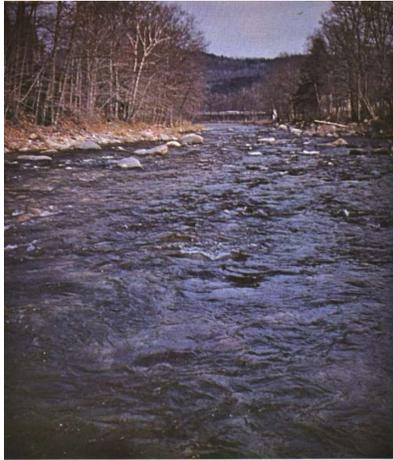
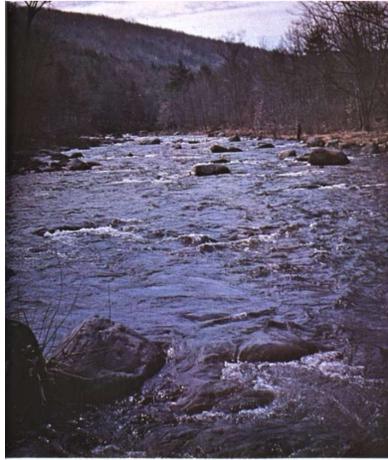


Roughness Characteristics of Natural Channels

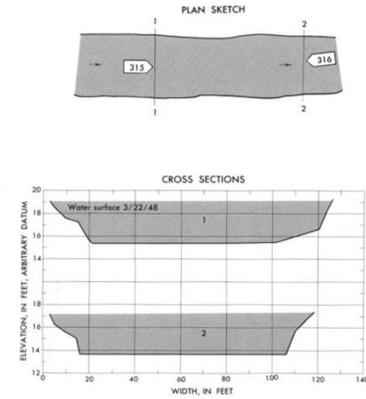
01180500 Middle Branch Westfield River at Goss Heights, Mass.



No. 315 downstream from above section 1, Middle Branch Westfield River at Goss Heights, Mass.



No. 316 upstream from below section 2, Middle Branch Westfield River at Goss Heights, Mass.



Plan sketch and cross sections, Middle Branch Westfield River at Goss Heights, Mass.

Location.-- Lat 42°15'31", long 72°52'23", near Goss Heights, Massachusetts.

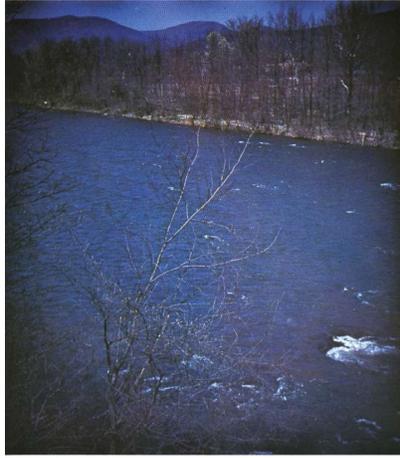
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
Mar. 22, 1948	4.35	---	3408.9	516.5	4.28	6.600	0.008679	0.056

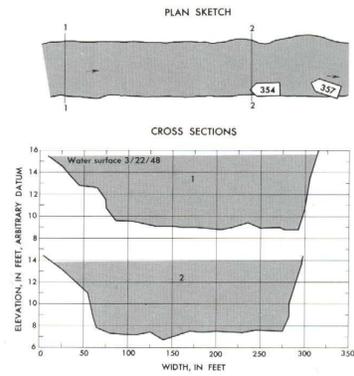
01362500 Esopus Creek at Coldbrook



No. 354 upstream along left bank from section 2, Esopus Creek at Coldbrook, N.Y.



No. 357 upstream from right end of bridge below reach, Esopus Creek at Coldbrook, N.Y. (at Highway 28-A).



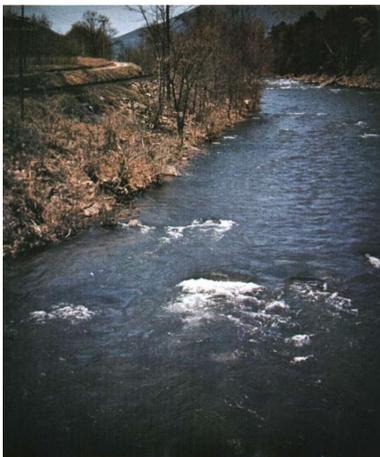
Plan sketch and cross sections, Esopus Creek at Coldbrook, N.Y.

Location.-- Lat 42°00'45", long 76°16'10", near Coldbrook, New York.

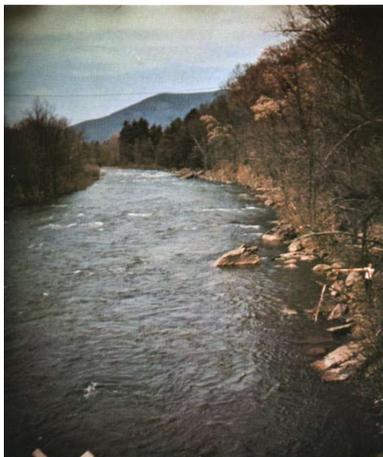
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
Mar. 22, 1948	5.45	---	13935.9	1594.5	5.51	8.740	0.003397	0.030

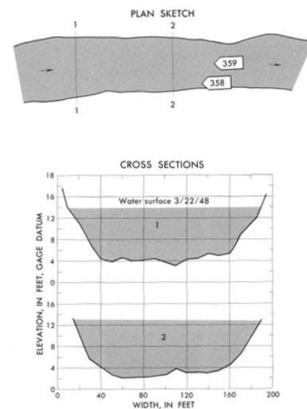
01362500 Esopus Creek at Coldbrook, N.Y.



No. 358 upstream along right bank from below reach, Esopus Creek at Coldbrook, N.Y.



No. 359 upstream along left bank from below reach, Esopus Creek at Coldbrook, N.Y.



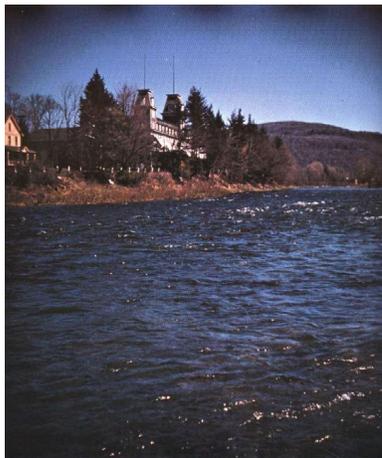
Plan sketch and cross sections, Esopus Creek at Coldbrook, N.Y.

Location.-- Lat 42°00'45", long 76°16'10", near Coldbrook, New York.

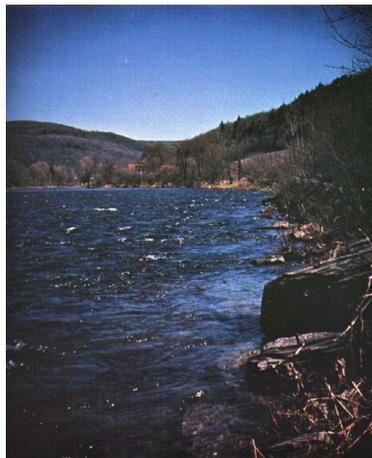
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 22, 1948	8.25	---	13866.2	1465.0	8.13	9.465	0.004457	0.043

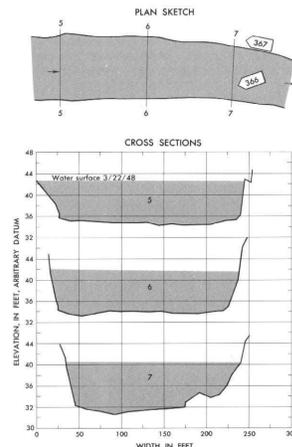
01420500 Beaver Kill at Cooks Falls



No. 366 upstream toward right bank from section 7, Beaver Kill at Cooks Falls, N.Y.



No. 367 upstream along left bank from section 7, Beaver Kill at Cooks Falls, N.Y.



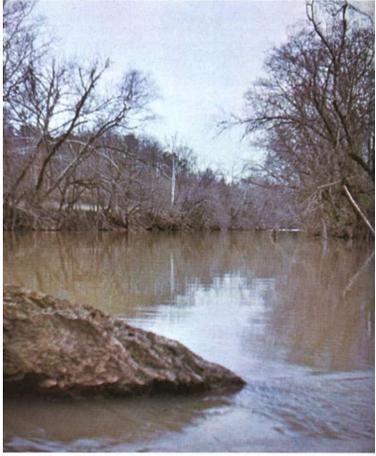
Plan sketch and cross sections, Beaver Kill at Cooks Falls, N.Y.

Location.-- Lat 41°56'50", long 74°58'45", near Cooks Falls, New York.

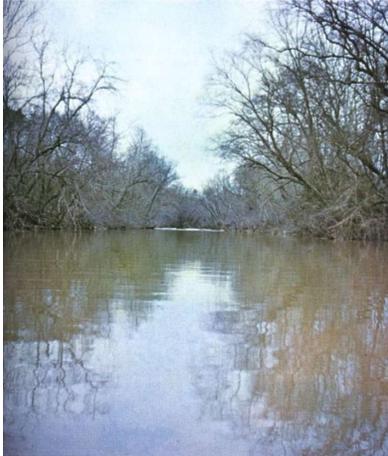
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
Mar. 22, 1948	7.40	---	15493.5	1650.0	7.27	9.390	0.003381	0.033

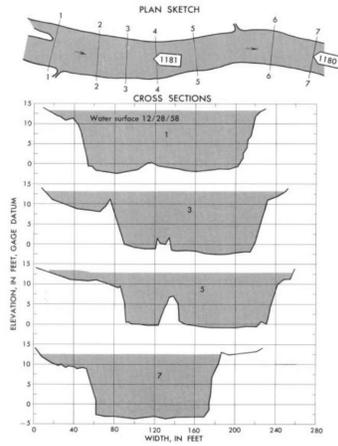
02100500 Deep River at Ramseur, N.C.



No. 1180 upstream from section 7, Deep River at Ramseur, N.C.



No. 1181 upstream from section 4, Deep River at Ramseur, N.C.



Plan sketch and cross sections, Deep River at Ramseur, N.C.

Location.-- Lat 35°44'__", long 79°30'__", near Ramseur, North Carolina.

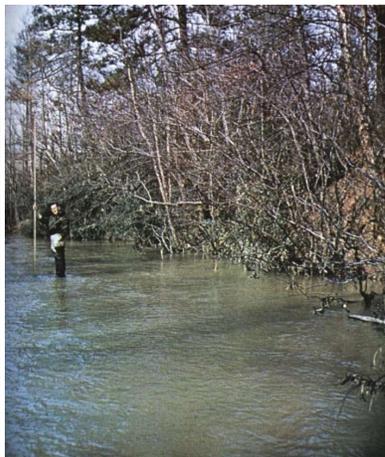
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
Dec. 28, 1958	10.37	---	8342.1	2214.4	9.77	3.767	0.000768	0.049

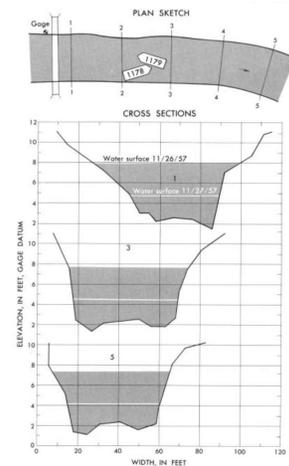
02188500 South Beaverdam Creek near Dewy Rose, Ga.



No. 1178 downstream along left bank from section 2, South Beaverdam Creek near Dewy Rose, Ga.



No. 1179 upstream from section 2, South Beaverdam Creek near Dewy Rose, Ga.



Plan sketch and cross sections, South Beaverdam Creek near Dewy Rose, Ga.

Location.-- Lat 34°11'__", long 82°57'__", near Dewy Rose, Georgia.

