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U.S. GEOLOGICAL SURVEY

Water Resources Investigations 76-88
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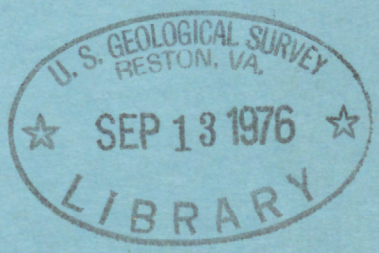

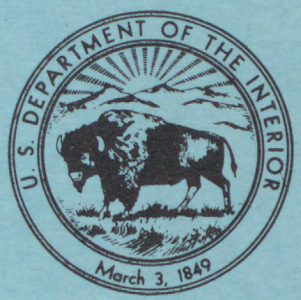

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By H.C. Riggs and W.A. Harenberg

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FLOOD CHARACTERISTICS OF STREAMS IN OWYHEE COUNTY, IDAHO

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ABSTRACT

Channel-width measurements were used to estimate annual peaks with a recurrence interval of 10 years at 79 sites in Owyhee County, Idaho, and adjacent areas. These discharges and those from 33 gaging stations are plotted on a map of the area. The map is provided to allow a user to interpolate between sites or otherwise transfer the data to a site of interest.

INTRODUCTION

Floods on Owyhee County streams are caused by snowmelt, rainfall, or by a combination of the two. Snowmelt is usually the dominant cause of floods on streams at high altitudes. Below 6,000 ft (1,830 m) altitude, thunderstorms of limited areal extent are the primary flood producers. This dichotomy of causes of floods among streams, and at different points on a single stream, is one reason that drainage area is not a useful index of flood-peak characteristics, as Thomas and others (1973) found. However, if channel width is used as an index of flood-peak characteristics, the sources and upstream modifications of flood flows need not be defined.

This report presents estimates of flood-peak characteristics at selected points on streams in Owyhee County and adjacent areas. These estimates are based on field measurements of channel width and on a relation of channel width to 10-year floods defined by records at gaged sites in the region.

Estimates of the 10-year flood peak at the sites where the channels were measured are plotted on a map. The user can estimate the 10-year flood at other sites and on other streams by interpolation or, by using this map in conjunction with a topographic map, can identify a measured stream similar to the one for which an estimate is wanted. An alternate and more reliable method would be to measure the channel near the site of interest.

The International System of Units (SI) is being adopted for use in reports prepared by the U.S. Geological Survey. To assist readers of this report in understanding and adapting to the new system, multiply feet by 0.3048 to obtain metres, and multiply cubic feet per second by 0.0283 to obtain cubic metres per second.

THE CHANNEL-WIDTH METHOD

The flow regimen of a stream and the channel material are the principal factors that determine the size of a stream channel. Therefore, in stream reaches of similar material, one should expect the channel size to be an indicator of the flow regimen. This has been demonstrated by several investigators. Among those relating flood-peak characteristics to channel size are: Hedman and others (1972 and 1974), Fields (1974), Riggs (1974), Moore (1974), Scott and Kunkler (1975), and Emmett (1975).

Measured width of either the whole-channel section or the active-channel section in a suitable reach is required. Criteria for reach selection and identification of the two sections to be measured in the reach are given by Riggs (1974). However, these guidelines should be supplemented by field instruction from someone experienced in the technique.

A relation between the 10-year flood and channel width is defined using data at gaged sites. The 10-year flood at an ungaged site then may be estimated from that relation.

Reliability of the method was tested by Wahl (written commun., 1975), who found that the variability in measuring width among seven experienced individuals would result in a standard error of the computed 10-year flood of about 30 percent.

APPLICATION TO OWYHEE COUNTY

Channel-width measurements were made at 25 gaged sites and at other accessible stream sites in the region. Whole-channel widths (Riggs, 1974) were measured, except for a few sites where only the active-channel width could be identified. These data are shown in table 1.

