

DIVISION OF MINING, LAND AND WATER
WATER RESOURCES SECTION
www.dnr.state.ak.us/mlw/water/index.htm



Anchorage Office 550 West 7 th Avenue, Suite 1020 Anchorage, AK 99501-3562 (907) 269-8588 Fax: (907) 269-8947		For ADNR Use Only Date/Time Stamp
For ADNR Use Only LAS #	For ADNR Use Only CID #	For ADNR Use Only Receipt Type WR

APPLICATION FOR RESERVATION OF WATER

INSTRUCTIONS <ol style="list-style-type: none"> 1. Complete one application per stream segment or water body (incomplete applications will not be accepted). 2. Attach legible map(s) indicating all sections from the beginning to the end of stream segment or for all parts of the lake or water body. 3. Submit non-refundable fee of \$1,500. 4. Attach extra pages for each section, as needed.
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APPLICANT INFORMATION			
_____ Organization Name (if applicable)		_____ Agent or Consultant Name (if applicable)	
_____ Individual Applicant Name (if applicable)		_____ Individual Co-applicant Name (if applicable)	
_____ Mailing Address	_____ City	_____ State	_____ Zip Code
_____ Daytime Phone Number		_____ Alternate Phone Number (optional)	
_____ Fax Number (optional)		_____ E-Mail Address (optional)	

LOCATION OF PROPOSED RESERVATION OF WATER					
Geographic Name of Waterbody _____					
Meridian	Township	Range	Section	Quarter Sections	
				1/4	1/4
				1/4	1/4

Describe the location of the point or points defining the boundary of the proposed reservation of water by river mile index, river mile, geographical or cultural landmark, etc., on the stream or water body.

Attach a US Geological Survey map at 1:63,360 scale, or 1:250,000 scale if 1:63,360 scale is unavailable for the area, clearly identifying the following for the proposed reservation of water:

1. Sections, townships, range and meridians
2. The stream or water body in which the reservation of water is proposed
3. Specific point or points defining the boundary of the proposed reservation of water
4. Permanent, temporary or planned locations of water measurement devices (such as gaging stations, weirs, staff gages)
5. Permanent, temporary or planned bench marks

WATER USE

Identify the purpose(s) of the proposed reservation of water by checking the appropriate box(es).

- Protection of fish and wildlife habitat, migration, and propagation
- Recreation and park purposes
- Navigation and transportation purposes
- Sanitary and water quality purposes

Describe in detail the purpose(s) of the proposed reservation, including, when appropriate, species and life stage, type of recreation, vehicle, or water quality parameter, or other relevant information.

Is the water currently being used for the purpose(s) applied for?

Yes

No If no, when will use for this purpose begin? Specify approximate date _____

WATER QUANTITY

Water requested to be reserved – **Check one**

- To maintain a specific instream flow rate, measured in cubic feet per second
- To maintain a specific amount of surface water, measured in cubic feet or acre feet
- To maintain a specific surface water elevation, measured in relation to a permanent benchmark

Quantify the specific amount of water requested to be reserved. Identify and quantify, as appropriate, flow rates, quantities, surface water elevations, depths, etc., as they relate to the requested time periods of the year during which the reservation is proposed. Include any flow release schedules from projects upstream of the proposed reservation that would be necessary.

METHODOLOGY AND MONITORING

Attach and submit with this application documentation or reports showing facts to support the following:

- (a) The need for the proposed reservation of water, including reasons why the reservation is being requested.
- (b) Identify and describe the methodology, data, and data analysis used to substantiate the need for and the quantity of water requested for the proposed reservation of water, including:
 - 1. Name and description of method used
 - 2. Who conducted the study and analysis
 - 3. Schedule of when data collection and analysis occurred
 - 4. Type(s) of instrument(s) used to collect and analyze data
 - 5. Description of data and how the data were collected, including when applicable, (A) selection of stream reach, study site and transect selection, (B) flow, survey, elevation, and depth measurements, (C) pertinent physical, biological, water chemistry and socio-economic data
 - 6. Description of how data were analyzed, and
 - 7. Maps, photos, aerial photos, calculations, and any other documents supporting this application

If there are provisions for monitoring this proposed reservation of water, include the following:

- (a) Description of monitoring equipment (such as gaging stations, staff gages, weirs)
- (b) Location of monitoring equipment
- (c) Provisions for payment for monitoring
- (d) Reporting system

11 AAC 93.142 sets out the required information on the application for a reservation of water. 11 AAC 93.143 authorizes the commissioner to decide what additional information needed to process an application for a reservation of water. This information is made a part of the state public water records and becomes public information under AS 40.25.110 and 40.25.120. Public information is open to inspection by you or any member of the public. A person who is the subject of the information may challenge its accuracy or completeness under AS 44.99.310, by giving a written description of the challenged information, the changes needed to correct it, and a name and address where the person can be reached. False statements made in an application for a benefit are punishable under AS 11.56.210.

SIGNATURE

The information presented in this application is true and correct to the best of my knowledge.

Signature

Date

Name (please print)

Title (if applicable)

Fee required by regulation 11 AAC 05.010(a)(8)

- **\$1,500** for up to 40 hours of staff time

Make checks payable to "Department of Natural Resources."

LOCATION OF PROPOSED RESERVATION OF WATER

Meridian	Township	Range	Sections
Copper River	48S	63E	21,28,29

Kadashan River is located near the community of Tenakee Springs in Southeast Alaska (Figure 1). This proposed reservation of water applies to stream flows within Reach E, one of five reaches within the Kadashan River watershed for which ADF&G has submitted a reservation of water application. Reach E begins at the downstream end of Tonalite Creek and extends upstream 2.4 miles to the boundary between Township 48S Range 63E Sections 29 and 32 (Figure 2). Stream reach boundaries were selected to ensure fish were present and to minimize the differences in flows (from accretion or reduction) within the reach. Reach boundaries were based on U.S. Geological Survey (U.S. Geological Survey, 1962) topographic maps.

