WHITEWATER PADDLING
INSTREAM FLOW ASSESSMENT
STUDY REPORT
SPOKANE RIVER PROJECT, FERC NO. 2545

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Prepared for
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Recreation, Land Use &
Aesthetics Work Group

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1.0 INTRODUCTION

Avista Corporation (Avista) owns the Spokane River Hydroelectric Project (Project), which operates under a license issued by the Federal Energy Regulatory Commission (FERC). The current license expires on July 31, 2007, and an application for a new license must be submitted to FERC no later than July 31, 2005. The Project includes the Post Falls Hydroelectric Development (HED), which is located in Idaho (river mile [RM] 102), and the Upper Falls HED (RM 74.2), Monroe Street HED (RM 74), Nine Mile HED (RM 58), and Long Lake HED (RM 34), all four of which are located in Washington. The relicensing process for the Spokane River Project includes collaboration among Avista and other stakeholders to (a) identify issues relevant to the continued operation of the Project; (b) determine information and study needs; (c) design studies; (d) interpret information and study results; and (e) develop appropriate protection, mitigation, and enhancement measures to be included in the license application.

The Whitewater Paddling Instream Flow Assessment was developed as a result of issues that were identified pertaining to the effects of Project operations on the Spokane River's whitewater resources. More specifically, the Recreation, Land Use & Aesthetics Work Group (Work Group) was interested in determining: (1) the existing character of the Spokane River's whitewater opportunities on the free-flowing sections of the river that are outside the Project boundary but are influenced by Project operations, (2) the availability of access to the Spokane River's whitewater resources, and (3) Project impacts on whitewater opportunities. The Work Group formed the whitewater sub-group to develop a study plan and methods to present to the Work Group for approval and implementation. The Louis Berger Group (LBG) was contracted to conduct the study.

The study plan accepted by the Work Group listed the following six specific objectives:

(1) Collect qualitative and quantitative information from existing users and sources about boating flow suitability and Project influence on the Spokane River between Post Falls Dam and Lake Spokane. The Work Group developed preliminary information about whitewater boating reaches, whitewater features, and river flows based upon local knowledge and existing guidebooks. This information is presented in Section 2.1.

(2) Conduct controlled flow studies and on-site evaluations of the boating flow suitability for those reaches of the Spokane River used for whitewater boating. This information is presented in Section 3.0.

(3) Identify minimum boatable and optimum summer and fall flows for the major whitewater features, including two river runs and park and play sites on the Spokane River that can be affected by Project operations. This information is presented in Section 4.0.

(4) Conduct controlled flow studies and on-site evaluations of the boating flow suitability for the major destination whitewater features on the Spokane River, such as park and play sites, that can be affected by Project operations. This information is presented in Section 3.0.

(5) Identify minimum boatable and summer optimum flows for these features. This information is presented in Section 4.0.

(6) Provide site assessments of public access to whitewater reaches of the Spokane River and provide evaluations of public safety concerns associated with whitewater flow releases. Both access adequacy and safety are addressed in Section 4.0 alongside the other results for each river reach and play feature.

LBG documented the study using digital video photography. A CD copy of the video is included in Avista's Project files.

2.0 WHITEWATER RECREATION IN THE SPOKANE REGION

2.1 Spokane River Whitewater Opportunities

The Spokane River runs through the center of an urbanized area and is heavily used by local residents for boating, tubing, swimming and fishing. The river also draws regional users when flows are sufficient for these activities. Whitewater boating opportunities on the Spokane River associated with the Project include two river reaches, which are used by boaters for down-river runs, and numerous "park-and-play" areas, where boaters use specific waves or hydraulics for freestyle boating. Table 1 lists the whitewater boating opportunities on the Spokane River, including approximate river mile, whitewater classification, access points, and general flow requirements. The whitewater classifications are based on the International Whitewater Classification System (American Whitewater Affiliation, 1990), which is summarized in Table 2.

The areas listed on Table 1 are shown on Figure 1. The two river reaches are known as the Upper Spokane and the Lower Spokane. The Upper Spokane river reach is sometimes defined as the 17-mile segment between McGuire Park and Boulder Beach, although the Upper Spokane down-river run generally extends from the Post Falls Dam to Mirabeau Point or Plantes Ferry Park. The most common run is from the access at Barker Road to Plantes Ferry. There are multiple access points along this reach that provide for longer or shorter runs. The Lower Spokane River extends from Peaceful Valley to the Plese Flats Access Area in Riverside State Park. The most common run is from Meenach Bridge to Plese Flats. There are number of commonly used access points that can shorten the trip, if desired. Park-and-play opportunities, which are mostly associated with the Upper Spokane reach, include Trailer Park Wave, Corbin Park, Dead Dog Hole, Climax Wave, Sullivan Hole, and Zoo Hole. The Upper (Barker to Mirabeau Point) and Lower Spokane (Meenach to Plese Flats) river reaches and three of the play feature sites—Trailer Park Wave, Sullivan Hole, and Zoo Hole—were specifically studied as part of this *Whitewater Paddling Instream Flow Assessment Study*.

Table 1. River sections and play spot locations

River Section or Play Feature Name	Access Points	Preliminary Minimum, Optimal, and Maximum Flows[b] (cfs)	Minimum and Preferred Flows from Study Results (cfs)	Whitewater Difficulty[c]
Upper Spokane (Post Falls Dam to Plantes Ferry Park)[a]	Post Falls, Barker Rd., Sullivan, Zoo, Plantes Ferry	1,200 2,800-3,200 5,000	1,500 2,500-3,200	II – III-
Lower Spokane (Below Peaceful Valley to Plese Flats)[a]	Various access sites along and near Riverside State Park	1,200 2,800-3,200 5,000	1,500 2,500	II – III
Trailer Park Wave[a]	Post Falls Park	4,000 4,500 5,500-5,900	3,500 4,000-5,000	II
Corbin Park	Corbin Park	15,000 20,000 23,000	Not Studied	IV
Dead Dog Hole	North Side of Stateline Bridge	12,000 20,000 25,000	Not Studied	II-III
Judd's New Hole[d]	End of Mission Road at Flora	2,000 Not Known Not Known	Not Studied	II
Climax Wave	End of Mission Road at Flora	4,500 5,500 6,500-7,000	Not Studied	III-IV

River Section or Play Feature Name	Access Points	Preliminary Minimum, Optimal, and Maximum Flows[b] (cfs)	Minimum and Preferred Flows from Study Results (cfs)	Whitewater Difficulty[c]
Sullivan Hole[a]	End of Mission Road at Flora	2,200-2,500 3,000 3,400	2,500 2,800-3,000	II-III
Zoo Hole[a]	Old Zoo	2,500 3,000 3,400	2,300 2,500-2,800	II-III

[a] River section or play feature included in this study.

[b] Preliminary flows, in cubic feet per second, were determined by Working Group member John Patrouch in consultation with local boaters. The flows represent the boaters' best estimates of minimum acceptable flow, optimal flow, and maximum acceptable flow, respectively, for the particular river section or play feature.

[c] See Table 2 for the definition of whitewater classifications.

[d] Judd's New Hole has been described by Working Group members as a potential play spot that may be used more in the future. At this time, however, little information is available to describe the spot's features and flow levels.

Table 2. Whitewater classification system (American Whitewater Affiliation, 1998)

Class I: Easy . Fast moving water with riffles and small waves. Few obstructions, all obvious and easily missed with little training. Risk to swimmers is slight; self-rescue is easy.

Class II: Novice. Straightforward rapids with wide, clear channels that are evident without scouting. Occasional maneuvering may be required, but rocks and medium sized waves are easily missed by trained paddlers. Swimmers are seldom injured and group assistance, while helpful, is seldom needed.

Class III: Intermediate. Rapids with moderate, irregular waves that may be difficult to avoid and that can swamp an open canoe. Complex maneuvers in fast current and good boat control in tight passages or around ledges are often required; large waves and strainers may be present but are easily avoided. Strong eddies and powerful current effects can be found, particularly on large-volume rivers. Scouting is advisable for inexperienced parties. Injuries while swimming are rare; self-rescue is usually easy but group assistance may be required to avoid long swims. Rapids that are at the lower or upper end of this difficulty range are designated "class iii-" or "class iii+" respectively.

Class IV: Advanced. Intense, powerful, but predictable rapids requiring precise boat handling in turbulent water. The river may feature large, unavoidable waves and holes or constricted passages that demand fast maneuvers under pressure. A fast, reliable eddy turn may be needed to initiate maneuvers, scout rapids, or rest. Rapids may require "must' moves above dangerous hazards. Scouting is necessary the first time down. Risk of injury to swimmers is moderate to high, and water conditions may make self-rescue difficult. Group assistance for rescue is often essential but requires practice and skill. A strong eskimo roll is highly recommended. Rapids that are at the upper end of this difficulty range are designated "class iv-" or "class iv+" respectively.

Class V: Expert. Extremely long, obstructed, or very violent rapids that expose a paddler to above-average endangerment. Drops may contain large, unavoidable waves and holes or steep, congested chutes with complex, demanding routes. Rapids may continue for long distances between pools, demanding a high level of fitness. What eddies exist may be small, turbulent, or difficult to reach. At the high end of the scale, several of these factors may be combined. Scouting is mandatory but often difficult. Swims are dangerous, and rescue is difficult even for experts. A very reliable eskimo roll, proper equipment, extensive experience, and practiced rescue skills are essential. Because of the large range of difficulty that exists beyond class iv, class 5 is an open ended, multiple level scale designated by class 5.0, 5.1, 5.2, etc.. Each of these levels is an order of magnitude more difficult than the last. example: increasing difficulty from class 5.0 to class 5.1 is a similar order of magnitude as increasing from class iv to class 5.0.

Class VI Extreme and exploratory. These runs have almost never been attempted and often exemplify the extremes of difficulty, unpredictability and danger. The consequences of errors are very severe and rescue may be impossible. For teams of experts only, at favorable water levels, after close personal inspection and taking all precautions. After a class vi rapids has been run many times, its rating may be changed to an appropriate class 5.x rating.

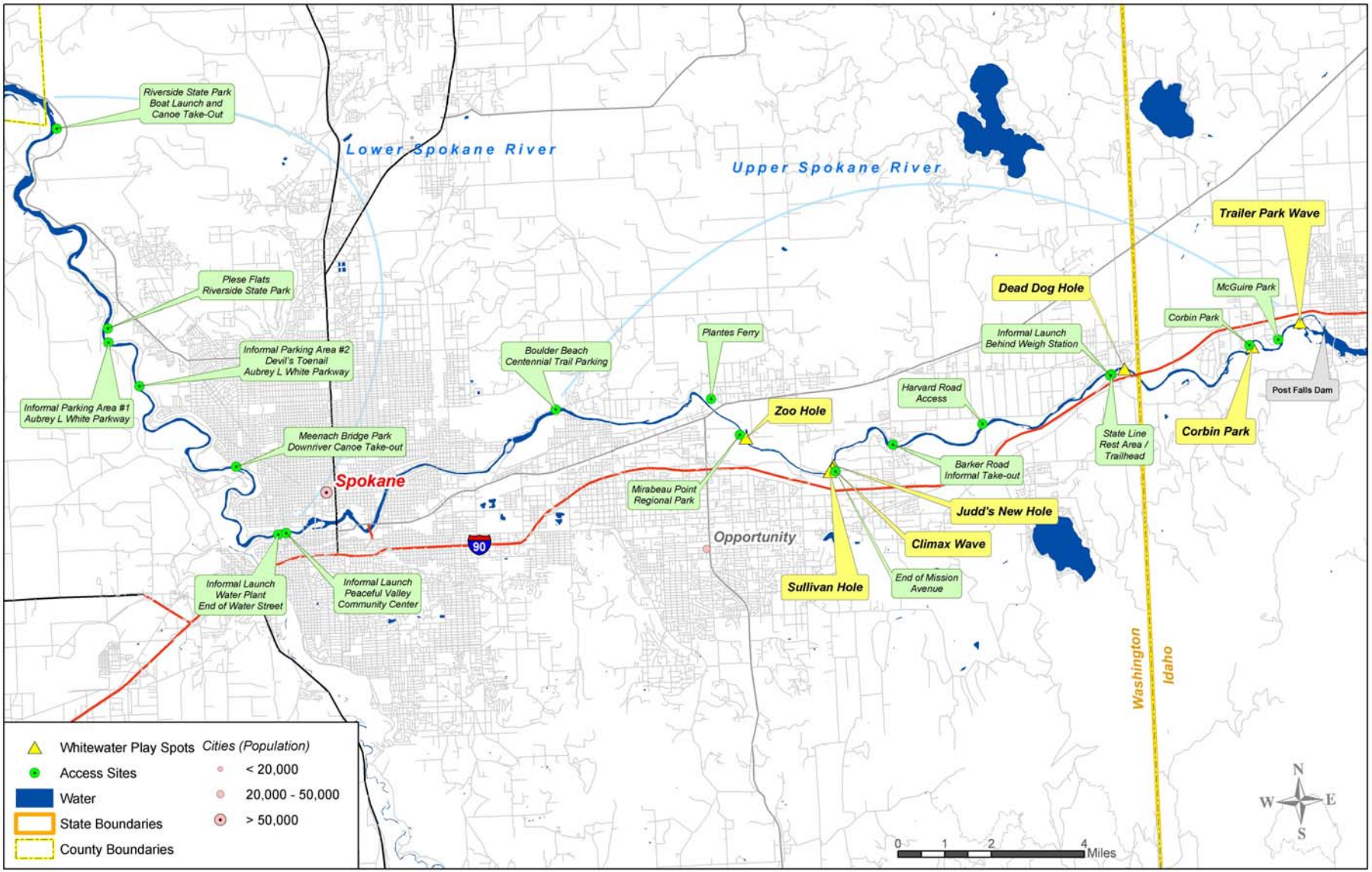
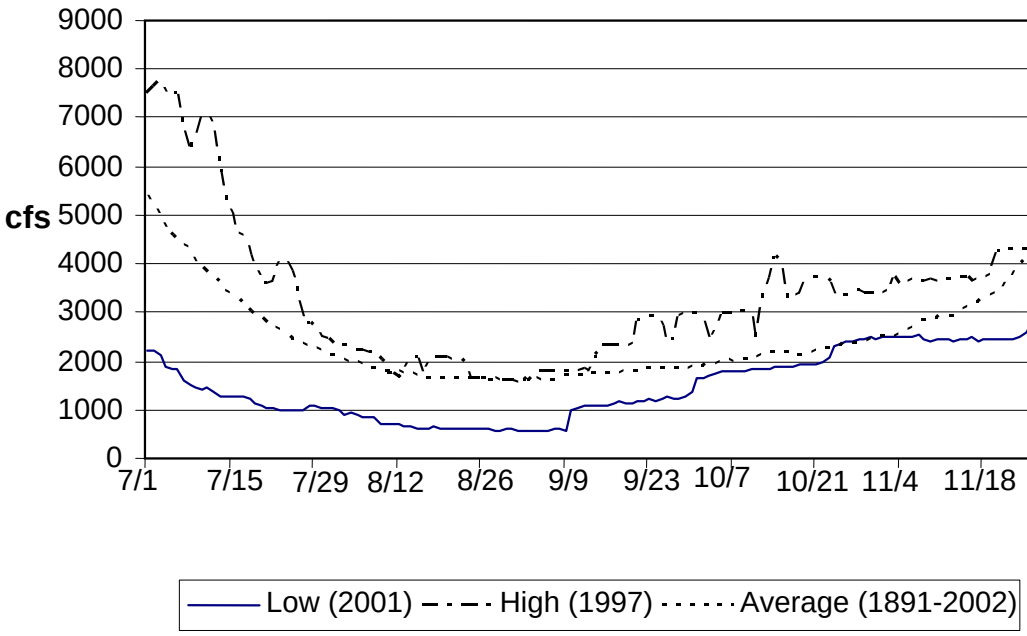


