Assessing Streamflow Needs for Whitewater Recreation in the Gunnison River basin.

Applying Overall Flow-Comparisons and Single-Flow Judgments to Define the Range of Flows that Support Whitewater Recreation

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Abstract

Streamflow, or the amount of water in a river, affects the quality, quantity, and timing of river-related recreation, such as whitewater boating. This report describes flows that provide whitewater boating opportunities for various craft-types on targeted river segments in the Gunnison River Basin in western Colorado. American Whitewater conducted the Gunnison Basin Flow Study during the summer of 2013, with the goals of 1) informing the deliberations and Basin Implementation Plan of the Gunnison Basin Roundtable and 2) adding to the dataset supplied to the Bureau of Reclamation (BOR) to inform the Colorado River Basin Supply and Demand Study. Two approaches were used in this assessment to collect information on the relationship between streamflows and recreation quality for each targeted river segment. An online survey collected information from 331 respondents who evaluated flows for whitewater boating on 17 river and stream segments in the Basin. Respondent data was organized to identify minimum, acceptable and optimal flows for whitewater boating, summarized by Flow-Evaluation curves describing the quality of boating opportunities for each measured stream-flow. Respondents also reported specific flows that provide certain recreation experiences or "niches", from technical low water to challenging high water trips. This report provides baseline information on streamflows and whitewater recreation in the Gunnison River Basin that can be applied to evaluating how future water management actions or risk management strategies may impact whitewater recreation.

Contents

I. Backgound: Whitewater Boating and instream flows

Whitewater boating is a flow dependent recreational use of rivers, and considerable work evaluating flow-recreation relationships has occurred over the last several decades (Brown et al., 1991; Shelby, Brown, & Taylor, 1992; Whittaker and Shelby, 2002). Many flow-recreation studies focus on whitewater boating, such as rafting, kayaking, and canoeing, as flow often determines whether people have opportunities to take a trip and what level of challenge or social value is provided (Whittaker & Shelby, 2000). Different flow levels provide for varied whitewater boating opportunities. As flows increase from zero, different paddling opportunities and challenges exist within ranges of flows on a spectrum: too low, minimal acceptable, technical, optimal, high challenge, and too high. Standard methodologies are used to define these flow ranges based on individual and group flow-evaluations. The various opportunities provided by different flow ranges are described as occurring in "niches" (Shelby et al., 1997).

Whitewater boating is enjoyed in different crafts, such as canoes, kayaks, and rafts. Different craft types provide different opportunities for river-based recreation, from individual or small group trips, to large group multi-day excursions. Flows that provide greater social value for one type of craft, such as canoes, may not provide equivalent social value for rafting. Changes in streamflow can have direct effects on the quality of whitewater boating, for every craft type. Direct effects may change quickly as flows change, such as safety in running rapids, number of boat groundings, travel times, quality of rapids, and beach and camp access (Brown, Taylor, & Shelby, 1991; Whittaker et al., 1993; Whittaker & Shelby, 2002). Indirectly, flow effects wildlife viewing, scenery, fish habitat, and riparian vegetation over the long term as a result of changes in flow regime (Bovee, 1996; Richter et al., 1997; Jackson & Beschta, 1992; Hill et al., 1991).

Streamflow is often manipulated through controlled reservoir releases, spills from dams, and diversions. Additional scenarios, such as climate change, drought, and water rights development can all impact flows and recreation quality. Decision-makers within land and resource management and regulatory agencies, and state and local governments are increasingly interested in assessing the impacts of flow regimes on recreation resources. This has been most notable in the Federal Energy Regulatory Commission's (FERC) relicensing process, and where decision-makers, resource managers, and interest groups consider the extent that flow regimes can be managed to provide desirable recreational resource conditions. In these decision-making settings, specific evaluative information on how flow affects recreation quality is critical, particularly where social values are often central to decision-making (Kennedy and Thomas 1995). American Whitewater is recognized for using best practices and science-based methodologies to define recreation flow needs and has done so across the country – including basin-wide assessments in the Yampa-White, Dolores, and Upper Colorado basins as well as most National Park Units along the Colorado River.

II. Introduction & Summary for Decision-makers

In 2010 the Gunnison Basin Roundtable (GBRT), created under the Water for the 21st Century Act, identified and mapped nonconsumptive (environmental and recreational) attributes and needs, 'prioritizing' 21 and 'identifying' others. Of these, the GBRT's 2010 Nonconsumptive Needs Assessment (NCNA) mapped 12 'priority' and 7 'identified' recreational whitewater kayaking and rafting attributes (GBRT, 2010). The other 9 'priority' nonconsumptive attributes include flatwater recreation and wildlife habitat and are external to the scope of this report. American Whitewater designed the 2013 Gunnison Basin Flow Study to correspond with the GBRT's mapped 'priority' and 'identified' whitewater segments (Table 2). In its NCNA, the GBRT did not quantify whitewater boating flow needs. To assist the Roundtable, AW is providing clearly defined recreational flow-needs that can be used in the development of a quantitative recreation metric. In addition to providing useful information that can be integrated into the NCNA, this data can inform the GBRT's approach to, and modeling for, the forthcoming Basin Implementation Plan (BIP), which will identify strategies to meet both consumptive and nonconsumptive needs. The Gunnison BIP will inform the Colorado Water Plan, and should therefore provide concise information on flows needed to maintain the regional whitewater recreation economy.

There are several reasons why integration of this data, as suggested above is defensible and advisable. For one, whitewater boating throughout the Gunnison Basin, state of Colorado and seven-state Colorado River Basin delivers substantial economic benefits to local and regional economies. In the Gunnison Basin, commercial floatboating alone generated $6,347,748 in economic impact in 2011 (Greiner and Warner, 2012). In 2006, commercial rafting in the state of Colorado generated $54 million in economic impact and supported 2,600 jobs (Loomis, 2008). At the Colorado Basin scale, river related recreation supports 25,000 jobs and produces $26 billion in economic output (Southwick, 2012).

Additionally, the GBRT's draft 'Principles and Priorities' document for the BIP call for quantification stating that "much of the Gunnison Basin economy is predicated upon recreational and environmental amenities; historical water management practices that protect these baseline values should be described, quantified and maintained in the BIP" (GBRT, 2013). Similarly, the State of Colorado's Basin Implementation Plan Draft Guidance recommends quantification of all values. Section 2.1 of the Guidance calls for the evaluation of nonconsumptive needs in terms of 'measurable outcomes', data, and assessment using methods described in the CWCB's Nonconsumptive Toolbox (CWCB, 2013). The Toolbox describes the flow-evaluation methodology used by American Whitewater as an example of 'measurable outcomes' and 'recreation tools' in appendices D and C, respectively.

A primary component of American Whitewater's 2013 Gunnison Basin Flow Study involved collecting paddler feedback through a Flow-Evaluation Survey

(Survey). Responding to a series of questions, survey participants provided information on flows for each of the studies targeted whitewater segments. When compiled, the results describe how flows affect recreation quality, and identify the range of flows that provide whitewater recreation opportunities for each segment.

This report describes the minimum, optimal and a range of acceptable flows for 17 of the Gunnison River Basin's most popular recreation segments (Table 1).

Table 1

Minimum, Optimal and Range of Acceptable Flows for Gunnison River Basin Segments

Gunnison River Basin Segment	Minimum Flow (CFS)	Optimal Flows (CFS)	Range of Acceptable Flow (CFS)
Black Canyon	600	800 - 1600	600 - 3000
Cimarron River	400	600 - 1200	400 - 2000
Daisy Creek	500	700 – 1600	500 - 2500
Escalante	400	500 - 1000	400 - 3000
Gunnison Gorge	600	800 – 3000	600 - 15000
Gunnison Whitewater Park	600	900 – 5000	600 - 5000
Gunnison Town Runs (above Blue Mesa)	500	700 – 3000	500 - 3000
Lake Fork Gunnison	500	800 – 2500	500 - 1800
Lower Gunnison	800	1000 – 10000	800 - 20000
North Fork Gunnison	600	900 - 4000	600 - 10000
Oh-Be-Joyful Creek	500	700 – 1200	500 – 1800
Ridgway Whitewater Park	500	600 – 900	500 – 2000
Slate River	500	700 – 2500	500 – 2500
Taylor River	400	500 – 1400	400 – 3000
Uncompahgre above Ridgway Reservoir	500	600 1800	500 – 2500
Uncompahgre below Ridgway Reservoir	400	500 – 1400	400 – 2000
Upper East	600	900 – 2500	600 – 3000

III. Recreational Flow Assessment - Methods and Locations

Researchers collecting and organizing evaluative information, often employ a normative approach using survey-based techniques. This approach is particularly useful for developing thresholds, or standards, that define low, acceptable, and optimal resource conditions for whitewater boating. Thresholds are crucial elements in any effective management or decision-making process (Shelby et al. 1992). The approach examines individuals' evaluations of a range of conditions (personal norms). Social Norms, developed by aggregating personal norms, describe a group's collective evaluation of resource conditions. This approach has been used to understand streamflows for whitewater boating on the Grand Canyon (Shelby et al. 1992), as well as several others rivers in Colorado (Vandas et al. 1990, Shelby & Whittaker 1995, Fey & Stafford 2009, Fey & Stafford 2010) and has been applied here.

To define normative standards for whitewater boating flows in the Gunnison River Basin, we collected and organized personal evaluations of recreational

resource conditions, and recreation-relevant hydrology, consistent with standard methodology. Using a web-based survey tool[1], American Whitewater designed two sets of questions asking respondents to evaluate flows for each study segment, relative to specific U.S. Geological Survey streamflow gage data. One set of survey questions collected information that was used to develop overall flow-evaluations curves, and another set of questions helped identify and explain various points on those same curves. A copy of the online Flow-Evaluation Survey, including both sets of questions, is attached (Appendix A). Most study segments had at least 50 respondents (Table 2) and all segments surveyed were reported to have high recreational value – consistent with the Basin Roundtable's Nonconsumptive Needs attributes.

Table 2

Recreational Whitewater Attribute Locations & Respondent Numbers

Whitewater Attribute	Streamflow Gage	Segment Description	NCNA Segment**	Respondent Numbers
Black Canyon	usgs-09128000	Crystal Dam to Chukar trail	2	52
Cimarron	usgs-09126000	1. Big Cimarron Campground to Cimarron Bridge 2. Cimarron to Gunnison River	identified	18
Daisy Creek	usgs-09111500*	40' Waterfall to Slate River confluence	8	53
Escalante Creek	Visual	Escalante Forks to Captain Smith's Cabin	identified	33
Gunnison Gorge	usgs-09128000	Chukar trail to Pleasure Park	3	126
Gunnison River	usgs-09114500	Gunnison Whitewater Park	17	67
Gunnison River above Blue Mesa	usgs-09114500	1. Almont to North Bridge 2. North Bridge to WW Park 3. WW Park to McCabes	17	70
Lake Fork Gunnison	usgs-09124500	Redbridge to Gateview	19	47
Lower Gunnison	usgs-09144250	1. Gunnison Forks to Escalante 2. Escalante to Whitewater 3. Whitewater to Grand Junction	4 & 5	55
North Fork Gunnison	usgs-09132500	Paonia Reservoir to below Somerset	6	23
Oh-Be-Joyful Creek	usgs-09111500*	Ankle Breaker to Beaver Ponds	8	46
Uncompahgre River	usgs-09146200	Ridgway Whitewater Park	12	18
Slate River	usgs-09111500*	Beaver Ponds to Oh-Be-Joyful CG	8	43
Taylor River	usgs-09110000	1. New Generation to S. Bank 2. South Bank to Five Mile 3. Five Mile to Almont	16	118
Uncompahgre above Ridgway Reservoir	usgs-09146020	1. Ouray to KOA CG 2. Rollins park to Ridgway Res.	12	27
Uncompahgre below Ridgway Reservoir	usgs-09147500	Billy Creek to Trout Rd.	12	21
Upper East	usgs-09112200*	Gothic Bridge to above Stupid Falls	9	50

* River segment 'correlates' to the indicated gage. Correlated gages are downstream of segment and may have additional inputs.