The relation of 10-year flood, Q_{10}, to whole-channel width, defined at gaged sites, is shown in figure 1. Gaged sites may be identified in table 1 as those having a Q_{10} listed under record. Some of these sites were not used in figure 1 because no width measurements were made.

Figure 1 was used to estimate Q_{10} from whole-channel width at the ungaged sites. For those sites where only an active-channel width was measured, the whole-channel width was estimated from the curve of figure 2. The curve is based on measurements of both channel widths at gaged sites in Utah, Wyoming, Oregon, Idaho, and Nevada.

The 10-year floods from record at gaged sites and from figure 1 at the sites where only channel width was measured are plotted on figure 3. These 10-year floods have not been adjusted to make them consistent along a channel. For example, the 10-year flood shown for Jarbidge River below its forks is greater than the sum of the 10-year floods of its forks. These estimates might not be inconsistent if the standard errors of estimates for the discharges were considered.

Estimates on some channels indicate a decreasing 10-year flood downstream. This characteristic of some channels in this region is supported by gage records on East Fork Bruneau River, Salmon Falls Creek, and Jordan Creek.

Estimates were made on Salmon Falls Creek below the reservoir. These estimates are considered reliable because the reservoir was built in 1910, and the channel downstream should now reflect the recent flood regimen.

Estimates of Q_{10} at undefined sites may be made in the office by interpolation, or on the basis of similarity in size and topographic location to a stream for which a Q_{10} is shown on figure 3.