Figure 1 –Spokane Area Whitewater Resources

The Spokane River Project regulates flows on the Spokane River. The hydraulic capacity of the Post Falls HED powerhouse is approximately 5,400 cubic feet per second (cfs). Flows above the 5,400 cfs are spilled through the north and south channel dams. Real time and historical streamflow information are available via the United States Geological Survey (USGS) gage (#12422500) located in Spokane, approximately 20 miles downstream of the dam. USGS also maintains a gage that is immediately downstream of the Post Falls HED and upstream of the boating areas discussed in this report, but those data are not published. Figure 2 contains the mean monthly streamflow information for the Spokane River gage for July through November.[1] The mean monthly streamflow is based upon data from 1891 to 2002.

Figure 2 - Spokane River Flows for Low, Average, and High Water Years



Source: USGS streamflow data, gage #12422500, http://waterdata.usgs.gov/wa/nwis/uv?12422500.

Whitewater boating opportunities on the Spokane River occur year round. When flows measured at the Spokane gage exceed approximately 1,500 cfs, river running opportunities exist in both the Upper and Lower reaches. Park-and-play boating opportunities generally exist when flows exceed 2,500 cfs. During dry water years, boating opportunities are often limited during the late summer and early fall months when flows can drop below 1,000 cfs at the Spokane gage.

The hydrology of the Spokane River is complex, and a complete description of hydrologic influences on flows in the Spokane River is beyond the scope of this report. However, it is important to note that the Spokane Rathdrum Aquifer affects flows measured at the Spokane gage. Members of the Work Group have indicated that, during wet years, the aquifer contributes enough water to the reach that the flows measured at the Spokane gage are

[1] Figure 2 includes flow data only for the summer and fall months because these are the months associated with flows below 5,000 cfs that could be influenced by operations of the Post Falls HED.

significantly higher than the flow released through the Post Falls HED. In contrast, Work Group members also indicate that, during dry years, the aquifer absorbs some portion of the releases from the Post Falls HED, such that flows measured at the Spokane gage are less than the flow released by the dam. This feature makes it difficult either to precisely control or to predict the flow at a particular place at any given time. The work being done by the Water Resources workgroup may be able to more precisely define the flow influences. For purposes of this study, done during the second driest season on record, flows measured at the Spokane gage are used in the narrative.

2.2 Regional Whitewater Opportunities

In addition to the whitewater opportunities on the Spokane River, there are a number of additional regional whitewater resources. Whitewater opportunities within a 1 to 2 hour drive of the city of Spokane include the Coeur d'Alene River, St. Joe River, St. Maries River, Latah Creek, Marble Creek, Sullivan Creek, and the Little Spokane River. These rivers and creeks provide a wide variety of boating opportunities ranging from Class I floats to Class V steep creeks. The following list summarizes the opportunities noted in several paddling references, including *Paddle Routes of the Inland Northwest* (Landers and Hansen, 1998), *A Guide to Whitewater Rivers of Washington, Second Edition* (Bennett, 1995), and *Idaho, The Whitewater State* (Amaral, 1998). Figure 3 shows the approximate location of these resources.

- Little Spokane River –This 6-mile-long river run is rated Class I and terminates at Riverside State Park, just outside Spokane. This section of the Little Spokane River has no whitewater, but does have sufficient water for floating virtually year-round (Landers and Hansen, 1998). The area abounds in summering songbirds, great blue herons, and other wildlife.

- Hangman Creek (Latah Creek) – Hangman Creek has good whitewater that ranges from slow water to Class IV. Opportunities for paddling on Hangman Creek occur primarily from January through April during mid-winter thaws and late-winter runoff. The flows are too low to paddle during most of the rest of the year. The most downstream run is a 6-mile-long Class II+ reach that runs through residential developments of Spokane and terminates where the creek joins the Spokane River (Amaral, 1998). Landers and Hansen (1998) describe the same reach as part of an 11-mile-long run that is rated Class I for the first few miles. This area offers exceptional wildlife viewing with one major drawback. It is difficult to plan trips in advance, because flows sufficient for paddling develop rapidly and disappear quickly (Landers and Hansen, 1998). The most upstream run on Hangman Creek is about 31 miles from Spokane in a remote, forested canyon. The run is 11 miles long, and it is rated Class IV at high flows.

- Sullivan Creek –Amaral (1998) describes two short, steep creek sections of Sullivan Creek, including Sullivan Creek run and the Mill Pond run. The Sullivan Creek run is a solid Class V steep creek that provides boating opportunities year round. The run is only 1.7 miles long, but drops 194 feet per mile and includes waterfalls and log jams, with up to 3 portages. The Mill Pond run, which is just upstream of the Sullivan Creek run, is considerably less difficult. It is a 1.3-mile-long Class II run that drops about 53 feet per mile. It can be run only in the spring.

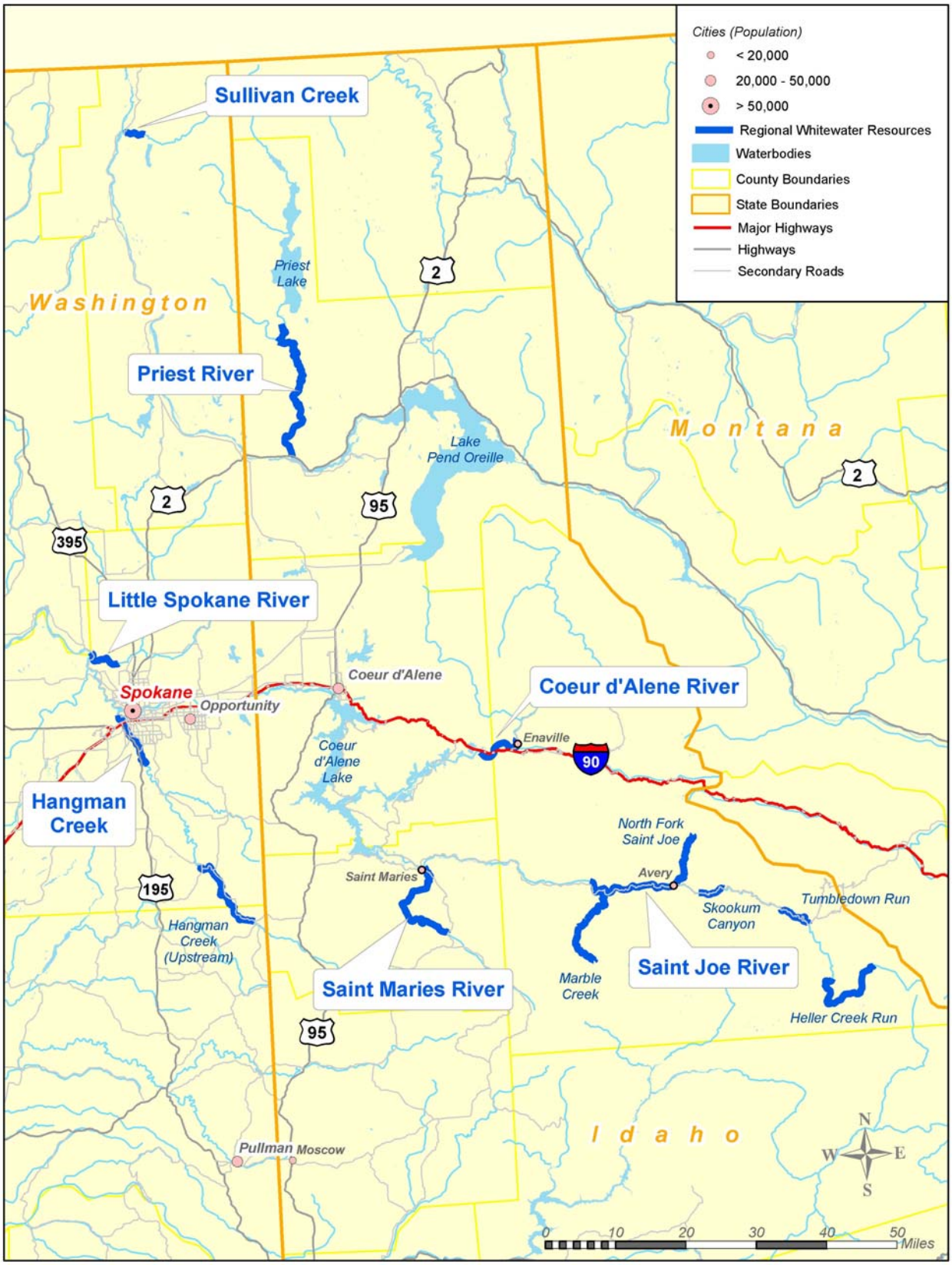


Figure 3 –Regional Whitewater Opportunities

- St. Joe River – The Wild and Scenic St. Joe River is nationally known for its spectacular fly fishing for wild westslope cutthroat trout. The North Fork, Marble Creek tributary, and main stem of the St. Joe River provide numerous whitewater boating opportunities that range from swift water floats to steep creeks. Landers and Hansen (1998) describe a 17-mile-long run on the St. Joe River beginning near the town of Avery, Idaho. This reach includes both Class I and Class II rapids, generally in June through mid-July. Amaral (1998) describes three popular whitewater runs on the mainstem St. Joe. Moving upstream from Avery, these include the following: Skookum Canyon, a 4-mile-long Class III-IV; the Tumbledown run, a 7-mile-long Class III-IV; and the Heller Creek Run, a 16 mile-long Class III-IV. In addition to these runs on the main stem, Amaral (1998) describes an early season 9-mile-long, Class III+ run on the North Fork St. Joe, and a 13-mile-long Class III-IV run on Marble Creek.

- St. Maries River— Landers and Hansen (1998) describe a 7-mile-long section of the lower St. Maries River as "a lazy drift through scenic forest and wetlands." It is rated Class I, offering paddling opportunities from March through November. The upper Saint Maries River has a spring and early summer Class II – III whitewater run that is about 15 miles long. The put-in is at Mashburn, and the takeout is at Grassy Flats. Amaral (1998) describes the run as a straightforward Class II run with some "splashy" Class III.

- Coeur d'Alene River – Flows on this 9.5-mile section of the Coeur d'Alene River between Enaville, Idaho, and the Old Mission State Park are sufficient for year-round boating. It is popular with swimmers and floating vessels in the summer, but is less used the remainder of the year. This reach is rated Class I with some Class II possibilities; whitewater boaters will encounter riffles for play and a few tight turns to test their skills (Landers and Hansen, 1998).

- Priest River – This 28-mile-long reach is rated Class I, with one Class II rapid. The boating season runs from May through as late as October, depending on the drawdown schedule at Outlet Dam (Landers and Hansen, 1998).

3.0 CONTROLLED FLOW STUDY

In an attempt to quantify the minimum and optimum flows for whitewater paddling, LBG worked with the whitewater sub-group to develop a controlled flow study. The whitewater sub-group identified those reaches and play spots to be studied based upon a list of the whitewater resources that could be influenced by flows within the Project's range of operation. Once the sub-group identified the features and flows to be studied, LBG coordinated with Avista's operations personnel to develop a schedule for providing flows and conducting the flow study. Avista and the Work Group wanted to ensure that execution of the study did not cause adverse effects on other resources or Coeur d'Alene Lake levels. LBG and Avista determined that it would be best to conduct the study during the fall drawdown of Coeur d'Alene Lake, when higher flows are typically released from the Post Falls HED. Because of issues associated with attenuation of flows and travel time of the flows from the Post Falls HED to the various whitewater reaches and features, the flow study was scheduled in two separate sessions,

encompassing 3 days each during September and October. Table 3 contains information about the dates, target and actual flows, and river reaches or features investigated during the study.

