



WATER-RIGHT DOCKET

Great Sand Dunes National Monument

Docket No: 6

INSTREAM FLOWS, 81CW164

State Water Rights Documentation

00-00-0000: district court, water division no. 3: case no. 81cw164; findings of fact, conclusions of law and decree; concerning the

COPY

JUL 5 - 1980
DISTRICT COURT, WATER DIVISION NO. 3, STATE OF COLORADO

*Filed in District Court
Water Division 3, Colorado*

DISTRICT COURT, WATER DIVISION NO. 3, STATE OF COLORADO

CASE NO. 81CW164

JUN 29 1981

FINDINGS OF FACT, CONCLUSIONS OF LAW AND DECREE

*Carl S. Rodling
Clerk Of The Water Court*

CONCERNING THE APPLICATION FOR WATER RIGHTS OF THE UNITED STATES
OF AMERICA IN ALAMOSA AND SAGUACHE COUNTIES

FINDINGS OF FACT

THIS MATTER comes before the court for entry of Findings of Fact, Conclusions of Law and Decree, the parties having consented thereto. The court, having examined the records and files herein, and being now fully and sufficiently advised in the premises, hereby makes the following Findings of Fact, Conclusions of Law and Decree:

1. The United States of America was joined as a party in Water Division No. 3 pursuant to the McCarran Amendment, 43 U.S.C. §666, in 1979.

2. The United States of America filed an application for water rights in December 20, 1979, styled a general application which was assigned Case No. 79CW85. Thereafter, on November 24, 1981, the United States filed this application for water rights at the Great Sand Dunes National Monument as an amendment to Case No. 79CW85 which was assigned Case No. 81CW164.

3. In this case, the United States claims reserved rights in the Great Sand Dunes National Monument "the sources of which are in, on, under, adjacent to, or otherwise appurtenant to the land described by Proclamation No. 1994 of March 17, 1932, 47 Stat. 2506, amended by Proclamation No. 2681 of March 12, 1946, 60 Stat. 1339 and Proclamation No. 3138 of June 7, 1956, 70 Stat. C31." Application, ¶2. The purposes for which the United States claims water are "to conserve the scenery and the natural and historic objects and wildlife therein." Id. at ¶3. The United States claims water for a multitude of specific uses including "preservation of objects of scenic, scientific and educational interest" and "preservation of educational, historic, scientific, scenic, aesthetic and other public values and habitat protection and management." Id.

4. The amount and source of the water claimed is "that quantity of surface, ground and underground waters, both tributary and non-tributary, which are located in, on, under, adjacent to, or otherwise appurtenant to the aforescribed reservation, and which are, or will become necessary to fulfill the purposes for which the reservation was created." Id.

5. The United States also claims a reserved right to Denton Spring in the amount of 0.02 cfs for "maintenance of the ecosystem." Id. at ¶4.

6. The following Objectors filed Statements of Opposition in Case No. 79CW85 but failed to file Supplemental Statements of Opposition in the captioned case:

Seamster Farms, Inc.
Avis Neal Roemer Trust
Homestake Mining Co.
Fullenwider Ranches, Inc.
/LD Ranch
Neil F. Seitz
Blue Pond and Associates
City and County of Denver
Adolph Coors Company
AZL Resources, Inc.
Hans G. Hardt
Rosie Hardt
Walter Mundorf
SLV Municipalities
City of Alamosa
Conejos Water Conservancy District

7. The following Objectors filed timely Statements of Opposition and/or Supplemental Statements of Opposition in the captioned case:

State of Colorado
Rio Grande Water Conservation District
Rio Grande Water Users Association, et al.
Malcolm Stewart

8. By Order of the court dated August 5, 1988, Objector Otaka, International, Inc., was substituted for Objector Malcolm Stewart.

9. The Great Sand Dunes National Monument was established pursuant to the Antiquities Act, 16 U.S.C. §431 by Proclamation No. 1994 of March 17, 1932, 47 Stat. 2506, "for the preservation of the great sand dunes and additional features of scenic, scientific, and educational interest." Two later proclamations

also pertain to the Great Sand Dunes National Monument. Proclamation No. 2681, dated March 12, 1946, 60 Stat. 1339 and Proclamation No. 3138, dated June 7, 1956, 70 Stat. C31 confirmed and redefined the boundaries of the Great Sand Dunes National Monument. For purposes of this decree, the only relevance of the later proclamations is that the Proclamation of June 17, 1956, reserved one additional section of land through which Little Medano Creek flows and a half-section of land through which Mosca Creek and Morris Gulch flow.

10. Medano Creek and its tributaries, Little Medano Creek, Horse Canyon Creek, Castle Creek, Sawmill Canyon Creek, Buck Creek, Garden Creek, an unnamed creek, Mosca Creek, and Morris Gulch, are identifiable and discrete watercourses within the Great Sand Dunes National Monument.

11. Sand Creek and its tributary, Cold Creek, are identifiable and discrete watercourses within the Great Sand Dunes National Monument.

12. Medano Creek enters the northeast part of the Great Sand Dunes National Monument in Section 11, T. 26 S., R. 73 W. of the 6th P.M., thence traversing Sections 11, 14, 23, 26, 35, and 34 (unsurveyed), T. 26 S., R. 73 W. of the 6th P.M. and Sections 3, 4, 8 and 7 of T. 27 S., R. 73 W. of the 6th P.M. Depending upon the season, Medano Creek infiltrates into the aeolian deposits in

the southern part of the Great Sand Dunes National Monument.

All of the above-described sections were reserved by Proclamation No. 1994, 47 Stat. 2506, dated March 17, 1932.

13. Little Medano Creek enters the Great Sand Dunes National Monument in Section 2, T. 26 S., R. 73 W. of the 6th P.M. and traverses Section 11 of the same Township and Range, where it joins Medano Creek at or near the intersection of the South Section line of the aforesaid Section 11 and Medano Creek. Section 2, T. 26 S., R. 73 W. of the 6th P.M. was reserved by Proclamation No. 3138, dated June 7, 1956, 70 Stat. C31. Section 11 of the same Township and Range was reserved by Proclamation No. 1994, dated March 17, 1932, 47 Stat. 2506.

14. Horse Canyon Creek enters the Great Sand Dunes National Monument in Section 14, T. 26 S., R. 73 W. of the 6th P.M. and traverses that section to its confluence with Medano Creek in the aforesaid Section 14 of the same Township and Range. Section 14 was reserved by Proclamation No. 1994, dated March 17, 1932.

15. Castle Creek enters the Great Sand Dunes National Monument in Section 23, T. 26 S., R. 73 W. of the 6th P.M., traversing this section in a westerly direction to its confluence with Medano Creek in the aforesaid Section 23. Said Section 23 was reserved by Proclamation No. 1994, dated March 17, 1932.

16. Sawmill Canyon Creek enters the Great Sand Dunes National Monument in Section 26, T. 26 S., R. 73 W. of the 6th P.M., traversing this section in a westerly direction to its confluence with Medano Creek in the aforesaid Section 26. Said Section 26 was reserved by Proclamation No. 1994, dated March 17, 1932.

17. Buck Creek enters the Great Sand Dunes National Monument in Section 26, T. 26 S., R. 73 W. of the 6th P.M., traversing this section and section 35 of the same Township and Range in a westerly direction to its confluence with Medano Creek in the aforesaid Section 35. Said Sections 26 and 35 were reserved by Proclamation No. 1994, dated March 17, 1932.

18. Garden Creek enters the Great Sand Dunes National Monument in Section 35, T. 26 S., R. 73 W. of the 6th P.M., traversing this section in a westerly direction to its confluence with Medano Creek in the aforesaid Section 35. Said Section 35 was reserved by Proclamation No. 1994, dated March 17, 1932.

19. An unnamed creek enters the Great Sand Dunes National Monument in Section 23, T. 26 S., R. 73 W. of the 6th P.M., traversing this section in a westerly direction to its confluence with Medano Creek in the aforesaid Section 23. Said Section 23 was reserved by Proclamation No. 1994, dated March 17, 1932.

20. Mosca Creek enters the Great Sand Dunes National Monument in Section 2, T. 27 S., R. 73 W. of the 6th P.M., traversing this section, Sections 35 and 34 (unsurveyed) of T. 26 S., R. 73 W. and Section 3, T. 27 S. R. 73 W., to its confluence with Medano Creek in the aforesaid Section 3. Said Section 2 was reserved by Proclamation No. 3138 dated June 7, 1956; said sections 3, 34 and 35 were reserved by Proclamation No. 1994, dated March 17, 1932.

21. Morris Gulch enters the Great Sand Dunes National Monument in Section 2, T. 27 S., R. 73 W. of the 6th P.M., traversing this section and section 3 of the same Township and Range in a westerly direction to its confluence with Medano Creek in the aforesaid Section 3. Said Section 2 was reserved by Proclamation No. 3138 dated June 7, 1956; said Section 3 was reserved by Proclamation No. 1994, dated March 17, 1932.

22. Sand Creek flows southwesterly entering the Great Sand Dunes National Monument at its northern boundary in Section 31, T. 25 S., R. 73 W., 6th P. M., and exits the monument in the same section at a point where it crosses the west section line. Sand Creek reenters the Great Sand Dunes National Monument in Section 15, T. 41 N., R. 12 E. of the N.M.P.M., and exits the Monument in Section 22, T. 41 N., R. 12 E. of the N.M.P.M. All of the above-described sections were reserved by Proclamation No. 1994, 47 Stat. 2506, dated March 17, 1932.

23. Cold Creek enters the Great Sand Dunes National Monument in Section 32, T. 25 S., R. 73 W. of the 6th P.M. and traverses that section to its confluence with Sand Creek in Section 31 of the same Township and Range. Sections 32 and 31 were reserved by Proclamation No. 1994, dated March 17, 1932.

24. Medano Creek exhibits a rare phenomenon known as "pulsating" or "surge flow". This phenomenon is of scientific, educational and scenic interest. Medano Creek also arrests the eastward migration of the dune mass by eroding the base of its eastern margin. Medano Creek transports the eroded sand to the southern part of the Monument where it is picked up and transported by wind to the northeast. Thus, Medano Creek is an integral part of the continual natural process of dune formation, migration and renewal.

25. Pulsating flow has also been observed on Sand Creek and Castle Creek. Sand Creek also supplies water for a pond, or water hole, located in Section 23, T. 41 N., R. 12 E., N.M.P.M.

26. Little Medano Creek, Horse Canyon Creek, Castle Creek, Sawmill Canyon Creek, Buck Creek, Garden Creek, An unnamed creek, Mosca Creek, and Morris Gulch, all being tributary to Medano Creek, make surface or subsurface contributions to the flow of Medano Creek and, thereby, to the transport of dune sand and the unique pulsating flow phenomenon observed in Medano Creek.

27. Cold Creek contributes to the flow of Sand Creek and, thereby, to the unique pulsating flow phenomenon observed in Sand Creek and the maintenance of the pond, or water hole, located in Section 23, T. 41 N., R. 12 E., New Mexico P.M.

28. Maintenance of instream flows in Medano Creek and its tributaries, Little Medano Creek, Horse Canyon Creek, Castle Creek, Sawmill Canyon Creek, Buck Creek, Garden Creek, an unnamed creek, Mosca Creek, and Morris Gulch and Sand Creek and its tributary, Cold Creek in the Great Sand Dunes National Monument is necessary for the preservation of the great sand dunes and additional objects of scenic, scientific, and educational interest. The amounts necessary for the aforestated purpose are as stated in paragraph 2 of the decree, infra. The quantified flows recognized in this decree are based on currently existing flow conditions and therefore reflect the impact, if there is any, of existing groundwater withdrawals outside the monument. Existing lawful levels of groundwater withdrawals, therefore, will not affect the decreed flows at their quantification points.

29. Maintenance of the entire yield of Denton Spring for "ecosystem maintenance" is not necessary for preservation of the great sand dunes and additional objects of scenic, scientific, and educational interest. However, the flow of the spring has created wildlife habitat and provided drinking water for wildlife

since at least 1946 and has been managed since that time for wildlife purposes by the National Park Service.

30. In addition to the foregoing requirements for water, the National Park Service needs an additional 8.0 acre-feet per year to satisfy future requirements for staff and visitor domestic needs directly related to the administration and operation of the Great Sand Dunes National Monument for preservation of the great sand dunes and additional objects of scenic, scientific, and educational interest. This water is to be diverted through one or more wells to be located on land reserved by one of the proclamations and used on reserved land for the aforesated purpose.

31. In order to facilitate administration of the rights decreed in decretal paragraph 14 and described in paragraph 30 and to facilitate contracting for construction of wells, the United States agrees to provide the State Engineer all information that is required for a permit to construct a well. Upon receipt of such information, the State Engineer agrees to issue a well permit in accordance with the provisions of paragraph 30 above and of decretal paragraph 4.

32. The time for filing Supplemental Statements of Opposition to the captioned case expired Sept. 2, 1986, pursuant to the Referee's Order filed July 15, 1986.

CONCLUSIONS OF LAW

33. All notices required by law for filing and publication of the application in the Resume of Water Division No. 3 have been fulfilled and the court has jurisdiction over the subject matter and all parties whether or not they appeared.

34. The primary purpose of the Great Sand Dunes National Monument is as stated in the March 17, 1932, proclamation, to wit: "preservation of the great sand dunes and additional objects of scenic, scientific, and educational interest."

35. As found in paragraph 28, above, water, in the form of minimum stream flows in Medano Creek and its tributaries, Little Medano Creek, Horse Canyon Creek, Castle Creek, Sawmill Canyon Creek, Buck Creek, Garden Creek, an unnamed creek, Mosca Creek, and Morris Gulch, and in Sand Creek and its tributary, Cold Creek is necessary to fulfill the primary purpose of the Great Sand Dunes National Monument. Therefore, the United States reserved instream flows in Medano Creek and Sand Creek and their respective tributaries described above, with priority dates as of the dates the respective parts of the Monument were reserved. Cappaert v. United States, 426 U.S. 128, 138 (1976); United States v. Denver, 656 P.2d 1, 20 (Colo. 1982).

36. The flow of Denton Spring for "ecosystem maintenance" is not necessary for the primary purpose of the Great Sand Dunes National Monument, therefore the claimed flow of Denton Spring is not reserved. United States v. New Mexico, 438 U.S. 696 (1978).

37. Denton Spring has been beneficially used by the United States for the purpose of wildlife habitat and wildlife drinking since 1946. Therefore, the United States has appropriated 0.02 cfs of the flow of Denton Spring for the aforestated purposes.

38. The federal reserved rights doctrine applies to quantified present and future needs for water necessary to achieve the purpose of federal reservations, Arizona v. California, 373 U.S. 546, 600 (1963); United States v. Denver, 656 P.2d 1, 34-35 (Colo. 1982). Therefore, the United States has reserved 8.0 acre-feet of water per year for future use for the operation and administration of the Great Sand Dunes National Monument for staff and visitor use for purposes directly related to preservation of the great sand dunes and additional objects of scenic, scientific, and educational interest.

39. In its application, the United States made very broad claims for a multitude of uses. The only water necessary for the primary purpose of the Great Sand Dunes National Monument is that required for Medano Creek and Sand Creek and their respective tributaries as found and described in paragraphs 10 through 28

above and the 8.0 acre-feet per year for future use described in paragraph 30, above. Therefore, no reserved rights were created by the proclamations pertaining to Great Sand Dunes National Monument except those decreed herein. Id.

40. This court has previously ruled that applications filed as amendments to Case No. 79CW85 prior to March 31, 1982, relate back to Case No. 79CW85. See, this court's Orders dated December 31, 1981, and June 9, 1988, Case No. 79CW85. The application in this case is within the terms of those Orders and is a clarifying amendment to the application filed by the United States in Case No. 79CW85, and the United States is, therefore, entitled to antedate priorities subsequent to March 17, 1932. United States v. Bell, 724 P.2d 631, 645 (Colo. 1986).

41. The United States has demonstrated its entitlement to this decree as a matter of law.

DECREE

IT IS HEREBY ORDERED, ADJUDGED AND DECREED:

1. The Findings of Fact and Conclusions of Law contained herein are incorporated by reference and made a part of this Decree.

2. That the United States has reserved rights to continuous minimum stream flows for the purpose of preservation of the great sand dunes and additional features of scenic, scientific and educational interest with priority of March 17, 1932, except as provided in subparagraph 2b, 2i and 2j, infra, in the following water courses, which drain into the Closed Basin area of the San Luis Valley and are "natural surface streams" within the meaning of §37-82-101(2), C.R.S. The United States has such reserved right at the point where each stream enters the Great Sand Dunes National Monument, except as further provided in paragraphs 2b, 2i, and 2j below, in the quantities listed:

a. Medano Creek, at a point where Medano Creek crosses the east section line of Section 11, T. 26 S., R. 73 W. of the 6th P.M., as follows:

i. From October 1 until November 1. 4.09 c.f.s. or the natural flow, whichever is less.

ii. From November 1 until December 1. 3.05 c.f.s. or the natural flow, whichever is less.

iii. From December 1 until January 1. 2.09 c.f.s. or the natural flow, whichever is less.

iv. From January 1 until February 1. 2.25 c.f.s. or the natural flow, whichever is less.

v. From February 1 until March 1. 2.17 c.f.s. or the natural flow, whichever is less.

vi. From March 1 until April 1. 2.17 c.f.s. or the natural flow, whichever is less.

vii. From April 1 until May 1. 3.69 c.f.s. or the natural flow, whichever is less.

viii. From May 1 until June 1. 19.66 c.f.s. or the natural flow, whichever is less.

ix. From June 1 until July 1. 20.94 c.f.s. or the natural flow, whichever is less.

x. From July 1 until August 1. 15.73 c.f.s. or the natural flow, whichever is less.

xi. From August 1 until September 1. 12.20 c.f.s. or the natural flow, whichever is less.

xii. From September 1 until October 1. 7.70 c.f.s. or the natural flow, whichever is less.

xiii. Provided however that the right to the above-described flows shall not include the amount of water taken and historically used by the Medano and Hudson Ditches under the decree entered by the Alamosa County District Court on July 21, 1914, in the case of Charles Wolf and John Meyer v. the Medano Springs Ranch Co.

b. Little Medano Creek, with priority date of June 17, 1956, at a point where Little Medano Creek enters the Great Sand Dunes National Monument in Section 2, T. 26 S., R. 73 W. of the 6th P.M., and with priority date of March 17, 1932, at a point where Little Medano Creek enters Section 11 of the same township and range as follows:

i. From October 1 until November 1. 0.89 c.f.s. or the natural flow, whichever is less.

ii. From November 1 until December 1. 0.66 c.f.s. or the natural flow, whichever is less.

iii. From December 1 until January 1. 0.45 c.f.s. or the natural flow, whichever is less.

iv. From January 1 until February 1. 0.49 c.f.s. or the natural flow, whichever is less.

v. From February 1 until March 1. 0.47 c.f.s. or the natural flow, whichever is less.

vi. From March 1 until April 1. 0.47 c.f.s. or the natural flow, whichever is less.

vii. From April 1 until May 1. 0.80 c.f.s. or the natural flow, whichever is less.

viii. From May 1 until June 1. 4.26 c.f.s. or the natural flow, whichever is less.

ix. From June 1 until July 1. 4.54 c.f.s. or the natural flow, whichever is less.

x. From July 1 until August 1. 3.41 c.f.s. or the natural flow, whichever is less.

xi. From August 1 until September 1. 2.64 c.f.s. or the natural flow, whichever is less.

xii. From September 1 until October 1. 1.67 c.f.s. or the natural flow, whichever is less.

c. Horse Canyon Creek, at a point where Horse Canyon Creek enters the Great Sand Dunes National Monument in Section 14, T. 26 S., R. 73 W. of the 6th P.M., as follows:

i. From October 1 until November 1. 0.08 c.f.s. or the natural flow, whichever is less.

ii. From November 1 until December 1. 0.08 c.f.s. or the natural flow, whichever is less.

iii. From December 1 until January 1. 0.05 c.f.s. or the natural flow, whichever is less.

iv. From January 1 until February 1. 0.06 c.f.s. or the natural flow, whichever is less.

v. From February 1 until March 1. 0.06 c.f.s. or the natural flow, whichever is less.

vi. From March 1 until April 1. 0.06 c.f.s. or the natural flow, whichever is less.

vii. From April 1 until May 1. 0.12 c.f.s. or the natural flow, whichever is less.

viii. From May 1 until June 1. 0.57 c.f.s. or the natural flow, whichever is less.

ix. From June 1 until July 1. 0.40 c.f.s. or the natural flow, whichever is less.

x. From July 1 until August 1. 0.29 c.f.s. or the natural flow, whichever is less.

xi. From August 1 until September 1. 0.17 c.f.s. or the natural flow, whichever is less.

xii. From September 1 until October 1. 0.11 c.f.s. or the natural flow, whichever is less.

d. Castle Creek, at a point where Castle Creek enters the Great Sand Dunes National Monument in Section 23, T. 26 S., R. 73 W. of the 6th P.M., as follows:

i. From October 1 until November 1. 0.14 c.f.s. or the natural flow, whichever is less.

ii. From November 1 until December 1. 0.14 c.f.s. or the natural flow, whichever is less.

iii. From December 1 until January 1. 0.09 c.f.s. or the natural flow, whichever is less.

iv. From January 1 until February 1. 0.12 c.f.s. or the natural flow, whichever is less.

v. From February 1 until March 1. 0.12 c.f.s. or the natural flow, whichever is less.

vi. From March 1 until April 1. 0.11 c.f.s. or the natural flow, whichever is less.

vii. From April 1 until May 1. 0.21 c.f.s. or the natural flow, whichever is less.

viii. From May 1 until June 1. 1.04 c.f.s. or the natural flow, whichever is less.

ix. From June 1 until July 1. 0.73 c.f.s. or the natural flow, whichever is less.

x. From July 1 until August 1. 0.52 c.f.s. or the natural flow, whichever is less.

xi. From August 1 until September 1. 0.31 c.f.s. or the natural flow, whichever is less.

xii. From September 1 until October 1. 0.19 c.f.s. or the natural flow, whichever is less.

e. Sawmill Canyon Creek, at a point where Sawmill Canyon Creek enters the Great Sand Dunes National Monument in Section 26, T. 26 S., R. 73 W. of the 6th P.M., as follows:

i. From October 1 until November 1. 0.11 c.f.s. or the natural flow, whichever is less.

ii. From November 1 until December 1. 0.11 c.f.s. or the natural flow, whichever is less.

iii. From December 1 until January 1. 0.07 c.f.s. or the natural flow, whichever is less.

iv. From January 1 until February 1. 0.09 c.f.s. or the natural flow, whichever is less.

v. From February 1 until March 1. 0.09 c.f.s. or the natural flow, whichever is less.

vi. From March 1 until April 1. 0.09 c.f.s. or the natural flow, whichever is less.

vii. From April 1 until May 1. 0.16 c.f.s. or the natural flow, whichever is less.

viii. From May 1 until June 1. 0.81 c.f.s. or the natural flow, whichever is less.

ix. From June 1 until July 1. 0.57 c.f.s. or the natural flow, whichever is less.

x. From July 1 until August 1. 0.41 c.f.s. or the natural flow, whichever is less.

xi. From August 1 until September 1. 0.24 c.f.s. or the natural flow, whichever is less.

xii. From September 1 until October 1. 0.15 c.f.s. or the natural flow, whichever is less.

f. Buck Creek, at a point where Buck Creek enters the Great Sand Dunes National Monument in Section 26, T. 26 S., R. 73 W. of the 6th P.M., as follows:

i. From October 1 until November 1. 0.10 c.f.s. or the natural flow, whichever is less.

ii. From November 1 until December 1. 0.09 c.f.s. or the natural flow, whichever is less.

iii. From December 1 until January 1. 0.06 c.f.s. or the natural flow, whichever is less.

iv. From January 1 until February 1. 0.08 c.f.s. or the natural flow, whichever is less.

v. From February 1 until March 1. 0.08 c.f.s. or the natural flow, whichever is less.

vi. From March 1 until April 1. 0.08 c.f.s. or the natural flow, whichever is less.

vii. From April 1 until May 1. 0.14 c.f.s. or the natural flow, whichever is less.

viii. From May 1 until June 1. 0.70 c.f.s. or the natural flow, whichever is less.

ix. From June 1 until July 1. 0.49 c.f.s. or the natural flow, whichever is less.

x. From July 1 until August 1. 0.35 c.f.s. or the natural flow, whichever is less.

xi. From August 1 until September 1. 0.21 c.f.s. or the natural flow, whichever is less.

xii. From September 1 until October 1. 0.13 c.f.s. or the natural flow, whichever is less.

g. Garden Creek, at a point where Garden Creek enters the Great Sand Dunes National Monument in Section 35, T. 26 S., R. 73 W. of the 6th P.M., as follows:

i. From October 1 until November 1. 0.08 c.f.s. or the natural flow, whichever is less.

ii. From November 1 until December 1. 0.08 c.f.s. or the natural flow, whichever is less.

iii. From December 1 until January 1. 0.05 c.f.s. or the natural flow, whichever is less.

iv. From January 1 until February 1. 0.06 c.f.s. or the natural flow, whichever is less.

v. From February 1 until March 1. 0.06 c.f.s. or the natural flow, whichever is less.

vi. From March 1 until April 1. 0.06 c.f.s. or the natural flow, whichever is less.

vii. From April 1 until May 1. 0.11 c.f.s. or the natural flow, whichever is less.

viii. From May 1 until June 1. 0.56 c.f.s. or the natural flow, whichever is less.

ix. From June 1 until July 1. 0.40 c.f.s. or the natural flow, whichever is less.

x. From July 1 until August 1. 0.28 c.f.s. or the natural flow, whichever is less.

xi. From August 1 until September 1. 0.17 c.f.s. or the natural flow, whichever is less.

xii. From September 1 until October 1. 0.10 c.f.s. or the natural flow, whichever is less.

h. An unnamed creek, at a point where the unnamed creek enters the Great Sand Dunes National Monument in Section 23, T. 26 S., R. 73 W. of the 6th P.M., as follows:

i. From October 1 until November 1. 0.08 c.f.s. or the natural flow, whichever is less.

ii. From November 1 until December 1. 0.08 c.f.s. or the natural flow, whichever is less.

iii. From December 1 until January 1. 0.06 c.f.s. or the natural flow, whichever is less.

iv. From January 1 until February 1. 0.07 c.f.s. or the natural flow, whichever is less.

v. From February 1 until March 1. 0.07 c.f.s. or the natural flow, whichever is less.

vi. From March 1 until April 1. 0.07 c.f.s. or the natural flow, whichever is less.

vii. From April 1 until May 1. 0.12 c.f.s. or the natural flow, whichever is less.

viii. From May 1 until June 1. 0.61 c.f.s. or the natural flow, whichever is less.

ix. From June 1 until July 1. 0.43 c.f.s. or the natural flow, whichever is less.

x. From July 1 until August 1. 0.31 c.f.s. or the natural flow, whichever is less.

xi. From August 1 until September 1. 0.18 c.f.s. or the natural flow, whichever is less.

xii. From September 1 until October 1. 0.11 c.f.s. or the natural flow, whichever is less.

i. Mosca Creek, with priority date of June 17, 1956, at a point where Mosca Creek enters the Great Sand Dunes National Monument in Section 2, T. 27 S., R. 73 W. of the 6th P.M., and with priority date of March 17, 1932, at a point where Mosca Creek enters Section 3 of the same township and range, as follows:

i. From October 1 until November 1. 0.32 c.f.s. or the natural flow, whichever is less.

ii. From November 1 until December 1. 0.31 c.f.s. or the natural flow, whichever is less.

iii. From December 1 until January 1. 0.21 c.f.s. or the natural flow, whichever is less.

iv. From January 1 until February 1. 0.26 c.f.s. or the natural flow, whichever is less.

v. From February 1 until March 1. 0.26 c.f.s. or the natural flow, whichever is less.

vi. From March 1 until April 1. 0.25 c.f.s. or the natural flow, whichever is less.

vii. From April 1 until May 1. 0.47 c.f.s. or the natural flow, whichever is less.

viii. From May 1 until June 1. 2.32 c.f.s. or the natural flow, whichever is less.

ix. From June 1 until July 1. 1.63 c.f.s. or the natural flow, whichever is less.

x. From July 1 until August 1. 1.16 c.f.s. or the natural flow, whichever is less.

xi. From August 1 until September 1. 0.69 c.f.s. or the natural flow, whichever is less.

xii. From September 1 until October 1. 0.43 c.f.s. or the natural flow, whichever is less.

j. Morris Gulch, with priority date of June 17, 1956, at a point where Morris Gulch enters the Great Sand Dunes National Monument in Section 2, T. 27 S., R. 73 W. of the 6th P.M., and with priority date of March 17, 1932, at a point where Morris Gulch enters Section 3 of the same township and range, as follows:

i. From October 1 until November 1. 0.15 c.f.s. or the natural flow, whichever is less.

ii. From November 1 until December 1. 0.15 c.f.s. or the natural flow, whichever is less.

iii. From December 1 until January 1. 0.10 c.f.s. or the natural flow, whichever is less.

iv. From January 1 until February 1. 0.12 c.f.s. or the natural flow, whichever is less.

v. From February 1 until March 1. 0.12 c.f.s. or the natural flow, whichever is less.

vi. From March 1 until April 1. 0.12 c.f.s. or the natural flow, whichever is less.

vii. From April 1 until May 1. 0.22 c.f.s. or the natural flow, whichever is less.

viii. From May 1 until June 1. 1.08 c.f.s. or the natural flow, whichever is less.

ix. From June 1 until July 1. 0.76 c.f.s. or the natural flow, whichever is less.

x. From July 1 until August 1. 0.54 c.f.s. or the natural flow, whichever is less.

xi. From August 1 until September 1. 0.32 c.f.s. or the natural flow, whichever is less.

xii. From September 1 until October 1. 0.20 c.f.s. or the natural flow, whichever is less.

k. Sand Creek at a point where Sand Creek crosses the north section line of Section 31, T. 25 S., R. 73 W. of the 6th P.M. as follows:

i. From October 1 until November 1. 11.70 c.f.s. or the natural flow, whichever is less.

ii. From November 1 until December 1. 6.36 c.f.s. or the natural flow, whichever is less.

iii. From December 1 until January 1. 4.72 c.f.s. or the natural flow, whichever is less.

iv. From January 1 until February 1. 4.11 c.f.s. or the natural flow, whichever is less.

v. From February 1 until March 1. 3.49 c.f.s. or the natural flow, whichever is less.

vi. From March 1 until April 1. 3.49 c.f.s. or the natural flow, whichever is less.

vii. From April 1 until May 1. 5.34 c.f.s. or the natural flow, whichever is less.

viii. From May 1 until June 1. 32.24 c.f.s. or the natural flow, whichever is less.

ix. From June 1 until July 1. 58.93 c.f.s. or the natural flow, whichever is less.

x. From July 1 until August 1. 46.40 c.f.s. or the natural flow, whichever is less.

xi. From August 1 until September 1. 42.09 c.f.s. or the natural flow, whichever is less.

xii. From September 1 until October 1. 26.49 c.f.s. or the natural flow, whichever is less.

1. Cold Creek at a point where Cold Creek enters the Great Sand Dunes National Monument in Section 32, T. 25 S., R. 73 W. of the 6th P.M., as follows:

i. From October 1 until November 1. 1.14 c.f.s. or the natural flow, whichever is less.

ii. From November 1 until December 1. 0.85 c.f.s. or the natural flow, whichever is less.

iii. From December 1 until January 1. 0.58 c.f.s. or the natural flow, whichever is less.

iv. From January 1 until February 1. 0.62 c.f.s. or the natural flow, whichever is less.

v. From February 1 until March 1. 0.60 c.f.s. or the natural flow, whichever is less.

vi. From March 1 until April 1. 0.60 c.f.s. or the natural flow, whichever is less.

vii. From April 1 until May 1. 1.02 c.f.s. or the natural flow, whichever is less.

viii. From May 1 until June 1. 5.45 c.f.s. or the natural flow, whichever is less.

ix. From June 1 until July 1. 5.81 c.f.s. or the natural flow, whichever is less.

x. From July 1 until August 1. 4.36 c.f.s. or the natural flow, whichever is less.

xi. From August 1 until September 1. 3.38 c.f.s. or the natural flow, whichever is less.

xii. From September 1 until October 1. 2.14 c.f.s. or the natural flow, whichever is less.

3. The reserved right to continuous minimum stream flows decreed herein is solely for instream purposes. No consumptive use shall be made by the United States of these waters other than through naturally occurring stream losses, nor shall these waters be diverted from their natural channels or applied to any other use.

4. The United States is entitled to a reserved right to 8.0 acre-feet of water per year to be withdrawn from one or more wells to be constructed in the future in the Alamosa Formation in Section 26, 27 (unsurveyed), 34 or 35 of T. 26 S., R. 73 W. or Section 3 or 10 of T. 27 S., R. 73 W. all with respect to the 6th P.M. The priority of this right is March 17, 1932.

5. The United States appropriated 0.02 cfs of the waters of Denton Spring located approximately 3140 feet from the west section line and approximately 2850 feet from the north section line which point is in the NW1/4 SE1/4 Section 15, T. 27 S., R. 73 W. of the 6th P.M., as of December 31, 1946, for wildlife purposes.

6. The priorities of the reserved rights confirmed in this decree antedate priorities subsequent to March 17, 1932, or June 17, 1956, as appropriate.

7. This judgment and decree constitutes the final adjudication of all claims of the United States for reserved rights for Great Sand Dunes National Monument pursuant to Proclamation No. 1994, 47 Stat. 2506; Proclamation No. 2681, 60 Stat. 1339; Proclamation No. 3138, 70 Stat. C31, and any act or acts of Congress approved prior to March 31, 1982.

8. The reserved and appropriative rights decreed herein are subject to administration by the State Engineer as is any other decree for the purposes decreed herein with their respective priorities.

9. Prior to construction of any well for future use decreed in paragraph 4 hereof, the United States shall provide the State Engineer all information that is required for an application for a permit to construct a well. Whereupon, the State Engineer shall issue a permit subject only to the conditions of said paragraph.

10. The Applicant shall install and maintain such water measurement devices, recording devices, content gauges and inlet and outlet measurement and recording devices, as the case may be, as are deemed essential by the Office of the State Engineer, and the same shall be installed and operated in accordance with instructions from said office. Provided, however, that such devices shall not be located so as to interfere with the purposes of the Great Sand Dunes National Monument.

11. This Decree was entered pursuant to agreement of the parties, the issues decided herein have not been litigated between the parties, and therefore, the parties shall not be collaterally estopped or barred in any way by these proceedings or this Decree from asserting any factual and/or legal issues in

any other action not involving these water rights. This Decree shall not be used, considered, or cited as precedent in any other case except and only to the extent that the rights decreed herein are at issue.

12. Nothing in this decree is intended to interfere with or be used to curtail the operation of the Closed Basin Division, San Luis Valley Project, as authorized by Congress in Pub L. 92-514, 86 Stat. 964; Pub. L. 96-375, 94 Stat. 1507; Pub. L. 98-570, 98 Stat. 2941.

13. The water clerk shall serve a copy of this Decree upon the parties, the Division Engineer, Water Division No. 3, and the State Engineer.

DATED this 30th day of June, 1989, ~~1988~~

BY THE COURT:


ROBERT W. OGBURN, Judge
Water Division No. 3
State of Colorado

The undersigned consent to the entry of this Decree.

DATED: 7 June 1989

MICHAEL J. NORTON
United States Attorney

By John R. Hill, Jr.
JOHN R. HILL, JR. #10214
Attorney
U. S. Department of Justice
Land and Natural Resources Div.
1961 Stout Street, Drawer 3607
Denver, CO 80294
(303) 844-2892

ATTORNEYS FOR APPLICANT
UNITED STATES OF AMERICA

DATED: 11-8-88

FOR THE ATTORNEY GENERAL

By Carol D. Angel
CAROL D. ANGEL #13123
Assistant Attorney General
Natural Resources Section
1525 Sherman Street, 3rd Floor
Denver, CO 80203
(303) 866-5114

DATED: 11-3-88

FOR OBJECTOR RIO GRANDE WATER
USERS ASSOCIATION

By Paula C. Phillips
PAULA C. PHILLIPS #8029
Carlson, Hammond & Paddock
2750 One United Bank Center
1700 Lincoln Street
Denver, CO 80203
(303) 861-9000

DATED: 10-31-88

FOR OBJECTOR RIO GRANDE WATER
CONSERVATION DISTRICT

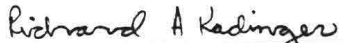
By


DAVID W. ROBBINS #6112
Hill & Robbins
1441 Eighteenth Street, Suite 100
Denver, CO 80202
(303) 296-8100

DATED: 1-3-88

FOR OBJECTOR OTAKA INTERNATIONAL,
INC.

By


RICHARD A. KADINGER #9788
Lucero, Kadinger & Lester
P. O. Box 1270
Alamosa, CO 81101
(719) 589-6626

DISTRICT COURT, WATER DIVISION 3, STATE OF COLORADO

CASE NO. 81CW164

CERTIFICATE OF MAILING

I do hereby certify that on the 30th day of June, 1989,
I personally deposited in the United States Mail, a signed copy of
the foregoing Findings of Fact, Conclusions of Law, Judgment and
Decree in a sealed envelope bearing sufficient postage
properly addressed to:

Jeris A. Danielson
State Engineer
1313 Sherman Street
Denver, CO 80203

Steven E. Vandiver
Division Engineer
Water Division 3
P.O. Box 269
Alamosa, CO 81101

United States of America
c/o John R. Hill, Jr.
Dept. of Justice
Land & Natural Resources Sec.
1961 Stout St., Drawer 3607
Denver, CO 80294

John R. Hill, Jr.
Attorney, U.S. Dept. of Justice
Land & Natural Resources Div.
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State of Colorado
Dept. of Natural Resources
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Rio Grande Water Conservation District
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Alamosa, CO 81101

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c/o John U. Carlson
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Denver, CO 80203

Paula D. Phillips
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Otaka International, Inc.
3655 Paces Ferry Road
Atlanta, Georgia 30327

Richard A. Kadinger
LUCERO, KADINGER & LESTER
P.O. Box 1270
Alamosa, CO 81101

BY:  Deputy
Carol S. Redding
Clerk of the Water Court
Water Division 3

Land History

The Great Sand Dunes National Monument was set aside by Proclamation no. 1994, ~~March 17, 1932.~~ (47 Stat. 2506), March 17, 1932. The purpose of the reservation was to preserve the sand dunes and additional features of scenic, scientific, and educational interest for the public. ~~Under this proclamation.~~ Subsequent boundary adjustments were made by Proclamation no. 2681, March 12, 1946, and Proclamation no. 3138, June 7, 1956. All land withdrawn from the public domain resulted from the original Proclamation in 1932. A summary of the land transactions is as follows: 29,639.64 acres withdrawn from the Bureau of Land Management; 734.96 acres transferred from the U. S. Forest Service; 4,370.72 acres from the State of Colorado; 1,680.84 purchased from private sources; and 2,232.99 acres still to be acquired. The total acreage is 38,659.15.

1. mosca ^{Pass} Springs

former names

a. Purchased from Howard K., Lyman G., & Margaret Linger Lewis
& Albert Linger

b. filing 16751 by Forest Service

2. Morris Gulch Springs

3. Well - Campground on Meadow Creek (mosca Creek well?)

a. 290' deep (depth to principal water bed - 250 feet)

b. 12" casing

c. Completed May 1957

d. location - SE $\frac{1}{4}$ ^{SE} sec 34, T26S, R73W

e. Permit to use Ground water & notice of
well registration # 16400

f. location sec. 34, T. 26S, R. 73W (~~40~~ SE $\frac{1}{4}$)

g. purpose

4. Well - Pinyon Flat Campground

a. location SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec 35, T26S, R73W, 6PM

b. Application/Permit # 04331-F

c. quantity of water - 30 gpm

d. priority - 6-17-63

1. Buck Creek Ditch

a. Filing # 15174

b. Location - SE $\frac{1}{4}$ SE $\frac{1}{4}$, SEC 26, T26N, R73W, 6th PM

c.