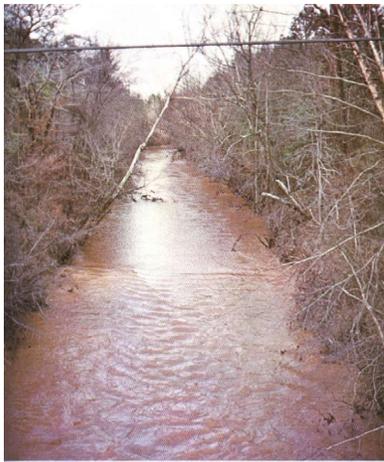
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
Nov. 26, 1957	4.58	---	821.1	275.0	4.29	2.986	0.001596	0.052
Nov. 27, 1957	2.24	---	224.0	107.2	2.15	2.090	0.001525	0.047

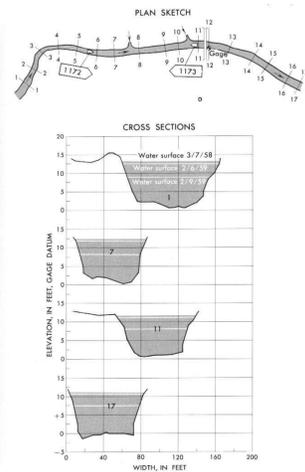
02213500 Tobesofkee Creek near Macon



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



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



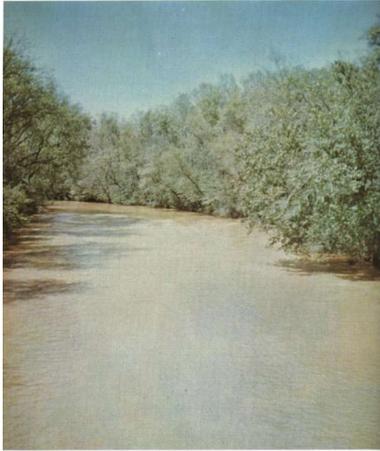
Plan sketch and cross sections, Tobesofkee Creek near Macon, Ga.

Location.-- Lat 32°48'__", long 83°46'__", near Macon, Georgia.

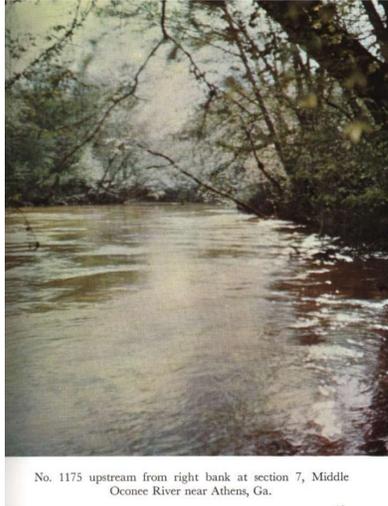
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
Mar. 7, 1958	6.22	---	1267.8	424.0	5.53	2.990	0.000729	0.043
Feb. 6, 1959	8.66	---	2251.1	676.0	7.55	3.330	0.000707	0.041
Feb. 9, 1959	9.02	---	2544.9	739.8	7.90	3.440	0.000771	0.039

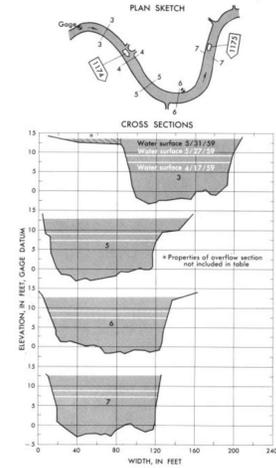
02217500 Middle Oconee River near Athens, Ga.



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



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



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

Location.-- Lat 33°58'__", long 83°25'__", near Athens, Georgia.

Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 31, 1959	10.90	---	6114.3	1524.0	10.11	4.012	0.000467	0.042
May 27, 1959	8.68	---	3140.8	976.0	8.10	3.218	0.000518	0.041
Apr. 17, 1959	7.28	---	2216.9	780.6	6.84	2.840	0.000588	0.044

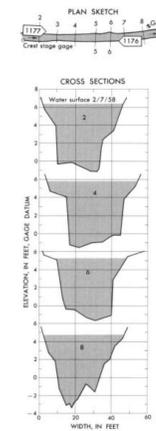
02221000 Murder Creek near Monticello, Ga.



No. 1176 upstream from right bank at section 7, Murder Creek near Monticello, Ga.



No. 1177 downstream from left bank at section 2, Murder Creek near Monticello, Ga.



Plan sketch and cross sections, Murder Creek near Monticello, Ga.

Location.-- Lat 33°25'__", long 83°40'__", near Monticello, Georgia.

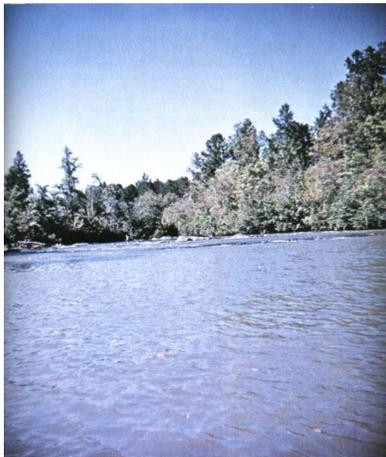
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
Feb. 7, 1958	4.60	---	848.7	205.9	3.97	4.123	0.002674	0.045

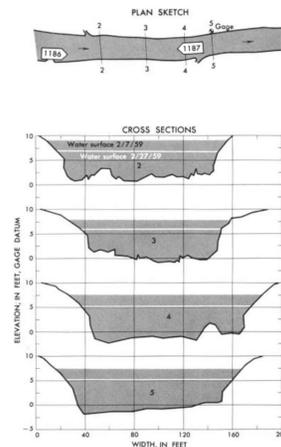
02331000 Chattahoochee River near Leaf, Ga.



No. 1186 downstream from above section 2, Chattahoochee River near Leaf, Ga.



No. 1187 upstream from section 4, Chattahoochee River near Leaf, Ga.



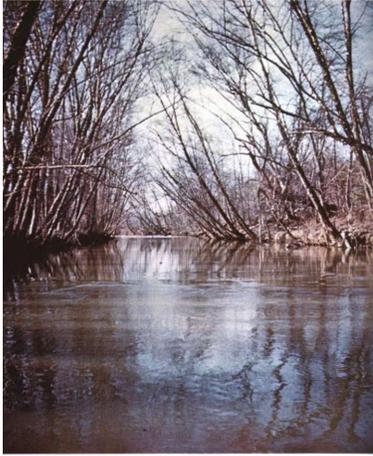
Plan sketch and cross sections, Chattahoochee River near Leaf, Ga.

Location.-- Lat 34°35'__", long 83°38'__", near Leaf, Georgia.

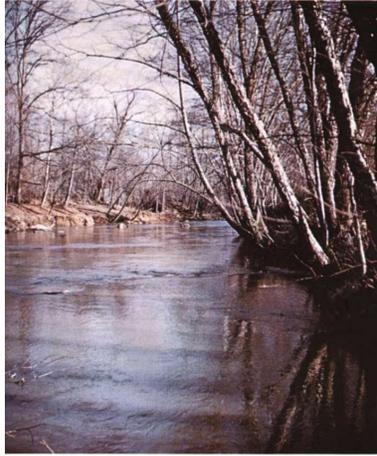
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
Feb. 7, 1959	7.70	---	17518.7	1135.0	7.41	15.435	0.002428	0.051
Feb. 27, 1959	6.25	---	2541.4	810.0	6.04	3.138	0.002775	0.074

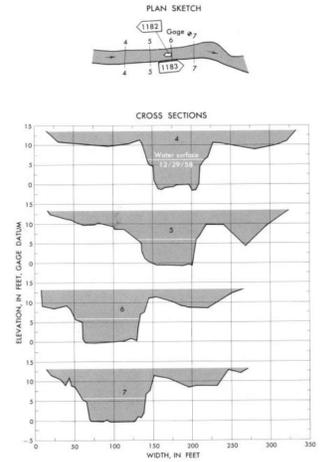
02935000 Haw River near Benaja, N.C.



No. 1182 upstream from section 6, Haw River near Benaja, N.C.



No. 1183 downstream along right bank from section 6, Haw River near Benaja, N.C.



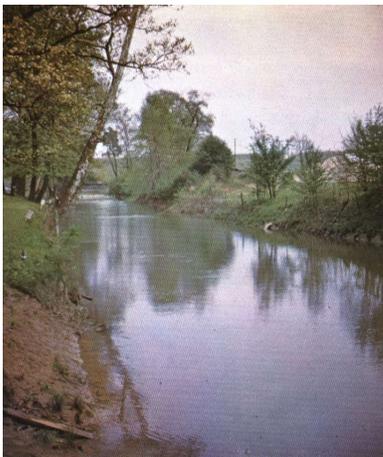
Plan sketch and cross sections, Haw River near Benaja, N.C.

Location.-- Lat 36°16'__", long 79°34'__", near Benaja, North Carolina.

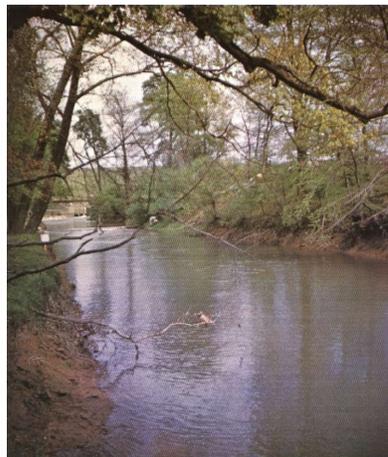
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
Dec. 29, 1958	5.28	---	1000.5	404.2	4.87	2.475	0.001152	0.059

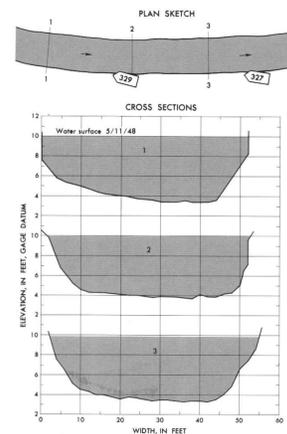
03121500 Indian Fork below Atwood Dam



No. 327 upstream from right bank below section 3, Indian Fork below Atwood Dam, near New Cumberland, Ohio.



No. 329 upstream from right bank at section 2, Indian Fork below Atwood Dam, near New Cumberland, Ohio.



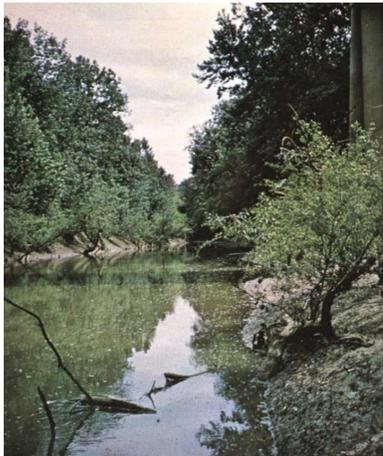
Plan sketch and cross sections, Indian Fork below Atwood Dam, near New Cumberland, Ohio.

Location.-- Lat 40°31'30", long 81°17'20", near New Cumberland, Ohio.

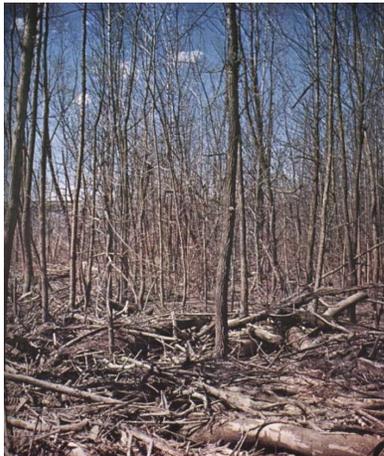
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 11, 1948	5.40	---	767.3	277.0	4.87	2.770	0.000283	0.026

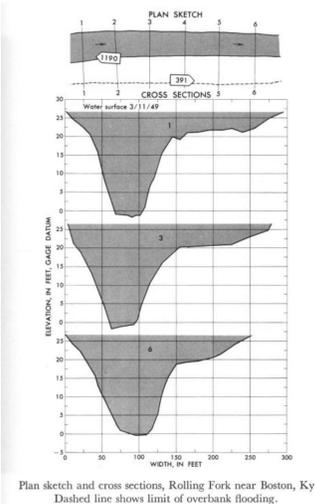
03301500 Rolling Fork near Boston, Ky.



No. 1190 upstream from left bank below section 6, Rolling Fork at Boston, Ky.



No. 391 downstream through right overflow from section 2, Rolling Fork at Boston, Ky.

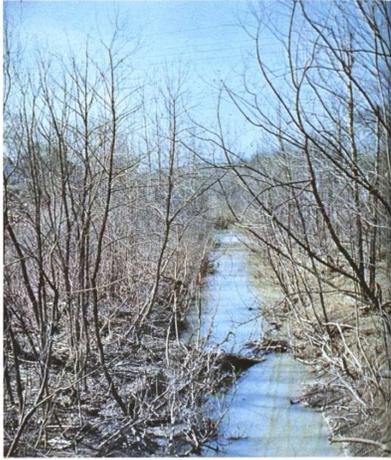


Location.-- Lat 37°46'02", long 85°42'14", near Boston, Kentucky.

