

# SUMMARY OF BLANCAN AND IRVINGTONIAN (PLIOCENE AND EARLY PLEISTOCENE) MAMMALIAN BIOCHRONOLOGY OF NEW MEXICO

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Significant mammalian faunas of Pliocene (latest Hemphillian and Blancan) and early Pleistocene (early and medial Irvingtonian) age are known from the Rio Grande and Gila River valleys of New Mexico. Fossiliferous exposures of the Santa Fe Group in the Rio Grande Valley, extending from the Española basin in northern New Mexico to the Mesilla basin in southernmost New Mexico, have produced 21 Blancan and six Irvingtonian vertebrate assemblages (Fig. 1). A medial Irvingtonian fauna is known from a cave deposit in the San Luis basin in northernmost New Mexico (Fig. 2). Three Blancan faunas occur in Gila Group strata in the Gila River Valley in the Mangas and Duncan basins in southwestern New Mexico (Fig. 3). More than half of these faunas contain five or more species of mammals, and many have associated radioisotopic dates and/or magnetostratigraphy, allowing for correlation with the North American land-mammal biochronology (Figs. 2-3).

Two diverse early Blancan (4.5-3.6 Ma) faunas are known from New Mexico, the Truth or Consequences Local Fauna (LF) from the Palomas basin and the Buckhorn LF from the Mangas basin. The Truth or Consequences LF contains five species of mammals indicative of the early Blancan: *Borophagus* cf. *B. hilli*, *Notolagus lepusculus*, *Neotoma quadriplicata*, *Jacobsomys* sp., and *Odocoileus brachyodontus*. Associated magnetostratigraphic data suggest correlation with either the Nunivak or Cochiti subchrons of the Gilbert Chron (between 4.6 and 4.2 Ma), which is consistent with the early Blancan age indicated by the mammalian biochronology. The Truth or Consequences LF is similar in age to the Verde LF from Arizona, and slightly older than the Rexroad 3 and Fox Canyon faunas from Kansas. The Buckhorn LF has 18 species of mammals, including two rodents typical of the early Blancan, *Mimomys poaphagus* and *Repomys panacaensis*. The Buckhorn LF also is similar in age to the Verde LF and has affinities with the Panaca LF from Nevada. Although the Buckhorn and Truth or Consequences LFs have few taxa in common, the similarities of both faunas with the Verde LF suggest they are close in age.

Eight faunas from the central and southern Rio Grande Valley are medial Blancan in age (3.6-2.7 Ma), including the Pajarito and Belen faunas from the Albuquerque basin, the Arroyo de la Parida LF from the Socorro basin, the Cuchillo Negro Creek and Elephant Butte Lake LFs from the Engle basin, the Palomas Creek LF from the Palomas basin, the Hatch LF from the Hatch-Rincon basin, and the Tonuco