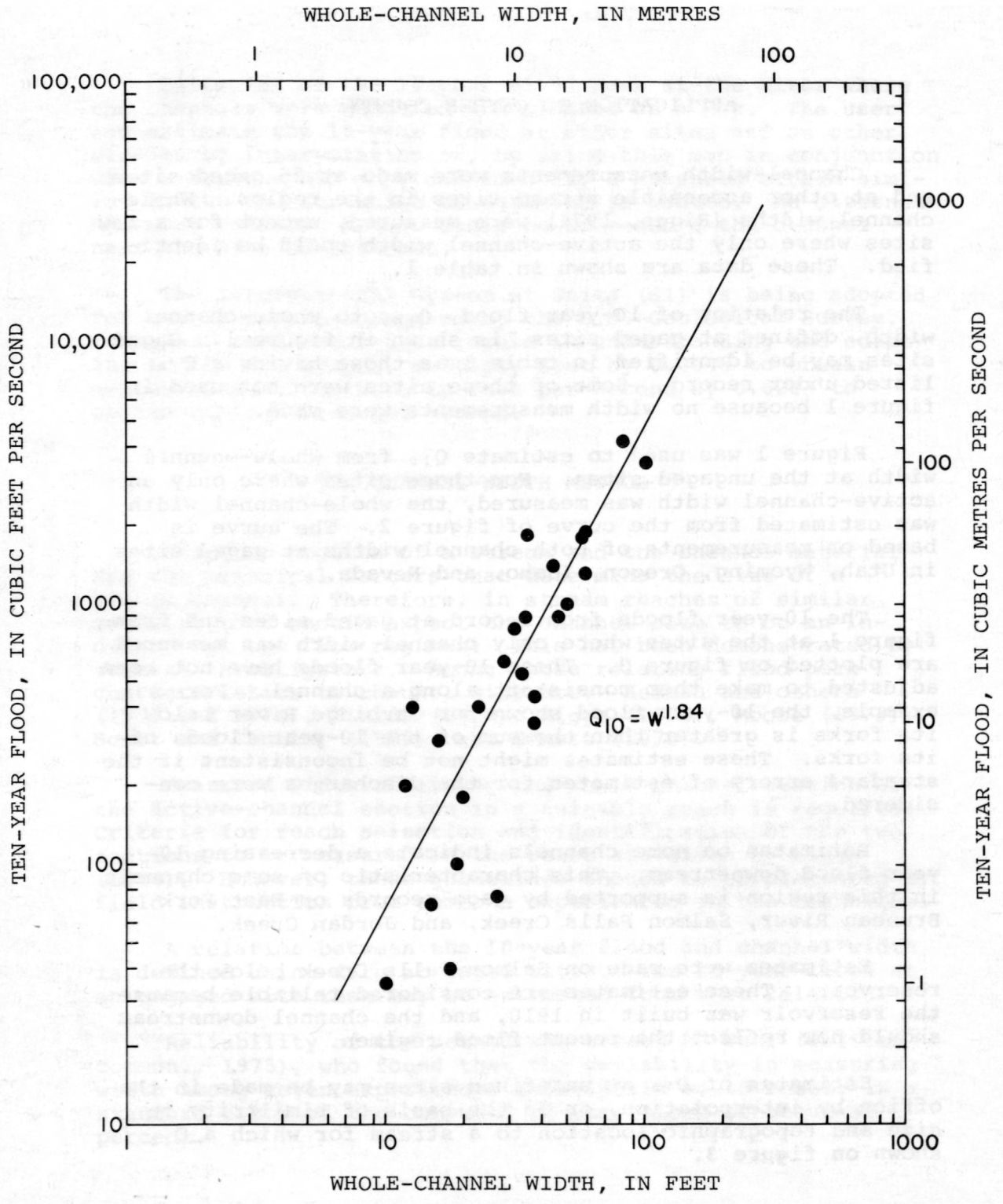

Figure 1.--Relation of 10-year flood to whole-channel width defined by data at gaged sites in table 1