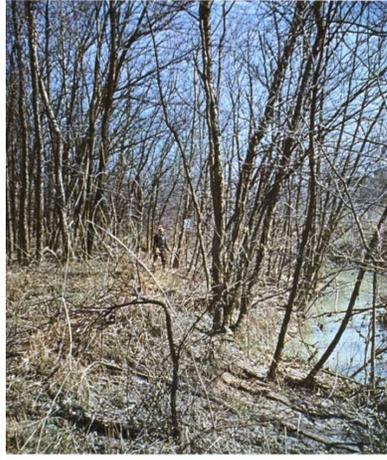
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
Mar. 11, 1949	13.97	---	5780.2	2428.7	15.45	2.380	0.000158	0.046
Mar. 11, 1949	4.85	---	325.8	603.3	4.85	0.540	0.000158	0.097

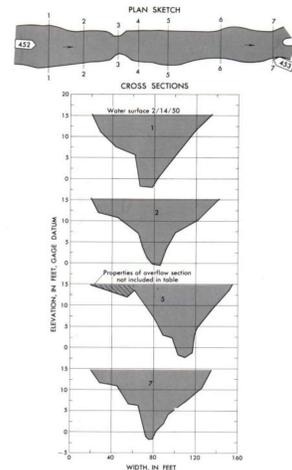
03302000 Pond Creek near Louisville, Ky.



No. 452 downstream from above section 1, Pond Creek near Louisville, Ky.



No. 453 upstream from right bank at section 7, Pond Creek near Louisville, Ky.



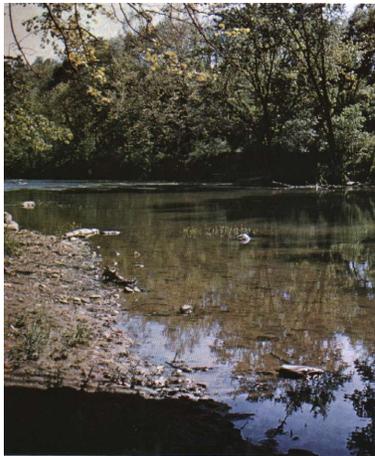
Plan sketch and cross sections, Pond Creek near Louisville, Ky.

Location.-- Lat 38°07'11", long 85°47'45", near Louisville, Kentucky.

Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
Feb. 14, 1950	5.22	---	1503.0	801.3	7.24	1.876	0.000637	0.070

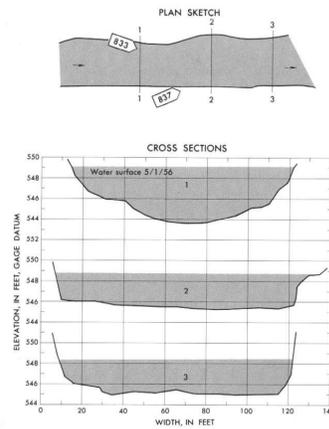
03336645 Middle Fork Vermilion River near Danville



No. 833 downstream from left bank at section 1, Middle Fork Vermilion River near Danville, Ill.



No. 837 downstream from right bank at section 1, Middle Fork Vermilion River near Danville, Ill.



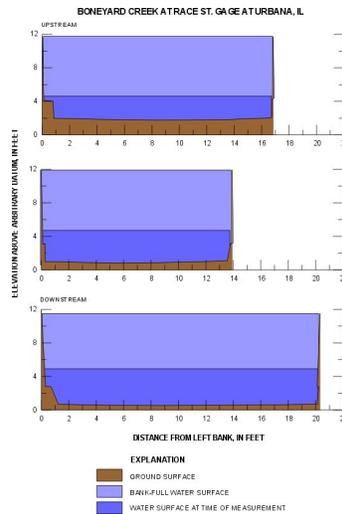
Plan sketch and cross sections, Middle Fork Vermilion River near Danville, Ill.

Location.-- Lat 40°08'14", long 87°44'45", near Danville, Illinois.

Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 1, 1956	3.27	---	1632.1	378.7	3.22	4.310	0.003100	0.037

03337250 Boneyard Creek at Race St. at Urbana, Ill

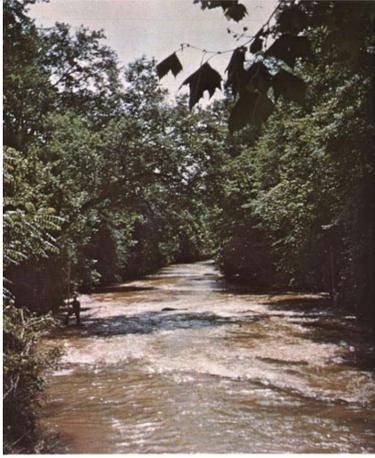


Location.-- Lat 40°06'53", long 88°12'33", near Urbana, Illinois.

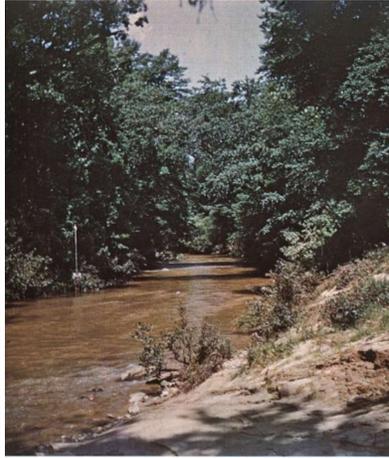
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
Oct. 25, 2001	4.17	---	303.5	79.2	3.96	3.900	0.000504	0.021

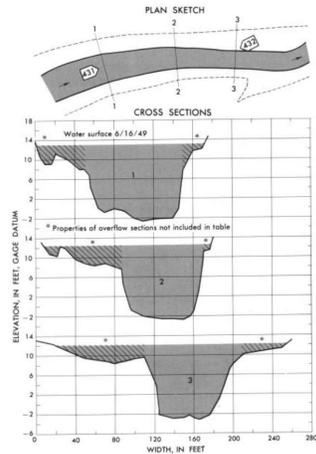
03448500 Hominy Creek at Candler, N.C.



No. 431 downstream from above section 1, Hominy Creek at Candler, N.C.



No. 432 upstream from left bank at section 3, Hominy Creek at Candler, N.C.



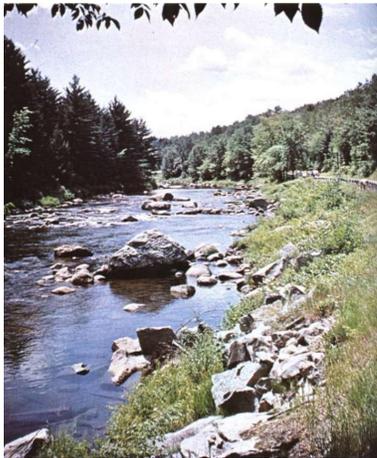
Plan sketch and cross sections, Hominy Creek at Candler, N.C. Dashed lines show limits of overbank flooding.

Location.-- Lat 35°32'28", long 82°40'35", near Candler, North Carolina.

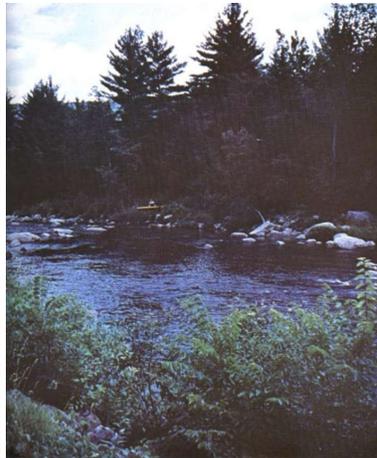
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
June 16, 1949	12.60	---	6480.8	1216.7	11.56	5.327	0.002000	0.060

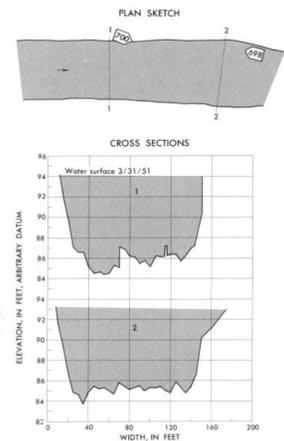
04275000 East Branch Ausable River at Au Sable Forks, N.Y.



No. 698 upstream along left bank from below section 2, East Branch Ausable River at Au Sable Forks, N.Y.



No. 700 downstream from left bank at section 1, East Branch Ausable River at Au Sable Forks, N.Y.



Plan sketch and cross sections, East Branch Ausable River at Au Sable Forks, N.Y.

Location.-- Lat 44°26'20", long 73°40'55", near Au Sable Forks, New York.

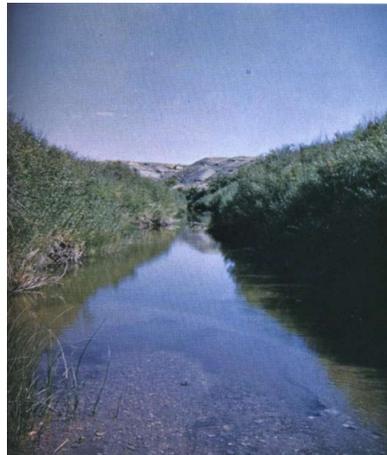
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
Mar. 31, 1951	7.10	---	7773.6	1070.0	6.72	7.265	0.005618	0.055

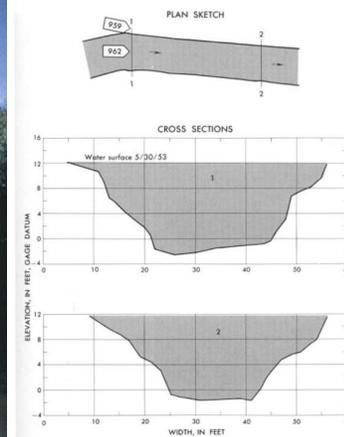
06394000 Beaver Creek near Newcastle, Wyo.



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



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



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

Location.-- Lat 43°32'05", long 104°07'00", near Newcastle, Wyoming.

Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 30, 1953	8.65	---	1615.0	425.0	6.94	3.800	0.001237	0.043

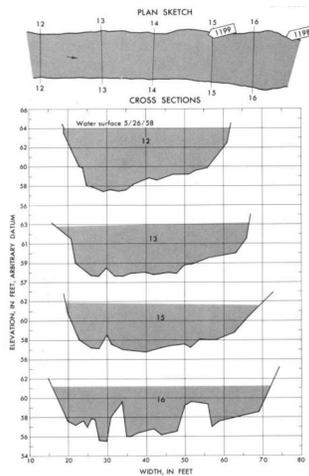
06719500 Clear Creek near Golden, Colo.



No. 1198 upstream from section 16, Clear Creek near Golden, Colo.



No. 1199 upstream from left bank at section 15, Clear Creek near Golden, Colo.



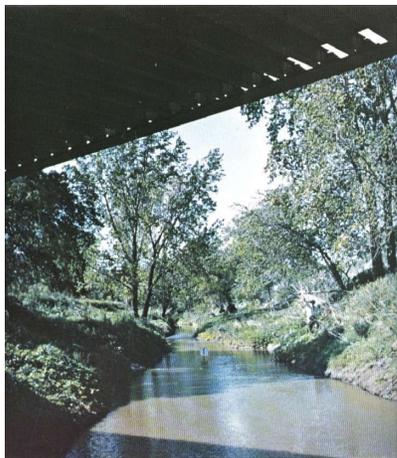
Plan sketch and cross sections, Clear Creek near Golden, Colo.

Location.-- Lat 39°45'05", long 105°14'55", near Golden, Colorado.

Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 26, 1958	3.82	---	1383.4	191.4	3.48	7.228	0.016768	0.050

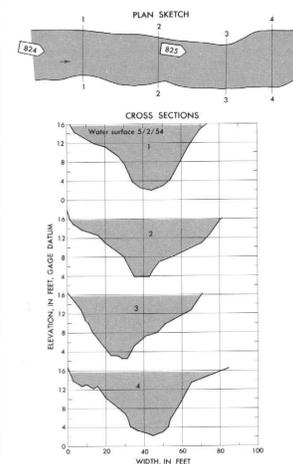
06803000 Salt Creek at Roca



No. 824 downstream from above section 1, Salt Creek at Roca, Nebr.



No. 825 downstream from below section 2, Salt Creek at Roca, Nebr.



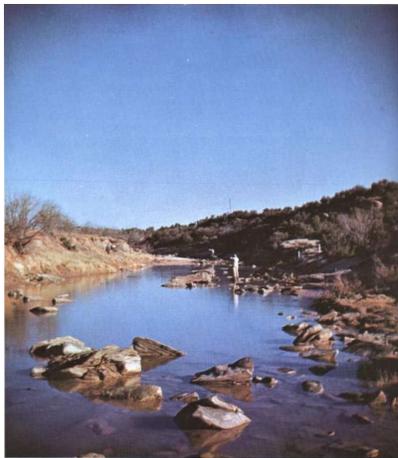
Plan sketch and cross sections, Salt Creek at Roca, Nebr.

Location.-- Lat 40°39'33", long 96°39'39", near Roca, Nebraska.