Table 3. Whitewater paddling study schedule

	Study Date					
	9/15/03	**9/17/03**	**9/19/03**	**10/27/03**	**10/29/03**	**10/31/03**
Target Flow	1,500	2,500	3,000	3,500	4,000	4,500
Average Flows Measured at the Spokane Gage[a]	1,353	2,188	2,558	3,508	3,701	3,745
Average Daily Release from Post Falls HED	1,608	2,695	2,888	3,642	4,035	4,045[b]
River Reach						
Upper Spokane River	●		●		●	
Lower Spokane River	●		●		●	
Play Spot						
Trailer Park Wave				●	●	●
Sullivan Hole		●	●	●		
Zoo Hole		●	●	●		

[a] Measurements taken from the Spokane gage are delayed by 8 hours to account for the travel time between the Post Falls HED and the USGS Spokane gage at Monroe Bridge.

[b] The actual release for the Trailer Park Wave assessment was 4,500 cfs from 10am to 2pm. Avista reduced the flow immediately following the conclusion of the flow assessment, which is demonstrated by the lower flow at the Spokane gage.

Table 3 includes the target flow conditions, average daily releases from the Post Falls HED, and average daily flow conditions recorded at the Spokane gage. As discussed earlier, flows that are released from the Post Falls HED are affected by the Spokane Rathdrum Aquifer. In addition, there are losses of flow due to attenuation and differences in measurement at the Post Falls HED versus the Spokane USGS gage. All responses to the questionnaires used in the study are related to actual flows recorded at the USGS Spokane gage.

3.1 Methods

LBG worked with John Patrouch, a member of the Northwest Whitewater Association and American Whitewater Affiliation (AW), along with other local paddlers, to engage a team of volunteer participants with intermediate or greater whitewater boating experience to participate in the study. Two teams were identified: one team to participate in the river-running assessment and one team to assess the park-and-play areas. The invitation is included as Appendix A. LBG coordinated the release times to ensure that the group would be paddling on the appropriate flow. The study was recorded with digital video and photography at a number of points along the river runs and at all of the park-and-play features for each flow.

Because the study took place in two sessions of several days each, a different number of participants took part on various days and at various sites. In all cases, LBG was successful in gathering participants with a variety of skills and boats for each of the study flows. Appendix B

(Tables B-1 through B-3) provides the breakdown of the number of participants and types of boats used in the study. Participants in the river-running portion of the study used three types of whitewater boats (hard shell kayak, cataraft, and open canoe with flotation) on each of the study days. Participants in the park-and-play portion of the study used hard shell kayaks, which is the standard craft used for freestyle boating. As the tables in Appendix B show, participants with a wide variety of skill levels were represented on individual days and throughout the study.

3.2 Surveys

For each of the whitewater reaches or park-and-play features, participants were asked to fill out a "Single Flow Survey" immediately following their experience. At the end of each 3-day study period, participants were asked to complete a "Flow Comparison Survey." Appendix C contains copies of each survey. The sub-group, AW, LBG, and Avista developed the two surveys collaboratively for Work Group approval and for implementation as part of the study. The Single Flow Survey was designed to capture individual impressions of the flows. Participants responded to questions only in regard to the particular flow that they had experienced. The Flow Comparison Survey was designed for participants to compare the flows and park-and-play feature attributes that they had boated throughout the study. LBG requested that only those participants who assessed all flows for a given reach would fill out the Flow Comparison form. For this reason, the number of respondents for the Flow Comparison form is considerably smaller than the number of respondents that completed Single Flow forms.

Participants in the study were asked to evaluate each individual flow in regard to a variety of characteristics, such as navigability, whitewater challenge, safety, and aesthetics. In addition, participants were asked to indicate how likely they would be to use a scheduled release of the study flow and to indicate their preferred flow. Participants also were asked to evaluate the access sites relative to floating the river.

4.0 RESULTS

4.1 River Reaches

The Upper and Lower Spokane whitewater reaches are separated by the Upriver Project, operated by the city of Spokane, and the Monroe Street HED (see Figure 1). Each reach offers different whitewater experiences, and the two were evaluated separately so that their characteristics could be considered independently.

4.1.1 Upper Spokane

The *Guide to Whitewater Rivers of Washington* (Bennett, 1995) describes the Upper Spokane as an easy and fun class II whitewater run, with access via 10 different locations. The length of the run varies depending upon the access site that is used, with a maximum length of 17 miles from McGuire Park to Boulder Beach. Two of the access sites -- McGuire Park and Corbin Park –are located in Idaho. The first access site in Washington is the State Line Launch. Two popular put-in locations are at Harvard Road Bridge and the Barker Road Bridge, with the majority of whitewater located downstream of Barker Road. The available take-out areas include Mission Avenue, Mirabeau Point, Plantes Ferry, and Boulder Beach. The Upper Spokane downstream of Barker Road contains four named rapids, which are all considered class

II. In order from upstream to downstream are Barker Rapids, Acceleration Rapids, Flora Rapids, and Sullivan Hole.

The study flows for the Upper Spokane, as measured at the Spokane gage, were 1,353, 2,558, and 3,701 cfs. The number of participants in the survey varied among the different flows. Ten participants assessed the 1,353 cfs flow, 9 assessed the 2,558 cfs flow, and 11 assessed the 3,701 flow. Participants were asked to rate the Upper Spokane first in regard to 10 individual characteristics and then to give an overall rating of the river reach. For each characteristic listed, participants were asked to provide a rating on a scale of -2 to +2, where -2 corresponds to highly unacceptable, -1 corresponds to moderately unacceptable, 0 corresponds to neutral, +1 corresponds to moderately acceptable, and +2 corresponds to highly acceptable. As shown in Table 4, respondents rated the characteristics of the 2,558 cfs run consistently higher than either the 1,353 or 3,701 cfs runs, with the exception of the number of portages, where the 3,701 cfs flow was rated higher. Safety and aesthetics were consistently rated at least moderately acceptable (+1) at all three flows, with the highest ratings for the 2,558 cfs flow. The average overall rating of 1.5 for the 2,558 cfs flow on the Upper Spokane reach indicates that the 2,558 cfs flow is the preferred flow, in terms of boating characteristics. The frequency distribution and standard deviations for these items are contained in Appendix D, Tables D-1 through D-4.

Table 4. Participant ratings of flow characteristics of the Upper Spokane River reach[a,b]

Characteristic	1,353 cfs Average	2,558 cfs Average	3,701 cfs Average
Boatability	0.9	1.4	1.1
Availability of challenging technical boating	0.2	0.8	0.0
Availability of powerful hydraulics	-0.1	0.7	0.0
Availability of whitewater "play areas"	0.8	1.7	0.5
Overall whitewater challenge	0.2	0.9	0.2
Safety	1.3	1.8	1.5
Aesthetics	1.3	1.6	1.2
Length of run	0.9	1.2	0.9
Rate of travel	0.3	1.7	1.1
Number of portages	0.2	0.4	0.9
Overall rating	0.7	1.5	0.8

[a] Key to rating scale:
-2 = highly unacceptable
-1 = moderately unacceptable
0 = neutral
+1 = moderately acceptable
+2 = highly acceptable

[b] Number of respondents: 1,353 cfs = 10; 2,558 cfs = 9; and 3,701 cfs = 11

In addition to questions about the characteristics of the flow that was boated, LBG asked the respondents to indicate whether they would prefer a higher, lower, or similar flow to the one that they had just experienced (Table 5). For the Upper Spokane, the greatest number of respondents (6 out of 9) indicated that they would prefer a flow of "About the same" after their experience with the Upper Spokane at a flow of approximately 2,558 cfs. Correspondingly, most respondents (8 out of 10) preferred a slightly or much higher flow than the 1,353 cfs, and most respondents (9 out of 11) preferred a slightly or much lower flow than the 3,701 cfs flow**.**

Table 5. Participants' flow preferences for the Upper Spokane River reach

Flow	Prefer Much Lower Flow	Prefer Slightly Lower Flow	Prefer Flow About the Same	Prefer Slightly Higher Flow	Prefer Much Higher Flow	Number of Responses
1,353 cfs	0	0	2	6	2	10
2,558 cfs	0	1	6	2	0	9
3,745 cfs	2	7	2	0	0	11

For each flow, participants were asked whether or not they would plan to boat on the flow that they had experienced if it were provided as a scheduled release on the Upper Spokane (Table 6). More than half of the participants that experienced the 2,558 cfs flow (5 out of 9) indicated that they would definitely plan to boat a flow of 2,558 cfs. Responses to other flows were also favorable, with more than half of the participants (6 out of 10) indicating that they would "probably" or "definitely" boat the 1,353 cfs flow and 6 out of 11 participants indicating that they would "probably" or "definitely" boat the 3,701 cfs flow.

Table 6. Participants' plans to boat this flow if scheduled for the Upper Spokane River reach

Flow	Definitely No	Possibly	Probably	Definitely Yes	Number of Responses
1,353 cfs	1	3	3	3	10
2,558 cfs	0	3	1	5	9
3,701 cfs	1	4	2	4	11

As part of the flow comparison survey, participants were asked to indicate the minimum flow at which they could (but not necessarily would) boat on the Upper Spokane reach (Table 7). The most frequent response was a flow of 1,500 cfs, with the next highest number of responses for 1,000 cfs. Participants were also asked to indicate their preferred flow, if only one flow were provided. The most frequent response for the preferred flow was 3,000 cfs (6 of 19 responses, or approximately 32%). Eight of the respondents (approximately 40%) selected lower flows of 1,500, 2,000, or 2,800 cfs as their preferred flow. The remaining 5 participants indicated a preference for flows above 3,000 cfs.

Table 7. Participants' minimum and preferred flows for boating the Upper Spokane River reach

Flow	Minimum	Preferred
600 cfs	1	0
700 cfs	1	0
750 cfs	1	0
1,000 cfs	6	0
1,200 cfs	1	0
1,500 cfs	9	3
2,000 cfs	0	3
2,800 cfs	0	2
3,000 cfs	0	6
3,200 cfs	0	1
3,300 cfs	0	1
4,000 cfs	1	1
6,000 cfs	0	1
7,000 cfs	0	1
12,000 cfs	1	0
Number of responses	21	19

As part of the flow comparison survey, LBG also asked participants to rate the importance of having multiple flows provided on the Upper Spokane (Table 8). Participants were asked about the importance of multiple flows in the context of both the varying experiences provided by various flow and the opportunities that they provide to people with different skill levels and types of watercraft. For participants in the Upper Spokane survey, the importance of providing multiple experiences was rated slightly higher than the importance of providing opportunities for different skill levels and watercraft. In both instances, the importance was rated from moderately important to extremely important in nearly all cases.

Table 8. Importance of providing multiple flows for the Upper Spokane River reach

Importance	For Multiple Experiences	For Different Skill Levels and Watercraft
Not at all important	0	0
Slightly important	1	3
Moderately important	6	5
Very important	10	9
Extremely important	3	3
Number of responses	20	20

As part of the flow comparison survey, participants were asked to assess the adequacy of access to the put-in and take-out sites (Table 9). Study participants used many types of boats with different weights and sizes, as well as large and small shuttle vehicles with car-top racks and trailers. Approximately 95% of participants indicated that the put-in provided adequate access, and 85% of participants indicated that the take-out was adequate.

Table 9. Participants' perceptions of access site adequacy for the Upper Spokane River reach

Access Site	Is Access Adequate?		Number of Responses
	Yes	No	
Put-in	19	1	20
Take-out	17	3	20

4.1.2 Lower Spokane River Reach

The Lower Spokane is a class II - III river run downstream of the city of Spokane where the river passes through Riverside State Park. There are five access sites to the Lower Spokane, some of which provide free public access and some of which charge fees for parking. The furthest upstream put-in location is near downtown Spokane in Peaceful Valley. Approximately one mile further downstream is an access on West Riverside Avenue. The most popular put-in is the public access site just downstream of the T.J. Meenach Bridge. A put-in and take-out is available at the Sewage Treatment Plant Access. The most downstream take-out location is at Plese Flats or the pull-out area immediately upstream of Plese Flats, both of which are located in Riverside State Park.

There are several rapids on the Lower Spokane reach, including two Class III rapids: Bowl & Pitcher and Devil's Toenail.

The number of participants in the Lower Spokane survey varied among the flows that were evaluated, with 12 participants experiencing the 1,353 cfs flow, 9 experiencing the 2,558 cfs flow, and 10 experiencing the 3,701 cfs flow. As a part of the individual flow survey, participants were asked to rate the Lower Spokane with respect to ten individual characteristics and then to give an overall rating to the river reach. As noted earlier in this report, the rating scale runs from -2 (highly unacceptable) to +2 (highly acceptable). Table 10 indicates that respondents rated the characteristics of the 3,701 cfs run consistently higher than either the 1,353 or 2,558 cfs runs, with the exception of the availability of challenging technical boating, which was rated higher at the 1,353 cfs flow. The availability of play areas, such as waves and hydraulics, was rated below zero at all study flows, meaning that none of the flows created acceptable play areas. The overall ratings for both the 2,558 cfs and the 3,701 cfs flows were the same (0.4), indicating that both flows were preferred to the 1,353 cfs flow, but that neither flow was rated highly overall. The overall score of 0.4 is between "neutral" (0) and "moderately acceptable" (+1). The frequency distribution and standard deviations for these items are contained in Appendix D, Tables D-5 through D-8.

Table 10. Participant ratings of flow characteristics of the Lower Spokane River reach[a,b]

Characteristic	1,353 cfs Average	2,558 cfs Average	3,701 cfs Average
Boatability	0.5	1.0	1.3
Availability of challenging technical boating	0.7	0.6	0.3
Availability of powerful hydraulics	-0.6	-0.3	0.6
Availability of whitewater "play areas"	-0.4	-0.2	-0.1
Overall whitewater challenge	0.0	0.1	0.4
Safety	0.7	0.8	1.2
Aesthetics	1.3	0.9	1.6
Length of run	0.6	0.9	1.3
Rate of travel	0.2	0.7	1.1
Number of portages	0.5	0.4	0.7
Overall rating	0.2	0.4	0.4

[a] Key to rating scale:
-2 = highly unacceptable
-1 = moderately unacceptable
0 = neutral
+1 = moderately acceptable

[b] Number of respondents: 1,353 cfs = 12; 2,558 cfs = 9; and 3,701 cfs = 10

In addition to questions about the characteristics of the flow that was boated, LBG asked the respondents to indicate whether they would prefer a higher, lower, or similar flow to the one that they had just experienced (Table 11). For the Lower Spokane, nearly all of the participants preferred higher flows for all of the releases. Eleven of 12 participants (92%) indicated a preference for a flow greater than 1,353 cfs, 8 of 9 participants (89%) indicated a preference for a flow greater than 2,558 cfs, and 7 of 10 participants (70%) indicated a preference for a flow greater than 3,701 cfs. However, the 3,701 cfs flow was also the only flow evaluated that had more than one individual indicating a preference for a lower flow.