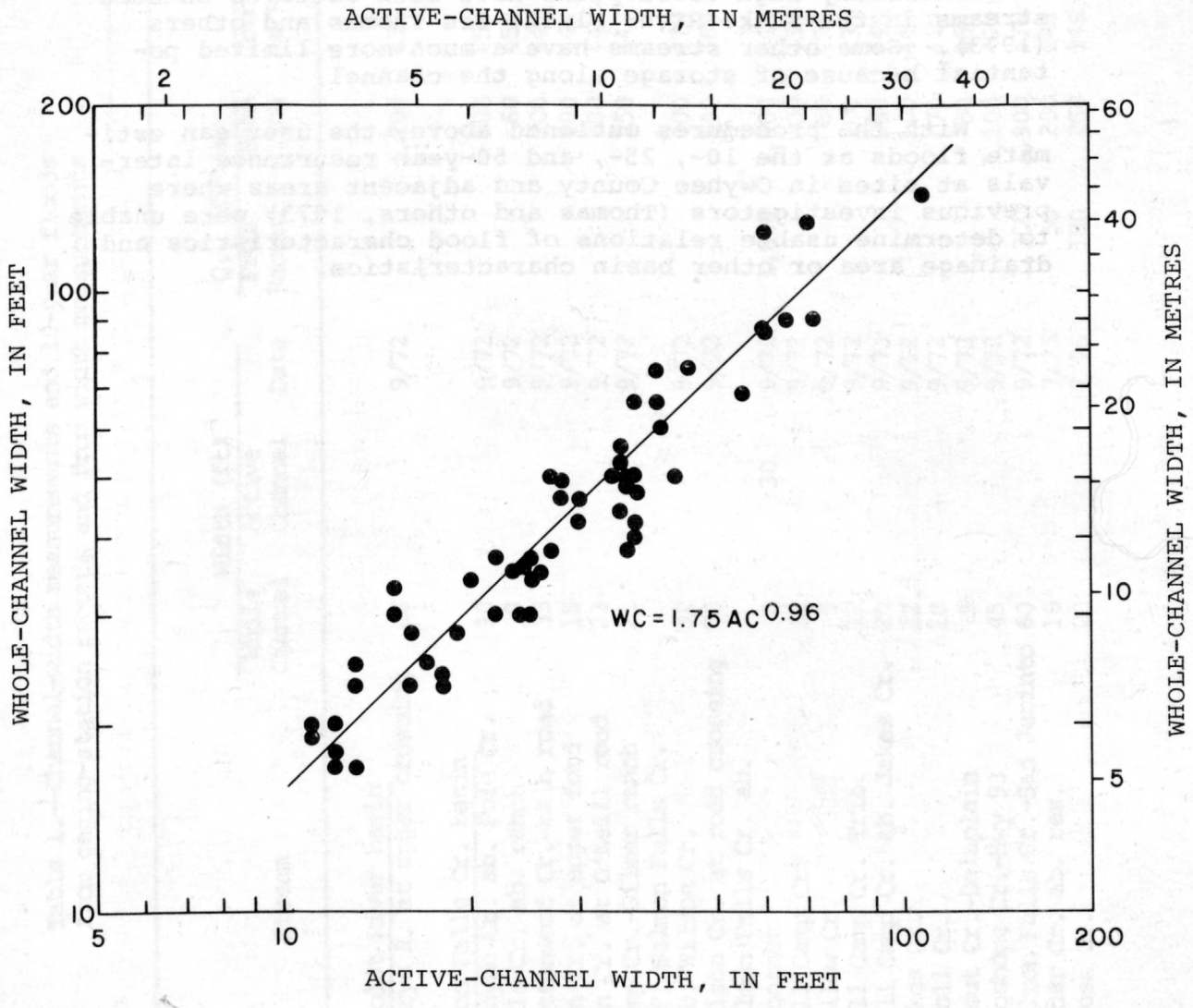

Figure 2.--Relation of whole-channel width to active-channel width

Floods of 25-year and 50-year recurrence intervals may be approximated by multiplying the 10-year flood by factors based on flood-frequency curves for streams in the region. For large streams and mountain streams, the factors are 1.4 for the 25-year flood and 1.7 for the 50-year flood. For streams heading at 6,000 ft (1,829 m) or lower, the factors are 2.0 and 3.0, respectively.

Extremely high flood peaks have been observed on some streams in the Snake River Plain; see Thomas and others (1973). Some other streams have a much more limited potential because of storage along the channel.

With the procedures outlined above, the user can estimate floods at the 10-, 25-, and 50-year recurrence intervals at sites in Owyhee County and adjacent areas where previous investigators (Thomas and others, 1973) were unable to determine usable relations of flood characteristics and drainage area or other basin characteristics.

Table 1.—Channel-width measurements and 10-year floods from gaging-station records and from width measurements

Station Number	Stream	Width (ft) Whole Channel	Width (ft) Active Channel	Date	Q_{10} (ft^3/s) From Record	Q_{10} (ft^3/s) From Width	Map Location Township & Range	Map Location Principal Meridian
	Humboldt River basin							
	Marys R. at upper crossing	46		9/72		1,200	43N 59E	MD
	Salmon Falls Cr. basin							
	Canyon Cr. ab. Pole Cr.	30		9/72		500	45N 61E	MD
	Pole Cr. ab. ranch	9		9/72		60	45N 61E	MD
	Cottonwood Cr.-main road	35		9/72		700	44N 61E	MD
	Sun Cr. at upper ford	18		9/72		200	44N 60E	MD
	Sun Cr. at O'Neill road	23		9/72		300	44N 61E	MD
	Camp Cr.-Gilmer ranch	21		9/72		250	44N 61E	MD
	N.F. Salmon Falls Cr. ab. Wilson Cr.	32		9/72		600	47N 62E	MD
	Wilson Cr. at road crossing	30		9/72		500	46N 62E	MD
13096000	Salmon Falls Cr. ab. Contact	58	30	9/72	1,800	1,800	44N 63E	MD
	Bull Camp Cr.	12		9/72		100	43N 63E	MD
	Willow Cr.	9		9/72		60	43N 63E	MD
	Bull Camp Cr. Trib.	12		9/72		100	43N 63E	MD
	Bull Camp Cr. ab. Jakes Cr.	20		9/72		250	44N 63E	MD
	Jakes Cr.	12		9/72		100	44N 63E	MD
	Knoll Cr.	10		9/72		70	44N 64E	MD
	Trout Cr.-Delaplain	8		9/72		50	46N 65E	MD
	Shoshone Cr.-Hwy 93	45		9/72		1,100	47N 64E	MD
13105000	Salmon Falls Cr.-San Jacinto	60		9/72	1,300	1,900	47N 64E	MD
13106600	Cedar Cr. ab. res.	18		7/75	50	200	14S 13E	B
13106650	House Cr.	20		7/75	180	250	14S 13E	B