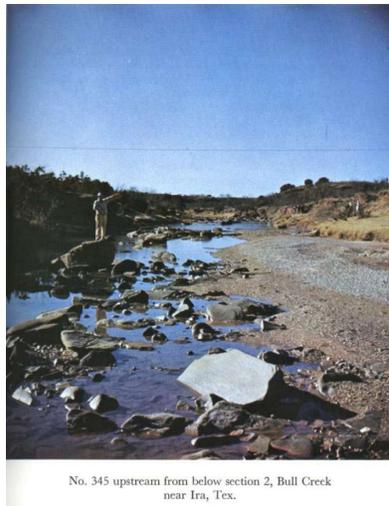
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 2, 1954	6.83	---	1853.2	506.0	6.28	3.663	0.000560	0.030

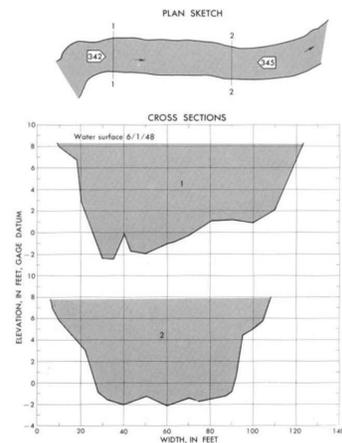
08118500 Bull Creek near Ira



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



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



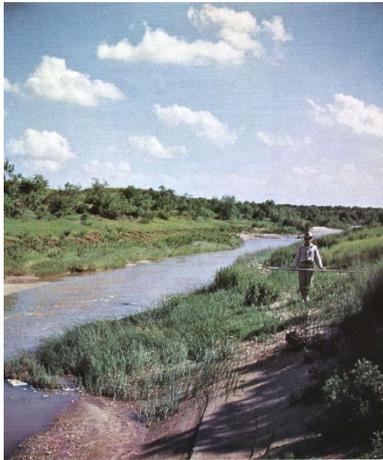
Plan sketch and cross sections, Bull Creek near Ira, Tex.

Location.-- Lat 32°36'02", long 101°05'40", near Ira, Texas.

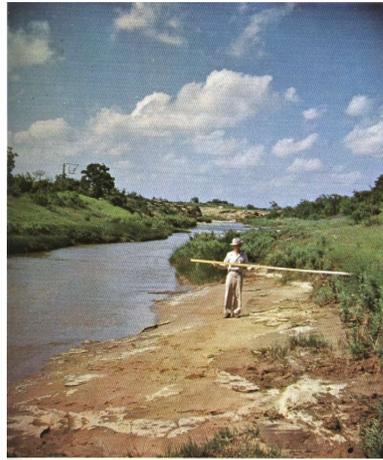
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
June 1, 1948	7.20	---	3230.2	776.5	6.83	4.160	0.001206	0.041

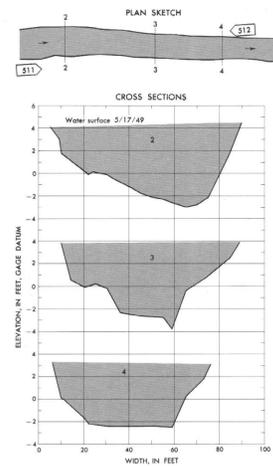
08123500 Champlin Creek near Colorado City



No. 511 downstream along right bank from above section 2, Champlin Creek near Colorado City, Tex.



No. 512 upstream along left bank from below section 4, Champlin Creek near Colorado City, Tex.



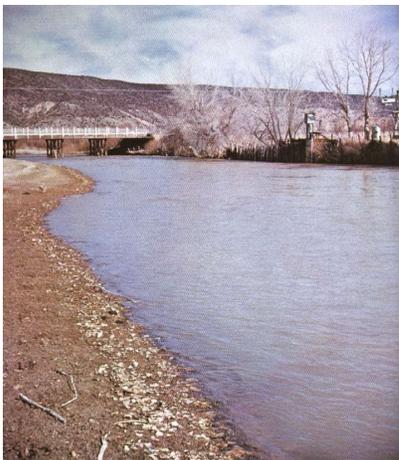
Plan sketch and cross sections, Champlin Creek near Colorado City, Tex.

Location.-- Lat 32°19'__", long 100°49'__", near Colorado City, Texas.

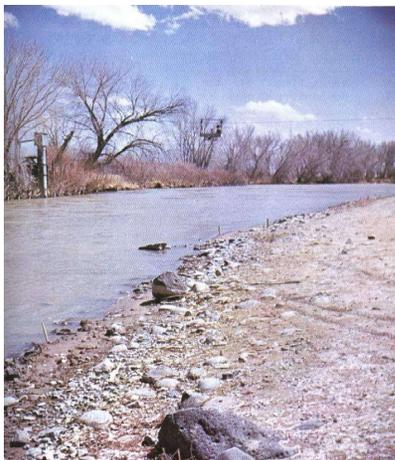
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 17, 1949	4.53	---	2427.2	354.3	4.38	6.850	0.003519	0.027

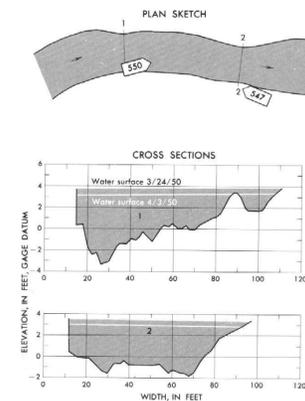
08290000 Rio Chama near Chamita



No. 547 upstream along right bank from below section 2, Rio Chama near Chamita, N. Mex.



No. 550 downstream from right bank at section 1, Rio Chama near Chamita, N. Mex.



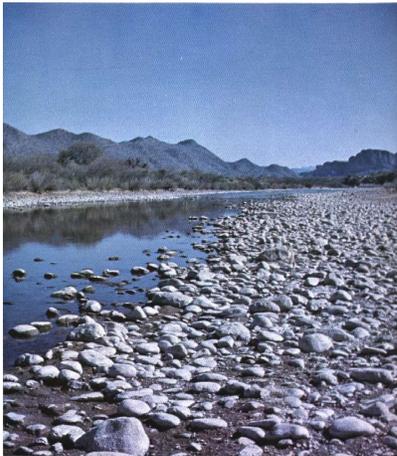
Plan sketch and cross sections, Rio Chama near Chamita, New Mex.

Location.-- Lat 36°04'25", long 106°06'39", near Chamita, New Mexico.

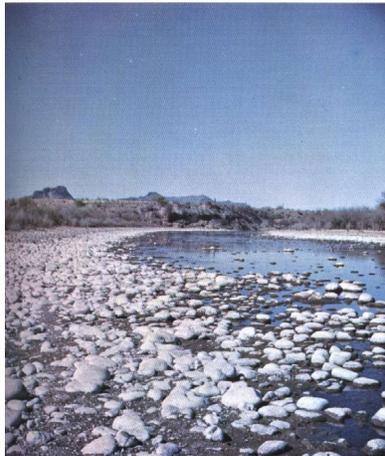
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
Mar. 24, 1950	3.40	---	1062.7	304.5	3.29	3.490	0.001188	0.032
Mar. 24, 1950	2.85	---	684.9	242.0	2.74	2.830	0.001139	0.036

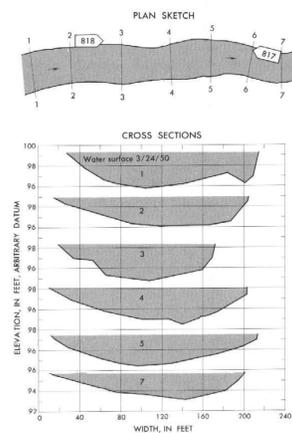
09502000 Salt River below Stewart Mountain Dam



No. 817 upstream along left bank from below section 6 Salt River below Stewart Mountain Dam, Ariz.



No. 818 downstream along left bank from section 2, Salt River below Stewart Mountain Dam, Ariz.



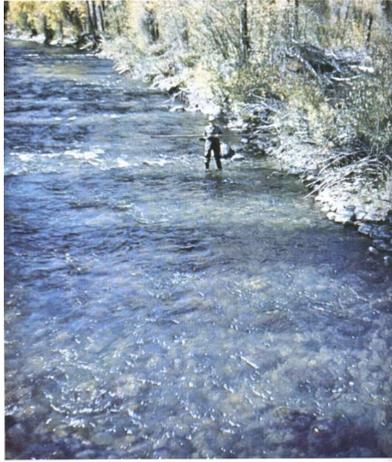
Plan sketch and cross sections, Salt River below Stewart Mountain Dam, Ariz.

Location.-- Lat 33°33'00", long 111°34'31", near Stewart, Arizona.

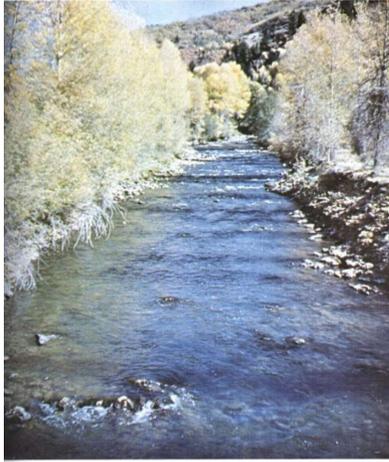
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
Mar. 24, 1950	2.18	---	1303.8	404.9	2.14	3.220	0.001903	0.032

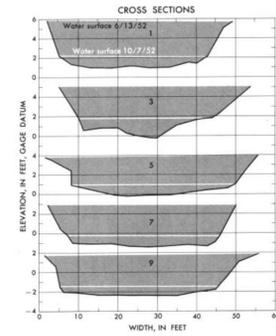
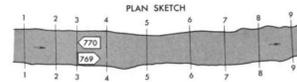
10155000 Provo River near Hailstone, Utah



No. 769 downstream from section 3, Provo River near Hailstone, Utah.



No. 770 upstream from section 3, Provo River near Hailstone, Utah.



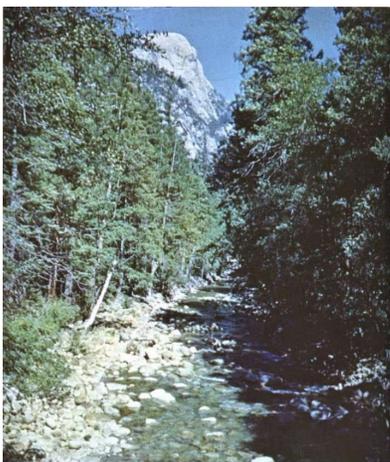
Plan sketch and cross sections, Provo River near Hailstone, Utah.

Location.-- Lat 40°36'__", long 111°22'__", near Hailstone, Utah.

Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
June 13, 1952	3.48	---	1202.2	176.8	3.34	6.800	0.008953	0.045
Oct. 7, 1952	0.98	---	64.9	34.6	0.90	1.876	0.008279	0.073

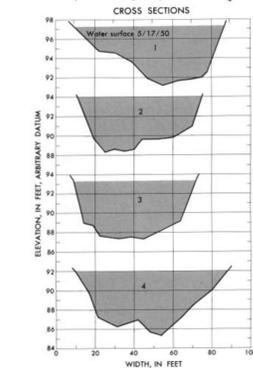
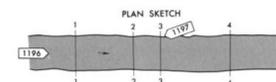
11264500 Merced River at Happy Isles Bridge, near Yosemite, Calif.



No. 1196 downstream from above section 1, Merced River at Happy Isles Bridge, near Yosemite, Calif.



No. 1197 upstream from right bank at section 3, Merced River at Happy Isles Bridge, near Yosemite, Calif.



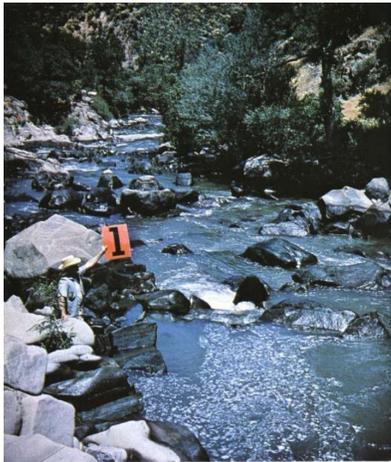
Plan sketch and cross sections, Merced River at Happy Isles Bridge, near Yosemite, Calif.

Location.-- Lat 37°43'54", long 119°33'28", near Yosemite, California.

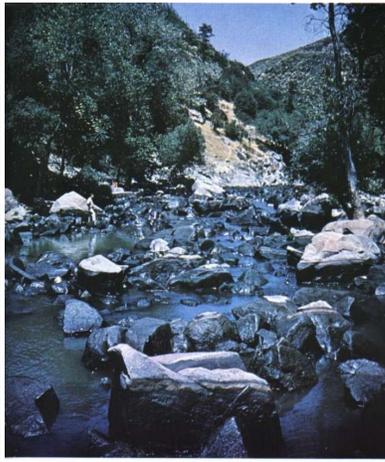
Description of channel.-- $d_{50} = 253$ mm. $d_{84} = 550$ mm.

