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Roughness Characteristics of Natural Channels

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Color photographs and descriptive data for 50 stream channels for which roughness coefficients have been determined

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$n = 0.038$

12–3065. Moyie River at Eastport, Idaho

Gage location.—Lat 49°00′, long 116°11′, in SE¼ sec. 10, T. 65 N., R. 2 E., on left bank at Eastport, 1,000 ft downstream from international boundary. Section 1 is about 0.5 mile downstream from gage.

Drainage area.—570 sq mi, approximately.

Date of flood.—May 24, 1948.

Gage height.—10.25 ft at gage; 20.68 ft (different datum) at section 1.

Peak discharge.—8,030 cfs.

Computed roughness coefficient.—Manning $n = 0.038$.

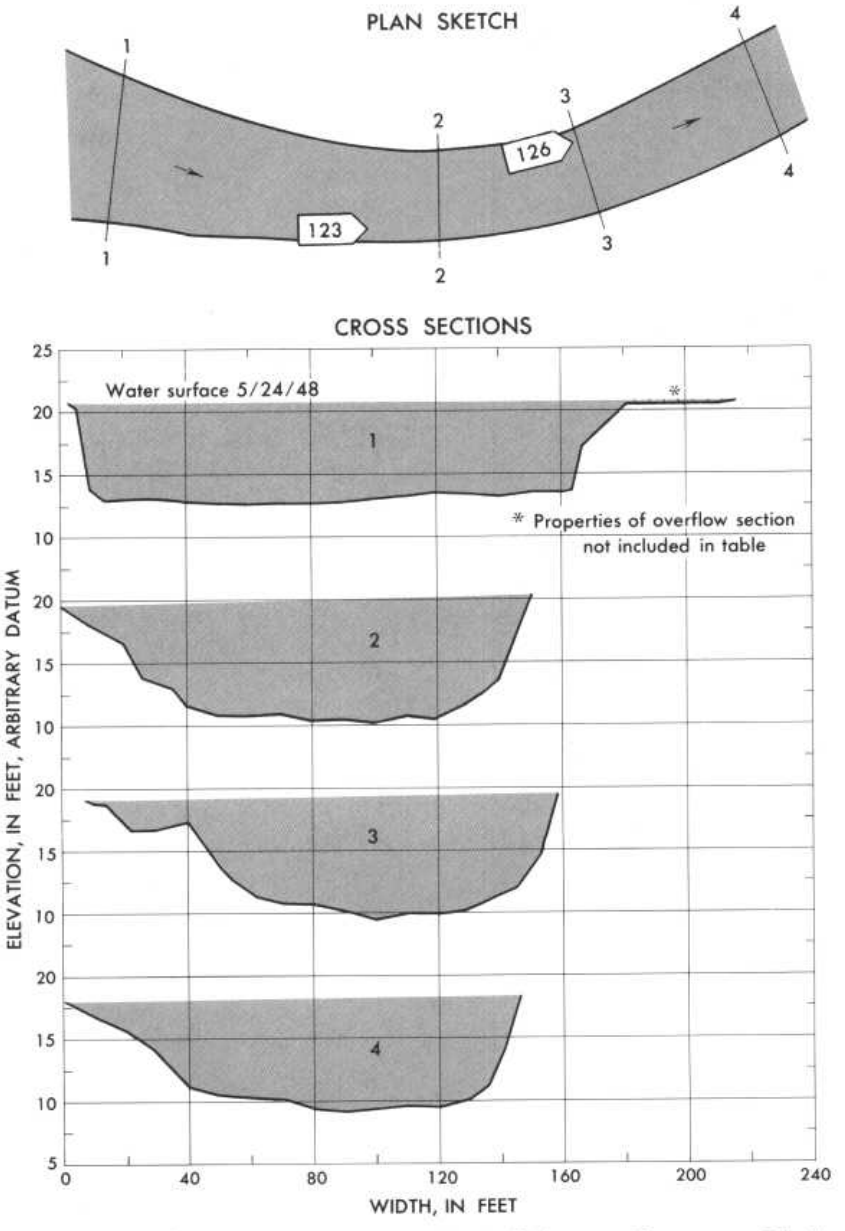
Description of channel.—Bed of gravel and well-rounded small boulders. Right bank is fairly steep and lined with trees and brush. Left bank slopes gently and has tree and brush cover below section 2.