Table 11. Participants' flow preferences for the Lower Spokane River reach

Flow	Much Lower Flow	Slightly Lower Flow	About the Same	Slightly Higher Flow	Much Higher Flow	Number of Responses
1,353 cfs	1	0	0	5	6	12
2,558 cfs	1	0	0	4	4	9
3,701 cfs	0	2	1	4	3	10

For each flow, participants were asked whether or not they would plan to boat on the flow that they had assessed if it were provided as a scheduled release on the Lower Spokane (Table 12). None of the participants indicated that they would definitely boat a flow of 1,353, and only 2 of 12 participants (17%) indicated that they would probably use that flow. For each of the higher flows, however, at least half of the participants indicated they would probably or definitely boat the river.

Table 12. Participants' plans to boat this flow if scheduled for the Lower Spokane

Flow	Definitely No	Possibly	Probably	Definitely Yes	Number of Responses
1,353 cfs	1	9	2	0	12
2,558 cfs	0	4	2	3	9
3,701 cfs	1	4	2	3	10

As a part of the flow comparison survey, participants were asked to indicate the minimum flow that they could (but not necessarily would) boat the Lower Spokane. The most frequent response was a flow of 1,500 cfs, although almost half of the respondents indicated a lower flow. Participants were also asked to indicate their preferred flow if only one flow were provided. Participants varied in terms of the flows that they preferred, with the responses ranging from 1,500 cfs to 12,000 cfs. The median response for the preferred flow was 4,000 cfs (that is, half the respondents preferred a flow higher than 4,000 cfs, and half preferred a lower flow). Table 13 provides a breakdown of all responses to this question.

Table 13. Participants' minimum and preferred flows for boating the Lower Spokane River reach

Flow	Minimum	Preferred
0 cfs	1	0
480 cfs	1	0
680 cfs	1	0
800 cfs	2	0
1,000 cfs	3	0
1,200 cfs	1	0
1,500 cfs	11	2
2,500 cfs	0	3
3,000 cfs	0	3
4,000 cfs	1	3
5,000 cfs	0	3
6,000 cfs	0	2
9,000 cfs	0	2
12,000 cfs	0	1
Total responses	21	19

As part of the flow comparison survey, LBG also asked participants to rate the importance of providing multiple flows on the Lower Spokane in the context of both the unique

experiences provided by each flow, and the opportunities that the flows provide for people with different skill levels and types of watercraft. Table 14 shows that participants rated the importance of providing flows for multiple experiences slightly lower than the importance of providing opportunities for different skill levels and watercraft. In both instances, the need for multiple flows was rated from moderately important to extremely important in nearly all cases.

Table 14. Importance of providing multiple flows for the Lower Spokane River reach

Importance	For Multiple Experiences	For Different Skill Levels and Watercraft
Not at all important	1	0
Slightly important	1	1
Moderately important	5	5
Very important	9	10
Extremely important	4	4
Number of responses	20	20

As part of the flow comparison survey, participants were asked to assess the adequacy of access to the put-in and take-out sites. Study participants used a variety of boats of different weights and sizes, as well as large and small shuttle vehicles with car-top racks and trailers. Table 15 shows that all of the participants indicated that the put-in and take-out sites provide adequate access.

Table 15. Participants' perceptions of access site adequacy for the Lower Spokane River reach

Access Site	Is Access Adequate?		Number of Responses
	Yes	No	
Put-in	20	0	20
Take-out	20	0	20

4.2 Park-and-Play Locations

The Spokane River offers a number of park-and-play areas, located mainly on the Upper Spokane. These park-and-play areas are available at a variety of water levels. Some are only usable at water levels in excess of water levels that can be controlled by Avista. For this study, only those areas that could be affected by flows within Avista's operating range were selected. The park-and-play locations are presented in order from upstream to downstream. As in the previous section, the participant's responses to survey questions are provided in the various tables. For these park-and-play locations, the individual characteristics of length of run, portages, and rate of travel are not included because those are river reach characteristics that are not applicable to the park-and-play areas.

4.2.1 Trailer Park Wave

Trailer Park Wave is located immediately downstream of Post Falls Dam in Post Falls, Idaho. This feature provides opportunities for freestyle kayaking and "rodeo" moves at the mid (3,000 cfs) to high (5,000 cfs) range of Avista's operating range and outside of the "normal"

summer range of 2,000 to 3,000 cfs. Access to the area is generally difficult. Typically, boaters park at the Falls Park parking area and carry their kayaks approximately one-fourth mile to a rocky and relatively steep bank to the north bypass channel. Boaters then paddle down the bypass reach approximately one-half mile to the wave for a total distance of about three-fourths mile. Boaters can also park at McGuire Park, approximately one-third mile downstream of the wave, paddle across the river, and portage up the shoreline to the wave. McGuire Park is slightly more convenient but parking is limited. Trailer Park Wave was investigated at flows of 3,500, 4,000 and 4,500 cfs as measured by the release from the Post Falls HED. The number of participants at the various flows equaled 7, 5, and 5 participants, respectively. However, even though they were given the opportunity, not every participant responded to each item on the survey, so some of the totals are less than the number of participants. The lower number of participants at Trailer Park Wave compared to the other park-and-play areas evaluated and the river reach participants is due primarily to participants' complications with work schedules, the late boating season, and the unseasonably cold weather during the last week in October 2003.[2]

As part of the individual flow survey, participants were asked to rate Trailer Park Wave in regard to seven individual characteristics and then to give an overall rating for the play area. For each of the characteristics listed, participants were asked to provide a rating on a scale of -2 to +2, where -2 corresponds to highly unacceptable and +2 corresponds to highly acceptable. As shown in Table 16, respondents rated the characteristics of the 4,000 cfs and 4,500 cfs runs fairly closely, with the exception of the availability of powerful hydraulics, where the 4,500 cfs flow was rated higher. Safety and aesthetics were highly rated (1.4 or higher) at all flows. The average overall ratings for Trailer Park Wave indicate that both the 4,000 cfs and 4,500 cfs flows are considered "highly acceptable" (that is, both flows score +2 on the rating scale). The frequency distribution and standard deviations for these items are contained in Appendix D (Tables D-9 through D-12).

[2] Temperatures in the last week of October 2003 were below freezing on all days, with morning temperatures on October 29 and 31 around 10 degrees Fahrenheit.

Table 16. Participant ratings of flow characteristics for Trailer Park Wave[a,b]

Characteristic	3,500 cfs Mean	4,000cfs Mean	4,500, cfs Mean
Boatability	1.4	1.6	1.8
Availability of challenging technical boating	1.0	1.4	1.8
Availability of powerful hydraulics	1.0	1.4	2.0
Availability of whitewater "play areas"	1.3	1.8	2.0
Overall whitewater challenge	1.0	1.6	1.8
Safety	1.7	1.4	1.4
Aesthetics	1.9	1.6	1.8
Overall rating	1.3	2.0	2.0

[a] Key to rating scale:
-2 = highly unacceptable
-1 = moderately unacceptable
0 = neutral
+1 = moderately acceptable

[b] Number of respondents: 3,500 cfs = 7; 4,000 cfs = 5; and 4,500 cfs = 5

LBG asked the respondents to indicate whether they would prefer a higher, lower, or similar flow to the one that they had just experienced (Table 17). For Trailer Park Wave, the greatest number of respondents indicated that the flow that came closest to their preferred flow was the 4,500 cfs flow. Two-thirds of the respondents (4 out of 6) preferred a flow higher than the 3,500 cfs flow, and 75% (3 out of 4) preferred a flow higher than 4,000 cfs. At a flow of 4,500 the greatest number of participants (3 out of 5) indicated that they would prefer about the same flow, and the remainder (2 out of 5) preferred a slightly higher flow.

Table 17. Participants' flow preferences for Trailer Park Wave

Flow	Much Lower Flow	Slightly Lower Flow	About the Same	Slightly Higher Flow	Much Higher Flow	Number of Responses
3,500 cfs	0	0	2	3	1	6
4,000 cfs	0	0	1	3	0	4
4,500cfs	0	0	3	2	0	5

For each flow, participants were asked whether or not they would plan to boat Trailer Park Wave if the flow that they experienced were provided as a scheduled release (Table 18). All five of the participants that experienced the 4,500 cfs flow indicated that they would definitely plan to boat a scheduled 4,500 cfs release. As indicated by the responses summarized in Table 18, all three flows would provide opportunities that the participants would plan to boat.

Table 18. Participants' plan to boat this flow if scheduled for Trailer Park Wave

Flow	Definitely No	Possibly	Probably	Definitely Yes	Number of Responses
3,500 cfs	0	1	1	5	7
4,000 cfs	0	0	1	4	5
4,500 cfs	0	0	0	5	5

As a part of the flow comparison survey, participants were asked to indicate the minimum flow that they could (but not necessarily would) use at Trailer Park Wave (Table 19). For the question of minimum flow, 3 of the respondents indicated a flow of zero. We do not believe that the respondents meant that a flow of 0 cfs would be a boatable flow and are not clear about what these responses indicate. For Trailer Park Wave, respondents gave two usable responses. The responses were flows of 1,500 and 2,500 cfs. Participants were also asked to indicate their preferred flow if only one flow were provided. The most common response for the preferred flow was 4,500 cfs.

Table 19. Participants' minimum and preferred flow for boating Trailer Park Wave

Flow	Minimum	Preferred
0 cfs	3	0
1,500 cfs	1	0
2,500 cfs	1	0
4,000 cfs	0	1
4,500 cfs	0	3
5,500 cfs	0	1
Number of responses	5	5

As part of the flow comparison survey, LBG also asked participants for their perceptions of the adequacy of access for Trailer Park Wave. As previously mentioned, the usual access to Trailer Park Wave is difficult. Boaters wishing to use Trailer Park Wave must carry a fair distance and paddle downstream or work their way upstream from another access point. Despite the difficulty, just 3 out of 5 participants indicated that the put-in and take-out do not provide adequate access. For the study, participants were allowed onto the Avista Island and access to the wave was very easy. The ease of access on the study date may have affected the participants' responses to this question.

Table 20. Participants' perceptions of adequacy of access sites for Trailer Park Wave

Access Site	Is Access Adequate?		Number of Responses
	Yes	No	
Put-in	2	3	5
Take-out	2	3	5

4.2.2 Sullivan Hole

Sullivan Hole is located just upstream of its access site, which is situated at the west end of Mission Road in Green Acres, Washington. Boaters who wish to paddle in the rapid must portage approximately 1,000 feet upstream along the Centennial Trail from the access site. The play feature provides opportunities for freestyle kayaking at levels in the mid-range of Avista's operating regime, including releases between 2,000 cfs and 3,500 cfs. Participants evaluated Sullivan Hole at flows of 2,188, 2,558, and 3,508 cfs.[3] Thirteen people participated in the survey during the 2,188 cfs flow, 8 participated at the 2,558 cfs flow, and 9 participated at the 3,508 cfs flow.

As part of the individual flow survey, participants were asked to rate Sullivan Hole first with respect to seven individual characteristics and then to give an overall rating for the play spot. As noted earlier, participants were asked to provide a rating on a scale of -2 to +2, where -2 corresponds to highly unacceptable and +2 corresponds to highly acceptable. As shown in Table 21, respondents rated the characteristics of the 2,558 cfs run higher than the other flows for five of the seven characteristics. The lower flow (2,188 cfs) was rated higher for availability of whitewater play areas and the higher flow (3,508 cfs) was rated higher for aesthetics. Safety was generally rated high at all flows, with a slight preference for safe conditions at the 2,558 flow. The average overall rating of 1.4 for the 2,558 cfs flow at Sullivan Hole indicates that the 2,558 cfs flow is the preferred flow of those evaluated, with the higher flow of 3,508 as the least preferred study flow. The frequency distribution and standard deviations for these items are contained in Appendix D, Tables D-13 through D-16.

[3] Early on the morning of the last assessment day, John Patrouch visited Sullivan Hole and observed that the feature was washed out. Mr. Patrouch requested that Avista drop the flows to around 3,200 cfs as measured at the Spokane gage. Avista agreed to this request, and lowered flows. The study participants estimated that the actual flow at Sullivan Hole during the assessment was around 3,400 cfs and dropping. For consistency in reporting flow data, we use the average flows measured at the Spokane gage for each study day.

Table 21. Participant ratings of flow characteristics for Sullivan Hole[a,b]

Characteristic	2,188 cfs Average	2,558 cfs Average	3,508 cfs Average
Boatability	1.4	2.0	0.4
Availability of challenging technical boating	0.5	1.0	-0.4
Availability of powerful hydraulics	0.7	2.0	-0.3
Availability of whitewater "play areas"	1.5	1.4	0.4
Overall whitewater challenge	0.6	1.6	0.2
Safety	1.5	1.7	1.4
Aesthetics	1.1	1.0	1.6
Overall rating	1.1	1.4	0.4

[a] Key to rating scale:
-2 = highly unacceptable
-1 = moderately unacceptable
0 = neutral
+1 = moderately acceptable

[b] Number of respondents: 2,188 cfs = 13; 2,558 cfs = 8; and 3,508 = 9

LBG asked the respondents to indicate whether they would prefer a higher, lower, or similar flow to the one that they had just experienced (Table 22). For Sullivan Hole, the 2,558 cfs flow appears to be the closest to a "consensus" preferred flow, with a slight preference for higher flows. Of the eight participants that boated the 2,558 cfs flow, five (60%) preferred a flow "about the same," while the remainder expressed a preference for a slightly higher flow. All 13 participants who experienced the 2,188 cfs flow expressed a preference for a slightly higher flow, and 7 of the 9 participants who experienced the 3,508 cfs flow expressed a preference for a slightly lower flow. It should be noted that at the 3,508 cfs flow, Sullivan Hole had become a set of three standing waves and was not a hydraulic hole feature.