WATER USE

The primary purpose of this proposed reservation is to protect fish habitat, migration and propagation within the Kadashan River and its watershed. This reach has been specified as important to anadromous fish (under AS 16.05.871) as Anadromous Water Catalog stream number 112-24-10250-2004 by the Alaska Department of Fish and Game (Johnson and Blanche 2011). Coho salmon (*Oncorhynchus . kisutch*), chum salmon (*O. keta*), steelhead trout (*O. mykiss*), rainbow trout (*O. mykiss*), pink salmon (*O. gorbuscha*), cutthroat trout (*O. clarki*), and Dolly Varden (*Salvelinus malma*) utilize the Kadashan River for a portion of, or all of their spawning, incubation, rearing, and passage life phases (B. Glynn, Fishery Biologist, Douglas, ADF&G, 2007 personal communication; Figure 3). These species contribute to sport and commercial fisheries in the area and provide recreational opportunities and values as well. Water of sufficient quantity is needed to sustain production of these valuable fisheries.

WATER QUANTITY

Requested instantaneous flows in cubic feet per second (cfs) to be reserved:

Time Period	Requested Reservation Flows (cfs)
January	35
February	35
March	40
April	73
May	136
June	95
July	38
August	32
September	58

October	124
November	67
December	42

METHODOLOGY AND MONITORING

Procedures used to prepare this reservation complied with reservation of water application instructions and requirements established by state law (AS 46.15.145) and regulations (11 AAC 93.141-147), and relevant portions of the *"State of Alaska Instream Flow Handbook"* (DNR 1985).

Requested flows were based primarily on flow duration analyses (Annear et al. 2004) combined with available fish data. Flow duration analyses for specified time periods were used to develop flow requests with seasonal flow variability that mimicked the natural hydrograph of mean daily flows. This approach provided a basis to mimic natural seasonal flows to which fish and other aquatic fauna have adapted to and are dependent upon (Hynes 1970; Estes 1984; Estes and Orsborn 1986; Poff et al. 1997; Richter et al. 1997; Stewardson and Gippel 2003; Annear et al. 2004; Lytle and Poff 2004; Arthington et al. 2006).

Hydrologic Analyses:

Mean daily flow data for the entire period of record were obtained from United State Geological Survey (USGS) National Water Information System website (<http://waterdata.usgs.gov/nwis>) for the Tonalite Creek Gage (No. 15106980). This gage is located at latitude 57° 40' 42", longitude 135° 13' 17" on Tonalite Creek (Figure 2) and has a period of record from June 1, 1968 to September 30, 1988.

Flow Duration Analyses:

Duration estimates represent the expected frequency of occurrence of mean daily flows within the specified time periods. The durations of daily mean flows were calculated as the percentiles of the empirical distribution of observed values within the specified time periods over the period of record (Table 1). This provided an estimate of the percentage of time a given mean daily flow was equaled or exceeded within the distribution of mean daily flows for each time period analyzed.

Mean Flow Statistics:

Mean monthly flows were estimated as the mean of monthly mean daily flows for all complete months over the entire period of record (Figure 5 and Table 2). Mean annual flow was estimated as a mean of the annual mean daily flow values for all complete water years of record (Table 3). Mean daily flows are presented in Figure 4 and Table 4.

Reservation of Water:

Sufficient flows are needed to support riverine habitats used by fish and to provide fluvial processes that maintain these habitats. To maintain seasonal uses of habitats by each life history stage, we recommend maintaining a flow regime that mimics the magnitude and timing of the natural flow regime as discussed above. This approach is necessary to meet the needs of species' life history stages that have coevolved and exhibit biological adaptations to the river's flow regime.

In general, flow requests fell within the 25 to 75% exceedance range for the specified time periods. Flows within the 25 to 75% exceedance range are normal hydrologic conditions and should provide flows and habitat conditions to which fish have adapted. Deviations from these levels subject riverine species to conditions that are increasingly uncommon. Flows outside of this range are defined as dry (75 to 100% exceedance) or wet (0 to 25% exceedance) conditions according to the USGS (2009).

Although important for maintaining fish habitat and overall aquatic and riparian productivity, channel maintenance or other high flows were not specified and requested within this application. Channel maintenance flows are gradually ascending and descending and most effectively meet sediment transport thresholds for the full-range of particle sizes. Evidence suggests that bankfull flow approximates the effective discharge in stable stream channels (Andrews 1980; Leopold 1994; Annear et al. 2004). Other types of periodic high flows are recognized for their importance to habitat maintenance and support of other environmental and biological needs, such as fish migration cues. Collectively, these flows provide the function and structure of river ecosystems (Annear et al. 2004; Schmidt and Potyondy 2004).

Currently, there is no monitoring of streamflow in the Kadashan River watershed.

REFERENCES

- Alaska Administrative Code Chapter 11 Section 93.141-147.
- Alaska Department of Natural Resources (DNR). 1985. State of Alaska instream flow handbook. DNR. Anchorage, Alaska.
- Andrews, E.D. 1980. Effective and bankfull discharges of streams in the Yampa River basin, Colorado and Wyoming. *Journal of Hydrology* 46:311-330.
- Annear, T., I. Chisholm, H. Beecher, A. Locke, and 12 other authors. 2004. Instream flows for riverine resource stewardship, revised edition. Instream Flow Council. Cheyenne, WY.
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- Leopold, L. B. 1994. *A view of the river*. Cambridge, MA : Harvard University Press. 298 pp.
- Lytle, D.A., and N.L. Poff. 2004. Adaptation to natural flow regimes. *Trends in Ecology and Evolution* 19:94-100.
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- Schmidt, L. and J. Potyondy (2004). *Quantifying Channel Maintenance Instream Flows: An Approach for Gravel-bed Streams in the Western United States*. Fort Collins, CO, U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station: 33 pages.
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- U.S. Geological Survey. 2009. <http://waterwatch.usgs.gov/ptile.html>.

Figure 1. Area map of Kadashan River near Tenakee Springs, Southeast Alaska.