Reach properties

Section	Area (sq ft)	Top width (ft)	Mean depth (ft)	Hydraulic radius (ft)	Mean velocity (ft per sec)	Length (ft) between sections	Fall (ft) between sections
1	1,224	176	6.96	6.74	6.56	.....	.....
2	1,090	150	7.27	7.13	7.37	269	0.73
3	919	118	7.78	7.47	8.74	185	.68
4	944	145	6.51	6.38	8.51	226	1.07

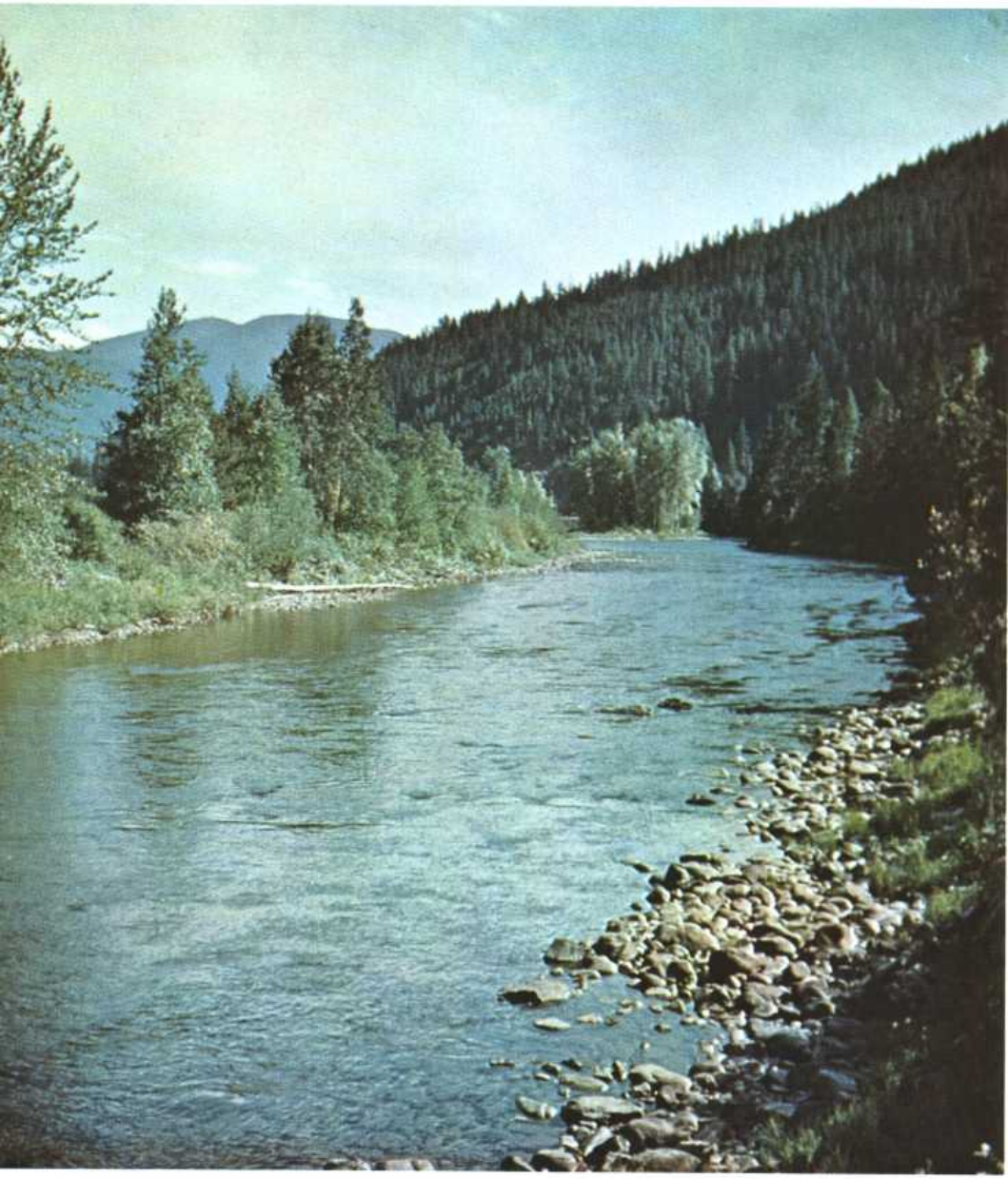
Notes.—

$n = 0.038$



Plan sketch and cross sections, Moyie River at Eastport, Idaho.

$n = 0.038$



No. 123 downstream from right bank above section 2, Moyie River at Eastport, Idaho.

$n = 0.038$

No. 126 downstream along left bank at section 3, Moyie River at Eastport, Idaho.

$n = 0.038$

12–4225. Spokane River at Spokane, Wash.

Gage location.—Lat 47°39′35″, long 117°26′50″, in SW¼ sec. 13, T. 25 N., R. 42 E., on right bank at Cochran Street in Spokane, 0.5 mile upstream from Latah Creek. Section 1 is about 800 ft upstream from gage.

Drainage area.—4,290 sq mi.

Date of flood.—May 31, 1948.

Gage height.—28.35 ft at gage; 29.37 at section 1.

Peak discharge.—39,600 cfs.

