*(Usually includes Dedication, President's Message, & Conference Organizer's Message.)*

*in:*

*Evaporite Karst of the Lower Pecos Region*, Land, Lewis; Bou Jaoude, Issam; Hutchinson, Peter; Zeigler, Kate; Jakle, Anne; Van Der Werff, Brittney, New Mexico Geological Society 73<sup>rd</sup> Annual Fall Field Conference Guidebook, 152 p. <https://doi.org/10.56577/FFC-73>

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*This is a section from the 2023 NMGS Fall Field Conference Guidebook.*

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## **Annual NMGS Fall Field Conference Guidebooks**

Every fall since 1950, the New Mexico Geological Society (NMGS) has held an annual [Fall Field Conference](#) that explores some region of New Mexico (or surrounding states). Always well attended, these conferences provide a guidebook to participants. Besides detailed road logs, the guidebooks contain many well written, edited, and peer-reviewed geoscience papers. These books have set the national standard for geologic guidebooks and are an essential geologic reference for anyone working in or around New Mexico.

### **Free Downloads**

NMGS has decided to make peer-reviewed papers from our Fall Field Conference guidebooks available for free download. This is in keeping with our mission of promoting interest, research, and cooperation regarding geology in New Mexico. However, guidebook sales represent a significant proportion of our operating budget. Therefore, only *research papers* are available for download. *Road logs*, *mini-papers*, and other selected content are available only in print for recent guidebooks.

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# EVAPORITE KARST OF THE LOWER PECOS REGION

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Lewis Land

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New Mexico Geological Society  
73<sup>rd</sup> Annual Field Conference  
October 4–7, 2023

This year's conference is co-sponsored  
by the National Cave and Karst  
Research Institute and Carlsbad  
Caverns National Park





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The New Mexico Geological Society is a tax-exempt corporation registered in the State of New Mexico that promotes interest in geology and associated sciences, fosters scientific research and publications, encourages cooperation among its members, and stimulates interest in New Mexico geology. These goals are met through annual fall field conferences held in different locations in New Mexico or adjoining states and annual spring meetings, generally held in Socorro, New Mexico, where oral and poster presentations on different aspects of New Mexico geology are given.

New Mexico Geological Society  
 c/o: New Mexico Bureau of Geology & Mineral Resources  
 801 Leroy Place  
 Socorro, NM 87801-4796  
<https://nmgs.nmt.edu>

**Copy Editor:** Anne Jakle  
**Design and Layout:** Brittney Van Der Werff  
**Front Cover:** Issam Bou Jaoude  
**Inside Front Cover:** Lewis Land  
**Title Page:** Lewis Land  
**Back Cover:** Lewis Land  
**Inside Back Cover (stratigraphic sections):** Lewis Land  
**Printer:** Starline Printing, Albuquerque, New Mexico

ISBN NO. 1-58546-117-2  
 EAN NO. 978-1-58546-117-2  
 DOI: <https://doi.org/10.56577/FFC-73>

73<sup>rd</sup> ANNUAL FALL FIELD CONFERENCE GUIDEBOOK  
 FIRST EDITION 2023  
 PRINTED IN THE U.S.A.

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## CONFERENCE ORGANIZERS' MESSAGE

Welcome to the New Mexico Geological Society's 73<sup>rd</sup> annual Fall Field Conference, and to the Guadalupe Mountains, the Lower Pecos region, and the northern Delaware Basin of southeastern New Mexico and west Texas. This region is of immense economic and scientific importance due to its prolific oil and gas production and its designation by the International Union of Geological Sciences as a Global Stratotype Section for rocks of Middle Permian age. The region also hosts Carlsbad Cavern, one of three World Heritage Sites in New Mexico. Most of the attendees at this conference will probably have heard the claim that New Mexico's state budget depends on oil and gas taxes and royalties for about one third of its general revenue. A significant percentage of that revenue comes directly from Eddy County and from the fluids stored in the Permian strata of this region.