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 17, 1950	4.30	---	1969.7	301.8	3.41	6.527	0.012976	0.065

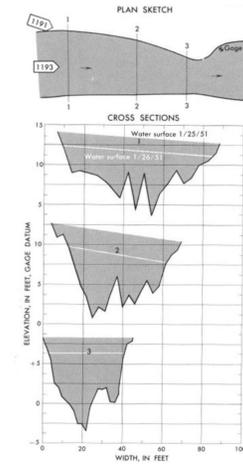
11451000 Cache Creek near Lower Lake, Calif.



No. 1191 downstream from left bank above section 1, Cache Creek near Lower Lake, Calif.



No. 1193 downstream from channel above section 1, Cache Creek near Lower Lake, Calif.



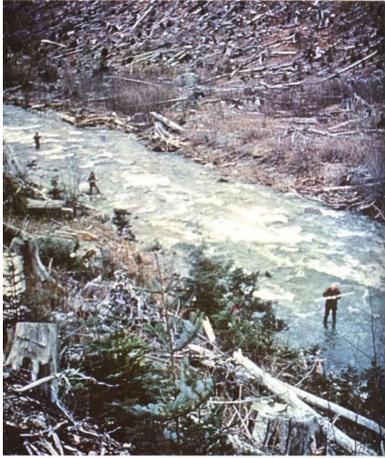
Plan sketch and cross sections, Cache Creek near Lower Lake, Calif.

Location.-- Lat 38°55'27", long 122°33'53", near Lower Lake, California.

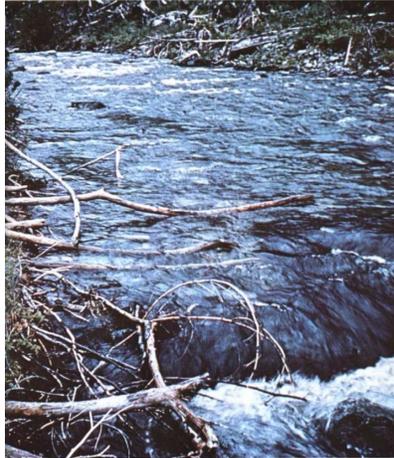
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
Jan. 25, 1951	5.83	---	3913.2	360.0	4.85	10.870	0.029878	0.053
Jan. 24, 1951	4.60	---	1848.5	239.3	3.81	7.723	0.032317	0.079

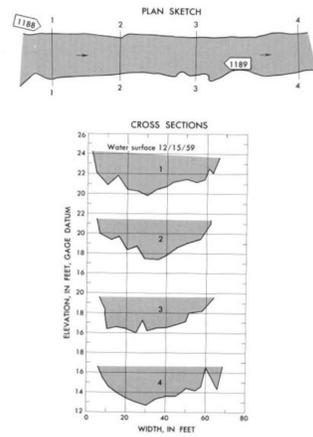
12113500 North Fork Cedar River near Lester, Wash.



No. 1188 downstream from left bank above section 1, North Fork Cedar River near Lester, Wash.



No. 1189 upstream from right bank below section 3, North Fork Cedar River near Lester, Wash.



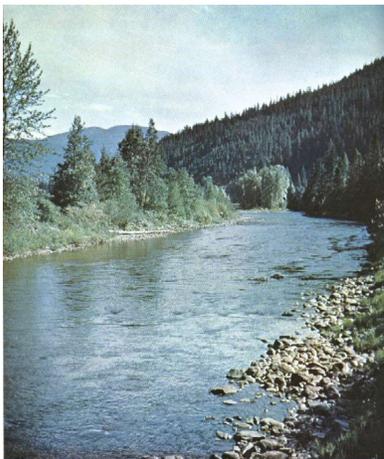
Plan sketch and cross sections, North Fork Cedar River near Lester, Wash.

Location.-- Lat 47°19'10", long 121°30'05", near Lester, Washington.

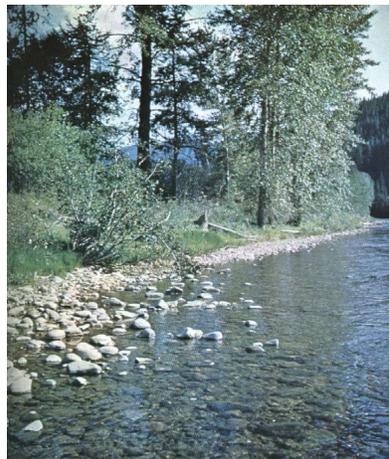
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
Dec. 15, 1959	2.58	---	1000.9	157.2	2.49	6.365	0.023718	0.059

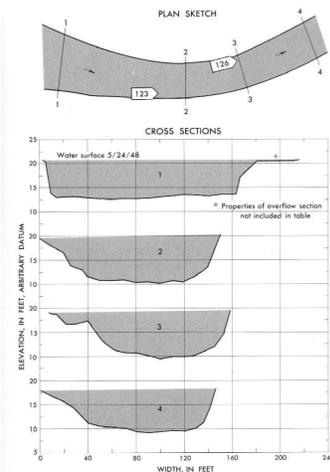
12306500 Moyie River at Eastport



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



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



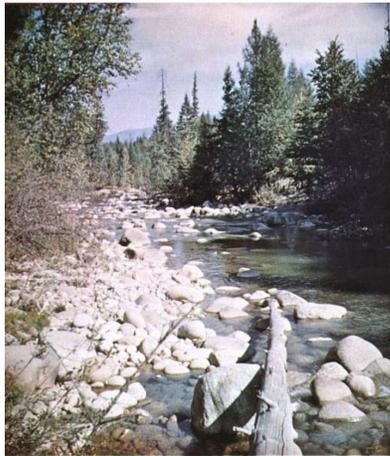
Plan sketch and cross sections, Moyie River at Eastport, Idaho.

Location.-- Lat 49°00'__", long 116°11'__", near Eastport, Idaho.

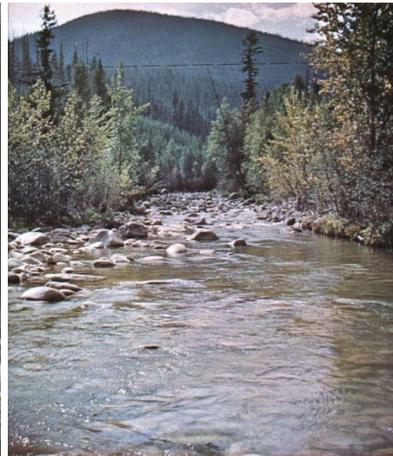
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 24, 1948	7.13	---	8145.1	1044.2	6.93	7.800	0.003647	0.038

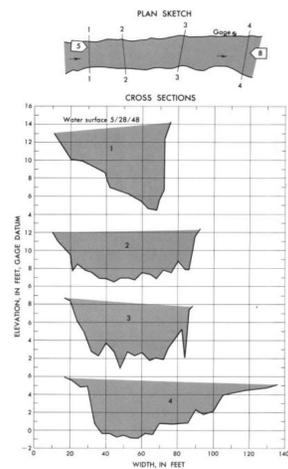
12321500 Boundary Creek near Porthill, Idaho



No. 5 downstream from left bank above section 1, Boundary Creek near Porthill, Idaho.



No. 8 upstream from below section 4, Boundary Creek near Porthill, Idaho.



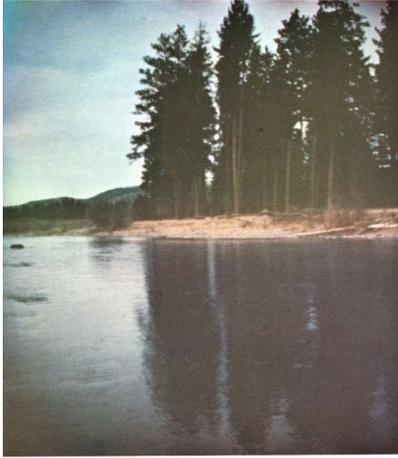
Plan sketch and cross sections, Boundary Creek near Porthill, Idaho.

Location.-- Lat 48°59'50", long 116°34'05", near Porthill, Idaho.

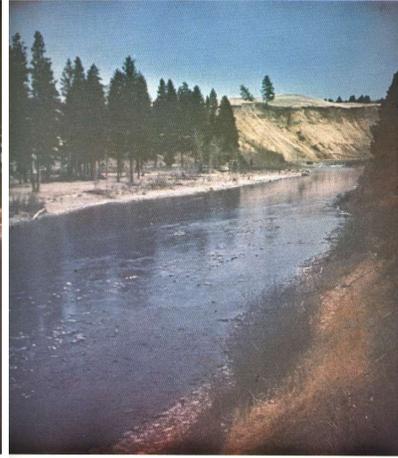
Description of channel.-- $d_{50} = 210$ mm. $d_{84} = 375$ mm.

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 28, 1948	4.40	---	2545.3	354.0	4.05	7.190	0.018664	0.073

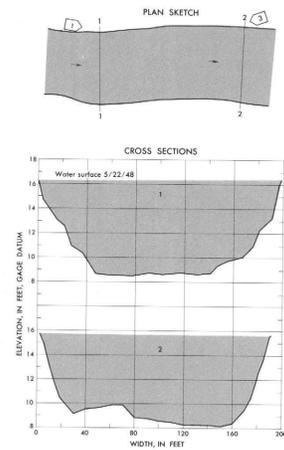
12338500 Blackfoot River near Ovando



No. 1 downstream from left bank above section 1, Blackfoot River near Ovanda, Mont.



No. 3 upstream towards right bank from below section 2, Blackfoot River near Ovanda, Mont.



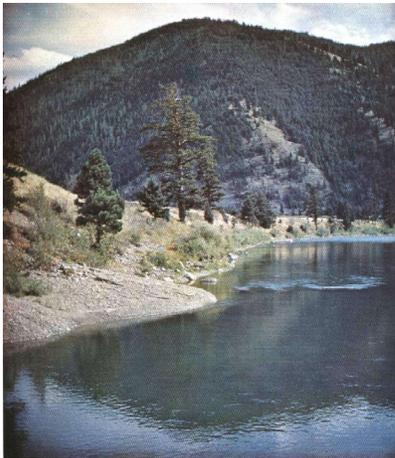
Plan sketch and cross sections, Blackfoot River near Ovanda, Mont.

Location.-- Lat 47°01'10", long 113°13'40", near Ovando, Montana.

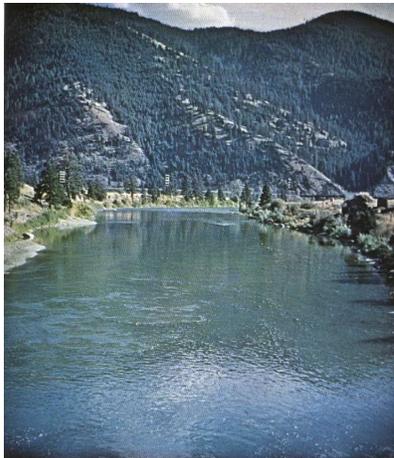
Description of channel.-- $d_{50} = 155$ mm. $d_{84} = 280$ mm.

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 22, 1948	6.12	---	8212.0	1185.0	6.05	6.930	0.002329	0.031

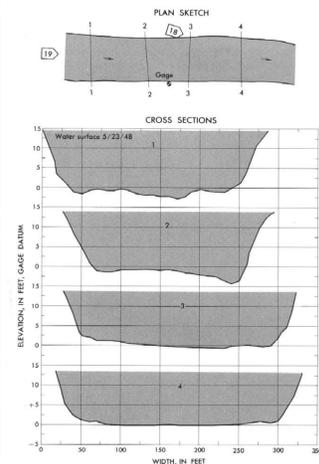
12340500 Clark Fork above Missoula



No. 18 downstream along left bank from above section 3, Clark Fork above Missoula, Mont.



No. 19 downstream through reach from bridge 400 ft above section 1, Clark Fork above Missoula, Mont.



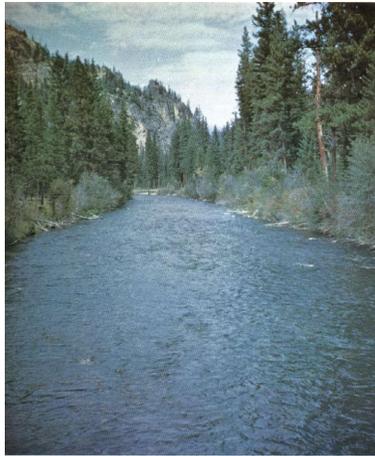
Plan sketch and cross sections, Clark Fork above Missoula, Mont.