[1] http://www.surveymonkey.com/s/GunnisonRiverBasinSurvey2013

** Corresponds to *Appendix D-3, Gunnison Basin NCNA Mapping results*.

An announcement of the Survey was emailed to American Whitewater's Colorado members, as well as distributed via American Whitewater's online newsletter. Survey announcements were also posted to online river-related discussion forums, such as mountainbuzz.com, and circulated via email to Gunnison-Basin river outfitters and non-commercial boaters. Additionally, American Whitewater staff hosted 'regional paddler dialogues' in Grand Junction, Ridgway, Montrose, Gunnison and Crested Butte and encouraged survey participation at river festivals throughout the state and Basin. These festivals included Paddlefest (Buena Vista), FIBArk (Salida), the Gunnison Whitewater Festival (Gunnison) and the Ridgway River Festival (Ridgway). Additional press releases, letters to the editor and/or articles announcing the study were published in the Montrose Press, Gunnison Country Times, Crested Butte News and Telluride Watch during the spring and summer of 2013. The web-based survey tool allowed whitewater boaters from across the country and of all skill-levels and craft-types to report personal evaluations. The Survey was developed such that respondents could provide feedback on river segments they were familiar with and had experience on. The Survey sample included outfitters currently permitted to operate commercially on targeted rivers as well as non-commercial boaters.

331 individuals participated in the Survey, and not all had experience with each of the 17 segments. 92% of participants identified themselves as private paddlers, while 15% identified themselves as commercial guides, and <1% identified themselves as commercial customers (Figure 1). 78% of respondents identified themselves as advanced or expert paddlers, and 93% reported paddling at least 5-20+ days per season. A wide range of craft types were represented among respondents with oar frame rafters comprising (21%), kayakers (66%), catarafters (3%), canoeists (3%) and paddle rafters (6%) (Figure 2). All of these respondents are represented in the data set.

Fig 1 *Respondents by Category*

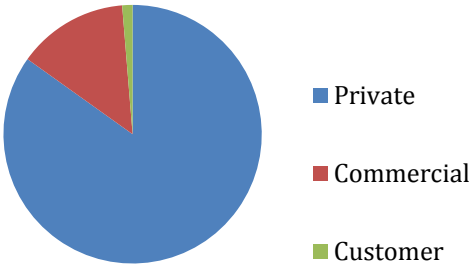
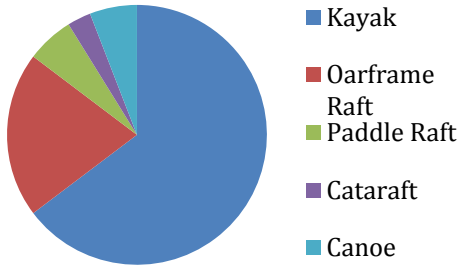


Fig 2 *Respondents by Craft*



IV. Results and Discussion

This study determined the range of both acceptable and optimal flows on all of the segments analyzed. Acceptable flows are reported to provide a range of resource conditions related to degree of difficulty, rapids, challenge and enjoyment, from lowest preferred flow to highest preferred flow. Optimal flows are reported to provide the most desirable conditions for the highest number of users. Results indicate that minimum acceptable flows for smaller tributaries generally range from 400-800cfs, while minimum flows increase within larger order stream segments downstream. The minimum acceptable flow is defined as "the lowest flow you would return to boat in your preferred craft, not the minimum flow that allows you to navigate the section". Optimal flow preferences are characterized by similar trends relative to stream size. At flow levels outside the range of acceptable flows, a significant percentage of respondents would not make the trip to the river to paddle. Conversely, for flows that exist within the optimal range, a significant percentage of respondents would travel from across the state, and for certain segments, even from around the country to paddle.

A. Overall Flow Evaluations

Overall flow evaluation questions asked respondents to evaluate recreation quality for specific measured flows on each study segment, using a five-point "acceptability" scale (unacceptable -2, slightly unacceptable -1, marginal 0, slightly acceptable 1, and acceptable 2). Aggregate responses are used to define the minimum, optimal and range of acceptable flows seen in Table 1. For each study segment, mean responses from the overall flow evaluation questions were plotted for each flow level, and connected to create a curve (Appendix B). This graphic representation of flows, in most cases, shows inverted U shapes where low flows and high flows provide lower quality recreation conditions, while medium flows provide more optimal conditions.

Another measure displayed on each curve is the Flow Acceptability Agreement Index (FAAI), which determines the level of respondent agreement regarding the evaluation of each specific flow level. Figure 1.B graphically displays the minimum, optimal and range of acceptable flows for that segment, for all survey respondents. The sizes of the bubbles correspond to the FAAI-defined level of respondent agreement; the smaller the bubble, the higher the level of agreement. FAAI statistics range between 0 - complete agreements, to 1 - complete disagreement, and Table 1.B describes respondent agreement for flows in the Black Canyon (Appendix B contains Flow-Acceptability Curves and FAAI tables for each Gunnison Basin study segment).

Figure 1.B
Flow Acceptability Agreement Index Curve for Black Canyon
(Flows represented are flow levels at USGS Gunnison River below Gunnison Tunnel, CO)

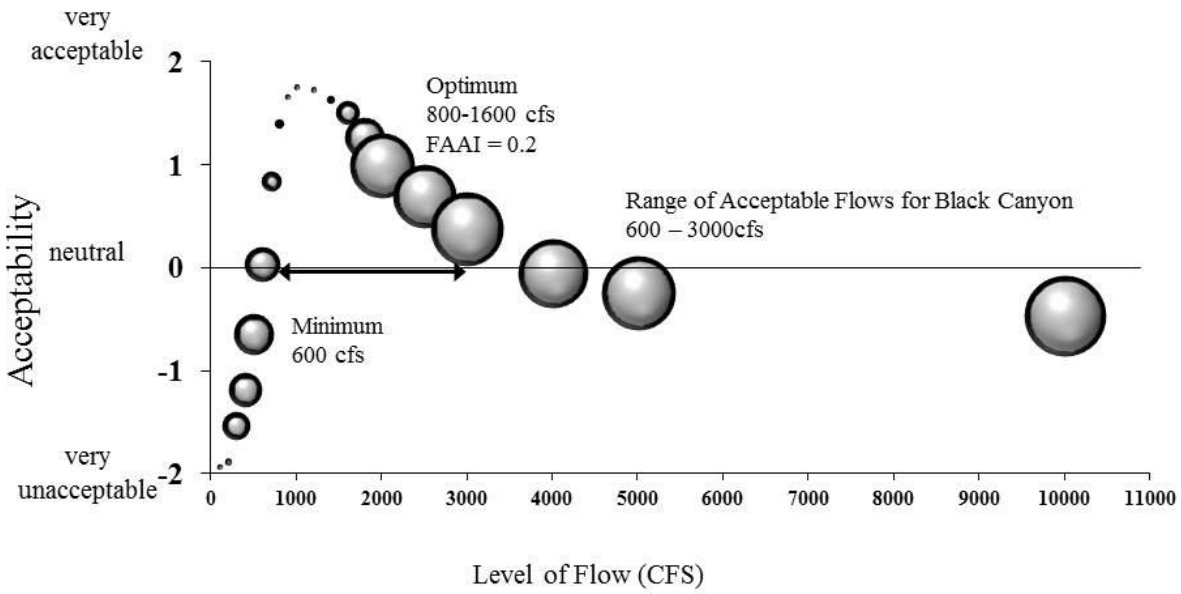


Table 1.B
Black Canyon Mean Acceptability Scores and Flow Acceptability Agreement Index
(Flows represented are flow levels at USGS *Gunnison River below Gunnison Tunnel, CO)*

Specific Flow CFS	Mean Acceptability	FAAI
100	-1.93	0
200	-1.88	0.06
300	-1.53	0.24
400	-1.18	0.29
500	-0.64	0.35
600	0.04	0.3
700	0.84	0.17
800	1.4	0.08
900	1.66	0.05
1000	1.76	0
1200	1.73	0.05
1400	1.64	0.07
1600	1.51	0.2
1800	1.27	0.34
2000	1	0.56
2500	0.7	0.54
3000	0.38	0.63
4000	-0.05	0.6
5000	-0.24	0.64
10000	-0.46	0.7

FAAI statistics show extremely high agreement levels for optimal flows while some level of disagreement between respondents exists in regard to flows at the high and low ends of the range of acceptable flows. The level of disagreement can generally be attributed to variations in flow preferences between craft-types. Acceptable flows for kayaks may not provide equal value for rafts, for example. Additionally, the type of river craft that a respondent uses may impact overall agreement at the lower and higher end of the acceptable range of flows. Table 3 lists a subset of study segments, and the corresponding range of acceptable and optimal flows for both rafts and kayaks to illustrate the variability by craft-type. For certain study segments, evaluations suggest that recreation quality may decline at higher flows, but may not drop below acceptable levels.

Table 3

Minimum, Optimal and Range of Acceptable Flows for Gunnison River Basin Segments, by Kayak and Raft Craft Type*

Gunnison River Basin Segment	Kayak/Raft	Minimum Flow (CFS)	Optimal Flows (CFS)	Range of Acceptable Flow (CFS)
Taylor River	Kayak	400	500 - 1800	400 - 3000
	Raft	400	500 - 1800	400 - 3000
Lake Fork	Kayak	500	800 - 2500	500 - 2500
	Raft	500	800 - 2500	500 - 2500
Gunnison Town	Kayak	500	700 - 5000	500 - 5000
	Raft	500	700 - 3000	500 - 5000
Gunnison Gorge	Kayak	500	700 - 1200	500 - 1800
	Raft	500	700 - 3000	500 - 7500
Lower Gunnison	Kayak	800	1000 - 20000	800 - 20000
	Raft	800	1000 - 10000	800 - 20000
North Fork Gunnison	Kayak	900	1000 - 10000	900 - 10000
	Raft	500	800 - 4000	500 - 10000

* *Oarframe, Paddle and Catarafters were combined to form the Raft Craft Type*

B. Single Flow Judgments

In order to further understand the relationship between flows and recreation quality described by the Flow-Curves, study participants were presented a set of single-flow open response questions for each study segment. Respondents were asked to report a single flow value that provides a distinct or "niche" paddling experience along a spectrum for each segment: lowest navigable, lowest acceptable, technical, standard, high challenge, and highest safe flow. By aggregating all responses for each given segment, median flow values for lowest navigable, lowest acceptable, technical, standard, high challenge and highest safe experiences are calculated for the 17 study segments (Table 4). In terms of the recreation experience provided, these terms are defined as:

- Lowest Navigable (minimum): the lowest flow required to navigate a stretch from the respondent's recreation perspective.
- Lowest Acceptable (low): the lowest acceptable flow that provides a reasonable experience on the given run and the lowest flow a respondent would return to boat in their preferred craft.
- Technical: some boaters are interested in taking trips at lower, more technically challenging flows. Respondents were asked to think of and identify (in cfs) this "technical flow value" for their craft – type.
- Standard: many boaters are interested in a "standard" whitewater trip at medium flows. Respondents were asked to think of and identify (in cfs) this "standard trip" for their craft. Outfitters often characterize commercial raft trips as "standard" when booking trips with clients.
- High Challenge: flows that result in trip participants experiencing increased whitewater challenge.
- Highest Safe: the highest safe flow to complete a run for a respondent's craft and skill level

Table 4

Median Lowest Navigable, Acceptable, Technical, Standard, High Challenge and Highest Safe Flows for Gunnison River Basin Segments

Gunnison River Basin Segment	Lowest Navigable Flow (CFS)	Lowest Acceptable Flow (CFS)	Technical Flow (CFS)	Standard Flow (CFS)	High Challenge Flow (CFS)	Highest Safe Flow (CFS)
Black Canyon	500	650	600	1000	1800	2000
Daisy Creek	400	500	400	750	1200	1400
Cimarron River	325	475	400	600	1000	1200
Escalante	300	350	300	500	900	1100
Gunnison Gorge	400	600	500	1000	3000	4750
Gunnison Whitewater Park	400	500	500	1000	2500	4000
Gunnison Town Runs (above Blue Mesa)	338	500	425	800	2500	4000
Lake Fork Gunnison	400	500	500	800	1550	2000
Lower Gunnison	600	800	700	1500	5000	10000
North Fork Gunnison	550	650	600	1200	2500	3000
Oh-Be-Joyful Creek	400	500	400	700	1000	1000
Ridgway Whitewater Park	300	400	350	NA*	1000	1500
Slate River	400	500	450	800	1200	1500
Taylor River	250	350	300	500	1000	1600
Uncompahgre above Ridgway	350	450	380	600	950	1400
Uncompahgre below Ridgway	350	400	350	600	1100	1000
Upper East	500	600	500	1000	2000	2000

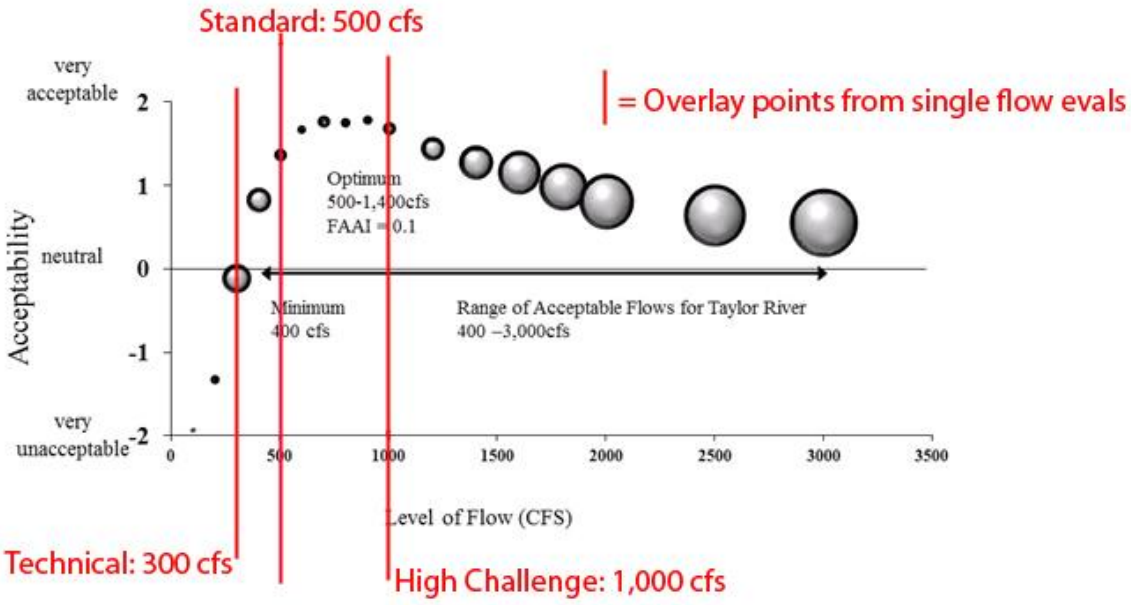
*Online Survey error, no results.

C. Discussion

Single-flow evaluations coupled with the Impact Acceptability Curves and the FAAI help further illustrate the characteristics that define the relationship between streamflows and the whitewater recreation experience. Overlaying the specific and overall flow-evaluation results is a helpful approach to analyzing the results of the study (Figure 3). For example, the minimum flow for the Taylor River as defined by the impact acceptability curve is 400 cfs (Table 1). The median lowest acceptable flow as reported by the single flow evaluations was 350 cfs (Table 4). The FAAI at the 400 cfs point on the acceptability curve was .21, identifying high levels of agreement that 400 cfs is indeed an acceptable flow. At 300 cfs however, the FAAI was .31, identifying greater levels of disagreement over its acceptability (Table 14.B). By integrating the two sets of responses, we can conclude that 350 cfs likely belongs at the very bottom of the acceptable flow range.

Figure 3

Integrating Single-Flow Evaluations and FAAI Index Curve for Taylor River



Further review of the lowest navigable flow for the Taylor River, reported as 250 cfs by median single-flow judgments (Table 4) illustrates that paddlers may still be able to get a boat down the river at these flows, but that 250 cfs does not provide a quality whitewater recreation experience. This single-flow value corresponds with both the 200 and 300 cfs points on the impact acceptability curve for the Taylor River being defined as unacceptable by a majority of respondents.

Good whitewater conditions for each target river segment have been identified in this study and the results generally show that good whitewater conditions (optimal flows) require higher flows than those identified as minimum acceptable or lowest navigable. Correspondingly, optimal conditions require lower flows than those identified as highest safe or highest acceptable. For each study segment, the median response for minimum whitewater corresponds to the point where the overall flow-evaluation curve crosses above the neutral line. The median response for optimal flows corresponds with the peak of the curve where ratings are highest indicating these flows provide the greatest value for the greatest number of people. Overall flow evaluation curves are relatively flat at the top for most segments, which is attributed to the multiple tolerance norms captured in the study results. These optimal flows are reported as a range for most study segments.

V. Conclusion and Recommendations

This report provides a set of defined flow-needs that support whitewater recreation in the Gunnison River Basin. The Study was based on two approaches to evaluating flows and recreation quality and includes personal evaluations of recreation quality and the structural norm approach, a technique used to graphically represent social norms. The graphic representation, referred to as Flow-Evaluation or Impact Acceptability Curves, is used to describe optimal flows, ranges of acceptable flows, norm intensity and level of norm agreement.

The whitewater flow-preferences described in this report are a necessary step towards developing a 'boatable days' metric that can be used to quantify river-related recreation opportunities in the Gunnison Basin. A quantitative metric will enable decision-makers to analyze and evaluate the impacts to whitewater boating attributes under future water supply and demand scenarios and could be applied to developing the Gunnison Basin Implementation Plan.

The river segments targeted in this study correspond with the GBRT's priority and identified segments under the Basin Nonconsumptive Needs Assessments. Decision-makers often use recreation flows as a management guide for providing a variety of environmental and economic benefits. Efforts to protect recreational flows can helpmeet a variety of nonconsumptive needs and be leveraged to keep west slope water on the west slope. Several west slope Basin Roundtables such as the Yampa-White and Colorado have integrated similar recreational flow-needs data into their NCNAs using the Watershed Flow Evaluation Tool (Sanderson et. al, 2012). This information provides the decision-makers in the Gunnison Basin with the same common technical information that other Colorado River basins are using, enabling higher-level strategic collaboration across the West Slope basins.

Kayaking the Black Canyon of the Gunnison at 800 cfs

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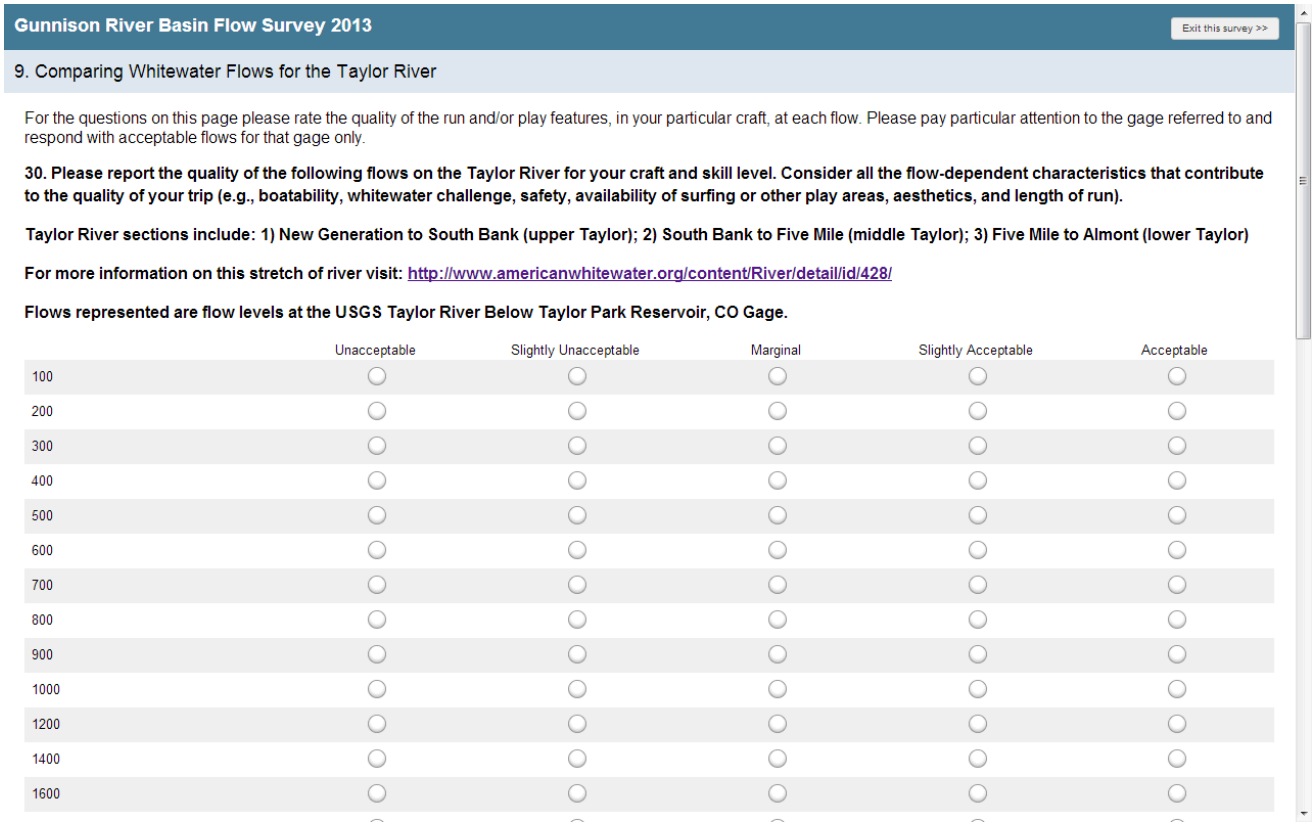
Appendix A: American Whitewater's Web-based Flow-Evaluation Survey

As an example of the 2013 Flow-Evaluation Survey, both sets of study questions are provided here for the Taylor River attribute. A PDF containing screenshots of the entire 40 page '2013 Gunnison Basin Flow Evaluation Survey' is available at: http://www.americanwhitewater.org/content/Document/view/documentid/1204/.

