June 30, 2011

Ms. Jennifer Gimbel, Director
Colorado Water Conservation Board
1313 Sherman Street, Room 721
Denver, CO 80203

Re: Supplemental Information to Stakeholder Group's May 13 Recommendation on Upper Colorado River Wild and Scenic Alternative Management Plan Instream Flow

Dear Ms. Gimbel,

By letter dated May 13, 2011, the Stakeholder Group for the Upper Colorado River Wild and Scenic Alternative Management Plan (SG Plan) submitted a consensus recommendation for instream flow right appropriations in the Colorado River between Kremmling and Dotsero. The Stakeholder Group (SG) recommendation was presented to the Board as an informational item during its May 2011 meeting in Durango and elicited questions from the Board members. This letter confirms the SG recommendation as conveyed in its May 13 submittal (Attachment A hereto), provides a more detailed explanation of the SG's recommendation and technical rationale (Attachment B), and provides written feedback in response to questions raised by the Board.

Board members asked questions regarding the relationship between the recommended instream flow rights filing and adoption by the BLM and U.S. Forest Service of the SG Plan as an alternative to a determination on suitability under the Wild and Scenic Rivers Act. The SG recommended approach set forth below attempts to honor deadlines that were negotiated under the SG Plan, while at the same time preserving the Board's ability to decide on a course of action that is responsive to the BLM and U.S. Forest Service's approval process. The SG requests the Board adopt the following, to be incorporated as part of the record of Board deliberations:

> "The CWCB directs the filing in 2011 of an application for this right. The CWCB will seek to defer the prosecution of the filed application until formal federal approval of the SG Plan without material change. If the water court declines to defer prosecution of the CWCB application, then the State will consult with the SG and seek a recommendation from the SG on a further course of action. Following consultation, the CWCB will take one of the following actions: (1) prosecution of the ISF application seeking a decree upon agency approval of the SG Plan; (2) withdrawal of the ISF application; or (3) any other action unanimously agreed upon by the SG and the CWCB. If the CWCB withdraws the application but the SG Plan is subsequently adopted by the federal agencies, then the CWCB will promptly file a new ISF application for the same amounts and subject to the same conditions. Nothing herein is intended to limit the discretion of the CWCB to make or respond to other ISF filings."

Finally, while not discussed during the Board's May 2011 meeting, a question has arisen within the SG regarding the relationship between the instream flow filings and potential water rights filings in connection with the proposed Colorado River Cooperative Agreement between Denver Water and certain west slope entities. The SG has arrived at the following consensus approach, which the SG requests be adopted and reflected in the record of Board deliberations:

a. The CWCB direct its staff and counsel to file the ISF application in 2011.
b. In order for any Colorado River Cooperative Agreement (CRCA) application made in 2011 to be senior in priority to the ISF filing, the CWCB will claim an appropriation date within 2011 for the ISF that is junior to the appropriation date claimed in any CRCA application made in 2011. The CWCB is willing to make this accommodation because the contemplated CRCA application(s) is/are intended to provide environmental benefits within the Colorado River basin.
c. The CWCB direct its staff and counsel to work cooperatively with the SG and the parties to the CRCA to address material conflicts, if any, that may arise between the ISF and CRCA applications if the CRCA application(s) cannot reasonably be filed in 2011.

Thank you for your continued support of the SG activities. If you have any questions regarding the supplemental information in this letter, please contact Rob Buirgy at (970) 690-4655 or rbuirgy@gmail.com.

Sincerely,

Rob R. Buirgy, Project Manager

462 Blue Lake Trail
Lafayette, CO 80026
(970) 690-4655

Two Enclosures: Stakeholder Group's May 13, 2011 Recommendation Letter
Upper Colorado River Wild and Scenic Instream Flow Summary Recommendation

cc: Ted Kowalski
Linda Bassi
Jeff Baessler
Susan Schneider

May 13, 2011

Ms. Jennifer Gimbel, Director
Colorado Water Conservation Board
1313 Sherman Street, Room 721
Denver, CO 80203

Dear Ms. Gimbel,

The Stakeholder Group for the Upper Colorado River Wild and Scenic Alternative Management Plan (Plan) is submitting this revised letter to transmit the Stakeholder Group (SG) recommendation for instream flows for the Colorado River. This letter supersedes our letter dated May 5, 2011, and incorporates the most current agreement among the stakeholders. This recommendation for instream flows addresses segments of the mainstem of the Upper Colorado River between Kremmling and Dotsero. These stream reaches were included in a U.S. Bureau of Land Management Wild and Scenic Rivers Act study conducted as part of the federal Land Management Plan revision process. It is that process which prompted formation of the SG and development of the Alternative Management Plan that is proposed in lieu of potential designation under the Wild and Scenic Rivers Act. One of the Plan's four primary long-term resource protection measures is a consensus recommendation from the SG to the CWCB for appropriation of instream flows (ISFs) pursuant to C.R.S. 37-92-102.

This recommendation is the product of a substantial effort by diverse SG interests to develop a consensus ISF recommendation for minimum flows that, when combined with other aspects of the Plan, the SG believes will preserve the natural environment to a reasonable degree while accommodating the needs of the various SG interests. This recommendation is supported by the individual staff members and representatives of the Plan's stakeholders but has yet to be approved by the governing boards of all stakeholder entities.

The SG consensus ISF recommendation is as follows:

<u>Blue River confluence to Piney River confluence</u>

Sept 16 -May 14	500 cfs
May 15 -July 31	600 cfs
Aug 1 -Sept 15	750 cfs

<u>Piney River confluence to Cabin Creek confluence</u>

Sept 16 -May 14	525 cfs
May 15 -July 31	650 cfs
Aug 1 -Sept 15	800 cfs

<u>Cabin Creek confluence to a point immediately upstream of the Eagle River confluence</u>

Sept 16 -May 14	650 cfs
May 15 -Jun 15	900 cfs
Jun 16 -Sept 15	800 cfs

The SG's recommendation for and support of this ISF is conditioned upon inclusion of the concepts set forth below within the CWCB's Declaration of Intent to Appropriate, water court application(s), and proposed decree(s):

1) This ISF is a unique ISF appropriation in that it is recommended by the consensus of a diverse stakeholder group under a local management plan designed to help protect resources of "outstanding remarkable value" that have been identified by the Bureau of Land Management and the United States Forest Service. This ISF is also unique because it involves the mainstem of the Colorado River, the relative size of that river, the current level of water supply development, the level of use for recreational fishing purposes, and the river's overall importance to the State of Colorado. The terms of this appropriation are part of a compromise and settlement and are unique circumstances that shall not establish any precedent and shall not be construed as a commitment to include any specific findings of fact, conclusions of law or administrative practices in future appropriations.

2) Pursuant to section 37-92-102(3)(b), C.R.S. (2010), this instream flow appropriation shall be subject to the present uses or exchanges of water being made by other water users, pursuant to appropriation or practices in existence on the date of this appropriation. The CWCB will apply this provision if the proponent provides adequate documentation and verification of present uses and exchanges.

3) During any period identified by the Upper Colorado River Commission in a finding issued pursuant to Article VIII(d)(8) of the Upper Colorado River Basin Compact of 1948 for curtailment of Colorado River basin water uses within Colorado, which the State of Colorado has agreed to implement in a manner that impacts water diversions within Water Division 5, the CWCB agrees that this ISF water right will be administered in accordance with compact curtailment rules adopted by the State of Colorado that are then in effect, if any. If no such compact curtailment rules are then in effect, it is the intent of the CWCB that this instream flow right will not be administered during the period of any such compact curtailment.

4) The CWCB agrees not to file a statement of opposition to adjudications of water rights made after the date of this filing that: (1) result in depletions that do not exceed 100 acre feet; or (2) are for changes of water rights that do not seek to change more than 2,500 acre feet, provided such changes of water rights do not involve an exchange through the subject ISF reaches; and (3) do not exceed a 1% depletive effect on the instream flow right decreed herein in accordance with the *de minimis* Rule 8e of the Rules Concerning the Instream Flow and Natural Lake Level Program. This term and condition does not preclude the CWCB from enforcing this ISF appropriation in accordance with the priority system. The CWCB may also evaluate applications for water rights made after the date of this filing to determine whether they are appropriate for application of the Injury with Mitigation Rule 8i.(3) of the Rules Concerning the Instream Flow and Natural Lake Level Program.

5) It is the intent of the CWCB that this ISF provide protection of the natural environment only to the extent authorized by state statute as against adjudications of water rights made after the date of this filing. The CWCB intends that the ISF water right decreed herein is not appropriate for consideration as a streamflow standard in other administrative or regulatory permitting contexts.

In addition, the SG consensus recommendation recognizes the ability of the CWCB to revisit its findings related to its determination of the amount of water necessary to preserve the natural environment to a reasonable degree if the Plan is no longer in effect.

If you have any questions regarding this recommendation, please contact Rob Buirgy at (970) 690-4655 or rbuirgy@gmail.com.

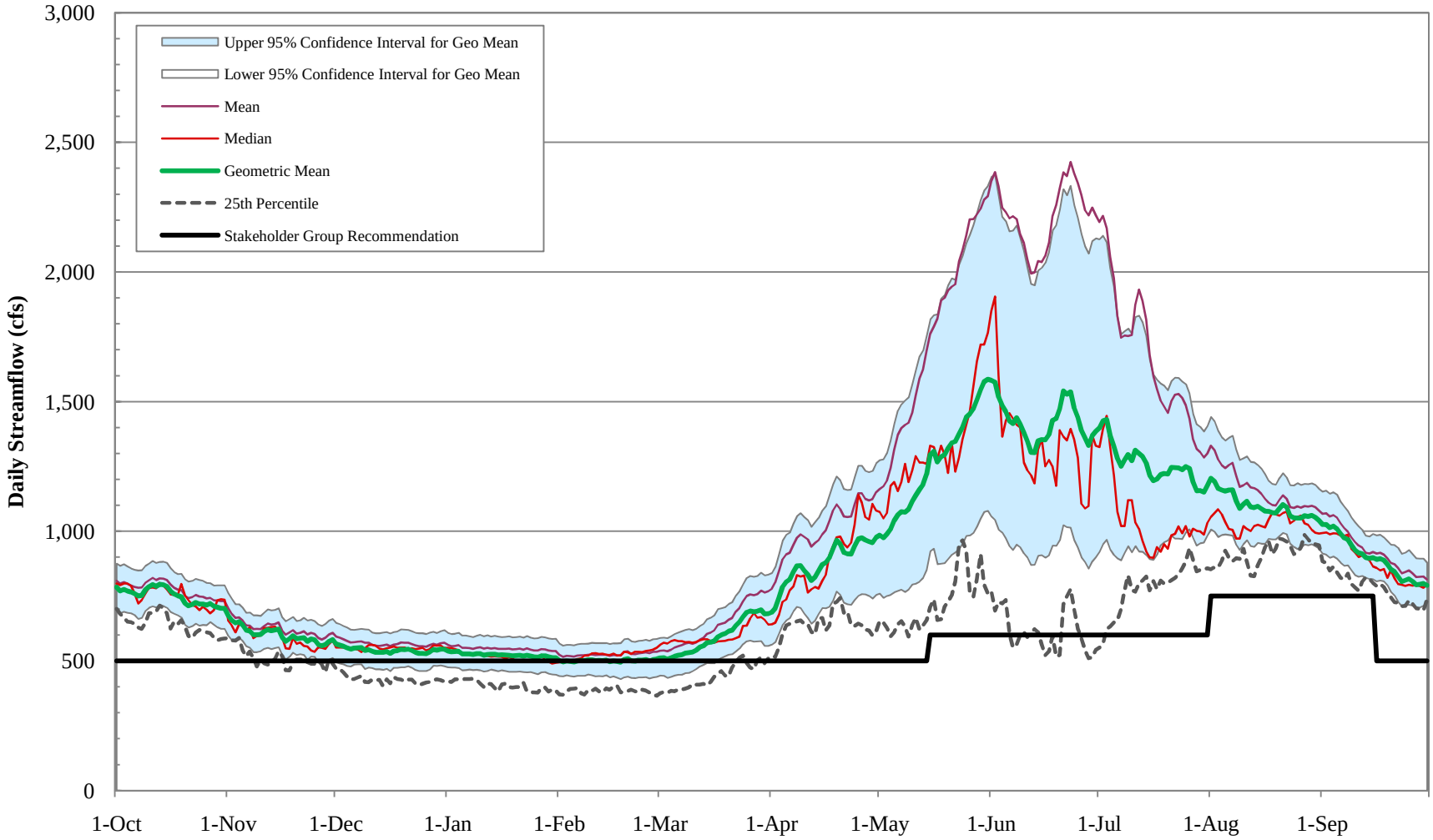
Sincerely,

Rob R. Buirgy, Project Manager

Enclosures (3)

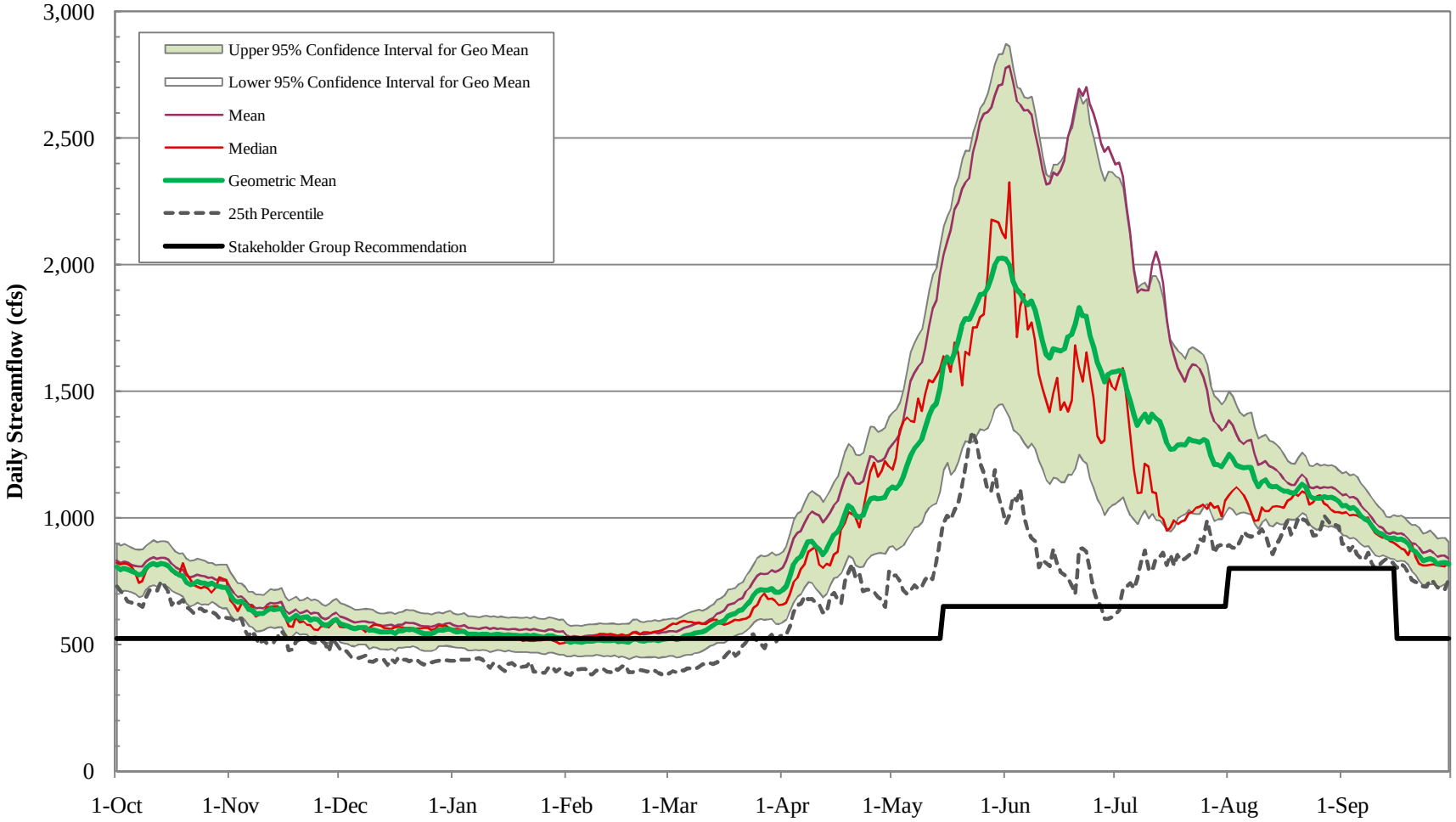
cc: Ted Kowalski
Linda Bassi
Jeff Baessler
Susan Schneider