Table 22. Participants' flow preferences for Sullivan Hole

Flow	Much Lower Flow	Slightly Lower Flow	About the Same	Slightly Higher Flow	Much Higher Flow	Number of Responses
2,188 cfs	0	0	0	13	0	13
2,558 cfs	0	0	5	3	0	8
3,508 cfs	0	7	1	0	1	9

For each flow, participants were asked whether or not they would plan to boat on the flow that they had experienced if it were provided as a scheduled release at Sullivan Hole (Table 23). All eight of the participants who experienced the 2,558 cfs flow indicated that they would definitely plan to boat a scheduled release of that flow. In addition, nearly all (12 out of 13) participants who experienced the 2,188 cfs flow indicated that they would definitely plan to boat

that flow if it were provided as a scheduled release. As indicated by the respondents, all 3 flows would provide opportunities that the participants would plan to boat.

Table 23. Participants' plans to boat this flow if scheduled for Sullivan Hole

Flow	Definitely No	Possibly	Probably	Definitely Yes	Number of Responses
2,188 cfs	0	0	1	12	13
2,558 cfs	0	0	0	8	8
3,508 cfs	0	4	2	3	9

As a part of the flow comparison survey, participants were asked to indicate the minimum flow that they could (but not necessarily would) boat Sullivan Hole (Table 19). The most frequently cited flow was 0 cfs. It is unlikely that the respondents felt that 0 cfs would be a boatable flow, and we are not clear about what these responses indicate. The two usable responses indicated minimum boatable flows of 1,500 and 1,800 cfs. Participants were also asked to indicate their preferred flow if only one were provided. The most frequent response for the preferred flow was 2,800 cfs, with 3 of the 4 respondents to this question selecting that as their preferred flow (Table 19).

Table 24. Participants' minimum and preferred flows for boating Sullivan Hole

Flow	Minimum	Preferred
0 cfs	4	0
1,500 cfs	1	0
1,800 cfs	1	0
2,800 cfs	0	3
3,000 cfs	0	1
Number of responses	6	4

As part of the flow comparison survey, LBG also asked participants to rate the importance of having multiple flows provided at Sullivan Hole. Participants were asked about the importance of multiple flows in the context of both the varying experiences provided by various flow and the opportunities that they provide to people with different skill levels and types of watercraft. For participants at Sullivan Hole, the importance of providing for multiple experiences was rated only slightly lower than the importance of providing opportunities for different skill levels and watercraft. Table 25 shows that 4 of 6 participants indicated that providing for multiple experiences was at least moderately important at Sullivan Hole, whereas 5 of 6 indicated that providing multiple flows was at least moderately important in providing opportunities for different skill levels and watercraft.

Table 25. Importance of providing multiple flows at Sullivan Hole

Importance	For Multiple Experiences	For Different Skill Levels and Watercraft
Not at all important	2	1
Slightly important	0	0
Moderately important	2	3
Very important	1	1
Extremely important	1	1
Number of responses	6	6

Table 26 indicates that nearly all of the participants find that the put-in and take-out provide adequate access. One participant indicated that the put-in is inadequate, and one participant indicated that the take-out is inadequate, but these participants did not indicate how or why the access sites limit or interfere with their boating experience.

Table 26. Participants' perceptions access site adequacy for Sullivan Hole

Access Site	Is Access Adequate?		Number of Responses
	Yes	No	
Put-in	5	1	6
Take-out	5	1	6

4.3.3 Zoo Hole

Zoo Hole is located approximately one-half mile upstream of Mirabeau Point in Spokane, Washington. Vehicular access to the play feature is the same as for the Sullivan Hole access, except that boaters paddle downstream approximately one and a half miles to Zoo Hole. Other access points include Sullivan Park, on Sullivan Road, and walking up from Mirabeau Point. With this approach, take-out requires setting up a shuttle from Mirabeau Point, or walking approximately one-half mile up the Centennial Trail to the Zoo Hole. Access directly to the hole is potentially available though the Inland Paper property. At Zoo Hole, 9 people participated in the survey at the 2,188 cfs flow level, 6 participated at the 2,558 cfs flow, and 7 participated at the 3,508 cfs flow.

As a part of the individual flow survey, participants were asked to rate Zoo Hole first in regard to seven individual characteristics and then to give an overall rating of the play spot. The rating scale was the same as that used at the other sites, ranging from -2 (highly unacceptable) to +2 (highly acceptable). As shown in Table 27, respondents rated the characteristics of the 2,558 cfs flow consistently the same as or higher than the other flows with the exception of aesthetics, where both the higher (3,508 cfs) and lower (2,188 cfs) flows were rated higher. Participants rated safety higher at the two lower flows. The average overall rating of 1.7 for the 2,558 cfs flow at Zoo Hole indicates that the 2,558 cfs flow is the preferred study flow at Zoo Hole. The frequency distribution and standard deviations for these items are contained in Appendix D, Tables D-17 through D-20.

Table 27. Participant ratings of flow characteristics for Zoo Hole[a,b]

Characteristic	2,188 cfs Average	2,558 cfs Average	3,508 cfs Average
Boatability	1.1	1.8	1
Availability of challenging technical boating	1.0	1.6	-0.3
Availability of powerful hydraulics	1.3	1.8	-0.6
Availability of whitewater "play areas"	1.3	1.8	0.4
Overall whitewater challenge	1.4	1.4	-0.1
Safety	1.6	1.6	1.1
Aesthetics	1.1	1.0	1.4
Overall rating	0.9	1.7	0.4

[a] Key to rating scale:
-2 = highly unacceptable
-1 = moderately unacceptable
0 = neutral
+1 = moderately acceptable

[b] Number of participants: 2,188 cfs = 9; 2,558 cfs = 6; and 3,508 cfs = 7

Participants were asked to indicate whether they preferred a higher, lower, or similar flow to the one that they had just experienced (Table 28). For Zoo Hole, the greatest number of respondents (5 out of 6) indicated that their preferred flow is "about the same" as the 2,558 cfs flow. The majority of participants who experienced the 2,188 cfs flow (7 out of 9) indicated a preference for a "slightly higher flow," whereas the majority of the participants who experienced the 3,508 cfs flow (5 out of 7) indicated a preference for a slightly lower flow.

Table 28. Participants' flow preferences for Zoo Hole

Flow	Much Lower Flow	Slightly Lower Flow	About the Same	Slightly Higher Flow	Much Higher Flow	Number of Responses
2,188 cfs	0	0	1	7	1	9
2,558 cfs	0	0	5	1	0	6
3,508 cfs	0	5	1	0	1	7

For each flow, participants were asked whether or not they would use the flow that they had experienced if it were provided as a scheduled release at Zoo Hole (Table 29). At a flow of 2,558 cfs all of the participants indicated that they would definitely plan to boat a scheduled release. In addition, nearly all participants (7 out of 9) indicated that they would definitely plan to boat a flow of 2,188 cfs. The responses to the 3,508 cfs flow were more variable, with only 2 of the 7 respondents who experienced that flow indicating that they would definitely plan to boat that flow if it were provided as a scheduled release. As indicated by the lack of "definitely no" responses, none of the flows were completely unacceptable to any of the participants.

Table 29. Participants' plans to boat this flow if scheduled for Zoo Hole

Flow	Definitely No	Possibly	Probably	Definitely Yes	Number of Responses
2,188 cfs	0	0	2	7	9
2,558 cfs	0	0	0	6	6
3,508 cfs	0	2	3	2	7

As a part of the flow comparison survey, participants were asked to indicate the minimum flow that they could (but not necessarily would) boat Zoo Hole. Two of the 3 participants indicated a minimum flow of 0 cfs. We do not believe that the respondents were indicating that no flow is required to use Zoo Hole, but we are not clear about what the respondents intended by this response. The single usable response indicated a minimum of 1,800 cfs. Participants were also asked to indicate their preferred flow, if only one flow were provided. The 2 responses for the preferred flow were 2,800 cfs and 3,000 cfs (Table 30). Because of the schedule, there were only 4 individuals that experienced all of the flows at Zoo Hole and subsequently filled out the Flow Comparison Survey. For the minimum and preferred flow questions, 1 and 2 respondents, respectively, did not provide responses. The low number of responses makes analysis of these questions difficult.

Table 30. Participants' minimum and preferred flows for boating for Zoo Hole

Flow	Minimum	Preferred
0 cfs	2	0
1,800 cfs	1	0
2,800 cfs	0	1
3,000 cfs	0	1
Number of responses	3	2

As part of the flow comparison survey, LBG also asked participants to rate the importance of having multiple flows in the context of both the unique experiences provided by various flows and the opportunities that various flows provide to people with different skill levels and types of watercraft. As indicated in Table 31, providing flows for multiple experiences and for different skill levels and watercraft were rated as moderately important by half of the participants and either "slightly" or "not at all" important by the other half. This suggests that providing for different flows at this play spot is not terribly important to the participants.

Table 31. Importance of providing multiple flows at Zoo Hole

Importance	For Multiple Experiences	For Different Skill Levels and Watercraft
Not at all important	1	1
Slightly important	1	1
Moderately important	2	2
Very important	0	0
Extremely important	0	0
Number of responses	4	4

When asked about the adequacy of access to Zoo Hole, participants were split in their responses. Half (2 out of 4) indicated that access at the put-in and take-out is adequate, and half indicated that access is not adequate (Table 32).

Table 32. Participants' perceptions of adequacy of access sites for Zoo Hole

Access site	Is Access Adequate?		Number of Responses
	Yes	No	
Put-in	2	2	4
Take-out	2	2	4

5.0 DISCUSSION

In this section, we discuss the data results, including minimum and optimum flows, safety, and access, in the context of qualitative comments that were written by participants on the survey forms, and other observations by LBG that occurred during the study.

5.1 Upper Spokane

Study participants considered the Upper Spokane run to be Class II at all flows. At the lowest study flows of around 1,350 cfs, participants noted that the run is generally difficult to navigate, with few deep channels for downriver boating and few play opportunities. If we define the minimum flow for downriver paddling as the lowest navigable flow, then 1,350 seems to be a reasonable minimum for the Upper Spokane.

While a minimum flow of 1,350 cfs can be established from survey results and comments, establishing a preferred or "optimum" flow for the Upper Spokane is more problematic. Boaters could reasonably paddle and enjoy the reach from the minimum flows through flows well above the study flows. Some participants described paddling the reach at 20,000 cfs and higher. Cat-rafters and open-canoe boaters that participated in the study noted that the middle study flow of about 2,550 cfs was more fun in their crafts. These types of boats were able to catch the stable wave features and hydraulics while floating downstream. Most of the closed-shell kayakers preferred the highest flow of about 3,700 cfs for play paddling, based on the more dynamic characteristics of the hydraulics and waves. All of the boaters indicated that "big water" experiences are also fun, which include flows well above the study flows. For the purposes of this report, we estimate that optimum flows are between 2,500 cfs and 3,200 cfs, but would expect boaters to use the down-river opportunities of the Upper Spokane from flows that start as low as about 1,500 cfs extending through the hydraulic capacity of the Post Falls HED.

Access to the Upper Spokane was considered to be good at the various put-in and take-out sites. For the study reach, all boaters were able to park and stage near the put-in and take-out, as well as easily launch and pull their boats from the river.

Safety was generally considered to be best at the mid-level study flows of about 2,550 cfs. At this level, most of the rocks are covered by water, but the current is not so powerful as to

push a boater or swimmer into dangerous areas of the river. The lowest flow was considered to be the least safe based upon the likelihood of hitting a rock if a boater were to swim. It is reasonable to assume that at some upper level flow, the force of the current could lead to difficult self-rescue, but these types of flows are well beyond the study flows.

Overall, the participants indicated that better flow information and some recreational releases on weekends during dry years would improve the boating opportunities for the Upper Spokane. The participants also noted that flows optimized to create park-and-play opportunities at the Sullivan Hole and Zoo Hole also would be adequate for summer downriver boating opportunities on the Upper Spokane.

5.2 Lower Spokane

The Lower Spokane was considered to be a Class II reach with two Class III rapids, Bowl & Pitcher and Devil's Toenail. Study participants estimated the lowest navigable flow at around the 1,350 study flow, but some hard-shell kayakers indicated that they paddled the reach at flows as low as 600 cfs. At the 1,350 cfs study flow, all of the boats, including kayaks, open canoes and rafts, were able to navigate all drops, but most boaters hit rocks on the shallower rapids. Based on the information gathered from the surveys, 1,350 cfs appears to be a reasonable minimum flow for the Lower Spokane.

As with the Upper Spokane, establishing a single optimum flow for the Lower Spokane is problematic. Study participants generally preferred the 2,558 cfs study flow for play paddling and safety, but indicated that boatable flows extend well above the study flows. Some boaters preferred higher flows for their type of boat; one open canoe boater pointed out that both the Punchbowl and Devils Toenail rapids became easier at high flows because straighter channels developed along the river-right shoreline. These boaters tended to prefer flows similar to the 3,701 cfs study flow, but also indicated that they enjoyed the technical challenge of the lower flows. Participants also indicated that boating opportunities in the Lower Spokane are the least sensitive to changes in flow conditions, such that navigation can occur from flows as low as 1,350 up to flood conditions. For this report, it is reasonable to assume that optimum flows start between the 1,350 cfs and 2,558 cfs study flows (a range of about 1,500 cfs) and extends through the hydraulic capacity of the Post Falls HED. Based on the survey information and discussions, LBG expects boaters to use any of the flows within this range.