2. Garden Ditch

a. Filing # 15149

b. Location - SW $\frac{1}{4}$ NE $\frac{1}{4}$, SEC 35, T26S, R73W, 6th PM

3. Opincar Ditch

a. Filing # 14818

b. Location - SW $\frac{1}{4}$ SW $\frac{1}{4}$, SEC 35, T26S, R73W, 6th P.M.

4. mosca Creek Ditch

a. Filing # 14916

b. Location - W $\frac{1}{2}$, NE $\frac{1}{4}$, T27S, R73W, 6th P.M.

5. mosca Spring

a. Filing # 16751

b. Location - NE $\frac{1}{4}$ NW $\frac{1}{4}$, Sec 2, T27S, R73W, 6th P.M.

6. morris Gulch Spring

a. no Filing

b. location - NE $\frac{1}{4}$ SW $\frac{1}{4}$, Sec 2, T27S, R73W, 6th P.M.

Project: Great Sand Dunes National Monument
Interest: Withdrawal
Date: January 30, 1981

All the withdrawn public domain land lying within the current boundary as of January 30, 1981, of Great Sand Dunes National Monument according to Presidential Proclamation No. 1994, 17 Stat. 2506, March 17, 1932, Presidential Proclamation No. 2681, 11 Federal Register 2623, March 12, 1946, Presidential Proclamation No. 3138, 21 Federal Register 4035, June 13, 1956 and Public Law 95-625, November 10, 1978, said withdrawn land situate in Alamosa and Saquache Counties, State of Colorado, and described as follows:

Sixth Principal Meridian

T. 25 S., R. 73 W.;

Section 31, Lots 3 and 4, $E\frac{1}{2}SW\frac{1}{4}$ and $SE\frac{1}{4}$ according to the original Government survey approved March 10, 1883, also being Lots 5 and 6, $E\frac{1}{2}SW\frac{1}{4}$ and $SE\frac{1}{4}$ according to the Government independent resurvey approved October 7, 1943,

Section 32, $NE\frac{1}{4}$, $S\frac{1}{2}NW\frac{1}{4}$ and $S\frac{1}{2}$ according to the original Government survey approved March 10, 1883, also being $NE\frac{1}{4}NE\frac{1}{4}$, $E\frac{1}{2}NW\frac{1}{4}NE\frac{1}{4}$, $S\frac{1}{2}NE\frac{1}{4}$, $E\frac{1}{2}SW\frac{1}{4}NW\frac{1}{4}$, $SE\frac{1}{4}NW\frac{1}{4}$ and $S\frac{1}{2}$ according to the Government independent resurvey approved October 7, 1943,

T. 26 S., R. 73 W.;

Section 2 through 10, inclusive,

Section 11, $W\frac{1}{2}$,

Section 14, $W\frac{1}{2}W\frac{1}{2}$,

Section 15,

Sections 17 through 22, inclusive,

Section 23, $W\frac{1}{2}NW\frac{1}{4}$ and $S\frac{1}{2}$,

Sections 26 through 34, inclusive,

Section 35, Lots 1 through 8, inclusive.

T. 27 S., R. 73 W.;

Section 2, $S\frac{1}{2}SW\frac{1}{4}$,

Section 3, Lots 2, 3 and 4, $SW\frac{1}{4}NE\frac{1}{4}$, $S\frac{1}{2}NW\frac{1}{4}$ and $S\frac{1}{2}$,

Sections 4 through 10, inclusive,

Section 15, $N\frac{3}{4}$ and $SW\frac{1}{4}SW\frac{1}{4}$, and

Section 17 and 18.

New Mexico Principal Meridian

T. 40 N., R. 12 E.;

Section 1,

Section 12, $N\frac{1}{2}$ and $SE\frac{1}{4}$,

Section 13, $E\frac{1}{2}$,

Fractional T. 40 N., R. 13 E.;

Section 6, 7 and 18,

T. 41 N., R. 12 E.;

Section 13, $S\frac{1}{2}$ and that portion of $N\frac{1}{2}$ lying south of Luis Maria

Baca Grant No. 4,

Section 14, $SE\frac{1}{4}$ and that portion of $NE\frac{1}{4}$ lying south of Luis Maria

Baca Grant No. 4,

Section 24, and

Fractional T. 41 N., R. 13 E.

The land described herein contains 30,468.31 acres, more or less.

NOTES ON FLOW SIMULATIONS FOR GREAT SAND DUNES NATIONAL MONUMENT

Analysis Done by: Gary Smillie

TASK: Develop estimates of mean annual and mean monthly flows for ungaged watersheds draining into Great Sand Dunes National Monument.

The basins chosen for simulation are shown in Table 1.

Table 1. Basins in simulation (from north to south).

	Basin	Area(sq mi)	Ave Elev(ft)
1)	Sand Creek	23.60	10900
2)	Cold Creek	4.20	10383
3)	Little Medano Creek	3.28	11069
4)	Medano Creek	15.14	10261
5)	Horse Canyon Creek	0.91	9997
6)	Castle Creek	1.65	10183
7)	Unnamed trib to Medano	0.97	9880
8)	Sawmill Canyon Creek	1.29	10128
9)	Buck Creek	1.11	9882
10)	Garden Creek	0.89	10010
11)	Mosca Creek	3.67	9890
12)	Morris Gulch Creek	1.71	9914
13)	North Arrastre Creek	1.14	10488
14)	South Arrastre Creek	1.40	10720

These names were taken from USGS topographic maps and are the same basins quantified by the Forest Service. The unnamed tributary to Medano Creek (basin 7) is located between Castle Creek and Sawmill Creek. Basin areas and elevations were taken from the Forest Service work except for Sand Creek which was adjusted for larger watershed area and lower mean elevation due to non-contiguous boundary with Forest Service land. Values used by the Forest Service for area and elevation were checked by eye to make sure they were reasonable. All basin areas were computed for the area above the boundary of the Monument. Mosca Creek (basin 11) has a three year period of gaging record. I was unable to find any other discharge record for the remaining streams except a few instantaneous measurements on Medano Creek.

For simulation of flows, 12 gaged basins in the San Luis Valley were identified and records obtained (see Table 2 for listing). Of these basins, Raspberry, Cotton, North Crestone, Cottonwood, and Mosca drain the west side of the Sangre De Cristo mountains and are quite similar in physical setting to the basins to be simulated (Mosca is one of them). Mean annual discharge was computed from the records of each of the five control basins. Since four out of the five basins have only a three year period of record, however, it was necessary to adjust the short term means. This adjustment was performed by comparing the same three year period mean with the long term mean for each of the long

term records in Table 2. The average adjustment factor was found to be 0.85, indicating that on average, basins in the San Luis Valley flowed at 118 per cent of normal during water years 1968-70.

Table 2. Gaged watersheds in the San Luis Valley.

	Basin	Area(sq mi)	Ave Elev(ft)	Period(yrs)
1)	Raspberry Creek near Villa Grove (USGS 8-2242)	1.78	10820	3
2)	Cotton Creek near Mineral Hot Sps (USGS 8-2267)	13.6	11356	3
3)	North Crestone Creek near Crestone (USGS 8-2275)	10.7	11300	23
4)	Cottonwood Creek near Crestone (USGS 8-2295)	6.77	11198	3
5)	Mosca Creek near Mosca (USGS 8-2342)	3.67	9890	3
6)	La Garita Creek near La Garita (USGS 8-2310)	61.0	unkn	23
7)	Rio Grande River at Alamosa (USGS 8-2230)	1710	unkn	58
8)	Trinchera Creek abv Turners Ranch (USGS 8-2405)	45.0	unkn	48
9)	Kerber Creek at Ashley Ranch (USGS 8-2245)	38.0	unkn	34
10)	Ute Creek near Fort Garland (USGS 8-2425)	32.0	unkn	48
11)	Saguache Creek near Saguache (USGS 8-2270)	595	unkn	57
12)	Carnero Creek near La Garita (USGS 8-2305)	117	unkn	52

A long term mean was available without adjustment for North Crestone Creek. This mean was compared to an estimated mean found by using water year data from 1968-70 and the adjustment factor and good agreement was found. The long term mean published by the USGS in 1970 was 11.0 cfs and the estimated mean was 11.3 cfs.

Regression analysis was performed on the five control basins to

attempt to find a predictor equation for mean annual discharge versus basin area and mean basin elevation. Regressions were attempted in arithmetic and log space for both mean annual runoff and runoff production per area. The coefficient of determination of several of the regressions were quite high, around 0.95. However, when the regressions were applied to the basins in the simulation negative values or values which appeared to be too low were produced. This resulted because the watershed areas of the control watersheds were considerably larger than many of the watersheds in the simulation and because mean elevation can be a misleading indicator of the amount of watershed area in the greatest water producing zone.

For these reasons an individual control basin was selected for each of the 14 basins in the simulation. Control basin selection was based on a visual comparison from topographic maps of the proportion of a basin in the highest elevation zone (above timberline). Inspection of records of the five control basin records suggested that this criteria was the dominant factor in runoff production. Unfortunately, none of the control basins were found to be geographically similar to Cold, Medano, or Little Medano Creeks. For this reason, the average runoff production from two control watersheds which bracket the elevation distributions in these basins was used to simulate mean annual discharge. Cottonwood and Mosca Creeks were used for this purpose. Cottonwood and Mosca Creeks were also used individually as control watersheds for the other basins. Table 4 shows the control watersheds used for each basin in the simulation.

Mean annual runoff per square mile of basin was calculated for Cottonwood and Mosca Creeks and the average of these two basins.

$$RO = Qa / A$$

where : RO = mean annual runoff production in
 cfs/square mile
 Qa = mean annual runoff in cfs
and A = basin area in square miles

The following results were obtained:

Cottonwood Creek RO = 0.87 cfs/square mile
Mosca Creek RO = 0.19 cfs/square mile
Average RO = 0.53 cfs/square mile.

These values were multiplied with associated basin areas to generate estimates of mean annual discharge for the basins in the simulation.

Estimates of mean monthly flow for each basin were obtained by ratios of mean monthly flow to mean annual flow averaged over the three year period of record for Cottonwood and Mosca Creeks and their average (Table 3).

The results of the simulation are shown in Tables 4 & 5. Also shown in Table 5 are the results produced by the Forest Service for their instream flow quantification of the same streams.

Table 3. Mean monthly flow / mean annual flow.

	Cottonwood	Mosca	Average
October	0.57	0.46	0.51
November	0.31	0.45	0.38
December	0.23	0.30	0.26
January	0.20	0.37	0.28
February	0.17	0.37	0.27
March	0.17	0.36	0.27
April	0.26	0.67	0.46
May	1.57	3.32	2.45
June	2.87	2.34	2.61
July	2.26	1.66	1.96
August	2.05	0.99	1.52
September	1.29	0.62	0.96

Table 4. Estimated average annual flow for streams in Great Sand Dunes National Monument.

Basin Name	NPS Est. (cfs)	USFS Est. (cfs)	Control Basin
=====	=====	=====	=====
Sand Creek	20.5	18.4(1)	Cottonwood
Cold Creek	2.2	1.8	Average
Little Medano Cr	1.7	1.5	Average
Medano Creek	8.0	7.5	Average
Horse Canyon Cr	0.2	0.1	Mosca
Castle Creek	0.3	0.2	Mosca
Unnamed Creek	0.2	0.1	Mosca
Sawmill Creek	0.2	0.2	Mosca
Buck Creek	0.2	0.1	Mosca
Garden Creek	0.2	0.1	Mosca
Mosca Creek	0.7	0.9	Mosca
Morris Gulch Cr	0.3	0.4	Mosca
N Arrastre Creek	0.2	0.3	Mosca
S Arrastre Creek	0.3	0.5	Mosca

(1) Forest Service used a smaller watershed area (21.7 sq mi)

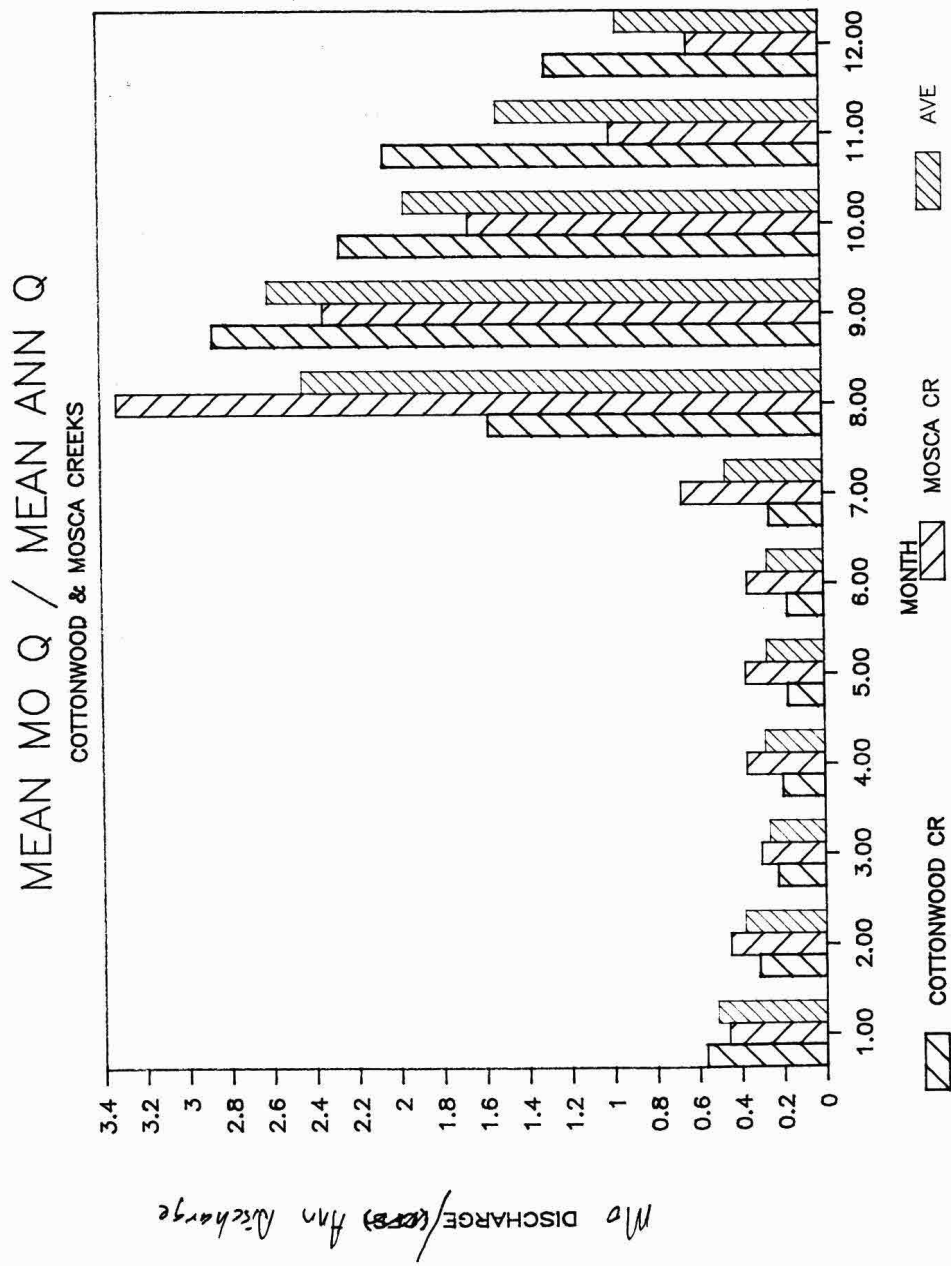
Table 5. Estimated mean monthly flows for streams in Great Sand Dunes National Monument.

Basin Name	Oct	Nov	Dec	Jan	Feb	Mar
Sand Creek	11.7	6.36	4.72	4.11	3.49	3.49
Cold Creek	1.14	0.85	0.58	0.62	0.60	0.60
Little Med	0.89	0.66	0.45	0.49	0.47	0.47
Medano Cr	4.09	3.05	2.09	2.25	2.17	2.17
Horse Canyon	0.08	0.08	0.05	0.06	0.06	0.06
Castle Cr	0.14	0.14	0.09	0.12	0.12	0.11
Unnamed cr	0.08	0.08	0.06	0.07	0.07	0.07
Sawmill Cr	0.11	0.11	0.07	0.09	0.09	0.09
Buck Creek	0.10	0.09	0.06	0.08	0.08	0.08
Garden Cr	0.08	0.08	0.05	0.06	0.06	0.06
Mosca Creek	0.32	0.31	0.21	0.26	0.26	0.25
Morris Cr	0.15	0.15	0.10	0.12	0.12	0.12
N Arrastre	0.10	0.10	0.06	0.08	0.08	0.08
S Arrastre	0.12	0.12	0.08	0.10	0.10	0.10

Table 5. Cont.

Basin Name	Apr	May	Jun	Jul	Aug	Sep
Sand Creek	5.34	32.24	58.93	46.40	42.09	26.49
Cold Creek	1.02	5.45	5.81	4.36	3.38	2.14
Little Med	0.80	4.26	4.54	3.41	2.64	1.67
Medano Cr	3.69	19.66	20.94	15.73	12.20	7.70
Horse Canyon	0.12	0.57	0.40	0.29	0.17	0.11
Castle Cr	0.21	1.04	0.73	0.52	0.31	0.19
Unnamed cr	0.12	0.61	0.43	0.31	0.18	0.11
Sawmill Cr	0.16	0.81	0.57	0.41	0.24	0.15
Buck Creek	0.14	0.70	0.49	0.35	0.21	0.13
Garden Cr	0.11	0.56	0.40	0.28	0.17	0.10
Mosca Creek	0.47	2.32	1.63	1.16	0.69	0.43
Morris Cr	0.22	1.08	0.76	0.54	0.32	0.20
N Arrastre	0.15	0.72	0.51	0.36	0.21	0.13
S Arrastre	0.18	0.88	0.62	0.44	0.26	0.16

Gary M. Smiller
8/12/88



Bureau of Reclamation has assured the National Park Service in the final environmental impact statement (INT FES 79-37) that:

"Lowering of the water table within project boundaries will not affect the sand dunes, the existing vegetation, or flows in Medano or Sand Creeks. The existing water table could be lowered as much as 2 feet at the project boundary which, at the closest point, is 2 to 3 miles southwest of the monument boundaries. The monument is considerably high in elevation and the ground water levels in the monument are dependent on surface and subsurface flows from the Sangre de Cristo Mountains to the east and north of the monument; all of these areas are upstream or above the project. Since the existing water regime will not be affected, vegetation composition will not be affected. Annual variation as presently occurs will continue as before."

A pipeline has been proposed that would be used in conjunction with Colorado Western Slope oil shale (synfuel) and would cross monument lands to access Medano or Mosca Pass. Due to current international petro-economics, oil shale development is not eminent. However, as energy needs and petro-politics change, this project could potentially be reestablished.

The proposed Taos-San Luis Valley 345-KV Transmission Project's preferred alternative route would pass through the San Luis Lakes Wildlife Management Area. Concerns have been expressed to the Rural Electrification Administration as to the visual impact of the proposed 85 to 120 foot transmission towers and their negative effect on interpretation of the dunes resources at the monument.

By a court decree in 1914, 15 cubic feet of water per second is permitted to be diverted from the Medano Creek drainage at a point near Medano Pass and transferred to the Wet Mountain Valley in the Arkansas River drainage. Diversion is permitted from May 15th through July 15th only. During dry years, or when water is illegally diverted after the July 15th cutoff date, the flow of Medano Creek in its lower reaches within the monument is adversely affected. Medano Creek is considered a good fisheries resource. That portion of the stream bed downstream from the Castle Creek junction is an excellent recreational resource for wading and hiking. It is this section of the creek bed that is most affected by the diversion of water over Medano Pass.

The potential for monument values to be affected by adjacent land speculation and attendant development is considerable. Large tracts of land are common in the sparsely settled San Luis Valley, and several of these tracts adjacent to monument boundaries are already being subdivided for recreational and permanent home sites. These developments will surely affect the setting of the monument as well as the visitation patterns and desires.

The Baca Grande, a major subdivision of approximately 12,000 planned homesites is being developed by the Arizona-Colorado Land and Cattle Company on the Luis Maria Baca Land Grant. This

Great Sara Jones National Monument

Smilie
10/9/87

Steps to find "AVE MONTHLY FLOWS" for:

- 1) Medano Creek
- 2) Castle Creek
- 3) Sand Creek

1) Used USGS daily flows from two similar watersheds in GRSA area:

- a) Cottonwood Creek WYs 1968-70
- b) Mosca Creek WYs 1968-70

- 2) Assumed 1) Medano Creek ~~was~~ ^{is} similar to average of Cottonwood & Mosca Creeks
- 2) Castle Creek ~~was~~ ^{is} similar to Mosca Creek
 - 3) Sand Creek is similar to Cottonwood Creek

These assumptions were made based on visual inspection of basins on USGS topographic maps.

3) Found the estimated average (three year) ~~flow~~ annual flow by using area ratios. Since Medano Creek was assumed ^{similar} to average of control watersheds, a value of flow was calculated separately ~~for~~ ^{by} each ^{control} watershed and the results averaged.

4) Average annual flows for the three year periods were adjusted to long term annual flow by a factor. This factor was found by ~~taking~~ ^{ratioing} the observed 3 year average flows with long term average annual flow for 8 basins in the San Luis Valley. The factor is the average of these 8 ratios.

- 5) ~~Flow~~ Average annual flow was distributed through the 12 months for each creek by applying monthly/annual ratios determined for the two control watersheds. The average of the two control creeks were used for Medano Creek, Mosca Creek for Castle Creek, and Cottonwood Creek for Sand Creek.

639:

Ave mo Q / Ave Annual Q

Cottonwood Creek

Mosca Creek

Ave of Cottonwood & Mosca Creeks

Estimated Mean Monthly Discharges (First Cut)

READY

	A	B	C	D	E	F	G	H
39						MEDANO CR	CASTLE CR	SAND CR
40								
41	1.00 Oct	0.57	0.46	0.51		4.06	0.14	11.69
42	2.00 Nov	0.31	0.45	0.38		3.03	0.14	6.48
43	3.00 Dec	0.23	0.30	0.26		2.08	0.09	4.64
44	4.00 Jan	0.20	0.37	0.28		2.24	0.11	4.08
45	5.00 Feb	0.17	0.37	0.27		2.16	0.11	3.59
46	6.00 Mar	0.17	0.36	0.27		2.12	0.11	3.57
47	7.00 Apr	0.26	0.67	0.46		3.65	0.20	5.26
48	8.00 May	1.57	3.32	2.45		19.33	1.00	32.39
49	9.00 Jun	2.87	2.34	2.61		20.58	0.70	59.07
50	10.00 Jul	2.26	1.66	1.96		15.49	0.50	46.62
51	11.00 Aug	2.05	0.99	1.52		12.03	0.30	42.30
52	12.00 Sep	1.29	0.62	0.96		7.57	0.19	26.62
53								
54				11.94				
55								
56								
57								
58								

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CALC CAPS

RIO GRANDE BASIN

129

Closed basin in San Luis Valley, Colo.

8-2275. North Crestone Creek near Crestone, Colo.

Location--Lat 38°00'49", long 105°41'32", on right bank in canyon, 1½ miles northeast of Crestone, Saguache County, and 3½ miles upstream from South Crestone Creek.

Drainage area--10.7 sq mi.

Records available--May 1936 to September 1968 (no winter records prior to 1948).

Gage--Water-stage recorder. Altitude of gage is 8,360 ft (from topographic map).

Average discharge--21 years (1947-68), 10.7 cfs (7,750 acre-ft per year).

Extremes--Maximum discharge during year, 57 cfs Aug. 14 (gage height, 1.84 ft); minimum not determined.

1936-68: Maximum discharge, 735 cfs Aug. 6, 1936 (gage height, 4.33 ft), from rating curve extended above 160 cfs on basis of slope-area measurement of peak flow; minimum daily recorded, 0.4 cfs Apr. 3, 1945.

Maximum stage known probably since at least 1884 occurred in October 1911. No flood since that in October 1911 has exceeded the flood of Aug. 6, 1936, from information by local residents.

Remarks--Records good except those for winter period, which are poor. No diversion above station.

Discharge, in cubic feet per second, water year October 1967 to September 1968

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	9.0	7.4					7.0	7.8	4.1	2.2	4.2	1.1
2	8.6	7.0					6.2	1.0	4.3	2.0	3.9	1.2
3	8.6	7.0					5.8	1.1	4.3	2.0	3.6	1.3
4	8.2	7.8					5.8	1.1	4.2	2.0	3.5	1.2
5	8.2	6.8					5.2	1.2	4.2	2.1	3.1	1.2
6	8.6	8.2					4.8	1.2	4.4	2.8	3.4	1.1
7	9.4	8.2					4.3	1.1	4.3	3.0	4.4	1.0
8	9.8	7.8					4.8	9.8	4.0	2.6	4.7	1.0
9	10	7.8					4.5	1.1	3.4	2.3	5.1	9.4
10	1.2	7.8					4.1	1.2	3.1	2.1	5.1	9.0
11	1.2	8.2				2.5	4.5	1.1	3.1	2.1	5.2	9.0
12	1.1	8.2					5.5	1.1	3.8	2.0	4.0	9.0
13	1.0	8.2					6.0	1.0	4.1	2.0	5.0	8.6
14	9.8	7.8					5.5	9.8	4.1	1.7	5.5	8.2
15	9.0	7.8					5.8	1.0	4.3	1.6	5.2	7.8
16	9.8	7.8	3.5	2.6	2.4		6.2	1.2	4.3	1.4	4.7	7.8
17	9.4	7.8					5.8	1.2	4.7	1.3	4.2	7.4
18	9.4	7.8					5.5	1.3	4.6	1.2	3.6	7.4
19	8.2	7.8					5.2	1.4	4.2	1.3	3.1	7.0
20	7.0	7.4					5.0	1.7	4.4	1.4	2.7	6.8
21	7.0	7.4				3.0	5.0	2.0	4.6	1.3	2.5	6.8
22	6.5	7.0				3.0	4.8	3.1	4.2	1.2	2.2	6.8
23	6.5	6.8				2.7	4.1	3.0	4.1	1.2	2.0	8.2
24	6.0	6.5				2.7	4.1	2.7	3.9	1.2	1.7	7.8
25	6.0	6.2				2.7	4.3	2.1	3.4	1.2	1.6	7.4
26	6.0	5.6				2.7	4.3	2.2	3.1	1.2	1.4	7.0
27	5.0	5.0				3.0	4.3	2.8	2.9	1.7	1.5	6.8
28	6.0	4.6				3.6	4.3	3.3	2.9	2.6	1.4	6.8
29	5.5	4.2				4.8	4.3	4.3	2.8	2.4	1.4	6.8
30	7.8	4.0				6.5	5.2	4.3	2.4	2.4	1.3	9.0
31	8.2					7.0		4.1		2.9	1.2	
Total	259.5	211.9	108.5	80.6	69.6	91.7	152.2	566.4	1,162	584	1,024	261.8
Mean	8.37	7.06	3.5	2.6	2.4	2.96	5.07	18.3	38.7	18.8	33.0	8.73
Max	12	8.2	-	-	-	7.0	7.0	43	47	30	55	13
Min	5.5	4.0	-	-	-	-	4.1	7.8	24	12	12	6.8
Ac-ft	515	420	215	160	138	182	302	1,120	2,300	1,160	2,030	519

Cal yr 1967: Total 4,395.6 Mean 12.0 Max 59 Min - Ac-ft 8,720

Wtr yr 1968: Total 4,572.7 Mean 12.5 Max 55 Min - Ac-ft 9,070

Peak discharge (base, 60 cfs)--No peak above base.

Note--No gage-height record Dec. 19 to Mar. 21.

128

RIO GRANDE BASIN

Closed basin in San Luis Valley, Colo.

8-2270. Saguache Creek near Saguache, Colo.

Location.--Lat 38°09'48", long 106°17'24", in SE¼SE¼ sec.10, T.45 N., R.6 E., on left bank ½ mile downstream from Middle Creek, and 10 miles northwest of Saguache.

Drainage area.--595 sq mi.

Records available.--August 1910 to September 1912, June 1914 to September 1968. Monthly discharge only for some periods, published in WSP 1312.

Gage.--Water-stage recorder. Altitude of gage is about 8,030 ft, revised (from topographic map). Prior to Apr. 9, 1934, at sites three-quarters of a mile downstream at different datums. Apr. 10, 1934, to Nov. 20, 1966, at present site at datum 1.00 ft higher.

Average discharge.--56 years; 70.2 cfs (50,820 acre-ft per year).

Extremes.--Maximum discharge during year, 464 cfs June 3 (gage height, 3.24 ft), from rating curve extended above 104 cfs; minimum not determined.

1910-12, 1914-68: Maximum discharge, 790 cfs Aug. 3, 1964 (gage height, 3.85 ft, present datum), from rating curve extended above 83 cfs; minimum daily recorded, 8.2 cfs Dec. 22, 1950, Aug. 17, 1951.

Greatest flood known occurred in 1869. Flood in 1884 or 1886 exceeded that of Aug. 3, 1964, from information by local residents.

Remarks.--Records good except those for winter period, which are poor. Natural flow of stream affected by transmountain diversions from Colorado River basin to drainage area above station through Tarbell ditch (see elsewhere in this report) and diversions above station for irrigation. Records of chemical analyses for water year 1968 are published in Part 2 of this report.

Discharge, in cubic feet per second, water year October 1967 to September 1968

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	46	46				32	65	61	404	77	229	77
2	45	42				31	54	82	392	72	221	75
3	45	33				30	43	103	428	68	243	86
4	45	33				30	37	108	424	68	188	108
5	46	33				30	40	110	376	70	159	83
6	46	33				28	46	120	368	76	168	74
7	46	26				29	38	89	412	69	194	69
8	44	29				30	30	72	392	70	204	66
9	43	33				32	29	80	308	77	246	63
10	43	36				30	33	92	235	79	260	61
11	45	33			23	37	37	104	196	79	348	61
12	43	34				33	40	117	178	71	396	61
13	40	33				29	41	126	188	71	296	65
14	40	38				27	39	100	202	69	290	64
15	40	34				29	40	86	199	64	308	60
16	39	34	25	22		29	45	90	186	61	278	56
17	39	33				30	48	92	178	57	226	57
18	40	29				31	44	98	171	55	199	56
19	40	28				34	43	115	168	53	178	55
20	38	26				30	38	153	164	52	162	54
21	38	24				33	43	191	157	49	157	52
22	37	29				33	45	238	151	52	144	51
23	37	22			31	32	40	356	151	61	132	51
24	36	18			29	38	44	308	144	77	120	50
25	37	25			32	40	46	240	134	84	111	49
26	39	28			31	40	45	224	115	100	106	47
27	36	24			29	41	43	229	101	181	106	46
28	37	13			28	44	44	260	98	312	117	45
29	41	20			27	52	51	316	93	278	104	45
30	34	21			-----	60	51	392	84	155	87	47
31	36	-----			-----	62	-----	408	-----	166	83	-----
Total	1,261	890	775	682	713	1,086	1,282	5,160	6,797	2,873	6,060	1,834
Mean	40.7	29.7	25	22	24.6	35.0	42.7	166	227	92.7	195	61.1
Max	46	46	-	-	-	62	65	408	428	312	396	108
Min	34	13	-	-	-	27	29	61	84	49	83	45
Ac-ft	2,500	1,770	1,540	1,350	1,410	2,150	2,540	10,230	13,480	5,700	12,020	3,640
Cal yr 1967: Total	13,970											
Wtr yr 1968: Total	29,413											
Mean	38.3											
Max	103											
Min	-											
Ac-ft	27,710											
Max	58,340											
Min	-											

Peak discharge (base, 210 cfs)

Date	Time	Gage height	Discharge	Date	Time	Gage height	Discharge
6-3	1200	3.24	464	8-3	0600	2.64	252
7-28	1700	2.93	344	8-12	1430	3.10	412

RIO GRANDE BASIN

139

8-2425. Ute Creek near Fort Garland, Colo.

Location.--Lat 37°27', long 105°26', in S½ sec.10, T.30 S., R.72 W., on left bank 1½ miles north of Fort Garland and 6 miles upstream from mouth.

Drainage area.--32 sq mi, approximately.

Records available.--March to October 1916, May 1923 to September 1968. Monthly discharge only for some periods, published in WSP 1312.

Gage.--Water-stage recorder. Altitude of gage is 8,030 ft (from topographic map). Mar. 18 to Oct. 9, 1916, staff gage and Cippolletti weir at different datum.

Average discharge.--45 years, 20.6 cfs (14,910 acre-ft per year).

Extremes.--Maximum discharge during year, 260 cfs Aug. 2 (gage height, 2.92 ft); minimum not determined.

1916, 1923-68: Maximum daily discharge, 630 cfs May 15, 1941; no flow July 28-31, Sept. 6-29, 1956.

Outstanding floods occurred in 1886 and in October 1911. The flood in 1886 probably exceeded that in October 1911 and the flood in October 1911 probably exceeded all subsequent floods, from information by local residents.

Remarks.--Records good except those for winter period, which are poor. A few diversions above station for irrigation.

Discharge, in cubic feet per second, water year October 1967 to September 1968

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	15	12	6.5				9.2	16	96	25	79	24
2	15	10	5.4				8.8	18	104	24	168	22
3	15	8.8	5.4				7.4	21	88	24	101	26
4	15	10	7.0				8.3	25	101	24	59	26
5	15	9.2	6.5				7.0	29	90	22	50	22
6	15	8.8	6.2				7.0	33	88	24	47	21
7	15	8.8	5.4				6.2	33	63	26	101	20
8	15	8.8	6.2				6.5	33	55	30	113	20
9	14	7.8	6.0				5.4	33	36	25	80	19
10	13	7.8	4.0			7.0	7.8	41	31	25	72	20
11	13	7.8	7.0				8.3	39	28	25	108	19
12	12	8.3	6.5				9.6	38	39	24	137	19
13	11	8.3	6.5				11	36	51	23	95	19
14	11	8.3					11	31	50	28	79	19
15	11	7.8					13	31	51	23	70	19
16	11	8.3		5.0	5.0		15	33	55	19	56	19
17	11	8.3					14	33	56	17	48	20
18	11	7.8					13	34	65	15	44	19
19	11	7.8				5.6	13	35	56	15	44	18
20	10	7.8				7.0	11	34	44	14	41	17
21	9.6	7.4				5.0	13	36	56	15	38	16
22	9.6	7.4	7.0			5.0	12	52	56	13	37	16
23	9.2	6.2				4.4	10	66	50	21	32	16
24	9.2	4.8				5.4	10	60	48	72	28	15
25	10	7.0				6.5	11	46	42	50	26	13
26	10	6.2				6.5	12	47	41	55	24	13
27	9.2	5.4				7.0	12	51	36	112	25	12
28	9.6	7.8				7.0	12	63	35	67	32	11
29	9.6	7.8				7.4	13	72	31	35	28	11
30	9.2	7.8				8.3	15	82	26	28	27	15
31	12					8.8		95		29	29	
Total	366.2	240.3	204.6	155.0	145.0	209.9	312.5	1,296	1,668	949	1,918	546
Mean	11.8	8.01	6.60	5.0	5.0	6.77	10.4	41.8	55.6	30.6	61.9	18.2
Max	15	12	-	-	-	-	15	95	104	112	168	26
Min	9.2	4.8	-	-	-	-	5.4	16	26	13	24	11
Ac-ft	726	477	406	307	288	416	620	2,570	3,310	1,880	3,800	1,080

Cal. yr 1967: Total 5,699.4 Mean 15.6 Max 107 Min - Ac-ft 11,300

Wtr yr 1968: Total 8,010.5 Mean 21.9 Max 168 Min - Ac-ft 15,890

Peak discharge (base, 100 cfs)

Date	Time	Gage height	Discharge	Date	Time	Gage height	Discharge
6-2	0500	2.25	137	8-8	1830	2.68	210
7-27	0900	2.48	170	8-12	0300	2.42	158
8-2	0700	2.92	260				

Note.--No gage-height record Dec. 14 to Mar. 19.

RIO GRANDE BASIN

Closed basin in San Luis Valley, Colo.

8-2245. Kerber Creek at Ashley Ranch, near Villa Grove, Colo.

Location (revised).--Lat 38°14'28", long 106°06'57", in SW 1/4 sec. 17, T.46 N., R.8 E., on left bank at Ashley Ranch, 4.5 miles upstream from Little Kerber Creek and 9 miles west of Villa Grove.

Drainage area.--38 sq mi, approximately.

Records available.--June 1923 to September 1926 (published as Kerber Creek near Villa Grove), May 1936 to September 1968. Monthly discharge only for some periods, published in WSP 1312.

Gage.--Water-stage recorder. Altitude of gage is 8,830 ft, revised (from topographic map). Prior to Dec. 10, 1963, at site 150 ft upstream at datum 1.50 ft higher.

Average discharge.--35 years, 12.6 cfs (9,120 acre-ft per year).

Extremes.--Maximum discharge during year, 161 cfs Aug. 7 (gage height, 1.67 ft); minimum not determined.

1923-26, 1936-68: Maximum discharge, 407 cfs May 14, 1941, from rating curve extended above 140 cfs; maximum gage height, 5.04 ft (site and datum then in use) May 11, 1947 (backwater from beaver dam); minimum daily discharge, 0.2 cfs Sept. 3, 1950, July 30 to Aug. 2, 1963, but may have been less during periods of no gage-height record.

Maximum discharge known since at least 1872, that of May 14, 1941, from information by local residents.

Remarks.--Records good except those for winter period, which are poor. No diversion above station. Records of chemical analyses for the water year 1968 are published in Part 2 of this report.

Discharge, in cubic feet per second, water year October 1967 to September 1968

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2.7	4.6						16	78	18	29	8.6
2	2.7	4.0						22	80	17	26	7.8
3	2.7	3.5						23	84	16	24	12
4	2.7	3.5						22	80	15	22	10
5	3.2	3.5						23	73	15	20	8.6
6	2.7							24	75	14	20	7.8
7	2.7							23	72	14	24	7.0
8	2.7						6.5	20	72	15	17	7.0
9	2.7							20	64	13	22	6.5
10	3.2							20	52	13	39	7.0
11	3.6							20	46	11	72	6.5
12	3.2							24	46	10	64	6.5
13	3.2							24	48	10	46	6.5
14	3.2							22	50	10	39	6.5
15	3.2							23	48	9.4	31	6.0
16	3.2		2.8	2.5	2.7	3.5		24	46	7.8	25	6.0
17	3.6							24	44	7.0	22	6.0
18	3.6	3.0					7.8	25	42	7.0	17	6.5
19	3.6						7.0	26	40	7.0	16	6.0
20	3.6						7.0	30	40	6.5	15	5.6
21	3.6						6.5	34	40	6.5	16	5.6
22	3.6						6.5	45	39	6.5	13	5.6
23	4.1						6.5	59	35	6.5	13	5.6
24	3.6						7.0	54	34	7.0	12	5.6
25	4.6						8.6	48	31	8.6	12	5.6
26	4.1						7.8	46	27	13	13	5.6
27	4.6						7.8	46	26	15	12	5.1
28	4.1						7.8	52	24	27	11	5.1
29	4.6						11	67	23	24	10	5.1
30	3.5						13	68	19	23	9.4	5.6
31	4.0						70			26	9.4	
Total	106.4	94.1	86.8	77.5	78.3	108.5	215.3	1,044	1,478	398.8	720.8	198.9
Mean	3.43	3.14	2.8	2.5	2.7	3.5	7.18	33.7	49.3	12.9	23.3	6.63
Max	4.6	-	-	-	-	-	13	70	84	27	72	12
Min	2.7	-	-	-	-	-	-	16	19	6.5	9.4	5.1
Ac-ft	211	187	172	154	155	215	427	2,070	2,930	791	1,430	395
Cal yr 1967: Total	1,902.8		Mean	5.21	Max	17	Min	-	Ac-ft	3,770		
Wtr yr 1968: Total	4,607.4		Mean	12.6	Max	84	Min	-	Ac-ft	9,140		

Peak discharge (base, 70 cfs)

Note.--No gage-height record Nov. 13 to Apr. 17.