Our last visit to this part of the state was in 2006, when the theme of the conference was caves and karst of the Guadalupe Mountains. This year's conference will focus specifically on evaporite karst of the Lower Pecos region, and more broadly on the geology, stratigraphy, and hydrology of the Delaware Basin and Northwest Shelf. Evaporite karst phenomena formed in Middle and Upper Permian rocks are broadly distributed throughout the region and occur on a variety of scales, ranging from small sinkholes and caves to regional subsidence basins. Evaporite karst processes have significantly influenced the topography along the margins of the Pecos River Valley and in some areas are a serious transportation and infrastructure geohazard.

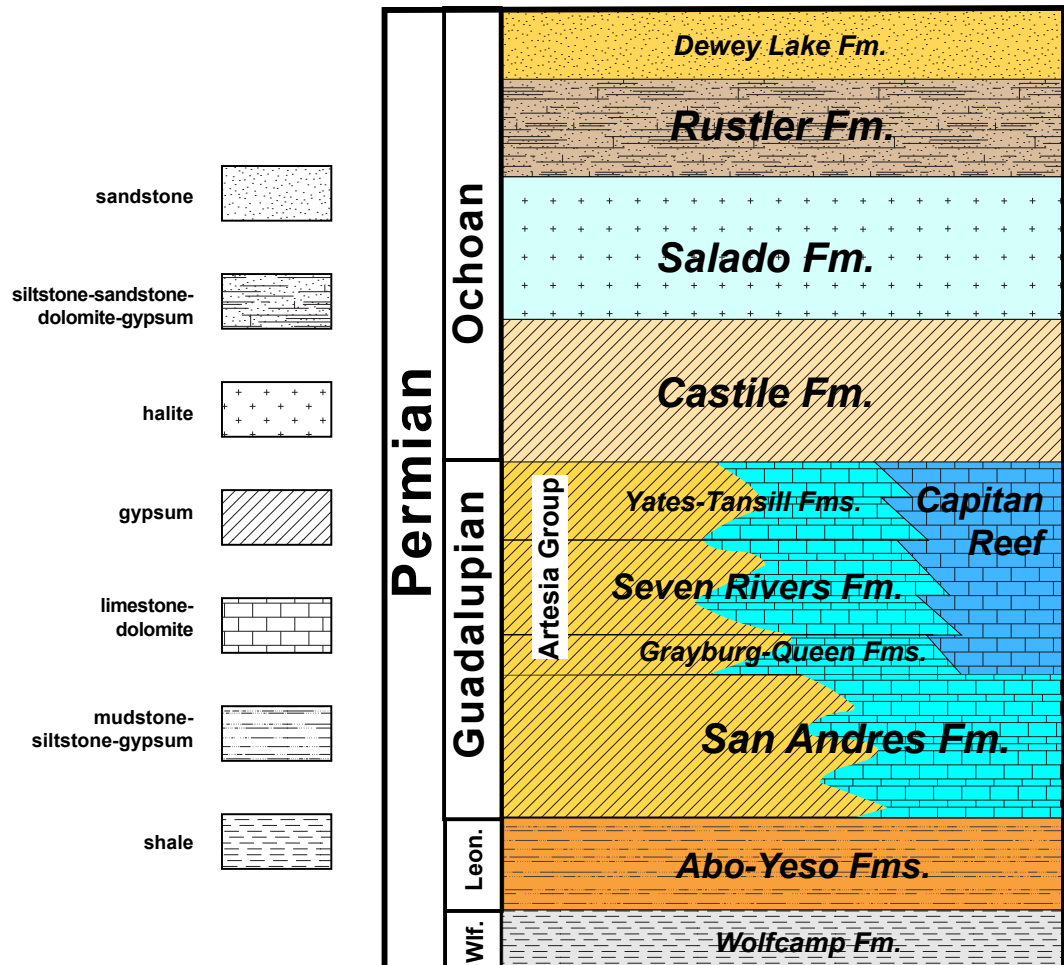
We wish to acknowledge the high level of professionalism and competence of our copy editor, Anne Jakle, and our layout editor, Brittney Van Der Werff, who have produced a truly admirable guidebook for us. We hope you enjoy this conference; our principal goal is to make it as informative and fun as possible.