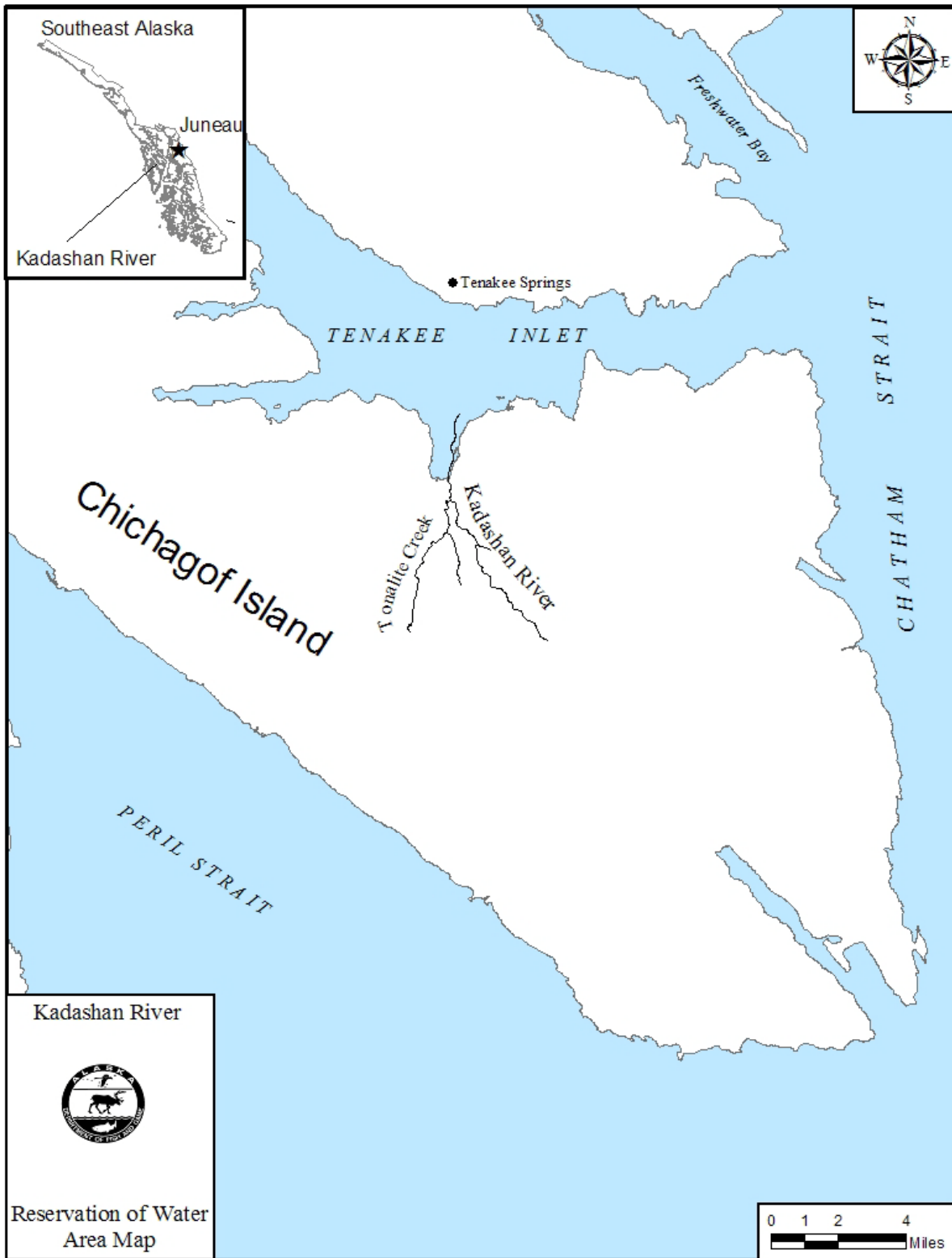


Figure 2. Reservation reach boundaries and location of USGS gages, Kadashan River near Tenakee Springs, Southeast Alaska.

