Surficial Geologic Map of the Middle Rio Grande Valley Floodplain, Isleta Diversion Dam to San Acacia Diversion Dam

By

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Open-File Report 482

The map area extends from the Isleta Diversion Dam to the San Acacia Diversion Dam (Figure 1). The focus of the map effort was to delineate the surficial geologic deposits within the inner Middle Rio Grande valley, in a manner consistent with our previous surficial geologic map that covered the San Acacia to Elephant Butte reach (Pearce and Kelson, 2003). This mapping effort provides a valuable baseline of information on the late Holocene geologic conditions in the inner Rio Grande valley, and hopefully will be useful in characterizing erosion/sedimentation along the river and habitats in the inner valley.

The area encompassed by this mapping effort is the inner valley of the Rio Grande in central New Mexico, which flows within the Rio Grande rift in a generally north-south orientation. This mapping focused on the inner valley between the diversion dams at Isleta (upstream) and San Acacia (downstream). The map included in this report (Plate 1) focuses on the surficial geology of the inner valley within 10 7.5-minute USGS quadrangles: Isleta, Dailes, Los Lunas, Belen, Tome, Veguita, Casa Colorado, Abeytas, La Joya, and San Acacia, as shown on Figure 1 (attached).

Our approach in delineating the surficial deposits in the Middle Rio Grande Valley was to analyze two sets of aerial photography (1935 and 2001), conduct a field reconnaissance of the area, input the geologic interpretation into a GIS, and identify substantial changes in the system through analysis of the two geologic map sets. The maps extend from the Isleta Diversion Dam on the north to the upstream end of San Acacia Diversion Dam on the south. We utilized black-and-white, stereo-pair images of the river valley taken in 1935, which were obtained from the Earth Data Analysis Center (EDAC) in Albuquerque. We chose to use these images because they are the earliest set of highquality stereo-pair imagery available for the Middle Rio Grande Valley. In addition, these 2 images pre-date substantial incursion of salt cedar vegetation (which tends to obscure geologic relations) throughout much of the valley, and thus allow for better delineation of surficial geologic units. The 1935 images are montages consisting of four separate images, and thus have noticeable distortion. To rectify this distortion and to

increase the accuracy of the map unit boundaries, we manually transferred geologic boundary lines from overlays on the photographs to mylar USGS topographic base maps. These mylar sheets were then scanned and digitized by the New Mexico Bureau of Geology and Mineral Resources, and imported to our ArcView GIS software. The files were then manually checked and revised to be consistent with known topographic and cultural features, in order to minimize areal distortion.

Aerial photography taken in 2001 also was analyzed to provide an interpretation of comparatively up-to-date channel and valley characteristics. This analysis used digital imagery provided by the U. S. Bureau of Reclamation, with map units being input directly into a digital database via manual tracings on the computer screen (i.e. on-screen, or “head-up”, digitizing). Because this imagery is not available in stereo (and thus provides no depth perception of topographic relief), we delineated map units through interpretation of planform patterns and tonal contrasts. Vegetation types, alignments, and densities also provided information from which to differentiate map units from the 2001-vintage imagery.

For delineation of the surficial geology from both the 1935 and 2001 images, we developed map units on the basis of recent similar mapping projects in the inner Rio Grande Valley, and refined these units on the basis of deposits identified during the course of this effort. Based on previous mapping of the of the inner Rio Grande Valley from San Acacia to Elephant Butte Reservoir (Pearce and Kelson, 2003), and from Bernalillo to Isleta by Kelson et al. (1999), we developed a workable stratigraphic framework to delineate geologic map units for the purposes of this project. In addition to delineating surficial geologic deposits, we classified the vegetation characteristics of each map polygon through a nine-division scheme similar to that used by Hendrickx and Harrison (2001).

Comparing the distribution and extent of the channel deposits from the two time windows, allows for 1) characterization of the fluvial processes that are operating in the system and 2) documentation of the changes that have occurred to the fluvial system

through time as a result of controlled discharge, such as erosion and deposition of stream sediment. This is important for understanding stream response in time and space to the regulation of discharge along the mapped reach, in light of potential decisions regarding the utility of restoring the natural flood pulse, or other current fluvial geomorphologic rehabilitation feasibility studies.