Date	Time	Gage height	Discharge	Date	Time	Gage height	Discharge
6-2	1000	1.30	93	8-7	1430	1.67	161
7-29	1700	1.57	138				

RIO GRANDE BASIN

137

8-2405. Trinchera Creek above Turners Ranch, near Fort Garland, Colo.

Location.--Lat 37°22', long 105°17', in Sangre de Cristo Grant, on right bank just downstream from confluence of North and South Forks, 1 mile upstream from Turners Ranch and 7 miles southeast of Fort Garland, Costilla County.

Drainage area.--45 sq mi, approximately.

Records available.--April 1923 to September 1968. No winter records prior to 1935 except water year 1928. Monthly discharge only for some periods, published in WSP 1312.

Gage.--Water-stage recorder. Prior to Apr. 12, 1929, at site 200 ft upstream at different datum.

Average discharge.--35 years (1927-28, 1934-68), 23.3 cfs (16,870 acre-ft per year).

Extremes.--Maximum discharge during year, 121 cfs June 6 (gage height, 3.06 ft); minimum not determined.

1923-68: Maximum discharge, 689 cfs May 27, 1942, from rating curve extended above 240 cfs; maximum gage height, 3.73 ft May 10, 1947; minimum daily discharge recorded, 3.0 cfs Oct. 3, 1942.

Outstanding floods occurred in 1886 and in October 1911. The flood in 1886 probably exceeded that in October 1911 and the flood in October 1911 probably exceeded all subsequent floods, from information by local residents.

Remarks.--Records good except those for winter period, which are poor. No regulation or diversion above station.

Discharge, in cubic feet per second, water year October 1967 to September 1968

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	9.9	9.9	7.2				9.5	21	89	40	41	20
2	9.5	9.9	7.0				9.5	23	89	40	42	19
3	9.5	9.9	7.2				10	27	90	38	41	19
4	9.9	9.5	8.3				10	28	95	35	37	19
5	10	9.9	7.5				10	33	103	36	37	18
6	10	9.9	7.5				9.1	36	116	36	40	18
7	11	9.5	7.2				9.1	34	114	36	40	18
8	10	9.5	8.3				9.5	35	111	35	38	17
9	10	10	7.5				9.5	37	106	30	38	17
10	10	9.9	7.0			7.0	9.9	40	98	28	43	17
11	9.9	9.9	7.5				9.5	34	92	27	42	16
12	9.9	9.5	7.5				10	31	87	26	43	16
13	9.5	9.1	7.0				12	31	87	25	40	16
14	9.5	9.1					12	30	87	25	44	16
15	9.5	9.1					13	30	86	24	40	15
16	9.1	9.1		5.0	6.0		14	38	84	20	37	15
17	9.5	9.1					14	43	84	20	36	16
18	9.5	8.7					15	44	81	20	33	15
19	9.5	8.7				9.1	16	48	80	20	31	15
20	9.1	8.7				9.1	16	50	78	19	30	14
21	9.1	8.7				6.9	16	56	72	17	30	14
22	9.1	8.7				7.5	15	72	68	17	28	14
23	8.7	8.3	6.5			6.9	14	76	64	18	28	15
24	8.3	7.9				6.6	15	74	58	20	25	14
25	8.7	7.9				7.5	14	69	58	24	24	14
26	9.1	8.3				7.2	14	66	56	31	23	14
27	7.9	7.5				7.9	14	69	52	47	23	13
28	8.7	7.9				8.3	14	81	49	34	24	13
29	7.9	7.5				8.7	14	87	47	34	21	14
30	6.3	7.5				9.5	16	87	43	34	21	16
31	9.9	- - - -				9.5	- - - -	87	- - - -	35	22	- - - -
Total	288.5	269.1	213.7	155.0	174.0	230.7	373.6	1,517	2,424	891	1,042	477
Mean	9.31	8.97	6.89	5.0	6.0	7.44	12.5	48.9	80.8	28.7	33.6	15.9
Max	11	10	-	-	-	-	16	87	116	47	44	20
Min	6.3	7.5	-	-	-	-	9.1	21	43	17	21	13
Ac-ft	572	534	424	307	345	458	741	3,010	4,810	1,770	2,070	946

Cal yr 1967: Total 3,807.0 Mean 10.4 Max 23 Min - Ac-ft 7,550
 Wtr yr 1968: Total 8,055.6 Mean 22.0 Max 116 Min - Ac-ft 15,980

Peak discharge (base, 50 cfs)

Note.--No gage-height record Dec. 10 to Mar. 19.

Date	Time	Gage height	Discharge	Date	Time	Gage height	Discharge
6-6	1300	3.06	121	7-29	2300	2.53	53
7-27	0130	2.79	90	8-10	0630	2.56	63

RIO GRANDE BASIN

123

8-2230, Rio Grande at Alamosa, Colo.

Location.--Lat 37°29', long 105°53', in SE $\frac{1}{4}$ sec.4, T.17 N., R.10 E., on right bank a quarter of a mile northwest of city limits of Alamosa and 9 miles upstream from Alamosa Creek.

Drainage area.--1,710 sq mi, approximately.

Records available.--May 1912 to September 1968. Monthly discharge only for some periods, published in WSP 1312.

Gage.--Water-stage recorder. Datum of gage is 7,532.66 ft above mean sea level, datum of 1929. Prior to Apr. 7, 1915, staff or chain gage and Apr. 7, 1915, to Nov. 5, 1935, water-stage recorder, at railroad and highway bridges in Alamosa 1 to 2½ miles downstream at different datums. Nov. 6, 1935, to June 30, 1942, water-stage recorder at present site at datum 1.00 ft higher.

Average discharge.--56 years, 255 cfs (184,600 acre-ft per year).

Extremes.--Maximum discharge during year, 2,550 cfs May 30 (gage height, 6.47 ft); minimum daily, 13 cfs Oct. 1.

1912-68: Maximum discharge, 14,000 cfs July 1, 1927 (gage height, 8.37 ft, site and datum then in use); maximum gage height, 10.62 ft June 20, 1949; minimum daily discharge, 1.0 cfs May 19, 1950.

Flood in October 1911 (stage, 0.2 ft lower than July 1, 1927, from floodmark), probably exceeded that of July 1, 1927, and is probably the greatest known since at least 1884, from information by local resident.

Remarks.--Records fair except those for winter period, which are poor. Natural flow of stream affected by transmountain diversions, storage reservoirs, ground-water withdrawals and diversions for irrigation, and return flow from irrigated areas.

Discharge, in cubic feet per second, water year October 1967 to September 1968

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	13	106	180	170	165	210	452	38	2,010	622	118	78
2	19	208	195	180	160	215	471	32	1,590	618	255	80
3	23	258	175	190	155	230	448	34	1,690	392	273	87
4	26	252	180	195	155	240	330	75	1,800	241	289	98
5	28	226	190	185	175	230	205	119	1,290	151	195	125
6	28	236	190	170	170	220	174	146	1,240	133	168	111
7	23	236	185	170	160	235	158	146	1,020	78	150	96
8	21	234	180	170	170	250	138	86	576	64	169	81
9	22	230	175	175	180	265	114	61	332	58	87	90
10	17	236	175	175	185	270	104	126	186	57	107	79
11	27	240	180	180	185	265	94	95	237	64	168	65
12	31	236	185	180	190	260	86	47	257	78	418	58
13	28	234	190	165	190	270	80	37	199	69	432	54
14	30	238	190	150	195	287	78	43	148	180	408	50
15	39	234	195	155	200	295	77	65	157	209	385	48
16	46	236	205	160	190	289	68	183	132	223	597	44
17	47	234	190	165	180	279	60	348	185	193	415	41
18	46	232	175	170	185	281	55	392	542	164	269	38
19	42	228	160	155	195	275	51	440	998	168	168	32
20	39	220	155	150	195	269	50	352	1,220	169	129	26
21	38	210	150	165	200	277	55	410	1,410	136	150	22
22	39	214	150	175	205	267	51	590	1,440	127	114	20
23	40	218	150	170	205	267	45	944	1,330	164	88	18
24	39	216	160	165	200	279	48	1,240	1,310	158	82	15
25	38	188	165	160	200	295	45	1,390	1,120	215	77	15
26	43	176	175	155	195	311	43	1,270	840	205	78	32
27	42	180	180	165	195	315	42	1,170	649	263	81	29
28	45	172	170	175	195	328	41	1,280	641	385	106	28
29	45	152	180	180	200	348	46	1,630	705	328	125	33
30	65	160	185	175	175	390	44	2,230	763	148	120	38
31	87	- - - -	175	170	- - - -	428	- - - -	2,420	- - - -	91	87	- - - -
Total	1,116	6,440	5,490	5,265	5,375	8,640	3,753	17,439	26,015	6,151	6,308	1,631
Mean	36.0	215	177	170	185	279	125	563	867	198	203	54.4
Max	87	258	205	195	205	428	471	2,420	2,010	622	597	125
Min	13	106	150	150	155	210	41	32	132	57	77	15
Ac-ft	2,210	12,770	10,890	10,440	10,660	17,140	7,440	34,590	51,600	12,200	12,510	3,240
Cal yr 1967: Total	34,789		Mean	95.3	Max	260	Min	12	Ac-ft	69,000		
Wtr yr 1968: Total	93,623		Mean	256	Max	2,420	Min	13	Ac-ft	185,700		

RIO GRANDE BASIN

Closed basin in San Luis Valley, Colo.

8-2310. La Garita Creek near La Garita, Colo.

Location (revised).--Lat 37°48'48", long 106°19'04", in NW¼SE¼ sec.9, T.41 N., R.6 E., on right bank 4.5 miles downstream from Little La Garita Creek and 4½ miles southwest of La Garita.

Drainage area.--61 sq mi, approximately.

Records available.--April 1919 to September 1968. No winter records prior to water year 1948 except water years 1926, 1941, 1945-46. Monthly discharge only for some periods, published in WSP 1312.

Gage.--Water-stage recorder. Altitude of gage is 8,030 ft (from topographic map). Apr. 1, 1919, to June 23, 1927, staff gages and June 24, 1927, to Nov. 13, 1935, water-stage recorder, at sites within a quarter of a mile downstream at different datums. Nov. 14, 1935, to Nov. 16, 1966, water-stage recorder at present site at datum 1.00 ft higher.

Average discharge.--24 years (1925-26, 1940-41, 1944-46, 1947-68), 13.0 cfs (9,410 acre-ft per year).

Extremes.--Maximum discharge during year, 224 cfs July 27 (gage height, 2.74 ft), from rating curve extended above 40 cfs; minimum not determined.

1919-68: Maximum discharge, 530 cfs July 9, 1957 (gage height, 4.00 ft, present datum), from rating curve extended above 140 cfs; minimum daily recorded, 0.2 cfs Sept. 28, 29, 1956.

Remarks.--Records good except those for winter period, which are poor. Diversions above station for irrigation.

Discharge, in cubic feet per second, water year October 1967 to September 1968

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	7.1	6.8					9.0	19	95	16	89	24
2	7.1	6.8					8.5	24	102	16	95	23
3	7.1	4.5					7.1	32	95	16	89	26
4	7.1	5.0					7.1	34	85	16	81	26
5	7.1	5.4					6.4	34	85	16	78	22
6	7.1	4.5					7.4	47	89	16	80	19
7	7.1	4.0					6.4	39	81	15	76	19
8	7.1	4.0					6.4	36	74	16	78	12
9	6.8	4.5					9.0	46	65	17	74	16
10	6.0	4.5				4.0	7.1	46	60	18	91	16
11	6.0	4.2					8.5	44	56	18	139	16
12	6.0	5.4					11	44	53	15	106	16
13	6.0	5.4					13	50	53	14	106	19
14	6.0	5.4					13	46	48	13	117	16
15	6.0	4.8					14	51	47	12	104	14
16	6.0	4.8	3.5	2.3	3.5		19	57	43	10	95	13
17	6.0	4.8					17	54	40	9.4	80	13
18	6.0	4.8					16	62	39	9.0	70	13
19	6.0	4.5					14	68	36	9.4	60	13
20	5.7	4.5				7.3	13	78	34	8.5	54	13
21	5.7	4.0				9.4	20	81	32	8.2	54	13
22	5.7	4.5				9.0	16	95	31	10	47	12
23	5.7	4.5				7.8	14	108	28	13	43	12
24	5.7	4.0				5.4	13	102	25	16	38	12
25	5.7	4.0				5.4	14	91	24	16	34	12
26	5.7	4.5				5.7	14	93	23	25	31	12
27	5.4	3.5				6.0	13	97	21	65	31	11
28	6.0	4.0				6.4	13	119	19	60	32	11
29	6.0	4.5				7.1	13	132	19	46	28	11
30	4.5	4.5				7.8	16	119	17	38	27	12
31	6.0					9.5		106		62	25	
Total	191.4	140.6	108.5	71.3	101.5	161.8	358.9	2054	1519	639.5	2152	473
Mean	6.17	4.69	3.5	2.3	3.3	5.22	12.0	66.3	30.6	20.6	69.4	15.8
Max	7.1	6.8	-	-	-	9.4	20	132	102	65	139	26
Min	4.5	3.5	-	-	-	-	6.4	19	17	8.2	25	11
Ac-ft	380	279	215	141	201	321	712	4,070	3,010	1,270	4,270	938
Cal yr 1967: Total	2,319.8											
Mean	6.34											
Max	27											
Min	-											
Ac-ft	4,590											
Wtr yr 1968: Total	7,971.5											
Mean	21.8											
Max	139											
Min	-											
Ac-ft	15,810											

Peak discharge (base, 80 cfs)

Date	Time	Gage height	Discharge	Date	Time	Gage height	Discharge
5-29	0300	2.55	171	7-31	2100	2.48	162
7-27	2000	2.74	224	8-11	0500	2.58	185

Note.--No gage-height record Dec. 11 to Mar. 20.

RIO GRANDE BASIN

125

Closed basin in San Luis Valley, Colo.

8-2242. Raspberry Creek near Villa Grove, Colo.

Location.--Lat 38°20'25", long 105°56'15", in NW1SE4 sec.11, T.47 N., R.9 E., on left bank 30 ft upstream from trail crossing, 3.2 miles upstream from Rock Creek, and 6½ miles north of Villa Grove.

Drainage area.--1.78 sq mi.

Records available.--January 1967 to September 1968.

Gage.--Water-stage recorder with rock and concrete control. Altitude of gage is 8,960 ft (from topographic map).

Extremes.--Maximum discharge during year, 2.9 cfs June 5 (gage height, 2.20 ft), from rating curve extended above 0.9 cfs; maximum gage height, 2.93 ft Nov. 24 (backwater from ice); minimum daily discharge, 0.06 cfs Dec. 21, 1967-68; Maximum discharge, that of June 5, 1968; maximum gage height, that of Nov. 24, 1967; minimum daily discharge, that of Dec. 21, 1967.

Remarks.--Records good except those for winter period, which are fair. No diversion above station.

Discharge, in cubic feet per second, water year October 1967 to September 1968

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0.56	0.64	0.42				0.44	0.49	1.2	0.79	0.99	0.99
2	.59	.65	.42				.42	.51	1.4	.76	.95	.95
3	.56	.60	.40				.40	.53	1.7	.76	.76	1.1
4	.59	.55	.41				.38	.56	1.9	.73	.88	.99
5	.59	.49	.40				.43	.58	2.0	.76	.85	.95
6	.62	.44	.40				.45	.56	2.3	.76	.95	.92
7	.62	.45	.38				.40	.54	2.3	.76	.92	.88
8	.62	.49	.36				.33	.51	1.9	.76	.92	.88
9	.59	.47	.33				.35	.51	1.7	.76	.92	.88
10	.64	.47	.33				.35	.53	1.5	.76	1.1	.88
11	.62	.47	.34				.40	.53	1.4	.73	1.3	.88
12	.59	.47	.31				.40	.51	1.5	.73	1.2	.88
13	.59	.47	.31				.45	.49	1.6	.70	1.1	.88
14	.59	.47	.32				.40	.49	1.5	.70	1.2	.85
15	.62	.47	.33				.45	.53	1.4	.70	1.1	.82
16	.62	.45	.34	0.20	0.30	0.40	.44	.58	1.4	.68	1.1	.85
17	.62	.45	.25				.42	.56	1.3	.67	1.1	.85
18	.59	.45	.08				.42	.56	1.2	.67	1.1	.85
19	.59	.45	.12				.43	.58	1.2	.70	1.1	.85
20	.59	.45	.16				.50	.61	1.1	.73	1.0	.82
21	.59	.45	.06				.40	.67	1.1	.70	1.1	.85
22	.59	.45	.08				.35	.82	1.1	.70	1.0	.82
23	.59	.41	.10				.38	.88	1.0	.70	.99	.85
24	.62	.39	.10				.39	.88	.95	.70	.99	.82
25	.62	.39	.12				.40	.82	.92	.70	.99	.82
26	.62	.40	.20				.35	.85	.88	.73	1.0	.82
27	.64	.38	.18				.32	1.0	.88	.79	.99	.82
28	.64	.38	.18				.34	1.1	.85	.88	1.0	.82
29	.67	.40	.18				.37	1.2	.82	.82	.99	.82
30	.65	.42	.16				.44	1.2	.82	.76	.99	.82
31	.67		.14					1.1		.85	.99	
Total	16.90	13.92	7.91	6.20	6.70	12.40	12.00	21.28	40.82	22.94	31.47	26.21
Mean	0.61	0.46	0.26	0.20	0.30	0.40	0.40	0.69	1.36	0.74	1.02	0.87
Max	0.67	0.66	0.42	-	-	-	0.50	1.2	2.3	0.88	1.3	1.1
Min	0.56	0.38	0.06	-	-	-	0.32	0.49	0.82	0.67	0.76	0.82
Ac-ft	37	28	16	12	17	25	24	42	81	46	62	52
Cal yr 1967: Total	160.17	Mean	0.44	Max	1.2	Min	0.06	Ac-ft	318			
Wtr yr 1968: Total	222.75	Mean	0.61	Max	2.3	Min	0.06	Ac-ft	442			

Peak discharge (base, 1.0 cfs)

Note.--No gage-height record Nov. 24 to Apr. 8.

Date	Time	Gage height	Discharge	Date	Time	Gage height	Discharge
6-5	2130	2.20	2.9	8-6	1630	1.84	1.4
7-27	2230	1.76	1.1	8-10	2230	1.91	1.8
8-1	0500	1.77	1.1	9-3	1100	1.84	1.4

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969												
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.82	.73	.35	.21	.26	.37	.30	.76	2.1	1.1	1.1	1.1
2	.79	.73	.36	.22	.27	.35	.29	.85	1.9	1.1	1.1	1.0
3	.79	.73	.36	.22	.29	.32	.30	.92	1.8	1.1	1.1	.99
4	.85	.70	.37	.21	.33	.31	.30	.88	1.7	1.1	1.1	.99
5	.79	.70	.39	.23	.36	.30	.37	.95	1.7	1.3	1.1	.99
6	.79	.67	.37	.28	.38	.27	.44	1.0	1.8	1.2	1.1	.95
7	.79	.64	.36	.27	.41	.31	.40	.95	1.7	1.1	1.1	.95
8	.79	.60	.35	.32	.37	.28	.45	.92	1.6	1.0	1.1	1.0
9	.79	.52	.37	.29	.35	.28	.51	.99	1.7	1.1	1.1	.99
10	.79	.64	.39	.29	.35	.28	.53	1.1	1.5	1.0	1.1	.99
11	.79	.58	.41	.30	.35	.29	.53	1.2	1.3	1.0	1.1	.95
12	.79	.46	.32	.30	.35	.29	.51	1.3	1.2	1.1	1.1	.92
13	.79	.54	.25	.30	.40	.28	.49	1.4	1.2	1.0	1.4	.92
14	.76	.55	.24	.33	.38	.30	.46	1.5	1.3	1.0	1.5	.88
15	.76	.50	.25	.32	.36	.27	.46	1.5	1.5	1.0	1.4	.95
16	.79	.50	.28	.29	.39	.28	.44	1.4	1.6	.90	1.4	.92
17	.79	.50	.28	.27	.36	.31	.47	1.5	1.6	1.1	1.3	.95
18	.75	.54	.22	.27	.36	.32	.52	1.6	1.5	1.1	1.3	.92
19	.79	.55	.16	.29	.40	.33	.49	1.7	1.7	1.2	1.3	.88
20	.79	.58	.10	.31	.32	.28	.58	1.8	1.6	1.1	1.3	.88
21	.79	.58	.12	.32	.34	.29	.79	1.8	1.4	1.1	1.2	.92
22	.76	.54	.11	.34	.37	.30	1.0	1.9	1.4	1.0	1.1	.88
23	.76	.52	.11	.30	.35	.30	1.2	1.9	1.3	1.0	1.2	.85
24	.76	.50	.12	.24	.34	.30	1.1	1.9	1.4	1.1	1.1	.85
25	.76	.50	.14	.27	.41	.26	.95	2.1	1.3	1.2	1.1	.76
26	.73	.47	.25	.30	.41	.26	.78	2.6	1.3	1.2	1.1	.60
27	.73	.43	.23	.34	.39	.26	.67	2.9	1.2	1.2	1.1	.82
28	.73	.43	.20	.34	.39	.27	.70	2.8	1.2	1.1	1.1	.82
29	.73	.35	.22	.28	-----	.70	2.8	3.0	1.2	1.1	1.0	.82
30	.73	.35	.21	.26	-----	.70	2.8	1.2	1.1	1.1	1.0	.82
31	.73	-----	.20	.26	-----	.31	-----	2.4	-----	1.2	1.0	-----
TOTAL	24.00	16.75	8.09	8.77	10.08	9.13	17.43	50.32	44.9	33.90	36.11	27.81
MEAN	.77	.53	.26	.28	.32	.29	1.22	1.50	1.50	1.30	1.30	1.11
MIN	.85	.73	.41	.34	.41	.37	1.2	3.0	2.1	1.3	1.5	1.1
MAX	.73	.45	.10	.21	.26	.26	.29	.76	1.2	.90	1.0	.60
AC-FT	48	43	16	17	20	18	35	100	89	67	72	54
CAL YR 1968	TOTAL 217.86		MEAN .63		MAX 2.3		MIN .10		AC-FT 458			
474 YR 1969	TOTAL 255.73		MEAN .79		MAX 3.0		MIN .10		AC-FT 569			
PEAK DISCHARGE (BASE, 1.5 CFS, REVISED)												
DATE	TIME	G.H.	DISCHARGE	DATE	TIME	G.H.	DISCHARGE					
4-23	2000	1.92	1.8	7-5	1600	1.93	1.8					
5-26	2300	2.26	3.8	8-13	1830	2.15	2.8					
6-19	2300	1.97	2.0									

NOTE:--No gage-height record Nov. 13 to Apr. 4.

RIO GRANDE BASIN

125

Closed basin in San Luis Valley, Colo.

08224200 Raspberry Creek near Villa Grove, Colo.

LOCATION.--Lat 38°20'25", long 105°56'35", in NW¼SE¼ sec.11, T.47 N., R.9 E., Saguache County, on left bank
30 ft upstream from trail crossing, 3.2 miles upstream from Rock Creek, and 6.5 miles north of Villa Grove.

DRAINAGE AREA.--1.78 sq mi.

PERIOD OF RECORD.--January 1967 to September 1970 (discontinued).

GAGE.--Water-stage recorder with rock and concrete control. Altitude of gage is 8,960 ft (from topographic
map).

EXTREMES.--Current year: Maximum discharge, 2.2 cfs May 21 (gage height, 2.02 ft); maximum gage height,
2.30 ft Nov. 3 (backwater from ice); minimum daily discharge, 0.31 cfs Mar. 4-6.
Period of record: Maximum discharge, 3.8 cfs May 26, 1969 (gage height, 2.26 ft), from rating curve
extended above 2.5 cfs; maximum gage height, 2.93 ft Nov. 24, 1967 (backwater from ice); minimum daily
discharge, 0.06 cfs Dec. 21, 1967.

REMARKS.--Records good except those for winter period, which are fair. No diversion above station.

DISCHARGE IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SE
1	.82	.74	.56	.52	.50	.37	.50	.58	1.3	.73	.56	.6
2	.79	.74	.56	.46	.52	.35	.51	.52	1.3	.73	.56	.6
3	.85	.72	.56	.46	.54	.33	.52	.50	1.2	.73	.78	.6
4	.85	.70	.53	.48	.52	.31	.52	.50	1.2	.70	.70	.6
5	.82	.70	.58	.50	.50	.31	.52	.51	1.2	.70	.67	.7
6	.82	.70	.54	.46	.49	.31	.51	.64	1.2	.70	.67	.7
7	.82	.70	.52	.46	.48	.32	.48	.82	1.2	.70	.73	.6
8	.82	.70	.50	.47	.47	.35	.40	.79	1.2	.70	.73	.6
9	.79	.70	.50	.48	.46	.37	.35	.76	1.2	.67	.64	.5
10	.79	.68	.50	.50	.46	.37	.33	.76	1.1	.64	.61	.5
11	.79	.65	.53	.54	.47	.36	.39	.85	1.2	.64	.58	.5
12	.60	.66	.54	.58	.48	.35	.40	.99	1.1	.64	.56	.6
13	.82	.60	.54	.58	.47	.38	.38	1.1	1.1	.61	.56	.6
14	.82	.64	.52	.52	.45	.40	.37	1.2	1.1	.58	.56	.5
15	.82	.60	.52	.50	.43	.40	.36	1.2	1.2	.64	.64	.5
16	.82	.62	.52	.50	.43	.42	.37	1.2	1.2	.61	.61	.5
17	.85	.64	.54	.52	.43	.45	.36	1.5	1.1	.61	.58	.8
18	.66	.60	.56	.54	.42	.40	.40	1.6	1.1	.58	.56	.6
19	.82	.56	.50	.56	.39	.44	.38	1.7	1.1	.56	.61	.5
20	.82	.58	.54	.56	.38	.45	.38	1.7	1.1	.56	.61	.5
21	.82	.60	.54	.56	.41	.46	.40	1.8	1.1	.58	.70	.5
22	.82	.60	.56	.56	.41	.46	.43	1.9	1.1	.56	.76	1.1
23	.82	.60	.58	.56	.40	.46	.46	1.9	.99	.58	.64	1.4
24	.85	.58	.58	.54	.38	.47	.48	1.9	.92	.58	.61	1.1
25	.85	.56	.56	.52	.36	.47	.51	1.8	.82	.58	.61	1.1
26	.85	.56	.56	.54	.35	.46	.58	1.8	.79	.56	.61	1.1
27	.85	.56	.54	.56	.36	.46	.64	1.7	.79	.58	.61	1.1
28	.85	.54	.50	.56	.38	.47	.60	1.6	.79	.61	.58	1.1
29	.62	.52	.47	.52	-----	.49	.55	1.6	.79	.58	.58	1.1
30	.82	.54	.48	.50	-----	.49	.57	1.5	.76	.58	.58	1.1
31	.75	-----	.50	.50	-----	.49	-----	1.4	-----	.58	.61	-----
TOTAL	25.31	18.96	16.01	16.11	12.34	12.68	13.69	38.32	32.25	19.40	19.41	25.9
MEAN	.82	.63	.54	.52	.44	.41	.46	1.24	1.08	.63	.63	.8
MAX	.88	.74	.58	.58	.54	.49	.64	1.9	1.3	.73	.78	1.
MIN	.60	.52	.47	.46	.35	.31	.33	.50	.76	.56	.56	.5
AC-FT	50	38	33	32	24	25	27	76	64	38	39	5

CAL YR 1969 TOTAL 294.77 MEAN .82 MAX 3.0 MIN .21 ACFT 593

WAT YR 1970 TOTAL 251.02 MEAN .69 MAX 1.9 MIN .31 ACFT 498

PEAK DISCHARGE (BASE, 1.5 cfs).--May 21 (2130) 2.2 cfs (2.02 ft); Aug. 3 (1430) 2.1 cfs (2.03 ft).

NOTE.--No gage-height record Nov. 4 to Apr. 21.

RIO GRANDE BASIN

127

Closed basin in San Luis Valley, Colo.

8-2267, Cotton Creek near Mineral Hot Springs, Colo.

Location.--Lat 36°07'55", long 105°47'17" (revised), in SW¼ sec.20, T.45 N., R.11 E., on left bank just downstream from diversion head-gate, 7 miles upstream from mouth and 8 miles southeast of Mineral Hot Springs.

Drainage area.--13.6 sq mi.

Records available.--January 1967 to September 1968.

Gage.--Digital water-stage recorder. Altitude of gage is 8,575 ft, revised (from topographic map).

Extremes.--Maximum discharge during year, 49 cfs June 6 (gage height, 3.34 ft); maximum gage height, 3.98 ft Mar. 13 (backwater from ice); minimum daily discharge, 4.8 cfs Apr. 8, 1967-68; Maximum discharge, that of June 6, 1968; maximum gage height, that of Mar. 13, 1968; minimum daily discharge, 4.2 cfs Jan. 8, 1967.

Remarks.--Records good. One small diversion just above station for stock water (67 acre-ft diverted in water year 1968).

DISCHARGE, IN CFS, WATER YEAR OCTOBER 1967 TO SEPTEMBER 1968												
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13	11	8.5	6.2	5.8	6.8	5.8	6.3	32	19	29	13
2	12	11	9.0	6.1	6.0	6.0	5.6	6.5	37	17	26	13
3	12	11	8.6	6.0	6.0	5.9	5.5	6.5	40	17	23	15
4	12	11	8.3	5.8	5.8	6.2	5.3	6.7	40	16	21	14
5	12	11	8.3	5.7	6.0	6.5	5.2	7.1	40	16	20	13
6	12	11	7.9	5.8	6.0	5.7	5.3	6.9	45	16	24	13
7	12	11	8.0	5.8	6.0	5.7	5.0	6.4	44	17	38	12
8	11	11	8.1	5.8	6.0	5.7	4.8	6.4	39	18	39	12
9	11	11	7.8	5.8	6.0	5.7	5.4	6.9	30	18	35	12
10	12	10	7.7	5.8	6.0	5.5	5.3	7.0	27	16	36	12
11	11	10	7.3	5.8	5.9	5.3	5.5	6.7	27	16	35	11
12	11	10	7.4	5.8	6.0	5.0	5.7	6.8	34	15	35	11
13	11	10	7.4	5.8	6.2	5.2	5.8	6.5	41	15	34	11
14	11	10	7.6	5.8	6.2	5.6	5.6	6.2	42	14	33	11
15	11	10	7.6	5.8	6.0	6.0	5.9	6.3	39	13	30	10
16	10	10	7.6	5.8	6.0	5.6	6.0	6.7	40	12	27	9.9
17	10	10	6.6	5.8	6.0	5.6	5.8	6.5	41	12	24	10
18	11	9.7	7.0	5.8	6.0	5.5	5.7	6.8	40	11	22	9.9
19	10	9.6	7.1	5.8	5.8	5.6	5.7	6.9	37	12	20	9.4
20	10	9.6	7.1	5.8	5.8	5.6	5.6	7.5	40	13	20	9.5
21	11	9.6	5.5	5.8	6.0	5.6	5.6	8.3	40	12	19	9.4
22	11	9.5	6.8	5.8	5.9	5.4	5.7	11	38	11	18	9.5
23	11	9.4	6.8	5.8	5.8	5.4	5.6	13	35	12	16	10
24	10	10	6.4	5.8	5.8	5.3	5.7	13	33	12	15	10
25	11	9.3	6.3	5.8	5.8	5.3	5.7	11	29	13	15	9.4
26	11	9.4	6.2	5.7	5.7	5.3	5.7	13	26	12	15	9.4
27	11	10	6.1	5.7	5.8	5.3	5.7	16	25	15	16	9.3
28	11	9.5	6.1	5.9	6.0	5.4	5.7	21	26	16	16	9.2
29	11	9.2	6.1	5.8	6.7	5.6	5.8	26	24	16	15	9.1
30	11	8.8	6.1	5.8	-----	5.8	6.1	31	21	20	15	9.7
31	11	-----	6.1	5.8	5.9	-----	-----	33	-----	24	14	-----
TOTAL	365	302.6	223.4	180.5	173.0	175.0	167.8	329.9	1,052	466	745	326.7
MEAN	11.1	10.1	7.21	5.82	5.97	5.65	5.59	10.6	35.1	15.0	24.0	10.9
MAX	13	11	9.0	6.2	6.7	6.8	6.1	33	45	24	39	15
MIN	10	8.8	5.5	5.7	5.7	5.0	4.8	6.2	21	11	14	9.1
AC-FT	684	600	443	358	343	347	333	654	2,090	924	1,480	648
CAL YR 1967#	TOTAL 4,000.7			MEAN 10.9		MAX 28		MIN 4.2		AC-FT 7,940		
WTR YR 1968#	TOTAL 4,486.9			MEAN 12.3		MAX 45		MIN 4.8		AC-FT 8,900		

Peak discharge (base, 30 cfs)

Date	Time	Gage height	Discharge	Date	Time	Gage height	Discharge
6-6	2400	3.34	49	8-8	1600	3.31	43
8-1	0500	3.25	35				

RIO GRANDE BASIN

133

Closed basin in San Luis Valley, Colo.

8-2267, Cotton Creek near Mineral Hot Springs, Colo.

LOCATION.--Lat 38°07'55", long 105°47'17", in SW¼ sec.20, T.45 N., R.11 E., Saguache County, on left bank just downstream from diversion headgate, 7 miles upstream from mouth and 8 miles southeast of Mineral Hot Springs.

DRAINAGE AREA.--13.6 sq mi.

PERIOD OF RECORD.--January 1967 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 8,575 ft (from topographic map).

EXTREMES.--Current year: Maximum discharge, 45 cfs June 16 (gage height, 3.30 ft); maximum gage height, 3.47 ft Nov. 18 (backwater from ice); minimum daily discharge, 3.5 cfs Dec. 20.
 Period of record: Maximum discharge, 49 cfs June 6, 1968 (gage height, 3.34 ft); maximum gage height, 3.98 ft Mar. 13, 1968 (backwater from ice); minimum daily discharge, 3.5 cfs Dec. 20, 1968.

REMARKS.--Records good. One small diversion just above station for stock water (135 acre-ft diverted in water year 1969).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.5	7.4	7.2	5.6	4.5	5.0	5.1	8.7	30	36	22	13
2	9.3	7.8	7.1	5.6	4.7	5.0	5.1	9.6	26	40	22	13
3	4.2	7.4	7.3	5.7	4.7	4.8	5.1	10	23	39	26	12
4	10	7.4	7.2	5.5	4.8	4.8	5.1	10	22	39	24	12
5	9.7	7.0	7.2	5.6	5.0	4.7	5.2	11	26	39	24	12
6	9.3	7.1	7.1	6.0	5.2	4.7	5.3	11	31	36	22	12
7	9.1	6.9	6.9	5.8	5.4	5.0	5.1	9.9	30	32	20	12
8	9.2	6.7	6.9	6.2	5.2	4.8	5.0	9.1	27	28	19	14
9	9.2	6.8	6.9	5.8	4.7	4.7	5.1	8.9	31	27	18	14
10	9.2	6.8	6.8	5.8	4.8	4.8	5.3	9.3	33	25	18	13
11	8.9	7.0	6.8	5.8	5.0	5.0	5.4	9.7	26	26	17	13
12	8.7	7.1	6.6	5.8	5.0	4.8	5.3	10	21	29	17	13
13	8.6	7.3	6.8	6.0	5.6	4.7	5.3	10	21	27	19	14
14	8.4	7.5	6.9	6.4	5.4	5.0	5.4	11	27	26	23	13
15	8.4	7.2	7.0	6.0	5.4	4.7	5.2	11	35	25	21	13
16	8.5	7.4	6.8	5.5	6.0	4.7	5.1	11	41	27	19	14
17	8.4	7.4	6.6	5.4	5.8	5.0	5.3	11	42	28	18	14
18	8.0	7.0	5.5	5.2	6.0	5.0	5.2	14	37	28	17	15
19	8.4	7.5	3.8	5.2	6.4	5.2	5.4	16	36	29	17	16
20	8.3	7.5	3.5	5.4	4.5	5.0	5.7	20	40	36	18	17
21	8.2	7.4	3.7	5.6	4.7	5.0	6.7	24	40	32	14	19
22	8.1	7.3	3.7	5.6	4.7	5.2	7.5	26	36	33	14	19
23	8.0	7.2	3.7	5.0	4.6	5.0	7.7	27	32	29	15	18
24	8.0	7.6	4.0	4.5	4.6	4.8	8.6	25	31	28	16	17
25	8.0	7.2	5.0	4.7	4.7	4.6	8.5	27	27	27	15	16
26	7.9	7.0	6.5	4.8	5.0	4.7	7.5	32	26	26	14	14
27	7.8	6.8	5.8	5.0	4.9	4.8	6.9	39	24	24	14	15
28	7.7	7.5	5.8	4.8	5.2	4.9	7.3	38	28	25	13	15
29	7.7	6.3	5.8	4.7	-----	4.9	7.5	38	32	24	13	14
30	7.6	7.0	5.6	4.6	-----	5.0	7.9	37	35	23	13	15
31	7.4	-----	5.6	4.6	-----	5.1	-----	36	-----	22	13	-----
TOTAL	2644.7	2152.7	1861.1	1684.2	1422.5	1514.4	1804.8	5704.2	916	915	553	433
MEAN	8.54	7.17	6.00	5.43	5.09	4.88	6.03	18.4	30.5	29.5	17.8	14.4
MAX	10	7.8	7.3	6.4	6.4	5.2	8.6	39	42	40	26	19
MIN	7.4	6.3	3.5	4.5	4.5	4.6	5.0	21	22	22	13	12
AC-FT	525	427	369	334	283	300	359	1,130	1,820	1,810	1,100	859

CAL YR 1968 TOTAL 4,281.9 MEAN 11.7 MAX 45 MIN 3.5 AC-FT 1,440
 WTR YR 1969 TOTAL 4,696.1 MEAN 12.9 MAX 42 MIN 3.5 AC-FT 9,310

PEAK DISCHARGE (BASE, 30 CFS)

NOTE.--No gage-height record Dec. 15 to Mar. 27.

DATE	TIME	G.H.	DISCHARGE	DATE	TIME	G.H.	DISCHARGE
6-16	0945	3.30	45	7-20	0100	3.30	40
7-2	2115	3.30	43	8-2	2045	3.28	36

RIO GRANDE BASIN

127

Closed basin in San Luis Valley, Colo.

08226700 Cotton Creek near Mineral Hot Springs, Colo.

LOCATION.--Lat 38°07'55", long 105°47'17", in SW¼ sec. 20, T.45 N., R.11 E., Saguache County, on left bank just downstream from diversion headgate, 7 miles upstream from mouth and 8 miles southeast of Mineral Hot Springs.

DRAINAGE AREA.--13.6 sq mi.

PERIOD OF RECORD.--January 1967 to September 1970 (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 8,575 ft (from topographic map).

EXTREMES.--Current year: Maximum discharge, 51 cfs June 23 (gage height, 3.31 ft); maximum gage height, 3.33 ft Sept. 13; minimum daily discharge, 4.0 cfs Jan. 29.
Period of record: Maximum discharge, 51 cfs June 23, 1970 (gage height, 3.31 ft); maximum gage height, 3.98 ft Mar. 13, 1968 (backwater from ice); minimum daily discharge, 3.5 cfs Dec. 20, 1968.