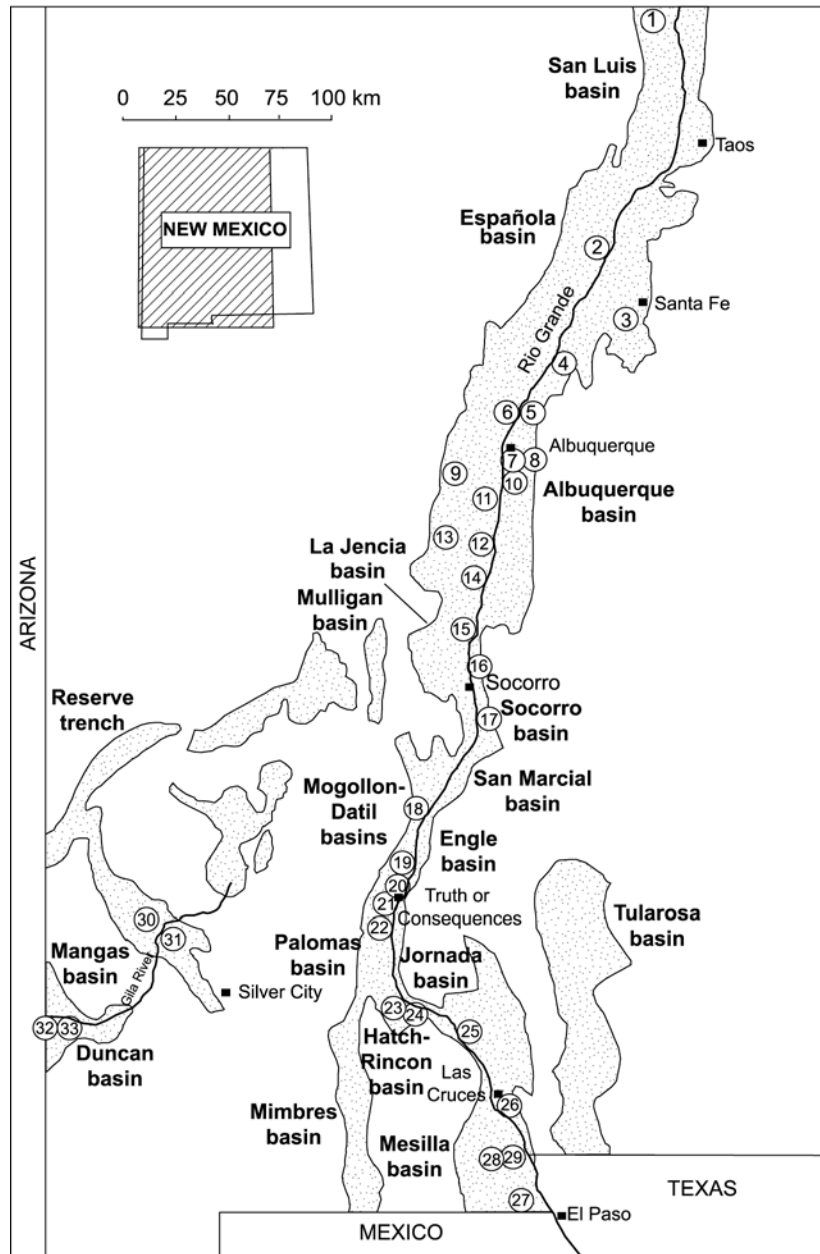
Mountain LF from the Jornada basin. These faunas are characterized by the presence of taxa absent from early Blancan faunas, including *Geomys (Nerterogeomys) paenebursarius*, *Equus cummingsii*, *E. scotti*, and *Camelops*, and the absence of South American immigrant mammals found in late Blancan faunas. The Pajarito LF is directly associated with a fluviially recycled pumice dated at 3.12±0.10 Ma (Maldonado et al., 1999). The Cuchillo Negro Creek and Elephant Butte Lake LFs are in close stratigraphic association with a basalt flow dated at 2.9 Ma. Magnetostratigraphy constrains the age of the Tonuco Mountain LF between 3.6 and 3.0 Ma.

The Mesilla A fauna from the Mesilla basin and the Pearson Mesa LF from the Duncan basin are late Blancan in age (2.7-2.2 Ma). Both faunas record the association of *Nannippus* with a South American immigrant, *Glyptotherium* from Mesilla A and *Glossotherium* from Pearson Mesa, restricting their age to the interval after the beginning of the Great American Interchange at about 2.7 Ma and before the extinction of *Nannippus* at about 2.2 Ma. Magnetostratigraphy further constrains the Mesilla A and Pearson Mesa faunas to the upper Gauss Chron, just prior to the Gauss/Matuyama boundary at 2.58 Ma. The Mesilla B and Virden faunas occur higher in the same stratigraphic sequences as the Mesilla A and Pearson Mesa faunas, respectively, and are latest Blancan in age (2.2-1.8 Ma). Both faunas contain taxa restricted to the Blancan, including the camels *Blancocamelus* and *Gigantocamelus* from Mesilla B, and *Canis lepophagus* from Virden. The absence of *Nannippus*, and of *Mammuthus* and other genera that first appear in the Irvingtonian, suggest an age range between 2.2 and 1.8 Ma. Magnetostratigraphic data from Mesilla B support a latest Blancan age.

