Front Matter

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

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GEOLOGY OF THE CHAMA BASIN

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Spencer G. Lucas
Kate E. Zeigler
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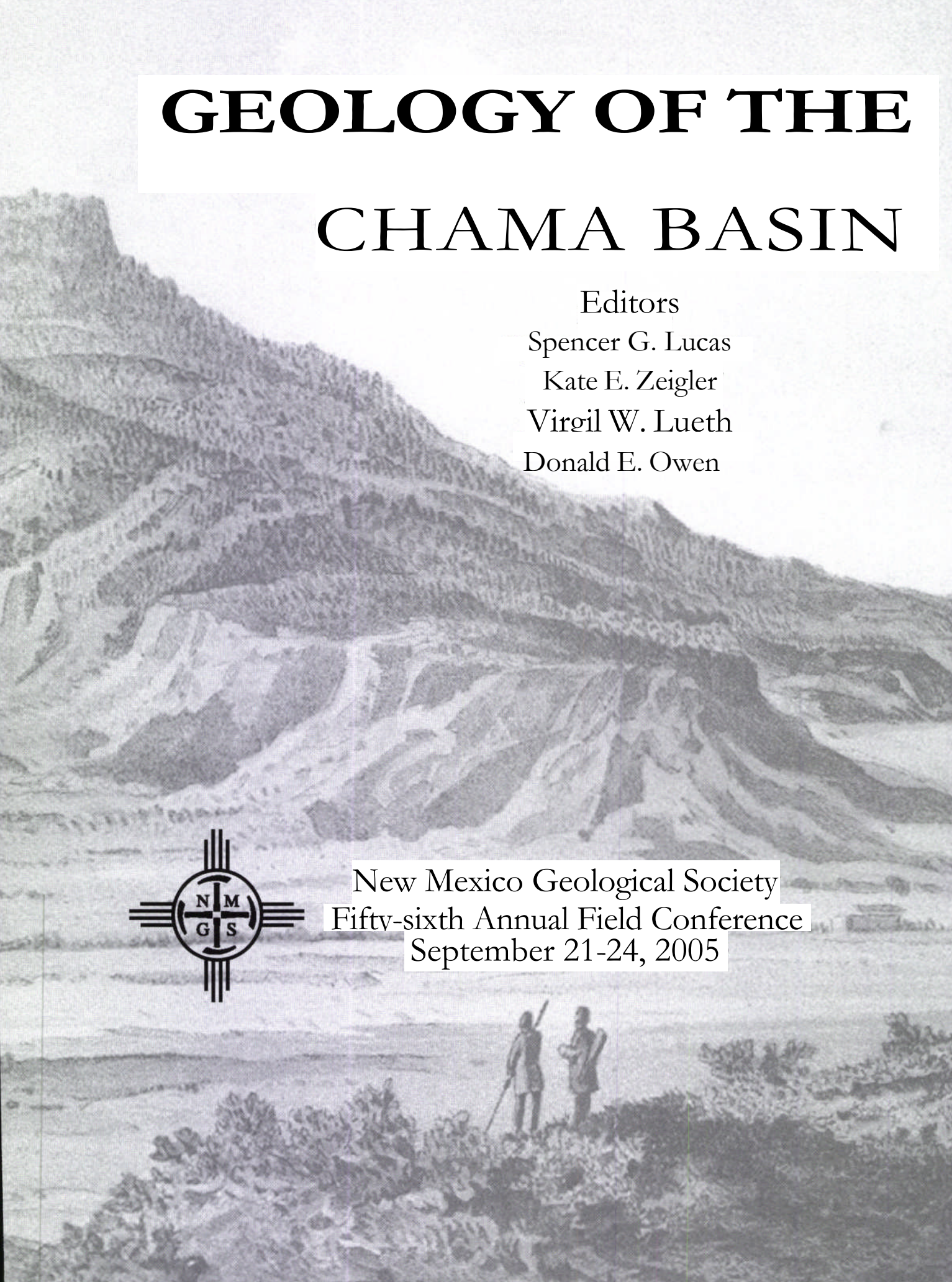
Donald E. Owen



New Mexico Geological Society
Fifty-sixth Annual Field Conference
September 21-24, 2005

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.