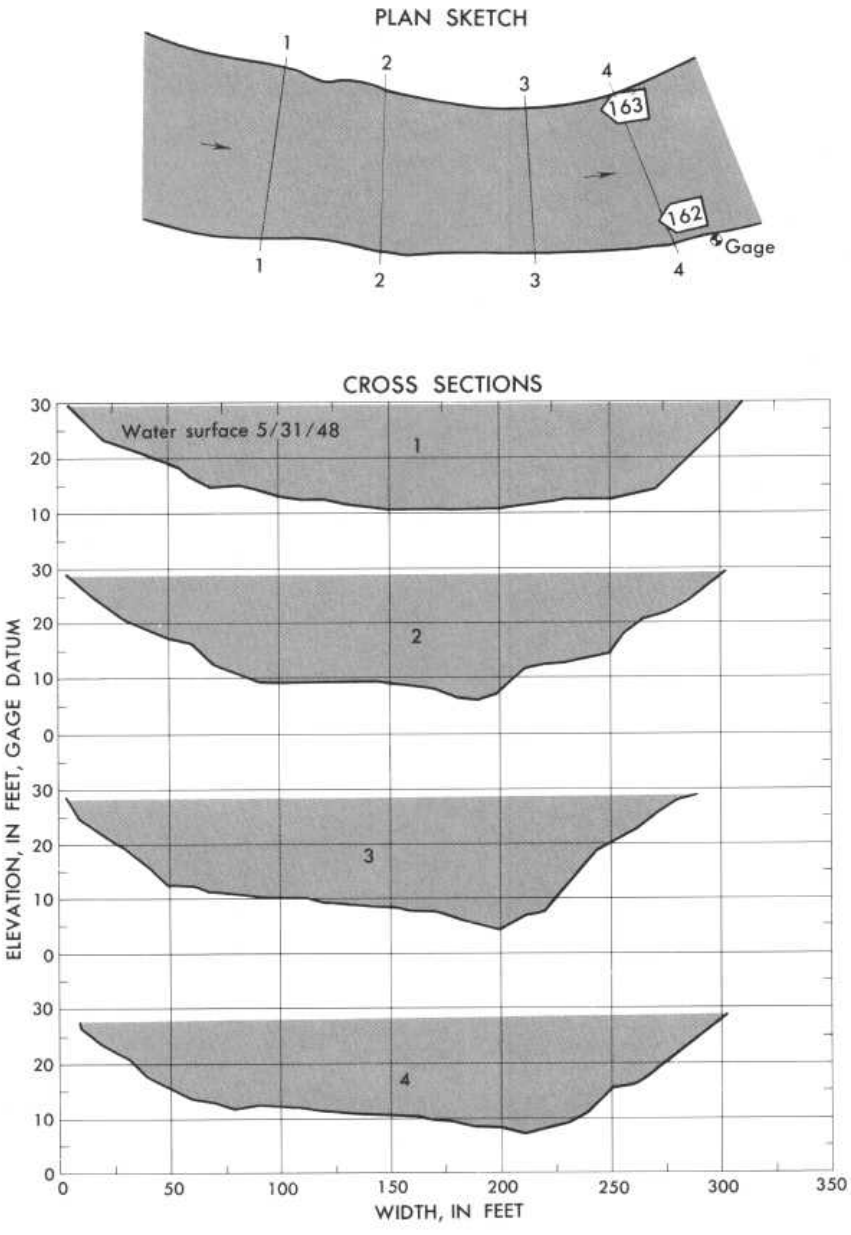
Computed roughness coefficient.—Manning $n = 0.038$.

Description of channel.—Bed is gravel and boulders; $d_{50} = 195$ mm, $d_{84} = 360$ mm. Banks are lined with trees and brush.

Reach properties

Section	Area (sq ft)	Top width (ft)	Mean depth (ft)	Hydraulic radius (ft)	Mean velocity (ft per sec)	Length (ft) between sections	Fall (ft) between sections
1	4,350	305	14.3	14.03	9.10	.....	.....
2	4,370	298	14.7	14.38	9.06	202	0.44
3	4,290	285	15.1	14.71	9.23	268	.49
4	4,120	293	14.1	13.84	9.61	220	.29

Notes.—



Plan sketch and cross sections, Spokane River at Spokane, Wash.

$n = 0.038$

No. 162 upstream along right bank from section 4, Spokane River at Spokane, Wash.

$n = 0.038$

No. 163 upstream along left bank from section 4, Spokane River at Spokane, Wash.

n = 0.043; 0.041; 0.039

2–2135. Tobesofkee Creek near Macon, Ga.

Gage location.—Lat 32°48′, long 83°46′, on right bank at downstream end of pier of bridge on U.S. Highway 80, 8 miles west of Macon, Bibb County, and 14 miles upstream from mouth. Section 1 is about 1,800 ft upstream from gage.

Drainage area.—182 sq mi.

Date of flood.—Mar. 7, 1958; Feb. 6, 1959; Feb. 9, 1959.

Gage height.—11.84 ft, 11.03 ft, 7.55 ft at gage; 13.31 ft, 12.51 ft, 9.02 ft at section 1.

Peak discharge.—2,540 cfs; 2,240 cfs; 1,260 cfs.

Computed roughness coefficient.—Manning n = 0.043; 0.041; 0.039.