Figure 1
Daily Streamflow Statistics and Stakeholder Group ISF Recommendation
Colorado River near Kremmling (USGS 09058000)



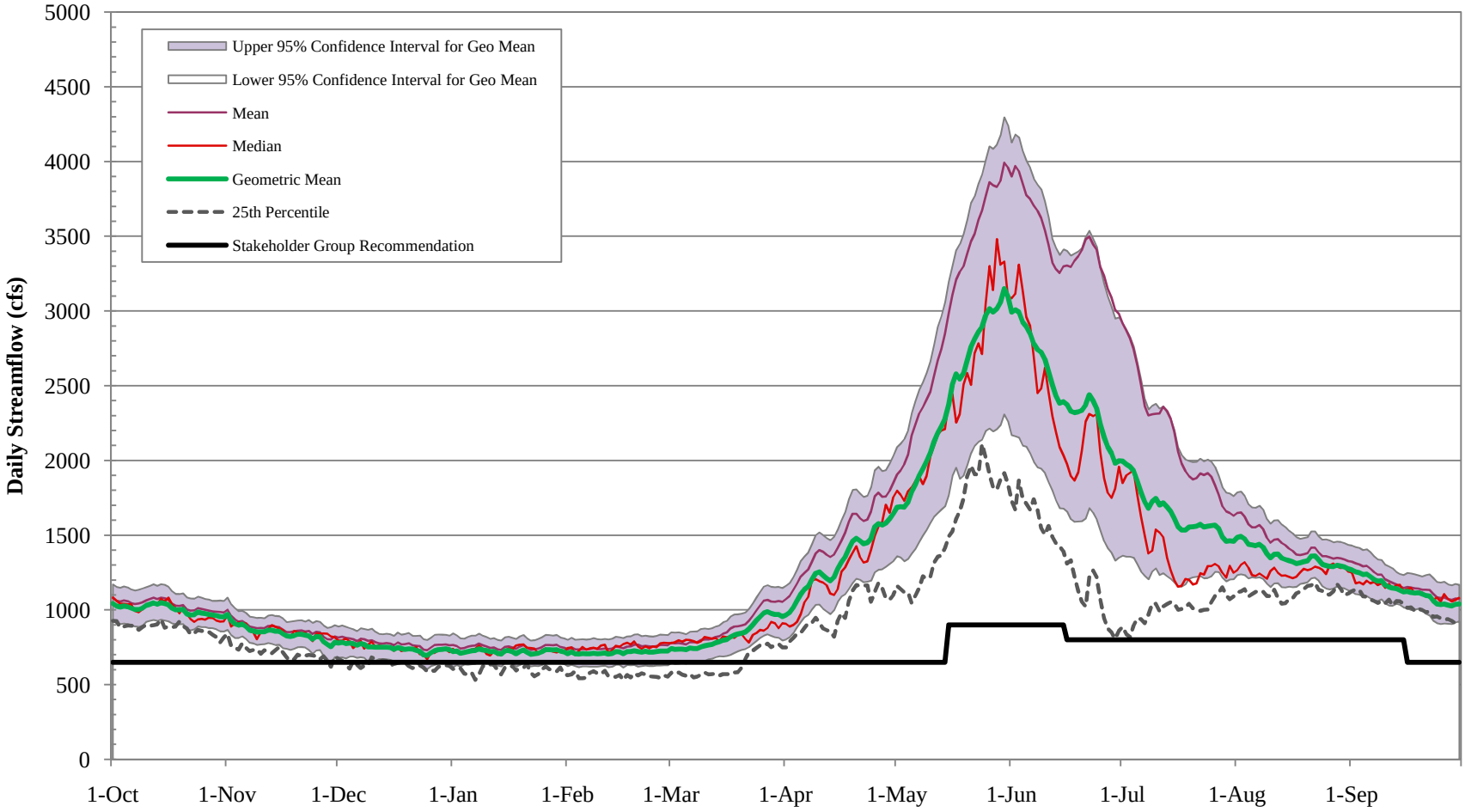
Note:
The Upper Colorado River Wild & Scenic Alternative Management Plan Stakeholder Group recommendation applies to the stream reach from the confluence of the Colorado River and the Blue River to the confluence with the Colorado River and the Piney River.

Figure 2
Daily Streamflow Statistics and Stakeholder Group ISF Recommendation
Colorado River near Kremmling (USGS 09058000) + Piney River near State Bridge (USGS 09059500)



Note:
The Upper Colorado River Wild & Scenic Alternative Management Plan Stakeholder Group recommendation applies to the stream reach from the confluence of the Colorado River and the Piney River to the confluence with the Colorado River and Cabin Creek.

Figure 3
Daily Streamflow Statistics and Stakeholder Group ISF Recommendation
Colorado River near Dotsero (USGS 09070500) - Eagle River below Gypsum (USGS 09070000)



Note:
The Upper Colorado River Wild & Scenic Alternative Management Plan Stakeholder Group recommendation applies to the stream reach from the confluence of the Colorado River and Cabin Creek to a point immediately upstream of the confluence with the Colorado River and the Eagle River.

Stream: Colorado River

Executive Summary

Water Division: 5
Water District: 100
CDOW#: 21262 & 19637

Segment: Blue River to Piney River

Upper Terminus: Blue River
Latitude: 40º 02’ 33.2”N Longitude: 106º 23’ 52.1"
WNW NE S19 T1N R80W 6PM

Lower Terminus: Piney River
Latitude: 39º 51’ 17.9”N Longitude: 106º 38’ 31.6"W
SW NW S25 T2S R83W 6PM

Counties: Grand and Eagle
Length: 23.7 miles

ISF Appropriation Amounts:

500 cfs	September 16th to May 14th
600 cfs	May 15th to July 31st
750 cfs	August 1st to September 15th

Segment: Piney River to Cabin Creek

Upper Terminus: Piney River
Latitude: 39º 51’ 17.9”N Longitude: 106º 38’ 31.6"W
SW NW S25 T2S R83W 6PM

Lower Terminus: Cabin Creek
Latitude: 39º 52’ 29.2”N Longitude: 106º 53’ 37.1"W
SE SE S15 T2S R85W 6PM

County: Eagle
Length: 20.8 miles

ISF Appropriation Amounts:

525 cfs	September 16th to May 14th
650 cfs	May 15th to July 31st
800 cfs	August 1st to September 15th

Segment: Cabin Creek to a point Immediately upstream of the Confluence with the Eagle River

Upper Terminus: Cabin Creek

Latitude: 39º 52’ 29.2”N Longitude: 106º 53’ 37.1"W
SE SE S15 T2S R85W 6PM

Lower Terminus: Eagle River

Latitude: 39º 38’ 46.5”N Longitude: 107º 03’ 28.8"W
SW NE S5 T5S R86W 6PM

County: Eagle
Length: 25.0 miles

ISF Appropriation Amounts:

650 cfs	September 16th to May 14th
900 cfs	May 15th to June 15th
800 cfs	June 16th to September 15th

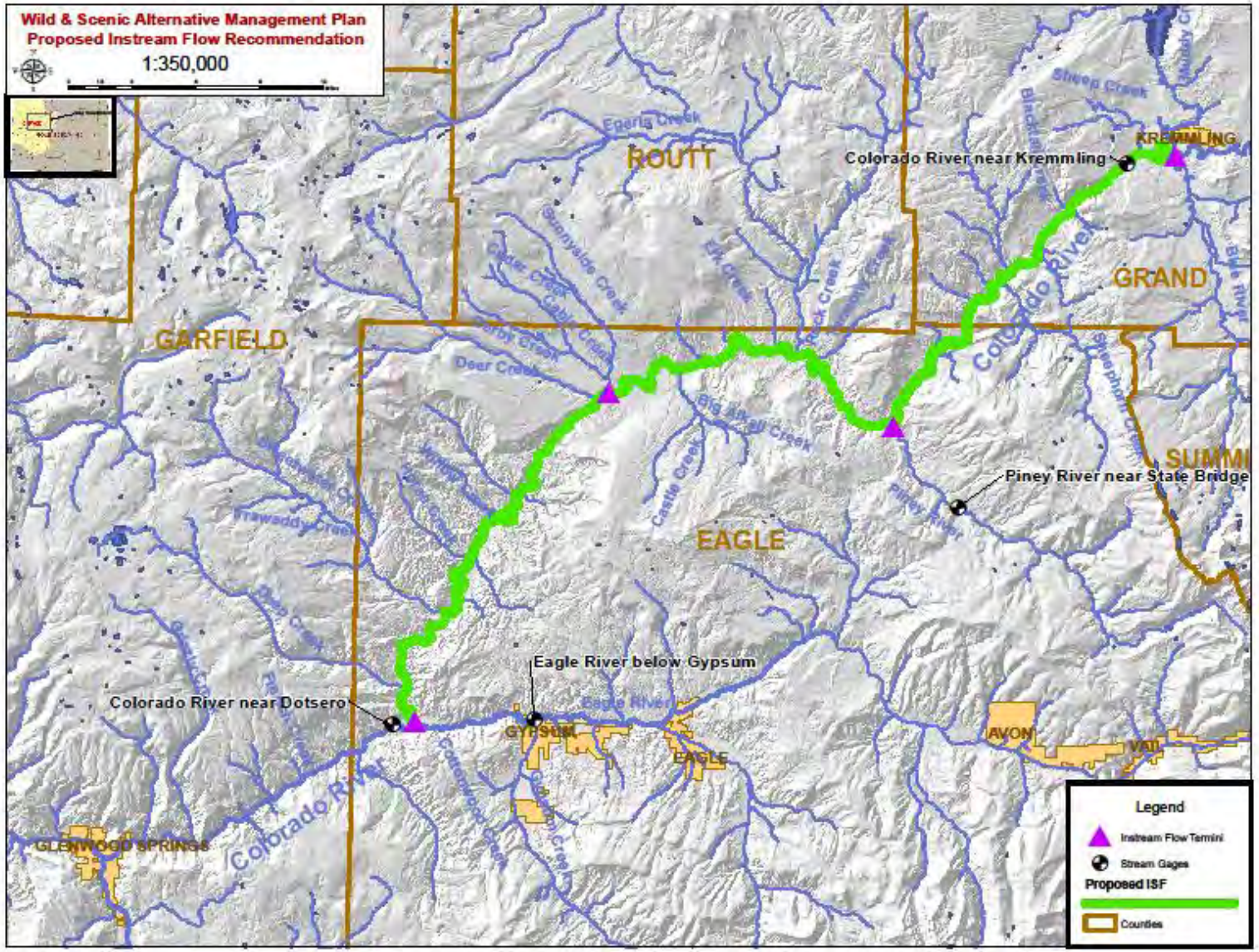


Figure 1: Map of the Colorado River from the confluence of the Blue River to the confluence of the Eagle River, with relevant streamflow gages.

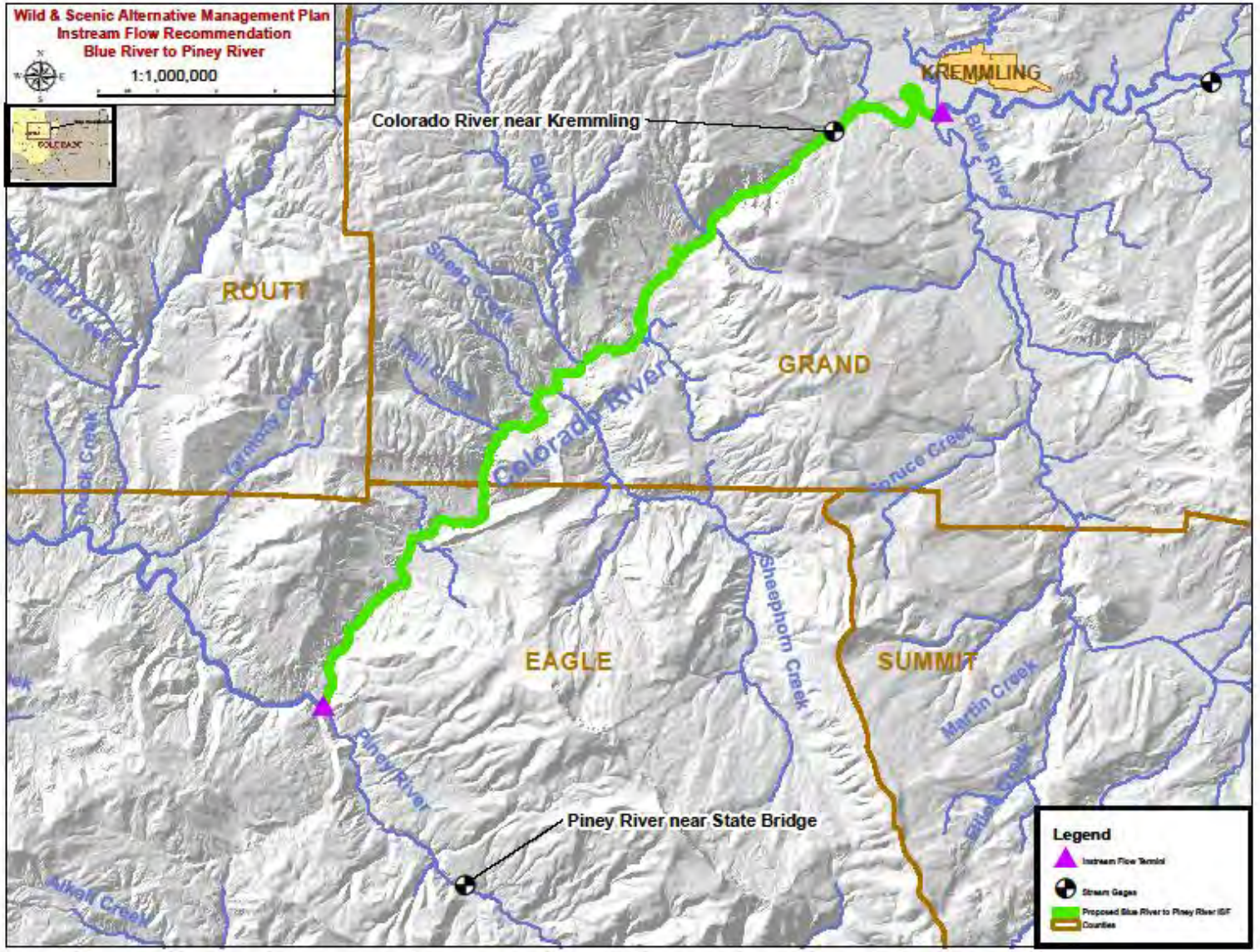


Figure 2: Map of the Colorado River ISF segment from the confluence with the Blue River to the confluence with the Piney River.