Location.-- Lat 46°52'40", long 113°55'40", near Missoula, Montana.

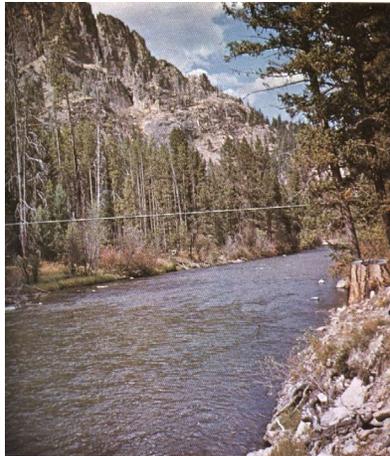
Description of channel.-- $d_{50} = 175$ mm. $d_{84} = 325$ mm.

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 23, 1948	12.76	---	31547.4	3689.8	12.48	8.550	0.001254	0.030

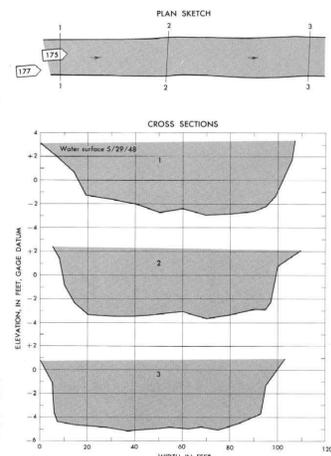
12342500 West Fork Bitterroot River near Conner



No. 175 downstream from section 1, West Fork Bitterroot River near Conner, Mont.



No. 177 downstream from right bank above section 1, West Fork Bitterroot River near Conner, Mont.



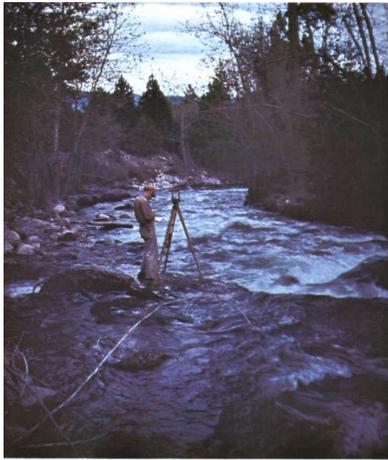
Plan sketch and cross sections, West Fork Bitterroot River near Conner, Mont.

Location.-- Lat 45°44'__", long 114°17'__", near Conner, Montana.

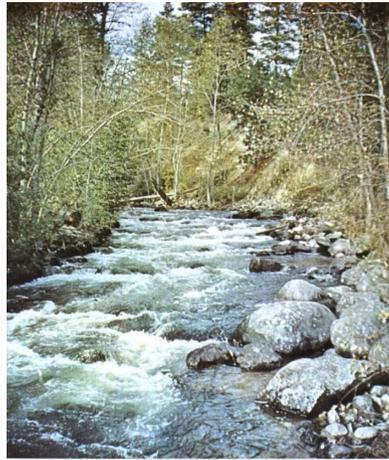
Description of channel.-- $d_{50} = 172$ mm. $d_{84} = 265$ mm.

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 29, 1948	4.80	---	3880.9	504.7	4.67	7.690	0.004618	0.036

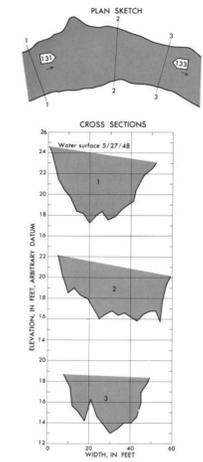
12345000 Rock Creek near Darby, Mont.



No. 131 downstream from above section 2, Rock Creek near Darby, Mont.



No. 133, upstream from below section 3, Rock Creek near Darby, Mont.



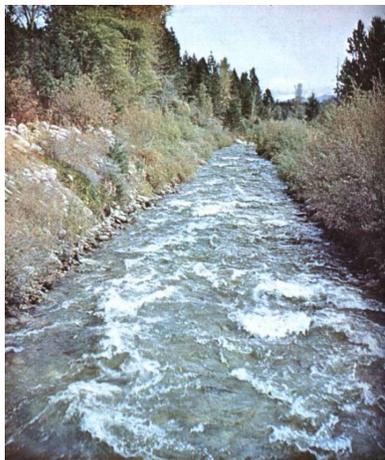
Plan sketch and cross sections, Rock Creek near Darby, Mont.

Location.-- Lat 46°04'10", long 114°13'20", near Darby, Montana.

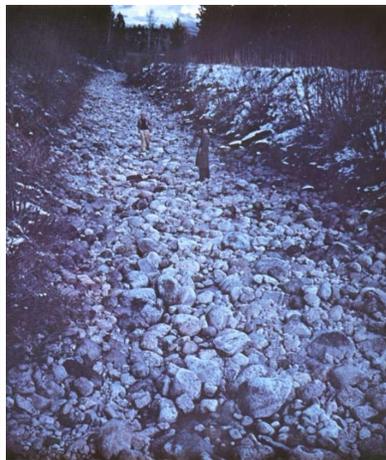
Description of channel.-- $d_{50} = 220$ mm. $d_{84} = 415$ mm.

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 27, 1948	3.69	---	1566.7	183.7	3.46	8.530	0.040476	0.075

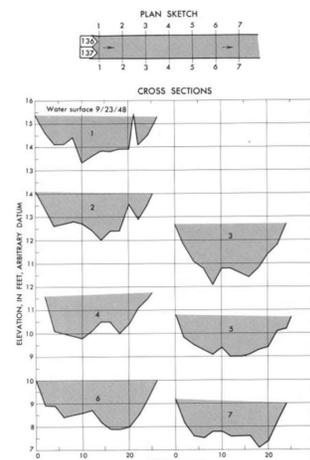
12345500 Rock Creek Canal near Darby, Mont.



No. 136 downstream from above section 1, Rock Creek Canal near Darby, Mont.



No. 137 downstream from above section 1, Rock Creek Canal near Darby, Mont.



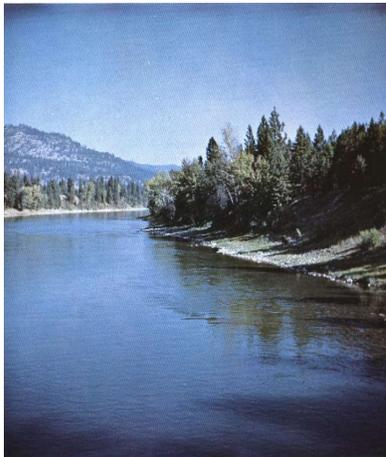
Plan sketch and cross sections, Rock Creek Canal near Darby, Mont.

Location.-- Lat 46°04'40", long 114°12'40", near Darby, Montana.

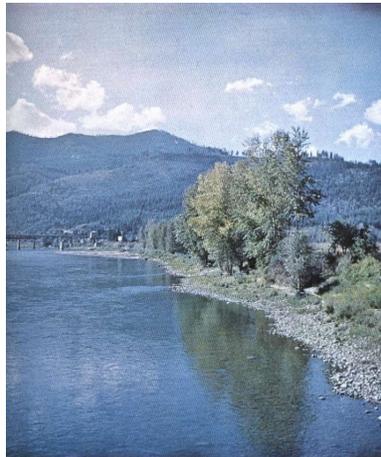
Description of channel.-- $d_{50} = 210$ mm. $d_{84} = 375$ mm.

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
Sept. 23, 1948	1.32	---	139.3	33.0	1.29	4.220	0.020983	0.060

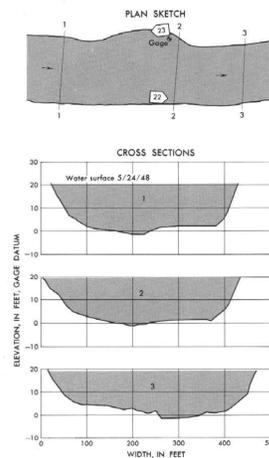
12354500 Clark Fork at St. Regis



No. 22 downstream along right bank from section 2, Clark Fork at St. Regis, Mont.



No. 23 upstream along left bank from section 2, Clark Fork at St. Regis, Mont.



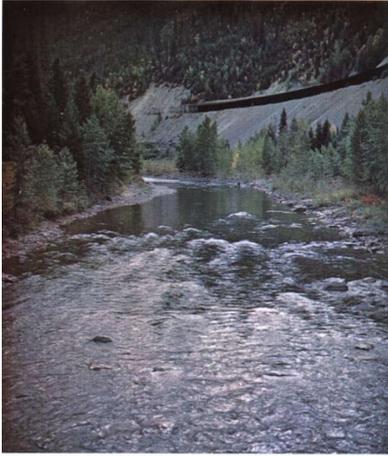
Plan sketch and cross sections, Clark Fork at St. Regis, Mont.

Location.-- Lat 47°18'05", long 115°05'15", near St. Regis, Montana.

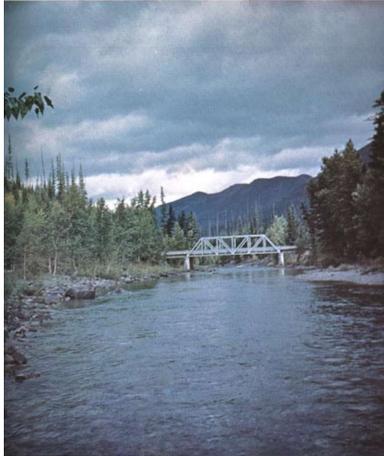
Description of channel.-- $d_{50} = 135$ mm. $d_{84} = 205$ mm.

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 24, 1948	16.36	---	68908.3	7010.0	16.13	9.830	0.000733	0.028

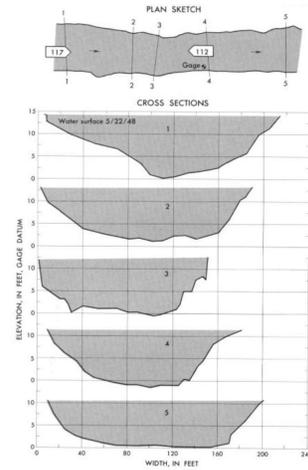
12355700 Middle Fork Flathead River near Essex, Mont.



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



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



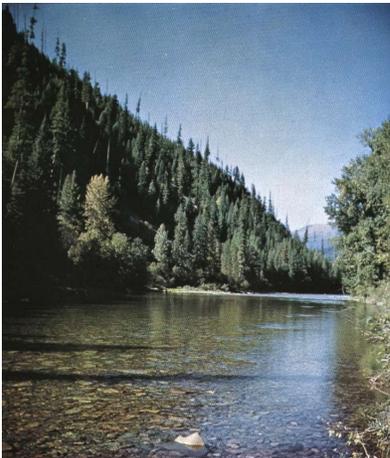
Plan sketch and cross sections, Middle Fork Flathead River near Essex, Mont.

Location.-- Lat 48°10'20", long 113°32'40", near Essex, Montana.

Description of channel.-- $d_{50} = 142$ mm. $d_{84} = 285$ mm.

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 22, 1948	8.85	---	14558.7	1596.0	8.58	9.122	0.014312	0.041

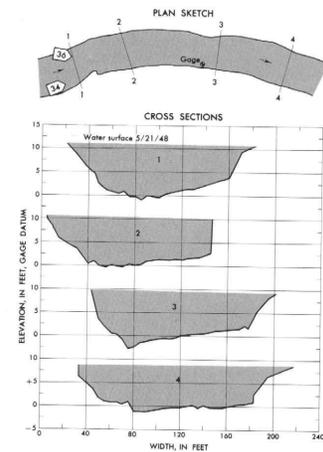
12412000 Coeur d'Alene River near Prichard



No. 34 downstream through reach from right bank, Coeur d'Alene River near Prichard, Idaho.



No. 36 downstream along right bank at section 1, Coeur d'Alene River near Prichard, Idaho.



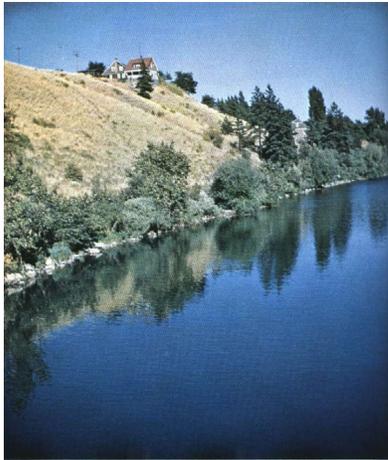
Plan sketch and cross sections, Coeur d'Alene River near Prichard, Idaho.

Location.-- Lat 47°38'05", long 115°58'55", near Prichard, Idaho.