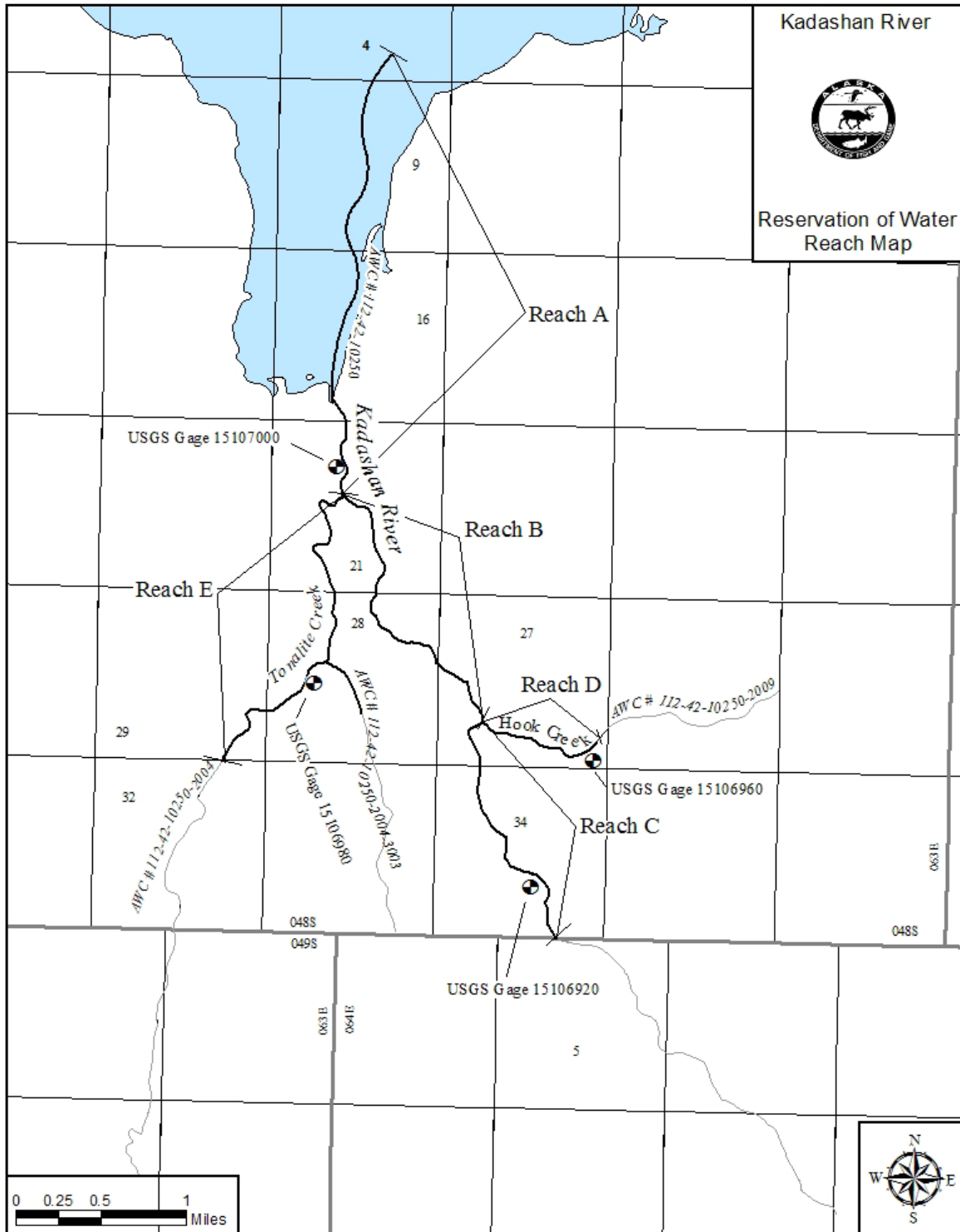


Figure 3. Fish species periodicity chart for Kadashan River near Tenakee Springs, Alaska.

Chum Salmon	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fry Passage			XX	XXXX	XXXX	XX						
Adult Passage							X	XXXX	XXXX	XX		
Spawning								XXXX	XXXX	XXX		
Incubation	XXXX	XXXX	XXXX	XXXX				XXXX	XXXX	XXXX	XXXX	XXXX
Rearing				XXXX	XX							
Coho Salmon	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Smolt Passage			XX	XXXX	XXXX	XX						
Adult Passage								XXXX	XXXX	XXXX	XX	
Spawning								XX	XXXX	XXXX	XXXX	XX
Incubation	XXXX	XXXX	XXXX	XXXX				XX	XXXX	XXXX	XXXX	XXXX
Rearing	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Pink Salmon	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fry Passage			XX	XXXX	XXXX	XX						
Adult Passage							XXXX	XXXX	XXXX			
Spawning							XX	XXXX	XXXX	XX		
Incubation	XXXX	XXXX	XXXX	XXXX	XX		XX	XXXX	XXXX	XXXX	XXXX	XXXX
Rearing				XXXX	XX							
Dolly Varden	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Smolt Passage*			XXXX	XXXX	XXXX							
Adult Passage			XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
Spawning									XX	XXXX	XX	
Incubation	XXXX	XXXX	XXXX	XXXX	XX				XX	XXXX	XXXX	XXXX
Rearing	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX

Based upon professional judgment of ADF&G biologists

Smolt passage is for juvenile emigration to estuarine/marine environment

Adult passage: for salmon is immigration: for trout, char, and other species, immigration and emigration.

Incubation life phase includes time of egg deposition to fry emergence

* DV and CT smolt defined as those fish undergoing initial emigration

Figure 3. continued.

Steelhead Trout												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Smolt Passage				XX	XXXX	XXXX						
Adult Passage				XXXX	XXXX	XXXX	XX					
Spawning				XX	XXXX	XXXX						
Incubation				XX	XXXX	XXXX	XXXX	XXXX				
Rearing	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Rainbow Trout												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Resident Adult Passage			XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX		
Spawning			X	XXXX	XXXX	XXXX						
Incubation			X	XXXX	XXXX	XXXX	XXXX	XXXX				
Rearing	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Cutthroat Trout												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Smolt Passage*			XXXX	XXXX	XXXX							
Adult Passage			XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
Spawning				XXX	XXXX	XX						
Incubation				XXX	XXXX	XXXX	XXXX	XX				
Rearing	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Based upon professional judgment of ADF&G biologists												
Smolt passage is for juvenile emigration to estuarine/marine environment												
Adult passage: for salmon is immigration: for trout, char, and other species, immigration and emigration.												
Incubation life phase includes time of egg deposition to fry emergence												
* DV and CT smolt defined as those fish undergoing initial emigration												

Figure 4. Annual hydrograph of mean daily flows (cfs) for Kadashan Reservation Reach E. Based on complete water years of record for USGS Gaging Station 15106980 (October 1, 1968 to September 30, 1988).