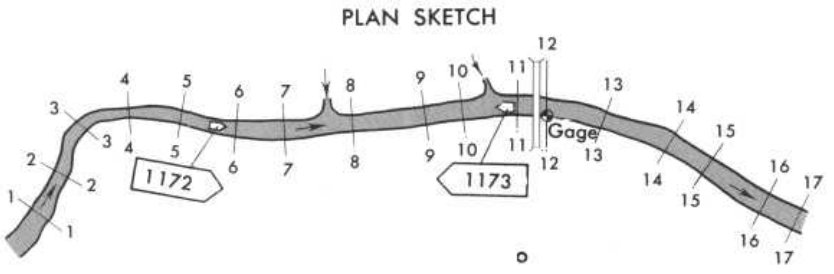
Description of channel.—Bed consists of sand, gravel, and a few outcrops. Banks are fairly uniform with overhanging trees and underbrush.

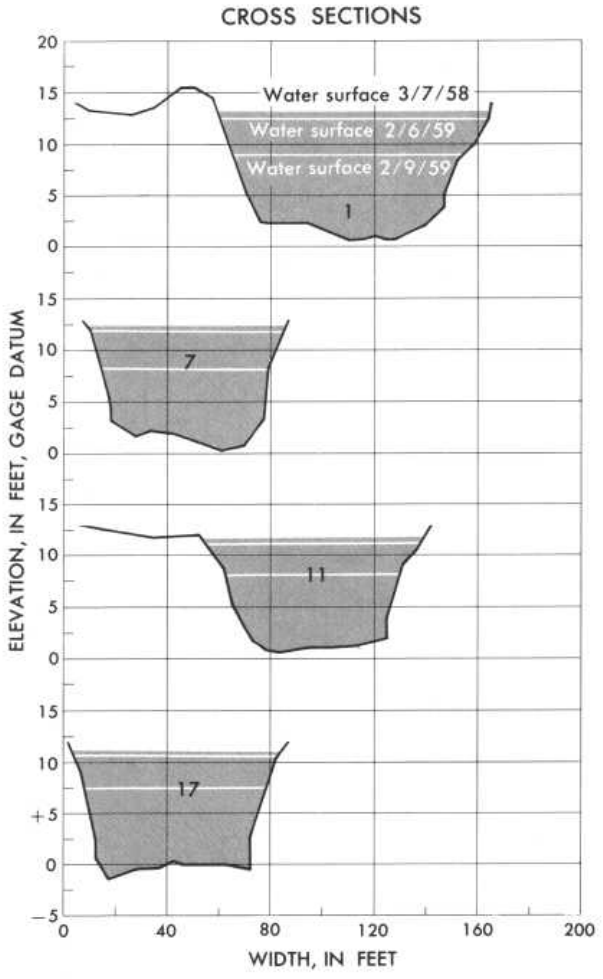
Reach properties

Section	Area (sq ft)	Top width (ft)	Mean depth (ft)	Hydraulic radius (ft)	Mean velocity (ft per sec)	Length (ft) between sections	Fall (ft) between sections
Mar. 7, 1958							
3	768	85	9.0	7.84	3.31	.....	.....
7	700	76	9.2	7.69	3.63	652	0.60
11	700	87	8.0	7.29	3.63	731	.58
14	761	80	9.5	8.36	3.34	495	.27
17	770	82	9.4	8.28	3.31	469	.36
Feb. 6, 1959							
3	700	81	8.8	7.65	3.20	.....	.....
7	640	74	8.7	7.40	3.50	652	0.60
11	625	83	7.6	6.80	3.58	731	.58
14	700	76	9.1	7.90	3.20	495	.27
17	715	79	9.1	8.00	3.13	469	.21
Feb. 9, 1959							
3	435	73	6.1	5.55	2.90	.....	.....
7	405	64	6.3	5.50	3.11	652	0.48
11	375	69	5.6	5.00	3.36	731	.60
14	450	64	6.5	5.85	2.80	495	.33
17	455	69	6.6	5.75	2.77	469	.30

Notes.—

$n = 0.043; 0.041; 0.039$





Plan sketch and cross sections, Tobesofkee Creek near Macon, Ga.

n = 0.043; 0.041; 0.039

No. 1172 downstream from section 6, Tobesofkee Creek near Macon, Ga.

$n = 0.043; 0.041; 0.039$

No. 1173 upstream from bridge section 12, Tobesofkee Creek near Macon, Ga.

8–1185. Bull Creek near Ira, Tex.

Gage location.—Lat 32°36′02″, long 101°05′40″, on left bank 800 ft upstream from bridge on Farm to Market Road 2085, 1.9 miles upstream from Colorado River, 5.3 miles downstream from Chimney Creek, 5.5 miles west of Ira, Scurry County, 7.7 miles northwest of Cuthbert, and 8.3 miles downstream from Bull Creek diversion dam. Section 1 is about 1,000 ft downstream from gage.

Drainage area.—388 sq mi, approximate contributing area.

Date of flood.—June 1, 1948.

Gage height.—8.84 ft at gage; 8.26 ft at section 1.