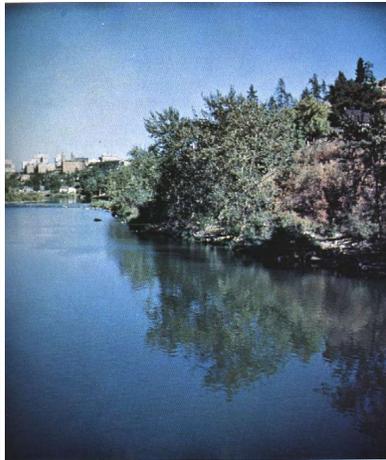
Description of channel.-- $d_{50} = 103$ mm. $d_{84} = 650$ mm.

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 21, 1948	7.90	---	11314.4	1269.5	7.62	8.912	0.002468	0.032

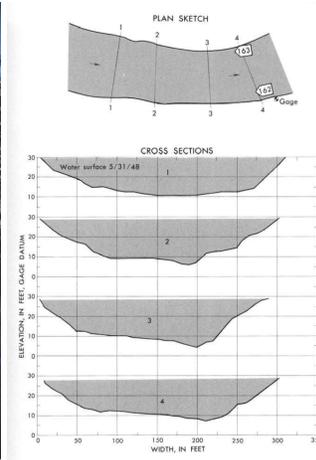
12422500 Spokane River at Spokane



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



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



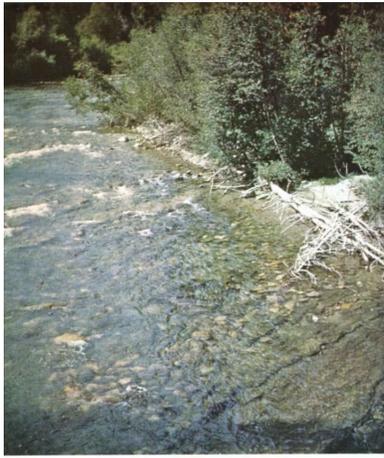
Plan sketch and cross sections, Spokane River at Spokane, Wash.

Location.-- Lat 47°39'35", long 117°26'50", near Spokane, Washington.

Description of channel.-- $d_{50} = 195$ mm. $d_{84} = 360$ mm.

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 31, 1948	14.55	---	39613.1	4282.5	14.24	9.250	0.001768	0.038

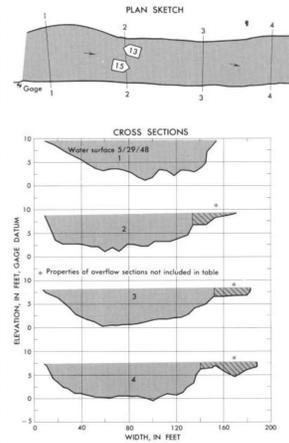
12456500 Chiwawa River near Plain, Wash.



No. 13 upstream along left bank from section 2, Chiwawa River near Plain, Wash.



No. 15 downstream along right bank from section 2, Chiwawa River near Plain, Wash.



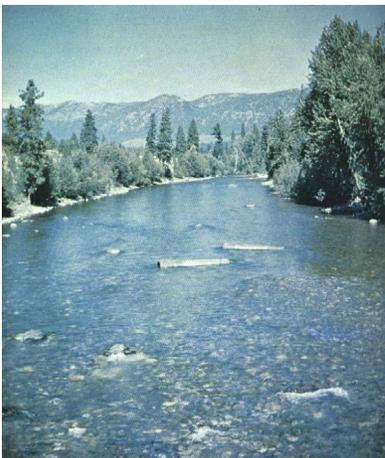
Plan sketch and cross sections, Chiwawa River near Plain, Wash.

Location.-- Lat 47°50'30", long 120°39'40", near Plain, Washington.

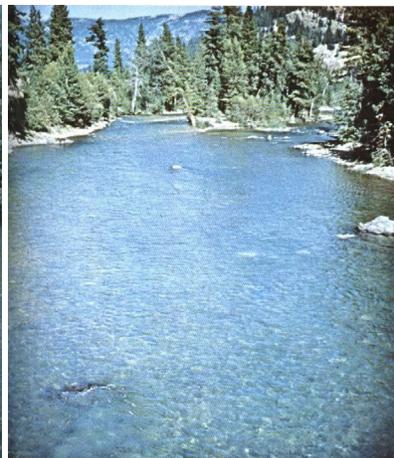
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 29, 1948	5.63	---	5884.8	766.0	5.49	7.683	0.004947	0.043

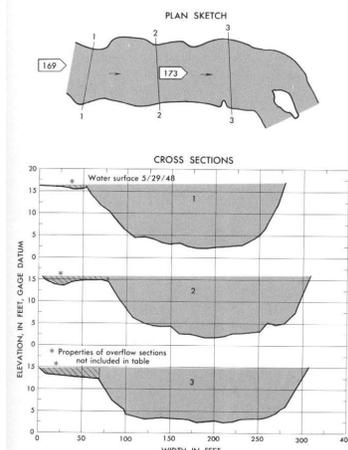
12457000 Wenatchee River at Plain



No. 169 downstream from above section 1, Wenatchee River at Plain, Wash.



No. 173 downstream from section 2, Wenatchee River at Plain, Wash.



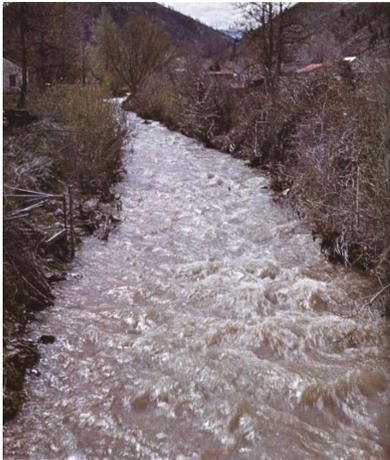
Plan sketch and cross sections, Wenatchee River at Plain, Wash.

Location.-- Lat 47°45'50", long 120°39'30", near Plain, Washington.

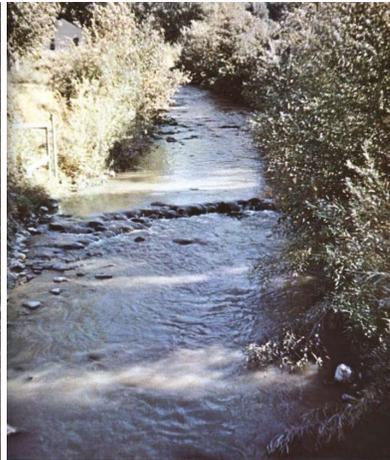
Description of channel.-- $d_{50} = 162$ mm. $d_{84} = 320$ mm.

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 29, 1948	10.73	---	22687.3	2463.3	10.50	9.210	0.002358	0.037

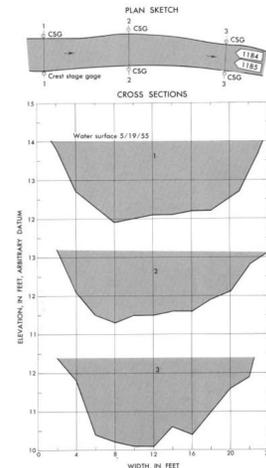
12462000 Mission Creek near Cashmere, Wash.



No. 1184 upstream from below section 3, Mission Creek near Cashmere, Wash.



No. 1185 upstream from below section 3, Mission Creek near Cashmere, Wash.



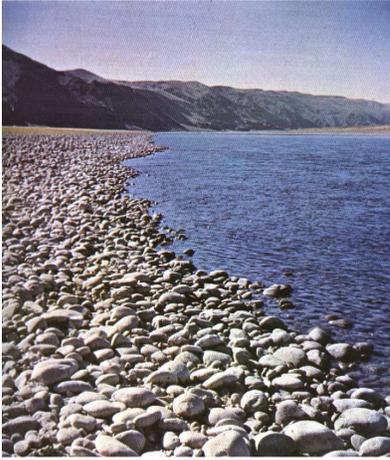
Plan sketch and cross sections, Mission Creek near Cashmere, Wash.

Location.-- Lat 47°30'15", long 120°28'30", near Cashmere, Washington.

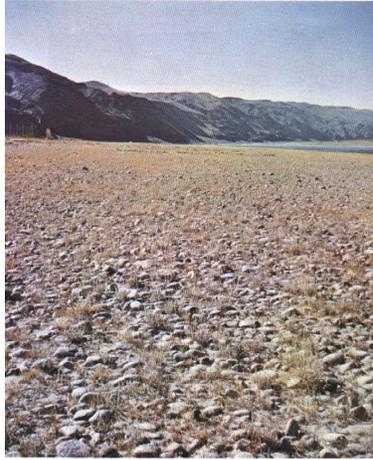
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 19, 1955	1.45	---	123.5	31.0	1.40	3.983	0.016947	0.057

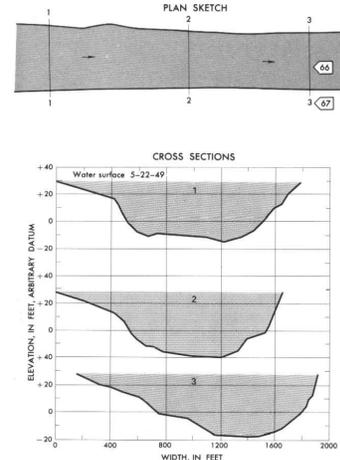
12464500 Columbia River at Vernita



No. 66 upstream along right bank from section 3, Columbia River at Vernita, Wash.



No. 67 upstream from top of bank at section 3, Columbia River at Vernita, Wash.



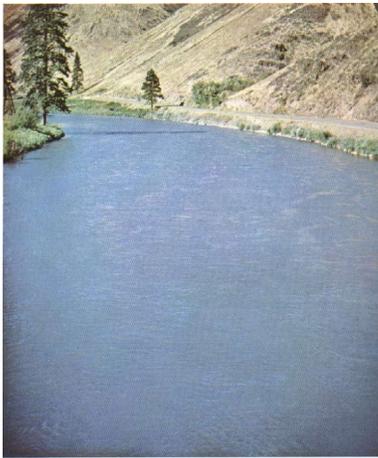
Plan sketch and cross sections, Columbia River at Vernita, Wash.

Location.-- Lat $_\circ _\prime _\prime\prime$, long $_\circ _\prime _\prime\prime$, near Vernita, Washington.

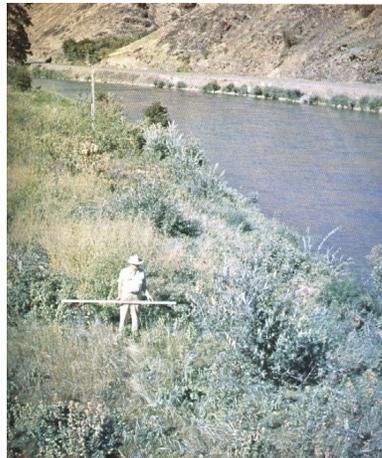
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 22, 1949	28.03	---	406308.8	48566.7	27.94	8.366	0.000194	0.024

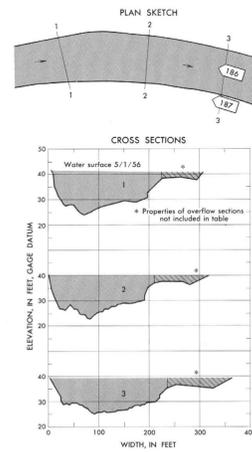
12484500 Yakima River at Umtanum



No. 186 upstream from section 3, Yakima River at Umtanum, Wash.



No. 187 upstream along right bank from below section 3, Yakima River at Umtanum, Wash.



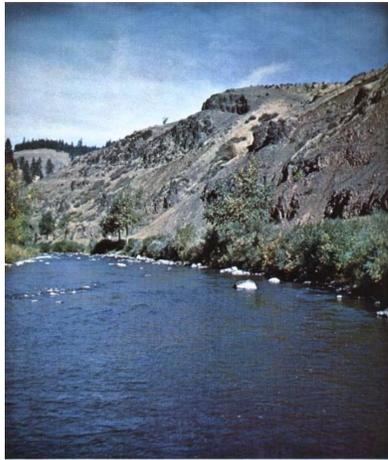
Plan sketch and cross sections, Yakima River at Umtanum, Wash.

Location.-- Lat $46^{\circ}51'45''$, long $120^{\circ}28'30''$, near Umtanum, Washington.