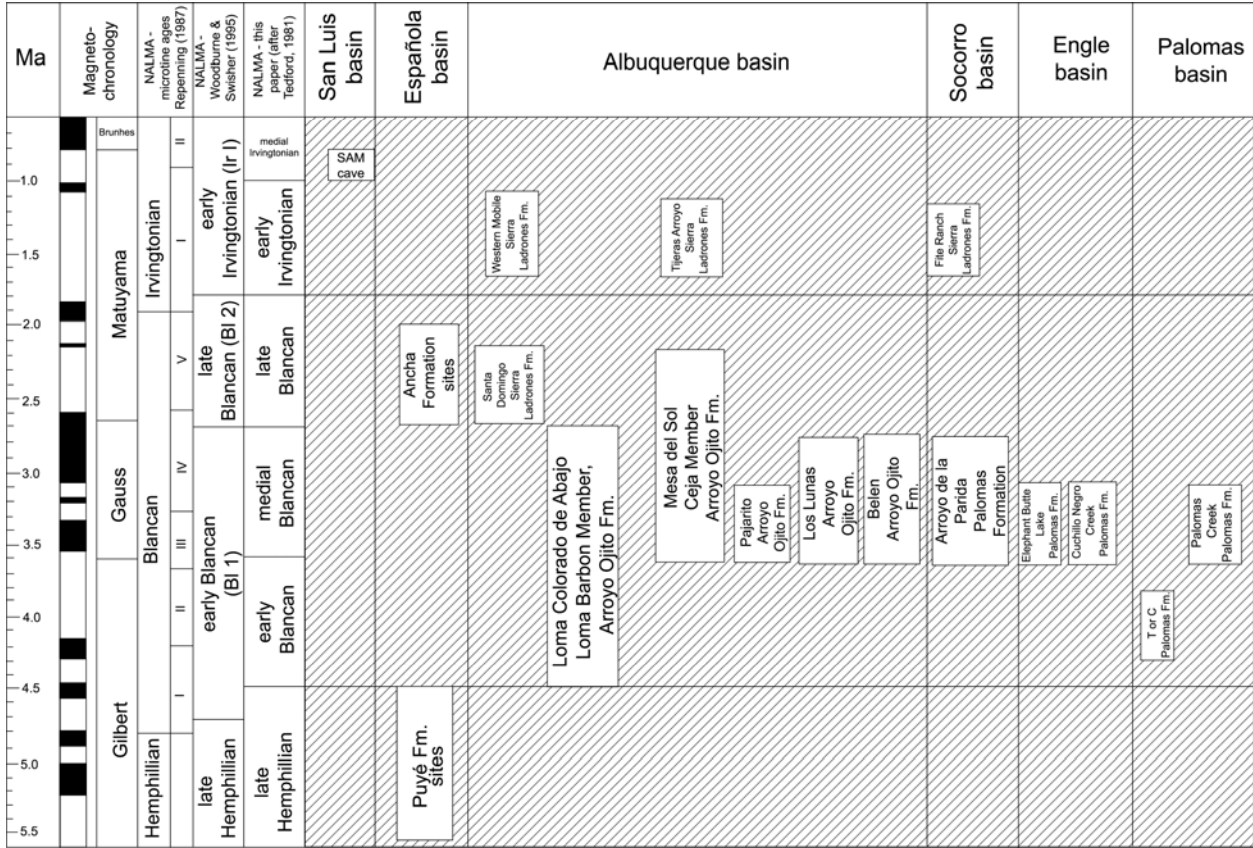
The Tijeras Arroyo fauna from the Albuquerque basin and the Tortugas Mountain and Mesilla C faunas from the Mesilla basin all include *Mammuthus* and other mammals indicative of an early Irvingtonian age (1.8-1.0 Ma). The association of *Mammuthus* and *Stegomastodon* in the Tortugas Mountain LF indicates an age younger than 1.8 Ma, after the arrival of *Mammuthus* in North America from Eurasia and before the extinction of *Stegomastodon* at about 1.2 Ma. The co-occurrence of *Glyptotherium arizonae*, *Equus scotti*, and the primitive mammoth *M. meridionalis* in Tijeras Arroyo and Mesilla C is typical of southwestern early Irvingtonian faunas. Fossils of *M. meridionalis* from Tijeras Arroyo and Mesilla C are both closely associated with dates of 1.6 Ma on pumice from the lower Bandelier tuff, making them among the oldest