Participants indicated that the lowest flow of about 1,350 cfs is the least safe of the study flows, particularly in the Class III drops where the jagged basalt bedrock is exposed. The middle and upper study flows were generally considered to be safe for boating because many of the rocks are covered but the velocity of the river is not strong enough to preclude self-rescue.

Access is considered good at the Lower Spokane put-ins and take-outs. The numerous opportunities for put-in and take-out allow boaters to create short or long runs depending on their schedules. Boaters also indicated that flow information from the Spokane gage is adequate for recreational needs in this run.

In general, participants found that boating opportunities are generally good for the Lower Spokane, but could be improved by providing some recreational releases on summer weekends

during dry years. Participants indicated that any release in the river system for upstream runs would benefit the Lower Spokane run as long as the timing is such that the run is watered during daylight hours.

5.3 Trailer Park Wave

Participants consider Trailer Park Wave an excellent feature for freestyle, whitewater boating. With the recent advent of short kayaks, boaters are developing new freestyle moves that increasingly require dynamic hydraulics. Advanced and expert boaters that participated in the study were able to initiate cartwheels and aerial flips (known as loops), as well as many other dynamic freestyle moves at most of the study flows.

The character of Trailer Park Wave changed with increased flows. At the lower flows, the hydraulic was considered forgiving and fun. None of the boaters had visited the wave at the 3,500 cfs level and were surprised at the quality of the feature, even at what was locally considered a low flow for the site. The participants suggested that the lower flows are more forgiving and would be good for intermediate and advanced boaters interested in developing some of the new freestyle moves. As the flows increase, the feature becomes increasingly powerful and less forgiving. However, at the higher flows, the participants were able to initiate more dynamic moves. The expert and elite boaters suggested that the hydraulic would be optimum for their level of skills with flows higher than 4,500 cfs, the upper test flow. The local boaters indicated that the feature is good from flows around 4,500 up to about 6,500cfs, above which it washes out. However, all of the participants that were familiar with the feature stated that any spill in the north channel creates a backwater influence that washes out the wave. It is possible that boating opportunities would exist at flows higher than 6,500 cfs if no spill occurred in the north channel.

Based on the study results and qualitative information, we estimate that the minimum flow for Trailer Park Wave is between 3,200 cfs and the 3,500 cfs study flow. The optimum level extends from 4,000 cfs to about 6,500 cfs.

Recreational safety at the wave was considered very good. A large pool immediately downstream of the feature allows boaters that accidentally exit their boats enough time to recover their equipment and swim to shore. Rocks are generally covered in the rapid even at the low flows, such that is unlikely, especially at the higher flows, for a swimmer to hit bottom.

As previously mentioned, access to Trailer Park Wave is challenging, requiring long portages and moving equipment over relatively steep, rocky banks. Boaters indicated that better flow information from the area near the Post Falls HED, such as actual flows, would create opportunities for boaters by providing information in advance of navigating the difficult access. Boaters from the Spokane area suggested that, without better flow-related information, they may not want to risk the drive and difficult access to find the wave dewatered, or the feature washed out. The participants observed that the access used for the study, which included driving across Avista's single-lane access bridge, which is closed to public use, and over the north bypass channel to the Avista-owned operator's residence, was an excellent access.

Some study participants expressed an interest in improving the access to Trailer Park Wave and promoting the area as a whitewater park. Others were concerned that improved access would attract more boaters, which could lead to overcrowding. Any significant increase in use would likely reduce the quality of the experience at this site.

Other discussions that occurred during the study included developing a low water whitewater park downstream of the wave and opening the spill channel on the south side of the powerhouse to whitewater boaters. Neither of these ideas was assessed for their viability as part of this study.

In general, participants found Trailer Park Wave to be a very high quality feature that could be of regional significance. Participants recommend targeting flows for the optimum range, limiting spill in the north channel whenever possible, improving access without affecting the positive characteristics of the wave, and providing flow information, ideally separating the spill data from the flow through the powerhouse.

5.4 Sullivan Hole

Participants considered Sullivan Hole an excellent whitewater feature. Unfortunately, because of the dynamic nature of the aquifer, study flows did not include the best flows that participants have experienced. At the lowest study flow (2,188 cfs) the hole was considered shallow, allowing intermediate and advanced boaters opportunities for flat spins and some cartwheels. At the middle flow of 2,558 cfs, the boaters indicated that the hole was good for cartwheels, but too shallow for aerial moves. At the highest test flow of about 3,500 cfs, participants indicated that the feature was washed out. Most boaters agreed that flows between 2,800 and 3,100 cfs are optimum, with the lower optimum range providing more stable characteristics and opportunities for intermediate and advanced paddlers and the higher flows providing more dynamic characteristics more suitable for advanced, expert, and elite boaters. For the purposes of this assessment, we find that the minimum flow for Sullivan Hole is about 2,500 cfs, with the optimum range between 2,800 cfs and 3,100 cfs, above which the hole washed out.

Participants pointed out that Sullivan Hole is uniquely sensitive to changes in flow. Participants indicated that it is rare for hydraulics to be optimum over such a small range (about 300 cfs), and suggested that boating opportunities would be significantly improved at the site if Avista were able to supply flows within the optimum range when the Post Falls HED is releasing between 2,500 and 4,000 cfs. Participants suggested a number of ideas to achieve these flows, such as daily cycling of flows, or starting the fall drawdown of Coeur d'Alene Lake earlier in the season to meet the net release requirements from the Project. Participants also suggested that some summer recreational releases during low flow years would improve the boating opportunities. In addition, boaters indicated that having real-time flow data from an upstream gage near the Post Falls HED would help develop a more sophisticated local knowledge and understanding of the hydraulic effects of the aquifer, which would in turn allow boaters from the region to plan trips to the Spokane River for recreational paddling.

Access was generally considered good. Boaters were able to park at the end of Mission Road, walk approximately 500 feet up the Centennial Trail, and put in next to the wave. The

shoreline on both sides of the river provides plenty of room for numerous boaters to rest and dry equipment between paddling sessions.

Safety of the site was also considered good. Boaters who flip and swim from the hole are able to collect equipment and swim to shore before the next major rapid. At higher flows, the increased velocity of the river could interfere with self-rescue, but the risk is relatively small compared to other park-and-play sites in the region.

Overall, participants found Sullivan Hole to be an excellent park-and-play site, with easy access and fun characteristics. Participants suggest that boating opportunities could be improved by targeting flows in the optimum range during the fall Coeur d'Alene Lake drawdown, providing flow data from a site near the Post Falls HED, providing some summer recreational releases during dry years, and possibly drawing down Coeur d'Alene Lake earlier in the fall.

5.5 Zoo Hole

Zoo Hole was considered very good at the medium study flow of approximately 2,600 cfs, and reasonably good up to the highest study flow of about 3,500 cfs. The feature is more wave than hole at all levels, but has dynamic characteristics at the mid flow level that allow advanced, expert and elite paddlers to initiate dynamic freestyle moves. The minimum flow for the site is at or near the low study flow of 2,188 cfs, where the characteristics of the site allow for some play moves.

In general, boaters indicated that Zoo Hole is optimum around 2,500 to 2,800 cfs, which is just below the optimum range for Sullivan Hole. Similar to the discussions at Sullivan Hole, participants suggested that summer boating opportunities would be significantly extended by targeting releases at 2,500 cfs, when the average release is between 1,500 cfs and 2,500 cfs, by providing some recreational releases during dry summer months, and by providing real-time flow data recorded near the Post Falls HED.

While vehicular access was noted to be difficult, most boaters were generally comfortable paddling from Sullivan Hole to Zoo Hole if flow conditions were acceptable. None of the boaters suggested the need for a public drive-in access to the area immediately adjacent to the feature.

Safety was generally considered good, with slow moving water downstream of the feature providing ample room for self-rescue.

6.0 CONCLUSIONS

The Spokane River provides excellent whitewater boating opportunities with both river runs and park-and-play areas. With the exception of Trailer Park Wave, access to each play area or river reach can be achieved with relative ease and, in most cases, is possible just minutes from downtown Spokane. In addition, paddlers can enjoy the whitewater resources for the vast majority of the year. Additional whitewater opportunities could be provided by publishing release data from near the Post Falls HED, by improving access at some sites, by adjusting releases within the 2,000 to 5,000 cfs range to meet the preferred flows described above, or by

providing additional recreational releases during summer months. Given the availability of whitewater on the Spokane River, the Work Group will need to consider the relative benefit of providing such releases of water versus the effects on water levels and water availability.

Table 33 provides a summary of the flow rates determined by the whitewater flow study.

Table 33. Whitewater paddling study summary of results

	Flow Summary		
	Minimum (cfs)[a]	**Maximum (cfs)[a]**	**Optimum (cfs)[a]**
River Reach			
Upper Spokane River	1,350	Spring runoff	3,000
Lower Spokane River	1,350	Spring runoff	3,700[b]
Play Spot			
Trailer Park Wave	3,300[c]	6,500	4,500+[d]
Sullivan Hole	2,500	3,100	2,800-3,100
Zoo Hole	2,200	3,500	2,500-2,800

[a] As determined during this study, measured at the downtown gage for all reaches and play spots except Zoo Hole, which was measured at the Post Falls Dam.

[b] Within study limits. Responses varied between studied flows and much higher flows.

[c] The whitewater study was run at 3,500 cfs. It is thought that the feature may be acceptable at flows of 3,200 to 3,500 cfs; however, it has not been tested.

[d] In the follow-up discussion, flows of 4,500 cfs up to the limit of 6,500 cfs were reported to be better for the advanced and pro paddlers.

7.0 REFERENCES

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APPENDIX A

WHITEWATER PADDLING INVITATION

Spokane River Project
Whitewater Paddling Assessment Study

Avista Corp.
East 1411 Mission Avenue
P.O. Box 3727
Spokane, WA 99220-3727

September 3, 2003

Dear Spokane River Whitewater Paddling Study Participant:

Thank you for your interest in, and willingness to volunteer for, the Spokane River Whitewater Paddling Study. This letter serves as an invitation and orientation to the study. It provides important information about the study and your participation. Please read it carefully.

The study is being conducted by the Louis Berger Group (Berger) as consultants to Avista Corporation (Avista). Assisting with the study are the Inland Northwest Whitewater Association, the Spokane Canoe and Kayak Club and the American Whitewater Association.

Purpose of the Study:
The purpose of this study is to identify and document minimum acceptable and optimum flows for whitewater paddling on the Spokane River. This study is one of many being undertaken by Avista Corporation as part of the Spokane River Project FERC relicensing process.

The study focuses on the Upper Spokane River, Lower Spokane River, Trailer Park Wave, Sullivan Hole and Zoo Hole. Data collected will be used to help identify minimum recreational paddling flows in the Spokane River and to identify optimal recreation flows if an annual whitewater release schedule is warranted in the new FERC license.

Schedule and Commitment:
The dates for the whitewater study are listed below. Also please note that the study requires a commitment from you to participate in **all** the scheduled flow dates for your group. The study has been divided into river runs and "park and play spots" to reduce the time commitment for participants.

The study requires all participants to boat Class III whitewater. Because of the length of the run (12 miles), this will be a physically demanding day. Please consider this reality in deciding whether to participate in the study. If you have any reservations about your ability to do this, please do not commit to the study.

Rafters and Canoeists are required for the river runs and need to commit to three study days in order to participate in the study. The whitewater stretches on both the upper and lower Spokane River will be run so full day commitments are needed. The dates are:

Date	Day	Flow (cfs)	Time Commitment
September 15, 2003	Monday	1,500	Full Day
September 19, 2003	Friday	3,000	Full Day
October 29, 2003	Wednesday	4,000	Full Day

Three (3) rafts and rafters (2 minimum) are needed for the study.
Four (4) whitewater canoes and canoeists (3 minimum) are needed for the study.

The Upper Spokane River will also be run on Wednesday, September 17th and Monday, October 27th as part of the Park and Play study. It is not required that the raft/canoe group participate in these river runs. However, if you are available you are welcome to participate.

Whitewater Kayakers are required for both the river runs and the "park and play spots". Participating kayakers need to commit to six study days to participate in the study. The schedule is shown below.

Date	Day	Flow (cfs)	Location	Time Commitment
September 15, 2003	Monday	1,500	River Run	Full Day
September 17, 2003	Wednesday	2,500	Play Spots (Note 1)	Afternoon
September 19, 2003	Friday	3,000	River Run/Play Spots (Note 1)	Full Day
October 27, 2003	Monday	3,500	Play Spots (Note 2)	Afternoon
October 29, 2003	Wednesday	4,000	River Run/Play Spots (Note 2)	Full Day
October 31, 2003	Friday	4,500	Trailer Park Wave Only	Afternoon

Notes (1) Play spots are Sullivan and Zoo Hole.
(Will likely run the upper stretch from Barker Road to Plantes Ferry on these days)
(2) Play spots are Sullivan, Zoo Hole and Trailer Park Wave.

A minimum of five (5) kayakers are needed for the study.

Study Plan and Logistics:

The whitewater study involves paddling on the river sections at pre-arranged flow levels. As a participant, after the flow level, you will be asked to evaluate specific characteristics of the river, as well as the quality of your experience using a standardized survey questionnaire. The intent of the study is to collect objective information about various aspects of the flow being tested, so it is important that your responses to the survey questions be as objective as possible. It is anticipated that filling out the survey at the end of each run will take about 30 minutes, and the daily debriefing at the end of the day will take an additional 30 minutes.

The orientation meeting will consist of a detailed review and orientation to the questionnaire and the logistics. **This meeting is mandatory for all study participants. The orientation meeting will start promptly at 8:00 am at the Plese Flats takeout on September 15th.** Avista is arranging for parking (Plese Flats is a fee area). All boating participants will be required to sign a liability waiver in order to participate in the study.

Berger and Avista are attempting to arrange for shuttles. However, it may be easier to arrange our own shuttles for the runs, so come prepared for either. Avista will provide lunch to study participants.