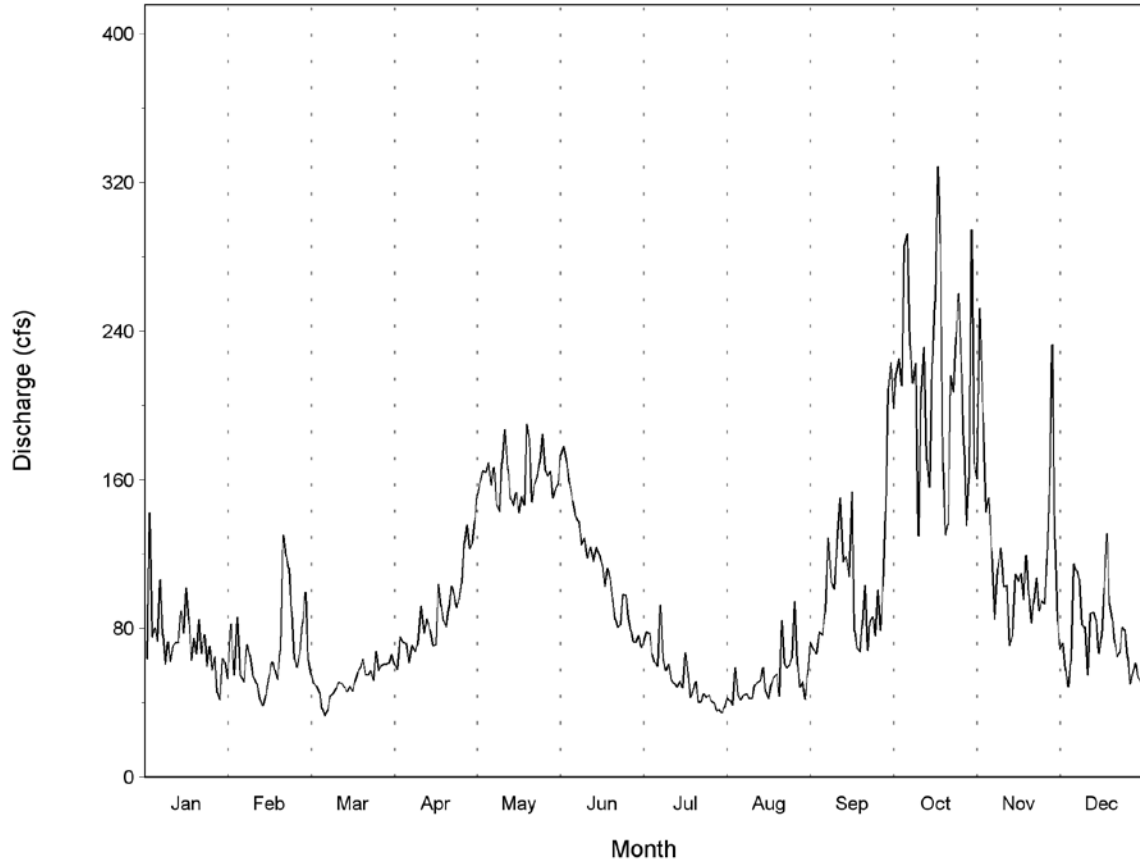
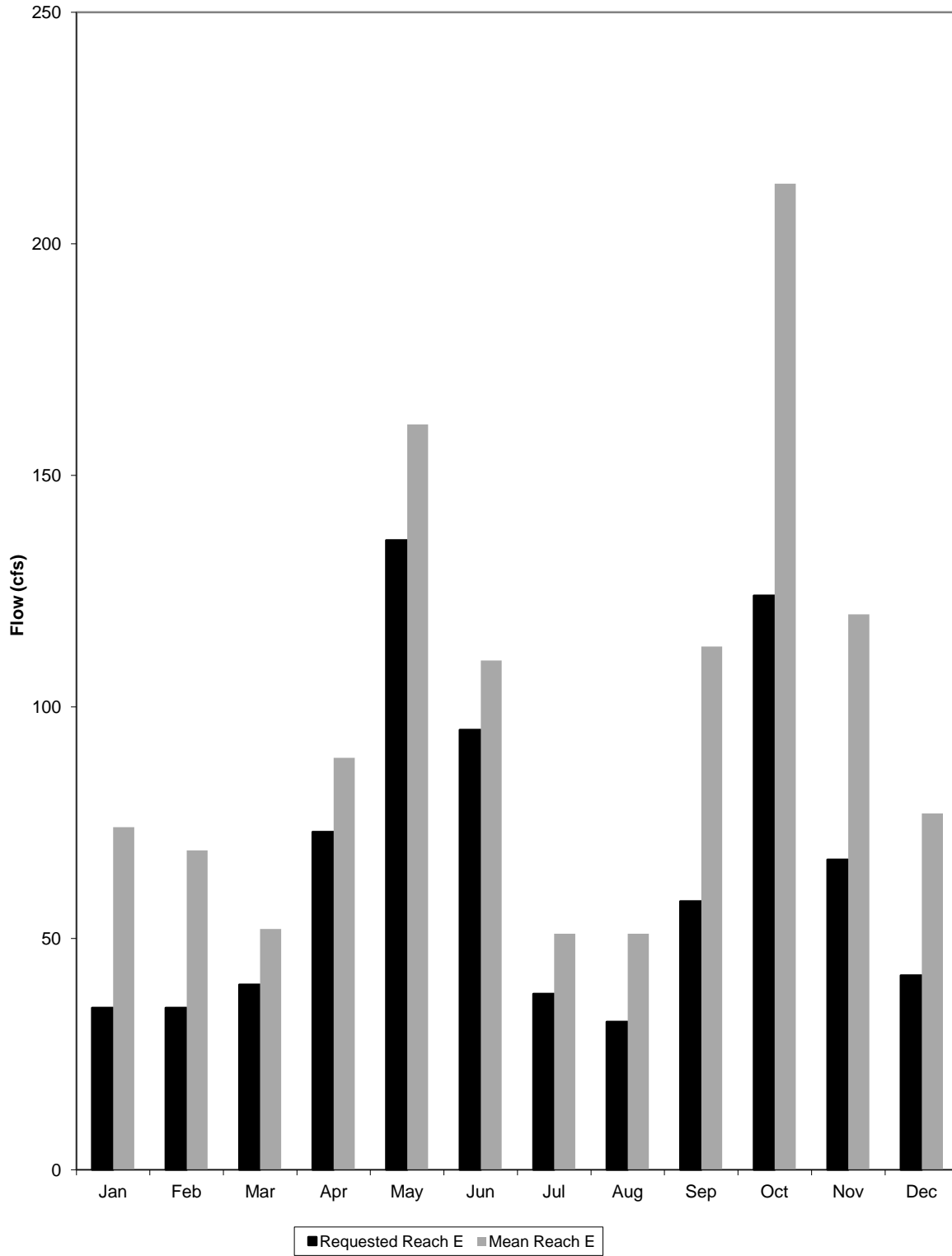


Figure 5. Mean monthly flows and reservation requests (cfs) for Kadashan Reservation Reach E. Based on complete months of record for USGS Gaging Station 15106980 (June 1, 1968 to September 30, 1988).



ATTACHMENT A. KADASHAN RIVER REACH E RESERVATION OF WATER APPLICATION.

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Table 1. Monthly exceedance flows (cfs) for Kadashan Reservation Reach E. Based on complete months of record USGS Gaging Station 15106980 (June 1, 1968 to September 30, 1988).