Peak discharge.—3,220 cfs.

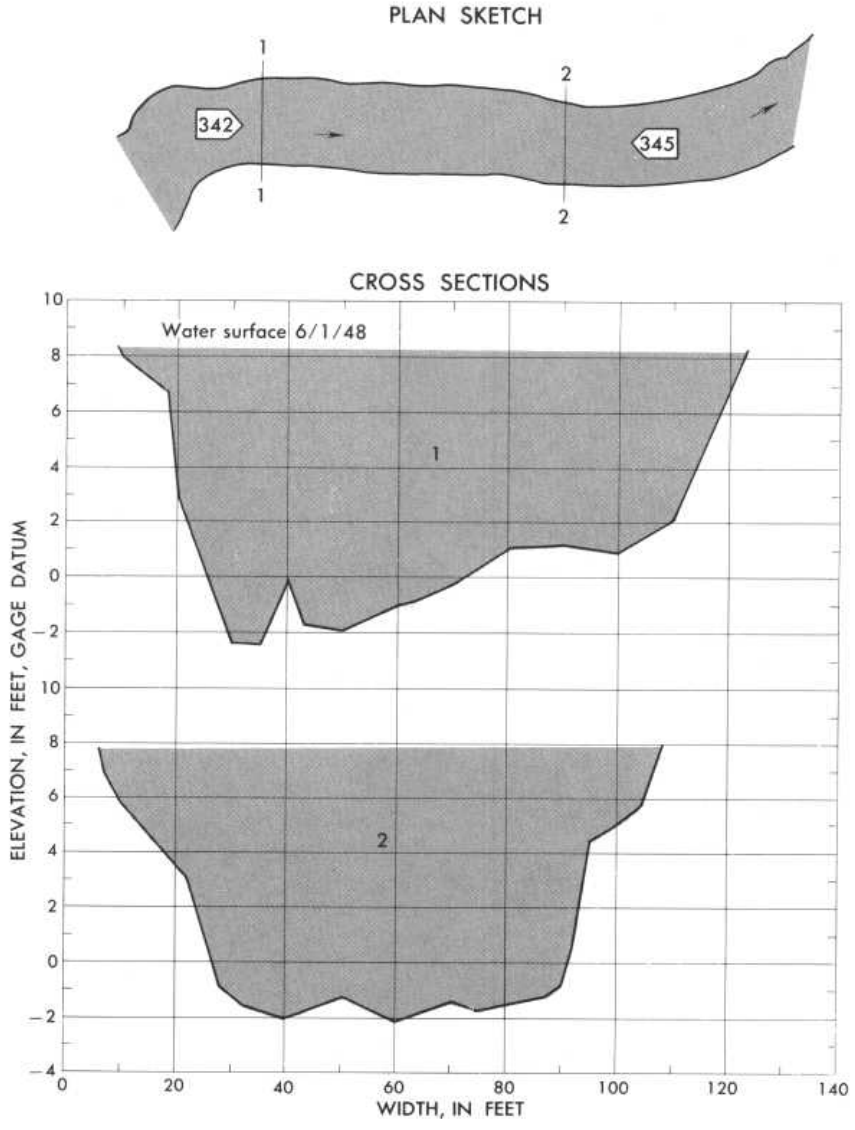
Computed roughness coefficient.—Manning $n = 0.041$.

Description of channel.—Bed is composed of sand, gravel, and small boulders with scattered large angular rocks. Banks are irregular and eroded, and have sparse cover of grass and scattered small trees. The channel reach between sections 1 and 2 is fairly straight. The channel curves sharply above the reach and moderately below it.

Reach properties

Section	Area (sq ft)	Top width (ft)	Mean depth (ft)	Hydraulic radius (ft)	Mean velocity (ft per sec)	Length (ft) between sections	Fall (ft) between sections
1	818	114	7.2	6.79	3.94	.....	.....
2	735	102	7.2	6.87	4.38	315	0.38

Notes.—



Plan sketch and cross sections, Bull Creek near Ira, Tex.

$n = 0.041$

No. 342 downstream from above section 1, Bull Creek near Ira, Tex.

$n = 0.041$

No. 345 upstream from below section 2, Bull Creek near Ira, Tex.

$n = 0.041$

12–3557. Middle Fork Flathead River near Essex, Mont.

Gage location.—Lat 48°10′20″, long 113°32′40″, near center of sec. 19, T. 28 N., R. 15 W., on right bank 0.25 mile downstream from Spruce Park Cabin, 1 mile downstream from Charlie Creek, and 7.5 miles southeast of Essex. Section 1 is 600 ft upstream from gage.

Drainage area.—408 sq mi.

Date of flood.—May 22, 1948.

Gage height.—10.95 ft at gage; 14.21 ft at section 1.

Peak discharge.—14,500 cfs.

