

Giant Sloths and Sabertooth Cats: Extinct Mammals and the Archaeology of the Ice Age Great Basin. Donald K. Grayson with animal reconstructions by Wally Woolfenden. 2016. The University of Utah Press, Salt Lake City. xxvi+421 pp., 129 figures, 23 tables. 5 appendices, notes, references, index. \$24.95 (paper).

Abstract: *This book provides a comprehensive review of the numerous mammals that inhabited the Great Basin of the western United States and became extinct by the end of the Late Pleistocene.*

The Great Basin is a vast expanse in the western United States between the Rocky Mountains and the Sierra Nevada that encompasses most of the state of Nevada and smaller portions of Oregon, California, Idaho, and Utah. Donald K. Grayson, who previously wrote *The Desert's Past: A Natural History of the Great Basin*, has now published a more tightly focused book on the extinct animals who inhabited this region during the end of the Late Pleistocene, about 50,000 to 10,000 radiocarbon years ago, when enormous pluvial lakes, including Lake Lahontan and Lake Bonneville, existed. Despite the title, this is more a paleontology book than an archaeology one, although Grayson does thoroughly examine all the archaeological evidence for direct interactions between ancient humans and the extinct large mammals, or megafauna, of the Great Basin (spoiler: there is none).

The bulk of the book, over 120 pages, is a systematic and detailed review of the extinct Late Ice Age fauna of the Great Basin. Thorough information on Pleistocene mammals and birds found in the rest of North America and South America provides context for the Great Basin data. Thirty-

seven genera of mammals and 20 genera of birds have vanished from North America (although some of these, including horse and capybara, survived on other continents), and Grayson describes all of them. A map for each mammal genera also shows their late Ice Age distribution in North America. The 20 extinct mammal genera and eight extinct bird genera that have actually been found at sites in the Great Basin are reviewed in more detail. Grayson summarizes major finds and sites, explains recent research, and acknowledges where uncertainty remains. All the usual suspects are present, including the giant sloths (four different genera, three of which have been found in the Great Basin), mastodon, and mammoths, but also the Aztlán rabbit, the short-faced skunk, yesterday's camel, and the giant bear (no longer called the giant short-faced bear, because "for a bear of its size, the length of *Arctodus's* face was just right" [p. 73]).

Grayson next focuses on five sites that have produced important Ice Age bones: Fossil Lake in Oregon, Gypsum Cave, Smith Creek Cave, and Mineral Hill Cave in Nevada, and Huntington Mammoth Site in Utah. At several of these sites, early research seemed to provide evidence of humans interacting with ground sloths or other extinct animals, but more recent research has greatly modified these earlier conclusions. Grayson demonstrates how improved radiocarbon dating methods have resulted in more accurate dates, but even so, in the Great Basin, only 10 of the 20 extinct mammals and none of the extinct birds have reliable radiocarbon dates. Of these, seven survived until between 12,000 and 10,000 years ago.

While fluted points have been found in the Great Basin, they are not technically Clovis points, and none of them have been radiometrically dated. Great Basin stemmed points and crescents, however, have been

found in contexts older than 11,000 years, meaning that ancient humans were in the Great Basin at the same time as at least seven extinct mammals. Grayson makes clear that none of these human artifacts have ever been found in direct association with any of the extinct mammals.

To make sense of the Ice Age fauna, Grayson turns to Great Basin flora. He combines several lines of research on grazing-intolerant grasses, so-called anachronistic fruits and their seeds, which may have evolved to survive being digested by megafauna, the past and current distribution of different species of plants, the height of trees, and the presence of thorns on short and tall plants to support his conclusion that "large, now-extinct mammals were never common in the floristic Great Basin and ... were particularly uncommon toward the very end of the Ice Age" (p. 272). If that sounds like a rather complex line of reasoning, well, it is. Grayson does a good job of clearly presenting a densely reasoned argument that integrates a lot of types of data -fauna, flora, climate, geography - for a provocative theory that may explain a whole Ice Age ecosystem. Yes, giant sloths, mammoths, mastodons, and other extinct mammals did live in the Great Basin, as did humans by the end of the Ice Age - but there were probably not large populations of either megafauna or humans, and there is no direct archaeological evidence that the people who lived in the Great Basin in the Late Ice Age preyed upon the megafauna that were present.

Finally, Grayson turns to the question of what caused the extinction of so many types of animals. For a long time, the two most popular theories to explain why megafauna became extinct have been human predation, or overkill, and climate change. More

recently, some researchers have proposed a comet impact. Grayson is critical of the comet explanation, as are most Ice Age specialists, and also rejects the overkill hypothesis, making the case (as he has for many years) that there is virtually no evidence to support it. He makes a convincing argument that climate-related hypotheses are best supported by the evidence, but may not be able to explain all Late Pleistocene extinction events. Therefore, he concludes with a recommendation that future research should focus on building more local individual histories of extinct mammal species.

Grayson has packed *Giant Sloths and Sabertooth Cats* full of data, but he also injects a bit of his personality with some lightly humorous asides to keep the book from getting too dry. This book is clearly a valuable resource for researchers studying extinction and Late Pleistocene paleoecology in North America. It provides a comprehensive introduction to the subject for advanced undergraduate students and serves as a valuable paleontological reference for professionals.

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