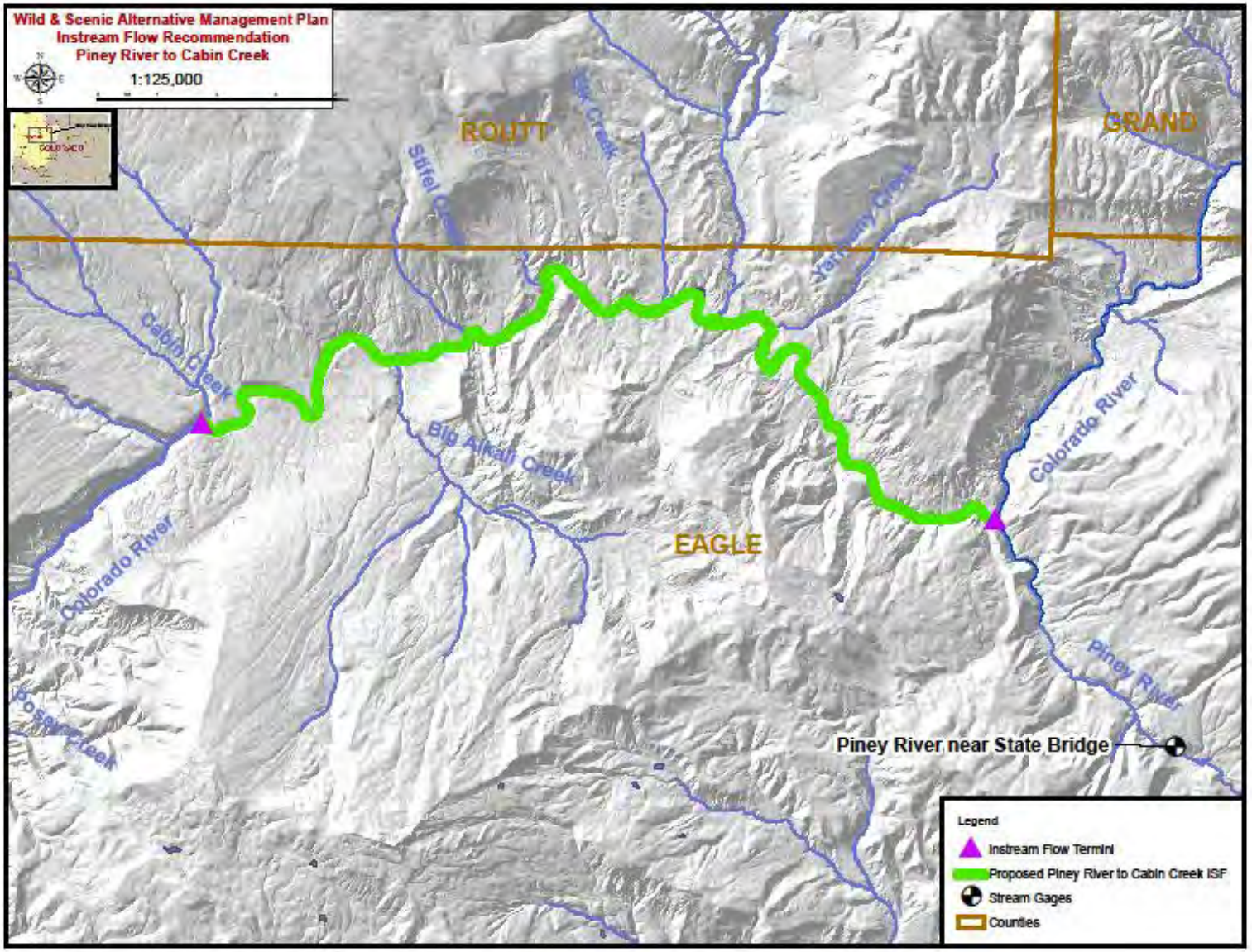


Figure 3: Map of the Colorado River ISF segment from the confluence with the Piney River to the confluence with Cabin Creek.

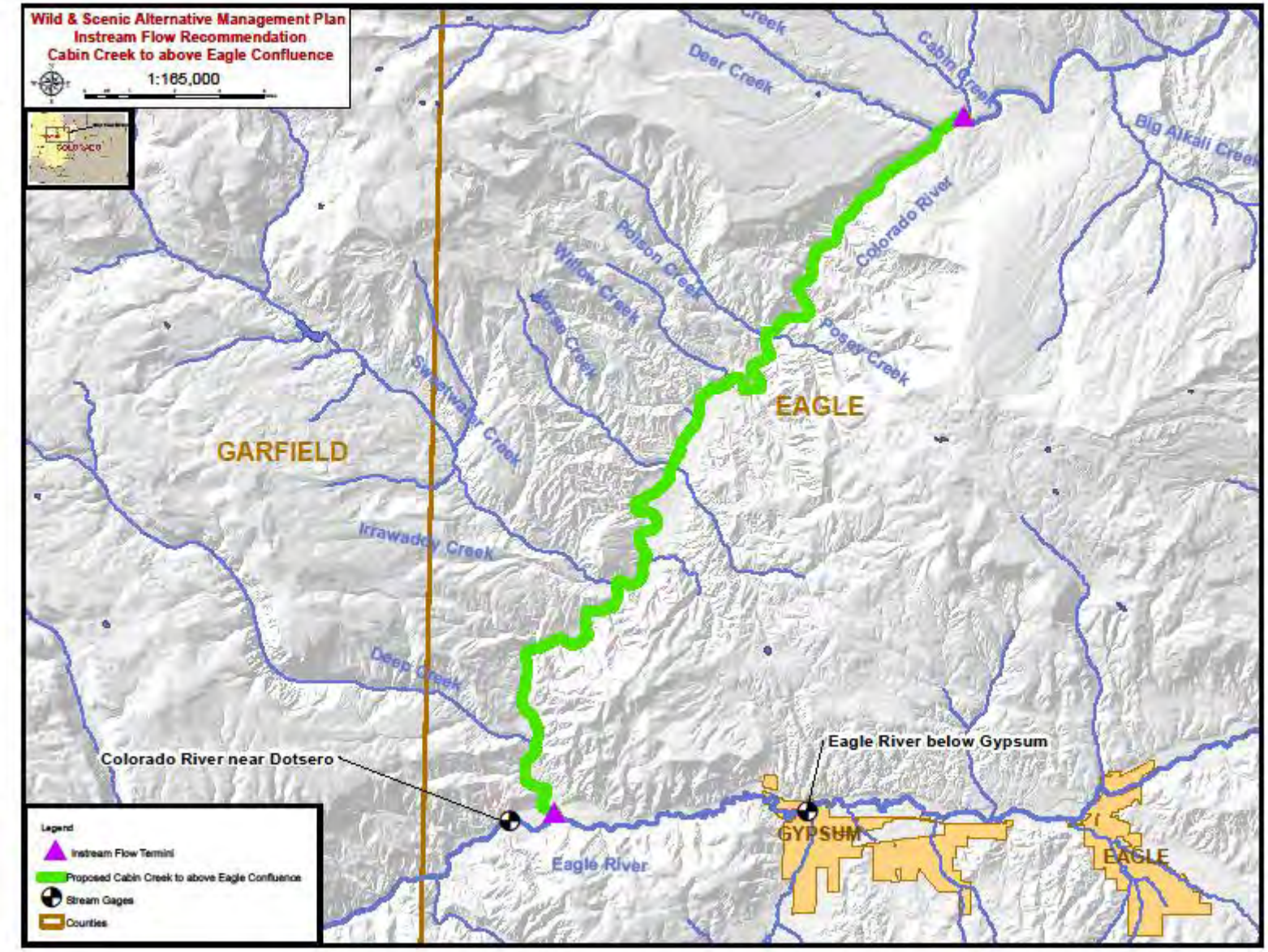


Figure 4: Map of the Colorado River ISF segment from the confluence with Cabin Creek to the confluence with the Eagle River.

Enclosure 1

Background Information

The Upper Colorado River Wild and Scenic Stakeholder Group (SG) represents a diverse range of interests who have worked together since 2008 to develop a management plan to protect the outstandingly remarkable values (ORVs) in the Colorado River from Kremmling downstream to the forest service boundary east of Glenwood Springs. The management plan includes long term protective measures and voluntary cooperative measures to protect the fishery and the recreational fishing ORV in the Upper Colorado River from Kremmling downstream to Dotsero.

The information presented in this summary forms the basis for the instream flow (ISF) recommendation to be considered by the Colorado Water Conservation Board (CWCB). It is the SG's opinion that the information contained in this report is sufficient to support the findings required by CWCB Rule 5(i). The SG recommends three segments of the Upper Colorado River for inclusion into the State of Colorado's Instream Flow Program.

The total reach of the Upper Colorado River that is considered for this ISF appropriation is 69.5 miles long (Figure 1). The reach begins at the confluence with the Blue River, near the town of Kremmling, at an elevation of approximately 7,300 feet and ends at a point immediately upstream of the confluence of the Eagle River at an elevation of approximately 6,100 feet. Given the different biological and hydrological characteristics along the length of this Upper Colorado River reach, the SG has divided this reach into three segments 1) Blue River to Piney River Segment, 2) Piney River to Cabin Creek Segment, and 3) Cabin Creek to Eagle River Segment (lower termini immediately upstream of the confluence with the Eagle River). Portions of the Blue River to Piney River Segment are located in both Grand and Eagle counties (Figure 2), while the entire Piney River to Cabin Creek and Cabin Creek to Eagle River segments are located in Eagle County (Figures 3 and 4). The Blue River to Piney River Segment represents 23.7 river miles; the Piney River to Cabin Creek Segment represents 20.8 river miles and the Cabin Creek to Eagle River Segment represents 25.0 river miles.

Fish Species of Interest, Sensitive Species and Species of Special Concern

The Upper Colorado River from Kremmling, Colorado downstream to Dotsero, Colorado is known to provide habitat for 14 fish species, with brown trout, rainbow trout, mountain whitefish and flannelmouth sucker being the key species of interest for the Physical Habitat Simulation (PHABSIM) modeling (MEC 2011) as selected by the Colorado Division of Wildlife (CDOW). The change in fish habitat in response to changes in flow was modeled for these species and some of their life stages at three locations in the Upper Colorado River: Pumphouse Site, Rancho del Rio Site, and Lyons Gulch Site. The Pumphouse and Rancho

del Rio sites are located on the Colorado River between the Blue River and Piney River and the Lyons Gulch Site is located on the Colorado River between Cabin Creek and the Eagle River.

The nonnative brown trout and rainbow trout provide the majority of the recreational fishing opportunities in the Upper Colorado River reach from Kremmling downstream to Dotsero. At a site sampled in 2008 near Radium (Blue River to Piney Segment), brown trout and rainbow trout comprised 45% and 2% of the fish sampled, respectively (Table 1, CDOW 2010). At a site sampled in 2008 from Cottonwood to Lyons Gulch (Cabin Creek to Eagle River Segment), brown trout and rainbow trout comprised 19% and <1% of the fish sampled (Table 1, CDOW 2010). Brown trout reproduce naturally in the Colorado River and its tributaries, while the rainbow trout population has been supplemented by stocking since the onset of whirling disease greatly reduced their populations. Beginning in 2008 and continuing in 2009, a whirling disease resistant strain of rainbow trout was stocked throughout the Colorado River mainstem with the intent to increase survival and reproduction of these fish in the future.

Table 1: Percent catch and total number of fish collected at two sites in the study area, sampled in 2008 (CDOW 2010).

Species / Hybrid Names	Radium Station	Cottonwood to Lyon's Gulch
Colorado River cutthroat trout	<1	--
Colorado River rainbow trout	--	<1
cutthroat x rainbow trout hybrid	<1	--
brown trout	45	19
rainbow trout	2	<1
brook trout	--	--
mountain whitefish	8	12
mottled sculpin	<1	<1
roundtail chub	--	<1
speckled dace	2	10
bluehead sucker	<1	<1
flannelmouth sucker	<1	3
longnose sucker	10	23
white sucker	32	33
white x flannelmouth sucker hybrid	<1	<1
white x longnose sucker hybrid	<1	<1
northern pike	<1	--
Total # Collected	1,782	1,347

Mountain whitefish, which are native in Colorado only to the Yampa River and White River drainages (Schisler 2010), comprised 8% and 12% of the fish sampled at the Radium and Cottonwood to Lyons Gulch sites sampled in 2008, respectively (Table 1, CDOW 2010). Speckled dace are native fish to the Colorado River drainage, and comprised 2% and 10% of the fish sampled at the Radium and Cottonwood to Lyons Gulch sites sampled in 2008, respectively (Table 1, CDOW 2010). Flannelmouth suckers comprised <1% and 3% of the fish sampled at the Radium and Cottonwood to Lyons Gulch sites sampled in 2008, respectively (Table 1, CDOW 2010). Similarly, the bluehead sucker comprised <1% of the fish sampled from both the Radium Site and from Cottonwood to Lyons Gulch. A brief life history discussion is provided for selected species in the Upper Colorado River ISF segments.