dated mammoths in North America. San Antonio Mountain (SAM) Cave in northernmost New Mexico lacks large mammals, but the presence of the microtine rodents *Mictomys kansasensis*, an

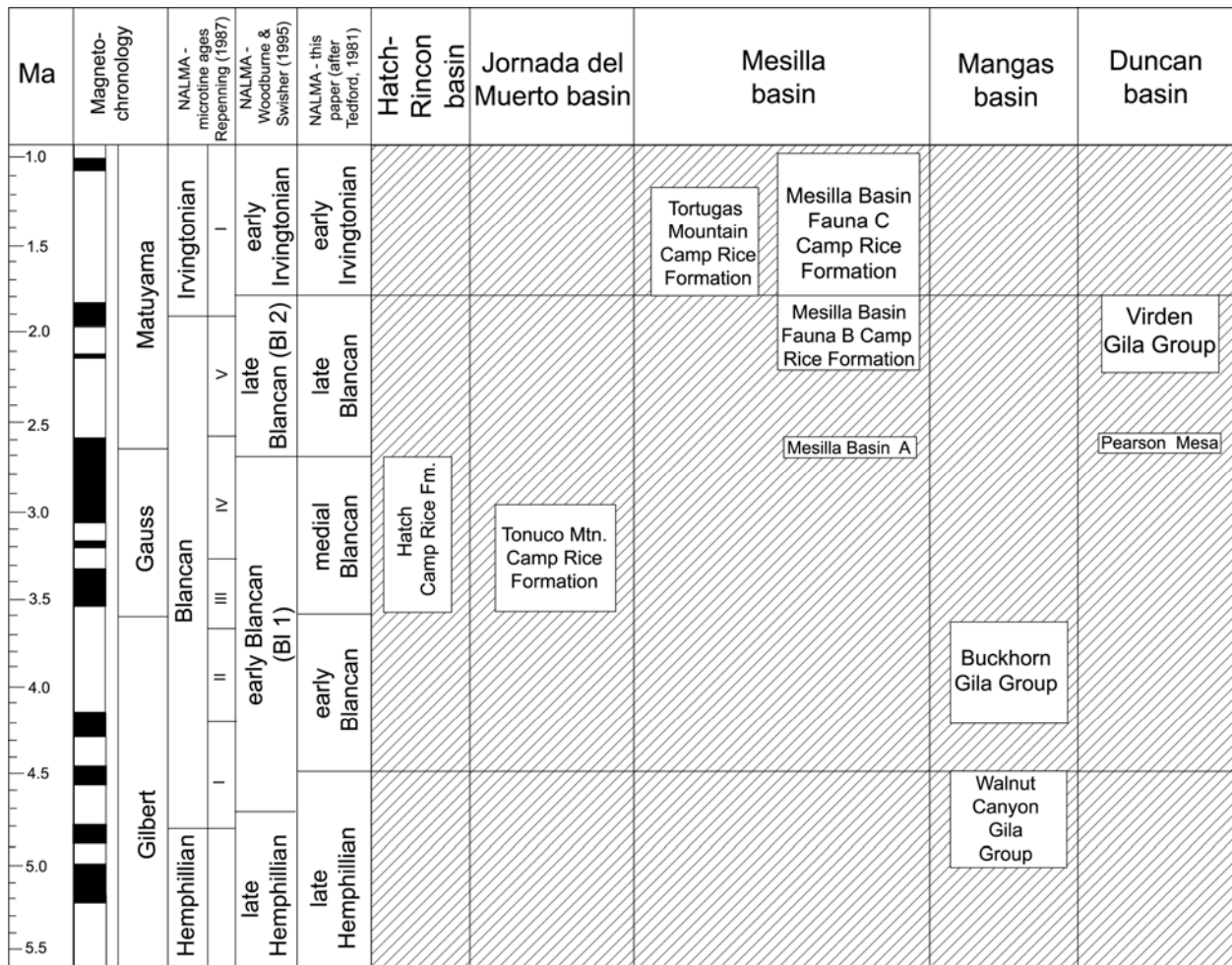
advanced species of *Allophaiomys*, *Lemmiscus curtatus*, and *Microtus* cf. *M. californicus* indicates a medial Irvingtonian age, between about 1.0 and 0.85 Ma.