The boating schedule will be as follows:

Day	Date	Flow (cfs)	Time	Study Run	Meeting Location
September 15	Monday	1,500	8:00 am	Lower Spokane	Plese Flats
			2:00 pm	Upper Spokane	Plantes Ferry
September 17	Wednesday	2,500	1:00 pm	Play Spots (Note 1)	Plantes Ferry
September 19	Friday	3,000	8:00 am	Lower Spokane	Plese Flats
			1:00 pm	Upper Spokane/Play Spots (Note 1)	Plantes Ferry (alternate Barker Road)
October 27	Monday	3,500	1:00 pm	Play Spots (Note 2)	Plantes Ferry
October 29	Wednesday	4,000	8:00 am	Lower Spokane	Plese Flats
			1:00 pm	Upper Spokane/Play Spots (Note 2)	Plantes Ferry
October 31	Friday	4,500	1:00 pm	Trailer Park Wave Only	Trailer Park

Notes: (1) Play spots are Sullivan and Zoo Hole.
(2) Play spots are Sullivan, Zoo Hole and Trailer Park Wave.

RSVP

If you are willing to and intend to participate in the study, and can commit to the study dates and other requirements noted above, please confirm by September 6th by calling or emailing John Patrouch at 509-927-7256 (email patrouch@cet.com). Please leave a contact phone number and address. If you do not confirm by September 6th we will assume you cannot participate and will find a replacement for you.

If you have any questions after September 6th please contact Ben Ellis at Louis Berger Group, (307) 732-2361, email ellis@lberger.com, or Speed Fitzhugh at AVISTA, (509) 495-4998, email speed.fitzhugh@avistacorp.com.

We greatly appreciate your participation in this study.

Signed,

Speed Fitzhugh

APPENDIX B

PARTICIPANT INFORMATION

Spokane River Project
Whitewater Paddling Assessment Study

Table B-1. Whitewater study participant numbers

River Reach / Play Spot	Date					
	9/15	9/17	9/19	10/27	10/29	10/31
Upper Spokane River	10	-	9	-	11	-
Lower Spokane River	12	5[a]	9	-	10	-
Trailer Park Wave	-	-	-	7	5	5
Sullivan Hole	-	14	7	9	-	-
Zoo Hole	-	10	5	7	-	-

[a] Several participants in the play spot evaluations on September 17 marked their surveys as applicable to the Lower Spokane as well as the play spots. This appears to be a response error. The data were evaluated only with respect to the play spots.

Table B-2. Watercraft use by participants

River Reach/ Play Spot	Date	Hard Shell Kayak	Cataraft	Open Canoe with Floatation	Self Bailing Raft	Total
Upper Spokane	9/15	6	1	2	0	9
Lower Spokane	9/15	6	1	2	0	9
Lower Spokane	9/17	3	1	1	0	5[a]
Sullivan Hole	9/17	13	0	0	0	13
Zoo Hole	9/17	10	0	0	0	10
Upper Spokane	9/19	4	1	4	0	9
Lower Spokane	9/19	4	1	3	1	9
Sullivan Hole	9/19	7	0	0	0	7
Zoo Hole	9/19	4	0	0	0	4
Trailer Park Wave	10/27	7	0	0	0	7
Sullivan Hole	10/27	8	0	0	0	8
Zoo Hole	10/27	7	0	0	0	7
Upper Spokane	10/29	7	1	3	0	11
Lower Spokane	10/29	6	1	3	0	10
Trailer Park Wave	10/29	5	0	0	0	5
Trailer Park Wave	10/31	5	0	0	0	5

[a] Several participants in the play spot evaluations on September 17 marked their surveys as applicable to the Lower Spokane as well as the play spots. This appears to be a response error. The data were evaluated only with respect to the play spots.

Table B-3. Skill level of participants

River Reach/ Play Spot	Date	Beginner	Intermediate	Advanced	Expert	Elite	Total
Upper Spokane	9/15	0	1	3	5	1	10
Lower Spokane	9/15	0	2	4	4	2	12

River Reach/ Play Spot	Date	Beginner	Intermediate	Advanced	Expert	Elite	Total
Lower Spokane	9/17	0	2	1	1	1	5[a]
Sullivan Hole	9/17	1	3	4	6	0	14
Zoo Hole	9/17	2	1	2	4	1	10
Upper Spokane	9/19	1	2	1	4	1	9
Lower Spokane	9/19	3	0	3	3	0	9
Sullivan Hole	9/19	1	0	1	3	1	6
Zoo Hole	9/19	0	0	2	2	1	5
Trailer Park Wave	10/27	0	1	1	4	1	7
Sullivan Hole	10/27	0	3	2	3	1	9
Zoo Hole	10/27	0	2	1	3	1	7
Upper Spokane	10/29	0	3	4	3	1	11
Lower Spokane	10/29	0	3	2	4	1	10
Trailer Park Wave	10/29	0	1	2	1	1	5
Trailer Park Wave	10/31	0	0	2	2	1	5

[a] Several participants in the play spot evaluations on September 17 marked their surveys as applicable to the Lower Spokane as well as the play spots. This appears to be a response error. The data were evaluated only with respect to the play spots.

APPENDIX C

SURVEYS

Spokane River Project
Whitewater Paddling Assessment Study

Spokane River
Single Flow Survey

Date of run: _____ / _____ / 2003

Reach Boated [Check one]: ❑ Upper Spokane ❑ Lower Spokane
❑Trailer Park Wave ❑Sullivan Hole ❑Zoo Hole

Name:_____ Age:_____ Gender: ❑ male ❑ female

1. What type of craft did you use for this run (Circle one)?

1.	Hard shell kayak	5.	Cataraft (please indicate length: _____)
2.	Inflatable kayak	6.	Self-bailing raft (please indicate length: _____)
3.	Closed deck canoe	7.	Wrap-floor raft (please indicate length: _____)
4.	Open canoe with floatation	8.	Other: (please explain) _____

2. How many years have you been paddling this watercraft?_____

3. Please rate your skill level for this watercraft? (Please check one)
❑Beginner ❑Intermediate ❑ Advanced ❑ Expert ❑Elite

4. What was the reported flow on this run? _____ cfs

5. Please estimate the time you put-in and completed this run.

Put-in time: _____ Take-out time: _____

6. Please evaluate today's flow for your craft and skill level for each of the following characteristics. *(Circle one number for each characteristic).*

Characteristic	Rating				
	Unacceptable		Neutral	Acceptable	
	Highly	Moderately		Moderately	Highly
Boatability	-2	-1	0	1	2
Availability of challenging technical boating	-2	-1	0	1	2
Availability of powerful hydraulics	-2	-1	0	1	2
Availability of whitewater "play areas"	-2	-1	0	1	2
Overall whitewater challenge	-2	-1	0	1	2
Safety	-2	-1	0	1	2
Aesthetics	-2	-1	0	1	2
Length of run	-2	-1	0	1	2
Rate of travel	-2	-1	0	1	2
Number of portages	-2	-1	0	1	2
Overall evaluation of all the flow-related conditions that contribute to a high quality trip.					

Overall Rating	-2	-1	0	1	2

7. Based on your experience, please note the river classification that you would rate this stretch of river.
   Class: I II III IV V VI

8. In general, would you prefer a flow that was higher, lower, or about the same as this flow? *(Circle one).*
   1. Much lower flow
   2. Slightly lower flow
   3. About the same; this was close to an optimum flow
   4. Slightly higher flow
   5. Much higher flow

9. If you prefer a higher or lower flow, please indicate the volume in cfs that you would like to paddle. _____cfs

10. If today's flow were provided on a scheduled basis (once a week or once a month) during the low flow summer conditions would you plan on boating this reach during this flow?
    1. Definitely no
    2. Possibly
    3. Probably
    4. Definitely yes

11. Please estimate the number of **hits**, **stops**, **boat drags**, and **portages** you had at this flow.

    I **hit** rocks or other obstacles (but did not stop) about ____ times.

    Number of hits generally acceptable to you____.

    I was **stopped** after hitting rocks or other obstacles about _____ times (but did not have to get out of my boat to continue downstream).

    I had to get out to **drag or pull my boat** off rocks or other obstacles about _____ times.

    I had to **portage** around unrunnable rapids or sections about _____ times.

12. Any additional comments?

Spokane River
Flow Comparison Survey

Please consider all of the flows that you have experienced as a part of the whitewater flow study.

Date of run: _____ / _____ / 2003

Reach Boated [Check one]: ❑ Upper Spokane ❑ Lower Spokane
❑Trailer Park Wave ❑Sullivan Hole ❑Zoo Hole

Did you participate in each of the single flow releases for this reach? ❑ Yes ❑No

Your name:_____ Your age:_____ Gender: ❑ male ❑ female

1. What type of craft did you use for this run (Circle one)?

1.	Hard shell kayak	5.	Cataraft (please indicate length: _____)
2.	Inflatable kayak	6.	Self-bailing raft (please indicate length: _____)
3.	Closed deck canoe	7.	Wrap-floor raft (please indicate length: _____)
4.	Open canoe with floatation	8.	Other: (please explain):_____

2. How many years have you been paddling this watercraft_____

3. Please rate your skill level for this watercraft? (Please check one)

❑Beginner ❑Intermediate ❑ Advanced ❑ Expert ❑Elite

4. Based on your boating trips on the Spokane River, please specify the flows that provide the following types of experiences.

		FLOW IN CFS
a) Think of the river as a waterway used for transportation. What is the lowest flow you need to simply get down the reach in your craft?		_____
b) Some people are interested in a "technical" whitewater trip at lower flows. Think of this **"technical"** trip in your craft.		
What is the lowest flow that provides an acceptable experience for this type of trip?		_____
What is the best or optimal range of flows for this type of trip?		_____ to _____
c) Some people are interested in taking trips at somewhat higher flows that feature stronger hydraulics but may offer less technical routes through rapids. Think of this **"standard trip"** in your craft.		
What is the lowest flow that provides an acceptable experience for this type of trip?		_____
What is the best or optimal range of flows for this type of trip?		_____ to _____
d) Some people are interested in taking trips at much higher flows that feature more powerful hydraulics and large waves. Think of this **"big water trip"** in your craft.		
What is the lowest flow that provides an acceptable experience for this type of trip?		_____
What is the best or optimal range of flows for this type of trip?		_____ to _____

e) Some people are interested in taking trips for playboating features. Think of this **"playboating-focused trip"** in your craft.		
What is the lowest flow that provides an acceptable experience for this type of trip?		_____
What is the best or optimal range of flows for this type of trip?		_____ to _____
f) What is the highest safe flow for your craft and skill level?		_____
g) If Avista released only one flow for boating, what flow would you prefer?		_____
h) If Avista released two flow levels that offer different types of boating experiences, what two flows would you prefer?		_____ & _____

5. How important is it to release a variety of flow levels on the reach? Please rate the importance of providing several different flows for the two reasons below, or check the box if variety is not important.

Providing several different flows is necessary to…	Not at all important	Slightly important	Moderately important	Very important	Extremely important
…provide different types of boating experiences.	1	2	3	4	5
… provide opportunities for people with different skill levels and craft types.	1	2	3	4	5

6. Did the put-in provide adequate access to the River? ❑Yes ❑No
   If no, why not?

7. Did the take-out provide adequate access to the River? ❑Yes ❑No
   If no, why not?

8. Any additional comments?

APPENDIX D

Standard Deviation and Frequency Distribution

Spokane River Project
Whitewater Paddling Assessment Study

Appendix D contains the means, standard deviations and frequency distributions for each of the single flow characteristic items.

Upper Spokane

Table D-1. Participant ratings of flow characteristics for the Upper Spokane[a, b]

Characteristic	1,353 cfs		2,558 cfs		3,701 cfs	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Boatability	0.9	0.9	1.4	0.7	1.1	1.2
Availability of challenging technical boating	0.2	1.1	0.8	1.3	0.0	1.3
Availability of powerful hydraulics	-0.1	1.3	0.7	1.4	0.0	1.4
Availability of whitewater "play areas"	0.8	0.8	1.7	0.7	0.5	1.3
Overall whitewater challenge	0.2	1.0	0.9	0.9	0.2	1.4
Safety	1.3	0.7	1.8	0.4	1.5	1.2
Aesthetics	1.3	0.7	1.6	0.5	1.2	0.9
Length of run	0.9	0.6	1.2	0.7	0.9	1.4
Rate of travel	0.3	0.9	1.7	0.5	1.1	0.8
Number of portages	0.2	0.6	0.4	0.9	0.9	1.1
Overall rating	0.7	0.7	1.5	0.5	0.8	1.0

[a] Key to rating scale:
-2 = highly unacceptable
-1 = moderately unacceptable
0 = neutral
+1 = moderately acceptable
+2 = highly acceptable

[b] Number of respondents: 1,353 cfs = 10; 2558 cfs = 9; and 3,701 cfs = 11

Table D-2. Frequency Distribution for Upper Spokane Characteristics for 1,353 cfs flow

Characteristic	Highly Unacceptable	Moderately Unacceptable	Neutral	Moderately Acceptable	Highly Acceptable
Boatability	0	1	1	6	2
Availability of challenging technical boating	0	3	4	1	2
Availability of powerful hydraulics	1	3	2	2	1
Availability of whitewater "play areas"	0	1	1	7	1
Overall whitewater challenge	1	1	3	5	
Safety	0	0	1	4	4
Aesthetics	0	0	1	5	4
Length of run	0	0	2	7	1
Rate of travel	1	0	4	5	
Number of portages	0	0	9	0	1
Overall rating	0	1	1	7	0

Table D-3. Frequency Distribution for Upper Spokane Characteristics for 2,558 cfs flow

Characteristic	Highly Unacceptable	Moderately Unacceptable	Neutral	Moderately Acceptable	Highly Acceptable
Boatability	0	0	1	3	5
Availability of challenging technical boating	1	0	2	3	3
Availability of powerful hydraulics	1	1	1	3	3
Availability of whitewater "play areas"	0	0	1	1	7