Brown trout

Brown trout (*Salmo trutta*) are native to Europe and western Asia (Scott and Crossman 1973). This species was brought to Colorado and other Rocky Mountain states in the late 1880s (Belica 2007); the introduced fish were a mix of stocks from England, Scotland, and Germany (Behnke 2002). Brown trout are often the dominant trout species in lower elevation mountain streams (Belica 2007), but large streams characterized by variable habitat can allow rainbow trout to coexist with brown trout (Behnke 2002). Although they can tolerate sluggish flows, brown trout do not require slow water velocities (Scott and Crossman 1973). This species spawns in October and November, when water temperatures reach approximately 7°C (Scott and Crossman 1973; Behnke 2002). Like other trout species, brown trout bury their eggs in redds in shallow, gravel-bottomed streams (Scott and Crossman 1973; Behnke 2002). Brown trout typically reach adult lengths of 16 inches (Scott and Crossman 1973), but in smaller, relatively unproductive streams, they usually do not exceed 10 inches (Behnke 2002). Brown trout are carnivorous, but their diet changes in response to food availability. They consume large amounts of stream invertebrates, but they also eat frogs, fish, and rodents (Scott and Crossman 1973; Behnke 2002; Belica 2007). Brown trout begin to transition to a piscivorous diet at approximately 6 inches in length; at a length of 12 inches, brown trout are almost entirely piscivorous if sufficient prey fish are present (Scott and Crossman 1973; Belica 2007). Piscivorous brown trout tend to be larger and longer-lived than those that eat mostly invertebrates (Behnke 2002).

Rainbow trout

The native range of the rainbow trout (*Oncorhynchus mykiss*) is the eastern Pacific Ocean and streams west of the Rocky Mountains; this range stretches from Baja California north to the Kuskokwim River in Alaska (Scott and Crossman 1973). However, rainbow trout have been introduced worldwide and are common in Colorado (Bernstein and Montgomery 2008). Rainbow trout inhabit small to moderately large streams with gravel substrates and riffle-pool morphology. They also inhabit lakes, but require streams for successful reproduction (Scott and Crossman 1973, Bernstein and Montgomery 2008). Rainbow trout spawn when water temperatures exceed 6-7°C, so timing is variable; in coastal areas, spawning occurs in

January or February, but in colder regions, it occurs as late as June (Behnke 2002). Fertilized eggs are buried in redds, or nests excavated by the female (Scott and Crossman 1973; Bernstein and Montgomery 2008). Female rainbow trout reach sexual maturity between 2 and 6 years of age, and an average adult length for resident stream rainbow trout is 12-18 inches (Behnke 2002; Bernstein and Montgomery 2008). Rainbow trout mainly consume drifting invertebrates, but larger individuals will also eat small fish, eggs, and an occasional rodent (Scott and Crossman 1973; Bernstein and Montgomery 2008).

Mountain whitefish

Mountain whitefish (*Prosopium williamsoni*) is native to western North America; its range stretches from the Lahontan Basin in the south through British Columbia in the north (Scott and Crossman 1973). In Colorado, mountain whitefish are not native south of the Green River Drainage of the Colorado River Basin (Behnke 2002), but they have been successfully introduced outside of their natural range. Mountain whitefish prefer large rivers, and are most commonly associated with open channel habitat and deeper water (Behnke 2002), but they can also utilize pool habitats in smaller, turbid streams (Scott and Crossman 1973). Mountain whitefish can tolerate higher turbidity and temperatures than many other trout species (Behnke 2002). Mountain whitefish typically grow to a maximum length of 8-12 inches and reach sexual maturity between ages 3 and 6. Spawning occurs in winter and can extend into January or February in large systems where temperatures are more stable (Scott and Crossman 1973, Behnke 2002). Mountain whitefish are broadcast spawners that do not build nests (Scott and Crossman 1973). The diet of the mountain whitefish is predominantly benthic invertebrates (Scott and Crossman 1973), but the species is also opportunistic and will feed on fish eggs, fish, and invertebrates on the water's surface (Scott and Crossman 1973, Behnke 2002).

Flannelmouth sucker

Historically, the flannelmouth sucker (*Catostomus latipinnis*) was commonly found in most, if not all, medium to large, lower elevation rivers of the Upper Colorado River drainage (upstream of Glen Canyon Dam). Within the State of Colorado, flannelmouth sucker are present in the Colorado River and numerous tributaries including the Gunnison River up to the Aspinall Unit reservoirs (Bezzerides and Bestgen 2002), the Uncompahgre River (Sigler and Miller 1963) and the Dolores River. Flannelmouth suckers are typically found in slower, warmer rivers in plateau regions of the Colorado River drainage (Deacon and Mize 1997). They usually inhabit the mainstem of moderate to large rivers but are occasionally found in small streams. This species frequents pools and deep runs but can also be found in the mouths of tributaries, riffles, and backwaters. Flannelmouth sucker typically spawn in the Upper Colorado River basin between April and June (McAda 1977, McAda and Wydoski 1980, Snyder and Muth 1990, Tyus and Karp 1990).

Bluehead sucker

This bluehead sucker (*Catostomus discobolus*) is found in a large variety of river systems ranging from large rivers with discharges of several thousand cfs to small creeks with less

than a couple of cfs (Smith 1966). Adult bluehead suckers exhibit a strong preference for specific habitat types (Holden and Stalnaker 1975). This species has been reported to typically be found in runs or riffles with rock or gravel substrate (Vanicek 1967, Holden and Stalnaker 1975, Carlson et al. 1979, Sublette et al. 1990). The bluehead sucker is known to feed on invertebrates, which have their highest densities in riffles. Although the species generally inhabits streams with cool temperatures, bluehead suckers have been found inhabiting small creeks with water temperatures as high as 82.4° F (Smith 1966).

Roundtail chub

Historically, roundtail chub (*Gila robusta*) were known to commonly occur in most medium to large tributaries of the Upper Colorado River Basin (Vanicek 1967, Holden and Stalnaker 1975, Joseph et al. 1977). Roundtail chub historically occurred in lower elevation (below 7,546 ft.) streams, including the Colorado, Dolores, Duchesne, Escalante, Green, Gunnison, Price, San Juan, San Rafael, White, and Yampa rivers (Bezzerides and Bestgen 2002). Roundtail chub are often found in stream reaches that have a complexity of pool and riffle habitats (Bezzerides and Bestgen 2002). Adults are found in eddies and pools adjacent to strong current and use instream boulders as cover (Sigler and Sigler 1996, Brouder et al., 2000). Roundtail chub begin spawning when water temperatures reach about 65°F (Vanicek and Kramer 1969, Joseph et al. 1977). In most Colorado River tributaries this increase in temperature coincides with a decrease in discharge after peak runoff (Bezzerides and Bestgen 2002).

Instream Flow Recommendations

The SG recommends an instream flow of 600 cfs from May 15th to July 31st (spring/summer), 750 cfs from August 1st to September 15th (late summer), and 500 cfs from September 16th to May 14th (fall/winter) for the Blue River to Piney River Segment. For the Piney River to Cabin Creek Segment, the SG recommends an instream flow of 650 cfs from May 15th to July 31st (spring/summer), 800 cfs from August 1st to September 15th (late summer), and 525 cfs from September 16th to May 14th (fall/winter). For the Cabin Creek to Eagle River Segment, the SG recommends an instream flow of 900 cfs from May 15th to June 15th (spring/early summer), 800 cfs from June 16th to September 15th (summer), and 650 cfs from September 16th to May 14th (fall/winter).

These instream flow recommendations are the result of a review of the physical habitat – flow relationships, hydrological conditions, and a compromise among the SG entities on the recommended minimum instream flow necessary to preserve the natural environment to a reasonable degree. The above instream flow recommendations consider the physical habitat – flow relationships, primarily for the adult trout life stage as presented in the MEC Instream Flow Report (2011) provided to the CWCB, although other native fish data were considered, in addition to water availability constraints. These flows are a component of the SG Plan to support the recreational fishing ORV. The instream flow levels are within the range of flow from 500 cfs to 1,500 cfs that provide abundant habitat for most species and lifestages (MEC 2011).

Recommendations for minimum flows are based on PHABSIM relationships as reported by MEC (2011) and an evaluation of total weighted usable habitat and the relative quality of habitat available for all species and life stages modeled. Emphasis is placed on total habitat availability for the adult nonnative brown trout and rainbow trout, which provide the majority of the recreational value, although fry and juvenile trout life stages were also weighted more heavily than other species. Mountain whitefish and flannelmouth sucker were also considered in this evaluation. An effort was made to establish minimum instream flow recommendations that would provide adequate habitat for all life stages of these native species.

Blue River to Piney River Segment

The Blue River to Piney River Segment is represented by the MEC (2011) Pumphouse and Rancho del Rio sites, which are evaluated together given the similarity in habitat and fish composition. As discussed by MEC (2011), total habitat quantity is abundant for most species and lifestages between 500 and 1,500 cfs based on PHABSIM habitat versus flow relationships. This essentially means that the maximum habitat, or the peak of the habitat – flow relationship, for each species life stage occurs somewhere along this continuum of flow. The maximum flow within this range reduces the amount of habitat for the majority of species life stages, especially the brown trout juvenile and fry life stages that provide the foundation for a robust trout fishery. A minimum flow between 500 and 750 cfs balances an adequate amount of habitat for all species and lifestages.

A minimum flow of 500 cfs established during the winter period from September 16th to May 14th will maintain sufficient levels of habitat for all life stages of brown trout and rainbow trout at both the Pumphouse and Rancho del Rio sites. When placed in the context of water availability, 500 cfs will provide sufficient levels of habitat during the base flow period that represents a bottleneck for adult trout in terms of metabolic constraints and survival. Based on the PHABSIM modeling, a minimum flow of 500 cfs will result in approximately 90% and 82% of the maximum total weighted usable habitat for adult brown trout and adult rainbow trout, respectively in the Blue River to Piney River Segment (Figures 5 – 8).

A minimum flow of 600 cfs during the spring/early summer period from May 15th to July 31st will provide less than the maximum amount of total weighted usable habitat (Figure 5 and Figure 6). When the 600 cfs ISF level is placed in the context of both the brown trout and rainbow trout habitat – flow relationships (Figures 5 – 8), approximately 91% and 88% of the maximum total weighted usable area will be available to the trout fishery, respectively. An ISF of 600 cfs during the summer provides adequate habitat for juvenile brown trout (Figure 5 and Figure 6), and juvenile rainbow trout (Figure 7 and Figure 8). Based on the habitat – flow relationships for adult brown trout (Figure 5 and Figure 6), the maximum total weighted usable area occurs at approximately 750 cfs at both the Pumphouse and Rancho del Rio sites. The SG recommendation also includes an ISF level that maximizes brown trout

habitat for a six week period during late summer from August 1st to September 15th, which represents a key time of the year in terms of aquatic life stress.

The SG's recommended flows seek to balance the habitat among the three trout life stages – adult, fry and juvenile. Stream flows greater than a 750 cfs, which maximizes adult brown trout habitat, would also begin to decrease the amount of fry and juvenile habitat. Thus, it is important to consider the multiple trout life stages, because the recruitment of young fish into the adult population is important in maintaining a healthy fishery.

When the 600 cfs and 750 cfs levels are placed in the context of the optimum adult mountain whitefish habitat range, 500 cfs to 1,100 cfs, these flows will provide a sufficient amount of habitat for all of the life stages at the Pumphouse Site (Figure 9). Similarly, a 600 cfs and 750 cfs flow at the Rancho del Rio Site will provide a suitable amount of habitat for juveniles and fry, but less than the optimal range of habitat for adult mountain whitefish which occurs from approximately 1,500 cfs to 3,000 cfs (Figure 10). At the Rancho del Rio Site, the physical habitat available to adult mountain whitefish is considerably different than the habitat at the Pumphouse Site; however increasing an ISF level to achieve a greater amount of habitat for adult mountain whitefish at the Rancho del Rio Site would decrease the available habitat for other species and their life stages.

Flannelmouth sucker habitat was modeled at the Rancho del Rio Site, despite only comprising <1% of the fish sampled at the Radium Site, in 2008. This reach of the Colorado River is near the upstream extent of the flannelmouth sucker, as the current distribution is documented to extend upstream to near Glenwood Springs, CO (Bezzerides and Bestgen 2002). The amount of available habitat at flows between 500 and 750 cfs is sufficient to maintain the current population of flannelmouth suckers which is near the upstream extent of its distribution.

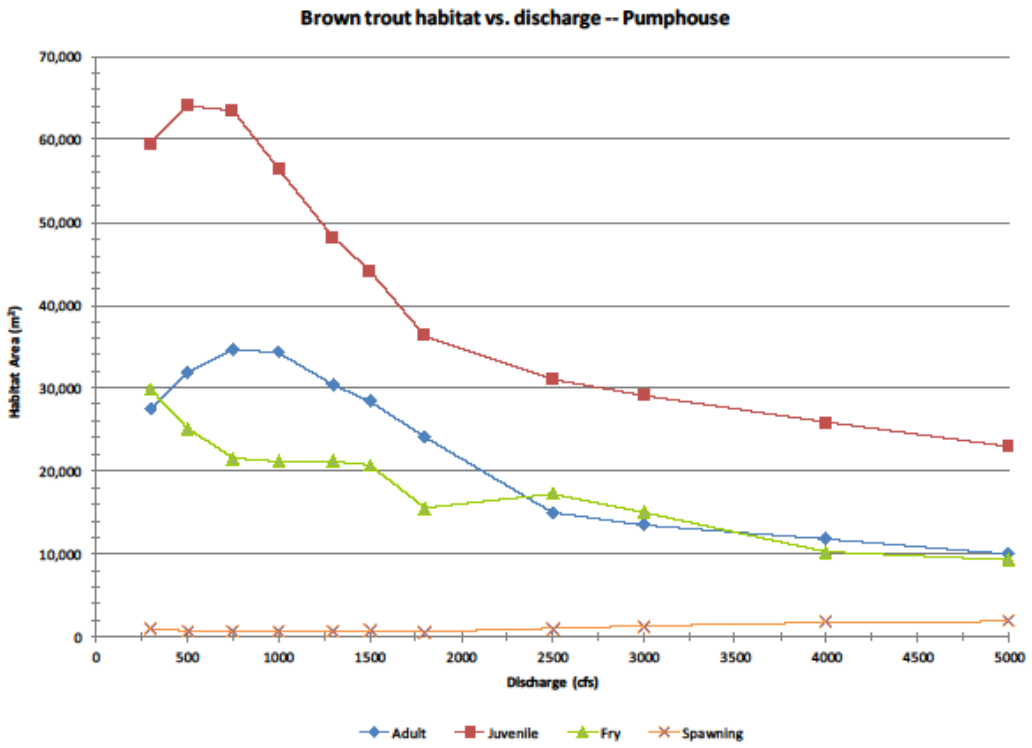


Figure 5: Brown trout habitat versus discharge at the Pumphouse Site (MEC 2011).