Table 1.--Channel-width measurements and 10-year floods from gaging-station records and from width measurements (Cont'd)

Station Number	Stream	Width (ft) Whole Channel	Width (ft) Active Channel	Date	Q_{10} (ft^3/s) From Record	Q_{10} (ft^3/s) From Width	Map Location Township & Range	Map Location [1]Principal Meridian
	Cedar Cr. at crossing S. of Roseworth	22		7/75		300	13S 14E	B
	Salmon Falls Cr. at Hwy S. of Castleford	45	19	7/75		1,100	11S 13E	B
		[2]30		7/75		500	11S 13E	B
	Devil Cr. at Tuana crossing	28		7/75		450	11S 13E	B
13108150	Salmon Falls Cr. at US 30	41		7/75		900	8S 14E	B
	Streams between Salmon Falls Cr. and Bruneau R.							
	Rosevear Gulch nr. Glenns Ferry	No channel		7/75		<20	6S 10E	B
	Deadman Cr. below Canyon nr. Glenns Ferry	28	16	7/75		450	6S 9E	B
	Sailor (Saylor) Cr. W. of Castleford	30	22	7/75		500	10S 12E	B
	Sailor (Saylor) Cr. nr. mouth	54		7/75		1,500	6S 8E	B
	Browns Cr. nr. mouth	33		7/75		600	6S 7E	B
	Bruneau River basin							
13161000	Bruneau-Charleston	[2]23	15	7/75	500	300	42N 58E	MD
13161200	76 Cr.	19		7/75	100	250	44N 58E	MD
13161300	Meadow Cr.	34	20	7/75	640	650	46N 56E	MD

Table 1.—Channel-width measurements and 10-year floods from gaging-station records and from width measurements (Cont'd)

Station Number	Stream	Width (ft) Whole Channel	Width (ft) Active Channel	Date	Q_{10} (ft^3/s) From Record	Q_{10} (ft^3/s) From Width	Map Location Township & Range	Map Location [1]Principal Meridian
13161500	Bruneau R.-Rowland	45		7/75	1,500	1,100	47N 56E	MD
13161600	McDonald Cr.	[2]28	18	7/75	75	450	47N 55E	MD
	Bruneau R. ab. Jarbidge	66		9/72		2,200	13S 7E	B
		59		7/75		1,800	13S 7E	B
13162200	Jarbidge R.-Jarbidge	37	25	7/75	540	750	46N 58E	MD
	Jack Cr. nr. mouth	17	13	7/75		200	46N 58E	MD
13162400	Buck Cr. at Diamond A Ranch	16		7/75	300	150	47N 58E	MD
	Buck Cr. nr. mouth	23		7/75		300	16S 9E	B
	Jarbidge R. ab. E.F.	40		9/72		900	16S 9E	B
		40		7/75		900	16S 9E	B
	Dave Cr. nr. Murphys H.S.	20		7/75		250	47N 58E	MD
13162500	E.F. Jarbidge at Murphys H.S.	35		9/72		700	16S 9E	B
		47	37	7/75	900	1,200	16S 9E	B
	Jarbidge R. below E.F.	60		9/72		1,900	16S 9E	B
		68	55	7/75		2,400	16S 9E	B
13162600	Columbet Cr.	10		7/75	32	70	47N 57E	MD
	Jarbidge R. nr. mouth	63		9/72		2,000	13S 7E	B
		59		7/75		1,800	13S 7E	B
13162700	Bruneau R. below Jarbidge R.	82		9/72		3,400	12S 7E	B
		89		7/75		3,800	12S 7E	B
13163200	Sheep Cr.-Grasmere	38		7/75		800	14S 6E	B
13164100	Marys Cr.-Grasmere	31		7/75		550	13S 5E	B