**Figure 1.** Map of New Mexico showing the location of late Hemphillian, Blancan, and Irvingtonian fossil sites. The structural basins are named and indicated by stippling. Sites are numbered from north to south in the Rio Grande Valley (sites 1-29), followed by sites in the Gila River Valley (sites 30-33). 1. San Antonio Mountain (SAM) Cave, medial Irvingtonian; 2. Puyé Formation site, late Hemphillian; 3. Ancha Formation sites, late Blancan; 4. Santo Domingo, late Blancan; 5. Western Mobile, early Irvingtonian; 6. Loma Colorado de Abajo, early/medial Blancan; 7. Mesa del Sol, Blancan; 8. Tijeras Arroyo, early Irvingtonian; 9. Pajarito, medial Blancan; 10. Isleta, Blancan; 11. Los Lunas, Blancan; 12. Belen, medial Blancan; 13. Mesas Mojinas, Blancan; 14. Veguita, Blancan; 15. Sevilleta, Blancan; 16. Arroyo de la Parida, medial Blancan; 17. Fite Ranch, early Irvingtonian; 18. Silver Canyon, Blancan; 19. Elephant Butte Lake, medial Blancan; 20. Cuchillo Negro Creek, medial Blancan; 21. Truth or Consequences, early Blancan; 22. Palomas Creek, medial Blancan; 23. Hatch, medial Blancan; 24. Rincon Arroyo, late Blancan/early Irvingtonian; 25. Tonuco Mountain, medial Blancan; 26. Tortugas Mountain, early Irvingtonian; 27. Mesilla A, late Blancan; 28. Mesilla B, latest Blancan; 29. Mesilla C, early Irvingtonian; 30. Buckhorn, early Blancan; 31. Walnut Canyon, latest Hemphillian; 32. Pearson Mesa, late Blancan; 33. Virden, latest Blancan.



**Figure 2.** Correlation chart showing the relative ages of late Hemphillian, Blancan, and Irvingtonian vertebrate faunas from the northern and central Rio Grande Valley in New Mexico, including the San Luis, Española, Albuquerque, Socorro, Engle, and Palomas basins. The chronological limits of the mammalian faunas are indicated by the vertical height of the boxes enclosing the fauna or site names. The lithostratigraphic unit from which each fauna or site was derived is also indicated within the box. The magnetochronology is from Berggren et al. (1995). Three different systems for subdividing the Blancan NALMA are indicated on the left side of the chart (Tedford, 1981; Repenning, 1987; Woodburne and Swisher, 1995).



**Figure 3.** Correlation chart showing the relative ages of late Hemphillian, Blancan, and Irvingtonian vertebrate faunas from the southern Rio Grande Valley and Gila River Valley in New Mexico, including the Hatch-Rincon, Jornada, Mesilla, Mangas, and Duncan basins. Other notes as for Figure 2.

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