OVERALL FLOW EVALUATION QUESTION (TAYLOR RIVER)



Gunnison River Basin Flow Survey 2013 Exit this survey >>

9. Comparing Whitewater Flows for the Taylor River

For the questions on this page please rate the quality of the run and/or play features, in your particular craft, at each flow. Please pay particular attention to the gage referred to and respond with acceptable flows for that gage only.

30. Please report the quality of the following flows on the Taylor River for your craft and skill level. Consider all the flow-dependent characteristics that contribute to the quality of your trip (e.g., boatability, whitewater challenge, safety, availability of surfing or other play areas, aesthetics, and length of run).

Taylor River sections include: 1) New Generation to South Bank (upper Taylor); 2) South Bank to Five Mile (middle Taylor); 3) Five Mile to Almont (lower Taylor)

For more information on this stretch of river visit: http://www.americanwhitewater.org/content/River/detail/id/428/

Flows represented are flow levels at the USGS Taylor River Below Taylor Park Reservoir, CO Gage.

	Unacceptable	Slightly Unacceptable	Marginal	Slightly Acceptable	Acceptable
100	○	○	○	○	○
200	○	○	○	○	○
300	○	○	○	○	○
400	○	○	○	○	○
500	○	○	○	○	○
600	○	○	○	○	○
700	○	○	○	○	○
800	○	○	○	○	○
900	○	○	○	○	○
1000	○	○	○	○	○
1200	○	○	○	○	○
1400	○	○	○	○	○
1600	○	○	○	○	○

SPECIFIC/SINGLE FLOW EVALUATION QUESTION (TAYLOR RIVER)

31. From a recreational perspective what is the lowest flow required to navigate this stretch? (please specify in cfs)

32. From a recreational perspective what is the lowest acceptable flow that provides a reasonable experience on this run? The lowest acceptable is the lowest flow you would return to boat in your preferred craft, not the minimum flow that allows you to navigate. (please specify in cfs)

33. Some people are interested in taking trips at lower flows for a technical trip. Think of this "technical trip" in your craft. What is the best or optimal flow for a technical trip? (please specify in cfs)

34. Many people are interested in a "standard" whitewater trip at medium flows. Think of this "standard trip" in your craft. What is the best or optimal flow for a standard trip? (please specify in cfs)

35. Some people are interested in taking trips at higher flows for increased whitewater challenge. Think of this "high challenge trip" in your craft. What is the best or optimal flow for a high challenge trip? (please specify in cfs)

36. What is the highest safe flow for your craft and skill level? (please specify in cfs)

37. What is your preferred craft for running the Taylor River? (Choose one)

- ☐ Hard shell kayak/canoe
- ☐ Raft/Shredder
- ☐ Inflatable kayak/canoe
- ☐ Open canoe
- ☐ Other (please specify)

38. Do you have any general comments on flows that you feel have not been addressed in the questions we've asked? Specifically if you do not have a good record of flows or dates from when you have run the river please include any qualitative observations on flows needs.

Appendix B – Overall Flow Evaluation Results

Figure 1.B
Flow Acceptability Agreement Index Curve for Black Canyon
(Flows represented are flow levels at USGS Gunnison River below Gunnison Tunnel, CO)

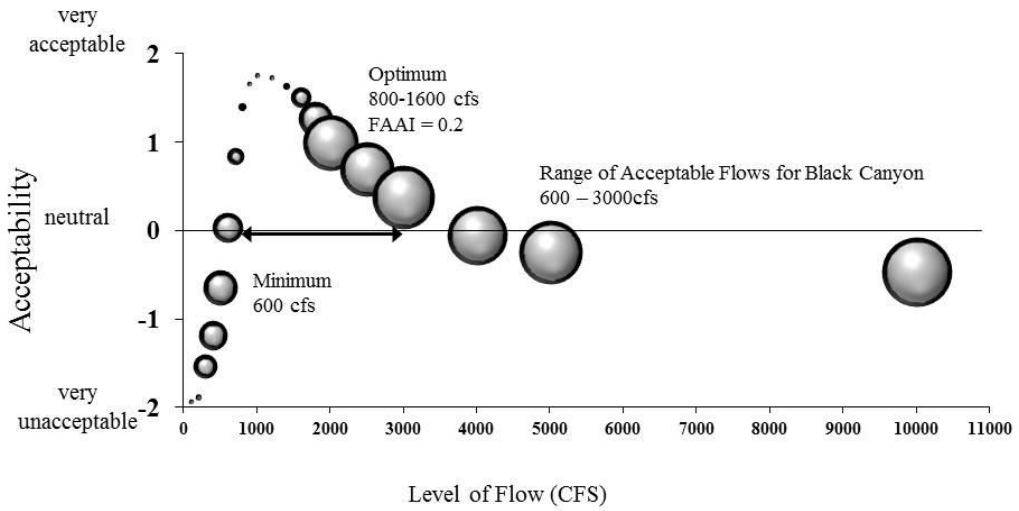


Table 1.B
Black Canyon Mean Acceptability Scores and Flow Acceptability Agreement Index
(Flows represented are flow levels at USGS *Gunnison River below Gunnison Tunnel, CO)*

Specific Flow CFS	Mean Acceptability	FAAI
100	-1.93	0
200	-1.88	0.06
300	-1.53	0.24
400	-1.18	0.29
500	-0.64	0.35
600	0.04	0.3
700	0.84	0.17
800	1.4	0.08
900	1.66	0.05
1000	1.76	0
1200	1.73	0.05
1400	1.64	0.07
1600	1.51	0.2
1800	1.27	0.34
2000	1	0.56
2500	0.7	0.54
3000	0.38	0.63
4000	-0.05	0.6
5000	-0.24	0.64
10000	-0.46	0.7

Figure 2.B

Flow Acceptability Agreement Index Curve for Cimarron River
(Flows represented are flow levels at USGS CIMARRON RIVER NEAR CIMARRON, CO)

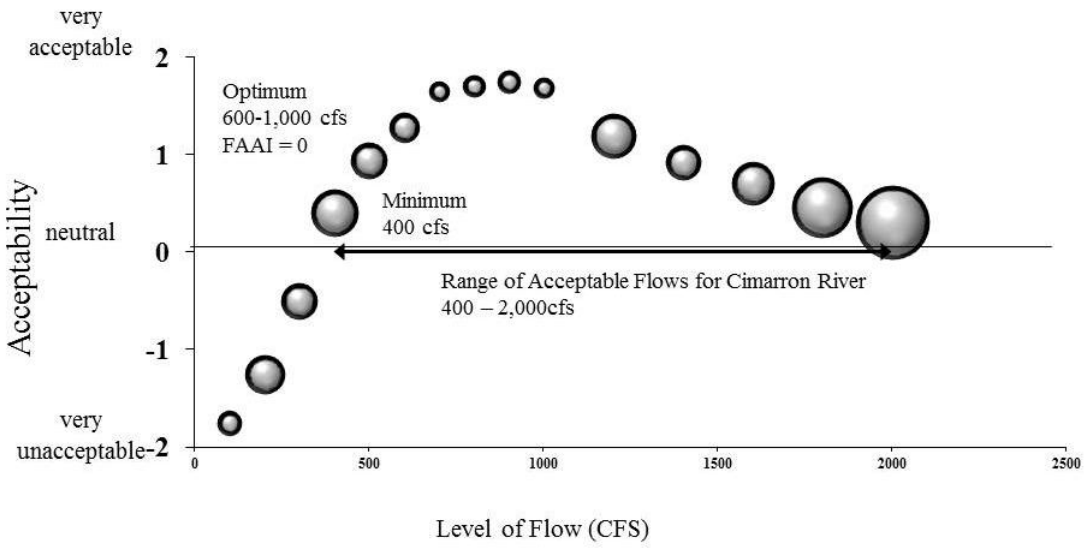


Table 2.B

Cimarron River Mean Acceptability Scores and Flow Acceptability Agreement Index
(Flows represented are flow levels at USGS CIMARRON RIVER NEAR CIMARRON, CO)

Specific Flow CFS	Mean Acceptability	FAAI
100	-1.75	0.23
200	-1.25	0.37
300	-0.50	0.34
400	0.41	0.44
500	0.94	0.34
600	1.28	0.28
700	1.65	0.19
800	1.71	0.21
900	1.75	0.22
1000	1.69	0.2
1200	1.20	0.42
1400	0.93	0.33
1600	0.71	0.4
1800	0.46	0.57
2000	0.31	0.69

Figure 3.B
Flow Acceptability Agreement Index Curve for Daisy Creek
(Flows represented are flow levels at USGS SLATE RIVER NEAR CRESTED BUTTE, CO)

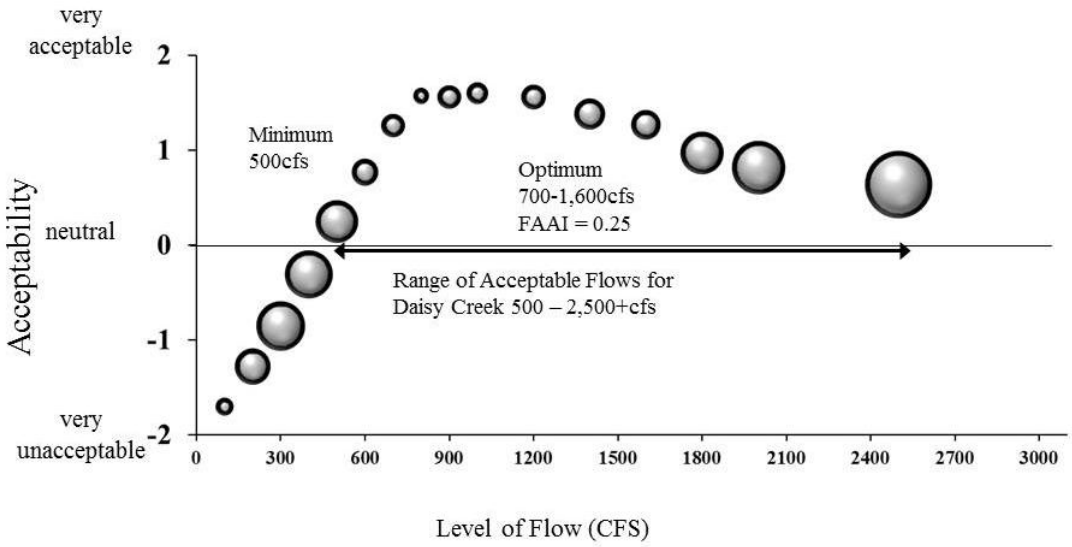


Table 3.B
Daisy Creek
Mean Acceptability Scores and Flow Acceptability Agreement Index
(Flows represented are flow levels at USGS *SLATE RIVER NEAR CRESTED BUTTE, CO)*