% Time exceeded	January	February	March	April	May	June	July	August	September	October	November	December
0	1,210	969	410	599	834	389	660	747	1,400	2,270	1,220	1,200
5	283	234	131	209	347	249	123	151	400	700	390	253
10	190	150	107	170	275	209	94	96	261	450	250	180
15	127	115	88	141	230	180	79	80	190	375	202	128
20	97	91	76	125	207	156	70	66	143	305	163	108
25	77	79	66	109	190	143	61	55	110	259	142	90
30	68	67	60	98	174	133	55	49	98	207	115	77
35	55	58	55	90	162	122	50	42	87	186	101	66
40	46	45	49	84	155	116	45	39	75	161	89	59
45	40	40	45	78	148	107	41	35	65	140	76	50
50	35	35	40	73	136	95	38	32	58	124	67	42
55	30	30	34	68	129	85	35	30	53	111	61	38
60	25	26	30	64	123	78	33	27	49	100	54	32
65	23	23	26	59	115	72	30	25	44	91	48	28
70	20	19	24	54	109	63	29	23	39	82	44	25
75	18	16	22	49	104	54	26	21	35	73	37	22
80	15	13	20	44	97	49	25	18	32	65	32	19
85	13	11	18	37	91	41	22	16	28	58	27	16
90	9.5	10	14	30	82	34	19	14	24	49	22	14
95	8.0	9.0	12	23	66	25	15	10	18	38	19	12
100	6.0	6.8	8.9	12	45	14	7.4	6.2	8.7	24	13	7.6
Mean	74	69	52	89	161	110	51	51	113	213	120	77

Table 2. Monthly flow summaries (cfs) for Kadashan Reservation Reach E. Based on complete months of record for USGS Gaging Station 15106980 (June 1, 1968 to September 30, 1988).

Month	# of Months	Minimum monthly flow (cfs)	Mean monthly flow (cfs)	Maximum monthly flow (cfs)
January	20	10	74	217
February	20	9.8	69	205
March	20	17	52	129
April	20	31	89	151
May	20	63	161	286
June	21	34	110	223
July	21	17	51	93
August	21	14	51	134
September	21	33	113	286
October	20	89	213	495
November	20	26	120	210
December	20	14	77	207

Table 3. Annual flow summaries (cfs) for Kadashan Reservation Reach E. Based on complete water years of record USGS Gaging Station 15106980 (October 1, 1968 to September 30, 1988).

Water year	Number of days of record	QAA (cfs)
1969	365	92
1970	365	108
1971	365	84
1972	366	100
1973	365	100
1974	365	75
1975	365	107
1976	366	93
1977	365	112
1978	365	68
1979	365	119
1980	366	90
1981	365	112
1982	365	88
1983	365	95
1984	366	93
1985	365	112
1986	365	96
1987	365	102
1988	366	119
Mean for period of record	7,305	98

Table 4. Daily flow summaries (cfs) for Kadashan Reservation Reach E. Based on complete water years of record for USGS Gage 15106980 (October 1, 1968 to September 30, 1988).

Julian Day	Day of Year	# of days of record	Minimum-mean daily flow (cfs)	Mean-mean daily flow (cfs)	Maximum-mean daily flow (cfs)
1	January 1	20	9.0	64	232
2	January 2	20	8.5	142	1,210
3	January 3	20	8.0	75	431
4	January 4	20	7.5	80	529
5	January 5	20	7.0	73	223
6	January 6	20	7.0	106	600
7	January 7	20	7.0	76	310
8	January 8	20	7.0	61	190
9	January 9	20	7.0	73	390
10	January 10	20	6.5	62	330
11	January 11	20	6.5	71	316
12	January 12	20	6.5	72	340
13	January 13	20	6.5	72	560
14	January 14	20	6.5	89	483
15	January 15	20	6.0	78	397
16	January 16	20	6.0	102	646
17	January 17	20	6.0	85	414
18	January 18	20	6.0	63	349
19	January 19	20	6.0	74	503
20	January 20	20	6.5	66	504
21	January 21	20	6.5	85	453
22	January 22	20	7.0	67	248
23	January 23	20	7.0	76	253
24	January 24	20	8.0	60	232
25	January 25	20	8.0	70	320
26	January 26	20	7.0	58	250
27	January 27	20	7.0	65	480
28	January 28	20	7.0	46	204
29	January 29	20	7.0	42	139
30	January 30	20	8.0	64	500
31	January 31	20	8.0	62	386

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Table 4. Page 2 of 12.

Julian Day	Day of Year	# of days of record	Minimum-mean daily flow (cfs)	Mean-mean daily flow (cfs)	Maximum-mean daily flow (cfs)
32	February 1	20	8.5	53	194
33	February 2	20	9.0	82	459
34	February 3	20	9.0	55	181
35	February 4	20	9.0	86	762
36	February 5	20	9.0	54	220
37	February 6	20	9.0	52	165
38	February 7	20	9.0	71	458
39	February 8	20	9.0	65	350
40	February 9	20	9.0	54	250
41	February 10	20	9.0	50	300
42	February 11	20	8.5	42	200
43	February 12	20	8.0	39	117
44	February 13	20	7.8	44	198
45	February 14	20	7.5	55	357
46	February 15	20	7.2	62	249
47	February 16	20	7.0	58	157
48	February 17	20	6.9	53	166
49	February 18	20	6.8	68	289
50	February 19	20	6.9	130	648
51	February 20	20	7.0	119	645
52	February 21	20	7.0	112	539
53	February 22	20	7.2	89	633
54	February 23	20	7.4	63	375
55	February 24	20	7.6	59	291
56	February 25	20	7.9	67	339
57	February 26	20	8.1	83	688
58	February 27	20	8.3	99	969
59	February 28 OR 29	25	8.8	63	265

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Table 4. Page 3 of 12.

Julian Day	Day of Year	# of days of record	Minimum-mean daily flow (cfs)	Mean-mean daily flow (cfs)	Maximum-mean daily flow (cfs)
60	March 1	20	8.9	55	233
61	March 2	20	9.2	50	214
62	March 3	20	9.8	49	230
63	March 4	20	10	46	190
64	March 5	20	10	37	100
65	March 6	20	11	33	97
66	March 7	20	11	36	103
67	March 8	20	11	44	119
68	March 9	20	12	45	129
69	March 10	20	13	48	144
70	March 11	20	12	51	169
71	March 12	20	12	51	131
72	March 13	20	11	49	120
73	March 14	20	11	46	115
74	March 15	20	11	49	163
75	March 16	20	12	47	124
76	March 17	20	12	52	226
77	March 18	20	12	56	186
78	March 19	20	13	59	215
79	March 20	20	14	63	350
80	March 21	20	14	55	250
81	March 22	20	14	55	140
82	March 23	20	13	57	143
83	March 24	20	13	52	141
84	March 25	20	12	67	410
85	March 26	20	12	57	191
86	March 27	20	12	60	247
87	March 28	20	12	61	184
88	March 29	20	19	61	240
89	March 30	20	18	61	242
90	March 31	20	15	66	135

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Table 4. Page 4 of 12.