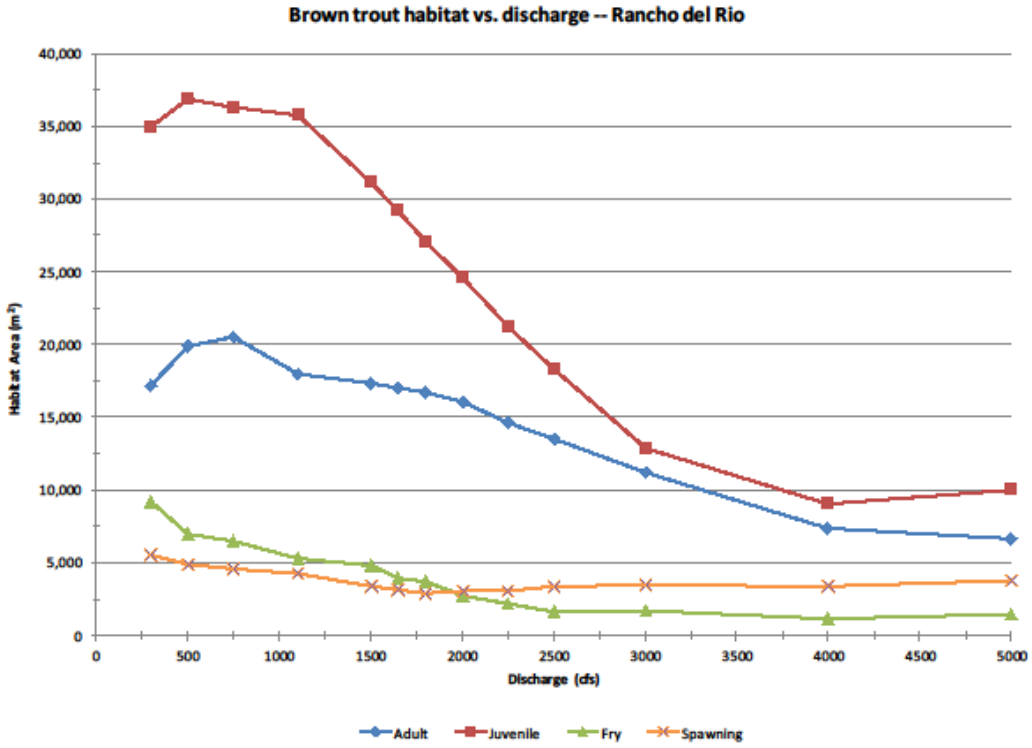


Figure 6: Brown trout habitat versus discharge at the Ranch del Rio Site (MEC 2011).

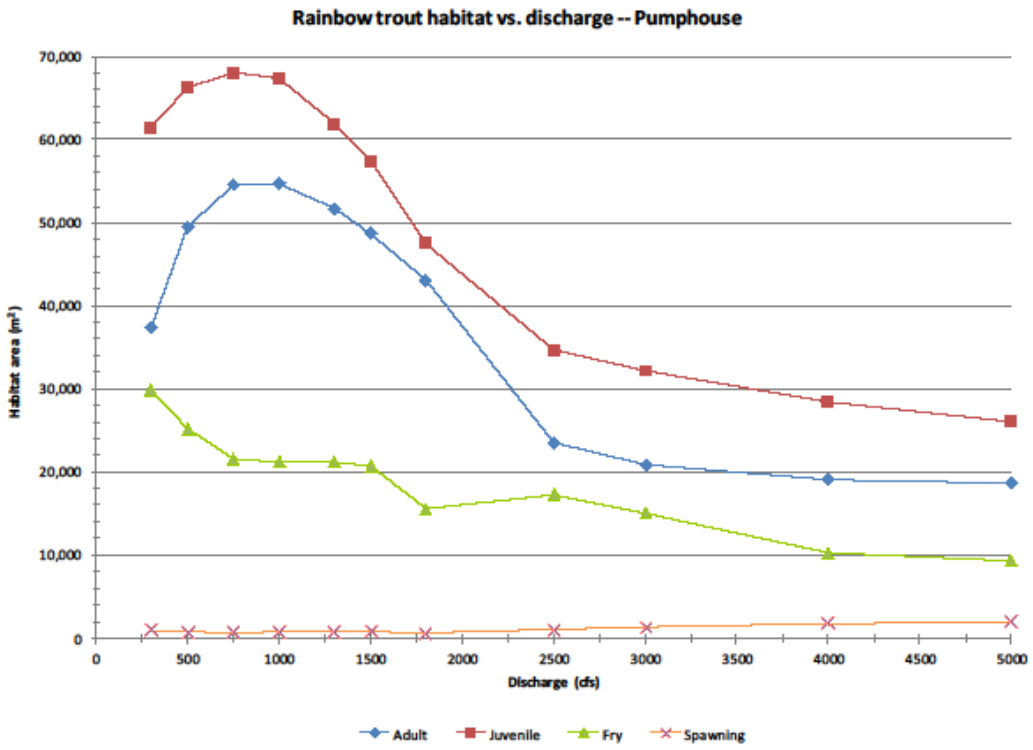


Figure 7: Rainbow trout habitat versus discharge at the Pumphouse Site (MEC 2011).

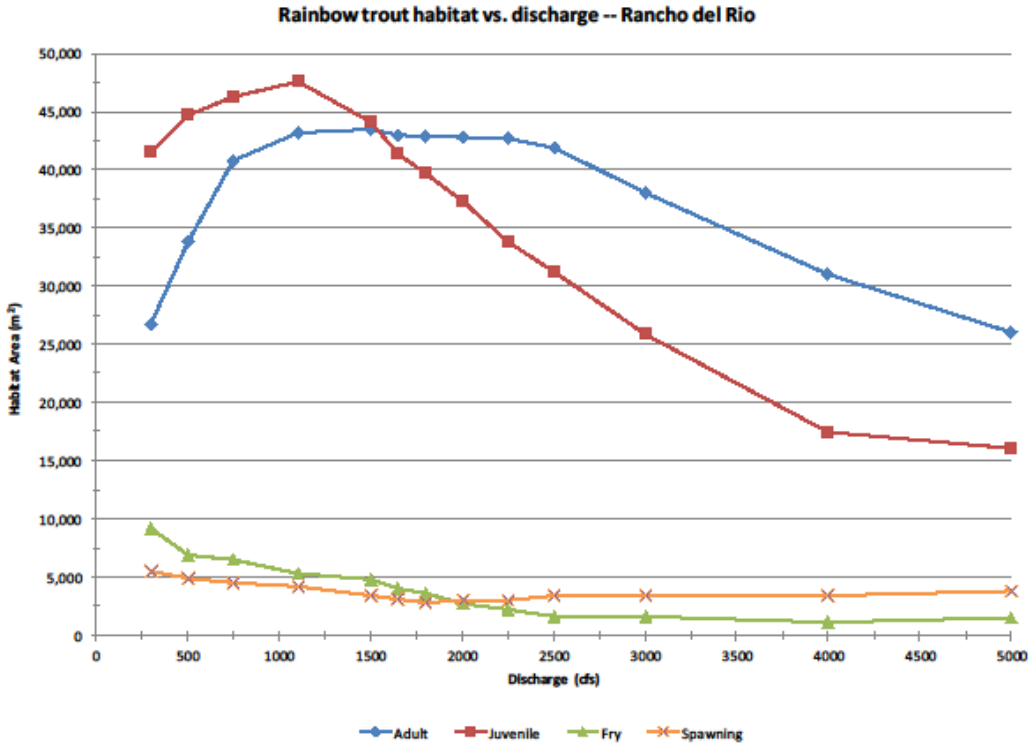


Figure 8: Rainbow trout habitat versus discharge at the Rancho del Rio Site (MEC 2011).

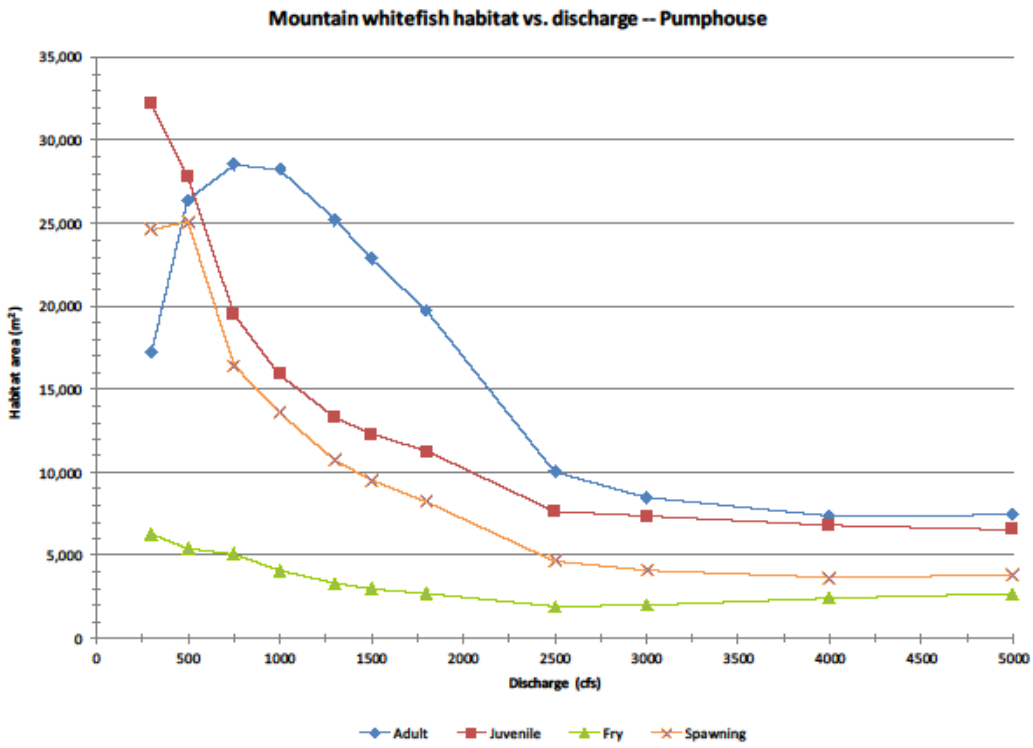


Figure 9: Mountain whitefish habitat versus discharge at the Pumphouse Site (MEC 2011).

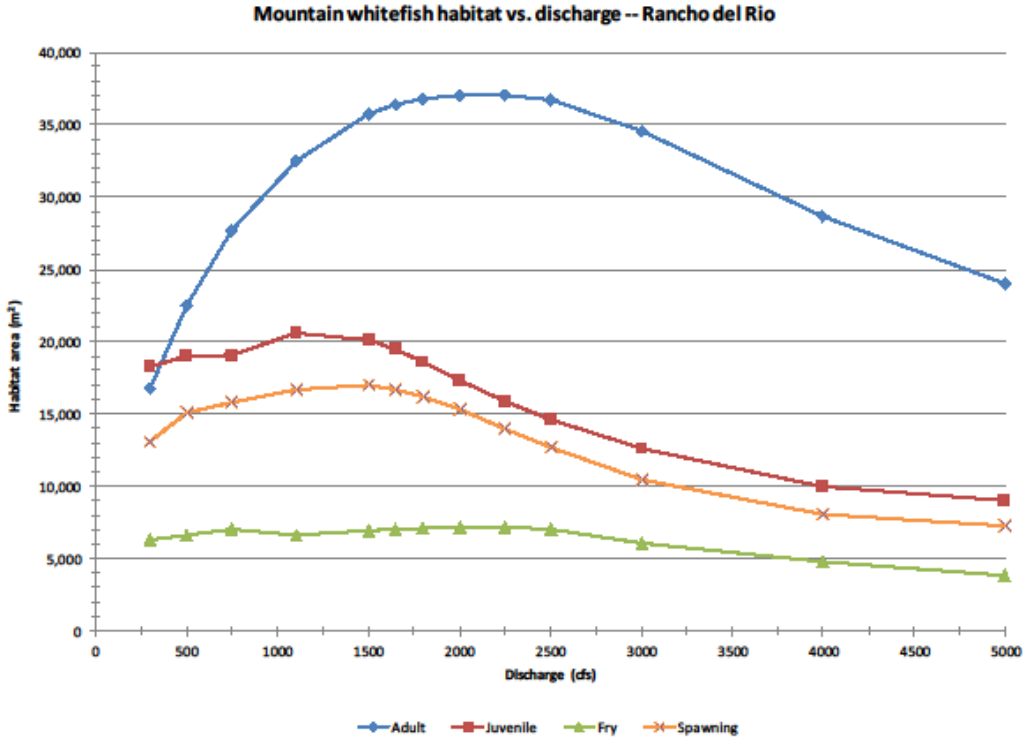


Figure 10: Mountain whitefish habitat versus discharge at the Rancho del Rio Site (MEC 2011).

Piney River to Cabin Creek Segment

The Piney River to Cabin Creek Segment represents a slight change in the hydrological conditions of the Colorado River given the additional inflows from the Piney River. Typically, the Piney River contributes about an additional 10% of flow above what is measured in the Colorado River at the Kremmling gage, approximately 24 miles upstream. This additional flow is relatively constant on a seasonal basis and does not appreciably change the shape of the hydrograph. For example, the timing of spring runoff and the timing of the peak flows do not appreciably change in the Colorado River with the addition of Piney River flow. This is generally not the case with the proposed third ISF segment – Cabin Creek to Eagle River. Hydrological inputs from Cabin Creek and other tributaries downstream to the confluence with the Eagle River increase the flows in the Colorado River by approximately 25%. The additional flows in the most downstream segment also change the timing of runoff, such that runoff occurs slightly earlier in the calendar year. The change in hydrological and hydraulic conditions in the Colorado River from State Bridge downstream to Dotsero was one of the primary reasons for creating two ISF segments in this reach. The Piney River to Cabin Creek Segment also represents a transition zone for the recreational fishing ORV. The Bureau of Land Management (BLM) recognizes that the recreational fishing ORV extends downstream to Red Dirt Creek, near McCoy, approximately 7 miles downstream of the confluence with the Piney River.

A River2D site was not established within the segment boundaries to evaluate fish habitat relationships. However, to evaluate the biological instream flow needs this segment is best represented by the Rancho del Rio River2D site (MEC 2011). The Rancho Del Rio site is approximately 4 miles upstream of the confluence with the Piney River. Given the Rancho Del Rio information was considered in the development of the instream flow for the Blue River to Piney River Segment, the SG believes that the upstream ISF values provided a starting point for the Piney River to Cabin Creek ISF Segment but should be increased given the additional flow contributions to the river.

A minimum flow of 525 cfs during the winter period from September 16th to May 14th will maintain sufficient levels of available habitat for all life stages of brown trout and rainbow trout at the Rancho del Rio Site. Based on the PHABSIM modeling, a minimum flow of 525 cfs will result in approximately 87% and 78% of the maximum total weighted usable habitat for adult brown trout and adult rainbow trout, respectively in the Piney River to Cabin Creek Segment.

A minimum flow of 650 cfs during the summer period from May 15th to July 31st will provide approximately 88% of the maximum amount of habitat available to brown trout at the Rancho Del Rio Site. A flow of 650 cfs in this reach will also provide 86% of the maximum amount of habitat available to rainbow trout at the Rancho Del Rio Site.

A minimum flow of 800 cfs during the late summer period from August 1st to September 15th will provide approximately 91% of the maximum amount of habitat available to brown trout at the Rancho Del Rio Site. A flow of 800 cfs will also provide 94% of the maximum amount of habitat available to rainbow trout at the Rancho Del Rio Site.