Specific Flow CFS	Mean Acceptability	FAAI
100	-1.7	0.17
200	-1.28	0.34
300	-0.85	0.46
400	-0.31	0.45
500	0.25	0.4
600	0.77	0.25
700	1.26	0.22
800	1.57	0.15
900	1.56	0.22
1000	1.6	0.2
1200	1.56	0.23
1400	1.38	0.29
1600	1.27	0.28
1800	0.97	0.4
2000	0.82	0.5
2500	0.64	0.63

Figure 4.B
Flow Acceptability Agreement Index Curve for Escalante
(Flows represented are visual)

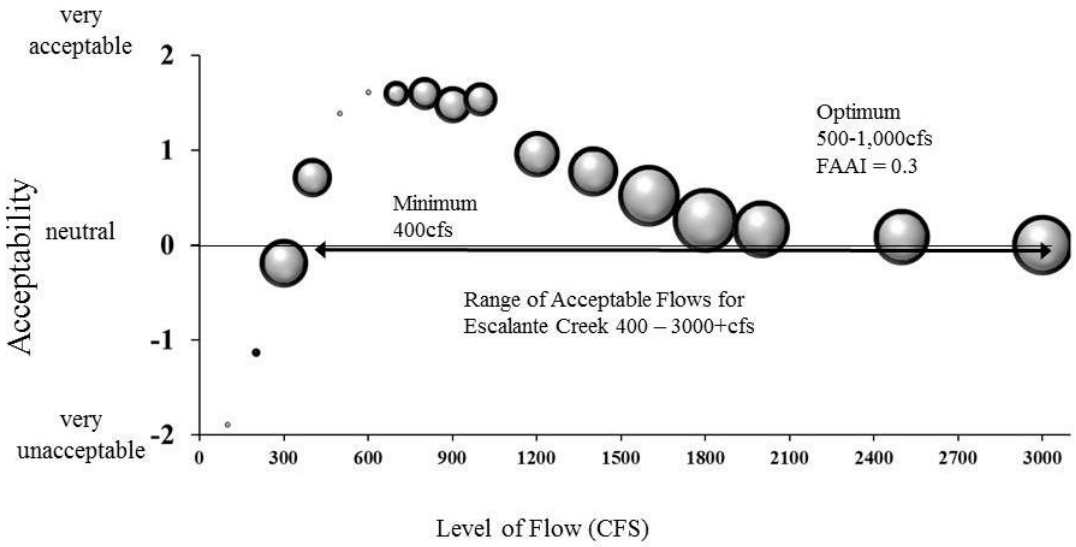


Table 4.B
Escalante Creek
Mean Acceptability Scores and Flow Acceptability Agreement Index
(Flows represented are visual)

Specific Flow CFS	Mean Acceptability	FAAI
100	-1.89	0
200	-1.13	0.08
300	-0.19	0.46
400	0.71	0.37
500	1.39	0
600	1.61	0
700	1.6	0.24
800	1.6	0.31
900	1.48	0.35
1000	1.54	0.32
1200	0.96	0.43
1400	0.78	0.47
1600	0.52	0.58
1800	0.26	0.61
2000	0.17	0.54
2500	0.09	0.53
3000	0	0.57

Figure 5.B

Flow Acceptability Agreement Index Curve for Gunnison Gorge
(Flows represented are flow levels at USGS Gunnison River below Gunnison Tunnel, CO)

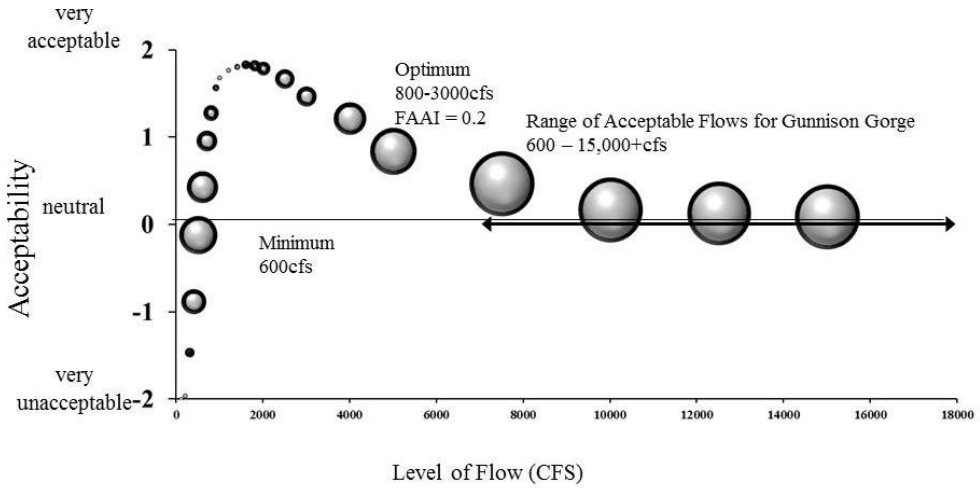


Table 5.B

Gunnison Gorge Mean Acceptability Scores and Flow Acceptability Agreement Index
(Flows represented are flow levels at USGS *Gunnison River below Gunnison Tunnel, CO)*

Specific Flow CFS	Mean Acceptability	FAAI
100	-2	0
200	-1.96	0
300	-1.46	0.1
400	-0.88	0.26
500	-0.12	0.4
600	0.43	0.33
700	0.96	0.21
800	1.28	0.16
900	1.57	0.07
1000	1.68	0.05
1200	1.77	0.03
1400	1.81	0.06
1600	1.83	0.09
1800	1.82	0.12
2000	1.79	0.14
2500	1.67	0.2
3000	1.47	0.21
4000	1.22	0.34
5000	0.84	0.49
7500	0.47	0.68
10000	0.17	0.68
12500	0.13	0.67
15000	0.09	0.68

Figure 6.B

Flow Acceptability Agreement Index Curve for Gunnison Park

(Flows represented are flow levels at USGS Gunnison River Above Blue Mesa Reservoir, CO)

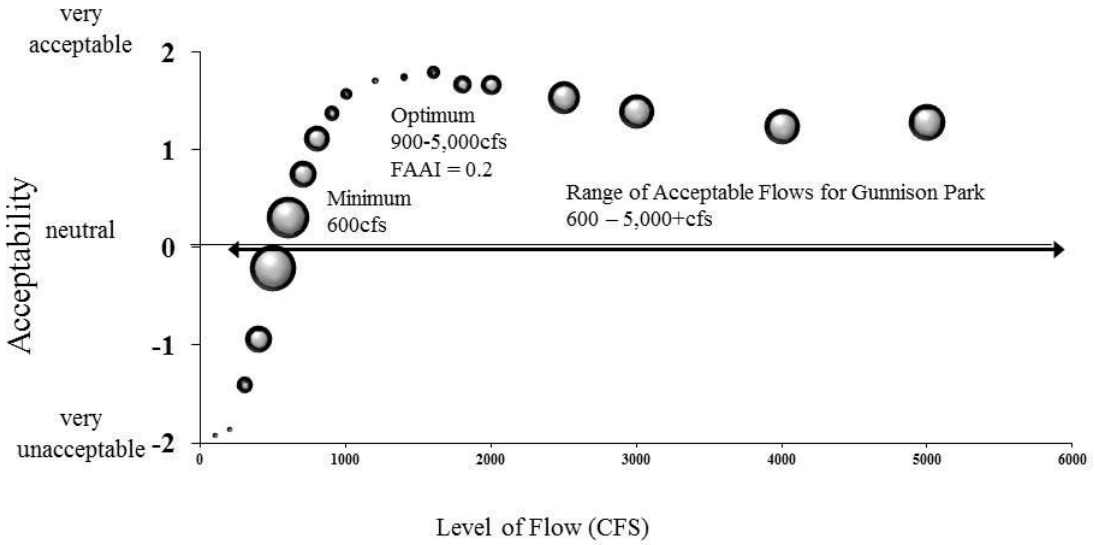


Table 6.B

Gunnison Park Mean Acceptability Scores and Flow Acceptability Agreement Index

(Flows represented are flow levels at USGS Gunnison River Above Blue Mesa Reservoir, CO)

Specific Flow CFS	Mean Acceptability	FAAI
100	-1.92	0
200	-1.86	0
300	-1.4	0.15
400	-0.93	0.25
500	-0.2	0.43
600	0.31	0.39
700	0.76	0.25
800	1.12	0.24
900	1.38	0.14
1000	1.58	0.11
1200	1.71	0.06
1400	1.75	0.07
1600	1.8	0.12
1800	1.68	0.17
2000	1.67	0.19
2500	1.54	0.3
3000	1.4	0.32
4000	1.25	0.33
5000	1.29	0.34

Figure 7.B

Flow Acceptability Agreement Index Curve for Gunnison Town
(Flows represented are flow levels at USGS Gunnison River Above Blue Mesa Reservoir, CO)

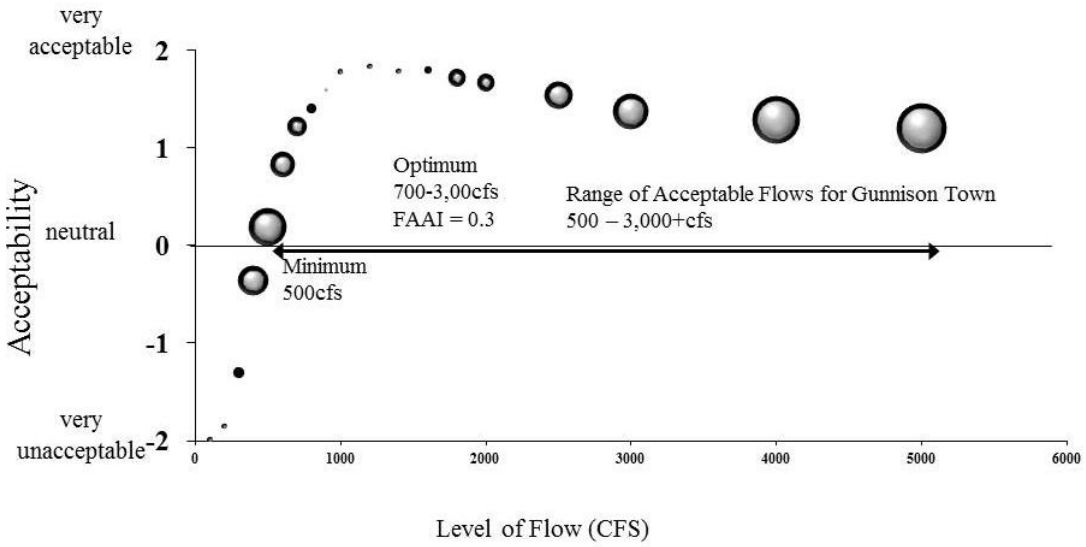


Table 7.B

Gunnison Town Mean Acceptability Scores and Flow Acceptability Agreement Index
(Flows represented are flow levels at USGS *Gunnison River Above Blue Mesa Reservoir, CO)*

Specific Flow CFS	Mean Acceptability	FAAI
100	-1.98	0
200	-1.84	0
300	-1.29	0.1
400	-0.35	0.28
500	0.2	0.35
600	0.84	0.23
700	1.23	0.18
800	1.42	0.09
900	1.61	0.03
1000	1.79	0
1200	1.85	0
1400	1.8	0.04
1600	1.81	0.07
1800	1.73	0.16
2000	1.68	0.16
2500	1.55	0.26
3000	1.39	0.33
4000	1.3	0.44
5000	1.21	0.46