REMARKS.--Records good. One small diversion just above station for stock water (about 10 acre-ft diverted in water year 1970).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15	11	8.5	6.0	4.5	6.0	6.5	7.5	34	37	13	11
2	14	10	8.5	6.0	4.5	5.8	6.0	7.7	29	33	13	11
3	14	11	8.5	5.5	5.5	5.5	6.5	7.8	28	31	14	10
4	15	11	9.0	6.0	6.0	5.3	5.5	8.0	28	32	15	11
5	15	11	8.5	6.0	6.0	5.6	5.5	9.0	28	35	13	14
6	14	11	8.0	6.0	6.0	6.0	5.5	9.6	31	32	14	26
7	14	10	7.5	6.0	6.2	5.8	5.5	10.0	34	29	13	22
8	14	10	7.5	6.0	6.5	6.0	5.5	11	33	28	13	17
9	14	10	7.5	6.0	6.7	6.5	6.0	10	35	27	12	16
10	13	10	8.0	6.5	6.0	6.0	5.5	10	32	29	12	14
11	13	9.9	7.5	6.5	6.5	6.0	6.0	13	34	28	12	13
12	13	9.9	7.5	6.5	7.0	6.8	5.5	16	30	27	11	14
13	14	9.3	8.0	6.5	6.6	7.4	5.2	18	30	24	11	28
14	13	9.6	8.0	6.5	6.5	7.8	6.0	19	31	22	11	30
15	13	9.5	8.0	6.5	5.5	8.0	5.5	19	36	21	11	38
16	13	9.6	8.0	6.0	6.0	8.0	6.0	21	39	21	16	36
17	13	9.5	8.0	6.5	6.6	7.6	6.5	27	41	21	13	33
18	13	9.0	8.0	6.0	6.0	6.5	6.4	29	42	21	13	28
19	13	8.5	7.9	6.0	5.5	6.0	6.0	30	43	24	14	24
20	12	9.0	7.9	6.0	5.5	6.0	5.6	30	45	24	16	19
21	12	9.0	7.9	6.2	6.0	6.0	5.8	33	44	22	17	18
22	12	9.5	7.8	6.0	5.5	6.5	5.6	35	47	21	17	19
23	12	9.0	7.8	6.0	6.1	7.0	5.4	37	47	20	16	18
24	12	9.0	7.9	6.0	5.7	8.0	5.6	37	44	20	13	18
25	11	9.0	7.7	6.0	6.0	7.5	6.0	38	44	19	13	18
26	11	9.0	7.7	5.8	5.5	7.0	6.5	37	44	18	12	17
27	11	8.5	7.8	5.5	5.5	6.5	7.0	36	44	17	12	16
28	11	8.0	7.6	5.0	6.0	8.0	7.5	34	45	16	11	15
29	12	8.5	7.0	4.0	-----	7.0	7.0	35	41	15	11	15
30	11	8.5	6.0	4.5	-----	7.0	7.5	37	40	14	11	15
31	11	-----	5.5	5.0	-----	7.0	-----	40	-----	13	10	-----
TOTAL	397	287.3	241.0	183.0	166.1	204.1	186.6	711.6	1,123	741	403	584
MEAN	12.8	9.58	7.77	5.90	5.33	6.58	6.02	23.0	37.4	23.9	13.0	19.5
MAX	15	11	9.0	6.5	7.0	8.0	7.5	40	47	37	17	38
MIN	11	8.0	5.5	4.0	4.5	5.3	5.2	7.5	28	13	10	10
AC-FT	787	570	478	363	329	405	358	1,410	2,230	1,470	799	1,160
CAL YR 1969	TOTAL 4,955.4	MEAN 13.6	MAX 42	MIN 4.5	AC-FT 9,830							
WTR YR 1970	TOTAL 5,221.7	MEAN 14.3	MAX 47	MIN 4.0	AC-FT 10,360							

PEAK DISCHARGE (BASE, 30 CFS)

NOTE.--No gage-height record Jan. 3 to May 5.

DATE	TIME	G.H.	DISCHARGE	DATE	TIME	G.H.	DISCHARGE
6-23	0245	3.31	51	9-13	1245	3.33	48
9-6	1230	3.25	36				

RIO GRANDE BASIN

129

Closed basin in San Luis Valley, Colo.

8-2275. North Crestone Creek near Crestone, Colo.

Location.--Lat 38°00'49", long 105°41'32", on right bank in canyon, 1½ miles northeast of Crestone, Saguache County, and 3½ miles upstream from South Crestone Creek.

Drainage area.--10.7 sq mi.

Records available.--May 1936 to September 1968 (no winter records prior to 1948).

Gage.--Water-stage recorder. Altitude of gage is 8,360 ft (from topographic map).

Average discharge.--21 years (1947-68), 10.7 cfs (7,750 acre-ft per year).

Extremes.--Maximum discharge during year, 57 cfs Aug. 14 (gage height, 1.84 ft); minimum not determined.
1936-68: Maximum discharge, 735 cfs Aug. 6, 1936 (gage height, 4.33 ft), from rating curve extended above 160 cfs on basis of slope-area measurement of peak flow; minimum daily recorded, 0.4 cfs Apr. 3, 1945.
Maximum stage known probably since at least 1884 occurred in October 1911. No flood since that in October 1911 has exceeded the flood of Aug. 6, 1936, from information by local residents.

Remarks.--Records good except those for winter period, which are poor. No diversion above station.

Discharge, in cubic feet per second, water year October 1967 to September 1968

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	9.0	7.4					7.0	7.8	4.1	22	4.2	1.1
2	8.6	7.0					6.2	1.0	4.3	20	3.9	1.2
3	8.6	7.0					5.8	1.1	4.3	20	3.6	1.3
4	8.2	7.8					5.8	1.1	4.2	20	3.5	1.2
5	8.2	6.8					5.2	1.2	4.2	21	3.1	1.2
6	8.6	8.2					4.8	1.2	4.4	28	3.4	1.1
7	9.4	8.2					4.3	1.1	4.3	30	4.4	1.0
8	9.8	7.8					4.8	9.8	4.0	26	4.7	1.0
9	1.0	7.8					4.5	1.1	3.4	23	5.1	9.4
10	1.2	7.8					4.1	1.2	3.1	21	5.1	9.0
11	1.2	8.2				2.5	4.5	1.1	3.1	21	5.2	9.0
12	1.1	8.2					5.5	1.1	3.8	20	4.0	9.0
13	1.0	8.2					6.0	1.0	4.1	20	5.0	8.6
14	9.8	7.8					5.5	9.8	4.1	1.7	5.5	8.2
15	9.0	7.8					5.8	1.0	4.3	1.6	5.2	7.8
16	9.8	7.8	3.5	2.6	2.4		6.2	1.2	4.3	1.4	4.7	7.8
17	9.4	7.8					5.8	1.2	4.7	1.3	4.2	7.4
18	9.4	7.8					5.5	1.3	4.6	1.2	3.6	7.4
19	6.2	7.8					5.2	1.4	4.2	1.3	3.1	7.0
20	7.0	7.4					5.0	1.7	4.4	1.4	2.7	6.8
21	7.0	7.4					3.0					
22	6.5	7.0					5.0	2.0	4.6	1.3	2.5	6.8
23	6.5	6.8					2.7	4.1	3.0	4.2	1.2	6.8
24	6.0	6.5					2.7	4.1	2.7	3.9	1.2	1.7
25	6.0	6.2					2.7	4.3	2.1	3.4	1.2	1.6
26	6.0	5.6					2.7	4.3	2.2	3.1	1.2	1.4
27	6.0	5.0					3.0	4.3	2.8	2.9	1.7	1.5
28	6.0	4.6					3.6	4.3	3.3	2.9	2.6	1.4
29	5.5	4.2					4.8	4.3	4.3	2.8	2.4	1.4
30	7.8	4.0					6.5	5.2	4.3	2.4	2.4	1.3
31	8.2						7.0		4.1		2.9	1.2
Total	259.5	211.9	108.5	80.6	69.6	91.7	152.2	566.4	1,162	584	1,024	261.8
Mean	8.37	7.06	3.5	2.6	2.4	2.96	5.07	18.3	38.7	18.8	33.0	8.73
Max	12	8.2	-	-	-	7.0	7.0	43	47	30	55	13
Min	5.5	4.0	-	-	-	-	4.1	7.8	24	12	12	6.8
Ac-ft	515	420	215	160	138	182	302	1,120	2,300	1,160	2,030	519

Cal yr 1967: Total 4,395.6 Mean 12.0 Max 59 Min - Ac-ft 8,720

Wtr yr 1968: Total 4,572.2 Mean 12.5 Max 55 Min - Ac-ft 9,070

Peak discharge (base, 60 cfs).--No peak above base.

Note.--No gage-height record Dec. 19 to Mar. 21.

RIO GRANDE BASIN

135

Closed basin in San Luis Valley, Colo.

8-2275. North Crestone Creek near Crestone, Colo.

LOCATION.--Lat 38°00'49", long 105°41'32", Saguache County, on right bank in canyon, 1.5 miles northeast of Crestone and 3.2 miles upstream from South Crestone Creek.

DRAINAGE AREA.--10.7 sq mi.

PERIOD OF RECORD.--May 1936 to current year (no winter records prior to 1948).

GAGE.--Water-stage recorder. Altitude of gage is 8,360 ft (from topographic map).

AVERAGE DISCHARGE.--22 years (1947-69), 10.9 cfs (7,900 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 60 cfs June 17 (gage height, 1.88 ft); minimum daily, 1.8 cfs Feb. 18, 19.

Period of record: Maximum discharge, 735 cfs Aug. 6, 1936 (gage height, 4.33 ft), from rating curve extended above 160 cfs on basis of slope-area measurement of peak flow; minimum daily recorded, 0.4 cfs Apr. 3, 1945.

Maximum stage known probably since at least 1884 occurred in October 1911. No flood since that in October 1911 has exceeded the flood of Aug. 6, 1936, from information by local residents.

REMARKS.--Records good except those for winter period, which are poor. No diversion above station.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.2	5.0	4.3	3.0	2.4	2.4	3.7	15	36	47	18	9.4
2	7.4	5.3	4.4	3.1	2.5	2.5	3.9	19	34	46	18	9.0
3	7.0	5.0	4.2	3.2	2.2	2.5	4.1	21	30	47	21	8.6
4	9.0	5.0	4.1	3.0	2.3	2.4	4.4	19	30	47	20	8.2
5	9.4	4.3	3.9	3.1	2.4	2.3	4.6	19	33	47	20	8.2
6	8.6	4.5	4.0	3.1	2.4	2.3	4.8	20	36	46	18	7.8
7	7.8	4.1	4.1	3.2	2.5	2.2	5.1	18	34	41	17	7.8
8	7.4	4.5	4.2	3.3	2.2	2.2	5.3	16	33	36	17	9.4
9	7.4	5.3	4.3	2.9	2.2	2.1	5.0	16	34	34	16	9.4
10	7.4	4.3	4.4	3.0	2.3	2.3	6.5	20	35	31	15	8.6
11	7.0	5.3	4.5	3.1	2.3	2.5	6.8	21	29	30	15	8.6
12	7.0	4.8	4.1	3.1	2.4	2.4	6.0	22	24	29	14	8.6
13	6.8	4.3	3.8	3.2	2.4	2.4	5.8	21	25	28	17	8.6
14	6.5	4.5	3.5	3.3	2.3	2.5	6.5	22	35	28	27	8.2
15	6.3	4.8	3.2	3.4	2.1	2.7	6.3	26	44	29	25	8.6
16	6.5	4.5	3.3	3.2	2.0	2.8	5.8	23	52	30	21	10
17	6.0	4.3	3.5	3.0	1.9	2.9	5.3	26	50	40	18	11
18	6.0	5.3	2.8	2.7	1.8	3.1	4.5	33	44	39	17	12
19	6.3	5.0	2.2	2.8	1.8	3.3	5.3	35	47	36	16	12
20	6.0	4.5	3.2	2.8	1.9	3.0	7.0	39	44	39	15	14
21	6.0	4.5	2.8	2.9	2.0	3.0	11	39	43	34	14	23
22	5.8	4.1	2.5	2.9	2.1	3.1	15	41	42	32	14	24
23	5.8	4.1	2.6	2.6	2.3	3.0	16	40	42	28	13	23
24	5.8	4.3	2.7	2.3	2.4	2.8	19	40	44	28	12	21
25	5.5	3.8	2.8	2.7	2.6	2.6	20	40	43	34	12	20
26	5.5	4.3	2.9	3.0	2.7	2.7	13	39	42	29	12	18
27	5.0	4.3	3.0	3.2	2.5	2.9	11	35	42	26	11	17
28	5.0	4.5	2.9	2.8	2.4	3.0	11	40	46	23	10	16
29	5.0	4.3	2.8	2.5	-----	3.2	12	46	44	20	9.8	15
30	5.3	4.3	2.8	2.2	-----	3.4	12	46	48	19	9.8	15
31	5.0	-----	2.8	2.3	-----	3.5	-----	42	-----	19	9.4	-----
TOTAL	203.7	137.1	106.6	90.9	63.3	84.0	246.7	899	1,165	1,042	492.0	380.0
MEAN	6.57	4.57	3.44	2.93	2.26	2.71	8.22	29.0	38.8	33.6	15.9	12.7
MAX	9.4	5.3	4.5	3.4	2.7	3.5	20	46	52	47	27	24
MIN	5.0	3.8	2.2	2.2	1.8	2.1	3.7	15	24	19	9.4	7.8
AC-FT	404	272	211	180	126	167	489	1,780	2,310	2,070	976	754

CAL YR 1968 TOTAL 4,439.70

MEAN 12.1

MAX 55

MIN -

AC-FT 8,810

WTR YR 1969 TOTAL 4,910.3

MEAN 13.5

MAX 52

MIN 1.8

AC-FT 9,740

PEAK DISCHARGE (BASE, 60 CFS).--June 17 (0030) 60 cfs (1.88 ft).

NOTE.--No gage-height record Dec. 3 to Apr. 7.

RIO GRANDE BASIN

129

Closed basin in San Luis Valley, Colo.

08227500 North Crestone Creek near Crestone, Colo.

LOCATION.--Lat 38°00'49", long 105°41'32", Saguache County, on right bank in canyon, 1.5 miles northeast of Crestone and 3.2 miles upstream from South Crestone Creek.

DRAINAGE AREA.--10.7 sq mi.

PERIOD OF RECORD.--May 1936 to current year (no winter records prior to 1948).

GAGE.--Water-stage recorder. Altitude of gage is 8,360 ft (from topographic map).

AVERAGE DISCHARGE.--23 years (1947-70), 11.0 cfs (7,970 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 59 cfs Sept. 14 (gage height, 1.87 ft); minimum daily, 2.0 cfs Jan. 2-7, 30, 31.

Period of record: Maximum discharge, 735 cfs Aug. 6, 1936 (gage height, 4.33 ft), from rating curve extended above 160 cfs on basis of slope-area measurement of peak flow; minimum daily recorded, 0.4 cfs Apr. 3, 1945.

Flood of October 1911 is the greatest probably since at least 1884. Stage and discharge of the flood of Aug. 6, 1936, are the greatest since October 1911, from information by local residents.

REMARKS.--Records good except those for winter period, which are poor. No diversion above station.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

DAY	CCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14	9.8	6.0	2.5	2.5	4.0	3.0	6.2	35	44	9.0	9.0
2	14	5.0	6.0	2.0	2.5	3.5	2.9	5.8	33	40	9.0	9.0
3	13	8.0	6.0	2.0	2.5	3.5	2.7	6.8	33	34	8.6	8.6
4	13	8.5	5.0	2.0	2.5	3.0	2.7	11	32	34	9.8	9.0
5	13	9.0	4.5	2.0	2.5	3.5	3.0	14	32	33	9.4	12
6	12	9.0	3.5	2.0	2.5	3.5	3.2	16	31	31	9.4	20
7	12	9.0	3.5	2.0	2.5	3.0	3.6	17	34	30	9.8	20
8	12	8.5	3.0	2.5	2.5	3.0	3.4	18	38	31	10	20
9	12	8.6	3.0	2.5	2.5	3.5	3.4	16	39	30	9.0	19
10	12	8.6	3.0	2.5	2.5	3.5	3.6	17	39	30	8.6	17
11	12	8.6	3.0	2.5	3.2	3.0	3.6	23	39	26	8.2	16
12	13	8.2	3.5	2.5	3.5	3.0	3.2	30	38	22	7.8	19
13	13	8.2	3.5	3.0	3.5	3.0	3.2	32	43	19	7.4	40
14	12	8.2	4.0	3.0	3.5	3.0	3.2	33	48	17	6.8	38
15	12	7.8	4.0	3.0	3.0	3.5	3.2	35	53	16	7.0	40
16	12	7.5	4.0	3.0	3.0	3.5	3.8	41	53	16	11	49
17	12	7.8	4.0	3.0	3.0	3.4	3.8	47	55	14	11	42
18	12	6.5	4.0	3.0	3.5	3.6	3.8	48	55	14	9.8	35
19	12	5.5	4.5	3.5	3.0	3.2	3.6	46	56	14	10	30
20	12	6.0	4.5	3.5	3.0	3.4	3.4	43	56	16	15	27
21	12	6.3	4.5	3.5	3.5	3.2	3.6	42	55	17	15	23
22	11	7.0	4.6	3.5	3.5	3.2	3.4	43	56	16	16	25
23	11	7.8	5.0	3.5	3.5	3.2	3.4	43	56	16	15	23
24	10	7.4	5.0	3.5	3.5	3.0	3.6	43	56	15	14	21
25	9.8	7.4	5.0	3.5	3.5	3.0	4.3	42	55	14	12	20
26	10	7.4	5.0	3.5	3.0	3.2	6.2	41	55	13	11	17
27	10	6.5	4.5	3.5	3.0	3.0	8.6	38	56	12	10	17
28	10	5.5	4.0	3.5	3.5	2.5	8.6	36	56	12	9.8	16
29	10	5.5	3.0	2.8	-----	2.7	6.8	40	56	11	9.0	16
30	9.8	6.0	2.5	2.0	-----	2.5	6.2	42	53	10	9.0	15
31	10	-----	2.5	2.0	-----	2.7	-----	39	-----	9.4	9.0	-----
TOTAL	362.6	228.9	128.1	86.8	84.2	58.8	121.0	554.8	1,396	656.4	316.4	671.6
MEAN	11.7	7.63	4.13	2.80	3.01	3.19	4.03	30.8	46.5	21.2	10.2	22.4
MAX	14	9.3	6.0	3.5	3.5	4.0	8.6	48	56	44	16	48
MIN	9.0	5.5	2.5	2.0	2.5	2.5	2.7	5.8	31	9.4	6.8	8.6
AC-FT	719	454	254	172	167	196	240	1,890	2,770	1,300	628	1,330

CAL YR 1969 TOTAL 5,192.5 MEAN 14.2 MAX 52 MIN 1.8 ACFT 10,280
WAT YR 1970 TOTAL 5,105.6 MEAN 14.0 MAX 56 MIN 2.0 ACFT 10,130

PEAK DISCHARGE (BASE, 60 CFS).--No peak above base.

NOTE.--No gage-height record Dec. 2 to Mar. 16.

130

RIO GRANDE BASIN

Closed basin in San Luis Valley, Colo.

8-2295, Cottonwood Creek near Crestone, Colo.

Location.--Lat 37°56'00", long 105°38'42" (revised), in Baca Grant, on left bank at Cottonwood Mining Camp (abandoned), 150 ft downstream from Cottonwood-Liberty Road, 1½ miles upstream from unnamed tributary, and 5.2 miles southeast of Crestone, Saguache County.

Drainage area.--6.77 sq mi.

Records available.--May to November 1936, January 1967 to September 1968.

Gage.--Water-stage recorder. Altitude of gage is 8,340 ft, revised (from topographic map).

Extremes.--Maximum discharge during year, 540 cfs July 26 (gage height, 5.2 ft, from flood marks), by slope-area measurement of peak flow; minimum daily, 0.70 cfs Dec. 21.

1936, 1967-68: Maximum discharge, that of July 26, 1968; minimum daily, that of Dec. 21, 1967.

Remarks.--Records good except those for winter period, which are fair. No diversion above station.

Discharge, in cubic feet per second, water year October 1967 to September 1968

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	4.9	3.0	1.9	1.1	1.2	1.3	1.5	2.0	32	10	63	6.0
2	4.7	2.8	1.8	1.1	1.1	1.3	1.3	2.7	30	9.6	27	5.7
3	4.5	2.5	1.6	1.2	1.2	1.4	1.2	2.8	36	8.9	24	6.4
4	4.5	2.8	1.7	1.1	1.3	1.3	1.3	2.8	39	9.3	18	6.7
5	4.4	2.5	1.7	1.1	1.2	1.3	1.2	2.9	42	9.6	14	6.4
6	4.2	2.4	1.8	1.0	1.2	1.4	1.1	2.9	25	15	49	6.2
7	4.2	2.4	1.8	1.0	1.2	1.6	1.1	2.5	25	31	40	6.0
8	4.2	2.4	1.8	1.1	1.3	1.5	1.3	2.5	22	21	36	5.7
9	4.0	2.4	1.9	1.2	1.3	1.5	1.3	2.8	13	15	31	6.7
10	4.0	2.4	1.7	1.3	1.3	1.5	1.2	2.9	12	14	43	5.3
11	4.0	2.3	2.3	1.3	1.3	1.3	1.3	2.9	15	13	58	4.9
12	3.8	2.3	2.5	1.3	1.3	1.1	1.3	3.0	29	16	64	4.8
13	3.7	2.3	2.1	1.2	1.3	1.1	1.4	2.8	30	20	37	4.6
14	3.7	2.2	1.9	1.2	1.4	1.1	1.3	2.7	27	15	27	4.4
15	3.7	2.2	2.2	1.3	1.2	1.2	1.4	3.0	27	12	22	4.4
16	3.5	2.2	2.4	1.3	1.2	1.2	1.4	3.4	30	10	17	4.2
17	3.5	2.2	1.9	1.6	1.2	1.4	1.4	3.3	32	9.0	14	4.2
18	3.5	2.2	1.6	1.5	1.4	1.3	1.3	3.5	27	9.3	12	4.0
19	3.4	2.1	1.7	1.4	1.4	1.2	1.3	3.9	28	11	10	3.7
20	3.3	2.2	1.8	1.5	1.4	1.2	1.3	4.5	32	14	9	3.6
21	3.3	2.1	.70	1.6	1.5	1.2	1.2	4.9	30	10	88	3.5
22	3.1	2.1	.80	1.5	1.5	1.3	1.2	9.0	27	9.6	8.5	3.5
23	3.0	2.0	1.1	1.4	1.4	1.3	1.2	9.9	24	9.0	8	4.0
24	2.9	1.6	1.2	1.4	1.4	1.4	.96	9.6	21	12	7.4	3.7
25	2.9	2.0	1.2	1.5	1.5	1.4	1.3	6.1	17	17	6.7	3.6
26	2.9	1.9	1.3	1.5	1.4	1.4	1.3	7.4	16	64	6.4	3.4
27	2.5	1.9	1.2	1.5	1.4	1.4	1.3	14	16	92	7.0	3.3
28	2.8	1.7	1.2	1.7	1.3	1.4	1.3	23	17	66	7.7	3.2
29	2.7	1.9	1.1	1.5	1.3	1.4	1.2	33	14	36	7.0	3.1
30	2.9	1.9	1.1	1.2	1.4	1.4	1.4	36	12	24	6.7	3.5
31	2.9	1.0	1.2	1.2	1.5	1.5	1.5	32	27	27	6.4	2.72
Total	111.6	66.7	50.00	40.8	39.1	41.3	38.26	244.6	74.7	639.3	695.6	137.3
Mean	3.60	2.22	1.61	1.32	1.31	1.33	1.28	7.89	24.9	20.6	22.4	4.38
Max	4.9	3.0	2.5	1.7	1.5	1.6	1.5	36	42	92	64	6.7
Min	2.5	1.6	0.70	1.0	1.1	1.1	0.96	2.0	12	8.3	6.4	3.1
Ac-ft	221	132	99	81	76	82	76	485	1,480	1,270	1,380	272

Cal yr 1967: Total 2,233.38 Mean 6.17 Max 81 Min 0.70 Ac-ft 4,470
 Wtr yr 1968: Total 2,850.26 Mean 7.79 Max 92 Min 0.70 Ac-ft 5,650

Peak discharge (base, 40 cfs)

Date	Time	Gage height	Discharge	Date	Time	Gage height	Discharge
6-5	2100	2.55	74	7-31	0200	1.90	
6-12	2130	2.45	58	8-6	0100	2.71	88
7-7	0100	2.23	40	8-11	2330	2.70	87
7-26	1930	5.2	540				

† Estimated.

Note.--No gage-height record Nov. 28 to Mar. 29, July 26 to Aug. 5.

RIO GRANDE BASIN

129

Closed basin in San Luis Valley, Colo.

8-2295. Cottonwood Creek near Crestone, Colo.

Location--Lat 37°56'00", long 105°38'50", in Baca Grant, on left bank at Cottonwood Mining Camp (abandoned), 150 ft downstream from Cottonwood-Liberty Road, 1½ miles upstream from unnamed tributary, and 5 miles southeast of Crestone, Saguache County.

Drainage area--6.77 sq mi (revised).

Records available--May to November 1936, January to September 1967.

Gage--Water-stage recorder. Altitude of gage is 8,400 ft (from topographic map).

Extremes--Maximum discharge during water year, 93 cfs July 14 (gage height, 2.71 ft), from rating curve extended above 24 cfs, on basis of slope-area measurement at gage height 3.13 ft; minimum not determined.
1936, 1967: Maximum discharge, 257 cfs Aug. 6, 1936 (gage height, 3.13 ft), by slope-area measurement of peak flow; minimum not determined.

Remarks--Records fair prior to June 7 and good thereafter. No diversion above station.

Discharge, in cubic feet per second, January to September 1967

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1							0.90	1.2	2.1	9.6	10	81
2							.90	1.2	3.0	9.0	14	58
3							.96	1.1	9.0	9.0	12	33
4							.96	1.1	16	8.3	16	23
5							1.0	1.1	18	7.7	13	18
6							1.0	1.0	20	7.4	12	16
7							1.1	1.3	20	7.0	14	14
8							1.2	2.7	18	16	13	13
9							1.2	4.5	17	9.9	18	14
10							1.1	3.8	14	7.7	25	12
11							1.1	3.1	11	7.4	18	12
12							1.1	3.3	9.0	13	14	10
13							1.2	3.1	7.4	13	19	9.6
14							1.3	3.1	7.0	27	22	8.6
15							1.1	2.7	8.3	30	19	8.0
16							1.0	3.4	12	24	14	7.4
17							1.0	4.5	13	35	13	7.2
18							1.2	2.9	16	29	12	7.0
19							1.3	2.4	19	23	10	7.0
20							1.1	2.2	23	24	9.3	6.5
21							1.2	1.9	23	32	8.3	6.3
22							1.1	3.4	21	29	7.2	6.1
23							1.2	1.0	2.9	21	6.7	5.9
24							1.2	1.0	3.0	17	6.1	5.6
25							1.2	1.0	2.7	14	5.6	5.4
26							1.1	.96	2.4	14	5.2	5.6
27							1.1	1.1	2.8	13	5.9	5.6
28							1.0	1.2	3.3	12	6.5	5.6
29							1.0	1.3	2.5	10	14	5.4
30							1.0	1.3	2.2	10	25	5.2
31							.90	2.1	2.1	12	5.0	5.2
Total				24.80	28.0	32.10	32.78	78.8	416.8	554.0	435.8	422.0
Mean				0.80	1.0	1.04	1.09	2.54	15.9	17.9	14.1	14.1
Max				-	-	-	1.3	4.5	23	35	50	81
Min				-	-	-	0.90	1.0	2.1	7.0	5.2	5.2
As-ft				49	56	64	65	156	827	1,100	864	837

Cal yr 1966: Total - Mean - Max - Min - As-ft -
Wtr yr 1967: Total - Mean - Max - Min - As-ft -

Peak discharge (date, 40 cfs)

Date	Time	Gage height	Discharge	Date	Time	Gage height	Discharge
7-14	1830	2.71	93	7-25	1900	2.50	63
7-17	1900	2.47	52	8-31	1630	2.63	91
7-20	1730	2.43	48				

Note.--No gage-height record Jan. 1 to Mar. 20.

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RIO GRANDE BASIN

Closed basin in San Luis Valley, Colo.

8-2295, Cottonwood Creek near Crestone, Colo.

LOCATION.--Lat 37°56'00", long 105°38'42", in Baca Grant, Saguache County, on left bank at Cottonwood Mining Camp (abandoned), 150 ft downstream from Cottonwood-Liberty Road, 1.5 miles upstream from unnamed tributary, and 5.2 miles southeast of Crestone, Saguache County.

DRAINAGE AREA.--6.77 sq mi.

PERIOD OF RECORD. May to November 1936, January 1967 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 8,340 ft (from topographic map).

EXTREMES.--Current year: Maximum discharge 224 cfs July 24 (gage height 3.62 ft); minimum daily 0.60 cfs Dec. 20. Period of record: Maximum discharge, 540 cfs July 26, 1968 (gage height, 5.2 ft, from floodmarks), by slope-area measurement of peak flow, minimum daily, 0.60 cfs Dec. 20, 1968.

REMARKS.--Records fair. No diversion above station.

REVISIONS.--WRD 1967: Drainage area.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969												
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.4	1.9	1.4	1.2	.90	.90	1.2	7.0	13	20	6.0	7.0
2	3.2	2.0	1.5	1.2	1.0	.90	1.1	9.6	12	34	4.9	6.7
3	3.1	1.9	1.4	1.3	.90	.90	1.2	6.6	9.9	36	8.9	6.0
4	3.1	2.1	1.5	1.2	.90	.80	1.2	4.2	10	32	7.4	5.5
5	3.3	1.9	1.4	1.3	1.0	.70	1.4	4.0	13	37	7.4	5.3
6	3.5	1.9	1.5	1.4	1.1	.70	1.9	4.0	16	35	5.5	4.9
7	3.6	1.7	1.5	1.4	1.1	.80	1.7	2.8	13	23	3.6	5.3
8	3.7	1.4	1.5	1.5	1.0	.70	1.5	2.3	12	17	2.6	6.7
9	3.6	1.4	1.5	1.4	1.0	.70	1.8	2.2	14	10	2.1	8.0
10	3.4	1.9	1.6	1.3	1.0	.70	2.2	2.5	17	13	5.9	7.2
11	3.3	1.4	1.7	1.2	1.0	.80	2.3	2.9	11	16	8.8	6.7
12	3.0	2.1	1.6	1.2	1.0	.70	2.1	2.9	8.8	8.0	6.7	6.2
13	2.9	2.2	1.5	1.3	1.1	.70	2.0	2.8	10	6.0	8.8	6.2
14	2.8	2.2	1.4	1.4	1.0	.80	2.2	3.2	17	5.5	51	5.5
15	2.7	2.2	1.5	1.3	.90	.70	2.1	3.7	23	5.1	23	5.7
16	2.7	2.2	1.6	1.2	1.0	.70	1.9	3.0	45	5.7	17	6.4
17	2.6	1.9	1.6	1.1	1.0	.80	1.8	3.9	38	5.5	16	6.0
18	2.6	1.6	1.4	1.1	.90	.80	1.6	9.9	31	4.6	15	6.2
19	2.8	1.7	.80	1.1	1.0	.90	1.7	16	37	3.7	16	6.0
20	2.7	1.8	.60	1.2	.80	.80	2.0	33	49	3.7	14	7.0
21	2.6	1.8	.70	1.2	.90	.80	3.1	32	16	3.8	12	11
22	2.6	1.8	.70	1.3	.90	.90	3.4	25	12	3.5	12	11
23	2.4	1.7	.70	1.2	.90	.90	3.2	21	10	3.0	11	10
24	2.4	1.7	.80	.90	1.0	.90	3.5	24	9.3	33	11	9.3
25	2.4	1.9	.90	1.0	1.1	.80	3.0	24	6.7	43	9.9	8.0
26	2.3	1.5	1.3	1.1	1.1	.80	2.0	30	6.2	33	9.3	7.0
27	2.2	1.3	1.2	1.2	1.0	.90	1.6	30	4.9	19	8.5	6.0
28	2.1	1.5	1.1	1.2	1.0	.90	1.9	34	6.7	13	8.0	5.1
29	2.1	1.3	1.2	1.0	-----	1.0	3.0	31	11	9.3	7.7	4.8
30	2.0	1.3	1.1	.90	-----	1.0	4.4	27	11	7.4	7.4	4.9
31	2.0	-----	1.1	.90	-----	1.2	-----	20	-----	6.4	7.2	-----
TOTAL	87.1	53.2	39.30	37.20	27.50	25.60	64.0	424.5	493.5	495.2	334.6	201.6
MEAN	2.81	1.77	1.27	1.20	.98	.83	2.13	13.7	16.5	16.0	10.8	6.72
MAX	3.7	2.2	1.7	1.5	1.1	1.2	4.4	34	49	43	51	11
MIN	2.0	1.3	.60	.90	.80	.70	1.1	2.2	4.9	3.0	2.1	4.8
AC-FT	173	136	78	74	55	51	127	842	973	982	664	400

CAL YR 1968 TOTAL 2,801.86 MEAN 7.56 MAX 92 MIN .60 AC-FT 5,550
 WTR YR 1969 TOTAL 2,263.30 MEAN 6.76 MAX 51 MIN .60 AC-FT 4,530

PEAK DISCHARGE (BASE, 70 CFS, REVISED)--July 24 (1800) 224 cfs (3.62 ft).

NOTE.--No gage-height record Nov. 19 to Apr. 3.

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RIO GRANDE BASIN

Closed basin in San Luis Valley, Colo.

08229500 Cottonwood Creek near Crestone, Colo.

LOCATION.--Lat 37°56'00", long 105°38'42", in Baca Grant, Saguache County, on left bank at Cottonwood Mining Camp (abandoned), 150 ft downstream from Cottonwood-Liberty Road, 1.5 miles upstream from unnamed tributary, and 5.2 miles southeast of Crestone.

DRAINAGE AREA.--6.77 sq mi.

PERIOD OF RECORD.--May to November 1936, January 1967 to September 1970 (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 8,340 ft (from topographic map).

EXTREMES.--Current Year: Maximum discharge, 121 cfs Aug. 7 (gage height, 3.14 ft), from rating curve extended above 28 cfs on basis of slope-area measurement at gage height 5.2 ft; minimum daily, 1.0 cfs Dec. 31.
 Period of record: Maximum discharge, 540 cfs July 26, 1968 (gage height, 5.2 ft, from floodmarks), by slope-area measurement of peak flow; minimum daily, 0.60 cfs Dec. 20, 1968.

REMARKS.--Records fair. No diversion above station.

REVISIONS.--WRD Colo. 1967: Drainage area.

DISCHARGE IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970											
JAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	SEP
1	5.3	4.8	2.2	1.2	1.4	1.5	1.5	2.4	10	17	5.3
2	4.9	3.2	2.3	1.2	1.1	1.7	1.2	2.2	12	14	5.1
3	5.3	2.8	2.4	1.4	1.2	1.5	1.4	2.2	13	14	5.3
4	6.0	2.9	2.5	1.4	1.3	1.3	1.3	2.4	13	18	9.0
5	5.7	2.8	2.2	1.5	1.2	1.3	1.2	2.7	13	17	7.4
6	6.0	2.7	1.5	1.4	1.2	1.4	1.2	3.1	13	14	6.7
7	6.0	2.6	1.4	1.3	1.2	1.4	1.2	3.4	13	15	27
8	6.0	2.6	1.4	1.4	1.3	1.5	1.2	3.7	14	16	28
9	6.2	2.6	1.5	1.5	1.2	1.6	1.3	3.3	15	14	14
10	6.0	2.6	1.6	1.5	1.2	1.5	1.5	3.3	13	13	11
11	5.7	2.6	1.5	1.6	1.3	1.4	1.8	4.6	13	12	9.3
12	5.3	2.6	1.6	1.7	1.5	1.3	1.9	7.2	12	12	8.5
13	5.7	2.6	1.8	1.7	1.6	1.3	1.9	7.4	13	11	7.2
14	5.5	2.6	1.8	1.7	1.6	1.4	1.8	7.2	16	13	6.7
15	5.5	2.5	1.8	1.8	1.4	1.7	1.8	8.0	18	9.3	7.7
16	5.5	2.5	1.9	1.7	1.5	1.9	1.7	12	18	9.3	11
17	5.3	2.2	1.9	1.9	1.6	1.9	1.7	18	19	8.2	9.3
18	5.5	2.0	1.9	1.8	1.4	1.7	1.9	20	20	8.8	8.8
19	5.3	2.1	1.9	1.7	1.3	1.5	1.9	17	23	9.6	15
20	5.1	2.4	2.0	1.7	1.3	1.6	1.9	20	22	10	22
21	5.1	2.5	2.2	1.8	1.5	1.2	1.8	22	25	11	15
22	5.1	2.7	2.1	2.0	1.4	1.3	1.7	24	36	9.3	15
23	5.1	2.6	2.1	2.0	1.5	1.5	1.7	24	37	9.3	13
24	4.9	2.5	2.0	1.9	1.4	1.6	1.7	25	28	8.8	11
25	5.1	2.5	2.0	1.9	1.5	1.8	1.8	15	25	7.7	9.3
26	5.5	2.4	2.1	2.0	1.3	1.5	2.1	11	24	7.4	8.8
27	5.5	2.2	1.9	1.8	1.3	1.3	2.6	9.3	24	6.7	8.0
28	5.3	2.0	1.6	1.5	1.4	1.2	3.3	7.7	25	6.7	7.2
29	5.1	2.1	1.4	1.1	-----	1.3	3.0	9.6	22	6.4	6.7
30	4.9	2.2	1.2	1.2	-----	1.5	2.7	12	20	5.7	6.2
31	4.8	-----	1.0	1.4	-----	1.6	-----	12	-----	5.5	6.0
TOTAL	168.2	77.4	56.7	49.7	38.1	46.2	53.6	321.7	569	336.4	331.1
MEAN	5.43	2.58	1.83	1.60	1.36	1.49	1.79	10.4	19.0	10.9	10.7
MAX	6.2	4.8	2.5	2.0	1.6	1.9	3.3	25	37	18	28
MIN	4.8	2.0	1.0	1.1	1.1	1.2	1.2	2.2	10	5.5	5.1
ACFT	334	154	112	99	76	92	106	638	1,130	867	657

CAL YR 1969 TOTAL 2,406.0 MEAN 6.59 MAX 51 MIN 1.70 ACFT 4,770

WAT YR 1970 TOTAL 2,503.2 MEAN 6.86 MAX 49 MIN 1.0 ACFT 4,970

PEAK DISCHARGE (BASE, 70 CFS).--Aug. 7 (1730) 121 cfs (3.14 ft); Sept. 13 (1630) 77 cfs (2.99 ft).

NOTE.--No gage-height record Nov. 19 to May 7.

RIO GRANDE BASIN

133

Closed basin in San Luis Valley, Colo.

8-2342, Mosca Creek near Mosca, Colo.

Location.--Lat 37°44'05", long 105°30'27", in N½ sec.2, T.27 S., R.73 W., Sixth principal meridian, on right bank 150 ft upstream from State Highway 150 in Great Sand Dunes National Monument and 21 miles northeast of Mosca.

Drainage area.--5.45 sq mi.

Records available.--January 1967 to September 1968.

Gage.--Water-stage recorder. Altitude of gage is 8,240 ft (from topographic map). Mar. 27 to May 11, 1967, staff gage at present site and datum.

Extremes.--Maximum discharge during year, 7.6 cfs May 24 (gage height, 1.29 ft); minimum daily, 0.02 cfs Dec. 21, 22, 1967-68; Maximum discharge, that of May 24, 1968; minimum daily, that of Dec. 21, 22, 1967.

Remarks.--Records good except those for winter period, which are fair. No diversion above station.