Table 1.--Channel-width measurements and 10-year floods from gaging-station records and from width measurements
(Cont'd)

Station Number	Stream	Width (ft) Whole Channel	Width (ft) Active Channel	Date	Q_{10} (ft^3/s) From Record	Q_{10} (ft^3/s) From Width	Map Location Township & Range	Map Location Principal Meridian
	Big Flat Cr.-Pole Cr. road	22		7/75		300	16S 11E	B
	Cherry Cr. ab. farms	18		7/75		200	16S 11E	B
	Three Cr. ab farms	17		7/75		200	16S 11E	B
13165300	Deer Cr. ab. Hwy	24		7/75		350	15S 11E	B
13167000	E.F. Bruneau R.-Three Cr.	29		9/72	700	500	14S 11E	B
	E.F. Bruneau R.-Clover Flat	32		7/75		600	11S 9E	B
13167500	E.F. Bruneau R.-Winter Camp	38	27	7/75	450	800	10S 8E	B
13168000	Bruneau R.-Roberson Trail	86		7/75		3,600	9S 6E	B
13168500	Bruneau R.-Hot Spring	82		7/75	4,300	3,400	7S 6E	B
	Big Jacks Cr.	15		7/75		150	11S 2E	B
	Duncan Cr.	17		7/75		200	11S 3E	B
	Wickahoney Cr.	15		7/75		150	10S 4E	B
13169500	Big Jacks Cr.-Bruneau	51		7/75	1,000	1,400	7S 4E	B
13170000	Little Jacks Cr.-Bruneau	23	18	7/73		300	7S 4E	B
		32		7/75	800	600	7S 4E	B
	Little Valley Cr. SW of Bruneau	46	28	7/75		1,200	7S 5E	B
13170100	Sugar Cr. Trib.-Grasmere	10		7/75	100	70	10S 5E	B
	Little Valley Cr. at Hwy 78	34		7/75		700	6S 5E	B
	Snake R. Tribs. between Bruneau and Owyhee Rivers							
	Shoofly Cr.	10		7/75		70	7S 2E	B
13171700	Poison Cr.	11		7/75		80	7S 2E	B
	Poison Cr. at mouth	15		7/75		150	7S 3E	B
	Shoofly Cr. below Poison Cr.	9		7/75		60	7S 3E	B

Table 1.—Channel-width measurements and 10-year floods from gaging-station records and from width measurements (Cont'd)

Station Number	Stream	Width (ft) Whole Channel	Width (ft) Active Channel	Date	Q_{10} (ft^3/s) From Record	Q_{10} (ft^3/s) From Width	Map Location Township & Range	Map Location [1]Principal Meridian
	Shoofly Cr. at Hwy 78	No channel		7/75		<20	5S 3E	B
	Birch Cr.	10		7/75		70	7S 1E	B
	Castle Cr.	23		7/75		300	5S 1E	B
	Castle Cr. at Hwy 78	24		7/75		350	4S 1E	B
13172200	Fossil Cr.-Oreana	12		7/73	200	100	4S 1W	B
	Sinker Cr. at Hwy 78	27		7/75		450	3S 1W	B
	Rabbit Cr.-Murphy	31		7/75		550	2S 2W	B
	W. Rabbit Cr. at Hwy 78	11	5	7/75		80	1S 2W	B
	[3]Salmon Cr.-Reynolds	13		7/73	[4]400	100	2S 4E	B
	[2]Reynolds Cr.-Reynolds	36		7/73	[4]1,800	750	2S 4E	B
13172800	L. Squaw Cr. trib. nr. Marsing				55		1S 5W	B
	Owyhee River basin							
13175900	Reed Cr. nr. Owyhee	15		7/75	70	150	46N 53E	MD
13176000	Owyhee R. ab. China Div. Dam				1,900		46N 53E	MD
13176100	Blue Cr.	39		7/75		850	11S 1E	B
	Juniper Cr.	24		7/75		350	15S 1W	B
	Battle Cr.	62		7/75		2,000	12S 1E	B
	Battle Cr. nr. mouth	[2]74	50	7/75		2,800	14S 2W	B
	Owyhee R. below Battle Cr.	79		7/75		3,100	14S 2W	B
	Paiute Cr.	32		7/75		600	14S 3W	B
	Hurry Back Cr.	40		7/75		900	10S 3W	B
	Current Cr. nr. mouth	[2]37	24	7/75		750	10S 3W	B