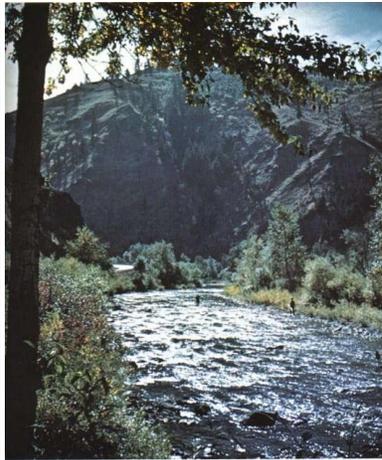
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 29, 1948	11.70	---	27714.8	2573.3	11.18	10.770	0.002955	0.036

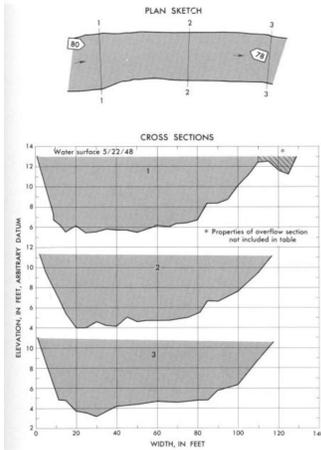
13319000 Grande Ronde River at La Grande, Oreg.



No. 78 upstream along left bank from channel below section 3, Grande Ronde River at La Grande, Oreg.



No. 80 downstream from left bank above section 1, Grande Ronde River at La Grande, Oreg.



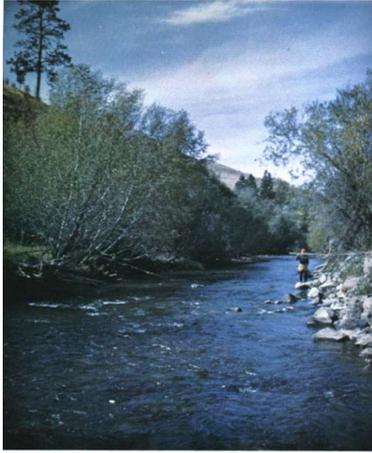
Plan sketch and cross sections, Grande Ronde River at La Grande, Oreg.

Location.-- Lat 45°21'__", long 118°08'__", near La Grande, Oregon.

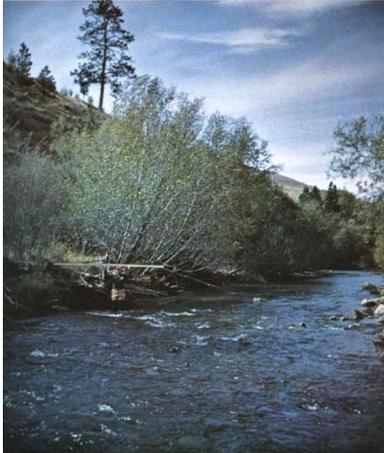
Description of channel.-- $d_{50} = 93$ mm. $d_{84} = 157$ mm.

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 22, 1948	5.44	---	4621.1	620.0	5.33	7.453	0.005255	0.043

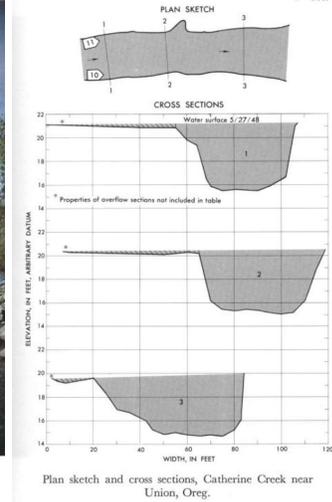
13320000 Catherine Creek near Union, Oreg.



No. 10 downstream along right bank from above reach, Catherine Creek near Union, Oreg.



No. 11 downstream along left bank from above reach, Catherine Creek near Union, Oreg.

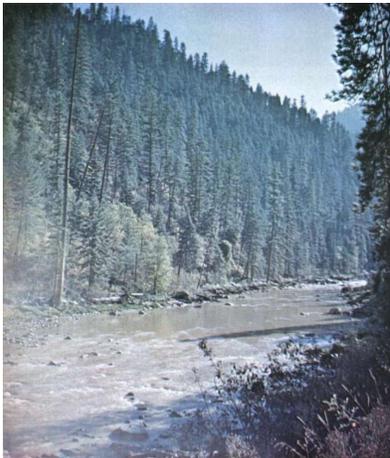


Location.-- Lat 45°09'20", long 117°46'40", near Union, Oregon.

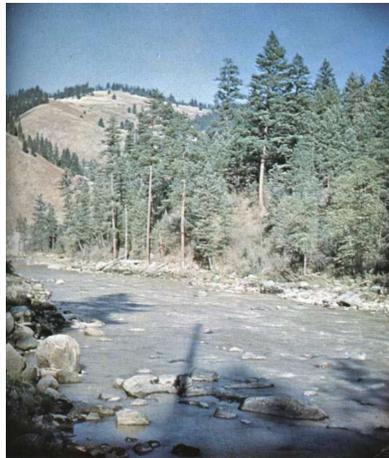
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 27, 1948	4.20	---	1746.8	237.3	3.97	7.360	0.006651	0.043

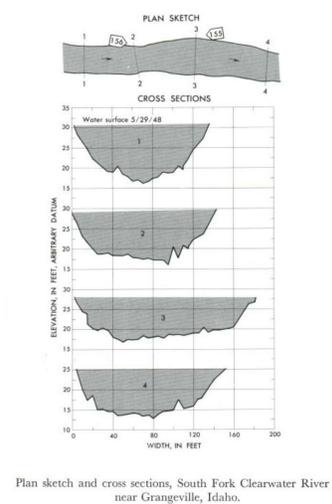
13338000 South Fork Clearwater River near Grangeville, Idaho



No. 155 upstream from left bank at section 3, South Fork Clearwater River near Grangeville, Idaho.



No. 156 downstream from left bank at section 2, South Fork Clearwater River near Grangeville, Idaho.

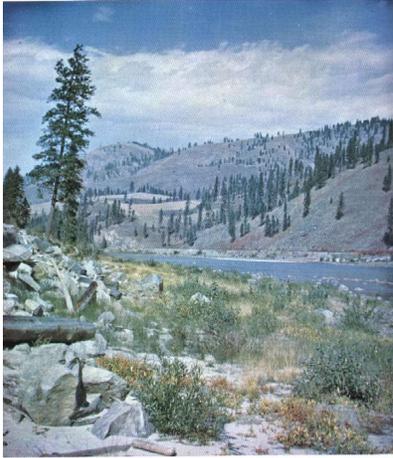


Location.-- Lat 45°55' __", long 116°01' __", near Grangeville, Idaho.

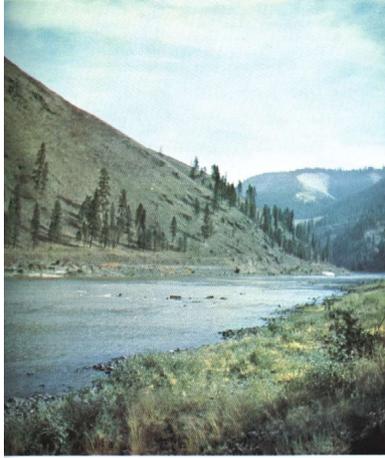
Description of channel.-- $d_{50} = 250$ mm. $d_{84} = 440$ mm.

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 29, 1948	8.88	---	12625.3	1334.2	8.51	9.463	0.006284	0.051

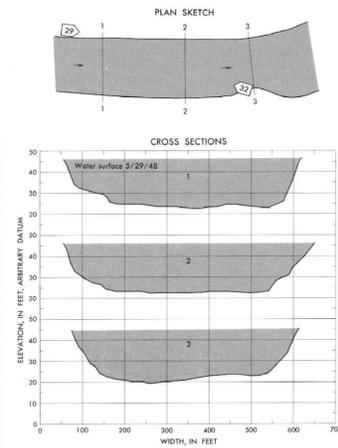
13339000 Clearwater River at Kamiah



No. 29 downstream along left bank from above section 1, Clearwater River at Kamiah, Idaho.



No. 32 upstream from left bank at section 3. Clearwater River at Kamiah, Idaho.



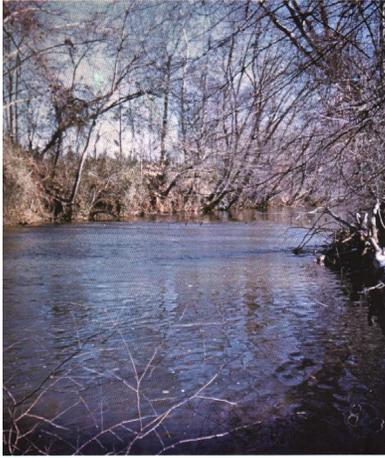
Plan sketch and cross sections, Clearwater River at Kamiah, Idaho.

Location.-- Lat 46°14'__", long 116°01'__", near Kamiah, Idaho.

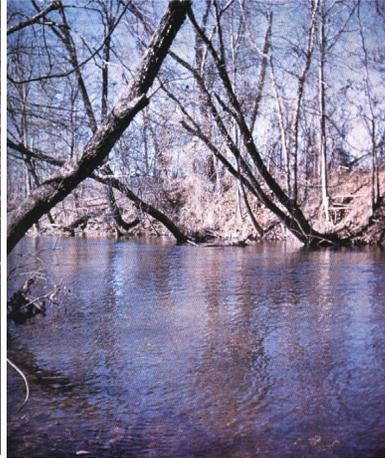
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 29, 1948	19.72	---	99013.4	11213.3	19.61	8.830	0.000789	0.033

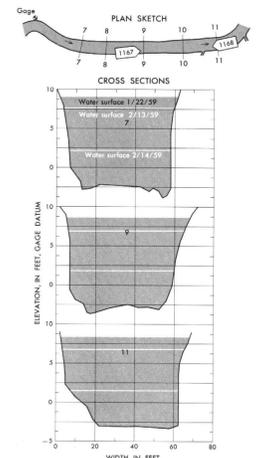
13339000 Etowah River near Dawsonville



No. 1167 downstream from right bank above section 9, Etowah River near Dawsonville, Ga.



No. 1168 upstream from right bank at section 11, Etowah River near Dawsonville, Ga.



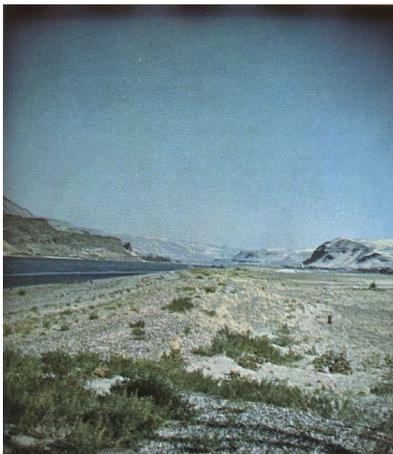
Plan sketch and cross sections, Etowah River near Dawsonville, Ga.

Location.-- Lat 34°23'__", long 84°04'__", near Dawsonville, Georgia.

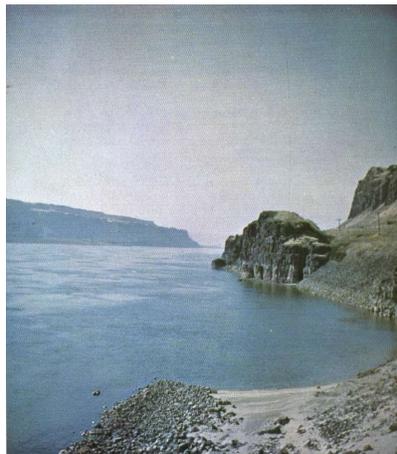
Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft ³ /s)	Average cross section area (ft ²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
Jan. 22, 1959	9.72	---	2261.9	618.0	7.95	3.660	0.000647	0.041
Feb. 13, 1959	8.76	---	1846.9	529.2	7.20	3.490	0.000610	0.039
Feb. 14, 1959	4.00	---	517.6	221.2	3.63	2.340	0.000610	0.035

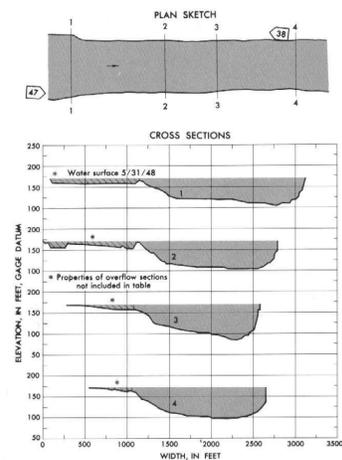
14105700 Columbia River at The Dalles



No. 38 upstream along left bank from section 4, Columbia River at The Dalles, Ore.



No. 47 downstream along right bank from above section 1, Columbia River at The Dalles, Ore.



Plan sketch and cross sections, Columbia River at The Dalles, Ore.

Location.-- Lat 45°36'10", long 121°10'40", near The Dalles, Oregon.

Description of channel.--

Date of observation	Average depth (ft)	Average surface width (ft)	Discharge (ft³/s)	Average cross section area (ft²)	Hydraulic radius (ft)	Mean velocity (ft/s)	Slope	Coefficient of roughness <i>n</i>
May 31, 1948	55.14	---	1000473.7	91597.5	53.75	10.922	0.000266	0.030