*Lewis Land*

*Issam Bou Jaoude*

*Kate Zeigler*

### Permian stratigraphy of southeastern New Mexico.





## DEDICATION



*John Hawley: "I figured this out by sheer animal cunning."*

We are pleased to dedicate this year's Fall Field Conference guidebook to John Hawley, who may accurately be described as one of the grand old men of New Mexico geology. My first encounter with John was during the 2003 NMGS Fall Field Conference to the Zuni Plateau. I happened to be sitting behind him in one of the vans on the first day of the conference, and throughout the day overheard him conversing nonstop, as is John's habit, with the people sitting next to him. I had just moved to New Mexico a year earlier, and as a relative newcomer I was overwhelmed by the firehose of information I was absorbing about the geology of my new home state just from eavesdropping on those conversations. At the end of the day I said to myself, "I need to make sure to sit next to this guy tomorrow."

At this stage of his career, John is probably getting tired of having things dedicated to him. Some of the more recent and notable dedications include the 1999 Fall Field Conference guidebook to the Albuquerque area, co-dedicated to John and to Lee Woodward, and the exhaustively detailed seven-page dedication (including a four-page list of John's publications, spanning four decades) in the New Mexico Museum of Natural History's 2005 Bulletin 28 on New Mexico's Ice Ages, composed by his long-time collaborator and colleague Dave Love. It is particularly appropriate to dedicate this year's guidebook to John because of his masterful contributions to the 1993 NMGS guidebook to the Carlsbad area, edited by John, Dave Love, and Jim Adams, which I have mined for information about the geology of the Guadalupe Mountains and greater Delaware Basin region for over two decades. (That guidebook officially lists Dave Love as senior editor, although modest Dave has always stated, "well, John Hawley actually did all the work.")

It would not be possible in this short space to provide a comprehensive list of John's accomplishments, honors, and awards. That said, John was born in Evansville, Indiana, where he was an enthusiastic caver in his youth and a member of the Evansville Grotto of the National Speleological Society. He went on to work for the U.S. Geological Survey's Groundwater Branch before earning his Ph.D. at the University of Illinois. He relocated to Las Cruces, New Mexico, with his wife Diane in 1962, and for the next 15 years led soil-geomorphology studies in southern New Mexico and west Texas at the U.S. Soil Conservation Service, including nine years coordinating soil-survey investigations for the Desert Soil Geomorphology Project in southern New Mexico. The impact of his participation and research in the Desert Project has been described by Les McFadden as "perhaps the greatest extant body of published research by a team of scientists concerning the evolution of desert landscapes and soils." While his field investigations have primarily emphasized Quaternary geology and geomorphic processes, John has also refined our understanding of Neogene-Quaternary stratigraphy, hydrostratigraphy, and landscape evolution concepts of the Rio Grande Rift, which have transformed our understanding of the nature of groundwater resources in the region. In 1977 John joined the New Mexico Bureau of Mines at New Mexico Tech, where he developed and coordinated programs in engineering and environmental geology. From 1991 to 1997 he managed the Bureau's Albuquerque office before "Retirement I," when he transitioned to private consulting as sole proprietor of Hawley Geomatters.

John's hydrogeologic studies have included large parts of the Albuquerque, Jornada del Muerto, and Mesilla basins, and the trans-boundary aquifer system in southwestern New Mexico, west Texas, and adjacent parts of Arizona, Chihuahua, and Sonora. A few years ago I put together a broad overview of brackish groundwater resources in New Mexico and was startled to find how many of the groundwater basins in the state had John's fingerprints on them. Many of those studies remain unpublished.

Among the great many honors John has received, he was named an honorary member of the New Mexico Geological Society in 1982, was co-recipient of the 2005 New Mexico Earth Science Achievement Award, and in that same year received the Geological Society of America Engineering Geology Division's Distinguished Career Award. He has also been the recipient of the GSA-Quaternary Geology and Geomorphology Division's Kirk Bryan and Distinguished Career Awards, in 1983 and 2006. As a New Mexico Tech emeritus retiree, John has taken on a number of pro-bono projects for local and tribal governments, and in 2007 was honored by the Santo Domingo tribe for "outstanding contribution to the improvement of their public water supply system." John has stated, however, that his proudest 90+ year accomplishment has been his 62+ years of marriage to his wife Diane, and his three Las Cruces-native children and three grandchildren.