When the recommended ISF levels for the Piney River to Cabin Creek Segment are placed in the context of the Rancho Del Rio Site mountain whitefish habitat-flow relationships, a suitable amount of habitat will be available for juveniles and fry, but less than the optimal range will be available for the adult mountain whitefish. Similarly, for the flannelmouth sucker, flows between 525 cfs and 800 cfs will be sufficient to maintain the current population of flannelmouth suckers which is near the upstream extent of its distribution.

Cabin Creek to a Point Immediately Upstream of the Confluence with the Eagle River Segment

The Cabin Creek to Eagle River Segment is represented by the Lyon's Gulch PHABSIM modeling site (MEC 2011). As discussed by MEC (2011), total habitat quantity is abundant for most species and lifestages between 500 and 1,500 cfs based on PHABSIM habitat versus flow relationships for this segment.

A minimum flow of 650 cfs during the winter period, September 16th to May 14th, will provide adequate amounts of habitat for all species and life stages during this base flow period. A 650 cfs flow during the winter period will provide approximately 89% and 94%, of the maximum total weighted usable habitat for adult brown trout and adult rainbow trout, respectively (Figure 11 and Figure 12). A 650 cfs flow will also provide an adequate amount habitat for fry and juvenile of each trout species. Again the adult brown trout and adult rainbow trout life stages were the primary species and life stage considered for this lower segment, although the mountain whitefish, speckled dace, and sucker species, including the flannelmouth sucker, were also considered. These other species comprised a larger component of the fish assemblage as compared to the upstream reach (CDOW 2010). However, as discussed above the winter period is the most critical period for adult trout in terms of metabolic constraints and survival, thus a 650 cfs flow should be protective of the adult trout during the winter period.

A minimum flow of 900 cfs established during the spring runoff and early summer period, May 15th to June 15th, will provide approximately 99% of the maximum total weighted usable habitat for both the adult brown trout and adult rainbow trout at the Lyon's Gulch Site. This flow level also provides an abundant amount of habitat for the adult mountain whitefish and adult flannelmouth sucker (Figure 13 and Figure 14).

A minimum flow of 800 cfs during the mid to late summer period will provide approximately 97% and 98% of the maximum total weighted usable habitat, for adult brown trout and adult rainbow trout, respectively (Figure 11 and Figure 12). This flow level balances the trout life stages during the summer months, a time when growth and development occurs for the younger life stages and adults.

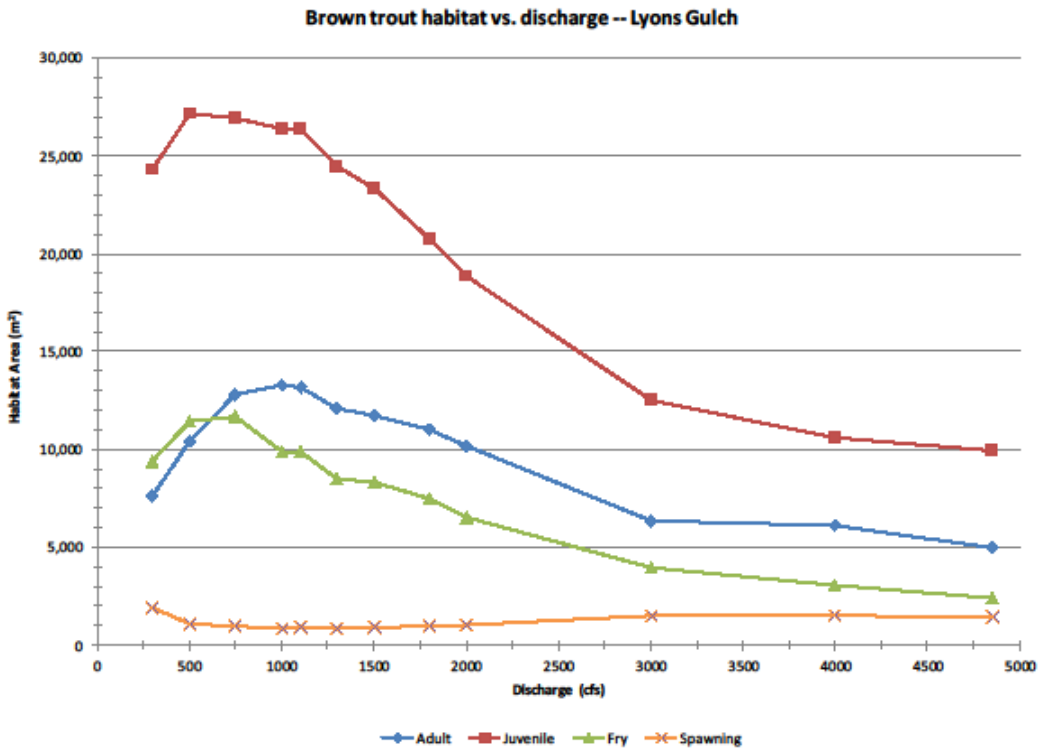


Figure 11: Brown trout habitat versus discharge at the Lyon's Gulch Site, Piney River to Eagle River Segment (MEC 2011).

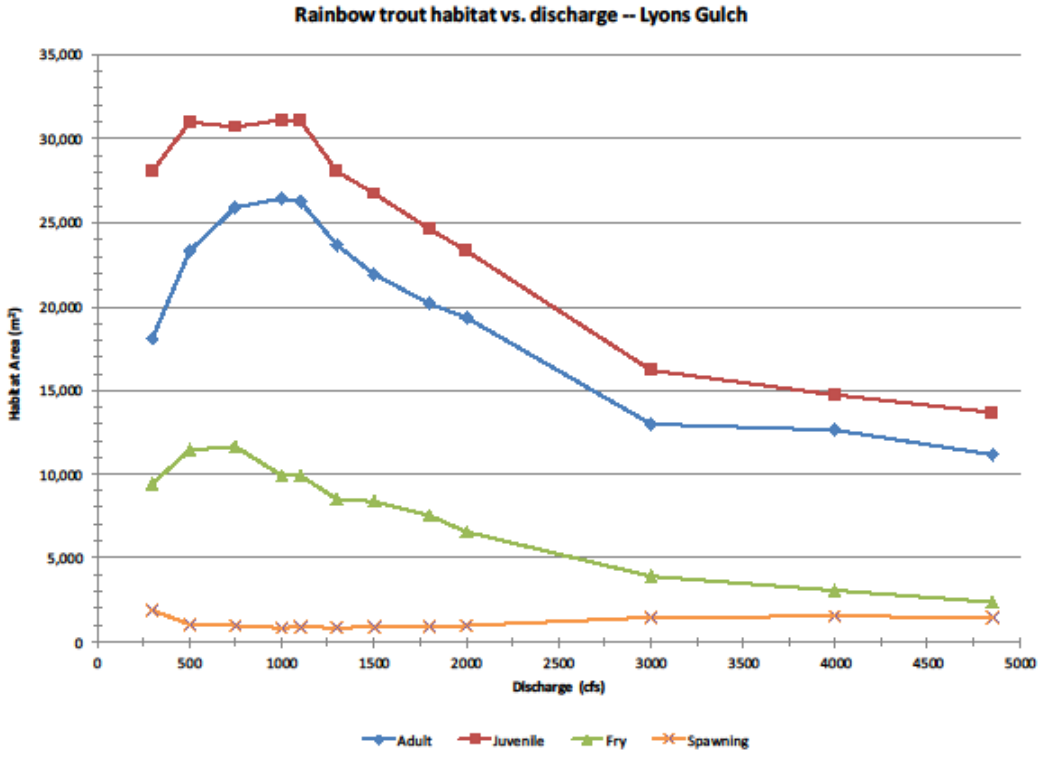


Figure 12: Rainbow trout habitat versus discharge at the Lyon's Gulch Site, Piney River to Eagle River Segment (MEC 2011).

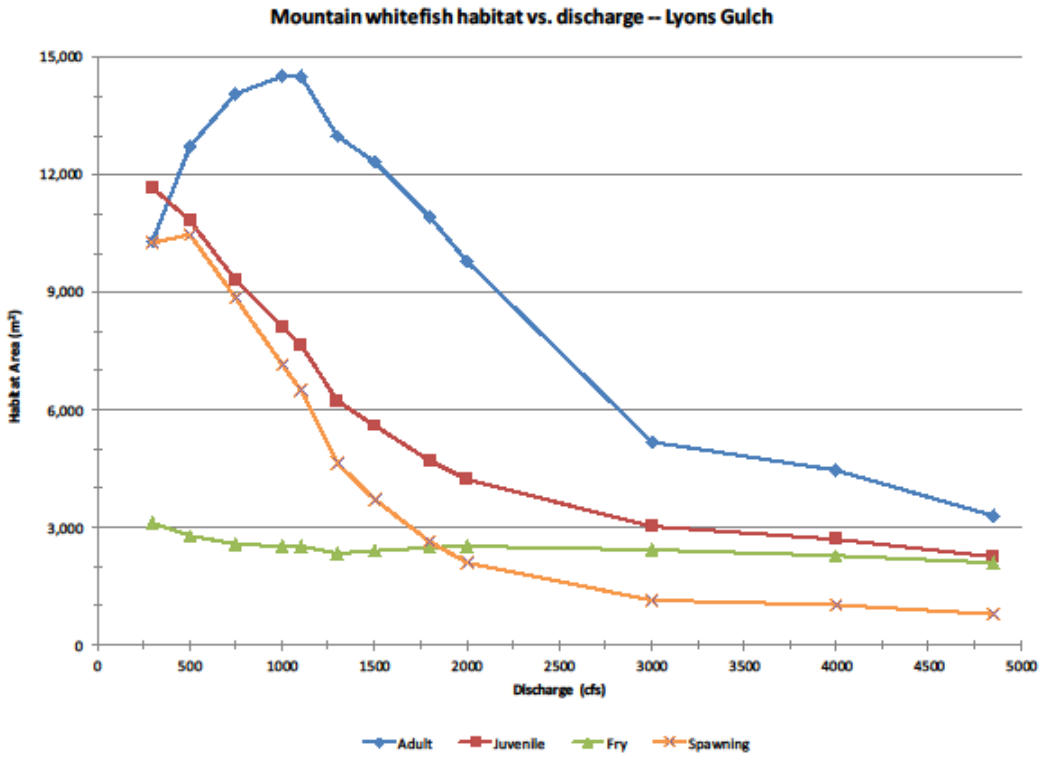


Figure 13: Mountain whitefish habitat versus discharge at the Lyon's Gulch Site, Piney River to Eagle River Segment (MEC 2011).

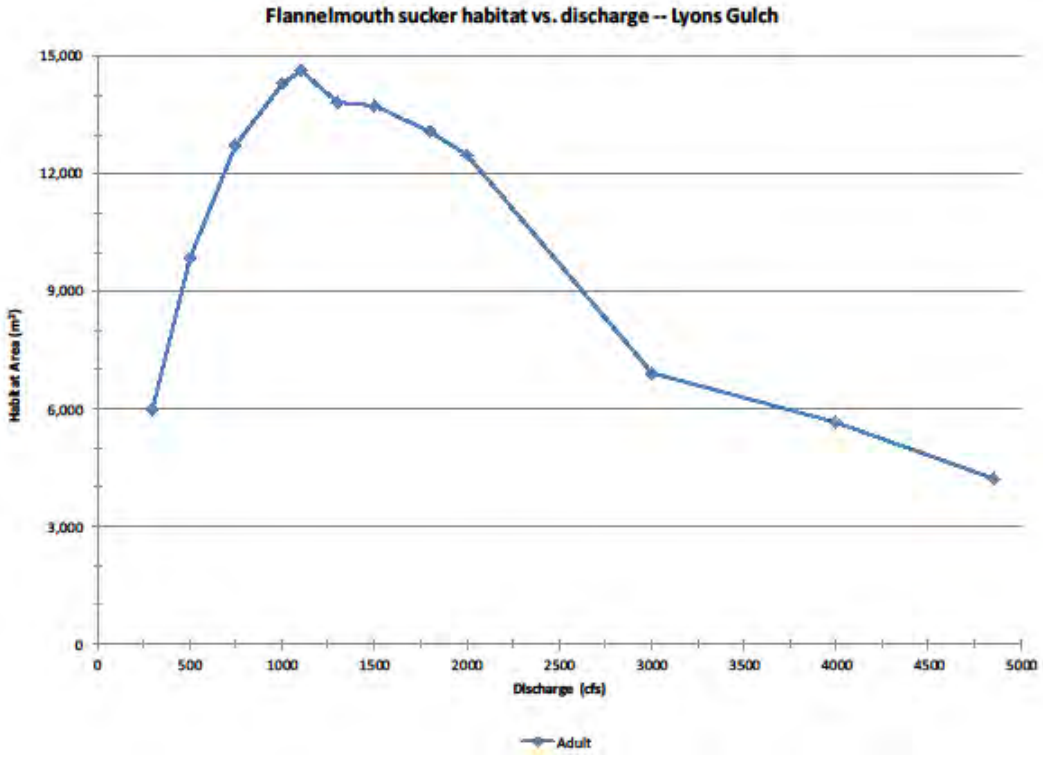


Figure 14: Flannelmouth sucker habitat versus discharge at the Lyon's Gulch Site, Piney River to Eagle River Segment (MEC 2011).

Hydrological Characteristics

During the development of the alternative management plan, the SG relied upon two hydrological data sets to establish flow-based resource guides. The SG evaluated both historical and future simulated flow conditions at three points of reference along the Upper Colorado River, from Kremmling downstream to Dotsero. The use of both historical and simulated future flow data was important for the SG to reach a consensus on the ISF recommendations. The Kremmling gage (09058000) provided the upstream reference point for the Blue River to Piney River Segment, the Kremmling gage plus the Piney gage (09059500) provided a reference point for the Piney River to Cabin Creek Segment, and lastly – the Dotsero gage (0907050) minus the Eagle gage (09070000) provided a downstream reference point for the Cabin Creek to Eagle River Segment. The period of record from April 1st 1983 to March 31st 2006, 24 years, was selected to characterize the historical flow conditions for all three points of reference along the Upper Colorado River.

The SG also evaluated simulated flows to characterize possible future flow scenarios at all three points of reference along the Upper Colorado River. Briefly, future water demands of the East Slope, Grand and Eagle counties were imposed on the undepleted flows of the Upper Colorado River to construct a future hydrological scenario. The undepleted flows used in the model represented the period of record from April 1st 1947 to March 31st 1991, 44 years.

Using each data set, the geometric mean value and the upper and lower 95% confidence intervals was calculated for each day of the year (Figures 15 - 20). These figures characterize the central tendency of flows on a daily basis for the entire period of record. The SG also identified dry year conditions as occurring 25% of the time over the period of record for the Kremmling gage, based on the cumulative annual flow that passes the gage. This evaluation resulted in 6 years being characterized as dry year conditions for the historical period (e.g. 1992, 1994, 2001 through 2004), and 11 years for the simulated future flows. As such, these dry year conditions provide a reference for low flow levels in the Upper Colorado River at the Kremmling gage.