Julian Day	Day of Year	# of days of record	Minimum-mean daily flow (cfs)	Mean-mean daily flow (cfs)	Maximum-mean daily flow (cfs)
91	April 1	20	17	61	149
92	April 2	20	16	58	164
93	April 3	20	16	75	313
94	April 4	20	17	72	199
95	April 5	20	15	72	185
96	April 6	20	13	62	144
97	April 7	20	12	71	216
98	April 8	20	12	68	139
99	April 9	20	13	72	195
100	April 10	20	13	92	360
101	April 11	20	15	78	177
102	April 12	20	20	85	244
103	April 13	20	24	79	194
104	April 14	20	26	71	201
105	April 15	20	20	71	174
106	April 16	20	15	104	599
107	April 17	20	20	92	480
108	April 18	20	34	84	236
109	April 19	20	40	81	176
110	April 20	20	20	91	347
111	April 21	20	15	103	266
112	April 22	20	16	98	233
113	April 23	20	25	92	183
114	April 24	20	34	96	273
115	April 25	20	39	105	251
116	April 26	20	47	126	244
117	April 27	20	44	136	336
118	April 28	20	42	123	314
119	April 29	20	45	126	352
120	April 30	20	49	138	338

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ATTACHMENT A. KADASHAN RIVER REACH E RESERVATION OF WATER APPLICATION.
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Table 4. Page 5 of 12.

Julian Day	Day of Year	# of days of record	Minimum-mean daily flow (cfs)	Mean-mean daily flow (cfs)	Maximum-mean daily flow (cfs)
121	May 1	20	57	152	437
122	May 2	20	61	159	395
123	May 3	20	62	165	491
124	May 4	20	57	164	448
125	May 5	20	59	169	388
126	May 6	20	63	157	377
127	May 7	20	67	166	440
128	May 8	20	87	146	338
129	May 9	20	84	143	328
130	May 10	20	65	169	392
131	May 11	20	57	187	451
132	May 12	20	55	165	394
133	May 13	20	72	150	298
134	May 14	20	64	146	315
135	May 15	20	63	153	386
136	May 16	20	64	142	252
137	May 17	20	66	151	295
138	May 18	20	64	147	243
139	May 19	20	62	190	834
140	May 20	20	59	182	810
141	May 21	20	54	148	353
142	May 22	20	55	158	339
143	May 23	20	56	162	347
144	May 24	20	67	169	395
145	May 25	20	63	184	377
146	May 26	20	75	165	290
147	May 27	20	64	162	424
148	May 28	20	51	164	400
149	May 29	20	45	150	400
150	May 30	20	55	155	585
151	May 31	20	46	157	406

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Table 4. Page 6 of 12.

Julian Day	Day of Year	# of days of record	Minimum-mean daily flow (cfs)	Mean-mean daily flow (cfs)	Maximum-mean daily flow (cfs)
152	June 1	20	66	173	389
153	June 2	20	63	178	368
154	June 3	20	68	169	366
155	June 4	20	67	158	308
156	June 5	20	54	149	348
157	June 6	20	46	140	320
158	June 7	20	43	138	300
159	June 8	20	39	125	280
160	June 9	20	35	128	270
161	June 10	20	31	118	240
162	June 11	20	29	124	310
163	June 12	20	27	116	288
164	June 13	20	26	123	260
165	June 14	20	25	119	288
166	June 15	20	24	114	380
167	June 16	20	23	103	263
168	June 17	20	23	112	280
169	June 18	20	23	107	236
170	June 19	20	22	95	197
171	June 20	20	25	85	171
172	June 21	20	23	81	151
173	June 22	20	21	82	141
174	June 23	20	21	98	280
175	June 24	20	19	98	236
176	June 25	20	18	85	185
177	June 26	20	17	79	193
178	June 27	20	16	73	155
179	June 28	20	16	73	171
180	June 29	20	16	76	180
181	June 30	20	14	70	198

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Table 4. Page 7 of 12.

Julian Day	Day of Year	# of days of record	Minimum-mean daily flow (cfs)	Mean-mean daily flow (cfs)	Maximum-mean daily flow (cfs)
182	July 1	20	16	73	190
183	July 2	20	15	78	257
184	July 3	20	16	77	305
185	July 4	20	15	66	179
186	July 5	20	14	62	185
187	July 6	20	14	60	171
188	July 7	20	15	92	660
189	July 8	20	13	63	237
190	July 9	20	13	57	160
191	July 10	20	20	61	180
192	July 11	20	18	52	113
193	July 12	20	22	50	108
194	July 13	20	20	48	94
195	July 14	20	19	51	104
196	July 15	20	16	48	84
197	July 16	20	15	67	381
198	July 17	20	13	55	204
199	July 18	20	12	43	80
200	July 19	20	17	47	145
201	July 20	20	15	51	321
202	July 21	20	14	40	131
203	July 22	20	19	41	98
204	July 23	20	18	45	90
205	July 24	20	18	43	123
206	July 25	20	18	44	130
207	July 26	20	17	41	152
208	July 27	20	16	40	75
209	July 28	20	14	36	74
210	July 29	20	13	36	85
211	July 30	20	12	35	72
212	July 31	20	12	38	103