Discharge, in cubic feet per second, water year October 1967 to September 1968

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0.17	0.27	0.31	0.22	0.23	0.27	0.38	0.65	3.5	0.83	1.3	0.79
2	.17	.27	.23	.21	.23	.27	.40	2.0	3.4	.83	1.3	.75
3	.17	.25	.18	.22	.23	.25	.40	1.0	3.2	.75	1.3	.87
4	.17	.32	.20	.22	.24	.25	.38	1.4	3.1	.75	1.3	.75
5	.15	.27	.21	.21	.24	.25	.40	1.6	3.0	.75	1.2	.67
6	.15	.27	.21	.20	.24	.25	.40	2.4	2.9	.67	1.2	.59
7	.17	.27	.20	.20	.24	.27	.32	1.7	2.8	.63	1.1	.59
8	.17	.27	.16	.21	.25	.27	.32	2.1	2.6	.63	1.1	.59
9	.17	.27	.09	.21	.25	.27	.40	2.1	2.5	.55	1.1	.59
10	.17	.27	.05	.22	.26	.21	.35	2.0	2.2	.49	1.1	.55
11	.17	.25	.07	.22	.25	.23	.35	1.9	2.0	.49	1.2	.55
12	.17	.27	.08	.21	.25	.27	.38	2.0	1.8	.44	1.3	.59
13	.17	.27	.09	.20	.25	.25	.39	2.2	1.7	.44	1.3	.59
14	.17	.27	.07	.20	.27	.23	.38	2.4	1.6	.44	1.3	.52
15	.19	.27	.08	.20	.24	.23	.40	2.4	1.4	.35	1.3	.52
16	.17	.30	.10	.20	.24	.23	.43	2.3	1.4	.35	1.3	.52
17	.19	.32	.08	.20	.24	.25	.46	3.3	1.3	.33	1.3	.52
18	.19	.32	.05	.21	.25	.25	.57	3.3	1.3	.33	1.2	.52
19	.21	.32	.06	.21	.25	.25	.55	3.3	1.2	.34	1.1	.52
20	.20	.32	.07	.21	.25	.24	.50	3.5	1.2	.35	1.1	.47
21	.23	.32	.02	.41	.25	.20	.50	4.2	1.1	.33	1.0	.47
22	.23	.32	.02	.21	.25	.20	.55	4.8	1.1	.30	.95	.47
23	.25	.30	.08	.21	.25	.21	.50	2.7	1.1	.30	.91	.55
24	.25	.23	.12	.22	.25	.23	.50	6.2	1.0	.35	.87	.49
25	.25	.32	.17	.22	.25	.23	.46	5.0	1.0	.41	.83	.47
26	.25	.32	.20	.22	.25	.25	.50	4.7	.95	.55	.83	.47
27	.25	.25	.19	.23	.27	.27	.50	4.5	.91	1.0	.91	.47
28	.25	.30	.16	.23	.27	.27	.46	4.2	.91	.95	.87	.47
29	.27	.32	.19	.23	.27	.32	.50	4.1	.97	.87	.83	.44
30	.30	.33	.22	.22	----	.35	.60	4.0	.87	1.0	.93	.47
31	.30	----	.23	.23	----	.38	----	3.9	----	1.2	.83	----
Total	6.32	8.65	4.18	6.61	7.21	7.90	13.23	90.65	53.91	18.00	34.06	16.83
Mean	0.20	0.29	0.13	0.21	0.25	0.25	0.44	2.92	1.80	0.58	1.10	0.56
Max	0.30	0.33	0.31	0.23	0.27	0.38	0.60	6.2	3.5	1.2	1.3	0.87
Min	0.13	0.23	0.02	0.20	0.23	0.20	0.32	0.65	0.87	0.30	0.83	0.44
Ac-ft	13	17	5.3	13	14	16	26	180	107	36	68	33
Cal yr 1967 Total	78.27			Mean 0.21	Max 0.49	Min 0.02	Ac-ft 155					
Wtr yr 1968 Total	267.55			Mean 0.73	Max 6.2	Min 0.02	Ac-ft 531					

Note.--No gage-height record Nov. 29 to Feb. 18.

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RIO GRANDE BASIN

Closed basin in San Luis Valley, Colo.

8-2342, Mosea Creek near Mosca, Colo.

Location.--Lat 37°44'05", long 105°30'27", in N½ sec.2, T.27 S., R.73 W., 61st principal meridian, on right bank 150 ft upstream from State Highway 150 in Great Sand Dunes National Monument and 21 miles northeast of Mosca.

Drainage area.--5.45 sq mi.

Records available.--January to September 1967.

Gage.--Water-stage recorder. Altitude of gage is 8,240 ft (from topographic map). Mar. 27 to May 11, 1967, staff gage at same site and datum.

Extremes.--Maximum discharge observed during period January to September, 0.61 cfs Apr. 14; maximum gage height recorded, 0.47 ft May 26; minimum daily discharge, 0.05 cfs Aug. 1.

Remarks.--Records fair prior to May 12 and good thereafter. No diversion above station.

Discharge, in cubic feet per second, January to September 1967

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1				0.10	0.30	0.20	0.21	0.21	0.40	0.15	0.05	0.21
2				.10	.30	.30	.21	.34	.40	.15	.07	.19
3				.10	.30	.30	.25	.29	.40	.13	.07	.19
4				.20	.30	.30	.25	.29	.38	.13	.09	.19
5				.20	.30	.20	.21	.49	.38	.11	.07	.21
6				.20	.20	.20	.21	.39	.40	.09	.07	.19
7				.10	.20	.20	.29	.29	.38	.09	.07	.17
8				.10	.30	.20	.25	.29	.35	.11	.07	.17
9				.10	.30	.20	.21	.39	.32	.09	.13	.19
10				.10	.30	.30	.21	.49	.30	.11	.17	.19
11				.10	.30	.30	.21	.40	.30	.13	.17	.17
12				.20	.30	.30	.21	.19	.27	.15	.15	.15
13				.20	.30	.30	.11	.21	.27	.13	.15	.15
14				.20	.40	.30	.29	.23	.27	.13	.15	.15
15				.20	.30	.20	.44	.25	.30	.17	.15	.15
16				.20	.20	.20	.39	.27	.27	.15	.17	.17
17				.20	.20	.20	.29	.27	.27	.17	.15	.17
18				.10	.20	.20	.39	.27	.27	.17	.17	.17
19				.20	.30	.20	.29	.27	.25	.15	.17	.17
20				.20	.20	.20	.29	.27	.25	.13	.17	.17
21				.20	.20	.20	.29	.25	.25	.11	.17	.15
22				.30	.20	.20	.29	.25	.23	.09	.15	.13
23				.20	.20	.20	.29	.23	.21	.09	.13	.13
24				.20	.30	.20	.29	.23	.19	.11	.11	.15
25				.20	.30	.20	.29	.23	.19	.13	.11	.17
26				.20	.30	.20	.25	.35	.19	.11	.13	.21
27				.20	.20	.21	.25	.35	.17	.09	.13	.21
28				.30	.20	.21	.29	.40	.15	.07	.11	.19
29				.30	-	.21	.21	.46	.17	.07	.13	.17
30				.30	-	.21	.18	.46	.15	.07	.17	.17
31		- - - - -		.40	- - - - -	.21	- - - - -	.43	- - - - -	.07	.21	- - - - -
Total				5.90	7.40	7.05	7.84	9.74	8.33	3.65	4.01	5.20
Mean				0.190	0.264	0.227	0.261	0.314	0.278	0.118	0.129	0.173
Max				0.40	0.40	0.30	0.44	0.49	0.40	0.17	0.21	0.21
Min				0.10	0.20	0.20	0.11	0.19	0.15	0.07	0.05	0.13
Ac-ft				12	15	14	16	19	17	7.2	8.0	10

Cal yr 1966: Total - Mean - Max - Min - Ac-ft -
 Wtr yr 1967: Total - Mean - Max - Min - Ac-ft -

Note.--No gage-height record Jan. 1 to May 25.

RIO GRANDE BASIN

139

Closed basin in San Luis Valley, Colo.

8-2342. Mosca Creek near Mosca, Colo.

LOCATION.--Lat 37°44'05", long 105°30'27", in N½ sec.2, T.27 S., R.73 W., Sixth principal meridian, Alamosa County, on right bank 150 ft upstream from State Highway 150 in Great Sand Dunes National Monument and 21 miles northeast of Mosca.

DRAINAGE AREA.--3.67 sq mi (revised).

PERIOD OF RECORD.--January 1967 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 8,240 ft (from topographic map). Mar. 27 to May 11, 1967, nonrecording gage at present site and datum.

EXTREMES.--Current year: Maximum discharge, 3.3 cfs July 1 (gage height, 0.98 ft); minimum daily, 0.14 cfs Dec. 19.

Period of record: Maximum discharge, 7.6 cfs May 24, 1968 (gage height, 1.29 ft); minimum daily, 0.02 cfs Dec. 21, 1967.

REMARKS.--Records good except those for winter period, which are fair. No diversion above station.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.44	.44	.25	.25	.25	.29	.36	.44	.71	3.1	.79	.35
2	.44	.44	.22	.25	.26	.28	.38	.47	.71	2.9	.75	.33
3	.44	.44	.23	.26	.24	.27	.41	.47	.67	2.7	.71	.33
4	.44	.44	.24	.24	.26	.27	.41	.47	.63	2.7	.67	.30
5	.44	.44	.26	.27	.28	.26	.41	.49	.59	2.6	.63	.30
6	.44	.44	.26	.31	.30	.24	.44	.55	.59	2.3	.59	.27
7	.44	.41	.25	.30	.32	.25	.41	.67	.59	2.1	.59	.27
8	.44	.48	.25	.34	.29	.23	.41	.67	.59	1.9	.52	.35
9	.44	.41	.26	.31	.28	.23	.41	.67	.59	1.8	.49	.38
10	.44	.41	.27	.29	.29	.23	.41	.75	.59	1.8	.55	.35
11	.44	.35	.29	.30	.30	.24	.41	.95	.59	1.6	.52	.33
12	.44	.38	.26	.31	.31	.24	.41	1.1	.59	1.6	.47	.33
13	.44	.38	.23	.33	.34	.23	.41	1.2	.75	1.6	.55	.33
14	.44	.38	.21	.37	.31	.25	.44	1.2	.71	1.5	.83	.33
15	.44	.35	.24	.35	.27	.23	.44	1.2	.75	1.4	.63	.33
16	.44	.27	.26	.33	.28	.24	.44	1.2	.91	1.3	.52	.35
17	.44	.21	.27	.31	.27	.25	.44	1.2	1.1	1.3	.49	.35
18	.44	.19	.26	.30	.26	.25	.41	1.2	1.2	1.4	.47	.35
19	.44	.35	.14	.31	.28	.25	.41	1.1	1.3	1.3	.50	.33
20	.44	.18	.16	.32	.24	.23	.41	1.0	1.4	1.3	.47	.41
21	.44	.18	.16	.32	.26	.25	.41	1.0	1.4	1.3	.44	.44
22	.44	.35	.16	.35	.29	.26	.41	1.0	1.3	1.2	.41	.41
23	.44	.35	.19	.31	.26	.26	.44	.95	1.3	1.1	.44	.38
24	.44	.35	.21	.25	.30	.26	.47	.87	1.3	1.1	.44	.38
25	.44	.35	.23	.27	.32	.24	.49	.87	1.5	1.0	.38	.33
26	.44	.30	.25	.29	.31	.25	.49	.83	2.0	.95	.38	.33
27	.44	.27	.24	.31	.28	.25	.49	.75	2.4	.91	.41	.33
28	.44	.30	.23	.30	.29	.28	.47	.75	2.7	.87	.38	.30
29	.44	.33	.24	.27	-----	.29	.47	.71	3.0	.83	.35	.30
30	.44	.30	.23	.25	-----	.29	.44	.71	3.1	.87	.38	.27
31	.44	-----	.22	.27	-----	.33	-----	.71	-----	.87	.35	-----
TOTAL	13.64	10.77	7.17	9.24	7.96	7.92	12.85	26.15	35.56	49.10	16.07	10.11
MEAN	.44	.36	.23	.30	.28	.26	.43	.84	1.19	1.58	.52	.34
MAX	.44	.44	.29	.37	.34	.33	.49	1.2	3.1	3.1	.83	.44
MIN	.44	.19	.14	.24	.24	.23	.35	.44	.59	.83	.35	.27
AC-FT	27	21	14	18	16	16	25	52	71	97	32	20

CAL YR 1968 TOTAL 272.98

WTR YR 1969 TOTAL 292.54

MEAN .77

MEAN .47

MAX 6.2

MAX 3.1

MIN .14

MIN .14

AC-FT 555

AC-FT 410

PEAK DISCHARGE (BASE, 1.0 CFS)

NOTE.--No gage-height record Dec. 1 to Apr. 1.

DATE	TIME	G.H.	DISCHARGE	DATE	TIME	G.H.	DISCHARGE
5-14	0900	0.76	1.3	8-14	1000	0.73	1.0
7-1	0400	0.98	3.3				

RIO GRANDE BASIN

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Closed basin in San Luis Valley, Colo.

08234200 Mosca Creek near Mosca, Colo.

LOCATION.--Lat 37°44'05", long 105°30'27", in N $\frac{1}{2}$ sec. 2, T. 27 S., R. 73 W., Sixth principal meridian, Alamosa County, on right bank 150 ft upstream from State Highway 150 in Great Sand Dunes National Monument and 21 miles northeast of Mosca.

DRAINAGE AREA.--3.67 sq mi.

PERIOD OF RECORD.--January 1967 to September 1970 (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 8,240 ft (from topographic map). Mar. 27 to May 11, 1967, nonrecording gage at present site and datum.

EXTREMES.--Current year: Maximum discharge, 11 cfs May 20 (gage height, 1.27 ft); minimum daily, 0.11 cfs Oct. 12.
Period of record: Maximum discharge, 11 cfs May 20, 1970 (gage height, 1.27 ft); maximum gage height, 1.29 ft May 24, 1968; minimum daily discharge, 0.02 cfs Dec. 21, 22, 1967.

REMARKS.--Records good except those for winter period, which are fair. No diversion above station.

REVISIONS.-- WRD Colo. 1969: Drainage area.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.30	.49	.36	.45	.32	.37	.34	1.6	3.9	2.6	.75	.52
2	.30	.47	.38	.42	.30	.35	.32	1.5	3.4	2.6	.75	.52
3	.30	.38	.38	.40	.31	.35	.36	1.6	3.3	2.3	.86	.52
4	.33	.47	.36	.40	.33	.32	.35	1.7	3.1	2.1	.86	.55
5	.33	.47	.35	.43	.33	.34	.40	1.9	3.1	2.7	.75	.78
6	.33	.47	.27	.38	.31	.38	.45	2.3	3.0	3.0	.75	.75
7	.35	.47	.25	.36	.33	.42	.54	2.8	3.0	2.6	.75	.63
8	.35	.47	.25	.35	.34	.44	.60	3.1	2.8	2.4	.75	.59
9	.35	.47	.25	.32	.35	.44	.70	3.6	2.8	2.3	.71	.59
10	.35	.47	.27	.30	.36	.43	.74	3.9	2.7	2.1	.67	.55
11	.27	.47	.25	.32	.36	.43	.74	5.2	3.0	2.0	.67	.55
12	.11	.47	.27	.32	.37	.38	.70	7.0	2.7	1.9	.59	.63
13	.35	.47	.30	.32	.37	.36	.70	6.3	2.6	1.8	.55	.67
14	.41	.44	.35	.32	.37	.36	.70	6.7	2.4	1.7	.52	.63
15	.41	.44	.40	.33	.33	.38	.70	8.0	2.1	1.6	.59	.59
16	.38	.44	.45	.32	.35	.38	.66	7.7	1.9	1.5	.63	.59
17	.44	.35	.47	.35	.36	.35	.60	8.2	1.8	1.4	.63	.59
18	.49	.13	.47	.32	.35	.32	.58	8.8	1.8	1.4	.63	.55
19	.49	.15	.47	.32	.31	.30	.70	9.2	1.8	1.3	.79	.55
20	.47	.25	.47	.31	.30	.31	.64	9.7	1.8	1.3	.86	.52
21	.47	.37	.48	.32	.32	.31	.70	9.0	2.5	1.3	.75	.52
22	.47	.40	.48	.33	.31	.33	.74	8.8	3.6	1.4	.71	.71
23	.47	.38	.46	.37	.33	.35	.74	8.0	4.4	1.4	.67	.67
24	.47	.37	.45	.38	.32	.37	.70	6.7	4.5	1.2	.63	.63
25	.47	.36	.45	.38	.35	.32	.60	6.1	4.4	1.1	.59	.63
26	.47	.36	.48	.38	.33	.30	1.1	5.6	4.0	.99	.55	.6
27	.47	.36	.48	.36	.35	.29	1.9	5.2	3.7	.92	.55	.63
28	.47	.32	.47	.35	.37	.29	1.8	4.7	3.3	.92	.52	.63
29	.47	.33	.47	.32	-----	.31	1.7	4.4	3.0	.86	.52	.63
30	.47	.35	.47	.30	-----	.33	1.7	4.0	2.7	.80	.52	.63
31	.47	-----	.45	.32	-----	.34	-----	3.9	-----	.75	.55	-----
TOTAL	12.28	11.80	12.16	10.85	9.43	10.95	23.50	167.2	99.1	52.24	20.62	18.18
MEAN	.40	.39	.39	.35	.34	.35	.78	5.39	2.97	1.69	.67	.61
MAX	.49	.49	.48	.45	.37	.44	1.9	9.7	4.5	3.0	.86	.78
MIN	.11	.13	.25	.30	.30	.29	.32	1.5	1.8	.75	.52	.52
AC-FT	24	21	24	22	19	22	47	332	177	104	41	36

CAL YR 1969 TOTAL 211.20 MEAN .58 MAX 3.1 MIN .11 ACFT 419

WAT YR 1970 TOTAL 438.31 MEAN 1.20 MAX 9.7 MIN .11 ACFT 869

PEAK DISCHARGE (BASE, 1.0 CFS)

NCTE.--No gage-height record Nov. 22 to Apr. 27

DATE	TIME	G.H.	DISCHARGE	DATE	TIME	G.H.	DISCHARGE
5-20	0230	1.27	11	8-19	1730	0.77	1.7
6-21	2000	1.10	6.9	9-5	2000	0.76	1.8
7-6	1600	1.12	7.3				

Closed basin in San Luis Valley, Colo.

8-2310. La Garita Creek near La Garita, Colo.

Location (revised).--Lat 37°48'48", long 106°19'04", in NW¼ sec. 9, T.41 N., R.6 E., on right bank 4.5 miles downstream from Little La Garita Creek and 4½ miles southwest of La Garita.

Drainage area.--61 sq mi, approximately.

Records available.--April 1919 to September 1968. No winter records prior to water year 1948 except water years 1926, 1941, 1945-46. Monthly discharge only for some periods, published in WSP 1312.

Gage.--Water-stage recorder. Altitude of gage is 8,030 ft (from topographic map). Apr. 1, 1919, to June 23, 1927, staff gages and June 24, 1927, to Nov. 13, 1935, water-stage recorder, at sites within a quarter of a mile downstream at different datums. Nov. 16, 1935, to Nov. 16, 1966, water-stage recorder at present site at datum 1.00 ft higher.

Average discharge.--24 years (1925-26, 1940-41, 1944-46, 1947-68), 13.0 cfs (9,410 acre-ft per year).

Extremes.--Maximum discharge during year, 224 cfs July 27 (gage height, 2.74 ft), from rating curve extended above 40 cfs; minimum not determined.
1919-68: Maximum discharge, 530 cfs July 9, 1957 (gage height, 4.00 ft, present datum), from rating curve extended above 140 cfs; minimum daily recorded, 0.2 cfs Sept. 28, 29, 1956.

Remarks.--Records good except those for winter period, which are poor. Diversions above station for irrigation.

Discharge, in cubic feet per second, water year October 1967 to September 1968

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	7.1	6.8					9.0	1.9	9.5	1.6	8.9	2.4
2	7.1	6.8					8.5	2.4	10.2	1.6	9.5	2.3
3	7.1	4.5					7.1	3.2	9.5	1.6	8.9	2.6
4	7.1	5.0					7.1	3.4	8.5	1.6	8.1	2.6
5	7.1	5.4					6.4	3.4	8.5	1.6	7.8	2.2
6	7.1	4.5					7.4	4.7	8.9	1.6	8.0	1.9
7	7.1	4.0					6.4	3.9	8.1	1.5	7.6	1.9
8	7.1	4.0					6.4	3.6	7.4	1.6	7.8	1.8
9	6.8	4.5					9.0	4.6	6.5	1.7	7.4	1.6
10	6.0	4.5				4.0	7.1	4.6	6.0	1.8	9.1	1.6
11	6.0	4.2					8.5	4.4	5.6	1.8	13.9	1.6
12	6.0	5.4					1.1	4.4	5.3	1.5	10.6	1.6
13	6.0	5.4					1.3	5.0	5.3	1.4	10.6	1.9
14	6.0	5.4					1.3	4.6	4.8	1.3	11.7	1.6
15	6.0	4.8					1.4	5.1	4.7	1.2	10.4	1.4
16	6.0	4.8	3.5	2.3	3.5		1.9	5.7	4.3	1.0	9.5	1.3
17	6.0	4.8					1.7	5.4	4.0	9.4	8.0	1.3
18	6.0	4.8					1.6	6.2	3.9	9.0	7.0	1.3
19	6.0	4.5					1.4	6.8	3.6	9.4	6.0	1.3
20	5.7	4.5				7.3	1.3	7.8	3.4	8.5	5.4	1.3
21	5.7	4.0					9.4	2.0	8.1	3.2	8.2	5.4
22	5.7	4.5					9.0	1.6	9.5	3.1	1.0	4.7
23	5.7	4.5					7.8	1.4	10.8	2.8	1.3	4.3
24	5.7	4.0					5.4	1.3	10.2	2.5	1.6	3.8
25	5.7	4.0					5.4	1.4	9.1	2.4	1.6	3.4
26	5.7	4.5					5.7	1.4	9.3	2.3	2.5	3.1
27	5.4	3.5					6.0	1.3	9.7	2.1	6.5	3.1
28	6.0	4.0					6.4	1.3	11.9	1.9	6.0	3.2
29	6.0	4.5					7.1	1.3	13.2	1.9	4.6	2.8
30	4.5	4.5					7.8	1.6	11.9	1.7	3.8	2.7
31	6.0						8.5		10.6		6.2	2.5
Total	191.4	140.6	108.5	71.3	101.5	161.8	358.9	205.4	1,519	639.5	2,152	473
Mean	6.17	4.69	3.5	2.3	3.5	5.22	12.0	66.3	50.6	20.6	69.4	15.8
Max	7.1	6.8	-	-	-	9.4	20	132	102	65	139	26
Min	4.5	3.5	-	-	-	-	6.4	19	17	8.2	2.5	1.1
Ac-ft	380	279	215	141	201	321	712	4,070	3,010	1,270	4,270	938

Cal yr 1967: Total 2,315.8 Mean 6.34 Max 27 Min - Ac-ft 4,590
Wtr yr 1968: Total 7,971.5 Mean 21.8 Max 139 Min - Ac-ft 15,810

Peak discharge (base, 80 cfs)

Date	Time	Gage height	Discharge	Date	Time	Gage height	Discharge
5-29	0300	2.55	171	7-31	2100	2.48	162
7-27	2000	2.74	224	8-11	0500	2.58	185

Note.--No gage-height record Dec. 11 to Mar. 20.

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RIO GRANDE BASIN

Closed basin in San Luis Valley, Colo.

8-2310. La Garita Creek near La Garita, Colo.

LOCATION.--Lat 37°48'48", long 106°19'04", in NW¼SE¼ sec.9, T.41 N., R.6 E., Saguache County, on right bank 4.5 miles downstream from Little La Garita Creek and 4.5 miles southwest of La Garita.

DRAINAGE AREA.--61 sq mi, approximately.

PERIOD OF RECORD.--April 1919 to current year. No winter records prior to water year 1948 except water years 1926, 1941, 1945-46. Monthly discharge only for some periods, published in WSP 1312.

GAGE.--Water-stage recorder. Altitude of gage is 8,030 ft (from topographic map). Apr. 1, 1919, to June 23, 1927, nonrecording gages and June 24, 1927, to Nov. 13, 1935, water-stage recorder, at sites within 0.2 mile downstream at different datums. Nov. 14, 1935, to Nov. 16, 1966, water-stage recorder at present site at datum 1.00 ft higher.

AVERAGE DISCHARGE.--26 years (1925-26, 1940-41, 1944-46, 1947-69), 13.1 cfs (9,490 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 144 cfs July 31 (gage height, 2.37 ft), from rating curve extended above 40 cfs; minimum daily, 4.5 cfs Jan. 18, 19, 24, 29, 30.

Period of record: Maximum discharge, 530 cfs July 9, 1957 (gage height, 4.00 ft, present datum), from rating curve extended above 140 cfs; minimum daily recorded, 0.2 cfs Sept. 28, 29, 1956.

REMARKS.--Records good except those for winter period, which are poor. Diversions above station for irrigation.

REVISIONS (WATER YEARS).--WSP 1312: 1946(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	8.5	6.0	5.5	4.7	8.0	13	24	16	11	59	20
2	11	9.9	6.0	5.1	4.7	8.0	13	24	15	12	48	20
3	11	8.2	6.0	5.2	4.8	8.0	13	21	14	12	47	18
4	11	9.4	6.0	5.2	4.9	8.0	13	19	15	12	51	17
5	12	9.0	6.0	5.3	5.0	8.0	13	16	14	16	47	17
6	11	8.5	6.1	5.4	5.1	7.6	14	16	15	12	40	26
7	10	8.5	6.3	5.1	5.2	7.3	15	16	14	11	44	19
8	10	8.6	6.3	5.0	5.0	7.6	14	14	14	9.9	31	18
9	10	8.7	6.3	5.1	5.2	8.0	14	20	13	9.9	29	25
10	10	8.8	6.3	5.2	5.6	7.8	16	31	14	11	29	22
11	10	8.8	6.3	5.2	6.0	7.6	16	32	14	9.9	28	19
12	10	8.9	6.3	5.2	5.9	7.4	16	25	14	12	27	19
13	9.9	11	6.0	5.3	5.8	7.6	14	23	16	14	37	16
14	9.9	9.9	6.0	5.4	5.8	8.0	15	24	17	11	57	17
15	9.9	8.8	6.2	5.5	5.7	8.4	16	23	23	9.9	31	17
16	9.9	8.4	6.5	5.0	6.3	8.6	14	22	31	10	25	20
17	9.9	8.0	6.5	4.7	7.2	9.0	13	22	28	13	25	18
18	9.9	7.5	6.2	4.5	7.1	8.8	12	26	20	26	27	19
19	11	7.5	5.6	4.5	7.0	8.7	13	27	19	44	39	17
20	11	7.0	5.9	4.6	7.0	9.0	15	30	17	35	29	18
21	10	7.0	6.1	4.7	6.9	1.0	22	30	14	44	24	28
22	9.9	7.0	6.3	4.7	7.5	11	28	29	13	40	23	25
23	10	7.0	6.5	4.8	7.8	11	32	28	14	37	35	20
24	9.9	7.0	6.5	4.5	8.0	10	37	24	16	53	32	17
25	9.9	7.0	6.5	4.7	8.2	9.7	29	22	18	59	24	17
26	9.4	6.5	6.2	4.9	8.4	9.4	19	22	25	41	21	16
27	9.0	6.2	6.0	4.7	8.2	10	13	24	23	36	20	15
28	8.5	6.0	5.7	4.6	8.0	10	17	21	15	44	21	15
29	8.5	6.5	5.4	4.5	-----	11	24	20	12	60	19	15
30	8.5	6.0	5.6	4.5	-----	12	24	17	12	48	20	14
31	8.5	-----	5.8	4.6	-----	12	-----	17	-----	80	21	-----
TOTAL	310.5	240.1	189.4	153.2	177.0	268.5	527	709	505	843.6	1,010	564
MEAN	10.0	8.00	6.11	4.94	6.32	8.66	17.6	22.9	16.8	27.2	32.6	18.8
MAX	12	11	6.5	5.5	8.4	12	37	32	31	80	59	28
MIN	8.5	6.0	5.4	4.5	4.7	1.0	12	14	12	9.9	19	14
AC-FT	616	476	376	304	351	533	1,050	1,410	1,000	1,670	2,000	1,120

CAL YR 1968 TOTAL 8,271.00

MEAN 22.6

MAX 139

MIN --

AC-FT 16,410

WTR YR 1969 TOTAL 5,497.3

MEAN 15.1

MAX 80

MIN 1.0

AC-FT 10,900

PEAK DISCHARGE (BASE, 80 CFS)

NOTE.--No gage-height record Nov. 27 to Apr. 23.

DATE	TIME	G.H.	DISCHARGE	DATE	TIME	G.H.	DISCHARGE
7-24	2100	2.28	121	8-14	0600	2.13	91
7-31	0330	2.37	144	8-19	1630	2.08	80

132

RIO GRANDE BASIN

Closed basin in San Luis Valley, Colo.

08231000 La Garita Creek near La Garita, Colo.

LOCATION.--Lat 37°48'48", long 106°19'04", in NW¼SE¼ sec.9, T.41 N., R.6 E., Saguache County, on right bank 4.5 miles downstream from Little La Garita Creek and 4.5 miles southwest of La Garita.

DRAINAGE AREA.--61 sq mi, approximately.

PERIOD OF RECORD.--April 1919 to current year. No winter records prior to water year 1948 except water years 1926, 1941, 1945-46. Monthly discharge only for some periods, published in WSP 1312.

GAGE.--Water-stage recorder. Altitude of gage is 8,030 ft (from topographic map). Apr. 1, 1919, to June 23, 1927, nonrecording gages and June 24, 1927, to Nov. 13, 1935, water-stage recorder, at sites within 0.2 mile downstream at different datums. Nov. 14, 1935, to Nov. 16, 1966, water-stage recorder at present site at datum 1.00 ft higher.

AVERAGE DISCHARGE.--27 years (1925-26, 1940-41, 1944-46, 1947-70), 13.4 cfs (9,710 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 348 cfs May 11 (gage height, 2.67 ft), from rating curve extended above 130 cfs; minimum daily, 3.5 cfs Jan. 2, 3.
Period of record: Maximum discharge, 530 cfs July 9, 1957 (gage height, 4.00 ft, present datum), from rating curve extended above 140 cfs; minimum daily recorded, 0.2 cfs Sept. 28, 29, 1956.

REMARKS.--Records good except those for winter period, which are poor. Diversions above station for irrigation.

REVISIONS (WATER YEARS).--WSP 1312: 1946(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17	24	17	4.5	5.5	7.0	6.5	9.8	58	24	9.6	11
2	16	23	18	3.5	5.5	6.5	6.5	12	54	23	9.6	11
3	19	25	19	3.5	5.5	6.0	6.8	18	50	22	8.5	9.6
4	24	27	21	4.0	6.0	5.5	6.0	46	40	21	12	8.5
5	22	24	20	4.0	5.5	6.0	6.0	72	50	22	10	11
6	21	24	14	4.0	6.0	6.0	7.4	87	47	22	9.0	59
7	21	21	10	4.0	6.0	6.0	9.4	104	47	24	9.6	20
8	23	21	8.0	4.0	6.5	6.5	9.8	99	42	27	12	16
9	24	22	6.0	4.5	6.5	7.0	9.4	85	45	13	8.1	15
10	25	20	5.5	5.0	6.5	6.5	7.8	90	41	22	7.3	14
11	26	19	5.5	5.0	6.7	6.0	9.0	162	45	20	6.5	13
12	25	19	6.0	5.0	7.0	6.0	8.5	149	44	20	5.7	13
13	25	17	6.0	5.0	7.0	6.5	8.5	125	36	16	5.7	25
14	27	16	6.5	5.0	6.5	6.5	7.1	154	33	16	5.3	35
15	24	20	6.5	5.5	6.0	7.0	7.1	131	33	15	8.5	22
16	24	18	6.0	5.0	6.0	7.0	8.2	116	37	20	23	16
17	24	16	6.5	5.0	6.0	6.8	9.8	137	32	16	16	16
18	26	14	6.2	5.0	7.0	5.5	9.4	134	31	20	11	14
19	26	12	6.5	5.5	6.5	5.5	9.0	140	31	20	11	13
20	24	15	6.5	5.0	6.0	6.0	8.5	134	31	16	12	13
21	25	17	7.0	5.5	6.5	5.0	7.4	128	47	13	13	13
22	26	17	7.0	5.5	6.5	6.0	7.8	116	45	13	12	16
23	27	16	7.0	6.5	6.5	6.5	7.8	110	36	19	10	16
24	25	14	7.5	6.5	6.5	7.0	8.2	105	32	13	9.0	21
25	27	15	7.0	6.5	6.5	6.8	7.3	100	30	16	8.1	15
26	27	16	7.5	6.0	6.0	6.5	34	90	29	16	8.1	13
27	27	16	6.5	6.0	6.5	6.0	40	83	28	14	14	13
28	27	14	6.0	5.5	6.0	5.5	31	88	27	12	18	12
29	24	16	5.0	4.9	-----	7.0	14	81	27	10	11	12
30	28	16	4.5	5.0	-----	7.5	12	72	27	9.0	11	11
31	30	-----	4.5	5.0	-----	7.0	-----	67	-----	9.6	15	-----
TOTAL	756	556	270.2	154.9	174.7	196.6	335.9	3,052.8	1,155	563.6	329.6	497.1
MEAN	24.4	18.5	8.72	5.00	6.24	6.34	11.7	98.5	38.5	18.2	10.6	16.6
MAX	30	27	21	6.5	7.0	7.5	40	162	58	33	23	59
MIN	16	12	4.5	3.5	5.5	5.0	6.0	9.8	27	9.0	5.3	8.5
AC-FT	1,500	1,100	536	307	347	390	666	6,060	2,290	1,120	654	986

CAL YR 1969 TOTAL 6,346.5 MEAN 17.4 MAX 80 MIN 4.5 AC-FT 12,500
WAT YR 1970 TOTAL 8,042.4 MEAN 22.0 MAX 162 MIN 3.5 AC-FT 15,950

PEAK DISCHARGE (BASE, 80 CFS).--May 11 (2330) 348 cfs (2.67 ft); Sept. 6 (0800) 95 cfs (2.04 ft).

NOTE.--No gage-height record Dec. 8 to Mar. 16.

RIO GRANDE BASIN

123

8-2230. Rio Grande at Alamosa, Colo.

Location--Lat 37°29', long 105°53', in SE¼ sec.4, T.37 N., R.10 E., on right bank a quarter of a mile northwest of city limits of Alamosa and 9 miles upstream from Alamosa Creek.

Drainage area--1,710 sq mi, approximately.

Records available--May 1912 to September 1968. Monthly discharge only for some periods, published in WSP 1312.

Gage--Water-stage recorder. Datum of gage is 7,532.66 ft above mean sea level, datum of 1929. Prior to Apr. 7, 1915, staff or chain gage and Apr. 7, 1915, to Nov. 5, 1935, water-stage recorder, at railroad and highway bridges in Alamosa 1 to 2½ miles downstream at different datums. Nov. 6, 1935, to June 30, 1942, water-stage recorder at present site at datum 1.00 ft higher.

Average discharge--56 years, 255 cfs (184,600 acre-ft per year).

Extremes--Maximum discharge during year, 2,550 cfs May 30 (gage height, 6.47 ft); minimum daily, 13 cfs Oct. 1.

1912-68: Maximum discharge, 14,000 cfs July 1, 1927 (gage height, 8.37 ft, site and datum then in use); maximum gage height, 10.62 ft June 20, 1949; minimum daily discharge, 1.0 cfs May 19, 1950.

Flood in October 1911 (stage, 0.2 ft lower than July 1, 1927, from floodmark), probably exceeded that of July 1, 1927, and is probably the greatest known since at least 1884, from information by local resident.

Remarks--Records fair except those for winter period, which are poor. Natural flow of stream affected by transmountain diversions, storage reservoirs, ground-water withdrawals and diversions for irrigation, and return flow from irrigated areas.

Discharge, in cubic feet per second, water year October 1967 to September 1968

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	13	106	180	170	165	210	452	38	2,010	622	118	78
2	19	208	195	180	160	215	471	32	1,590	618	255	80
3	23	258	175	190	155	230	448	34	1,690	392	273	87
4	26	252	180	195	155	240	330	75	1,800	241	289	98
5	28	226	190	185	175	230	205	119	1,290	151	195	125
6	28	236	190	170	170	220	174	146	1,240	133	168	111
7	23	236	185	170	160	235	158	146	1,020	78	150	96
8	21	234	180	170	170	250	138	86	576	64	169	81
9	22	230	175	175	180	265	114	61	332	58	87	90
10	17	236	175	175	185	270	104	126	186	57	107	79
11	27	240	180	180	185	265	94	95	237	64	168	65
12	31	236	185	180	190	260	86	47	257	78	418	58
13	28	234	190	165	190	270	80	37	199	69	432	54
14	30	238	190	150	195	287	78	43	148	180	408	50
15	39	234	195	155	200	295	77	65	157	209	385	48
16	46	236	205	160	190	289	68	183	132	223	597	44
17	47	234	190	165	180	279	60	348	183	193	415	41
18	46	232	175	170	185	281	55	392	542	164	269	38
19	42	228	160	155	195	275	51	440	998	168	168	32
20	39	220	155	150	195	269	50	352	1,220	169	129	26
21	38	210	150	165	200	277	55	410	1,410	136	150	22
22	39	214	150	175	205	267	51	590	1,440	127	114	20
23	40	218	150	170	205	267	45	944	1,330	164	88	18
24	39	216	160	165	200	279	48	1,240	1,310	158	82	15
25	38	188	165	160	200	295	45	1,390	1,120	215	77	15
26	43	176	175	155	195	311	43	1,270	840	205	78	32
27	42	180	180	165	195	315	42	1,170	649	263	81	29
28	45	172	170	175	195	328	41	1,280	641	385	106	28
29	45	152	180	180	200	348	46	1,630	705	328	125	33
30	65	160	185	175	390	44	2,230	763	148	120	38	38
31	87	175	170	170	428	428	2,420	91	87	87	87	87
Total	1,116	6,440	5,490	5,265	5,375	8,640	3,753	17,439	26,015	6,151	6,308	1,631
Mean	36.0	215	177	170	185	279	125	563	867	198	203	54.4
Max	87	258	205	195	205	428	471	2,420	2,010	622	597	125
Min	13	106	150	150	155	210	41	32	132	57	77	15
Ac-ft	2,210	12,770	10,890	10,440	10,660	17,140	7,440	34,590	51,600	12,200	12,510	3,240
Cal yr 1967: Total	34,789		Mean 95.3	Max 260	Min 12	Ac-ft 69,000						
Wtr yr 1968: Total	93,623		Mean 256	Max 2,420	Min 13	Ac-ft 185,700						

RIO GRANDE BASIN

129

8-2230. Rio Grande at Alamosa, Colo.

LOCATION.--Lat 37°28'53", long 105°52'46", in SE¼NE¼ sec.4, T.37 N., R.10 E., Alamosa County, on right bank 0.2 mile northwest of city limits of Alamosa and 9 miles upstream from Alamosa Creek.

DRAINAGE AREA.--1,710 sq mi, approximately.

PERIOD OF RECORD.--May 1912 to current year. Monthly discharge only for some periods, published in WSP 1312.

GAGE.--Water-stage recorder. Datum of gage is 7,532.66 ft above mean sea level. Prior to Apr. 7, 1915, non-recording gages and Apr. 7, 1915, to Nov. 5, 1935, water-stage recorder, at railroad and highway bridges in Alamosa 1 to 2.5 miles downstream at different datums. Nov. 6, 1935, to June 30, 1942, water-stage recorder at present site at datum 1.00 ft higher.

AVERAGE DISCHARGE.--57 years, 254 cfs (184,000 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 790 cfs June 18 (gage height, 4.58 ft); minimum daily, 33 cfs Oct. 11.

Period of record: Maximum discharge, 14,000 cfs July 1, 1927 (gage height, 8.37 ft, site and datum then in use); maximum gage height, 10.62 ft June 20, 1949; minimum daily discharge, 1.0 cfs May 19, 1950. Flood in October 1911 (stage, 0.2 ft lower than July 1, 1927, from floodmark), probably exceeded that of July 1, 1927, and is probably the greatest known since at least 1884, from information by local resident.

REMARKS.--Records fair except those for winter period, which are poor. Natural flow of stream affected by transmountain diversions, storage reservoirs, ground-water withdrawals and diversions for irrigation, and return flow from irrigated areas.