Table 1.—Channel-width measurements and 10-year floods from gaging-station records and from width measurements (Cont'd)

Station Number	Stream	Width (ft) Whole Channel	Width (ft) Active Channel	Date	Q_{10} (ft^3/s) From Record	Q_{10} (ft^3/s) From Width	Map Location Township & Range	Map Location [1]Principal Meridian
13176900	Jack Cr. below Shoonover Cr.			7/75	290		42N 52E	MD
13177200	S.F. Owyhee-Spanish ranch	60		9/72	1,900	1,900	41N 52E	MD
13177800	S.F. Owyhee R.-White Rock	102		9/72	3,500	5,000	45N 49E	MD
	S.F. Owyhee R. ab. E. Little Owyhee R.	76		7/75		2,900	14S 5W	B
	E. Little Owyhee nr. mouth	35		7/75		700	14S 5W	B
	S.F. Owyhee R. below E.F. Little Owyhee R.	90		7/75		4,000	14S 5W	B
	Owyhee R.-Warm Springs (ab. M.F. Owyhee R)	205		7/75		18,000	35S 45E	W
	M.F. Owyhee R. nr. mouth	74	40	7/75		2,800	35S 45E	W
	Squaw Cr. at Fenwick ranch	25		7/75		350	10S 5W	B
	N.F. Owyhee R. nr. mouth	66	40	7/75		2,200	34S 45E	W
	Jordan Cr. nr. Silver City	30		7/75		500	4S 4W	B
	Jordan Cr. ab. Flint Cr.	47		7/75		1,200	6S 4W	B
	Flint Cr.	[2]47	31	7/75		1,200	6S 4W	B
	Meadow Cr. on Oreana-Jordan Valley road	39		7/75		850	7S 3W	B
	Rock Cr. below Josephine Cr.	50		7/75		1,300	7S 3W	B
	Mammoth Cr. (trib. to Boulder Cr.)	25		7/75		350	6S 3W	B
	Williams Cr.	24		7/75		350	7S 5W	B
13178000	Jordan Cr. ab. Lone Tree Cr. nr. Jordan Valley				4,000		6S 5W	B
13179000	Jordan Cr. nr. Jordan Valley				3,000		30S 45E	W

Table 1.--Channel-width measurements and 10-year floods from gaging-station records and from width measurements (Cont'd)

Station Number	Stream	Width (ft) Whole Channel	Width (ft) Active Channel	Date	Q_{10} (ft^3/s) From Record	Q_{10} (ft^3/s) From Width	Map Location Township & Range	Map Location [1]Principal Meridian
13181000	Owyhee R. nr. Rome				27,000		31S 41E	W
13182000	Owyhee R. ab. Owyhee Res.				16,500		27S 43E	W
13183000	Owyhee R. below Owyhee Dam				15,600		22S 45E	W

[1]B = Boise meridian, Idaho; MD = Mount Diablo meridian, Nevada; W = Willamette meridian, Oregon.

[2]Estimated from active-channel width and figure 2.

[3]Station operated by Agricultural Research Service, Northwest Watershed Research Center.

[4]Flood frequency computed by USGS using peak discharges furnished by ARS.

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