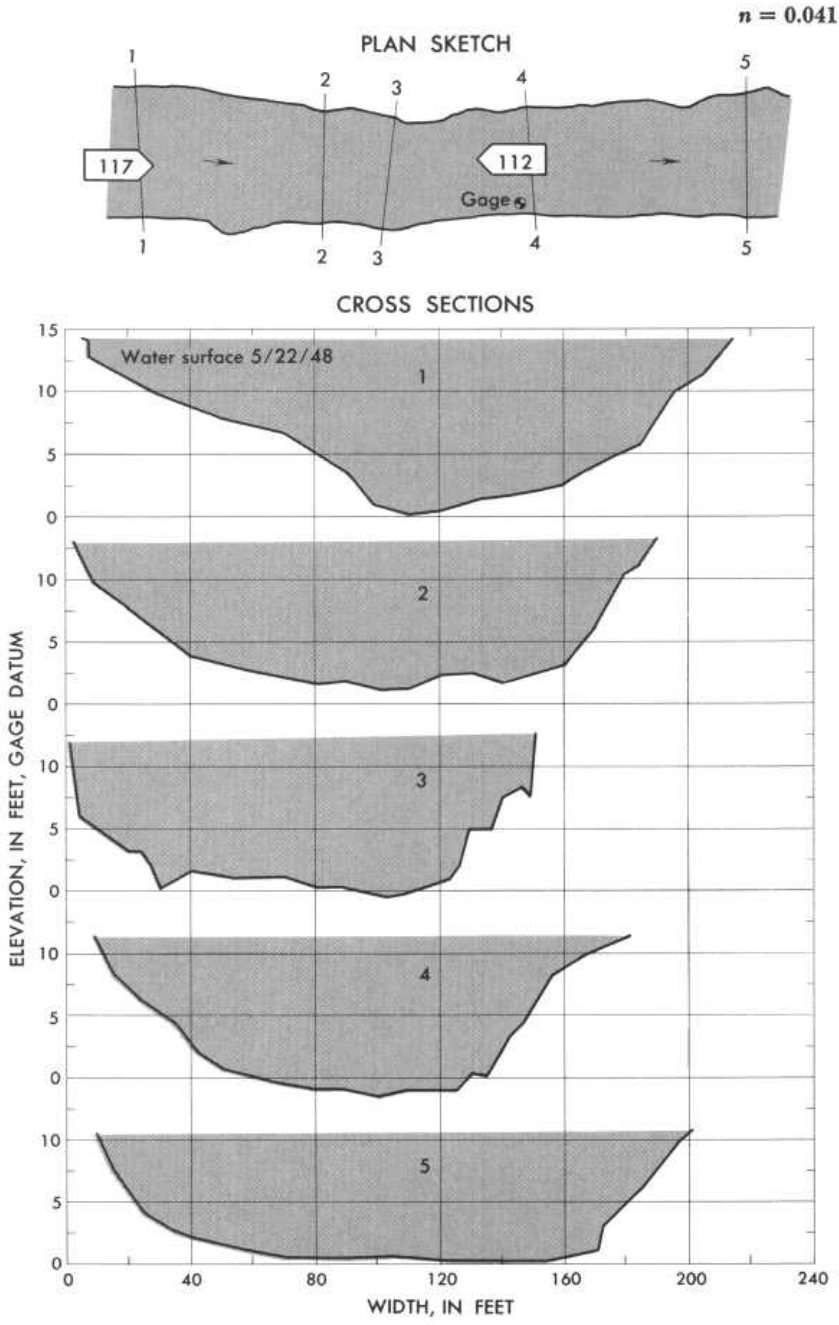
Computed roughness coefficient.—Manning $n = 0.041$.

Description of channel.—Bed consists of boulders; $d_{50} = 142$ mm, $d_{84} = 285$ mm. Banks are composed of gravel and boulders, and have trees and brush along the tops.

Reach properties

Section	Area (sq ft)	Top width (ft)	Mean depth (ft)	Hydraulic radius (ft)	Mean velocity (ft per sec)	Length (ft) between sections	Fall (ft) between sections
1	1,745	208	8.39	8.23	8.31	.....	.....
2	1,658	187	8.87	8.73	8.75	291	1.07
3	1,504	150	10.03	9.35	9.64	109	.64
4	1,472	172	8.56	8.37	9.85	221	.88
5	1,601	191	8.38	8.22	9.06	346	.87

Notes.—



Plan sketch and cross sections, Middle Fork Flathead River near Essex, Mont.

$n = 0.041$

No. 112 upstream from section 4, Middle Fork Flathead River near Essex, Mont.

$n = 0.041$

No. 117 downstream from section 1, Middle Fork Flathead River near Essex, Mont.

2–2175. Middle Oconee River near Athens, Ga.

Gage location.—Lat 33°58′, long 83°25′, on left bank 0.5 mile upstream from U.S. Highway 29, 2 miles west of Athens, Clarke County, and 5 miles upstream from Barber Creek. Section 3 is about 3,100 ft upstream from gage.

Drainage area.—398 sq mi.

Date of flood.—May 31, May 27, Apr. 17, 1959.