Characteristic	Highly Unacceptable	Moderately Unacceptable	Neutral	Moderately Acceptable	Highly Acceptable
Overall whitewater challenge	0	1	1	5	2
Safety	0	0	0	2	7
Aesthetics	0	0	0	4	5
Length of run	0	0	1	5	3
Rate of travel	0	0	0	3	6
Number of portages	0	0	7	0	2
Overall rating	0	0	0	4	4

Table D-4. Frequency Distribution for Upper Spokane Characteristics for 3,701 cfs flow

Characteristic	Highly Acceptable	Moderately Acceptable	Neutral	Moderately Unacceptable	Highly Acceptable
Boatability	1	0	1	4	5
Availability of challenging technical boating	1	4	2	2	2
Availability of powerful hydraulics	2	2	3	2	2
Availability of whitewater "play areas"	1	2	1	5	2
Overall whitewater challenge	1	3	1	3	2
Safety	1	0	0	1	9
Aesthetics	0	0	3	3	5
Length of run	1	1	1	3	5
Rate of travel	0	0	3	4	4
Number of portages	0	0	5	0	4
Overall rating	0	1	3	3	3

Lower Spokane

Table D-5. Participant ratings of flow characteristics for the Lower Spokane[a, b]

Characteristic	1,353 cfs		2,558 cfs		3,701 cfs	
	Mean	**Std Dev**	**Mean**	**Std Dev**	**Mean**	**Std Dev**
Boatability	0.5	1.0	1.0	0.5	1.3	0.9
Availability of challenging technical boating	0.7	1.1	0.6	1.0	0.3	1.4
Availability of powerful hydraulics	-0.6	1.2	-0.3	1.1	0.6	1.2
Availability of whitewater "play areas"	-0.4	1.1	-0.2	1.1	-0.1	1.6
Overall whitewater challenge	0.0	1.0	0.1	1.0	0.4	1.3
Safety	0.7	1.2	0.8	1.5	1.2	1.0
Aesthetics	1.3	0.9	0.9	1.3	1.6	0.5
Length of run	0.6	0.9	0.9	0.9	1.3	0.7
Rate of travel	0.2	1.1	0.7	1.1	1.1	0.8
Number of portages	0.5	1.0	0.4	0.9	0.7	1.0
Overall rating	0.2	1.2	0.4	1.3	0.4	1.0

[a] Key to rating scale:
-2 = highly unacceptable
-1 = moderately unacceptable
0 = neutral
+1 = moderately acceptable
+2 = highly acceptable

[b] Number of respondents: 1,353 cfs = 12; 2558 cfs = 9; and 3,701 cfs = 10

Table D-6. Frequency Distribution for Lower Spokane Characteristics for 1,353 cfs flow

Characteristic	Highly Unacceptable	Moderately Unacceptable	Neutral	Moderately Acceptable	Highly Acceptable
Boatability	0	2	4	4	2
Availability of challenging technical boating	1	0	3	6	2
Availability of powerful hydraulics	4	2	3	3	0
Availability of whitewater "play areas"	3	1	6	2	0
Overall whitewater challenge	2	1	4	5	0
Safety	0	3	1	4	4
Aesthetics	0	0	3	2	6
Length of run	0	1	5	4	2
Rate of travel	0	3	5	2	2
Number of portages	0	1	7	1	3
Overall rating	1	2	3	4	1

Table D-7. Frequency Distribution for Lower Spokane Characteristics for 2,558 cfs flow

Characteristic	Highly Unacceptable	Moderately Unacceptable	Neutral	Moderately Acceptable	Highly Acceptable
Boatability	0	0	1	7	1
Availability of challenging technical boating	0	2	1	5	1
Availability of powerful hydraulics	1	4	1	3	0
Availability of whitewater "play areas"	1	3	2	3	0

Characteristic	Highly Unacceptable	Moderately Unacceptable	Neutral	Moderately Acceptable	Highly Acceptable
Overall whitewater challenge	1	1	3	4	0
Safety	1	1	1	2	4
Aesthetics	1	0	1	4	3
Length of run	0	1	1	5	2
Rate of travel	0	2	2	3	2
Number of portages	0	0	7	0	2
Overall rating	1	1	1	4	1

Table D-8. Frequency Distribution for Lower Spokane Characteristics for 3,701 cfs flow

Characteristic	Highly Unacceptable	Moderately Unacceptable	Neutral	Moderately Acceptable	Highly Acceptable
Boatability	0	0	3	1	6
Availability of challenging technical boating	1	3	0	4	2
Availability of powerful hydraulics	0	2	3	2	3
Availability of whitewater "play areas"	3	1	2	2	2
Overall whitewater challenge	0	4	0	4	2
Safety	0	1	1	3	5
Aesthetics	0	0	0	4	6
Length of run	0	0	1	5	4
Rate of travel	0	0	2	4	3
Number of portages	0	0	5	0	3
Overall rating	0	2	2	4	1

Trailer Park Wave

Table D-9. Participant ratings of flow characteristics for Trailer Park Wave[a]

Characteristic	3,500 cfs		4,000 cfs		4,500 cfs	
	Mean	**Std Dev**	**Mean**	**Std Dev**	**Mean**	**Std Dev**
Boatability	1.4	0.8	1.6	0.5	1.8	0.4
Availability of challenging technical boating	1.0	0.8	1.4	0.5	1.8	0.4
Availability of powerful hydraulics	1.0	0.4	1.4	1.0	2.0	0.0
Availability of whitewater "play areas"	1.3	1.0	1.8	0.4	2.0	0.0
Overall whitewater challenge	1.0	0.8	1.6	0.5	1.8	0.4
Safety	1.7	0.5	1.4	0.5	1.4	0.9
Aesthetics	1.9	0.4	1.6	0.9	1.8	0.4
Overall rating	1.3	0.8	2.0	0.0	2.0	0.0

[a] Key to rating scale:
-2 = highly unacceptable
-1 = moderately unacceptable
0 = neutral
+1 = moderately acceptable
+2 = highly acceptable

[b] Number of respondents: 3,500 cfs = 7; 4,000 cfs = 5; and 4,500 cfs = 5

Table D-10. Frequency distribution for Trailer Park Wave characteristics for 3,500 cfs flow

Characteristic	Highly Unacceptable	Moderately Unacceptable	Neutral	Moderately Acceptable	Highly Acceptable
Boatability	0	0	1	2	4
Availability of challenging technical boating	0	0	2	3	2
Availability of powerful hydraulics	0	0	2	3	2
Availability of whitewater "play areas"	0	0	2	1	4
Overall whitewater challenge	0	0	2	3	2
Safety	0	0	0	2	5
Aesthetics	0	0	0	1	6
Overall rating	0	0	1	3	3

Table D-11. Frequency distribution for Trailer Park Wave characteristics for 4,000 cfs flow

Characteristic	Highly Unacceptable	Moderately Unacceptable	Neutral	Moderately Acceptable	Highly Acceptable
Boatability	0	0	0	2	3
Availability of challenging technical boating	0	0	0	3	2
Availability of powerful hydraulics	0	0	1	1	3
Availability of whitewater "play areas"	0	0	0	1	4
Overall whitewater	0	0	0	2	3

Characteristic	Highly Unacceptable	Moderately Unacceptable	Neutral	Moderately Acceptable	Highly Acceptable
challenge					
Safety	0	0	0	3	2
Aesthetics	0	0	1	0	4
Overall rating	0	0	0	1	3

Table D-12. Frequency distribution for Trailer Park Wave characteristics for 4,500 cfs flow

Characteristic	Highly Unacceptable	Moderately Unacceptable	Neutral	Moderately Acceptable	Highly Acceptable
Boatability	0	0	0	1	4
Availability of challenging technical boating	0	0	0	1	4
Availability of powerful hydraulics	0	0	0	0	5
Availability of whitewater "play areas"	0	0	0	0	5
Overall whitewater challenge	0	0	0	1	4
Safety	0	0	1	1	3
Aesthetics	0	0	0	1	4
Overall rating	0	0	0	0	5

Sullivan Hole

Table D-13. Participant ratings of flow characteristics for Sullivan Hole[a]

Characteristic	2,188 cfs		2,558 cfs		3,508 cfs	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Boatability	1.4	0.8	2.0	1.1	0.4	0.8
Availability of challenging technical boating	0.5	1.0	1.0	1.0	-0.4	1.2
Availability of powerful hydraulics	0.7	1.1	2.0	1.1	-0.3	1.0
Availability of whitewater "play areas"	1.5	0.7	1.4	1.1	0.4	1.4
Overall whitewater challenge	0.6	0.9	1.6	0.7	0.2	1.2
Safety	1.5	0.9	1.7	0.5	1.4	0.9
Aesthetics	1.1	1.0	1.0	0.6	1.6	0.7
Overall rating	1.1	0.6	1.4	0.9	0.4	1.4

[a] Key to rating scale:
-2 = highly unacceptable
-1 = moderately unacceptable
0 = neutral
+1 = moderately acceptable
+2 = highly acceptable

[b] Number of respondents: 2,188 cfs = 13; 2558 cfs = 8; and 3,508 cfs = 9

Table D-14. Frequency Distribution for Sullivan Hole Characteristics for 2,188 cfs flow

Characteristic	Highly Unacceptable	Moderately Unacceptable	Neutral	Moderately Acceptable	Highly Acceptable
Boatability	0	0	2	4	7
Availability of challenging technical boating	1	0	4	7	1
Availability of powerful hydraulics	1	0	3	5	3

Characteristic	Highly Unacceptable	Moderately Unacceptable	Neutral	Moderately Acceptable	Highly Acceptable
Availability of whitewater "play areas"	0	0	1	4	7
Overall whitewater challenge	0	1	5	5	2
Safety	0	1	0	3	9
Aesthetics	0	1	3	3	6
Overall rating	0	0	1	7	2

Table D-15. Frequency Distribution for Sullivan Hole Characteristics for 2,558 cfs flow

Characteristic	Highly Unacceptable	Moderately Unacceptable	Neutral	Moderately Acceptable	Highly Acceptable
Boatability	0	1	0	0	6
Availability of challenging technical boating	0	1	0	4	2
Availability of powerful hydraulics	0	1	0	2	4
Availability of whitewater "play areas"	0	1	0	1	5
Overall whitewater challenge	0	0	1	3	2
Safety	0	0	0	2	5
Aesthetics	0	0	1	5	1
Overall rating	0	0	1	1	3

Table D-16. Frequency Distribution for Sullivan Hole Characteristics for 3,508 cfs flow

Characteristic	Highly Unacceptable	Moderately Unacceptable	Neutral	Moderately Acceptable	Highly Acceptable
Boatability	0	3	0	5	1
Availability of challenging technical boating	2	2	4	0	1
Availability of powerful hydraulics	1	3	3	2	0
Availability of whitewater "play areas"	1	1	2	2	2
Overall whitewater challenge	1	1	3	3	1
Safety	0	0	2	1	6
Aesthetics	0	0	1	2	6
Overall rating	1	3	0	4	1

Zoo Hole

Table D-17. Participant ratings of flow characteristics for Zoo Hole[a]

Characteristic	2,188 cfs		2,558 cfs		3,508 cfs	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Boatability	1.4	0.8	2.0	1.1	0.4	0.8
Availability of challenging technical boating	0.5	1.0	1.0	1.0	-0.4	1.2
Availability of powerful hydraulics	0.7	1.1	2.0	1.1	-0.3	1.0
Availability of whitewater "play areas"	1.5	0.7	1.4	1.1	0.4	1.4
Overall whitewater challenge	0.6	0.9	1.6	0.7	0.2	1.2

	2,188 cfs		2,558 cfs		3,508 cfs	
Safety	1.5	0.9	1.7	0.5	1.4	0.9
Aesthetics	1.1	1.0	1.0	0.6	1.6	0.7
Overall rating	1.1	0.6	1.4	0.9	0.4	1.4

[a] Key to rating scale:
-2 = highly unacceptable
-1 = moderately unacceptable
0 = neutral
+1 = moderately acceptable
+2 = highly acceptable

[b] Number of respondents: 2,188 cfs = 9; 2,558 cfs = 6; and 3,508 cfs = 7

Table D-18. Frequency Distribution for Zoo Hole Characteristics for 2,188 cfs flow

Characteristic	Highly Unacceptable	Moderately Unacceptable	Neutral	Moderately Acceptable	Highly Acceptable
Boatability	0	0	2	4	3
Availability of challenging technical boating	1	0	1	3	4
Availability of powerful hydraulics	0	0	1	4	4
Availability of whitewater "play areas"	0	0	0	6	3
Overall whitewater challenge	0	0	1	3	5
Safety	0	0	2	0	7
Aesthetics	1	0	0	3	4
Overall rating	0	0	1	7	2

Table D-19. Frequency Distribution for Zoo Hole Characteristics for 2,558 cfs flow

Characteristic	Highly Unacceptable	Moderately Unacceptable	Neutral	Moderately Acceptable	Highly Acceptable
Boatability	0	0	0	1	4
Availability of challenging	0	0	0	2	3

Characteristic	Highly Unacceptable	Moderately Unacceptable	Neutral	Moderately Acceptable	Highly Acceptable
technical boating					
Availability of powerful hydraulics	0	0	0	1	4
Availability of whitewater "play areas"	0	0	0	1	4
Overall whitewater challenge	0	0	1	1	3
Safety	0	0	1	0	4
Aesthetics	0	0	1	3	1
Overall rating	0	0	0	1	3

Table D-20. Frequency Distribution for Zoo Hole Characteristics for 3,508 cfs flow

Characteristic	Highly Unacceptable	Moderately Unacceptable	Neutral	Moderately Acceptable	Highly Acceptable
Boatability	0	0	1	4	1
Availability of challenging technical boating	1	2	2	2	0
Availability of powerful hydraulics	1	3	2	1	0
Availability of whitewater "play areas"	1	0	1	5	0
Overall whitewater challenge	1	2	1	3	0
Safety	0	0	2	2	3
Aesthetics	0	0	1	2	4
Overall rating	1	0	1	5	0