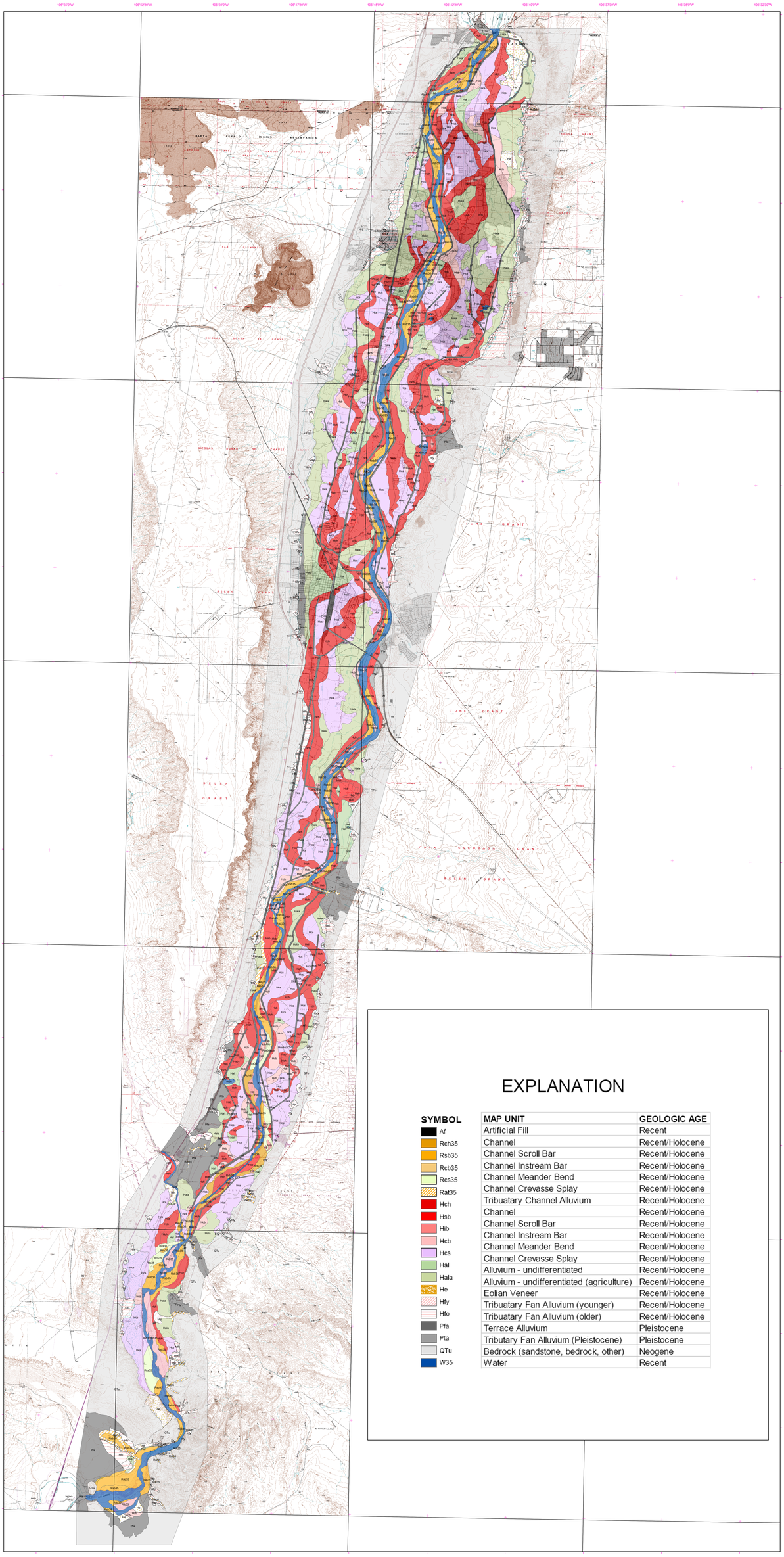
This mapping effort was completed primarily by Justin Pearce of WLA, under the supervision of Keith Kelson. Please feel free to contact either of the undersigned if there are any questions or if we can be of further assistance.

References

Hendrickx, J., and Harrison, B., 2000, Geomorphological Units, Bosque del Apache: unpublished map submitted to the U.S. Fish and Wildlife Service, Bosque Improvement Group, and New Mexico Tech; scale 1:25,000.

Kelson, K.I., Hitchcock, C.S., and Randolph, C.E., 1999, Liquefaction susceptibility in the inner Rio Grande valley near Albuquerque, New Mexico: Final Technical Report submitted to the USGS National Earthquake Hazard Reduction Program, Award No. 98-HQ-GR-1009

Pearce, J.T., and Kelson, K.I, (2003), Surficial Geologic Map of the Middle Rio Grande Valley Floodplain, from San Acacia to Elephant Butte Reservoir, New Mexico; New Mexico Bureau of Geology & Mineral Resources, Open File Report 476



EXPLANATION

SYMBOL	MAP UNIT	GEOLOGIC AGE
Af	Artificial Fill	Recent
Rch35	Channel	Recent/Holocene
Rsb35	Channel Scroll Bar	Recent/Holocene
Rcb35	Channel Instream Bar	Recent/Holocene
Rcs35	Channel Meander Bend	Recent/Holocene
Rat35	Channel Crevasse Splay	Recent/Holocene
Hch	Tribuatary Channel Alluvium	Recent/Holocene
Hsb	Channel	Recent/Holocene
Hib	Channel Scroll Bar	Recent/Holocene
Hcb	Channel Instream Bar	Recent/Holocene
Hcs	Channel Meander Bend	Recent/Holocene
Hal	Channel Crevasse Splay	Recent/Holocene
Hala	Alluvium - undifferentiated	Recent/Holocene
He	Alluvium - undifferentiated (agriculture)	Recent/Holocene
Hfy	Eolian Veneer	Recent/Holocene
Hfo	Tribuatary Fan Alluvium (younger)	Recent/Holocene
Pfa	Tribuatary Fan Alluvium (older)	Recent/Holocene
Pta	Terrace Alluvium	Pleistocene
QTu	Tributary Fan Alluvium (Pleistocene)	Pleistocene
W35	Bedrock (sandstone, bedrock, other)	Neogene
	Water	Recent

UTM zone 13 NAD 1983 shown by magenta ticks
7.5 min quadrangle boundaries, NAD 1927, shown in black

1:48,000

0 0.5 1 2 3 4 Kilometers

0 0.5 1 2 3 4 Miles

Plate 1. Surficial Geologic Map
Middle Rio Grande Valley - 1935
Isleta Diversion to San Acacia Diversion

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Printed: July 2004