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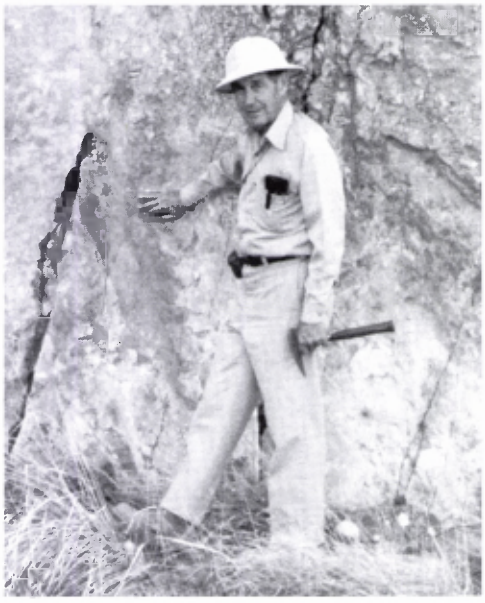
DEDICATION
CLAY T. SMITH

It is my great honor to dedicate the Ghost Ranch II guidebook to one of New Mexico's best, Dr. Clay T. Smith. Known affectionately to many as "Clay T." or "Clay," Dr. Smith was very active in many areas of the profession of geology at home and abroad, but he was especially active in New Mexico. As one of the earliest members of the New Mexico Geological Society, his contributions to the science and profession are many and varied. Clay was heavily involved in the first Ghost Ranch volume. It is fitting we dedicate this volume to him.



Clay Smith at Rancho de las Canas near Socorro in the early 1990s.

Clay Taylor Smith was born in Omaha, Nebraska, on July 30, 1917, and raised in California. Following High School, Clay attended The California Institute of Technology, where he received his Ph.D. in Economic Geology with a minor in Paleontology in June 1943. While attending Cal Tech, Clay worked part time for the U.S. Geological Survey mapping chromite deposits and complex stratigraphic relationships in the Jurassic sequence as part of his thesis and dissertation research work. This proved to be a fortuitous relationship. During his college years, Clay joined the Marine ROTC at Cal Tech to help with college funding. When Clay graduated with his doctorate, the United States was deeply involved in World War Two, and Clay was still in the Marine Reserves. Because the Marines always need some good men, Clay was promptly snapped up (this explains those "slick" Marine hairs cuts Clay sported while a Professor at New Mexico Tech.) Fortunately for us, the Government had other ideas. While in Boot Camp, Clay was ordered to his commandant's office where he was told to pack his belongings and change to civilian clothes. He would be told his assignment later. He had been transferred from the Marines to the top-secret Manhattan Project, where he spent the rest of the war mapping and sampling strategic mineral deposits in western North America with emphasis on uranium deposits in the Jurassic of the Four Corners Region.

In 1946, one of Clay's former professors told him of an opening for an Assistant Professor at the New Mexico School of Mines (later New Mexico Institute of Mining and Technology) in Socorro. In 1947, Clay and Sallie moved to Socorro. Clay's first assignment was as Assistant Professor of Engineering and Acting Head of the Department of Engineering where he taught Mineral Economics, Petroleum Engineering and Mining Engineering. He soon moved to the Geology Department as an Assistant Professor. He taught many courses including Physical Geology, Historical Geology, Mineralogy, Petrology, Petrography, Stratigraphy, Field Mapping, Field Camp, Ore Deposits, Mineral Economics and Value Theory/Land Valuation, to mention just a few. His primary specialties were Mineralogy, Ore Deposits, Economic Evaluations and Field Geology. He ran many of the Field Camps for Tech and was responsible for the field training of many geologists. As one of the last great " generalist" geologists, Clay was involved in many areas of the science, but he was primarily a field man. He taught us early on that geology was first and foremost a field science with lab analysis of the data in a critical but important support role.

My first encounter with Clay Smith was in Physical Geology lecture and lab in 1971. We went out on a field trip with Clay one weekend to look at the Pennsylvanian strata east of Socorro. There, in the lead, was his field companion, Sedgwick the dog. Clay always said Sedgwick was a much better geologist than he since he was much closer to the ground. Therefore, the dog saw much more of the detail. After my graduation in 1975, we maintained a close professional and personal relationship, spending much time in the field together mapping or working on consulting projects together for years.

Student humor about Clay was ubiquitous. He was well aware of this and bore it with a quiet grace and humor. As freshmen, we were "fed" the rumor that Clay was actually quite ancient (somewhere over 70), although he looked very fresh (possibly early forties). We were told not to ask him because he was supposedly quite severe and would toss us out of his office after flunking us out of his course. Obviously, he was never like that at all, but we did not know that at the time. Finally, several of us worked up the courage and asked him. He laughed and told us his age. Students also knew he was an expert on rock and mineral identification. It comes as no surprise that there were many who tried to "pull a fast one" on Clay. While in the field east of Socorro one day, I asked Clay about this. He laughed and related how some graduate students had ground up a bunch of different rocks and a few minerals, combined it with wheat flour, sugar, and water and baked the resulting paste into a "rock sample." After thin-sectioning the "mystery rock", the slide and "hand specimen" were presented to him for identification. He identified it alright – it was "Flourite." He told them what was in it, returned the hand specimen and went on with his work, much to the chagrin of the pranksters.

