

## MAMMALIAN BIOSTRATIGRAPHY IN THE VALLECITO/FISH CREEK BASIN

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Biostratigraphy is the science that studies the stratigraphic distribution of fossils. Biostratigraphy is crucial to understanding the paleontologic and geologic history of Anza-Borrego Desert State Park because the sequence of appearances and disappearances of mammalian taxa forms the chronologic background for that history. Biostratigraphy allows study of changes in the composition of Blancan and Irvingtonian faunas in the park.

One of the best areas to find land mammal fossils in Anza-Borrego Desert State Park is the Fish Creek-Vallecito Creek (FCVC) basin. Strata comprising the Palm Spring Group offer the best opportunity to use biostratigraphy to delimit the Blancan North American Land Mammal Age (NALMA) and define Blancan-Irvingtonian NALMA boundary. Palm Spring Group rocks are more than 4,300 meters thick and show evidence of being deposited without major breaks in deposition. This means that it is possible to study the stratigraphic distribution of fossils in a single geographic area without the need to correlate from one distant area to another.

A collecting transect was set up in the part of the FCVC basin that is not disturbed by faulting and folding to stratigraphically order the fossils and plot the appearances and disappearances of fossil taxa through time in the FCVC basin. Mammalian fossils in the FCVC basin document the presence of at least three superposed NALMAs: the Hemphillian (latest Miocene-earliest Pliocene, 9 Mya-4.8 Mya), Blancan (Pliocene, 4.8 Mya-1.8 Mya), and Irvingtonian (early-middle Pleistocene, 1.8 Mya-0.2 Mya). The Blancan and Irvingtonian fossil records are the better documented of the three. The boundaries between the NALMAs are defined by the lowest stratigraphic datum (LSD) of characteristic taxa. At present, the best approximation for the Hemphillian-Blancan boundary in the park is the LSD of *Sigmodon*, which occurs approximately 3,980 m below the top of the section and has an estimated date of 4.32 Ma, and which is slightly younger than the accepted date for the boundary.

Traditionally, the Irvingtonian is defined by the appearance of the mammoth, *Mammuthus*, an immigrant from Eurasia. The oldest reliable radiometric date for the earliest North American appearance of *Mammuthus*, and hence the Blancan-Irvingtonian boundary, is 1.35 Ma. In the park, the oldest *Mammuthus* occurs in strata that are estimated to be 1.2 Ma, indicating that the Blancan-Irvingtonian boundary occurs some distance below that occurrence. The implication is that, with additional fieldwork, the strata in the park contain the potential to accurately locate the Hemphillian-Blancan and Blancan-Irvingtonian boundaries as well as encompass the entire span of Blancan time in

a single stratigraphic section.