This subset of dry year conditions was also evaluated using the geometric mean (Figure 21 and Figure 22). These hydrographs are noticeably different from the entire period of record hydrographs in that peak flows do not occur until late summer given the absence of snowpack driven runoff that is typically observed in early June. It is also apparent that modeled future dry conditions may be very similar to historical dry periods based on the similar shape of the hydrographs. During the historical winter base flow conditions, the lower 95% confidence interval ranged from approximately 300 cfs to 450 cfs, and the modeled future flows show a similar range.

The geometric mean analyses for the daily hydrographs were considered, in part, by the SG entities in developing the consensus ISF appropriations for the Upper Colorado River – Blue River to Piney River Segment, the Piney River to Cabin Creek Segment, and the Cabin Creek to Eagle River Segment.

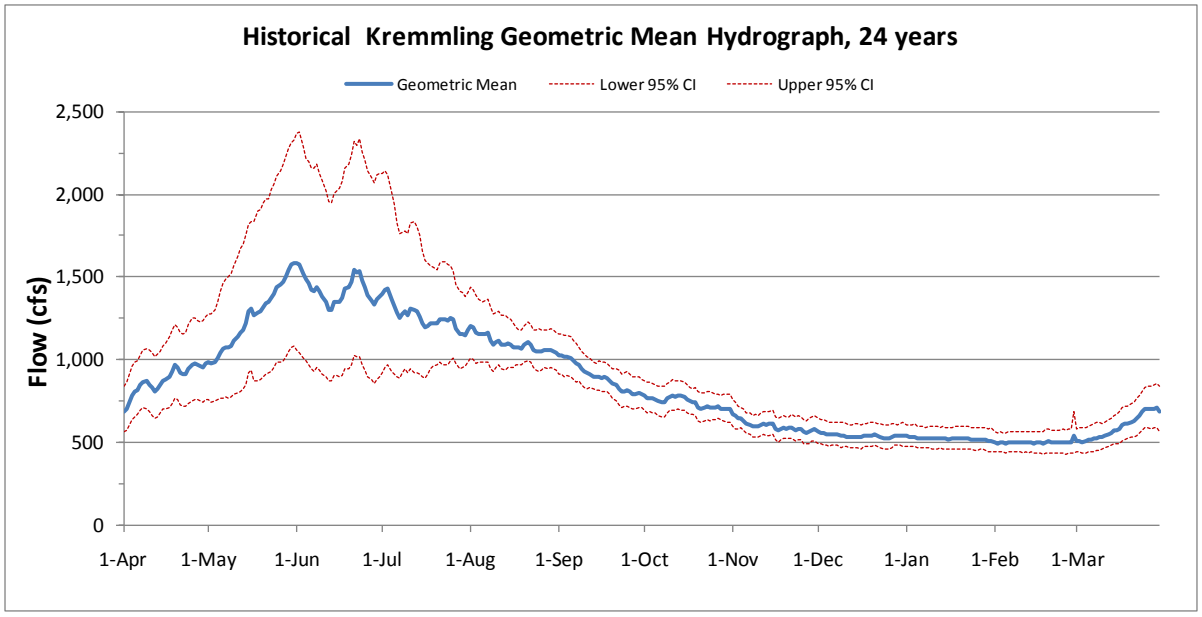


Figure 15: Daily historical Kremmling gage geometric mean hydrograph using the 1983 to 2006 period of record.

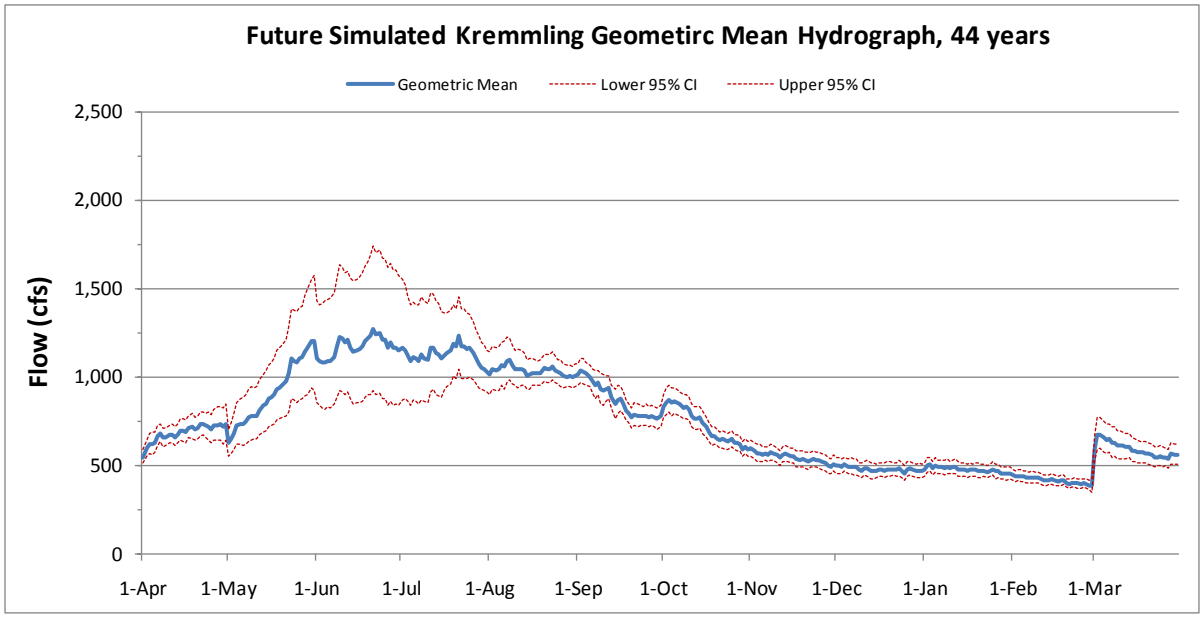


Figure 16: Daily simulated Kremmling gage geometric mean hydrograph using the 1947 to 1991 period of record to estimate a future flow scenario.

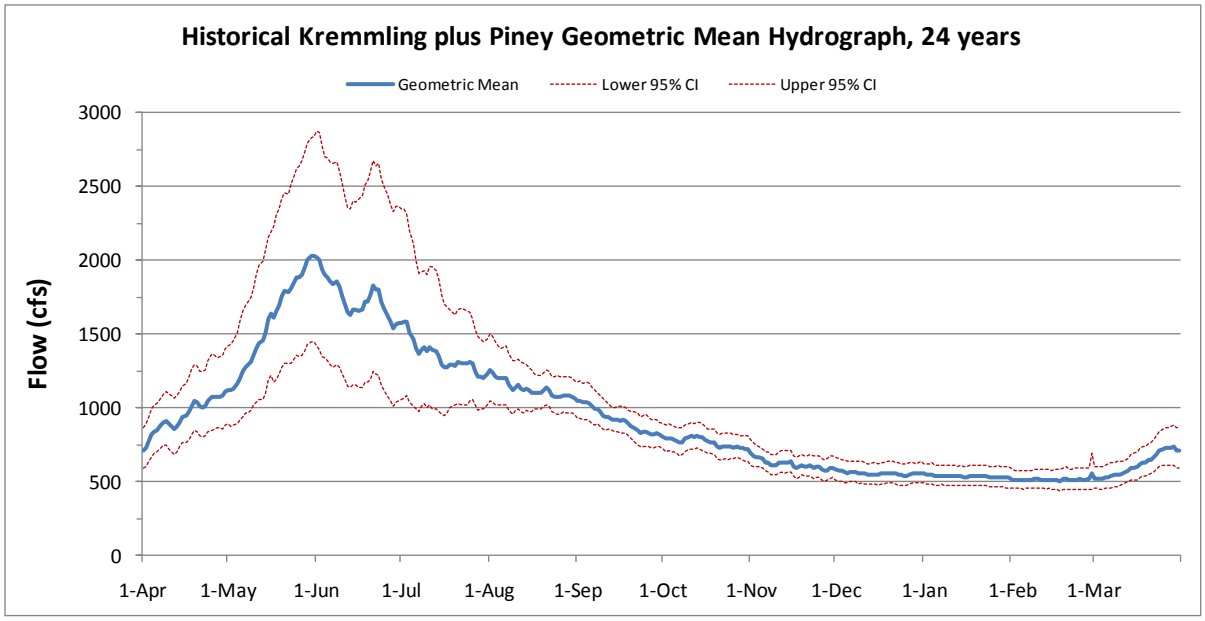


Figure 17: Daily historical Kremmling gage plus Piney gage geometric mean hydrograph using the 1983 to 2006 period of record.

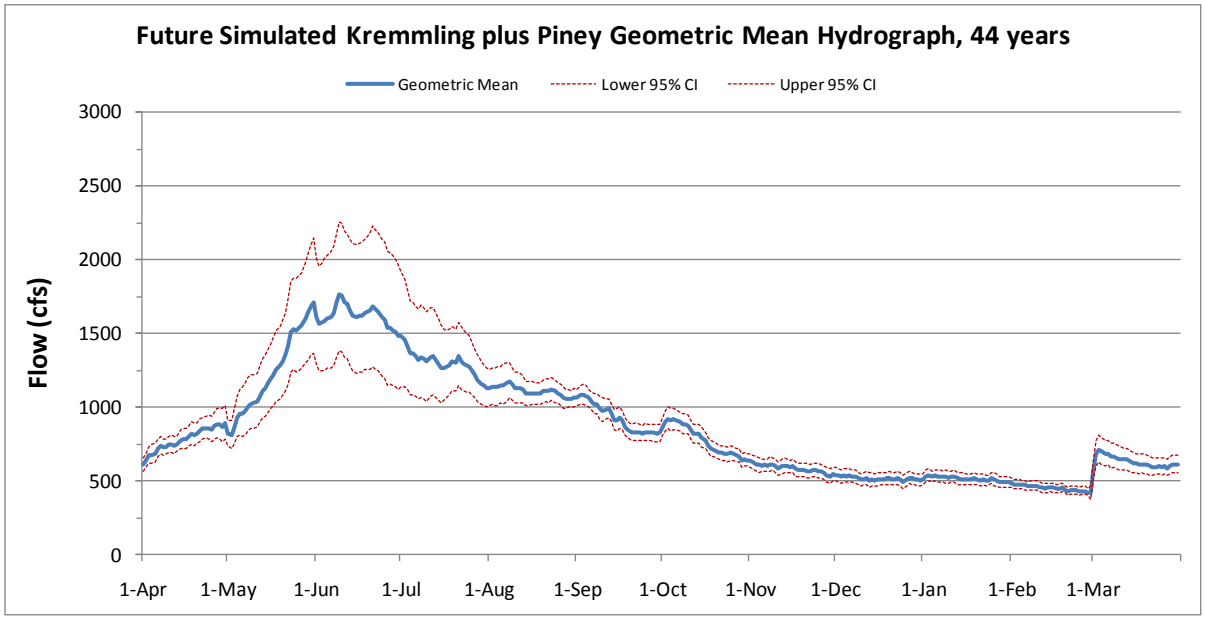


Figure 18: Daily simulated Kremmling gage plus Piney gage geometric mean hydrograph using the 1947 to 1991 period of record to estimate a future flow scenario.

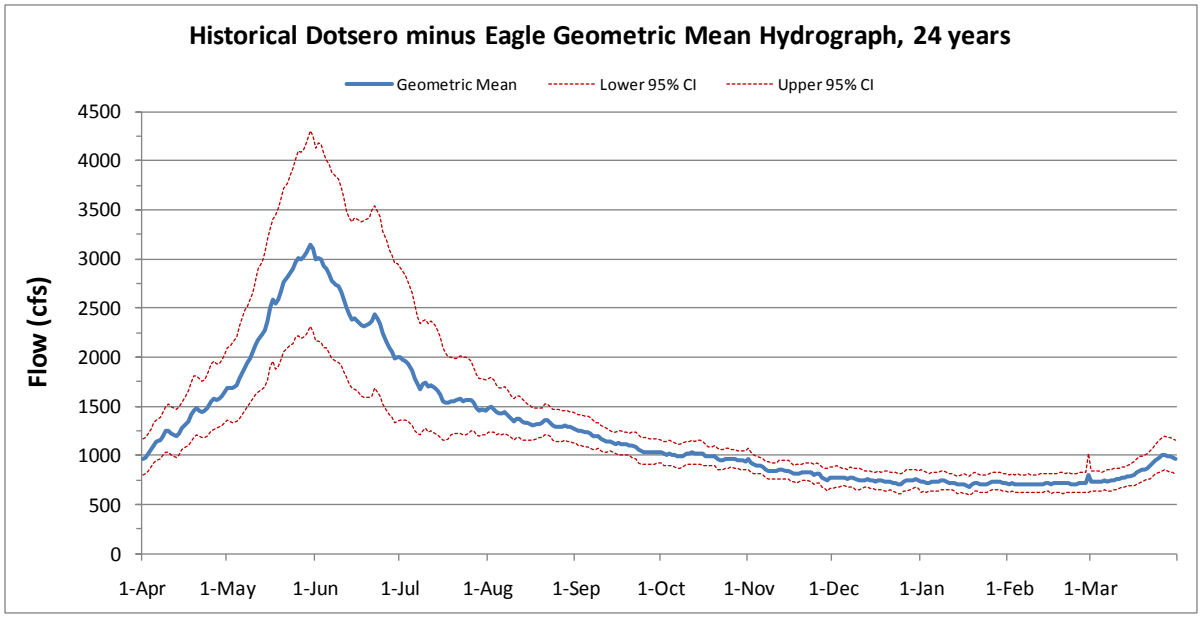


Figure 19: Calculated daily historical geometric mean hydrograph using the Dotsero gage minus the Eagle gage for the 1983 to 2006 period of record.

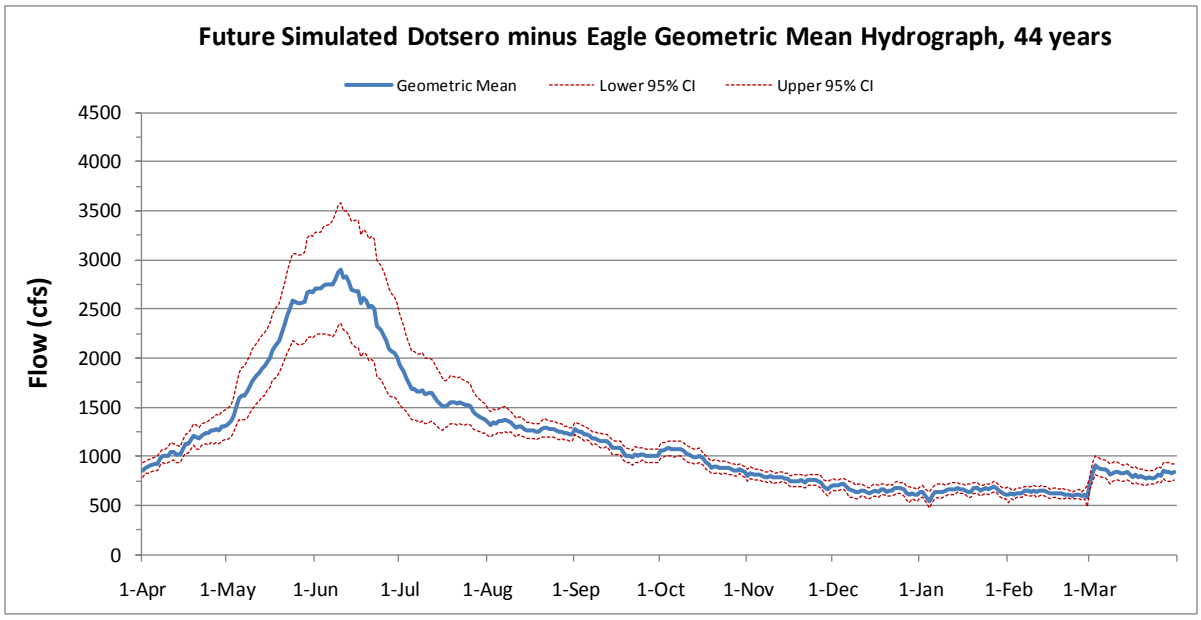


Figure 20: Daily simulated Dotsero gage minus the Eagle gage geometric mean hydrograph using the 1947 to 1991 period of record to estimate a future flow scenario.