As an expert in minerals, ore deposits and economic geology, Clay's expert testimony was widely sought in disputes and litigations. A thorough investigator, his opinion weighed heavily in court decisions. He was responsible for quietly exposing several scams and correcting the overstated ore reserve calculations usually found in mining property promotional literature.

Clay believed in all of his students and followed their careers with great interest. He never forgot a name or face. He was an enthusiastic supporter of each of his graduate students and expected them to develop new ideas and interpretations within the constraints of the data. Much of the financial support came through his consulting projects. He was never harsh, but could be very direct and honest without being nasty. He could be quite severe and demanding when faced with what he viewed as mediocrity or bad science, yet remained open and flexible to new ideas or concepts. He taught all of us that life was not "fair," so if we were to succeed, we had better perform.

Clay promoted a broader interest in geology and other earth sciences through his activities with the State Science and Engineering Fair (he was twice its Director) and Visiting Professor Programs for the school. In 1983, he served as General Chair of the International Science and Engineering Fair held in Albuquerque. He was also active in numerous professional societies. These include: Fellow of the Geological Society of America, Fellow of the Society of Economic Geologists, Charter Member of the New Mexico Geological Society, Charter Member of the American Institute of Professional Geologists and Certified Professional Geologist, Fellow of the American Association for the Advancement of Science, Member of the National Association of Geoscience Teachers, Life Member of the New Mexico Academy of Science and Member of Sigma Xi, New Mexico Tech Chapter. He was also active in the local community through the Lions Club (I still remember the pancakes on Labor Day Weekend) and as Treasurer for the Friends of the Bosque Del Apache National Wildlife Refuge. A lifelong athlete, Clay was dedicated to athletics in the State of New Mexico, officiating high school football and basketball games throughout the State. After 40 years of continuing service, he was inducted into the New Mexico Official Association's Hall of Fame in 1987.

To the very last, Clay was a quiet, humble, Christian gentleman who never sought attention or recognition. He worked hard and accomplished much. To the very last, he did what he loved the most – worshipped God, taught geology and watched football. While watching Monday Night Football, Clay was stricken with a cerebral hematoma and fell into a deep coma. He slipped into Eternity on November 10, 2003. We will all miss his energy and enthusiasm for the profession and science. Adios mi Maestro, Professor, Amigo y Compañero del Campo – Vaya con Diós. ¡Hasta la Vista!

Robert M. Colpitts

PRESIDENT'S MESSAGE

The 56th New Mexico Geological Society Fall Field Conference will be held in the Chama-Ghost Ranch region, previously visited by NMGS in 1960 and in 1974. This year the trip organizers are Kate Zeigler, a graduate student at UNM, and Spencer Lucas, who needs no introduction to many of our members. Spencer organized several past field conferences, including the 2003 trip to the Zuni Plateau. Kate and Spencer will be leading us through the Mesozoic stratigraphy of the area.

Our managing editor, Virgil Lueth, set a high standard for the Fall Field Conference guidebooks with his innovations in the 2004 Taos region guidebook. He has done another superb job with this year's volume. As always, the quality of the publications matches their presentation. All of our guidebooks remain in print, but we are going to digitize some of the books that are becoming rare. If you are looking to complete your guidebook collection with real books, you might want to contact our publications department soon and they will be happy to help you. In the near future, purchases of the older guidebooks will be made in the form of a compact disc.

Speaking of publications, at the end of 2004 NMGS published *The Geology of New Mexico-A Geologic History* (NMGS Special Publication #11) edited by Greg Mack and Kate Giles of New Mexico State University. This volume is the definitive work on the geology of New Mexico and should be part of every NMGS member's library. In addition, the updated Geologic Highway Map of New Mexico is now published. This is one of our most popular publications and continues to educate people about the geology of New Mexico. As always, students will receive a 35% discount on all Society publications, as well as free membership to NMGS.

The New Mexico Geological Society Foundation continues to award scholarships to the students of New Mexico, the amount of which has increased each year since I have served on the Executive Committee. In 2005 we are budgeted to award $41,900 in student scholarships, an increase of 20% from last year. We thank the Board of the Foundation, headed by Paul Catacosinos, for their continued support.

Nelia Dunbar and Shari Kelley chaired the Spring Meeting this year. Many thanks go to them and all of the volunteers who helped make this meeting a success.The next few Fall Field Conferences include: 2006 - Carlsbad, 2007 - Jemez Mountains, and 2008 - Gila Wilderness area. The Society welcomes your suggestions for future conferences.