REVISIONS (WATER YEARS).--WSP 928: Drainage area. WSP 1312: 1936(M). WSP 1732: 1951.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	37	61	170	220	180	275	313	463	313	166	64	99
2	38	90	160	230	190	270	269	477	360	130	64	94
3	41	111	170	220	200	270	181	507	239	87	52	76
4	42	120	170	210	205	265	163	368	147	71	46	74
5	44	113	140	215	210	260	160	305	160	79	48	63
6	50	113	150	220	220	250	160	183	197	129	52	62
7	49	106	140	225	225	247	185	188	185	126	48	62
8	43	104	150	230	235	240	233	157	201	190	49	63
9	40	100	180	220	240	230	180	93	261	180	52	66
10	41	99	170	215	220	230	153	98	293	133	55	82
11	33	118	180	200	230	231	185	95	267	85	59	68
12	36	145	215	205	240	225	181	126	141	69	61	58
13	40	159	200	220	260	223	139	102	119	86	51	67
14	41	166	200	225	250	229	132	105	136	130	52	67
15	50	166	180	230	240	219	169	83	163	59	138	59
16	47	157	190	240	230	225	169	75	223	62	148	70
17	55	142	200	245	235	231	175	78	403	60	115	75
18	60	132	210	230	240	249	169	91	709	58	79	77
19	55	132	230	220	240	261	135	147	468	78	62	87
20	56	130	180	210	230	261	145	139	243	175	120	89
21	64	147	190	220	230	259	157	180	223	159	215	72
22	73	147	205	230	225	265	193	209	330	183	162	142
23	72	145	220	240	220	269	283	235	277	175	114	325
24	67	144	230	245	225	251	325	273	229	150	114	299
25	64	138	240	230	235	249	373	245	231	132	168	201
26	53	130	250	205	250	233	413	265	207	94	177	153
27	47	135	260	220	265	243	418	273	263	83	111	115
28	50	150	250	225	280	249	468	263	177	71	78	89
29	48	160	235	235	-----	261	443	219	123	56	70	73
30	48	165	220	220	-----	279	443	243	175	57	73	62
31	52	-----	200	195	-----	295	-----	283	-----	60	87	-----
TOTAL	1,536	3,925	6,085	6,895	6,450	7,744	7,112	6,568	7,463	3,373	2,784	2,969
MEAN	49.5	131	196	222	230	250	237	212	249	109	89.8	99.6
MAX	73	166	260	245	280	295	468	507	709	190	215	325
MIN	33	61	140	195	180	219	132	75	119	56	46	58
AC-FT	3,050	7,790	12,070	13,680	12,790	15,360	14,110	13,030	14,800	6,690	5,520	5,930
CAL YR 1968	TOTAL 92,123			MEAN 252	MAX 2,420	MIN 15	AC-FT 182,700					
WIK YR 1969	TOTAL 62,924			MEAN 172	MAX 709	MIN 33	AC-FT 124,800					

[illegible]

RIO GRANDE BASIN

137

8-2405. Trinchera Creek above Turners Ranch, near Fort Garland, Colo.

Location.--Lat 37°22', long 105°17', in Sangre de Cristo Grant, on right bank just downstream from confluence of North and South Forks, 1 mile upstream from Turners Ranch and 7 miles southeast of Fort Garland, Costilla County.

Drainage area.--45 sq mi, approximately.

Records available.--April 1923 to September 1968. No winter records prior to 1935 except water year 1928. Monthly discharge only for some periods, published in WSP 1312.

Gage.--Water-stage recorder. Prior to Apr. 12, 1929, at site 200 ft upstream at different datum.

Average discharge.--35 years (1927-28, 1934-68), 23.3 cfs (16,870 acre-ft per year).

Extremes.--Maximum discharge during year, 121 cfs June 6 (gage height, 3.06 ft); minimum not determined.

1923-68: Maximum discharge, 689 cfs May 27, 1942, from rating curve extended above 240 cfs; maximum gage height, 3.73 ft May 10, 1947; minimum daily discharge recorded, 3.0 cfs Oct. 3, 1942.

Outstanding floods occurred in 1886 and in October 1911. The flood in 1886 probably exceeded that in October 1911 and the flood in October 1911 probably exceeded all subsequent floods, from information by local residents.

Remarks.--Records good except those for winter period, which are poor. No regulation or diversion above station.

Discharge, in cubic feet per second, water year October 1967 to September 1968

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	9.9	9.9	7.2				9.5	21	89	40	41	20
2	9.5	9.9	7.0				9.5	23	89	40	42	19
3	9.5	9.9	7.2				10	27	90	38	41	19
4	9.9	9.5	8.3				10	28	95	35	37	19
5	10	9.9	7.5				10	33	103	36	37	18
6	10	9.9	7.5				9.1	36	116	36	40	18
7	11	9.5	7.2				9.1	34	114	36	40	18
8	10	9.5	8.3				9.5	35	111	35	38	17
9	10	10	7.5				9.5	37	106	30	38	17
10	10	9.9	7.0			7.0	9.9	40	98	28	43	17
11	9.9	9.9	7.5				9.5	34	92	27	42	16
12	9.9	9.5	7.5				10	31	87	26	43	16
13	9.5	9.1	7.0				12	31	87	25	40	16
14	9.5	9.1					12	30	87	25	44	16
15	9.5	9.1					13	30	86	24	40	15
16	9.1	9.1		5.0	6.0		14	38	84	20	37	15
17	9.5	9.1					14	43	84	20	36	16
18	9.5	8.7					15	44	81	20	33	15
19	9.5	8.7				9.1	16	48	80	20	31	15
20	9.1	8.7				9.1	16	50	78	19	30	14
21	9.1	8.7				6.9	16	56	72	17	30	14
22	9.1	8.7				7.5	15	72	68	17	28	14
23	8.7	7.9				6.9	14	76	64	18	28	15
24	8.3	7.9				6.6	15	74	58	20	25	14
25	8.7	7.9				7.5	14	69	58	24	24	14
26	9.1	8.3				7.2	14	66	56	31	23	14
27	7.9	7.5				7.9	14	69	52	47	23	13
28	8.7	7.9				8.3	14	81	49	34	24	13
29	7.9	7.5				8.7	14	87	47	34	21	14
30	6.3	7.5				9.5	16	87	43	34	21	16
31	9.9					9.5		87		35	22	
Total	288.5	269.1	213.7	155.0	174.0	230.7	373.6	1,517	2,424	891	1,042	477
Mean	9.31	8.97	6.89	5.0	6.0	7.44	12.5	48.9	80.8	28.7	33.6	15.9
Max	11	10	-	-	-	-	16	87	116	47	44	20
Min	6.3	7.5	-	-	-	-	9.1	21	43	17	21	13
Ac-ft	572	534	424	307	345	458	741	3,010	4,810	1,770	2,070	946
Cal yr 1967: Total	3,807.0			Mean 10.4	Max 23	Min -	Ac-ft 7,550					
Wtr yr 1968: Total	8,055.6			Mean 22.0	Max 116	Min -	Ac-ft 15,980					

Peak discharge (base, 50 cfs)

Date	Time	Gage height	Discharge	Date	Time	Gage height	Discharge
6-6	1300	3.06	121	7-29	2300	2.53	53
7-27	0130	2.79	90	8-10	0630	2.56	63

Note.--No gage-height record Dec. 10 to Mar. 19.

RIO GRANDE BASIN

143

8-2405. Trinchera Creek above Turners Ranch, near Fort Garland, Colo.

LOCATION (revised).--Lat 37°22'29", long 105°17'40", Costilla County, in Sangre de Cristo Grant, on right bank 0.9 mile downstream from North Fork, 1 mile upstream from Turners Ranch and 8.3 miles southeast of Fort Garland.

DRAINAGE AREA.--45 sq mi, approximately.

PERIOD OF RECORD.--April 1923 to current year. No winter records prior to 1935 except water year 1928. Monthly discharge only for some periods, published in WSP 1312.

GAGE.--Water-stage recorder. Altitude of gage is 8,520 ft (from topographic map). Prior to Apr. 12, 1929, at site 200 ft upstream at different datum.

AVERAGE DISCHARGE.--36 years (1927-28, 1934-69), 23.3 cfs (16,880 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 92 cfs May 23 (gage height, 2.90 ft); minimum daily, 7.0 cfs Nov. 28, 30, Dec. 1, 5.
Period of record: Maximum discharge, 689 cfs May 27, 1942 (gage height, 3.32 ft), from rating curve extended above 240 cfs; maximum gage height, 3.73 ft May 10, 1947; minimum daily discharge recorded, 3.0 cfs Oct. 3, 1942.
Outstanding floods occurred in 1886 and in October 1911. The flood in 1886 probably exceeded that in October 1911 and the flood in October 1911 probably exceeded all subsequent floods, from information by local residents.

REMARKS.--Records good except those for winter period, which are poor. No regulation or diversion above station.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14	12	7.0	8.0	7.4	8.3	12	32	84	44	31	18
2	14	12	7.2	7.6	7.6	8.6	11	32	83	43	28	17
3	14	11	7.2	7.7	7.7	8.8	11	33	77	41	29	16
4	14	12	7.1	7.8	7.8	8.6	11	33	72	42	29	16
5	14	11	7.0	7.8	7.8	8.3	11	33	69	43	26	15
6	13	12	7.2	8.0	7.9	8.4	12	32	66	39	23	15
7	13	11	7.4	8.1	8.0	8.4	12	29	65	36	23	16
8	13	11	7.4	8.2	7.6	8.4	13	27	65	35	22	18
9	13	12	7.2	7.6	7.7	8.4	14	28	63	36	21	19
10	13	12	7.4	7.8	7.9	8.4	15	30	65	33	21	16
11	13	12	7.6	8.0	8.0	8.2	14	33	63	31	21	16
12	12	13	7.5	8.1	7.9	8.0	13	37	59	29	19	16
13	12	12	7.4	8.2	7.8	8.4	13	41	63	29	24	15
14	12	11	7.6	8.3	7.6	8.2	14	42	57	29	41	15
15	14	11	7.8	8.6	7.6	8.0	14	44	63	31	28	16
16	14	12	8.0	8.4	7.4	8.2	14	45	65	29	23	16
17	12	12	8.2	8.2	7.2	8.3	13	45	74	31	22	17
18	12	12	7.8	8.0	7.2	8.5	13	51	69	30	24	16
19	13	13	7.6	8.0	7.5	8.9	12	54	68	31	24	16
20	13	13	8.0	8.1	7.8	9.0	14	62	69	32	22	18
21	13	13	7.8	8.2	8.1	9.0	22	69	68	28	21	31
22	12	12	7.6	8.4	8.4	9.0	28	74	68	26	20	26
23	12	12	7.8	8.0	8.4	8.6	26	81	66	28	21	23
24	12	11	8.0	7.5	8.3	8.6	30	83	63	27	23	21
25	12	12	8.2	7.9	8.3	8.4	30	81	66	29	20	21
26	12	10	8.4	8.1	8.3	8.6	28	81	66	27	19	21
27	12	8.0	8.6	8.4	8.3	8.7	23	81	57	25	21	20
28	12	7.0	8.5	8.0	8.2	8.3	24	81	53	24	21	19
29	12	7.5	8.0	7.6	-----	8.3	26	84	48	23	18	19
30	11	7.0	8.2	7.2	-----	9.5	29	87	47	25	18	18
31	12	-----	8.4	7.2	-----	10	-----	87	-----	31	19	-----
TOTAL	394	336.5	239.1	247.0	219.7	265.5	522	1,652	1,961	987	722	546
MEAN	12.7	11.2	7.71	7.97	7.85	8.56	17.4	53.3	65.4	31.8	23.3	18.2
MAX	14	13	8.6	8.6	8.4	10	30	87	84	44	41	31
MIN	11	7.0	7.0	7.2	7.2	8.0	11	27	47	23	18	15
AC-FT	781	667	474	490	436	527	1,040	3,280	3,890	1,960	1,430	1,080

CAL YR 1968 TOTAL 8,253.90 MEAN 22.6 MAX 116 MIN - AC-FT 16,370
WTR YR 1969 TOTAL 8,091.8 MEAN 22.2 MAX 87 MIN 7.0 AC-FT 16,050

PEAK DISCHARGE (BASE, 50 CFS).--May 23 (2100) 92 cfs (2.90 ft); Aug. 14 (1400) 53 cfs (2.53 ft).

NOTE.--No gage-height record Nov. 29 to Mar. 25.

RIO GRANDE BASIN

137

08240500 Trinchera Creek above Turners Ranch, near Fort Garland, Colo.

LOCATION.--Lat 37°22'29", long 105°17'40", Costilla County, in Sangre de Cristo Grant, on right bank 0.9 mile downstream from North Fork, 1 mile upstream from Turners Ranch and 8.3 miles southeast of Fort Garland.

DRAINAGE AREA.--45 sq mi, approximately.

PERIOD OF RECORD.--April 1923 to current year. No winter records prior to 1935 except water year 1928. Monthly discharge only for some periods, published in WSP 1312.

GAGE.--Water-stage recorder. Altitude of gage is 8,520 ft (from topographic map). Prior to Apr. 12, 1929, at site 200 ft upstream at different datum.

AVERAGE DISCHARGE.--37 years (1927-28, 1934-70), 23.3 cfs (16,880 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 121 cfs May 20 (gage height, 3.07 ft); minimum daily, 5.5 cfs Jan. 2-4.

Period of record: Maximum discharge, 689 cfs May 27, 1942 (gage height, 3.32 ft), from rating curve extended above 240 cfs; maximum gage height, 3.73 ft May 10, 1947; minimum daily discharge recorded, 3.0 cfs Oct. 3, 1942.

Outstanding floods occurred in 1886 and in October 1911. The flood in 1886 probably exceeded that in October 1911 and the flood in October 1911 probably exceeded all subsequent floods, from information by local residents.

REMARKS.--Records good except those for winter period, which are poor. No regulation or diversion above station.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18	15	11	6.5	7.5	13	9.0	16	97	38	20	13
2	17	14	11	5.5	8.0	12	9.5	20	92	36	25	13
3	17	13	12	5.5	7.5	11	10	17	87	35	21	13
4	18	14	13	5.5	8.5	10	9.5	21	81	34	20	12
5	18	15	13	6.0	8.0	12	9.5	28	76	33	20	13
6	17	16	12	6.0	8.5	12	9.9	35	72	33	19	15
7	17	16	12	6.0	8.5	11	12	42	69	34	19	13
8	17	15	12	6.0	8.5	11	11	43	72	34	22	12
9	16	15	11	6.5	8.5	14	13	35	66	31	20	12
10	16	15	12	7.5	8.1	13	12	41	63	29	18	11
11	17	15	13	7.5	9.0	12	13	54	69	28	16	11
12	16	15	15	8.0	10	12	13	64	62	29	16	14
13	17	14	15	8.0	10	12	13	66	56	26	16	22
14	17	14	16	8.5	11	13	12	82	54	26	16	18
15	17	15	16	9.0	9.0	14	13	82	56	28	18	15
16	16	14	15	9.0	9.5	14	16	84	54	26	18	14
17	16	13	16	10	10	11	21	95	54	25	16	14
18	18	11	16	9.0	12	9.9	17	106	50	25	16	14
19	18	10	16	9.0	10	9.9	13	111	49	25	19	14
20	16	13	17	9.5	9.0	10	11	114	50	27	19	13
21	16	14	18	9.9	11	8.0	9.9	115	52	25	17	13
22	16	16	18	10	11	8.5	10	119	60	30	17	15
23	16	15	18	12	12	8.5	13	118	54	28	18	15
24	15	13	19	12	11	8.7	17	117	53	25	15	15
25	15	13	18	12	11	7.9	26	116	50	24	15	15
26	16	13	20	11	12	7.5	35	111	48	23	14	13
27	15	12	15	11	10	7.5	35	108	47	23	14	13
28	15	9.0	11	9.0	11	7.0	29	105	45	22	15	13
29	15	10	8.0	7.0	-----	10	22	100	44	20	15	13
30	15	10	7.5	6.5	-----	12	19	100	42	20	15	12
31	16	-----	6.5	7.0	-----	11	-----	98	-----	20	13	-----
TOTAL	500	407.0	433.0	255.9	268.1	333.4	463.3	2,363	1,824	862	542	413
MEAN	16.4	13.6	14.0	8.25	9.58	10.8	15.4	76.2	60.3	27.8	17.5	13.8
MAX	18	16	20	12	12	14	35	119	97	38	25	22
MIN	15	9.0	6.5	5.5	7.5	7.0	9.0	16	42	20	13	11
AC-FT	1,010	807	859	508	532	661	919	4,690	3,620	1,710	1,080	819

CAL YR 1969 TOTAL 8,471.2 MEAN 23.2 MAX 87 MIN 6.5 AC-FT 16,800
 CAL YR 1970 TOTAL 5,673.7 MEAN 23.8 MAX 119 MIN 5.5 AC-FT 17,200

PEAK DISCHARGE (BASE, 50 CPS).--Apr. 26 (2000) 80 cfs (2.72 ft); May 20 (2100) 121 cfs (3.07 ft).

NOTE.--No gage-height record Dec. 9 to Mar. 18.

RIO GRANDE BASIN

Closed basin in San Luis Valley, Colo.

8-2245. Kerber Creek at Ashley Ranch, near Villa Grove, Colo.

Location (revised).--Lat 38°14'28", long 106°06'57", in SW 1/4 sec. 17, T.46 N., R.8 E., on left bank at Ashley Ranch, 4.5 miles upstream from Little Kerber Creek and 9 miles west of Villa Grove.

Drainage area.--38 sq mi, approximately.

Records available.--June 1923 to September 1926 (published as Kerber Creek near Villa Grove), May 1936 to September 1968. Monthly discharge only for some periods, published in WSP 1312.

Gage.--Water-stage recorder. Altitude of gage is 8,830 ft, revised (from topographic map). Prior to Dec. 10, 1963, at site 150 ft upstream at datum 1.50 ft higher.

Average discharge.--35 years, 12.6 cfs (9,120 acre-ft per year).

Extremes.--Maximum discharge during year, 161 cfs Aug. 7 (gage height, 1.67 ft); minimum not determined.

1923-26, 1936-68: Maximum discharge, 407 cfs May 14, 1941, from rating curve extended above 140 cfs; maximum gage height, 5.04 ft (site and datum then in use) May 11, 1947 (backwater from beaver dam); minimum daily discharge, 0.2 cfs Sept. 3, 1950, July 30 to Aug. 2, 1963, but may have been less during periods of no gage-height record.

Maximum discharge known since at least 1872, that of May 14, 1941, from information by local residents.

Remarks.--Records good except those for winter period, which are poor. No diversion above station. Records of chemical analyses for the water year 1968 are published in Part 2 of this report.

Discharge, in cubic feet per second, water year October 1967 to September 1968

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2.7	4.6						16	78	18	29	8.6
2	2.7	4.0						22	80	17	26	7.8
3	2.7	3.5						23	84	16	24	12
4	2.7	3.5						22	80	15	22	10
5	3.2	3.5						23	73	15	20	8.6
6	2.7							24	75	14	20	7.8
7	2.7							23	72	14	24	7.0
8	2.7							20	72	15	17	7.0
9	2.7							22	64	13	22	6.5
10	3.2							20	52	13	39	7.0
11	3.6							20	46	11	72	6.5
12	3.2							24	46	10	64	6.5
13	3.2							24	48	10	46	6.5
14	3.2							22	50	10	39	6.5
15	3.2							23	48	9.4	31	6.0
16	3.2							24	46	7.8	25	6.0
17	3.6							7.8	24	4.4	22	6.0
18	3.6							7.0	25	4.2	7.0	6.5
19	3.6							7.0	26	4.0	16	6.0
20	3.6							7.0	30	4.0	15	5.6
21	3.6							6.5	34	4.0	16	5.6
22	3.6							6.5	45	3.9	13	5.6
23	4.1							6.5	5.9	3.5	13	5.6
24	3.6							7.0	5.4	3.4	12	5.6
25	4.6							8.6	4.8	3.1	12	5.6
26	4.1							7.8	4.6	2.7	13	5.6
27	4.6							7.8	4.6	2.6	15	5.1
28	4.1							7.8	5.2	2.4	2.7	11
29	4.6							11	6.7	2.3	2.4	10
30	3.5							13	6.8	1.9	2.3	9.4
31	4.0							7.0	7.0	2.6	9.4	9.4
Total	106.4	94.1	86.8	77.5	78.3	108.5	215.3	104.4	1,478	398.8	720.8	198.9
Mean	3.43	3.14	2.8	2.5	2.7	3.5	7.18	33.7	49.3	12.9	23.3	6.63
Max	4.6	-	-	-	-	-	13	70	84	27	32	12
Min	2.7	-	-	-	-	-	-	16	19	6.5	9.4	5.1
Ac-ft	211	187	172	154	155	215	427	2,070	2,930	791	1,430	395

Cal yr 1967: Total 1,902.8 Mean 5.21 Max 17 Min - Ac-ft 3,770
 Wtr yr 1968: Total 4,607.4 Mean 12.6 Max 84 Min - Ac-ft 9,140

Peak discharge (base, 70 cfs)

Note.--No gage-height record Nov. 13 to Apr. 17.

Date	Time	Gage height	Discharge	Date	Time	Gage height	Discharge
6-2	1000	1.30	93	8-7	1430	1.67	161
7-29	1700	1.57	138				

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RIO GRANDE BASIN

Closed basin in San Luis Valley, Colo.

8-2245. Kerber Creek at Ashley Ranch, near Villa Grove, Colo.

LOCATION.--Lat 38°14'28", long 106°06'57", in SW¼NW¼ sec.17, T.46 N., R.8 E., Saguache County, on left bank at Ashley Ranch, 4.5 miles upstream from Little Kerber Creek and 9 miles west of Villa Grove.

DRAINAGE AREA.--38 sq mi, approximately.

PERIOD OF RECORD.--June 1923 to September 1926 (published as Kerber Creek near Villa Grove), May 1936 to current year. Monthly discharge only for some periods, published in WSP 1312.

GAGE.--Water-stage recorder. Altitude of gage is 8,830 ft (from topographic map). Prior to Dec. 10, 1963, at site 150 ft upstream at datum 1.50 ft higher.

AVERAGE DISCHARGE.--36 years, 12.5 cfs (9,060 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 51 cfs May 26 (gage height, 0.89 ft); maximum gage height, 1.43 ft Nov. 12 (backwater from ice); minimum daily discharge, 1.5 cfs Nov. 19.

Period of record: Maximum discharge, 407 cfs May 14, 1941 (gage height, 3.88 ft, site and datum then in use), from rating curve extended above 140 cfs; maximum gage height, 5.04 ft (site and datum then in use) May 11, 1947 (backwater from beaver dam); minimum daily discharge, 0.2 cfs Sept. 3, 1950, July 30 to Aug. 2, 1963, but may have been less during periods of no gage-height record.

Maximum stage known since at least 1872, that of May 14, 1941, from information by local residents.

REMARKS.--Records good except those for winter period, which are poor. No diversion above station.

REVISIONS (WATER YEARS).--WSP 1312: 1937-38. WSP 1512: 1943.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.6	5.1	5.1	2.0	2.5	3.4	5.1	13	34	14	11	6.0
2	5.1	4.6	5.2	2.1	2.6	3.5	5.3	17	35	15	9.4	5.6
3	5.1	5.1	5.1	2.2	2.2	3.4	5.5	19	34	15	11	5.1
4	5.6	4.6	4.9	2.1	2.4	3.4	5.8	18	31	14	11	4.6
5	5.6	5.1	4.6	2.3	2.6	3.3	6.0	23	23	14	9.4	4.6
6	5.6	5.1	4.7	2.5	2.8	3.2	6.3	23	19	14	8.6	5.6
7	5.6	5.1	4.8	2.7	3.0	3.1	6.5	23	19	13	7.8	5.6
8	5.6	5.1	4.9	3.0	2.6	3.0	6.8	24	19	11	7.8	5.6
9	5.6	5.1	5.0	2.8	2.6	2.8	7.1	23	18	12	7.8	6.0
10	5.6	5.1	5.2	2.9	2.8	3.0	7.5	25	19	10	10	5.6
11	5.6	5.1	5.4	3.0	2.9	3.3	8.0	27	18	9.4	9.4	5.1
12	5.6	5.1	3.5	3.1	3.1	3.1	8.5	30	19	12	10	4.6
13	5.1	5.1	2.5	3.3	3.3	3.2	9.0	36	19	13	12	5.1
14	5.1	5.1	2.6	3.4	3.2	3.5	9.5	35	18	12	12	5.1
15	5.1	5.1	2.7	3.4	3.1	3.7	10	42	24	13	9.4	4.6
16	5.1	5.1	2.8	3.2	3.1	3.8	6.5	31	22	13	8.6	6.5
17	4.6	5.1	3.0	3.1	3.0	4.0	6.5	31	25	14	9.4	8.6
18	4.6	5.1	2.5	3.0	3.0	4.2	8.6	35	22	16	8.6	6.0
19	7.0	5.1	1.5	3.1	3.0	4.5	7.0	39	16	15	8.6	5.6
20	5.6	5.1	2.2	3.1	3.1	3.9	10	41	17	14	8.6	5.6
21	5.1	5.1	2.1	3.2	3.1	4.0	10	38	15	14	7.0	7.8
22	4.6	5.1	1.7	3.3	3.2	4.3	13	41	16	12	7.8	6.0
23	4.6	5.1	1.7	2.9	3.3	4.1	15	36	16	11	7.8	5.6
24	4.6	5.1	1.8	2.5	3.4	3.9	17	42	18	13	7.8	5.1
25	4.6	5.1	1.8	2.9	3.5	3.5	14	47	17	13	6.0	5.1
26	4.6	5.1	1.9	3.2	3.7	3.8	13	48	16	11	5.6	5.1
27	5.1	5.1	2.0	3.7	3.3	4.1	13	45	16	10	5.6	5.1
28	5.1	5.1	1.9	3.1	3.3	4.5	13	47	15	10	5.1	5.1
29	5.1	5.1	1.9	2.6	-----	4.7	13	41	14	10	5.1	5.1
30	4.6	5.0	1.8	2.3	-----	4.8	13	39	14	9.4	5.1	4.6
31	4.1	-----	1.9	2.4	-----	5.0	-----	36	-----	11	5.1	-----
TOTAL	160.5	151.9	98.7	88.4	83.7	116.0	279.5	1,015	608	387.8	258.4	165.7
MEAN	5.18	5.06	3.18	2.85	2.99	3.74	9.32	32.7	20.3	12.5	8.34	5.52
MAX	7.0	5.1	5.4	3.7	3.7	5.0	17	48	35	16	12	8.6
MIN	4.1	4.6	1.5	2.0	2.2	2.8	5.1	13	14	9.4	5.1	4.6
AC-FT	318	301	196	175	166	230	554	2,010	1,210	769	513	329

CAL YR 1968 TOTAL 4,731.20

WTR YR 1969 TOTAL 3,413.6

MEAN 12.9

MEAN 9.35

MAX 44

MAX 48

MIN -

MIN 1.5

AC-FT 9,320

AC-FT 6,770

PEAK DISCHARGE (BASE, 70 CFS).--No peak above base.

NOTE.--No gage-height record Nov. 29 to Apr. 15.

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RIO GRANDE BASIN

08224500 Kerber Creek at Ashley Ranch, near Villa Grove, Colo.

LOCATION.--Lat 38°14'28", long 106°06'57", in SW¼NW¼ sec.17, T.46 N., R.8 E., Saguache County, on left bank at Ashley Ranch, 4.5 miles upstream from Little Kerber Creek and 9 miles west of Villa Grove.

DRAINAGE AREA.--38 sq mi, approximately.

PERIOD OF RECORD.--June 1923 to September 1926 (published as Kerber Creek near Villa Grove), May 1936 to current year. Monthly discharge only for some periods, published in WSP 1312.

GAGE.--Water-stage recorder. Altitude of gage is 8,830 ft (from topographic map). Prior to Dec. 10, 1963, at site 150 ft upstream at datum 1.50 ft higher.

AVERAGE DISCHARGE.--37 years, 12.5 cfs (9,060 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 125 cfs May 15 (gage height, 1.40 ft); maximum gage height, 1.53 ft May 19 (backwater from debris); minimum daily discharge, 1.6 cfs Jan. 4.

Period of record: Maximum discharge, 407 cfs May 14, 1941 (gage height, 3.88 ft, site and datum then in use), from rating curve extended above 140 cfs; maximum gage height, 5.04 ft (site and datum then in use) May 11, 1947 (backwater from beaver dam); minimum daily discharge, 0.20 cfs Sept. 3, 1950, July 30 to Aug. 2, 1963, but may have been less during periods of no gage-height record.

Maximum stage since at least 1872, that of May 14, 1941, from information by local residents.

REMARKS.--Records good except those for winter period, which are poor. No diversion above station.

REVISIONS (WATER YEARS).--WSP 1312: 1937-38. WSP 1512: 1943.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.1	5.5	4.5	2.0	2.4	4.0	5.8	11	60	13	6.0	11
2	4.6	4.5	4.5	1.9	2.4	4.3	5.2	10	51	15	6.0	9.4
3	6.0	4.5	4.5	1.7	2.4	4.5	5.5	11	46	15	8.3	7.8
4	7.8	4.7	4.1	1.6	2.5	4.5	5.7	13	50	15	14	8.6
5	6.5	4.6	3.6	1.7	2.5	4.7	6.2	20	48	12	8.6	13
6	6.5	5.0	2.9	1.8	2.6	5.0	7.0	33	44	13	6.5	20
7	6.5	5.0	2.9	1.8	2.6	5.2	7.0	60	46	13	7.8	13
8	6.5	4.9	2.9	1.9	2.7	5.6	7.0	55	40	13	10	13
9	6.5	4.8	2.8	2.0	2.8	5.8	7.2	46	44	13	7.0	11
10	6.5	4.6	2.8	2.1	2.9	6.0	7.2	51	42	13	6.0	9.4
11	6.5	4.6	2.8	2.2	3.0	6.0	7.2	70	45	14	5.6	7.8
12	6.2	4.7	3.1	2.3	3.0	6.0	7.0	81	34	15	5.1	6.6
13	6.0	5.0	3.4	2.3	2.9	6.0	6.8	88	26	14	5.1	20
14	6.0	5.2	3.6	2.4	2.9	6.2	6.8	93	25	14	4.6	16
15	7.8	5.2	3.9	2.4	2.9	6.2	7.0	101	25	13	9.4	17
16	8.6	5.2	4.0	2.5	2.9	6.2	7.5	78	25	13	16	16
17	9.4	5.0	4.1	2.5	2.9	6.2	8.5	91	25	13	10	15
18	8.6	4.5	4.2	2.6	2.9	6.2	8.0	103	29	13	9.4	14
19	7.8	4.0	4.5	2.7	2.9	6.0	7.5	110	30	13	10	13
20	8.6	5.0	4.7	2.9	2.8	6.0	7.0	103	32	13	13	13
21	7.8	4.7	4.9	3.0	3.0	6.2	7.0	103	31	13	10	12
22	7.0	5.1	5.2	3.0	3.2	6.2	7.0	103	27	12	13	14
23	7.0	4.9	5.2	3.0	3.4	6.4	7.0	88	38	11	9.4	13
24	7.0	4.7	5.2	3.0	3.5	6.4	8.0	91	36	10	8.6	13
25	7.0	4.6	5.2	3.0	3.5	6.6	9.0	86	29	10	7.0	12
26	6.5	4.3	5.2	3.0	3.5	6.2	11	84	26	9.4	6.5	11
27	6.0	4.0	4.5	3.0	3.5	5.8	14	99	23	8.6	7.5	10
28	6.0	4.0	3.4	2.6	3.7	5.8	13	89	19	9.4	9.4	8.6
29	6.0	4.3	2.2	2.2	-----	5.8	12	83	19	6.5	7.0	7.8
30	6.0	4.3	2.0	2.3	-----	6.0	11	80	14	6.0	9.4	7.8
31	6.0	-----	2.0	2.3	-----	6.0	-----	76	-----	6.0	14	-----
TOTAL	210.3	141.7	118.8	73.7	82.2	178.0	236.1	2,200	1,029	371.9	270.2	365.8
MEAN	6.78	4.72	3.83	2.38	2.94	5.74	7.87	71.0	34.3	12.0	8.72	12.2
MAX	9.4	5.5	5.2	3.0	3.7	6.6	14	110	60	15	16	20
MIN	4.6	4.0	2.0	1.6	2.4	4.0	5.2	10	14	6.0	4.6	7.8
AC-FT	417	281	236	146	163	353	468	4,360	2,040	738	536	726

CAL YR 1969 TOTAL 3,473.3 MEAN 9.52 MAX 48 MIN 2.0 ACFT 6,890
 WAT YR 1970 TOTAL 5,277.7 MEAN 14.5 MAX 110 MIN 1.6 ACFT 10,470

PEAK DISCHARGE (BASE, 70 CFS).--May 15 (1100) 125 cfs (1.40 ft).

NOTE.--No gage-height record Nov. 3 to Mar. 16, Mar. 18 to May 8.

RIO GRANDE BASIN

139

8-2425. Ute Creek near Fort Garland, Colo.

Location.--Lat 37°27', long 105°26', in S½ sec.10, T.30 S., R.72 W., on left bank 1½ miles north of Fort Garland and 6 miles upstream from mouth.

Drainage area.--32 sq mi, approximately.

Records available.--March to October 1916, May 1923 to September 1968. Monthly discharge only for some periods, published in WSP 1312.

Gage.--Water-stage recorder. Altitude of gage is 8,030 ft (from topographic map). Mar. 18 to Oct. 9, 1916, staff gage and Cippolletti weir at different datum.

Average discharge.--45 years, 20.6 cfs (14,910 acre-ft per year).

Extremes.--Maximum discharge during year, 260 cfs Aug. 2 (gage height, 2.92 ft); minimum not determined.

1916, 1923-68: Maximum daily discharge, 630 cfs May 15, 1941; no flow July 28-31, Sept. 6-29, 1956.

Outstanding floods occurred in 1886 and in October 1911. The flood in 1886 probably exceeded that in October 1911 and the flood in October 1911 probably exceeded all subsequent floods, from information by local residents.

Remarks.--Records good except those for winter period, which are poor. A few diversions above station for irrigation.

Discharge, in cubic feet per second, water year October 1967 to September 1968

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	15	12	6.5				9.2	16	96	25	79	24
2	15	10	5.4				8.8	18	104	24	168	22
3	15	8.8	5.4				7.4	21	88	24	101	26
4	15	10	7.0				8.3	25	101	24	59	26
5	15	9.2	6.5				7.0	29	90	22	50	22
6	15	8.8	6.2				7.0	33	88	24	47	21
7	15	8.8	5.4				6.2	33	63	26	101	20
8	15	8.8	6.2				6.5	33	55	30	113	20
9	14	7.8	6.0				5.4	33	36	25	80	19
10	13	7.8	4.0			7.0	7.8	41	31	25	72	20
11	13	7.8	7.0				8.3	39	28	25	108	19
12	12	8.3	6.5				9.6	38	39	24	137	19
13	11	8.3	6.5				11	36	51	23	95	19
14	11	8.3					11	31	50	28	79	19
15	11	7.8					13	31	51	23	70	19
16	11	8.3		5.0	5.0		15	33	55	19	56	19
17	11	8.3					14	33	56	17	48	20
18	11	7.8					13	34	65	15	44	19
19	11	7.8				5.6	13	35	56	15	44	18
20	10	7.8				7.0	11	34	44	14	41	17
21	9.6	7.4				5.0	13	36	56	15	38	16
22	9.6	7.4				5.0	12	52	56	13	37	16
23	9.2	6.2				4.4	10	66	50	21	32	16
24	9.2	4.8				5.4	10	60	48	72	26	15
25	10	7.0				6.5	11	46	42	50	26	13
26	10	6.2				6.5	12	47	41	55	24	13
27	9.2	5.4				7.0	12	51	36	112	25	12
28	9.6	7.8				7.0	12	63	35	67	32	11
29	9.6	7.8				7.4	13	72	31	35	28	11
30	9.2	7.8				8.3	15	82	26	28	27	15
31	12					8.8		95		29		
Total	366.2	240.3	204.6	155.0	145.0	209.9	312.5	1,296	1,668	949	1,918	546
Mean	11.8	8.01	6.60	5.0	5.0	6.77	10.4	41.8	55.6	30.6	61.9	18.2
Max	15	12	-	-	-	-	15	95	104	112	168	26
Min	9.2	4.8	-	-	-	-	5.4	16	26	13	24	11
Ac-ft	726	477	406	307	288	416	620	2,570	3,310	1,880	3,800	1,080

Cal yr 1967: Total 5,699.4 Mean 15.6 Max 107 Min - Ac-ft 11,300
 Wtr yr 1968: Total 8,010.5 Mean 21.9 Max 168 Min - Ac-ft 15,890

Peak discharge (base, 100 cfs)

Date	Time	Gage height	Discharge	Date	Time	Gage height	Discharge
6-2	0500	2.25	137	8-8	1830	2.68	210
7-27	0900	2.48	170	8-12	0300	2.42	158
8-2	0700	2.92	260				

Note.--No gage-height record Dec. 14 to Mar. 19.

RIO GRANDE BASIN

145

8-2425. Ute Creek near Fort Garland, Colo.

LOCATION (revised).--Lat 37°26'50", long 105°25'30", Costilla County, in Sangre de Cristo Grant, on left bank 2,300 ft upstream from Newton ditch, 1.4 miles north of Fort Garland, and 5.7 miles upstream from mouth.

DRAINAGE AREA.--32 sq mi, approximately.

PERIOD OF RECORD.--March to October 1916, May 1923 to current year. Monthly discharge only for some periods, published in WSP 1312.

GAGE.--Water-stage recorder. Altitude of gage is 8,045 ft, revised (from topographic map). Mar. 18 to Oct. 9, 1916, nonrecording gage and Cippoletti weir at different datum.

AVERAGE DISCHARGE.--46 years, 20.6 cfs (14,920 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 241 cfs Aug. 14 (gage height, 2.78 ft); minimum daily, 3.6 cfs Nov. 26, 30.

Period of record: Maximum daily discharge, 630 cfs May 15, 1941; no flow July 28-31, Sept. 6-29, 1956.

Outstanding floods occurred in 1886 and in October 1911. The flood in 1886 probably exceeded that in October 1911 and the flood in October 1911 probably exceeded all subsequent floods, from information by local residents.