Figure 8.B
Flow Acceptability Agreement Index Curve for Lake Fork Gunnison
(Flows represented are flow levels at USGS Lake Fork at Gateview Campground, CO)

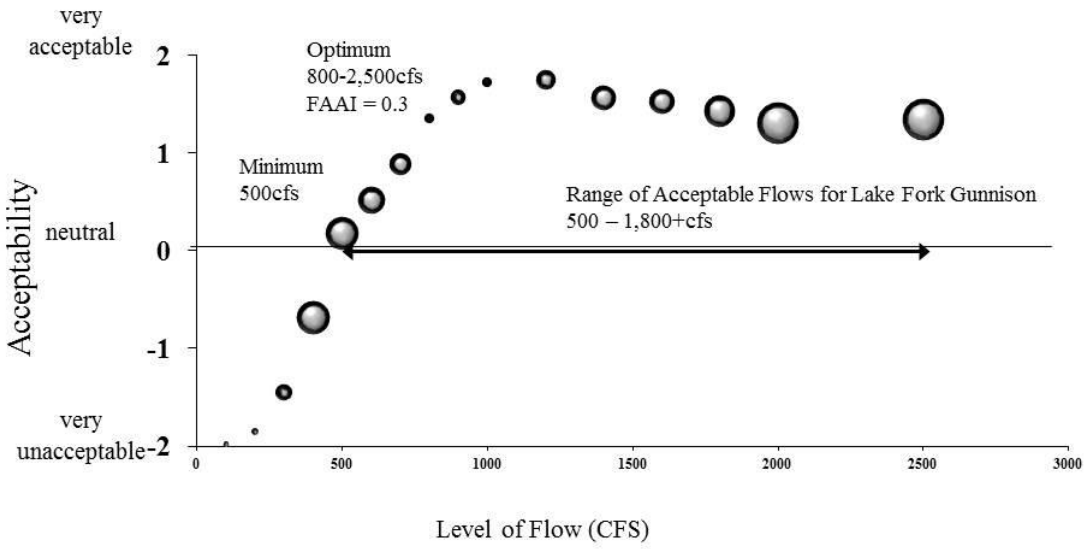


Table 8.B
Lake Fork Gunnison
Mean Acceptability Scores and Flow Acceptability Agreement Index
(Flows represented are flow levels at USGS *Lake Fork at Gateview Campground, CO)*

Specific Flow CFS	Mean Acceptability	FAAI
100	-1.97	0
200	-1.84	0.06
300	-1.44	0.15
400	-0.68	0.31
500	0.19	0.3
600	0.53	0.25
700	0.9	0.2
800	1.37	0.09
900	1.58	0.14
1000	1.73	0.09
1200	1.76	0.18
1400	1.58	0.23
1600	1.54	0.23
1800	1.44	0.29
2000	1.32	0.39
2500	1.35	0.39

Figure 9.B
Flow Acceptability Agreement Index Curve for Lower Gunnison
(Flows represented are flow levels at USGS Gunnison River Near Grand Junction, CO)

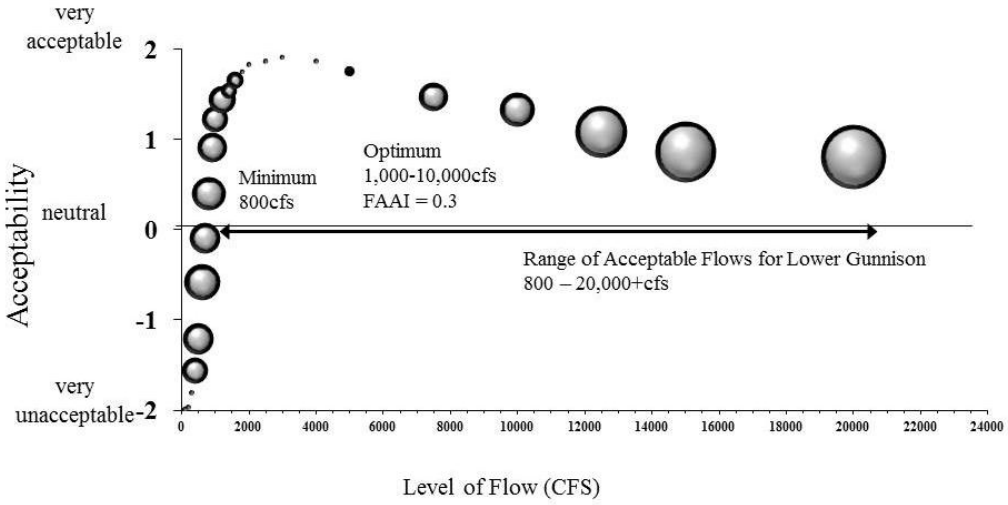


Table 9.B
Lower Gunnison Mean Acceptability Scores and Flow Acceptability Agreement Index
(Flows represented are flow levels at USGS *Gunnison River Near Grand Junction, CO)*

Specific Flow CFS	Mean Acceptability	FAAI
100	-1.98	0
200	-1.96	0
300	-1.8	0.05
400	-1.55	0.26
500	-1.2	0.31
600	-0.57	0.36
700	-0.08	0.31
800	0.41	0.34
900	0.92	0.3
1000	1.24	0.26
1200	1.45	0.27
1400	1.55	0.16
1600	1.67	0.17
1800	1.76	0.05
2000	1.84	0
2500	1.88	0
3000	1.92	0
4000	1.88	0.05
5000	1.77	0.1
7500	1.48	0.29
10000	1.34	0.35
12500	1.09	0.52
15000	0.87	0.62
20000	0.82	0.65

Figure 10.B

Flow Acceptability Agreement Index Curve for NF Gunnison River

(Flows represented are flow levels at USGS NORTH FORK GUNNISON RIVER NEAR SOMERSET, CO)

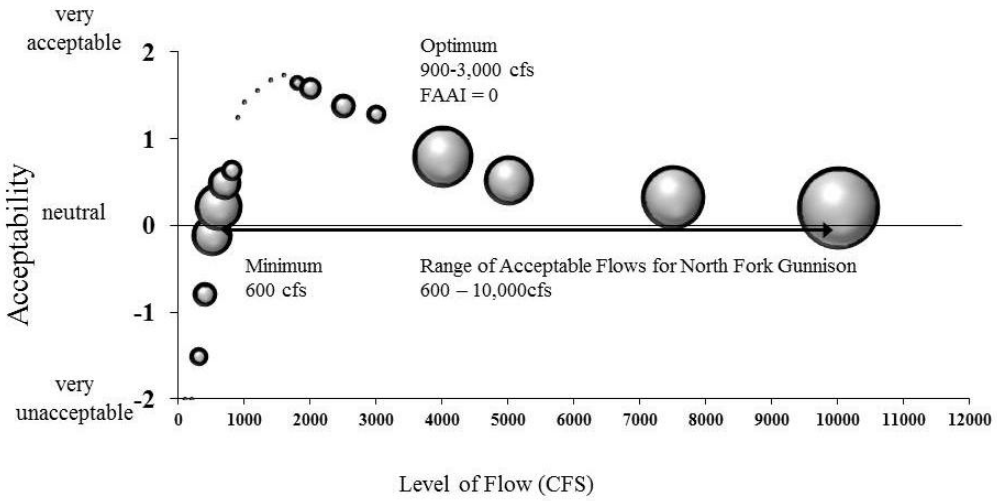


Table 10.B

NF Gunnison River Mean Acceptability Scores and Flow Acceptability Agreement Index

(Flows represented are flow levels at USGS NORTH FORK GUNNISON RIVER NEAR SOMERSET, CO)

Specific Flow CFS	Mean Acceptability	FAAI
100	-2.00	0
200	-2.00	0
300	-1.50	0.19
400	-0.79	0.25
500	-0.11	0.42
600	0.22	0.49
700	0.50	0.34
800	0.64	0.22
900	1.25	0
1000	1.43	0
1200	1.56	0
1400	1.68	0
1600	1.74	0
1800	1.65	0.16
2000	1.59	0.23
2500	1.38	0.25
3000	1.29	0.2
4000	0.80	0.63
5000	0.53	0.51
7500	0.33	0.66
10000	0.21	0.85

Figure 11.B
Flow Acceptability Agreement Index Curve for Oh-Be-Joyful Creek
(Flows represented are flow levels at USGS SLATE RIVER NEAR CRESTED BUTTE, CO)

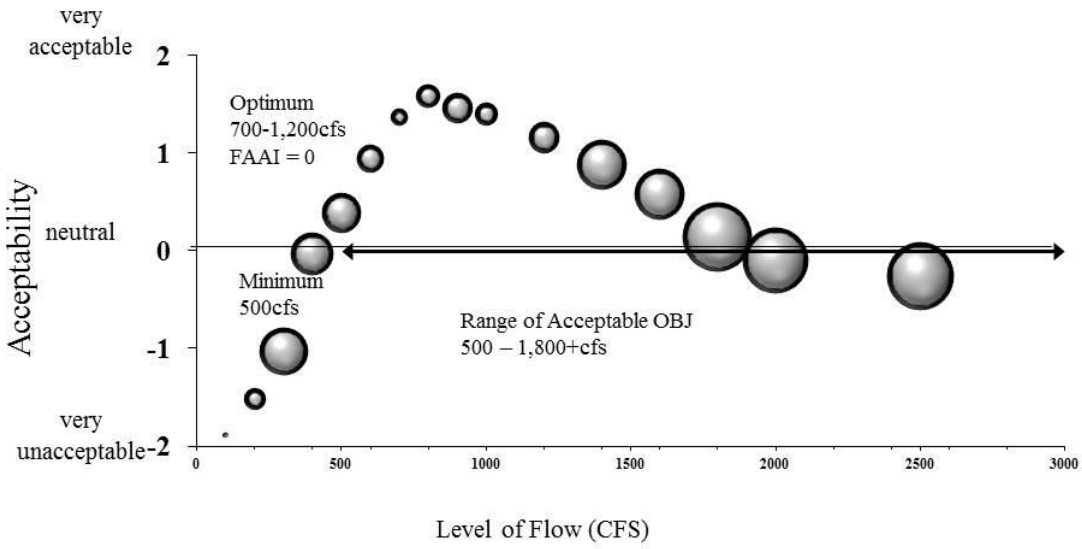


Table 11.B
Oh-Be-Joyful Creek
Mean Acceptability Scores and Flow Acceptability Agreement Index
(Flows represented are flow levels at USGS *SLATE RIVER NEAR CRESTED BUTTE, CO)*

Specific Flow CFS	Mean Acceptability	FAAI
100	-1.88	0.05
200	-1.51	0.2
300	-1.02	0.45
400	-0.02	0.4
500	0.4	0.37
600	0.95	0.26
700	1.38	0.16
800	1.59	0.22
900	1.47	0.28
1000	1.41	0.21
1200	1.17	0.29
1400	0.89	0.46
1600	0.59	0.47
1800	0.15	0.65
2000	-0.09	0.62
2500	-0.25	0.63

Figure 12.B

Flow Acceptability Agreement Index Curve for Ridgway Whitewater Park
(Flows represented are flow levels at USGS UNCOMPAHGRE RIVER NEAR RIDGWAY, CO)