One of John Hawley's more memorable expressions...

*"Don't let Quaternary geologists and geomorphologists do road-logging, because the entire landscape is an outcrop."*

## PRESIDENT'S MESSAGE

It is my pleasure to welcome you to the 73<sup>rd</sup> annual New Mexico Geological Society Fall Field Conference in the Carlsbad area of southeastern New Mexico! Field conferences like the one you are about to embark on have been taking place through the New Mexico Geological Society (NMGS) since 1950, and this year's field itinerary should be packed with excellent field stops from localities throughout southeastern New Mexico and parts of west Texas.

This year, the Fall Field Conference will focus primarily on the regional geology and stratigraphy of the Delaware Basin and evaporite karst phenomena of the Lower Pecos region. This region is known worldwide for its prolific petroleum production (especially over the past 15 years) and has been designated by the International Union of Geological Sciences as a Global Stratotype Section for Middle Permian age rocks. NMGS last visited this region in 2006, and a number of studies since then have contributed even further to our understanding on karst systems and the greater Delaware Basin.

Participants this year can expect a wide range of pre-meeting trips that include visits to Guadalupe Peak, the Cornudas Mountains, and Carlsbad Caverns. Field themes from the main conference include the regional geology of the Guadalupe Mountains and Delaware Basin, karst hydrology of the Black and Pecos Rivers, and Middle Permian back-reef facies and giant gypsum cenotes. All parts of this conference would not be possible without great efforts from co-organizers Lewis Land (National Cave and Karst Research Institute), Kate Zeigler (Zeigler Geologic Consulting), Peter Hutchinson (THG Geophysics), and Issam Bou Jaoude (National Cave and Karst Research Institute). These individuals have spent countless hours organizing, writing, editing, and moving forward logistics for road logs, lodging, and field stops (in addition to the many other responsibilities that come with leading these conferences). If you find a chance, please reach out to our co-organizers and thank and congratulate them on a Fall Field Conference well done!

In addition to welcoming you all to the 73<sup>rd</sup> annual NMGS Fall Field Conference, I would also like to thank each of you for your continuing membership and support of NMGS. The Society is a volunteer-based organization and would not exist without the passion, dedication, and commitment of its members to promoting interest in the geology and new research taking place in the Southwestern U.S. and especially New Mexico. Members like you make this possible through the NMGS annual spring and fall meetings as well as through student scholarships and research awards that enable new student research to take place throughout New Mexico. We hope this year's conference is an excellent field experience for you and look forward to seeing you all on the outcrop!

*Brian Hampton*  
2023 NMGS President

# NEW MEXICO GEOLOGICAL SOCIETY FOUNDATION

The New Mexico Geological Society (NMGS) Foundation was established in 2003 with the mission of providing a source of funding for educational and scientific objectives, which benefit the geologic profession in New Mexico and the general public. The NMGS has a distinguished history as one of the premier state geologic organizations in the country, dating to its founding 76 years ago in 1947. One of the primary attributes that differentiates NMGS from many state geological societies is the ready access to world-class geologic outcrops and the effort to get young geoscience students out of the classroom and into this natural laboratory to gain hands-on experience during the annual Fall Field Conferences. NMGS Fall Field Conference organizers and presenters are at the forefront of their geoscience fields and use the latest technologies and applications that optimize student-learning experiences and broaden their educational experience.

The NMGS Foundation was created as a nonprofit organization (501(c)(3) organization) whose revenues are responsible for supporting activities that include the annual NMGS Fall Field Conference, NMGS Spring Meeting, numerous NMGS Grants-in-Aid to students undertaking geological research in the state of New Mexico, and scholarships to students attending four-year colleges and research universities throughout New Mexico.

The objective of ensuring student participation in NMGS annual field trips and research events will continue the legacy of NMGS events as a premier nationwide destination for education in the geosciences. In that spirit, we invite you to join us in supporting the NMGS with a philanthropic gift. You can go to <https://nmgs.nmt.edu/donations> to make your gift.

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Chert nodules in San Andres limestone, Otero Mesa.