REMARKS.--Records good except those for winter period, which are poor. A few diversions above station for irrigation.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14	9.2	3.9	5.0	4.9	5.8	14	36	48	46	22	16
2	13	11	4.2	4.7	5.0	6.5	14	41	39	42	19	15
3	13	10	4.1	4.8	5.2	7.0	14	41	30	45	16	12
4	13	10	4.0	5.0	5.4	6.7	14	41	27	46	21	11
5	14	10	4.0	5.2	5.5	6.6	15	41	33	53	39	10
6	14	11	4.3	5.3	5.7	6.7	18	46	39	42	19	9.2
7	11	8.4	4.6	5.4	6.0	7.0	15	40	37	35	18	10
8	9.6	8.8	4.5	5.6	5.2	7.0	15	30	33	31	18	16
9	9.6	9.2	4.3	4.9	5.4	7.0	19	30	35	29	17	19
10	9.2	10	4.7	5.1	5.6	7.0	21	32	46	27	15	15
11	9.2	7.2	5.0	5.3	5.8	6.9	21	36	31	23	26	13
12	8.8	8.8	4.9	5.4	5.6	6.8	19	40	24	21	18	13
13	8.4	9.2	4.7	5.6	5.4	6.9	20	40	36	21	21	11
14	9.2	9.2	4.7	5.9	5.3	7.0	21	41	30	26	141	10
15	11	8.4	4.9	6.2	5.2	6.8	24	46	49	25	80	10
16	12	8.0	5.1	5.9	5.1	7.8	21	41	74	24	42	13
17	12	8.4	5.4	5.6	5.0	8.3	19	35	95	29	32	14
18	11	4.8	5.2	5.4	4.9	8.8	18	44	79	76	36	13
19	12	6.8	4.8	5.6	5.1	8.8	21	52	73	62	30	12
20	12	9.2	5.2	5.9	5.4	8.8	25	58	76	52	25	11
21	12	9.2	5.0	6.0	5.7	8.8	33	59	71	46	21	15
22	11	9.2	4.7	6.2	6.0	8.7	42	64	58	55	20	17
23	11	7.6	4.8	5.6	5.9	8.6	45	61	48	44	20	15
24	10	7.2	5.0	5.0	5.8	8.5	51	64	41	33	20	14
25	10	8.0	5.2	5.4	5.7	8.4	46	59	39	32	16	13
26	10	3.6	5.3	5.8	5.6	8.0	39	65	35	28	16	12
27	10	4.0	5.6	6.4	5.5	6.0	31	68	29	25	15	11
28	9.6	5.2	5.2	5.8	5.4	5.6	30	67	31	21	14	9.6
29	9.6	3.8	4.8	5.2	-----	7.6	29	71	35	20	13	9.2
30	9.6	3.6	5.0	4.6	-----	9.2	30	67	36	19	14	8.8
31	9.2	-----	5.2	4.7	-----	12	-----	64	-----	24	16	-----
TOTAL	338.0	239.0	148.3	168.5	152.3	235.6	744	1,520	1,357	1,102	840	377.8
MEAN	10.9	7.97	4.78	5.44	5.44	7.60	24.8	49.0	45.2	35.5	27.1	12.6
MAX	14	11	5.6	6.4	6.0	12	51	71	95	76	141	19
MIN	8.4	3.6	3.9	4.6	4.9	5.6	14	30	24	19	13	8.8
AC-FT	670	474	294	334	302	467	1,480	3,010	2,690	2,190	1,670	749

CAL YR 1968 TOTAL 7,924.7 MEAN 21.7 MAX 168 MIN 3.6 AC-FT 15,720
WTR YR 1969 TOTAL 7,222.5 MEAN 19.8 MAX 141 MIN 3.6 AC-FT 14,330

PEAK DISCHARGE (BASE, 100 CFS)

NOTE.--No gage-height record Dec. 3 to Mar. 25.

DATE TIME G.H. DISCHARGE DATE TIME G.H. DISCHARGE
6-17 0430 2.18 119 8-14 1230 2.78 241
7-18 0630 2.06 110

RIO GRANDE BASIN

139

08242500 Ute Creek near Fort Garland, Colo.

LOCATION.--Lat 37°26'50", long 105°25'30", Costilla County, in Sangre de Cristo Grant, on left bank 2,300 ft upstream from Newton ditch, 1.4 miles north of Fort Garland, and 5.7 miles upstream from mouth.

DRAINAGE AREA.--32 sq mi, approximately.

PERIOD OF RECORD.--March to October 1916, May 1923 to current year. Monthly discharge only for some periods, published in WSP 1312.

GAGE.--Water-stage recorder. Altitude of gage is 8,045 ft (from topographic map). Mar. 18 to Oct. 9, 1916, nonrecording gage and Cippoletti weir at different datum.

AVERAGE DISCHARGE.--47 years, 20.6 cfs (14,920 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 160 cfs Sept. 13 (gage height, 2.66 ft); minimum daily, 3.5 cfs Jan. 2-8, Mar. 21, 27.

Period of record: Maximum daily discharge, 630 cfs May 15, 1941; no flow July 28-31, Sept. 6-29, 1956. Outstanding floods occurred in 1886 and in October 1911. The flood in 1886 probably exceeded that in October 1911 and the flood in October 1911 probably exceeded all subsequent floods, from information by local residents.

REMARKS.--Records good except those for winter period, which are poor. A few diversions above station for irrigation.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.5	10	6.6	4.0	5.0	7.0	6.0	19	52	41	16	17
2	9.0	8.5	6.5	3.5	5.5	6.5	8.0	19	46	38	25	17
3	8.5	8.5	6.2	3.5	5.5	6.5	9.0	21	45	35	18	14
4	9.5	12	5.9	3.5	5.5	6.0	8.5	25	45	38	22	14
5	10	10	5.9	3.5	5.5	6.5	11	25	38	50	20	20
6	10	9.5	4.5	3.5	6.0	6.5	14	29	38	68	19	55
7	9.5	9.0	4.5	3.5	6.0	6.0	15	32	41	52	24	35
8	9.0	9.0	4.4	3.5	6.0	6.0	15	36	42	58	41	27
9	8.5	9.0	4.3	4.0	6.0	7.0	17	36	43	41	24	22
10	8.0	9.0	4.3	5.0	6.0	6.0	17	34	38	45	22	20
11	9.0	9.0	5.0	5.0	6.5	5.5	15	39	42	41	19	18
12	7.0	8.5	5.2	5.0	7.0	5.5	14	48	38	36	16	20
13	8.0	5.4	5.0	7.0	5.5	5.5	14	54	37	31	15	82
14	12	8.0	5.7	5.0	6.5	5.5	12	57	39	28	14	136
15	12	8.0	6.0	5.5	6.0	6.0	15	58	42	33	15	82
16	11	8.5	6.2	5.5	6.5	6.0	18	58	41	32	22	60
17	12	7.6	6.3	5.5	7.0	5.0	19	65	41	32	21	47
18	16	4.2	6.5	5.5	7.5	4.5	15	68	44	37	26	37
19	17	4.5	6.5	5.5	6.5	4.8	14	74	50	42	24	33
20	14	11	7.0	5.5	6.0	4.8	12	70	52	43	25	32
21	12	11	7.2	6.0	7.0	3.5	12	72	53	38	24	28
22	12	3.0	7.2	6.5	7.0	4.0	12	72	89	35	23	33
23	12	7.3	7.4	7.0	7.0	4.5	15	71	92	41	24	30
24	12	7.6	7.5	7.0	6.5	5.2	19	72	91	30	24	30
25	12	7.6	7.5	7.0	6.5	3.8	22	74	77	28	22	28
26	12	7.3	8.0	6.5	6.0	3.8	28	68	68	29	20	26
27	12	7.6	7.0	6.5	6.0	3.5	29	58	61	26	19	25
28	11	6.0	6.5	5.0	6.5	4.0	28	52	58	21	18	24
29	12	6.2	4.5	4.5	-----	5.5	22	52	56	13	18	23
30	12	6.2	4.5	4.5	-----	6.5	22	54	49	16	17	22
31	9.5	-----	4.0	5.0	-----	6.5	-----	60	-----	16	16	-----
TOTAL	343.0	246.6	184.3	156.0	170.0	167.9	477.5	1,570	1,548	1,119	653	1,057
MEAN	11.1	8.22	5.93	5.03	6.29	5.42	15.9	50.6	51.6	36.1	21.1	35.2
MAX	17	12	8.0	7.0	7.5	7.0	29	74	92	68	41	136
MIN	7.0	4.2	4.0	3.5	5.0	3.5	6.0	19	37	16	14	14
AC-FT	660	489	366	309	349	333	947	3,110	3,070	2,220	1,300	2,100

CAL YR 1969 TOTAL 7,271.1 MEAN 19.9 MAX 141 MIN 4.0 ACFT 14,420
 MAY YR 1970 TOTAL 7,698.3 MEAN 21.1 MAX 136 MIN 3.5 ACFT 15,270

PEAK DISCHARGE (BASE, 100 CFS).--June 22 (2330) 111 cfs (2.27 ft); Sept. 13 (2130) 160 cfs (2.66 ft).

NOTE.--No gage-height record Dec. 7 to Mar. 18.

Closed basin in San Luis Valley, Colo.

8-2270. Saguache Creek near Saguache, Colo.

Location.--Lat 38°09'48", long 106°17'24", in SE¼SE¼ sec.10, T.45 N., R.6 E., on left bank ¼ mile downstream from Middle Creek, and 10 miles northwest of Saguache.

Drainage area.--595 sq mi.

Records available.--August 1910 to September 1912, June 1914 to September 1968. Monthly discharge only for some periods, published in WSP 1312.

Gage.--Water-stage recorder. Altitude of gage is about 8,030 ft, revised (from topographic map). Prior to Apr. 9, 1934, at sites three-quarters of a mile downstream at different datums. Apr. 10, 1934, to Nov. 20, 1966, at present site at datum 1.00 ft higher.

Average discharge.--56 years, 70.2 cfs (50,820 acre-ft per year).

Extremes.--Maximum discharge during year, 464 cfs June 3 (gage height, 3.24 ft), from rating curve extended above 104 cfs; minimum not determined.

1910-12, 1914-68; Maximum discharge, 790 cfs Aug. 3, 1964 (gage height, 3.85 ft, present datum), from rating curve extended above 83 cfs; minimum daily recorded, 8.2 cfs Dec. 22, 1950, Aug. 17, 1951.

Greatest flood known occurred in 1869. Flood in 1884 or 1886 exceeded that of Aug. 3, 1964, from information by local residents.

Remarks.--Records good except those for winter period, which are poor. Natural flow of stream affected by transmountain diversions from Colorado River basin to drainage area above station through Tarbell ditch (see elsewhere in this report) and diversions above station for irrigation. Records of chemical analyses for water year 1968 are published in Part 2 of this report.

Discharge, in cubic feet per second, water year October 1967 to September 1968

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	46	46				32	65	61	404	77	229	77
2	45	42				31	54	82	392	72	221	75
3	45	33				30	43	103	428	68	243	86
4	45	33				30	37	108	424	68	188	108
5	46	33				30	40	110	376	70	159	83
6	46	33				28	46	120	368	76	168	74
7	46	26				29	38	89	412	69	194	69
8	44	29				30	30	72	392	70	204	66
9	43	33				32	29	80	308	77	246	63
10	43	36				30	33	92	235	79	260	61
11	45	33			23	37	37	104	196	79	348	61
12	43	34				33	40	117	178	71	396	61
13	40	33				29	41	126	188	71	296	65
14	40	38				27	39	100	202	69	290	64
15	40	34				29	40	86	199	64	308	60
16	39	34	25	22		29	45	90	186	61	278	56
17	39	33				30	48	92	178	57	226	57
18	40	29				31	44	98	171	55	199	56
19	40	28				34	43	115	168	53	178	55
20	38	26				30	38	153	164	52	162	54
21	38	24				33	43	191	157	49	157	52
22	37	29				33	45	238	151	52	144	51
23	37	22			31	32	40	356	151	61	132	51
24	36	18			29	38	44	308	144	77	120	50
25	37	25			32	40	46	240	134	84	111	49
26	39	28			31	40	45	224	115	100	108	47
27	36	24			29	41	43	229	101	181	106	46
28	37	13			28	44	44	260	98	312	117	45
29	41	20			27	52	51	316	93	278	104	45
30	34	21			- - - -	60	51	392	84	155	87	47
31	36	- - - -			- - - -	62	- - - -	408	- - - -	166	83	- - - -
Total	1,261	890	775	682	713	1,086	1,282	5,160	6,797	2,873	6,060	1,834
Mean	40.7	29.7	25	22	24.6	35.0	42.7	166	227	92.7	195	61.1
Max	46	46	-	-	-	62	65	408	428	312	396	108
Min	36	13	-	-	-	27	29	61	84	49	83	45
Ac-ft	2,500	1,770	1,540	1,350	1,410	2,150	2,540	10,230	13,480	5,700	12,020	3,640
Cal yr 1967: Total	13,970			Mean 38.3	Max 103	Min -	Ac-ft 27,710					
Wtr yr 1968: Total	29,413			Mean 80.4	Max 428	Min -	Ac-ft 58,340					

Peak discharge (base, 210 cfs)

Date	Time	Gage height	Discharge	Date	Time	Gage height	Discharge
6-3	1200	3.24	464	8-3	0600	2.64	252
7-28	1700	2.93	344	8-12	1430	3.10	412

PEAK DISCHARGE (BASE, 210 CFS)							
DATE	TIME	G.H.	DISCHARGE	DATE	TIME	G.H.	DISCHARGE
6-15	1600	2.56	224	8- 4	2350	2.83	316
7-20	0400	2.78	290				

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RIO GRANDE BASIN

Closed basin in San Luis Valley, Colo.

08227000 Saguache Creek near Saguache, Colo.

LOCATION.--Lat 38°09'48", long 106°17'24", in SE4SE4 sec.10, T.45 N., R.6 E., Saguache County, on left bank 0.2 mile downstream from Middle Creek, and 10 miles northwest of Saguache.

DRAINAGE AREA.--595 sq mi.

PERIOD OF RECORD.--August 1910 to September 1912, June 1914 to current year. Monthly discharge only for some periods, published in WSP 1312.

GAGE.--Water-stage recorder. Altitude of gage is about 8,030 ft (from topographic map). Prior to Apr. 9, 1934, at sites 0.8 mile downstream at different datums. Apr. 10, 1934, to Nov. 20, 1966, at present site at datum 1.00 ft higher.

AVERAGE DISCHARGE.--58 years, 70.4 cfs (51,000 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 428 cfs May 20 (gage height, 3.94 ft), from rating curve extended above 270 cfs; minimum daily, 15 cfs Jan. 2, 3.

Period of record: Maximum discharge, 790 cfs Aug. 3, 1964 (gage height, 3.85 ft, present datum), from rating curve extended above 83 cfs; maximum gage height, 3.94 ft May 20, 1970; minimum daily discharge recorded, 8.2 cfs Dec. 22, 1950, Aug. 17, 1951.

Greatest flood observed occurred in 1869. A flood in 1884 or 1886 exceeded that of Aug. 3, 1964, from information by local residents.

REMARKS.--Records good except those for winter period, which are poor. Natural flow of stream affected by transmountain diversions from Colorado River basin to drainage area above station through Tarbell ditch (see elsewhere in this report) and diversions above station for irrigation.

REVISIONS (WATER YEARS).--WSP 1242: 1948-49. WSP 1312: 1912, 1934(M), 1942(M). WSP 1923: 1951.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

DAY	CCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	52	72	44	18	27	43	38	87	296	119	77	89
2	53	52	51	15	27	42	33	67	269	111	74	80
3	58	53	53	15	27	40	37	81	251	104	77	81
4	87	57	60	16	28	33	35	141	251	100	93	72
5	75	53	57	16	27	33	37	223	247	114	106	83
6	64	58	48	16	29	36	42	270	223	129	104	146
7	64	58	37	16	29	36	50	299	222	131	93	192
8	65	51	29	16	30	37	53	292	237	141	114	191
9	67	54	27	16	30	40	57	269	242	144	97	133
10	71	56	23	23	30	34	59	233	222	141	83	127
11	75	55	23	23	31	38	68	256	218	123	73	119
12	74	57	27	23	34	32	53	315	208	116	68	114
13	62	52	27	23	37	33	48	342	181	104	63	141
14	64	40	30	24	36	36	51	354	168	61	63	192
15	63	48	29	25	32	40	46	354	164	87	70	222
16	62	58	28	23	32	38	46	354	158	101	100	136
17	70	51	30	23	32	35	65	360	148	98	150	166
18	30	35	30	23	38	33	60	392	147	98	130	159
19	37	25	30	26	35	33	60	410	148	109	100	152
20	68	30	31	25	32	35	51	410	144	96	100	148
21	73	32	32	27	36	37	49	394	156	93	110	140
22	74	32	34	27	36	41	47	392	140	97	120	143
23	67	23	33	35	36	37	46	388	139	104	110	143
24	79	29	37	35	34	39	51	378	176	105	95	148
25	71	30	35	35	34	40	87	368	163	97	84	130
26	70	29	40	32	37	33	198	366	145	109	80	118
27	68	29	33	32	37	38	254	369	139	100	83	114
28	65	26	29	29	37	34	276	354	133	107	79	110
29	65	29	20	25	-----	40	156	336	137	93	77	106
30	58	40	19	25	-----	40	105	321	134	83	74	101
31	60	-----	18	25	-----	35	-----	306	-----	81	92	-----
TOTAL	2,144	1,343	1,039	735	508	1,146	2,267	5,470	5,705	3,326	2,839	4,005
MEAN	68.2	44.8	33.5	23.7	32.4	37.0	75.6	305	190	107	91.6	134
MAX	87	72	60	35	38	43	275	410	296	144	150	222
MIN	52	25	18	15	27	32	33	67	133	81	63	72
AC-FT	4,250	2,660	2,060	1,460	1,800	2,270	4,500	18,780	11,320	6,600	5,630	7,940

CAL YR 1969 TOTAL 21,715 MEAN 59.5 MAX 238 MIN 18 ACFT 43,070
WAT YR 1970 TOTAL 34,527 MEAN 95.7 MAX 410 MIN 15 ACFT 69,280

PEAK DISCHARGE (BASE, 210 CFS)

DATE	TIME	G.H.	DISCHARGE	DATE	TIME	G.H.	DISCHARGE
4-28	2000	3.35	315	9-15	1030	2.94	227
5-20	0400	3.94	428				

RIO GRANDE BASIN

131

Closed basin in San Luis Valley, Colo.

8-2305. Carnero Creek near La Garita, Colo.

Location (revised).--Lat 37°51'35", long 106°19'08", in SW¼ sec. 28, T.42 N., R.6 E., (projected) on left bank 4½ miles northwest of La Garita and 6.6 miles downstream from North Fork.

Drainage area.--117 sq mi.

Records available.--April 1919 to September 1968. No winter records prior to water year 1945 except water years 1926, 1941. Monthly discharge only for some periods, published in WSP 1312.

Gage.--Water-stage recorder. Altitude of gage is 8,150 ft, revised (from topographic map). Prior to Aug. 6, 1925, staff gage or water-stage recorder at site 300 ft downstream at different datum. Aug. 6, 1925, to Apr. 20, 1929, staff gage or water-stage recorder at site at datum 1.00 ft higher. Apr. 21, 1929, to Nov. 20, 1966, water-stage recorder at present site at datum 1.00 ft higher.

Average discharge.--26 years (1925-26, 1940-41, 1944-68), 11.3 cfs (8,180 acre-ft per year).

Extremes.--Maximum discharge during year, 438 cfs Aug. 14 (gage height, 3.43 ft), from rating curve extended above 71 cfs; minimum not determined.

1919-68: Maximum discharge, 1,600 cfs July 21, 1945 (gage height, 6.75 ft, present datum), from rating curve extended above 160 cfs; no flow for several days during summer months in 1951, 1955-56, 1963.

Remarks.--Records good except those for winter period, which are poor. Diversions above station for irrigation. Records of chemical analyses for water year 1968 are published in Part 2 of this report.

Discharge, in cubic feet per second, water year October 1967 to September 1968

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	8.8	5.7					15	40	132	14	86	39
2	7.4	5.7					14	55	124	14	154	38
3	7.4	3.3					16	64	120	15	168	50
4	7.8	4.2					17	67	113	14	156	50
5	8.1	3.6					16	72	111	14	128	39
6	7.8	3.3					14	78	108	14	117	36
7	7.8	3.6					15	51	95	14	108	33
8	7.0	3.0					14	55	80	13	111	31
9	5.7	3.0					15	66	73	13	106	29
10	5.1	2.6					12	66	66	12	126	28
11	5.4	2.6				6.0	15	60	57	12	168	28
12	4.5	3.0					20	66	52	11	128	29
13	3.3	2.8					20	81	44	11	159	37
14	4.2	3.3					20	72	40	11	275	30
15	4.2	2.8					23	86	38	11	253	25
16	3.6	3.3	2.0	3.3	3.8		31	90	35	9.5	220	24
17	3.9	3.6					28	80	32	8.1	195	22
18	4.8	3.3					25	86	30	8.8	168	22
19	4.5	2.8					20	93	28	8.4	145	21
20	4.5	2.6				5.5	16	113	28	10	124	20
21	4.5	2.6				8.8	21	113	27	7.8	120	20
22	5.4	2.4				8.5	20	152	26	9.2	99	18
23	4.8	2.2				6.0	16	149	26	13	86	18
24	3.6	2.6				6.7	16	137	26	21	78	18
25	4.5	3.3				6.7	18	128	26	14	70	18
26	4.8	2.8				7.0	18	120	25	19	66	18
27	3.3	2.6				6.4	16	118	18	57	62	17
28	5.1	2.6				8.1	17	132	16	62	67	17
29	5.7	2.4				10	20	149	16	50	51	17
30	3.9	2.2				12	29	145	14	43	45	18
31	5.7	---				16	---	139	---	49	41	---
Total	167.1	93.8	62.0	102.3	110.2	215.7	557	2,923	1,626	582.8	3,880	810
Mean	5.39	3.13	2.0	3.3	3.8	6.96	18.6	94.3	54.2	18.8	125	27.0
Max	8.8	5.7	-	-	-	16	31	152	132	62	275	50
Min	3.3	2.2	-	-	-	-	12	40	14	7.8	41	17
Ac-ft	331	186	123	203	219	428	1,100	5,800	3,230	1,160	7,700	1,610

Cal yr 1967: Total 1,933.4 Mean 5.30 Max 28 Min - Ac-ft 3,830

Wtr yr 1968: Total 11,129.9 Mean 30.4 Max 275 Min - Ac-ft 22,080

Peak discharge (base, 110 cfs)

Date	Time	Gage height	Discharge	Date	Time	Gage height	Discharge
5-22	0330	2.77	189	8-10	1800	2.90	248
8-2	0600	2.86	233	8-14	0030	3.43	438
8-8	1600	2.61	178				

Note.--No gage-height record Dec. 18 to Mar. 20.

RIO GRANDE BASIN

137

Closed basin in San Luis Valley, Colo.

8-2305. Carnero Creek near La Garita, Colo.

LOCATION.--Lat 37°51'35", long 106°19'08", in SW¼NE¼ sec.28, T.42 N., R.6 E., (projected), Saguache County, on left bank 4.5 miles northwest of La Garita and 6.6 miles downstream from North Fork.

DRAINAGE AREA.--117 sq mi.

PERIOD OF RECORD.--April 1919 to current year. No winter records prior to water year 1945 except water years 1926, 1941. Monthly discharge only for some periods, published in WSP 1312.

GAGE.--Water-stage recorder. Altitude of gage is 8,150 ft (from topographic map). Prior to Aug. 6, 1925, non-recording gage or water-stage recorder at site 300 ft downstream at different datum. Aug. 6, 1925, to Apr. 20, 1929, nonrecording gage or water-stage recorder at present site at datum 1.00 ft higher. Apr. 21, 1929, to Nov. 20, 1966, water-stage recorder at present site at datum 1.00 ft higher.

AVERAGE DISCHARGE.--27 years (1925-26, 1940-41, 1944-69), 11.3 cfs (8,190 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 63 cfs Aug. 20 (gage height, 1.95 ft); minimum daily, 2.6 cfs Feb. 21.

Period of record: Maximum discharge, 1,600 cfs July 21, 1945 (gage height, 6.75 ft, present datum), from rating curve extended above 160 cfs; no flow for several days during summer months in 1951, 1955-56, 1963.

REMARKS.--Records good except those for winter period, which are poor. Diversions above station for irrigation.

REVISIONS (WATER YEARS).--WSP 1312: 1935 (monthly figures only).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17	9.8	5.3	4.5	3.5	3.8	12	12	11	8.2	24	13
2	16	12	5.5	4.3	3.7	4.0	12	12	10	8.2	19	13
3	16	11	5.3	4.4	3.8	3.5	12	13	9.8	7.8	19	12
4	16	12	5.1	4.4	3.9	3.6	12	13	12	8.2	20	9.0
5	16	11	5.0	4.5	4.0	3.8	12	12	11	15	20	9.0
6	16	9.4	5.2	4.5	4.2	3.2	13	15	10	10	18	12
7	16	9.0	5.4	4.4	4.3	3.1	15	22	10	7.8	18	9.4
8	16	9.5	5.2	4.2	3.7	3.0	15	21	9.8	6.1	15	9.4
9	16	9.5	5.0	4.2	3.8	3.0	14	29	9.0	6.1	14	16
10	17	9.5	5.3	4.3	3.9	3.4	16	26	10	8.2	13	12
11	15	9.0	5.6	4.3	4.0	4.0	16	25	10	7.0	14	11
12	15	9.5	5.1	4.3	4.2	3.6	16	22	12	10	17	11
13	14	10	4.7	4.4	4.3	4.2	14	21	14	19	23	9.0
14	13	11	4.9	4.5	3.7	5.0	14	21	16	12	29	11
15	13	10	5.1	4.5	3.3	4.5	15	21	22	13	19	9.4
16	13	10	5.4	4.2	3.4	5.5	15	20	26	19	15	12
17	12	10	5.8	3.9	3.5	6.5	14	19	26	18	14	13
18	14	9.8	3.5	3.6	3.4	7.0	13	19	22	23	15	13
19	15	9.0	3.0	3.7	3.2	8.0	14	19	17	27	19	10
20	14	8.2	4.0	3.9	2.9	6.5	15	19	15	26	33	10
21	13	9.4	3.7	4.0	2.6	7.0	18	19	13	32	26	17
22	12	9.4	3.5	4.2	2.8	7.5	21	19	10	28	19	15
23	12	10	3.5	3.9	3.0	6.8	22	18	9.8	25	20	12
24	12	12	3.8	3.5	3.3	6.4	23	18	11	25	20	10
25	11	11	4.0	3.8	3.6	6.0	20	17	16	26	17	9.0
26	11	8.2	4.5	4.0	4.0	6.6	15	16	23	22	15	8.6
27	10	6.0	4.8	4.5	3.8	7.2	13	15	21	20	15	8.2
28	10	6.5	4.5	4.0	3.7	8.0	14	15	13	23	14	8.2
29	10	5.5	4.4	3.5	-----	8.8	15	13	10	25	13	8.2
30	9.8	5.0	4.6	3.3	-----	10	15	13	8.6	22	13	8.2
31	10	-----	4.7	3.4	-----	11	-----	12	-----	24	13	-----
TOTAL	420.8	282.2	145.4	127.1	101.5	174.5	455	556	418.0	531.6	563	328.6
MEAN	13.6	9.41	4.69	4.10	3.63	5.63	15.2	17.9	13.9	17.1	18.2	11.0
MAX	17	12	5.8	4.5	4.3	11	23	29	26	32	33	17
MIN	9.8	5.0	3.0	3.3	2.6	3.0	12	12	8.6	6.1	13	8.2
AC-FT	835	560	288	252	201	346	902	1,100	829	1,050	1,120	652

CAL YR 1968 TOTAL 11,655.40 MEAN 31.8 MAX 275 MIN - AC-FT 23,120
 WTR YR 1969 TOTAL 4,103.7 MEAN 11.2 MAX 33 MIN 2.6 AC-FT 8,140

PEAK DISCHARGE (BASE, 110 CFS).--No peak above base.

NOTE.--No gage-height record Nov. 29 to Apr. 24.

RIO GRANDE BASIN

131

Closed basin in San Luis Valley, Colo.

08230500 Carnero Creek near La Garita, Colo.

LOCATION.--Lat 37°51'35", long 106°19'08", in SW¼NE¼ sec.28, T.42 N., R.6 E., (projected), Saguache County, on left bank 4.5 miles northwest of La Garita and 6.6 miles downstream from North Fork.

DRAINAGE AREA.--117 sq mi.

PERIOD OF RECORD.--April 1919 to current year. No winter records prior to water year 1945 except water years 1926, 1941. Monthly discharge only for some periods, published in WSP 1312.

GAGE.--Water-stage recorder. Altitude of gage is 8,150 ft (from topographic map). Prior to Aug. 6, 1925, non-recording gage or water-stage recorder at site 300 ft downstream at different datum. Aug. 6, 1925, to Apr. 20, 1929, nonrecording gage or water-stage recorder at present site at datum 1.00 ft higher. Apr. 21, 1929, to Nov. 20, 1966, water-stage recorder at present site at datum 1.00 ft higher.

AVERAGE DISCHARGE.--28 years (1925-26, 1940-41, 1944-70), 11.5 cfs (8,330 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 146 cfs Apr. 26 (gage height, 2.37 ft); minimum daily, 2.5 cfs Mar. 21.

Period of record: Maximum discharge, 1,600 cfs July 21, 1945 (gage height, 6.75 ft, present datum), from rating curve extended above 160 cfs; no flow for several days during summer months in 1951, 1955-56, 1963.

REMARKS.--Records good except those for winter period, which are poor. Diversions above station for irrigation.

REVISIONS (WATER YEARS).--WSP 1312: 1935 (monthly figures only).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12	20	13	4.0	5.0	5.0	3.5	12	42	17	13	9.4
2	11	31	14	3.0	4.0	4.5	3.5	9.4	41	16	13	8.6
3	12	33	15	3.0	4.0	4.0	3.8	14	41	16	11	8.6
4	23	25	15	3.5	4.5	3.5	3.5	35	40	15	12	7.4
5	16	21	14	3.5	3.5	4.0	3.5	57	40	16	12	9.8
6	15	17	9.0	3.5	4.0	4.0	7.0	59	40	16	11	32
7	16	15	7.0	3.5	4.0	4.0	14	73	36	16	11	14
8	18	15	6.0	3.5	4.5	4.5	18	78	37	20	11	11
9	21	17	5.5	4.0	4.5	5.0	16	62	38	22	9.8	9.8
10	22	15	5.0	4.5	4.5	4.5	14	59	33	18	9.4	9.0
11	23	15	5.0	4.5	4.5	4.0	16	78	35	16	7.8	9.0
12	22	15	5.5	4.5	5.0	4.0	12	86	35	18	7.4	9.4
13	30	13	5.5	4.5	5.0	4.5	9.0	91	29	14	7.0	14
14	25	12	6.0	4.5	4.5	4.5	9.8	94	25	14	7.0	20
15	20	15	6.0	5.0	4.8	5.0	7.4	86	24	13	11	15
16	20	14	5.5	4.5	4.0	5.0	8.2	83	23	15	24	11
17	22	13	6.0	4.5	4.0	5.0	16	89	22	16	17	9.0
18	23	12	6.0	4.5	5.0	3.5	14	98	23	18	14	8.6
19	23	10	6.0	5.0	4.5	3.5	11	98	23	24	14	8.6
20	21	14	6.0	4.5	4.0	4.0	9.4	89	22	16	18	8.2
21	21	15	6.5	5.0	4.5	2.5	7.4	86	24	14	17	7.8
22	22	15	6.5	5.0	4.5	3.5	8.2	78	29	15	13	9.0
23	23	12	6.5	5.5	4.5	4.0	8.2	72	27	22	14	11
24	21	13	7.0	5.5	4.5	4.5	11	66	24	18	11	12
25	23	14	6.5	5.5	4.5	4.5	27	63	23	22	9.0	10
26	23	13	7.0	5.0	4.0	4.0	52	60	23	20	8.6	9.8
27	23	13	6.0	5.0	4.0	3.5	54	55	20	18	12	9.8
28	22	11	5.0	4.0	4.0	3.0	40	57	19	18	12	9.4
29	19	12	4.5	3.5	-----	4.0	18	49	18	16	11	9.0
30	22	12	4.0	3.5	-----	4.5	14	45	18	14	9.8	8.6
31	25	-----	4.0	3.5	-----	4.0	-----	43	-----	12	11	-----
TOTAL	636	472	224.5	133.0	120.5	128.0	439.4	2,024.4	874	525	368.8	328.8
MEAN	20.5	15.7	7.24	4.29	4.30	4.13	14.6	65.3	29.1	16.9	11.9	11.0
MAX	33	33	15	5.5	5.0	5.0	54	98	42	24	24	32
MIN	11	10	4.0	3.0	3.5	2.5	3.5	9.4	18	12	7.0	7.4
AC-FT	1,260	936	445	264	239	254	872	4,020	1,730	1,040	732	652

CAL YR 1969 TOTAL 4,587.8 MEAN 12.6 MAX 33 MIN 2.6 ACFT 9,100
WAT YR 1970 TOTAL 6,274.4 MEAN 17.2 MAX 98 MIN 2.5 ACFT 12,450

PEAK DISCHARGE (BASE, 110 CFS).--Apr. 26 (2330) 146 cfs (2.37 ft); May 8 (0230) 142 cfs (2.36 ft).

NOTE.--No gage-height record Oct. 8 to Apr. 2.

Compilation of Records of Surface Waters of the United States through September 1950

Part 8. Western Gulf of Mexico Basins

Prepared under the direction of J. V. B. WELLS, Chief, Surface Water Branch

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1312



UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1960

380

RIO GRANDE BASIN

Closed basin in San Luis Valley, Colo.

Yearly discharge, in cubic feet per second, of North Crestone Creek near Crestone, Colo.									
Year	W.S.F. no.	Water year ending Sept. 30					Calendar year		
		Discharge		Minimum day	Mean	Runoff in acre-feet	Mean	Runoff in acre-feet	
		W.S.F. no.	Date						
1936	808	755	Aug. 6, 1936	-	-	-	-	-	-
1937	826	88	May 14, 1937	-	-	-	-	-	-
1938	858	141	May 28, 1938	-	-	-	-	-	-
1939	878	76	May 19, 1939	-	-	-	-	-	-
1940	898	63	May 31, 1940	-	-	-	-	-	-
1941	928	375	June 22, 1941	-	-	-	-	-	-
1942	958	270	May 26, 1942	-	-	-	-	-	-
1943	978	265	June 30, 1943	-	-	-	-	-	-
1944	1008	2105	June 11, 1944	-	-	-	-	-	-
1945	1038	71	May 26, 1945	30.4	-	-	-	-	-
1946	1058	56	June 4, 1946	-	-	-	-	-	-
1947	1088	154	June 19, 1947	-	-	-	-	-	-
1948	1118	133	June 3, 1948	-	16.0	11,600	14.7	10,480	-
1949	1148	149	June 17, 1949	-	13.9	10,090	14.4	10,480	-
1950	1178	78	June 5, 1950	-	4.15	2,950	-	-	-

8 Maximum daily.

9 Minimum daily recorded.

288. South Crestone Creek near Crestone, Colo.

Location.--Lat 37°59', long 105°42' (revised), in Baca Grant, 300 ft upstream from Crestone-Cottonwood mine highway, 1 mile (revised) southeast of Crestone, Saguache County, and 2 miles upstream from confluence with North Crestone Creek.

Drainage area.--5 sq mi, approximately.

Gage.--Water-stage recorder. Altitude of gage is about 7,950 ft (from topographic map).

Extremes.--May to November 1936: Maximum discharge, 39 cfs Aug. 6 (gage height, 1.67 ft); minimum daily, 0.5 cfs Nov. 29, 30.

Remarks.--No diversions above station.

Monthly mean discharge, in cubic feet per second									
Year	May	June	July	Aug.	Sept.	Oct.	Nov.		
1936	5.05	1.77	4.65	9.91	4.68	1.30	1.08		

Monthly runoff, in acre-feet									
Year	May	June	July	Aug.	Sept.	Oct.	Nov.		
1936	188	105	286	610	278	80	64		

289. Willow Creek near Crestone, Colo.

Location (revised).--Lat 37°59', long 105°40', in Baca Grant, three-quarters of a mile upstream from Crestone-Cottonwood road, and 2½ miles southeast of Crestone, Saguache County.

Drainage area.--6 sq mi, approximately.

Gage.--Water-stage recorder. Altitude of gage is about 8,000 ft (from topographic map).

Extremes.--May to November 1936: Maximum discharge, 385 cfs Aug. 6 (gage height, 3.53 ft); from rating curve extended above 33 cfs on basis of slope-area determination at peak flow; minimum daily, 0.8 cfs Nov. 21.

Remarks.--No diversions above station.

Monthly mean discharge, in cubic feet per second									
Year	May	June	July	Aug.	Sept.	Oct.	Nov.		
1936	7.67	8.62	11.3	32.1	10.0	4.12	2.17		

Monthly runoff, in acre-feet									
Year	May	June	July	Aug.	Sept.	Oct.	Nov.		
1936	471	513	694	1,970	596	253	129		

RIO GRANDE BASIN

381

Closed basin in San Luis Valley, Colo.

290. Spanish Creek near Crestone, Colo.

Location.--Lat 37°57', long 105°40' (revised), in Baca Grant, just upstream from bridge and 3½ miles (revised) southeast of Crestone, Saguache County.

Drainage area.--3 sq mi, approximately.

Gage.--Water-stage recorder. Altitude of gage is about 8,200 ft (from topographic map).

Extremes.--May to November 1936: Maximum discharge, 493 cfs Aug. 5 (gage height, 4.13 ft); from rating curve extended above 15 cfs on basis of slope-area determination of peak flow; minimum daily, 1.2 cfs Nov. 3, 6, 9, 22.

Remarks.--No diversions above station.

Monthly mean discharge, in cubic feet per second									
Year	May	June	July	Aug.	Sept.	Oct.	Nov.		
1936	5.22	4.48	7.58	16.8	4.97	2.28	1.36		

Monthly runoff, in acre-feet									
Year	May	June	July	Aug.	Sept.	Oct.	Nov.		
1936	321	266	466	1,050	296	140	81		

291. Cottonwood Creek near Crestone, Colo.

Location.--Lat 37°56', long 105°39', in Baca Grant, at Cottonwood Mining Camp, 150 ft downstream from Cottonwood-Liberty road and 5 miles (revised) southeast of Crestone, Saguache County.

Drainage area.--7 sq mi, approximately.

Gage.--Water-stage recorder. Altitude of gage is about 8,400 ft (from topographic map).

Extremes.--May to November 1936: Maximum discharge, 257 cfs Aug. 6 (gage height, 3.13 ft); from rating curve extended above 23 cfs on basis of slope-area determination of peak flow; minimum daily, 2.3 cfs May 10.

Remarks.--No diversions above station.

Monthly mean discharge, in cubic feet per second									
Year	May	June	July	Aug.	Sept.	Oct.	Nov.		
1936	9.81	7.82	6.73	21.5	10.2	4.50	3.34		

Monthly runoff, in acre-feet									
Year	May	June	July	Aug.	Sept.	Oct.	Nov.		
1936	603	465	537	1,320	607	264	199		

292. Deadman Creek near Crestone, Colo.

Location.--Lat 37°54', long 105°38' (revised), in Baca Grant, at mouth of Deadman Canyon, 1 mile upstream from Crestone-Liberty road and 8 miles southeast of Crestone, Saguache County.

Drainage area.--10 sq mi, approximately.

Gage.--Water-stage recorder. Altitude of gage is 8,300 ft (from topographic map).

Extremes.--May to November 1936: Maximum discharge, 46 cfs July 28 (gage height, 1.53 ft); from rating curve extended above 28 cfs; minimum daily, 2.5 cfs Nov. 24.

Remarks.--Records include diversions into canal directly above station from Sept. 2 to Nov. 30. No other diversions above station.

Monthly mean discharge, in cubic feet per second									
Year	May	June	July	Aug.	Sept.	Oct.	Nov.		
1936	13.6	6.56	12.1	24.8	15.0	5.84	4.13		

Monthly runoff, in acre-feet									
Year	May	June	July	Aug.	Sept.	Oct.	Nov.		
1936	839	390	743	1,530	772	359	246		

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RIO GRANDE BASIN

Closed basin in San Luis Valley, Colo.

294. La Garita Creek near La Garita, Colo.

Location.--Lat 37°48'50", long 106°18'30", in sec. 10, T. 41 N., R. 6 E., 4 miles south west of La Garita and 4 1/2 miles downstream from Little La Garita Creek.

Drainage area.--61 sq mi, approximately.

Gage.--Water-stage recorder. Altitude of gage is 7,970 ft (from topographic map). Apr. 1919, to June 22, 1927, staff gages and June 24, 1927, to Nov. 13, 1935, water-stage recorder, at sites within a quarter of a mile downstream at different datums.

Average discharge.--7 years (1925-26, 1940-41, 1944-46, 1947-50), 17.1 cfs.
 Extreme.--1919-50: Maximum discharge recorded (revised), 499 cfs Sept. 10, 1933 (gage height, 9.30 ft, site and datum then in use), from rating curve extended above 190 ft maximum gage height, 5.11 ft, present site, May 16, 1941; minimum daily recorded, 0 cfs Aug. 29, 1940.

Remarks.--Diversions above station for irrigation.

Cooperation.--Records for 1919-33, not previously published by Geological Survey, furnished by State engineer of Colorado.