Gage height.—11.68 ft, 7.04 ft, 4.90 ft at gage; 13.34 ft, 8.96 ft, 7.24 ft at section 3.

Peak discharge.—6,110 cfs; 3,140 cfs; 2,210 cfs.

Computed roughness coefficient.—Manning n = 0.042; 0.041; 0.044.

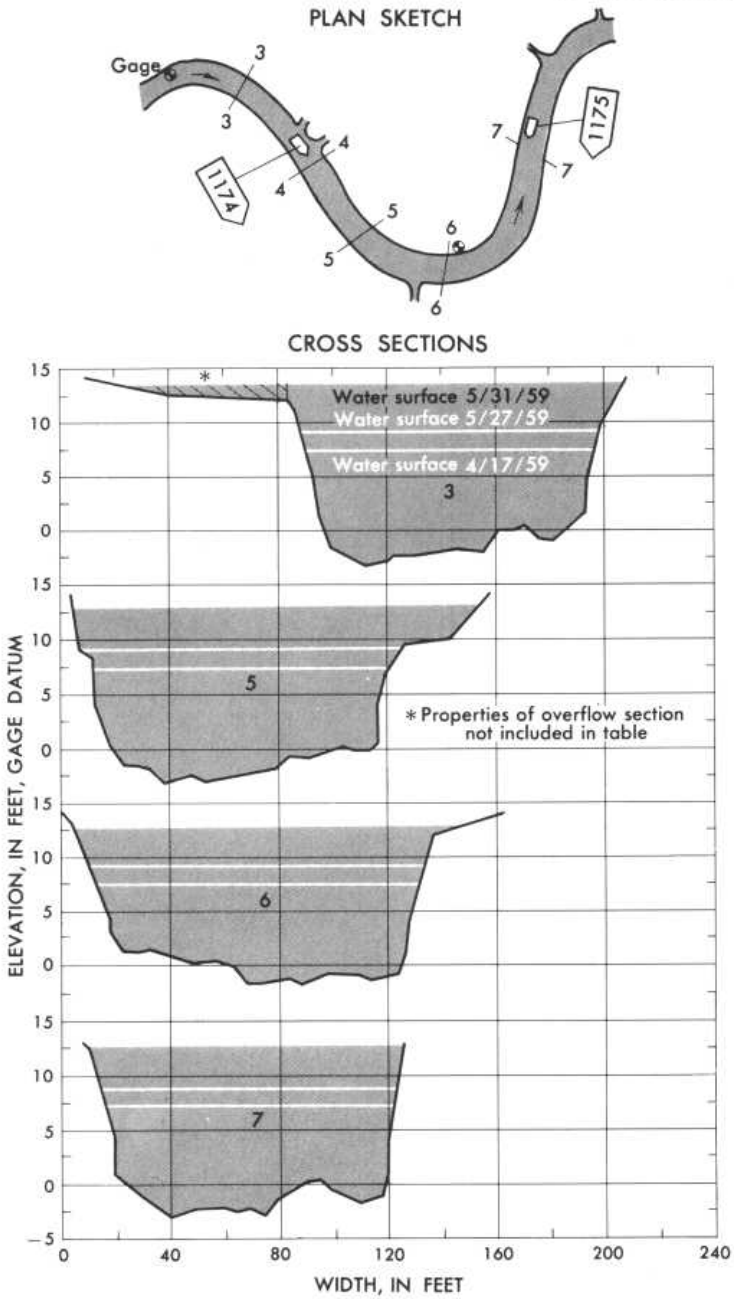
Description of channel.—Bed is sand and gravel with several outcrops in the reach. Banks are steep and lined with overhanging trees and bushes.

Reach properties

Section	Area (sq ft)	Top width (ft)	Mean depth (ft)	Hydraulic radius (ft)	Mean velocity (ft per sec)	Length (ft) between sections	Fall (ft) between sections
May 31, 1959							
3	1,560	161	9.7	8.91	3.92	.....	.....
4	1,510	140	10.8	10.38	4.05	278	0.07
5	1,560	146	10.7	9.94	3.92	554	.34
6	1,540	142	10.8	10.13	3.97	333	.10
7	1,450	116	12.5	11.19	4.20	399	.22
May 27, 1959							
3	1,020	108	9.5	8.83	3.09	.....	.....
4	940	116	8.1	7.70	3.34	278	0.21
5	1,000	112	8.9	8.38	3.12	554	.21
6	970	121	8.0	7.52	3.24	333	.16
7	950	107	8.9	8.05	3.30	399	.23
Apr. 17, 1959							
3	840	105	8.0	7.57	2.63	.....	.....
4	735	110	6.7	6.50	3.01	278	0.20
5	810	104	7.8	7.23	2.73	554	.29
6	758	116	6.5	6.11	2.92	333	.15
7	760	103	7.4	6.79	2.91	399	.28

Notes.—

$n = 0.042; 0.041; 0.044$



Plan sketch and cross sections, Middle Oconee River near Athens, Ga.

n = 0.042; 0.041; 0.044

No. 1174 downstream from above section 4, Middle Oconee River near Athens, Ga.

