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# Quaternary Fault and Fold Database of the United States

**As of January 12, 2017, the USGS maintains a limited number of metadata fields that characterize the Quaternary faults and folds of the United States. For the most up-to-date information, please refer to the interactive fault map.**

## Northern Sangre de Cristo fault, San Luis section (Class A) No. 2321d

**Last Review Date: 2012-01-13**

## Compiled in cooperation with the Colorado Geological Survey

***citation for this record:*** **Kirkham, R.M., and Haller, K.M., compilers, 2012, Fault number 2321d, Northern Sangre de Cristo fault, San Luis section, in Quaternary fault and fold database of the United States: U.S. Geological Survey website, https://earthquakes.usgs.gov/hazards/qfaults, accessed 12/14/2020 03:00 PM.**

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| **Synopsis** | **General:** The Northern Sangre de Cristo fault is a major down-to-west normal fault within the Rio Grande rift in Colorado. This high-angle normal fault dips to the west and forms the structural boundary between the Sangre de Cristo Range/Culebra Range on the east and the San Luis basin. The San Luis basin is tl largest of the major north-trending extensional basins of the northern Rio Grande rift. The fault extends from Poncha Pass to near the Colorado-New Mexico state line.<br><br>**Sections:** This fault has 4 sections. The Northern Sangre de Cristo fault is divide into sections based on mountain-front and fault-scarp morphology for the purpos |

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| | of this compilation. The entire fault shows evidence that suggests multiple late Quaternary surface displacements, including Holocene movement. The following sections from north to south are: the Crestone section, the Zapata section, the Blanca section, and the San Luis section; these three segments are herein called sections. A fourth section (San Luis) extends generally southward from the south side of the Blanca Peak Massif to Jarosa Creek near the Colorado-New Mexico state line. |
| **Name comments** | **General:** The Sangre de Cristo fault zone borders the eastern side of San Luis basin from near Poncha Pass, Colorado, to near Taos, New Mexico. This fault zo has been subdivided into two discrete faults for this compilation: the Northern Sangre de Cristo fault, which bounds the west side of the Sangre de Cristo Mountains in Colorado and the Southern Sangre de Cristo fault, which is in New Mexico. Ruleman and Machette (2007 #7165), Ruleman and others (2008 #7286) and Crone and others (2006 #7753) suggest the geomorphology of the Northern Sangre de Cristo fault and the adjacent range front indicate differing amounts of offset and different faulting histories north of Blanca Peak massif in contrast to th San Luis section defined here, which they prefer to call the Central Sangre de Cristo fault zone.<br><br>**Section:** The name of the San Luis section was assigned by Widmann and others (1998 #3441). The San Luis section extends from the Blanca Peak massif southward to Jaroso Creek near the state line. This section also includes a northeast-trending fault mapped by Wallace (1997 #2782) north of Fort Garland that lies a short distance east of the main fault trace. Along the San Luis section, the range front is more subdued than to the north and fault scarps are more discontinuous.<br><br>**Fault ID:** Fault number Q69d of Widman and others (1998 #3441); fault 116 in Kirkham and Rogers (1981 #792); fault 131 in Witkind (1976 #2792); fault 3 of Colman (1985 #1953). |
| **County(s) and State(s)** | COSTILLA COUNTY, COLORADO |
| **Physiographic province(s)** | SOUTHERN ROCKY MOUNTAINS |
| **Reliability of location** | Good<br>Compiled at 1:125,000 scale.<br><br>*Comments:* The trace used for this compilation is chiefly based upon Colman and others (1985 #1954; scale 1:125,000) except where recent, more detailed mappin by Wallace (1997 #2782; scale 1:24,000) is available. |
| **Geologic setting** | The Northern Sangre de Cristo fault is a major down-to-west normal fault within |

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| | the Rio Grande rift. It forms the eastern boundary of the east-tilted half-graben of San Luis basin. The deepest part of San Luis basin lies adjacent to the Northern Sangre de Cristo fault (Gaca and Karig, 1965 #2690). Estimates of the maximum thickness of synorogenic basin fill in that part of San Luis basin have widely ranged. Gaca and Karig (1965 #2690) suggested a maximum thickness of about 9 km; Huntley (1976 #2698; 1976 #2699) reported it at about 5 km; Stoughton (19 #2750) at 6,000 m; and Kluth and Schaftenaar (1994 #1183) at 6.4 km. Estimates of the amount of vertical displacement on the Northern Sangre de Cristo fault als vary widely. Kluth and Schaftenaar (1994 #1183) suggested the Northern Sangre Cristo fault has approximately 9.2 km of vertical separation; geophysical data suggest that total Neogene throw on the Northern Sangre de Cristo fault is at leas km (Brister and Gries, 1994 #1178). |
| **Length (km)** | This section is 59 km of a total fault length of 164 km. |
| **Average strike** | N12°W (for section) versus N19°W,N35°E (for whole fault) |
| **Sense of movement** | Normal |
| **Dip Direction** | W<br><br>*Comments:* This section of the Northern Sangre de Cristo fault dips to the west, b the amount of dip is unknown. |
| **Paleoseismology studies** | Site 2321-6 Crone and others (2006 #7753) mapped two closely spaced trenches located about 5.4 km northeast of San Luis, Colorado that cross the valleyward strand of the fault at the mouth of Rito Seco Creek. The southern trench was 27 m long across a 2.7-m-high scarp on young alluvium, and the northern trench was 3 long across a 6.6-m-high scarp on older alluvium. Tertiary Santa Fe Group was exposed in the footwall of both trenches. Details supporting interpretation of four prehistoric earthquakes are not included in the preliminary report. The report includes radiocarbon ages for two of the five samples from the southern trench an one radiocarbon age for the northern trench. In addition, luminescence ages for tw of the four samples from the southern trench and six of seven samples from the northern trench. No further interpretation is provided. |
| **Geomorphic expression** | Several faults within this group are associated with linear or arcuate topographic escarpments as much as 35 m high. Colman and others (1985 #1954) measured scarp profiles at three locations, but no trenching investigations were conducted o this section. |
| **Age of faulted surficial deposits** | Scarps within the San Luis section are present on surfical deposits ranging from middle Pleistocene (pre-Bull Lake) to Holocene age (Kirkham and Rogers, 1981 #792; Colman and others, 1985 #1954; Wallace, 1997 #2782). Kirkham and Roge |

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| | (1981 #792) reported middle Holocene age for faulted deposits along this part of the fault. |
| **Historic earthquake** | |
| **Most recent prehistoric deformation** | latest Quaternary (<15 ka)<br><br>*Comments:* Charcoal from faulted deposits in a natural exposure along Rito Seco yielded a radiocarbon age of 4,715±170 yr BP (Kirkham and Rogers, 1981 #792) |
| **Recurrence interval** | |
| **Slip-rate category** | Less than 0.2 mm/yr<br><br>*Comments:* Widmann and others (1998 #3441) placed this section of the fault within the <0.2 mm/yr slip-rate category. |
| **Date and Compiler(s)** | 2012<br>Robert M. Kirkham, Colorado Geological Survey<br>Kathleen M. Haller, U.S. Geological Survey |
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