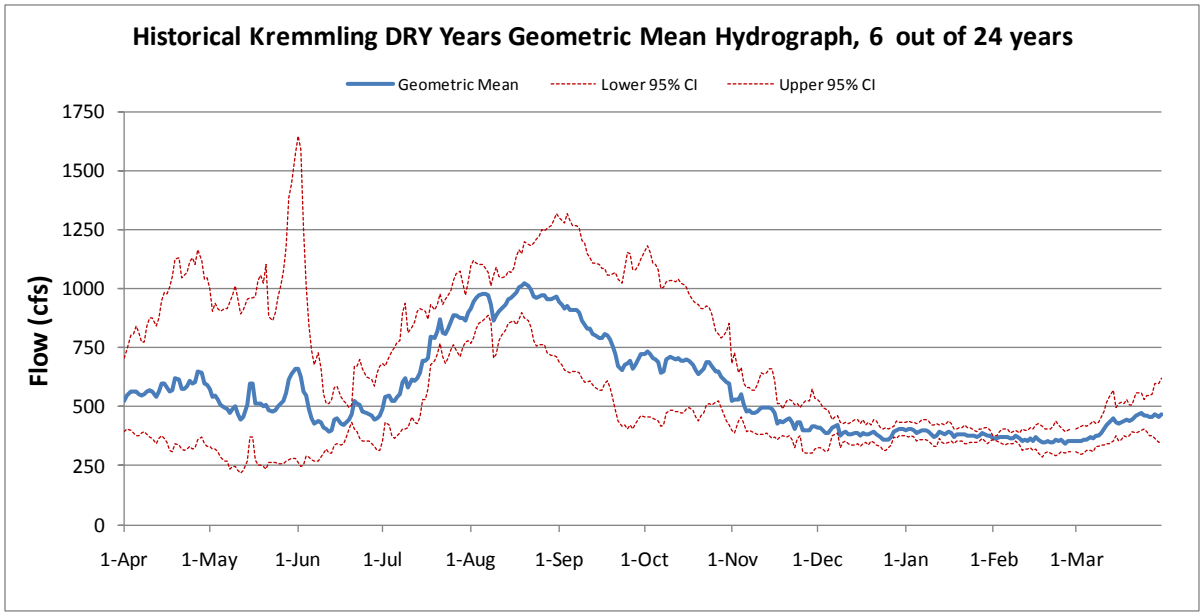


Figure 21: Daily historical Kremmling gage geometric mean hydrograph using six driest years in the 1983 to 2006 period of record.

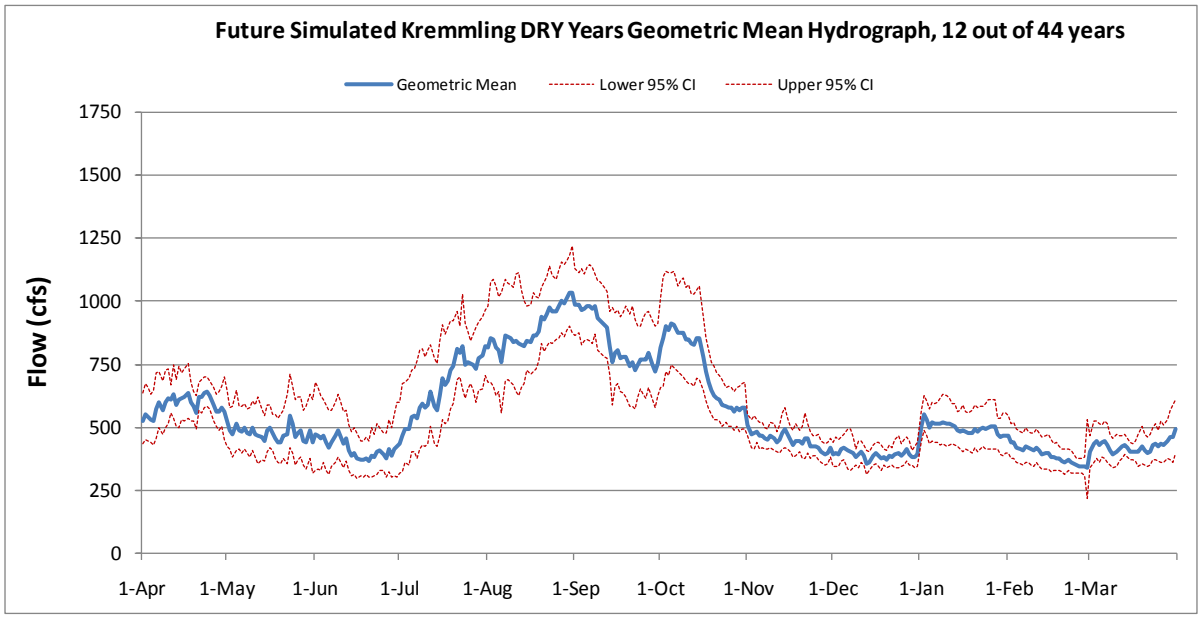


Figure 22: Daily simulated Kremmling gage geometric mean hydrograph using 12 driest years in the 1947 to 1991 period of record to estimate a future flow scenario.

Instream Flow Summary

The SG recommended ISF levels are placed in the context of the Historical flow conditions for each segment (Figures 23 – 25). The hydrographs illustrate the typical water year as observed from October 1st to September 31st rather than the SG water year April 1st to March 31th as presented above. The figures also present some of the daily flow summary statistics that the SG considered during the development of the management plan as well as the minimum instream flows.

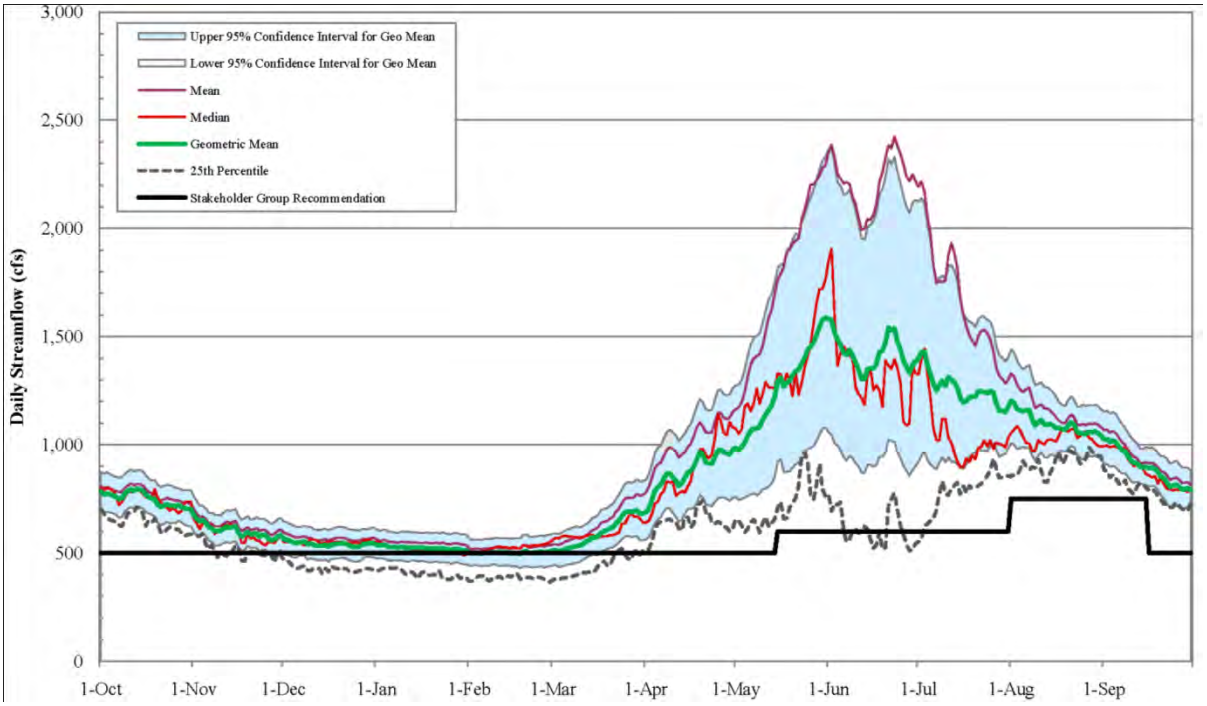


Figure 23: Blue River to Piney River ISF summary; hydrograph based on the Kremmling gage (09058000).

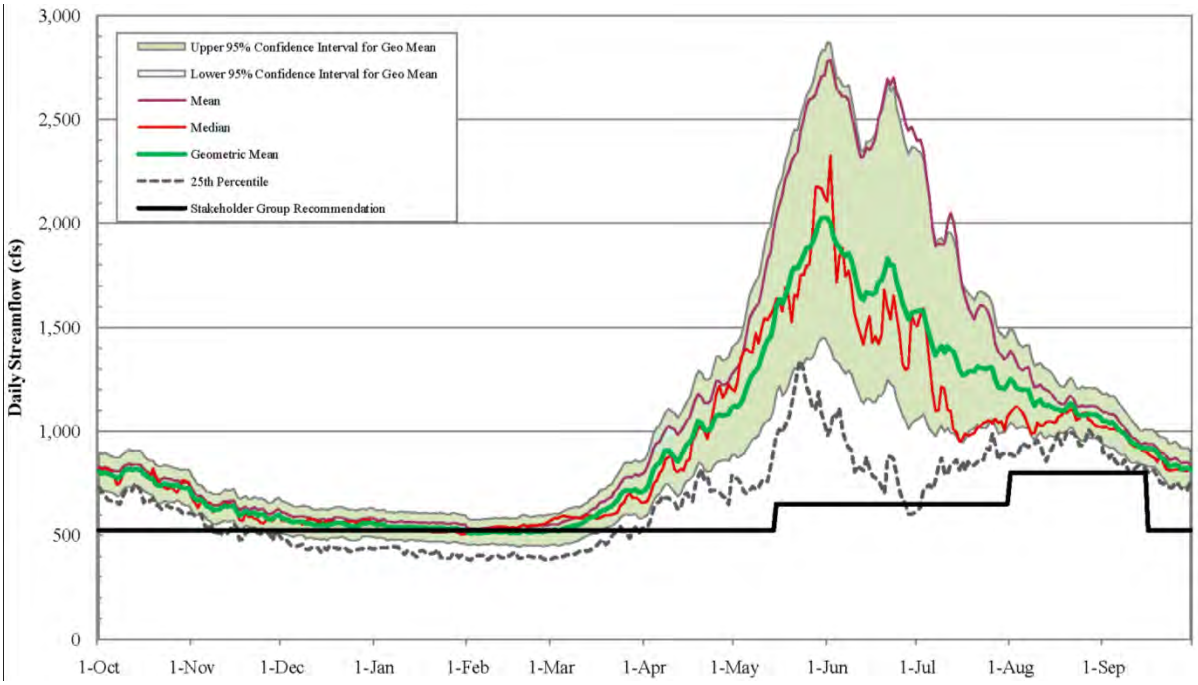


Figure 24: Piney River to Cabin Creek ISF summary; hydrograph based on the Kremmling gage (09058000) plus the Piney River gage (09059500).

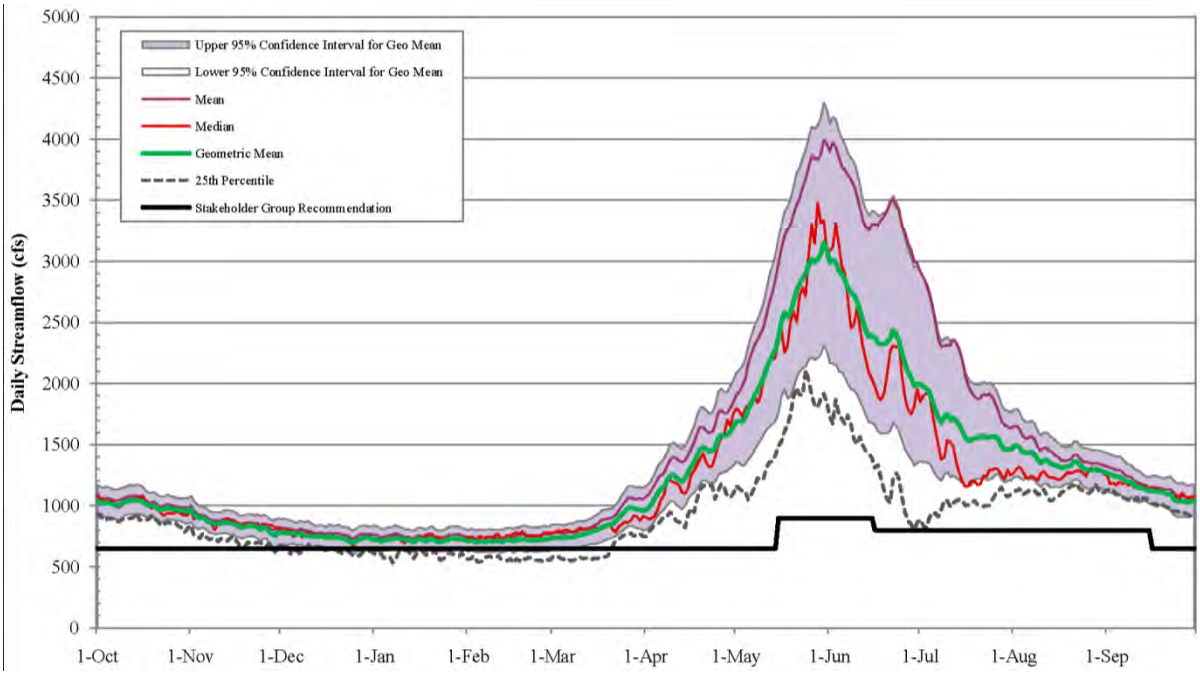


Figure 25: Cabin Creek to Eagle River ISF summary; hydrograph based on the Dotsero gage (09070500) minus the Eagle River gage (09070000).