$n = 0.042; 0.041; 0.044$

No. 1175 upstream from right bank at section 7, Middle Oconee River near Athens, Ga.

6–3940. Beaver Creek near Newcastle, Wyo.

Gage location.—Lat 43°32′05″, long 104°07′00″, in NW¼ sec. 18, T. 41 N., R. 60 W., at highway bridge, 2.5 miles downstream from Sheep Creek, and 23 miles south of Newcastle. Section 1 is about 300 ft downstream from gage.

Drainage area.—1,320 sq mi, approximately.

Date of flood.—May 30, 1953.

Gage height.—12.75 ft at gage; 11.98 ft at section 1.

Peak discharge.—1,600 cfs.

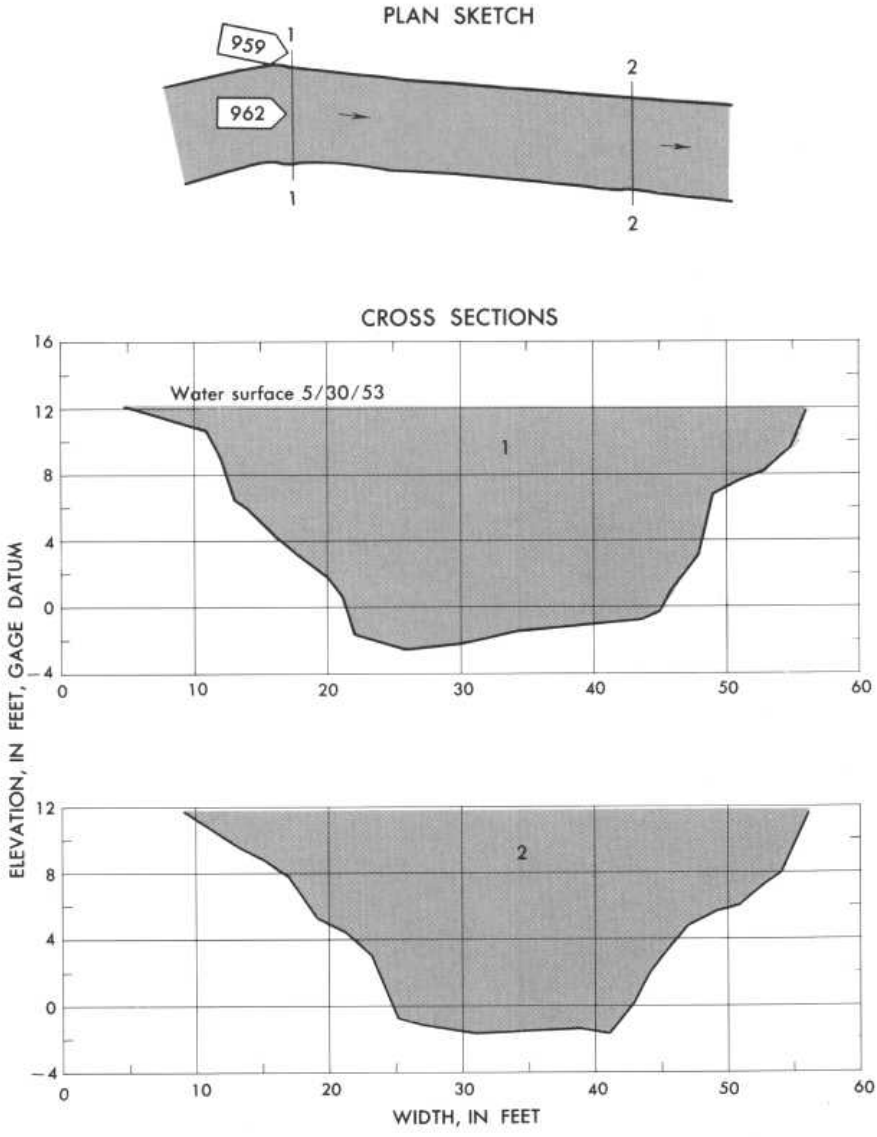
Computed roughness coefficient.—Manning $n = 0.043$.

Description of channel.—Bed is mostly sand and silt. Banks are irregular and have thick growth of brush. Channel curves about 20° to the right above the reach and straightens below it.

Reach properties

Section	Area (sq ft)	Top width (ft)	Mean depth (ft)	Hydraulic radius (ft)	Mean velocity (ft per sec)	Length (ft) between sections	Fall (ft) between sections
1	461	51	9.0	7.20	3.49	.....	.....
2	389	47	8.3	6.68	4.11	194	0.24

Notes.—



Plan sketch and cross sections, Beaver Creek near Newcastle, Wyo.

$n = 0.043$

No. 959 downstream from left bank at section 1, Beaver Creek near Newcastle, Wyo.

$n = 0.043$

No. 962 downstream from above section 1, Beaver Creek near Newcastle, Wyo.