Many thanks go to everyone who helped with NMGS this year, including Maureen Wilks, Adam Read, Bob Myers, Lynn Hemenway, Ryan Wood, and many others. Finally, we are always looking for volunteers to serve on the Executive Committee or to help run the Spring Meeting. If you have been attending our events for years or are a new member, perhaps now is a good time to get involved!

Jeffrey M. Amato

CONFERENCE ORGANIZERS' MESSAGE

New Mexico's Chama Basin can be defined physiographically as the drainage basin of the Chama River and its principal tributaries (especially the Rio Gallinas and Arroyo Seco) in Rio Arriba County. Defined geologically, the Chama Basin is a portion of the eastern Colorado Plateau between the eastern edge of the San Juan Basin, the southern edge of the San Juan volcanic field, the northern edge of the Jemez volcanic field and the western edge of the Rio Grande rift. However you define the Chama Basin, it offers some of New Mexico's finest geological scenery, from the coal-bearing Cretaceous strata of the Gallina hogback to the cliffs of Jurassic sandstones and red badlands of the upper Triassic at Ghost Ranch (the subjects of many paintings by famous artist Georgia O'Keefe), to the Cretaceous sandstone ledges and vast shale slopes at the Vado of the Rio Chama near Tierra Amarilla.

John Strong Newberry (in 1858) and Edward Drinker Cope (in 1874) first described geological features in the Chama Basin. Nelson H. Darton followed them in the early years of the 20th Century. By the 1960's extensive work by Clay T. Smith (to whom this guidebook is dedicated), William Muehlberger, Carl Dane and their colleagues and students established a diverse understanding of the geology of the Chama Basin. That understanding was well elaborated by the 11th (1960) and 25th (1974) Fall Field Conferences of the New Mexico Geological Society, which focused on the geology of the Chama Basin. Some other Fall Field Conferences of the New Mexico Geological Society have visited parts of the Chama Basin, but this year's conference truly is the third time the New Mexico Geological Society revisits this region.

The Chama Basin is mostly a region of relatively high plateaus and canyons developed in little deformed sedimentary rocks of Pennsylvanian, Permian, Triassic, Jurassic and Cretaceous age. Extensive advances in understanding the stratigraphy, sedimentology and paleontology of these rocks are the theme of most of the articles in this guidebook. The road logs also well reflect this by presenting the results of much of the last two decades of geological research in the Chama Basin.

This conference moves across much of the southern and eastern Chama Basin. It begins outside of the basin in Espanola, then traverses the western Rio Grande rift and southern flank of the Chama Basin to progress to Ghost Ranch at the end of the first day. The second day moves from Ghost Ranch to Chama, and the last day visits Cumbres Pass and locations to the south in the Tierra Amarilla region. We believe that the committee who produced the road logs for these trips has written what are truly detailed and instructive logs. They deserve special thanks: William R. Berglof, Brian S. Brister, Larry S. Crumpler, Andrew B. Heckert, Adrian P. Hunt, Daniel J. Koning, Florian Maldonado, and Justin A. Spielmann. Virgil Lueth's skill as managing editor made this book happen. We also thank the following institutions for diverse support of this guidebook and field conference: New Mexioco Museum of Natural History and Science, University of New Mexico, New Mexico Bureau of Geology and Mineral Resources, and Lamar University.

Spencer G. Lucas
Kate E. Zeigler
Donald E. Owen.

x

FIELD CONFERENCE SCHEDULE

Wednesday, September 21, 2005 –Registration Day

6:00 – 9:00 PM	Registration and ice-breaker party, OK Casino & Resort, Espanola

Thursday, September 22, 2005 – First Day, Espanola to Ghost Ranch

6:00 – 7:15 AM	Breakfast (not provided)
7:00 – 7:30 AM	Registration, Northern New Mexico Community College
7:30 AM	Caravan leaves Northern New Mexico Community College
6:00 PM	Barbeque (provided), Ghost Ranch

Friday, September 23, 2005 – Second Day, Ghost Ranch to Chama

6:00 – 7:15 AM	Breakfast (not provided)
7:00 – 7:30 AM	Registration, Ghost Ranch
8:00 AM	Caravan leaves Ghost Ranch
6:00 PM	Caravan arrives at Elk Horn Lodge, Chama
6:00 – 7:00 PM	Social hour at Elk Horn Lodge, Chama
7:00 PM	Annual Banquet (provided), Elk Horn Lodge, Chama

Saturday, September 24, 2005 – Third Day, Chama to El Vado Dam

6:00 – 7:30 AM	Breakfast (not provided)
8:00 AM	Caravan leaves Elk Horn Lodge
1:00 PM	Conference ends at El Vado Dam, southwest of Chama