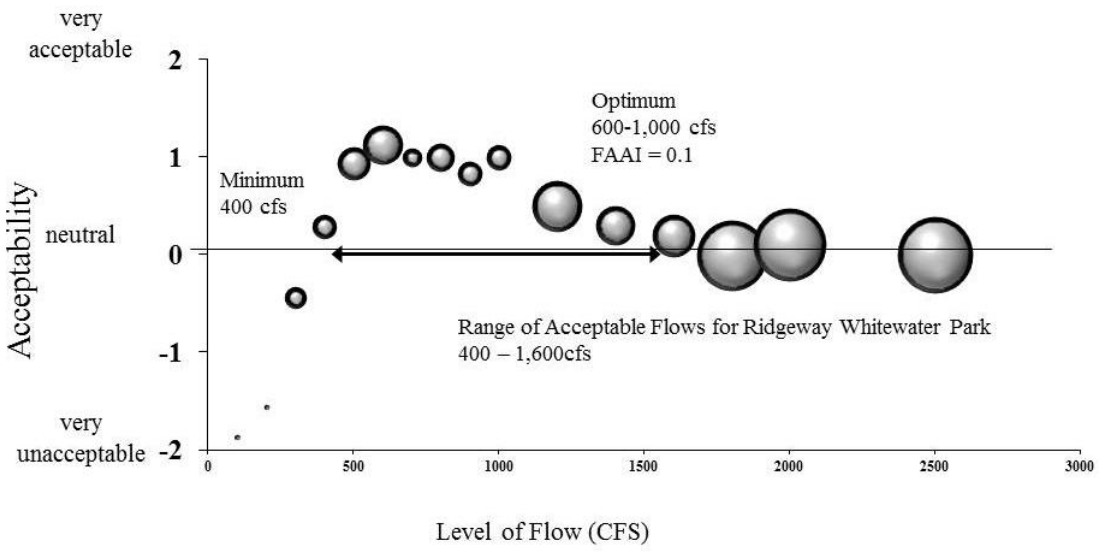


Table 12.B

Ridgway Whitewater Park
Mean Acceptability Scores and Flow Acceptability Agreement Index
(Flows represented are flow levels at USGS UNCOMPAHGRE RIVER NEAR RIDGWAY, CO)

Specific Flow CFS	Mean Acceptability	FAAI
100	-1.87	0
200	-1.56	0
300	-0.44	0.2
400	0.29	0.22
500	0.94	0.31
600	1.13	0.37
700	1.00	0.18
800	1.00	0.26
900	0.83	0.23
1000	1.00	0.23
1200	0.50	0.47
1400	0.30	0.37
1600	0.20	0.4
1800	0.00	0.56
2000	0.11	0.58
2500	0.00	0.51

Figure 13.B
Flow Acceptability Agreement Index Curve for Slate River
(Flows represented are flow levels at USGS SLATE RIVER NEAR CRESTED BUTTE, CO)

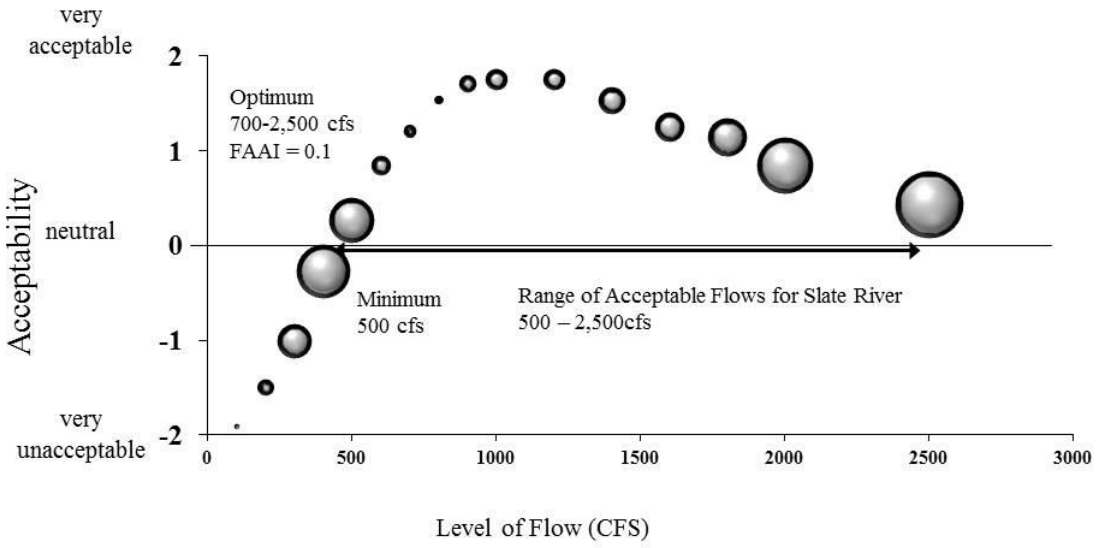


Table 13.B
Slate River
Mean Acceptability Scores and Flow Acceptability Agreement Index
(Flows represented are flow levels at USGS *SLATE RIVER NEAR CRESTED BUTTE, CO)*

Specific Flow CFS	Mean Acceptability	FAAI
100	-1.9	0
200	-1.49	0.15
300	-1	0.32
400	-0.27	0.5
500	0.27	0.42
600	0.85	0.18
700	1.21	0.12
800	1.54	0.08
900	1.71	0.16
1000	1.76	0.2
1200	1.76	0.2
1400	1.53	0.25
1600	1.26	0.27
1800	1.15	0.36
2000	0.85	0.53
2500	0.44	0.63

Figure 14.B

Flow Acceptability Agreement Index Curve for Taylor River

(Flows represented are flow levels at USGS Taylor River Below Taylor Park Reservoir, CO)

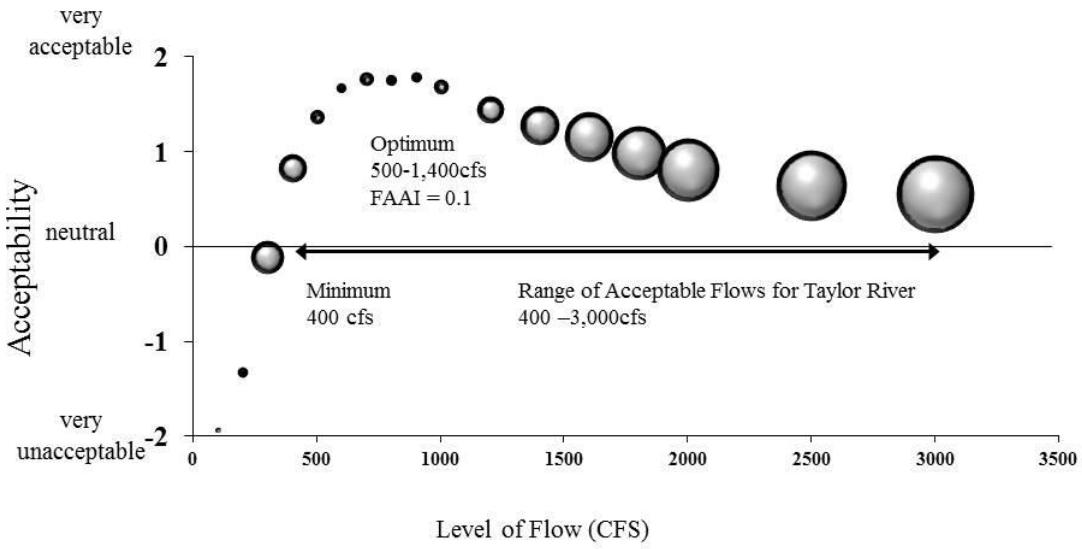


Table 14.B

Taylor River Mean Acceptability Scores and Flow Acceptability Agreement Index

(Flows represented are flow levels at USGS *Taylor River Below Taylor Park Reservoir, CO)*

Specific Flow CFS	Mean Acceptability	FAAI
100	-1.93	0
200	-1.32	0.1
300	-0.11	0.31
400	0.83	0.26
500	1.37	0.13
600	1.68	0.09
700	1.77	0.13
800	1.76	0.1
900	1.79	0.1
1000	1.69	0.14
1200	1.45	0.25
1400	1.28	0.36
1600	1.16	0.46
1800	0.99	0.51
2000	0.81	0.59
2500	0.65	0.66
3000	0.56	0.73

Figure 15.B

FAAI Curve for Uncompahgre River above Ridgway Reservoir
(Flows represented are flow levels at USGS UNCOMPAHGRE RIVER NEAR RIDGWAY, CO)

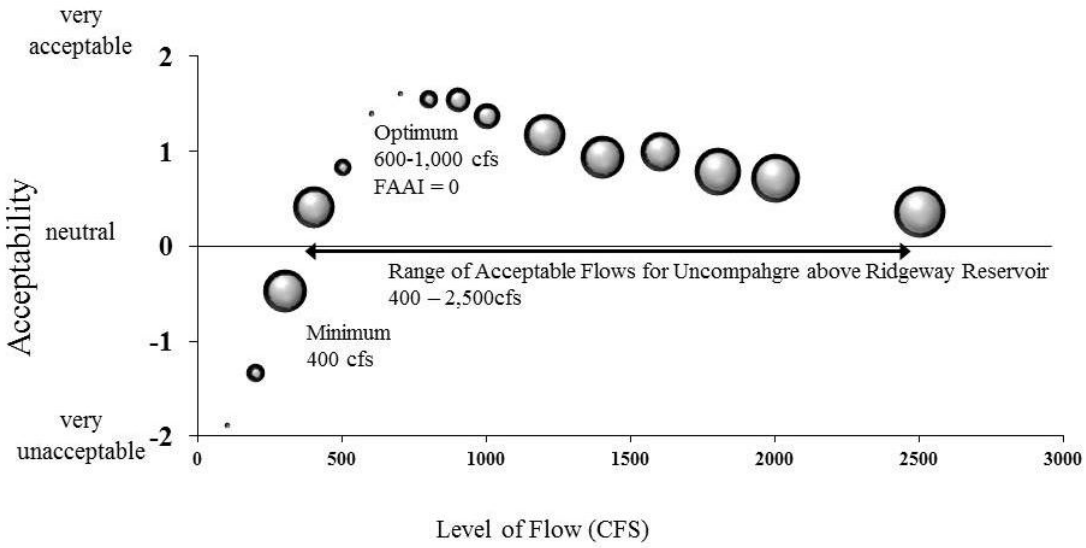


Table 15.B

Uncompahgre River above Ridgway Reservoir
Mean Acceptability Scores and Flow Acceptability Agreement Index
(Flows represented are flow levels at USGS UNCOMPAHGRE RIVER NEAR RIDGWAY, CO)

Specific Flow CFS	Mean Acceptability	FAAI
100	-1.88	0
200	-1.32	0.17
300	-0.46	0.4
400	0.42	0.39
500	0.84	0.161
600	1.40	0
700	1.61	0
800	1.55	0.17
900	1.55	0.23
1000	1.38	0.24
1200	1.18	0.39
1400	0.95	0.4
1600	1.00	0.37
1800	0.79	0.44
2000	0.72	0.45
2500	0.37	0.48

Figure 16.B
FAAI for Uncompahgre River below Ridgway Reservoir
(Flows represented are flow levels at USGS UNCOMPAHGRE RIVER AT COLONA, CO)