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Julian Day	Day of Year	# of days of record	Minimum-mean daily flow (cfs)	Mean-mean daily flow (cfs)	Maximum-mean daily flow (cfs)
213	August 1	20	11	43	170
214	August 2	20	10	41	196
215	August 3	20	10	39	135
216	August 4	20	12	59	361
217	August 5	20	9.2	44	151
218	August 6	20	8.9	42	137
219	August 7	20	14	44	159
220	August 8	20	15	45	201
221	August 9	20	17	43	107
222	August 10	20	15	42	87
223	August 11	20	16	50	251
224	August 12	20	15	51	212
225	August 13	20	14	52	202
226	August 14	20	13	59	401
227	August 15	20	11	46	153
228	August 16	20	11	43	120
229	August 17	20	11	50	185
230	August 18	20	11	54	247
231	August 19	20	10	55	190
232	August 20	20	9.7	44	90
233	August 21	20	8.7	84	747
234	August 22	20	9.2	61	401
235	August 23	20	11	59	324
236	August 24	20	9.7	60	219
237	August 25	20	9.2	64	492
238	August 26	20	9.2	94	694
239	August 27	20	12	61	377
240	August 28	20	11	49	223
241	August 29	20	13	51	187
242	August 30	20	11	42	121
243	August 31	20	9.7	56	206

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Julian Day	Day of Year	# of days of record	Minimum-mean daily flow (cfs)	Mean-mean daily flow (cfs)	Maximum-mean daily flow (cfs)
244	September 1	20	9.2	73	289
245	September 2	20	9.2	69	209
246	September 3	20	8.7	66	190
247	September 4	20	8.7	78	392
248	September 5	20	11	77	320
249	September 6	20	11	89	650
250	September 7	20	14	128	1,010
251	September 8	20	14	105	550
252	September 9	20	13	101	302
253	September 10	20	12	126	449
254	September 11	20	13	150	639
255	September 12	20	14	116	689
256	September 13	20	17	118	448
257	September 14	20	19	108	645
258	September 15	20	19	153	985
259	September 16	20	18	79	184
260	September 17	20	18	69	136
261	September 18	20	18	68	243
262	September 19	20	18	82	293
263	September 20	20	16	103	711
264	September 21	20	18	68	263
265	September 22	20	23	83	374
266	September 23	20	26	86	487
267	September 24	20	27	76	304
268	September 25	20	23	101	482
269	September 26	20	21	79	266
270	September 27	20	20	103	381
271	September 28	20	20	143	640
272	September 29	20	23	209	1,010
273	September 30	20	27	223	840

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Julian Day	Day of Year	# of days of record	Minimum-mean daily flow (cfs)	Mean-mean daily flow (cfs)	Maximum-mean daily flow (cfs)
274	October 1	20	37	198	560
275	October 2	20	33	217	661
276	October 3	20	34	225	860
277	October 4	20	30	211	745
278	October 5	20	28	286	1,580
279	October 6	20	25	292	1,700
280	October 7	20	39	232	1,000
281	October 8	20	38	212	800
282	October 9	20	34	222	1,440
283	October 10	20	30	130	305
284	October 11	20	28	208	709
285	October 12	20	32	231	1,510
286	October 13	20	40	170	614
287	October 14	20	37	156	803
288	October 15	20	35	223	700
289	October 16	20	33	256	1,150
290	October 17	20	32	328	1,070
291	October 18	20	30	287	1,670
292	October 19	20	33	169	322
293	October 20	20	32	130	386
294	October 21	20	31	136	500
295	October 22	20	40	216	900
296	October 23	20	35	207	900
297	October 24	20	29	237	800
298	October 25	20	28	260	1,430
299	October 26	20	26	223	1,590
300	October 27	20	25	178	536
301	October 28	20	24	135	477
302	October 29	20	37	161	513
303	October 30	20	32	294	2,270
304	October 31	20	32	168	732

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Julian Day	Day of Year	# of days of record	Minimum-mean daily flow (cfs)	Mean-mean daily flow (cfs)	Maximum-mean daily flow (cfs)
305	November 1	20	30	161	760
306	November 2	20	29	252	1,220
307	November 3	20	27	196	1,070
308	November 4	20	39	143	549
309	November 5	20	34	150	944
310	November 6	20	30	121	388
311	November 7	20	26	85	382
312	November 8	20	23	112	778
313	November 9	20	22	123	614
314	November 10	20	20	103	483
315	November 11	20	20	103	689
316	November 12	20	20	71	206
317	November 13	20	18	76	217
318	November 14	20	18	109	307
319	November 15	20	16	106	450
320	November 16	20	16	109	573
321	November 17	20	15	96	254
322	November 18	20	15	119	938
323	November 19	20	14	98	337
324	November 20	20	14	83	350
325	November 21	20	13	95	412
326	November 22	20	13	107	406
327	November 23	20	15	90	211
328	November 24	20	17	95	340
329	November 25	20	17	93	364
330	November 26	20	17	117	407
331	November 27	20	15	157	959
332	November 28	20	13	233	1,200
333	November 29	20	13	128	528
334	November 30	20	13	84	240

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Table 4. Page 12 of 12.

Julian Day	Day of Year	# of days of record	Minimum-mean daily flow (cfs)	Mean-mean daily flow (cfs)	Maximum-mean daily flow (cfs)
335	December 1	20	13	69	189
336	December 2	20	13	72	316
337	December 3	20	13	58	215
338	December 4	20	14	49	200
339	December 5	20	15	63	253
340	December 6	20	14	115	620
341	December 7	20	12	111	395
342	December 8	20	12	106	376
343	December 9	20	12	82	250
344	December 10	20	11	81	385
345	December 11	20	11	55	150
346	December 12	20	10	88	450
347	December 13	20	9.6	89	370
348	December 14	20	9.0	85	340
349	December 15	20	9.0	67	200
350	December 16	20	9.0	76	400
351	December 17	20	10	102	1,000
352	December 18	20	11	131	1,200
353	December 19	20	13	93	550
354	December 20	20	10	85	460
355	December 21	20	9.4	72	420
356	December 22	20	8.6	65	430
357	December 23	20	8.0	67	300
358	December 24	20	7.8	80	350
359	December 25	20	7.6	79	290
360	December 26	20	8.0	65	280
361	December 27	20	9.6	50	130
362	December 28	20	13	56	180
363	December 29	20	13	61	410
364	December 30	20	11	54	200
365	December 31	20	13	52	145