Monthly and yearly mean discharge, in cubic feet per second												
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919	6.47	-	-	-	-	6.0	38.8	151	45.9	49.4	35.9	10.1
1920	-	-	-	-	-	-	9.22	80.5	63.2	17.5	21.4	10.0
1921	5.0	-	-	-	-	-	10	52.7	126	65.3	45.9	28.4
1922	8.87	-	-	-	-	-	14.9	45.8	58.6	15.3	15.1	30.7
1923	-	-	-	-	-	-	-	55.6	38.6	32.0	47.0	52.4
1924	42.6	-	-	-	-	-	186	51	113.0	17.8	6.29	6
1925	7.29	6.20	-	-	-	-	17.7	25.1	11.7	29.3	45.2	19.5
1926	13.3	9.23	7.2	5.6	5.2	6	38.8	117	50.1	19.5	11.2	3.77
1927	3.03	7	-	-	-	-	14.6	16.7	12.5	11.8	11.0	12.5
1928	5.26	-	-	-	-	-	14.9	45.8	58.6	15.3	15.1	30.7
1929	8.26	8.37	-	-	-	-	39.1	52.9	12.2	17.0	25.5	-
1930	-	-	-	-	-	-	16.6	14.2	12.0	16.2	43.2	13.2
1931	9.84	-	-	-	-	-	11.6	16.1	11.5	7.03	4.10	5.97
1932	5.26	-	-	-	-	-	12.2	35.0	19.9	15.3	10.0	5.73
1933	10.6	-	-	-	-	-	6.6	14.2	17.9	16.2	11.7	5.97
1934	5.0	-	-	-	-	-	11.7	5.1	4.3	4.1	4.8	3.3
1935	2.9	-	-	-	-	-	11.5	31.0	49.5	19.0	9.5	7.7
1936	6.6	3.7	-	-	-	-	120.2	18.1	12.3	8.18	23.3	14.3
1937	8.96	4.62	-	-	-	-	24.7	55.1	17.3	9.74	6.94	5.12
1938	4.41	-	-	-	-	-	37.4	76.1	53.1	15.7	6.74	11.4
1939	15.1	-	-	-	-	-	18.8	33.9	15.4	5.35	5.32	7.3
1940	3.80	-	-	-	-	-	7.09	9.82	4.91	2.58	2.07	2.60
1941	2.57	1.80	1.5	2.0	2.5	3.51	10.7	104	106	28.8	13.3	6.71
1942	9.96	47.13	-	-	-	-	45.9	117	60.9	19.0	10.3	5.84
1943	5.67	46.38	-	-	-	-	10.4	9.78	7.19	4.75	13.4	7.88
1944	5.11	4.03	-	-	-	-	7.75	95.6	49.0	12.1	5.14	3.21
1945	5.50	4.53	44.0	43.5	44.0	4.69	33.4	33.8	14.1	8.40	17.3	7.88
1946	8.03	7.83	43.5	44.5	45.0	6.12	17.2	18.0	8.98	6.17	5.85	4.78
1947	4.48	3.53	-	-	-	-	6.69	32.5	32.8	12.2	15.4	15.3
1948	10.4	6.42	5.0	4.5	4.8	6.0	32.8	75.0	48.5	15.3	16.47	3.60
1949	6.22	6.08	3.55	3.49	4.21	7.18	33.8	85.8	72.4	37.8	15.9	7.21
1950	7.85	5.39	4.0	3.0	6.0	8.21	12.2	6.18	6.78	5.51	2.80	2.37

* Revised; differs from records previously published by State engineer of Colorado.

† Not previously published; partly estimated by Geological Survey on basis of records for nearby stations.

Monthly and yearly runoff, in acre-feet												
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1919	-	-	-	-	-	-	2,310	9,880	2,730	3,940	2,210	601
1920	398	-	-	-	-	369	549	4,950	5,760	1,090	1,520	595
1921	307	-	-	-	-	-	595	3,240	7,800	4,020	5,850	1,690
1922	545	-	-	-	-	-	687	4,270	1,880	870	5,310	599
1923	-	-	-	-	-	-	-	3,420	2,300	1,970	5,890	3,120
1924	2,620	-	-	-	-	-	7,500	13,000	9,750	1,080	510	598
1925	148	369	-	-	-	-	1,050	1,840	296	1,800	7,780	1,150
1926	818	549	443	344	289	369	2,310	7,190	2,980	1,200	689	234
1927	186	417	-	-	-	-	689	1,150	744	728	678	144
1928	615	-	-	-	-	-	687	4,270	1,880	870	5,310	599
1929	508	498	-	-	-	-	2,400	1,360	750	4,330	1,580	-
1930	-	-	-	-	-	-	988	973	154	996	5,300	796
1931	605	-	-	-	-	-	713	990	684	435	252	236
1932	323	-	-	-	-	-	728	2,150	1,180	941	615	549
1933	652	-	-	-	-	-	395	873	1,070	996	719	531
1934	507	-	-	-	-	-	898	560	296	252	298	186
1935	180	-	-	-	-	-	672	1,910	2,940	1,170	581	465

* Revised; differs from records previously published by State engineer of Colorado.

† Not previously published; partly estimated by Geological Survey on basis of records for nearby stations.

RIO GRANDE BASIN

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Closed basin in San Luis Valley, Colo.

Monthly and yearly runoff, in acre-feet, of La Garita Creek near La Garita, Colo.--Continued												
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1936	407	220	-	-	-	-	4,200	1,120	735	505	1,430	651
1937	351	287	-	-	-	-	1,470	2,340	1,060	599	477	505
1938	271	-	-	-	-	-	2,220	4,680	3,160	985	415	681
1939	326	-	-	-	-	-	1,120	2,080	916	339	327	282
1940	234	-	-	-	-	-	422	542	292	159	127	155
1941	158	107	92	123	139	216	635	11,560	6,300	1,770	618	399
1942	615	4424	-	-	-	-	2,610	6,880	5,620	1,170	633	347
1943	348	2380	-	-	-	-	619	601	434	290	633	455
1944	314	240	-	-	-	-	461	6,060	2,920	745	216	191
1945	358	270	246	2315	2222	288	796	2,060	958	541	1,070	470
1946	493	454	2215	4277	4278	376	1,020	1,100	381	380	560	285
1947	275	210	507	277	265	388	398	2,000	1,250	750	948	913
1948	840	392	507	277	265	388	1,250	4,610	2,770	815	521	214
1949	289	243	218	215	234	440	1,420	5,150	4,210	2,310	978	429
1950	358	221	248	184	353	505	724	505	405	339	172	141

* Not previously published; see footnote to preceding table.

Yearly discharge, in cubic feet per second												
Year	V.S.P. no.	Water year ending Sept. 30					Calendar year					
		Discharge	Maximum	Minimum	Mean	Runoff in acre-feet	Mean	Runoff in acre-feet	Mean	Runoff in acre-feet	Mean	Runoff in acre-feet
1919	(a)	-	-	-	-	-	-	-	-	-	-	-
1920	(a)	4182	May 26, 1920	-	-	-	-	-	-	-	-	-
1921	(a)	-	July 18, 1921	-	-	-	-	-	-	-	-	-
1922	(a)	4242	Aug. 4, 1922	-	-	-	-	-	-	-	-	-
1923	(a)	42419	July 17, 1923	-	-	-	-	-	-	-	-	-
1924	(a)	42395	Apr. 22, 1924	-	-	-	-	-	-	-	-	-
1925	(a)	42400	July 21, 1925	-	-	-	-	-	-	-	-	-
1926	(a)	42178	May 3, 1926	-	24.0	17,400	-	-	-	-	-	-
1927	(a)	3448	Apr. 29, 1927	-	-	-	-	-	-	-	-	-
1928	(a)	42793	July 27, 1928	-	-	-	-	-	-	-	-	-
1929	(a)	42255	Aug. 1, 1929	-	-	-	-	-	-	-	-	-
1930	(a)	42297	July 30, 1930	-	-	-	-	-	-	-	-	-
1931	(a)	4212	July 37, 1931	-	-	-	-	-	-	-	-	-
1932	(a)	4191	July 12, 1932	-	-	-	-	-	-	-	-	-
1933	(a)	4499	Sept. 10, 1933	-	-	-	-	-	-	-	-	-
1934	(a)	763	Aug. 15, 1934	-	-	-	-	-	-	-	-	-
1935	(a)	788	Aug. 30, 1935	-	-	-	-	-	-	-	-	-
1936	(a)	808	4380	July 31, 1936	-	-	-	-	-	-	-	-
1937	(a)	826	2162	Apr. 15, 1937	-	-	-	-	-	-	-	-
1938	(a)	858	395	July 14, 1938	-	-	-	-	-	-	-	-
1939	(a)	876	115	Apr. 29, 1939	-	-	-	-	-	-	-	-
1940	(a)	898	69	July 21, 1940	0.7	-	-	-	-	-	-	-
1941	(a)	928	457	May 16, 1941	-	30.8	22,360	-	-	-	-	-
1942	(a)	958	282	May 9, 1942	-	-	-	-	-	-	-	-
1943	(a)	978	418	Aug. 16, 1943	-	-	-	-	-	-	-	-
1944	(a)	1008	226	May 15, 1944	-	-	-	-	-	-	-	-
1945	(a)	1038	209	Aug. 7, 1945	-	10.3	47,490	410.8	-	-	-	47,800
1946	(a)	1058	191	July 14, 1946	-	17.98	45,770	-	-	-	-	-
1947	(a)	1088	250	Aug. 15, 1947	-	-	-	-	-	-	-	-
1948	(a)	1118	158	May 21, 1948	-	18.1	15,220	17.2	-	-	-	15,510
1949	(a)	1148	154	May 15, 1949	-	22.4	16,210	22.7	-	-	-	16,410
1950	(a)	1178	34	Apr. 7, 1950	-	5.84	4,230	-	-	-	-	-

* Revised.

† Not previously published.

‡ Reports of State engineer of Colorado.

b Maximum observed.

c Estimated; discharge not determined.

Compilation of Records of Surface Waters of the United States, October 1950 to September 1960

Part 8. Western Gulf of Mexico Basins

Prepared under the direction of E. L. HENDRICKS, Chief, Surface Water Branch

BIOLOGICAL SURVEY WATER-SUPPLY PAPER 1732



UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1964

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RIO GRANDE BASIN

Closed basin in San Luis Valley, Colo.

296. Big Spring Creek near Hooper, Colo.

Location.--Lat 37°44', long 105°40' (revised), in sec. 9, T. 40 N., R. 12 E., 1½ miles northeast of Medano Ranch headquarters, and 12 miles (revised) east of Hooper.

Gage.--Water-stage recorder. Altitude of gage is 7,540 ft (from topographic map).

Extremes.--1948-50: Maximum discharge, 14 cfs July 11, 1949 (gage height, 1.39 ft); minimum gage height, 2.67 ft Jan. 8, 1950 (ice jam); minimum daily discharge, 5.0 cfs Sept. 2, 1950.

Remarks.--No diversions above station. Flow is mostly seepage from sand hills.

Monthly and yearly mean discharge, in cubic feet per second												
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1948	17.0	17.0	7.58	6.94	6.82	7.76	6.99	7.29	6.91	6.75	6.91	87.08
1949	8.82	5.91	7.08	6.52	7.33	6.05	9.12	8.37	7.66	7.67	6.99	7.18
1950	7.31	7.66	6.78	7.28	7.23	7.46	7.74	7.04	6.04	5.85	5.85	6.39

† Not previously published; estimated on basis of weather records and normal seasonal pattern.

Monthly and yearly runoff, in acre-feet												
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1948	430	441	465	427	395	479	416	448	411	411	415	411
1949	245	351	436	401	407	495	543	515	456	471	450	403
1950	450	456	417	448	401	471	461	453	359	360	366	416

† Not previously published; estimated on basis of weather records and normal seasonal pattern.

Yearly discharge, in cubic feet per second												
Year	W.S.P. no.	Water year ending Sept. 30				Calendar year				Mean	Runoff in acre-feet	Mean
		Discharge	Maximum	Minimum	Mean	Discharge	Maximum	Minimum	Mean			
1948	1148	13	June 29, 1948	5.9	7.06	15,330	6.81	6.94	6.94	6.94	6.94	6.94
1949	1148	14	July 11, 1949	5.5	7.26	5,250	7.52	7.52	7.52	7.52	7.52	7.52
1950	1178	11	Apr. 26, 1950	5.0	6.96	5,040	-	-	-	-	-	-

† Not previously published.

297. Little Spring Creek near Hooper, Colo.

Location.--Lat 37°43', long 105°40', in sec. 16, T. 40 N., R. 12 E., 1½ miles east of Medano Ranch headquarters, and 12 miles east of Hooper.

Gage.--Water-stage recorder. Altitude of gage 7,540 ft (from topographic map).

Extremes.--1948-50: Maximum discharge, 14 cfs July 11, 1949 (gage height, 1.10 ft); minimum gage height, 0.2 cfs Sept. 29, 1950.

Remarks.--Small diversions above station for irrigation. Flow is mostly seepage from hills.

Monthly and yearly mean discharge, in cubic feet per second												
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1948	42.0	42.0	2.0	2.0	2.0	2.0	2.28	2.01	1.86	1.34	1.73	1.52
1949	1.95	1.89	2.01	2.71	2.98	3.24	3.11	2.51	1.95	2.01	1.51	1.50
1950	1.80	2.11	2.33	2.29	1.36	.52	.97	2.28	2.42	2.08	1.98	1.94

† Not previously published; estimated on basis of weather records.

Monthly and yearly runoff, in acre-feet												
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1948	125	119	123	123	115	123	136	124	111	82	106	90
1949	120	113	124	167	165	199	185	155	116	123	95	88
1950	111	126	143	141	76	37	58	140	144	128	122	116

† Not previously published; estimated on basis of weather records.

Yearly discharge, in cubic feet per second												
Year	W.S.P. no.	Water year ending Sept. 30				Calendar year				Mean	Runoff in acre-feet	Mean
		Discharge	Maximum	Minimum	Mean	Discharge	Maximum	Minimum	Mean			
1948	1148	6.0	Sept. 30, 1948	-	11.89	1,380	1.66	1.66	1.66	1.66	1.66	1.66
1949	1148	14	July 11, 1949	1.2	2.28	1,650	2.31	2.31	2.31	2.31	2.31	2.31
1950	1178	4.5	Sept. 19, 1950	.2	1.84	1,340	-	-	-	-	-	-

† Not previously published.

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RIO GRANDE BASIN

Closed basin in San Luis Valley, Colo.

298. North Zapato Creek near Blanca, Colo.

Location.--Lat 37°39', long 105°33', in SW¼ sec. 33, T. 27 S., R. 73 W., 700 ft upstream from Middle Zapato Creek, 2 miles east of Zapato Ranch, and 15 miles north of Blanca.

Drainage area.--5 sq mi, approximately.

Gage.--Water-stage recorder. Altitude of gage is about 8,000 ft (from topographic map).

Extremes.--1948-50: Maximum discharge, 60 cfs June 12, 1949 (gage height, 1.95 ft), from rating curve extended above 12 cfs; no flow at times June to September 1950.

Remarks.--No diversions above station.

Monthly and yearly mean discharge, in cubic feet per second												
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1948	-	-	-	-	-	-	-	8.36	8.16	2.28	1.12	0.69
1949	0.84	0.62	0.29	0.36	0.23	0.27	1.59	6.84	11.6	4.70	1.86	1.00
1950	.35	.92	.50	.39	.35	.35	.35	.32	.42	.07	.03	.06

Monthly and yearly runoff, in acre-feet												
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1948	-	-	-	-	-	-	-	502	486	140	69	41
1949	52	37	18	2	13	17	95	420	690	289	115	59
1950	46	55	31	72	19	22	14	19	25	4.2	1.6	5.0

Yearly discharge, in cubic feet per second												
Year	W.S.P. no.	Water year ending Sept. 30				Calendar year				Mean	Runoff in acre-feet	Mean
		Discharge	Maximum	Minimum	Mean	Discharge	Maximum	Minimum	Mean			
1948	1148	20	May 16, 1948	-	-	-	-	-	-	-	-	-
1949	1148	60	June 12, 1949	0	2.52	1,830	2.56	2.56	2.56	2.56	2.56	2.56
1950	1178	1.6	Oct. 19, 1949	0	.36	264	-	-	-	-	-	-

RIO GRANDE BASIN

299. Alamosa Creek at Jasper, Colo.

Location.--Lat 37°25'00", long 106°28'20" in sec. 29, T. 37 N., R. 5 E., half a mile west of Jasper and 3 miles upstream from California Gulch.

Drainage area.--64 sq mi, approximately.

Gage.--Staff gage. Altitude of gage is 9,150 ft (from topographic map). Nov. 4, 1932, to Apr. 17, 1933, timber weir at site 1 mile downstream at different datum.

Extremes.--1931-33: Maximum discharge observed, 1,160 cfs May 31, 1933 (gage height, 3.46 ft), from rating curve extended above 750 cfs; minimum daily determined, 6.8 cfs Nov. 2, 1932.

Remarks.--No diversions above station.

Monthly and yearly mean discharge, in cubic feet per second												
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1932	181.2	24.5	24.2	217	217	226	2150	449	729	287	78.5	28.0
1933	14.5	12.9	12.1	10.6	10.6	21.4	23.8	161	445	104	440	430

† Not previously published; partly estimated on basis of records for nearby stations.

Monthly and yearly runoff, in acre-feet												
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1932	44,990	1,460	1,430	11,060	11,060	11,350	49,930	27,600	43,400	17,400	4,850	1,470
1933	892	768	744	652	589	701	3,420	9,900	25,400	16,380	8,400	81,790

† Not previously published; partly estimated on basis of records for nearby stations.

Yearly discharge, in cubic feet per second												
Year	W.S.P. no.	Water year ending Sept. 30				Calendar year				Mean	Runoff in acre-feet	Mean
		Discharge	Maximum	Minimum	Mean	Discharge	Maximum	Minimum	Mean			
1932	733	1,050	June 11, 1932	-	159	115,000	151	151	151	151	151	151
1933	748	1,150	May 31, 1933	6.8	172.8	420,700	-	-	-	-	-	-

† Not previously published.

6/11/87

THE ROLE OF WATER IN
GREAT SAND DUNES NATIONAL MONUMENT

There have been two studies done at Great Sand Dunes National Monument (GRSA) relating directly or indirectly to water that can serve as a means to link a reserved water rights claim with the purposes for which the Monument was created. The studies are CSU Masters of Science theses (Bean, 1977, and Wiegand, 1977).

Bean studied the pulsating or surge flow phenomenon that commonly occurs in Medano Creek and has been reported to have occurred in Sand Creek. Pulsating flow is manifested in the periodic passage of a wave or bore of water which results from the rapid release of water stored behind bed-forms which rapidly change shape. It is thought that pulsating flows occur at GRSA because of the rare occurrence of a steep gradient stream flowing over the very fine dune sand.

The phenomenon is of scientific and engineering interest and has been known to rarely occur in arroyos, glacial outwash streams and other alluvial systems having steep slopes and fine textured bed material. For example, the literature reports one case where the highly erosive nature of this phenomenon was described by an observer who viewed the damaging passage of such pulsating flow waves during a naturally occurring flood event.

Bean's thesis examines the properties of this phenomenon but, due to the highly variable and rapidly changing nature of the physical processes, provides a largely qualitative assessment. However, the discussions and those measurements which were made do, nevertheless, have value in identifying the uniquely important character of the streams at GRSA.

Preliminary review of the literature indicates pulsating flow has been little studied. Perhaps this apparent lack of interest exists because this flow regime is so rarely encountered and, therefore, does not represent a significant design concern in normal water related engineering situations.

Wiegand (1977) looked at Dune structure and behavior and in so doing provided indirect evidence of an additional important role of water at the Monument. In this study it was postulated that dune sand transported as sediment by streams arrests the eastward migration of the Dune mass. In addition to halting migration, the transport of sediment by stream flow effectively replenishes depleted sand supplies in up-wind dune areas.

The magnitude of sediment transport necessary to accomplish this replenishment effect is reasonably approximated by Bean's

estimates of fluvial sediment transport in Medano Creek.

The Monument was established on 17 March 1932 by Presidential Proclamation (47 Stat. 2506) under the aegis of the Antiquities Act. The purpose for the reservation, aside from those of the Antiquities Act, is stated as "...the preservation of the great sand dunes and additional features of scenic, scientific, and educational interest;"

From these two studies, a logical argument may be advanced as to the importance of water for the accomplishment of the purposes for which the reservation was created. The scientific importance and rarity of the pulsating flow phenomenon may be easily demonstrated. Further, the redistribution effect is of substantial importance in 1) keeping the dune mass from migrating farther eastward which would, if unchecked, inundate existing facilities and structures, and 2) maintaining the dynamic equilibrium of the dune mass thus allowing the public to see a dune mass which is changing in detail while being essentially arrested in its present geographical setting.

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Schumm, S.A., D.W. Bean, M.D. Harvey, 1982. BED-FORM-DEPENDENT PULSATING FLOW IN MEDANO CREEK, SOUTHERN COLORADO, Earth Surface Processes and Landforms, Vol. 7, 17 - 28.

Wiegand, J. Patrick 1977, DUNE MORPHOLOGY AND SEDIMENTOLOGY AT GREAT SAND DUNES NATIONAL MONUMENT, M.S. Thesis, Department of Earth Resources, Colorado State University, Fort Collins Colo.

7/17/87

WATER AND ITS RELATION TO RESERVATION PURPOSES

SAND DUNES NATIONAL MONUMENT

Compiled by
Owen R. Williams, Hydrologist
Water Rights Branch, Water Resources Division
National Park Service
Fort Collins, Colorado 80521

PURPOSES: "... the preservation of the great sand dunes and additional features of scenic, scientific, and educational interest;" (47 STAT 2506, March 17, 1932)

1. Relation of water to the preservation of "the great sand dunes":

* "One of the most interesting aspects of dune migration along the east side of the Monument is that although individual dunes have migrated up to 140 meters (460 feet) in 39 years, the position of the dune complex's eastern border has remained unchanged. Dunes in the complex are migrating northeastward, but the complex as a single unit is not.

"When the dunes farthest downwind reach Medano Creek, further advance of these dunes is halted by the stream. But dunes upwind of the stream and not affected by it continue to advance downwind. Upon reaching the immobile dunes at the creek, the upwind dunes override them and continue to advance until they, too, are halted by the stream.

"This process not only accounts for the stationary dune border, but also for the great thickness of sand, at least along the eastern side of the complex." (Wiegand, Patrick J., 1977, P. 52.)

* "Sand removed from the dunes is transported downstream to be deposited when the velocities decrease or water loss to seepage significantly reduces flow. The high sediment capacities of both streams [Medano and Castle Creeks - ed.] facilitates removal of the eroded sand. The sand carried downstream each year is subsequently deflated by the southwest wind, and it is again carried towards the northeastern margin of the central dune complex.

"Although the main dune complex is fixed in position, the individual dunes migrate as expected. They deliver a high sand load to Medano Creek which transports it to

the south where it becomes a source of sand for wind erosion and transport. The dune sand, therefore, probably has been recycled many times." (Wiegand, Patrick J., 1977, P. 68 - 69.)

* "In Medano Creek suspended sediment concentrations averaged 5000 mg/liter." (Bean, Daniel William, 1977, P. 75.)

2. Relation of water to the preservation of "additional features of scenic, scientific, and educational interest":

* "Recently a new type of pulsating flow has been described ... that takes place in a mobile bed channel. During an experimental study of flow in a flume, Foley (1975) noted that the flow became pulsational under certain slope conditions and when the Froude number was between 0.71 and 1.06. He referred to this as pulsing flow, and he concluded that it would rarely occur in nature... Pulsating flow has also been noted through the years by visitors to Great Sand Dunes National Monument...

"It is apparent that none of the observers of bed-form-dependent pulsating flow seriously considered it to be more than an interesting hydraulic phenomenon of little or no geomorphic or geologic significance, but it is possible that it has significant geomorphic and sedimentologic effects. The origin and mechanics of this type of pulsating flow was studied in alluvial channels at Great Sand Dunes National Monument by Bean (1977) during the spring of 1975 and by Harvey in 1980." (Schumm, S.A., D.W. Bean and M.D. Harvey, 1982, P. 18.)

* "Open channel flow of the type identified in Medano Creek, which consists of a moving wave train of periodic bores in an alluvial channel, has not been previously described, and is termed pulsating flow. However, it cannot be unconditionally stated that pulsating flow and slug flow are entirely unrelated to one another, due to the poor understanding of the mechanisms of slug flow. Nevertheless, observed slug flows form in rigid boundary channels, without sediments or bedforms present, whereas pulsating flow interacts with, and is highly dependent upon bedform development and associated sediment. This leads to the conclusion that pulsating flow is a separate and distinct type of open-channel flow." (Emphasis in original.) (Bean, Daniel William, 1977, P. 7.)

* "Medano Creek exhibits pulsating flow because of oversteepened gradients resulting from the eolian sediment supplied by the adjacent dune fields. During

the fall and winter months, Medano Creek does not flow. During this time its channel is filled with sand from the adjacent dune masses. The gradient of this eolian fill is sufficiently great to cause pulsating flows during spring runoff. This stream is unusual in the sense that its steep gradient is reconstructed annually." (Schumm, S.A., D.W. Bean and M.D. Harvey, 1982, P. 26.)

* "Within Great Sand Dunes National Monument, a second stream, Castle Creek, exhibited pulsating flow...

"Suspended sediment concentrations ranged from 35,000 mg/liter to a maximum of 570,000 mg/liter." (Bean, Daniel William, 1977, P. 83 - 84.)

* "Medano Creek, Mosca Creek, and Sand Creek are the three primary streams flowing into the monument. All of these streams sink into the loose sedimentary strata in or near the monument. Several small ponds in the southwestern corner of the monument may be fed by this underground water system. These isolated shallow, but permanent, water holes support interesting aquatic life that requires additional study." (USDI - National Park Service, 1984, P. SFM-6.).

3. References Cited:

Bean, Daniel William. 1977. Pulsating Flow in Alluvial Channels, Thesis, Colorado State University, Fort Collins Colorado.

Foley, M.G. 1975. Scour and Fill in Ephemeral Streams, W.M. Keck Laboratory of Hydraulics and Water Resources Report, KH-R-33, California Institute of Technology, 189 PP.

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USDI - National Park Service. 1984. Great Sand Dunes National Monument Statement for Management, Rocky Mountain Region, Denver, Colorado.

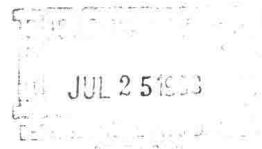
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Other Supporting Information



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The State of Colorado
DEPARTMENT OF LAW
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July 22, 1988

David Robbins
Hill & Robbins
100 Blake Street Building
1441 18th Street
Denver, CO 80202

RE: Case Nos. 81CW161, 163, 164
Water Division No. 3

Dear David:

Here, finally, are my comments on the proposed decrees in the above-referenced cases. I apologize for the delay.

81CW161

As Paula noted, the reference to well no. 2 in paragraph 3, p.2 should refer to well no. 4.

I am not sure why paragraph 7 on p.3 is necessary, and it seems confusing. Cannot the United States simply indicate it no longer desires a right for the well?

81CW163

Again, as Paula noted, the priority dates in paragraph 3, p.2, must be corrected. I believe the correct dates are August 1, 1963 for well no. 2 and August 4, 1978 for well no. 3.

At paragraph six, p.3, the discrepancy between claiming the well for "municipal" use and decreeing it for "domestic" should be explained. I believe a simple description of the actual uses of the well would suffice.

Paragraph two of the decree, at p.4, gives the location of well no. 2 as sec. 35. The log and history give the location as sec. 26. If the well is not actually located in sec. 35, I believe the location should be corrected in an amended applica-

David Robbins
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tion. (I am attempting to find out the well's true location from the Park Service.)

Finally, I believe the addition of 2 paragraphs to the decree, identical to paragraphs 4 & 5 of the 81CW161 decree, would be appropriate.

81CW164

At paragraphs 3 & 4, p.2, citations to the application should be used to attribute the quotes.

At paragraph 7, p.3, "Malcom" Stewart should be "Malcolm." However, if Otaka is substituted, this paragraph will have to be redone anyway.

At paragraph 28, p.9 (and again at paragraph 36, p.12) I want some evidence that the Park Service was even aware of Denton Spring in 1932 before I can accept that priority date.

At paragraph 29, p.9, and again at paragraph 37, p.12, again, some substantiation of the need for 8 A.F. for future use is needed before I can accept it. I have already requested this from John Hill, and may be able to resolve this quickly.

At paragraph 2(b), p.15, I would like the following added under the heading xiii:

Provided, however, that the right to the above described flows shall not include the amount of water taken and historically used by the Medano and Hudson Ditches under the decree entered by the Alamosa County District Court on July 21, 1914, in the case of Charles Wolf and John Meyer v. The Medano Springs Ranch Co..

(A copy of the decree in question is attached.)

In addition, I support all of the changes requested by Paula Phillips. Please note that in her proposed change to paragraph 2(j), p.29, the second date should be March 17, not March 127.

Finally, Steve Vandiver has informed me that Sand Creek has a constantly changing channel, which may eventually migrate off the monument lands. John Hill has told me that he agrees that if

David Robbins
Page 3

the creek moves off the monument a reserved right no longer applies, but that he feels that resolution of such an eventuality in this decree is not advisable. I will accept that if it is acceptable to the other parties, as long as the State's position that the right would lapse in that circumstance is clearly understood.

Please call me if any of these comments need further clarification. Thank you for your assistance.

Sincerely,

FOR THE ATTORNEY GENERAL

Carol D. Angel

CAROL D. ANGEL
Assistant Attorney General
Natural Resources Section

CDA:jg

cc: John Hill ✓
Paula Phillips

AG Alpha No. LW NR YNR
AG File No. ENR880098

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Defendants.

On this 21st day of July, A. D. 1914, Comes George W. Linger, by Goudy, Mitchell and Burkhardt, his Attorneys, and shows to the Court that he has acquired all the interests of the defendant. The Medano Springs Ranch Company in this litigation, and asks to be substituted as a defendant herein, as successor in title to said The Medano Springs Ranch Company, and the plaintiffs, appearing by Messrs. John E. Smith and J. G. Schwergert, their attorneys, and consenting to such substitution of defendant,

It is, Therefore, Ordered, Adjudged and Decreed that the said George W. Linger be made party defendant herein as successor in title to said The Medano Springs Ranch Company.

Dated this 21st day of July, A. D. 1914.

By the Court:-

Chas. C. Holbrook

Judge.

State of Colorado }
County of Alamosa } ss.

IN THE DISTRICT COURT.

Charles Wolf, John Meyer,
Emil Schmidt and Ernest Schwab,

Plaintiffs.

V. The Medano Springs Ranch Company,
George W. Linger substituted as defendant as
successor in title to said The Medano Springs
Ranch Company, Et Al.

Defendants.

Come now the plaintiffs Emil Schmidt and Ernest Schwab, two of the defendants above named and upon the calling of this case for trial said two named plaintiffs move to dismiss the complaint as to themselves, and the Court being fully advised in the premises, doth order, adjudge and decree that said complaint be dismissed as to said plaintiffs Emil Schmidt and Ernest Schwab with prejudice.

Dated this 21st day of July, 1914

By the Court:-

Chas. C. Holbrook, Judge.

Order Dismissing
MOTION TO DISMISS
7/21/14

0123

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State of Colorado }
Alamosa County } ss.

IN THE DISTRICT COURT

Charles Wolf and John Meyer }
vs. }
The Medano Springs Ranch Company }
George W. Lingor, et. al }

On this day July 21st 1914 come the plaintiffs by J. G. Schweigert and John E. Smith their attorneys and show to the Court that F. W. Swanson as Division Engineer of Water Div. No. 1 and I. V. Janney as water commissioner of Water Dist. No. 35 an successors in office to D. V. Jones, as superintendant of Irrigation and Max Artencio as Water Commissioner and on motion of plaintiffs it is ordered that said F. W. Swanson as Division Engineer of Water Division No. 1 and I. V. Janney as Water Commissioner of said Water District No. 35 in the State of Colorado be and they are hereby substituted as and made parties defendant in this action as successors in office to and in the place and stead of said D. V. Jones the said former superintendant of irrigation and said Max Artencio such former Water Commissioner and now said substituted defendants enter their appearance herein.

It is further ordered on application of the defendant George W. Lingor that he have and is hereby given leave to file an amended answer and cross-complaint and plaintiffs be and are hereby allowed to file reply thereto all of which is now done.

By the Court:-

Chas. C. Holbrook Judge.

State of Colorado }
County of Alamosa } ss.

IN THE DISTRICT COURT

Charles Wolf and John Meyer,
Plaintiffs

7/21/14

V
The Medano Springs Ranch Company. DECREE
George W. Lingor substituted as a defendant
as successor in title to said The Medano Springs
Ranch Company. F. W. Swanson as Irrigation Division
Engineer of Water Division No. 3 in the State of Colorado
and I. V. Janney, Water Commissioner of Water District No.
35 in the State of Colorado.

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Defendants

On this 21st day of July, A. D. 1914, come the plaintiffs by John E. Smith and J. G. Schweigert, their attorneys, as well also the defendants, The Medano Springs Ranch Company and George W. Linger, by Goudy Twitchell and Burkhardt, their attorneys; and the defendants F. W. Swanson, Irrigation Division Engineer and I. V. Janney, Water Commissioner, come in their own proper person; and they having heretofore entered their appearance in this cause, and this cause now coming on for final hearing upon the plaintiffs complaint and the amended answer and Cross-Complaint and the replication thereto, and upon the testimony offered, and the Court having heard the testimony, documentary and oral, and the arguments of counsel, and being fully advised in the premises, doth find that heretofore (in the case of George H. Adams, Trustee, plaintiff, versus The Medano Ditch Company, a Corporation, (Walter V. Houser, David F. Botte, John W. Robinson, Emil Schmidt, Ernest Schwab, Charles J. Hoeler, William J. Milsar, Louisa M. Brockman, William T. Frink, and John Meyer, defendants, pending, heard and determined in the District Court of Saguache County, involving the rights of plaintiff as owner of the Los Ojos Ditch and the Hull Ditch, taking water from Big Spring Creek, and of the South Ditch No. 1 and South Ditch No. 2, taking water from Little Spring Creek, and the defendants as owners of the Medano Ditch, taking water from Medano Creek,) (and in a certain other cause heretofore pending and determined in the District Court of Saguache County, wherein George H. Adams, as Trustee, was plaintiff, and Joshua B. Hudson, H. Allington, David E. Wilcox, George H. Graham, Joseph H. Murray, C. M. Lincoln, John Meyer, and Timothy H. Hudson were defendants, and in which case were involved the rights of the plaintiff as owner of said ditches from Big Spring Creek and Little Spring Creek, and the right of defendants as owner of the Hudson Ditch, taking water from said Medano Creek, it was found and decreed in each of said cases that Medano Creek, its branches and tributaries, were tributary to and supplied both Big Spring Creek and Little Spring Creek; that the priorities of the plaintiff in said cases decreed to his said ditches taken from said Big Spring Creek and Little Spring Creek were superior and senior to the rights and priorities of the defendants, appurtenant to said Medano Ditch and said Hudson Ditch, taking water from Medano Creek and its tributaries; and the ~~deprivation of any portion of the waters of Medano Creek or its tributaries~~

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- ② By said Medano or Hudson Ditches or otherwise between the 15th day of May and the 1st day of October of each year materially diminished the water supply in Big Spring Creek and Little Spring Creek, all of the flow of which two latter named creeks was required to supply the priorities of the ditches of the plaintiff therein, and the said Defendants in each of said cases, their officers, agents, employees, heirs, representatives and assigns, were restrained and enjoined from diverting any part or
- ③ portion of the waters of Medano Creek from its channel or any of its branches or tributaries between the 15th day of May and the 1st day of October of each year; that from appeal of said cases to the Supreme Court of the State of Colorado, said Decrees of said District Court of Saguache County were Affirmed, the Supreme Court, however, declaring
- ④ that the law read into the decrees that the inhibitions as to the diversion of water from Medano Creek by said Medano and Hudson Ditches only covers such portion of the period between the dates specified that plaintiff had use for the water for the purposes of irrigation. The Court further finds from the evidence and from the conditions now existing as shown thereby,
- ⑤ that John Meyer and Charles Wolf, plaintiffs herein as owners in the Medano Ditch, and John Meyer as owner of the Hudson Ditch, may, without material injury to the rights of the said defendant take and divert water from said Medano Creek, through said Medano and Hudson Ditches to a total amount of not exceeding 15 cubic feet of water per second of time for the period from May 15th to July 15th of each year, and further finds that any diversion during said period from May 15th to July 15th of any greater amount of water from said Medano Creek and its branches or
- ⑥ tributaries than said 15 cubic feet per second of time, and that any diversion of any amount of water by said Medano Ditch or Hudson Ditch or by any other ditch or other means from said Medano Creek or its tributaries from July 15th to October 1st would materially injure and affect the rights of the defendant in and to the waters of said Big Spring Creek and Little Spring Creek as aforesaid:

It is, Therefore, Ordered, Adjudged and Decreed that the Plaintiffs John Meyer, and Charles Wolf may have and take through the Medano Ditch and the Hudson Ditch from the 15th day of May to the 15th day of July each year not exceeding a total by means of both ditches of fifteen cubic feet of water per second of time, from said Medano Creek, its branches and tributaries, and that the Decrees of the District Court of Saguache

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County hereinabove described and referred to, be and the same are hereby
② modified so as to allow such taking, and in all other respects said former
Decrees of said District Court of Saguache County are hereby re-affirmed
as to all parties affected thereby. Said fifteen Cubic Feet of water
③ per second of time may be taken in either of said ditches, or divided
so as to take any part of said amount through either of said ditches, but
the total amount taken by both of said ditches during said period shall
not exceed fifteen cubic feet of water per second of time.

It is further Ordered, Adjudged and Decreed that said Plaintiffs,
their agents, attorneys, servants, heirs representatives and assigns,
and any and all parties claiming or to claim under them or either of them,
④ be and they are hereby severally perpetually enjoined from taking from
said Medano Creek or its branches or tributaries, by means of said Molano
and Hudson Ditches, or either of them, or by any other means, an amount
of water in excess of fifteen cubic feet per second of time between the
15th day of May and the 15th day of July of each year, and are hereby
further perpetually enjoined from taking or diverting by means of said
ditches or by any other means, directly or indirectly, any of the waters
of said Medano Creek, its branches or tributaries, between the 15th day
of July and the 1st day of October each year.

It is further Ordered, Adjudged and Decreed that the defendant
George W. Linge, his agents, attorneys, servants, heirs, representatives
⑤ and assigns, and all persons claiming or to claim under him, be and they
are hereby perpetually enjoined from interfering with the taking of said
fifteen cubic feet of water per second of time by said John Meyer and
Charles Wolf, their heirs and assigns, for and during the period of time
from May 15th to July 15th in each year hereafter.

It is Further Ordered, Adjudged and Decreed that said defendant-the
Irrigation Division Engineer and said defendant Water Commissioner and
their successors in office, are enjoined to give due regard and observance
to this decree, in connection with all former decrees, in the distribution
of the waters in said Irrigation District No. 35.

It is Further Ordered that each party hereto shall pay the costs
incurred by them respectively.

Done this 21st day of July, A . D. 1914..

By the Court:-

Chas. C. Holbrook, Judge.

Form 388
CERTIFICATE OF COURT.—The One Who Pending and Substantive Co., Colorado Springs, Colo.

STATE OF COLORADO, }
Adams County, } ss.

I, James T. Robinson Clerk of the District Court of
Adams County, in the State aforesaid, do hereby certify the above and fore-
going to be a true, perfect and complete copy of the order, motion to dismiss
complaints and dismiss in a certain cause
pending in said Court, on the _____ side thereof, wherein
John Wolf and John Meyer are Plaintiff, and
The Mendano Springs Ranch Co., The Al. Lingen St. St. are Defendant.

In Witness Whereof, I have hereunto set my hand and affixed the Seal
of said Court, at Adams this
2nd day of May A. D. 1914.
James T. Robinson, Clerk

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Docket Information

Number of Documents in Docket 121
Documents Dated from 7/21/1914 to 6/30/1989
Docket Compiled: 3/29/2011