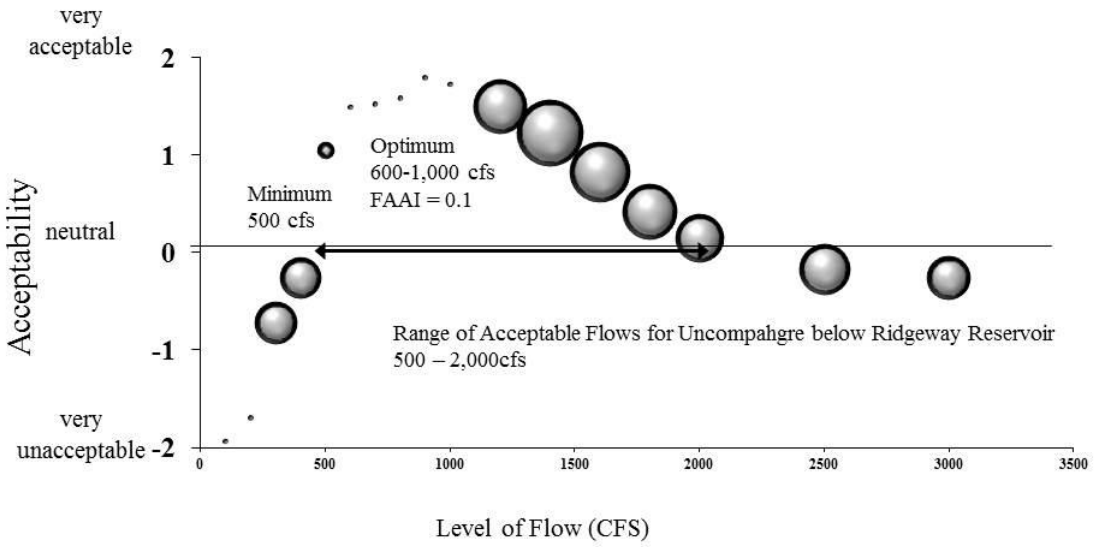


Table 16.B
Uncompahgre River below Ridgway Reservoir
Mean Acceptability Scores and Flow Acceptability Agreement Index
(Flows represented are flow levels at USGS UNCOMPAHGRE RIVER AT COLONA, CO)

Specific Flow CFS	Mean Acceptability	FAAI
100	-1.93	0
200	-1.69	0
300	-0.72	0.4
400	-0.25	0.39
500	1.05	0.161
600	1.50	0
700	1.53	0
800	1.59	0
900	1.80	0
1000	1.73	0
1200	1.50	0.31
1400	1.23	0.32
1600	0.83	0.36
1800	0.42	0.42
2000	0.15	0.45
2500	-0.17	0.48
3000	-0.25	0.41

Figure 17.B

Flow Acceptability Agreement Index Curve for Upper East River
(Flows represented are flow levels at USGS UPPER EAST BELOW CEMENT CREEK, CO)

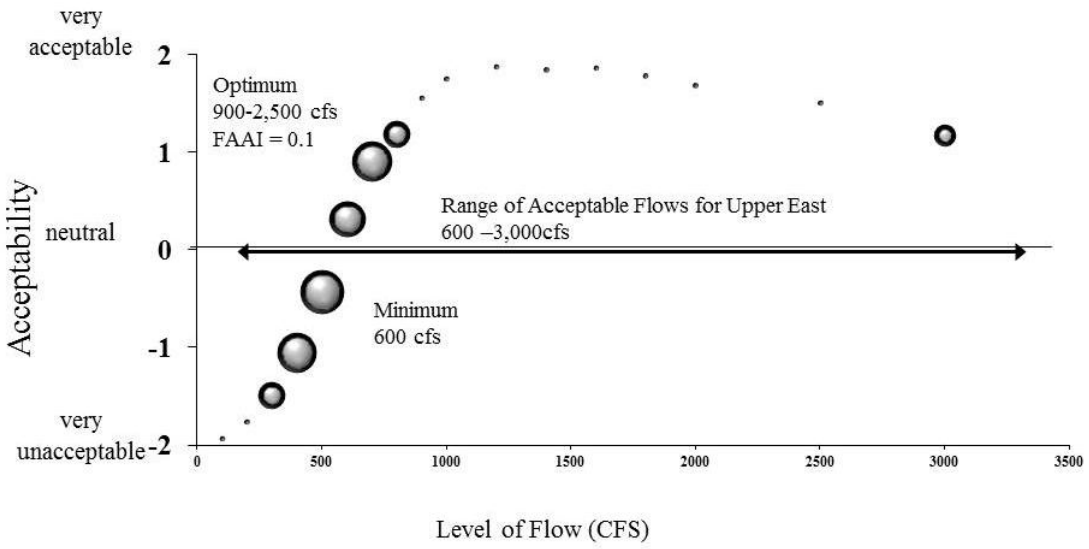


Table 17.B

Upper East
Mean Acceptability Scores and Flow Acceptability Agreement Index
(Flows represented are flow levels at USGS *UPPER EAST BELOW CEMENT CREEK, CO)*

Specific Flow CFS	Mean Acceptability	FAAI
100	-1.93	0
200	-1.76	0.05
300	-1.49	0.25
400	-1.05	0.37
500	-0.43	0.41
600	0.32	0.34
700	0.91	0.37
800	1.19	0.25
900	1.56	0.05
1000	1.76	0
1200	1.88	0
1400	1.85	0
1600	1.87	0
1800	1.79	0
2000	1.69	0
2500	1.51	0.05
3000	1.18	0.2

Appendix C

A subset of FERC regulated hydropower and other projects at which discrete usable boating days have been scheduled and/or provided as mitigation for impacts to whitewater boating, and/or analyzed as part of a whitewater flow study.

River	Project Name	State	FERC Project #
COOSA RIVER	JORDAN DAM	AL	00618
COOSA RIVER	MITCHELL	AL	00082
BUTTE CREEK	FORKS OF BUTTE	CA	06896
FEATHER RIVER	FEATHER RIVER	CA	02100
KERN RIVER	BOREL	CA	00382
KERN RIVER	ISABELLA	CA	08377
KERN RIVER	KERN CANYON	CA	00178
KERN RIVER	KERN RIVER NO 1	CA	01930
KERN RIVER	KERN RIVER NO 3	CA	02290
KINGS RIVER	PINE FLAT	CA	02741
MIDDLE FORK AMERICAN R	MIDDLE FORK AMERICAN RIVER	CA	02079
MIDDLE FORK STANISLAUS RIVER	BEARDSLEY/DONNELLS	CA	02005
N FK KINGS R	HAAS-KINGS RIVER	CA	01988
NORTH FORK FEATHER RIVER	POE	CA	02107
NORTH FORK FEATHER RIVER	ROCK CREEK-CRESTA	CA	01962
NORTH FORK FEATHER RIVER	UPPER NORTH FORK FEATHER RIVER	CA	02105
NORTH FORK MOKELUMNE RIVER	MOKELUMNE RIVER	CA	00137
PIRU CREEK	SANTA FELICIA	CA	02153
PIT RIVER	MCCLOUD-PIT	CA	02106
PIT RIVER	PIT 3, 4, & 5	CA	00233
PIT RIVER	PIT NO. 1	CA	02687
SAN JOAQUIN R	KERCKHOFF	CA	00096
SAN JOAQUIN RIVER	BIG CREEK NO 3	CA	00120
SAN JOAQUIN RIVER	BIG CREEK NO 4	CA	02017
SAN JOAQUIN RIVER	BIG CREEK NO.1 & NO.2	CA	02175
SOUTH FORK AMERICAN R	UPPER AMERICAN RIVER	CA	02101
SOUTH FORK AMERICAN RIVER	CHILI BAR	CA	02155
SOUTH FORK FEATHER RIVER	SOUTH FEATHER POWER	CA	02088
SOUTH FORK OF THE AMERICAN RIVER	EL DORADO	CA	00184
SOUTH YUBA RIVER	DRUM-SPAULDING	CA	02310
SOUTH YUBA RIVER	YUBA-BEAR	CA	02266
STANISLAUS R MIDDLE FORK	SAND BAR	CA	02975
STANISLAUS RIVER	SPRING GAP-STANISLAUS	CA	02130
WEST BRANCH FEATHER RIVER	DESABLA-CENTERVILLE	CA	00803
TALLULAH RIVER	NORTH GEORGIA	GA	02354
BEAR RIVER	BEAR RIVER	ID	00020
DEAD RIVER	FLAGSTAFF STORAGE	ME	02612
KENNEBEC RIVER	INDIAN POND	ME	02142
RAPID RIVER	UPPER & MIDDLE DAMS STORAGE	ME	11834
S BR PENOBSCOTT R	CANADA FALLS	ME	

W BR PENOBSCOT R	PENOBSCOT	ME	02458
W BR PENOBSCOT R	RIPOGENUS	ME	02572
SWAN RIVER	BIGFORK	MT	02652
WEST ROSEBUD CREEK	MYSTIC LAKE	MT	02301
PIGEON RIVER	WALTERS	NC	00432
TUCKASEGEE RIVER	DILLSBORO	NC	02602
WEST FORK TUCKASEGEE RIVER	WEST FORK	NC	02686
NANTAHALA RIVER	NANTAHALA	NC	02692
EAST FORK TUCKASEGEE	EAST FORK	NC	02698
ANDROSCOGGIN RIVER	PONTOOK	NH	02861
PEMIGEWASSET RIVER	AYERS ISLAND	NH	02456
HOOSIC RIVER	HOOSIC	NY	02616
MONGAUP RIVER	RIO	NY	09690
MOOSE RIVER	MOOSE RIVER	NY	04349
RAQUETTE RIVER	[STONE VALLEY REACH]	NY	
RAQUETTE RIVER	PIERCEFIELD	NY	07387
SACANDAGA RIVER	STEWARTS BRIDGE	NY	02047
SALMON R	SALMON RIVER	NY	11408
SARANAC RIVER	SARANAC RIVER	NY	02738
BEAVER RIVER	BEAVER FALLS	NY	02593
BEAVER RIVER	BEAVER RIVER	NY	02645
BLACK RIVER	GLEN PARK	NY	04796
BEAVER RIVER	LOWER BEAVER FALLS	NY	02823
BLACK RIVER	WATERTOWN	NY	02442
KLAMATH RIVER	KLAMATH	OR	02082
SOUTH FORK ROGUE RIVER	PROSPECT NO 3	OR	02337
SUSQUEHANNA RIVER	HOLTWOOD	PA	01881
SALUDA RIVER	SALUDA	SC	00516
WATEREE RIVER	CATAWBA-WATEREE	SC	02232
LITTLE TENNESSEE RIVER	TAPOCO	TN	02169
DEERFIELD RIVER	DEERFIELD RIVER	VT	02323
LITTLE RIVER	WATERBURY	VT	02090
LAKE CHELAN	LAKE CHELAN	WA	00637
SPOKANE RIVER	SPOKANE RIVER	WA	02545
SULLIVAN CREEK	SULLIVAN LAKE (STORAGE)	WA	02225
SULTAN RIVER	HENRY M JACKSON (SULTAN)	WA	02157
TIETON RIVER	TIETON DAM	WA	03701
BLACK RIVER	HATFIELD	WI	10805
CHIPPEWA RIVER	JIM FALLS	WI	02491