

APPENDIX 2H

ADDITIONAL RESULTS FROM J. C. BOYLE BYPASS REACH CONTROLLED FLOW STUDY

Boater Profile Information

All participants were skilled (Class III/IV/V) boaters with a diversity of interests in whitewater boating. A pre-study survey asked boaters to describe their experience and skill, as well as preferences for different types of trips. Results are summarized below and in Figure H-1.

- *Kayaking experience.* Fourteen boaters were hard shell kayakers, although only 12 of the 14 reported they kayaked frequently (the other two kayak “rarely”). Collectively, they averaged 16.2 years kayaking. All but the two “rare” kayakers classified themselves as Class IV or V boaters.
- *Inflatable kayaking experience.* Seventeen boaters reported some experience with inflatable kayaks (IKs), although only two reported doing this activity frequently and none used this craft in the study.
- *Rafting experience.* Twenty-five boaters reported experience rafting, with 13 reporting they raft frequently. Among all rafters, 3 reported Class III skill, 2 reported Class III/IV skill, 9 reported Class IV or IV/V, and 10 reported Class V. Two-thirds of the rafters report using 14 to 15 foot rafts, while the remainder reported using 12 to 13 foot rafts. The mean number of years rafting was 7.9.
- *Participants’ age and gender.* The average age of boaters was 34, although 43 percent were under 30 and 30 percent were over 40. There were 5 female participants and 20 males.
- *River-running preferences.* Boaters were asked to agree or disagree (on a seven-point scale with a “no opinion” midpoint) with ten statements about river-running preferences that have been used in similar studies. Responses helped characterize participants’ boating interests and offered potential explanations for variations in other responses during the study. A summary of responses to each of the following statements is given in Figure H-1.
 - I prefer running rivers with difficult rapids (Class IV and V).
 - Running challenging whitewater is the most important part of my boating trips.
 - I often boat short river segments (under 4 miles) to take advantage of whitewater play areas.
 - I often boat short river segments to experience a unique and interesting place.
 - I often boat short river segments to run challenging rapids.
 - Good whitewater play areas are more important than challenging rapids.
 - I am willing to tolerate difficult put-ins and portages in order to run interesting reaches of whitewater.
 - I prefer boating rivers that feature large waves and powerful hydraulics.
 - I prefer boating steep, technical rivers.

- I enjoy boating both technical and big water rivers.

Results suggest several conclusions about the panel as a group:

- Most boaters were interested in boating short river segments if they offer whitewater playboating or opportunities to run challenging rapids. However, just under half (46 percent) reported interest in short segments for access to a unique or interesting place. The panel was clearly focused on whitewater boating rather than access.
- Most boaters reported a willingness to tolerate difficult access or portages to run interesting whitewater.
- Most boaters appear interested in challenging rapids and whitewater playboating. All the boaters who preferred playboating more than whitewater challenge were kayakers; of those, only two strongly agreed that playboating was more important than challenge.
- Most of the panel appeared interested in both “creek boating” (smaller, technical streams) and “big water” boating (stronger hydraulics and larger waves), although slightly more preferred stronger hydraulics than technical runs.
- The panel as a whole was very interested in challenging rapids, with 100% agreeing that they prefer to run Class IV and V rivers and 81% agreeing that challenge is the most important part of their trips.

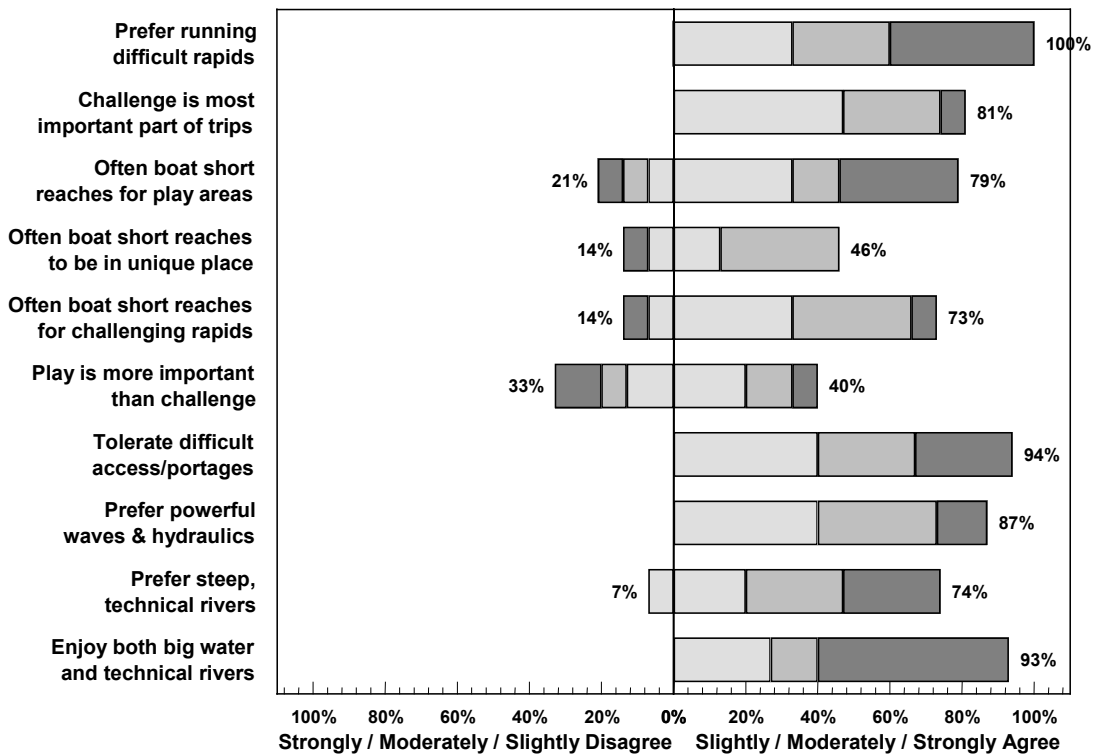


Figure H-1. Percent of J. C. Boyle bypass reach study boaters who agree or disagree with statements about boating preferences.

Boatability Problems and Tolerances

Boatability issues refer to the ability of boaters to negotiate the reach while minimizing inadvertent contact with rocks or obstacles in the channel or becoming grounded. Boaters were asked to report the number of boatability problems (hits, stops, and boat drags as defined below) during each of their runs.

- Hits: contact with an in-channel rock without loss of momentum.
- Stops: contact that causes the boat to stop, but you can continue without getting out of your boat.
- Boat drags: requires getting out of your boat to pull it off obstacles.
- Portages: requires taking your boat out of the channel to avoid unrunnable rapids or obstacles.

Curves based on mean reported numbers of hits and stops are shown in Figure H-2. They indicate that hits decrease as flows become higher (from 30 to 50, depending upon the craft at 690 cfs, to less than 10 at 1,480 cfs). Kayakers reported an average of two or less stops at the two lowest flows and none at the two higher ones, while rafters reported an average of over 10 at 960 cfs, and only one at 1,480 cfs. At 690 cfs, the single catarafts were stopped an average of 4.5 times each. (Note that hits are read from the left vertical axis in the figure, while stops are read from the right vertical axis with a different scale).

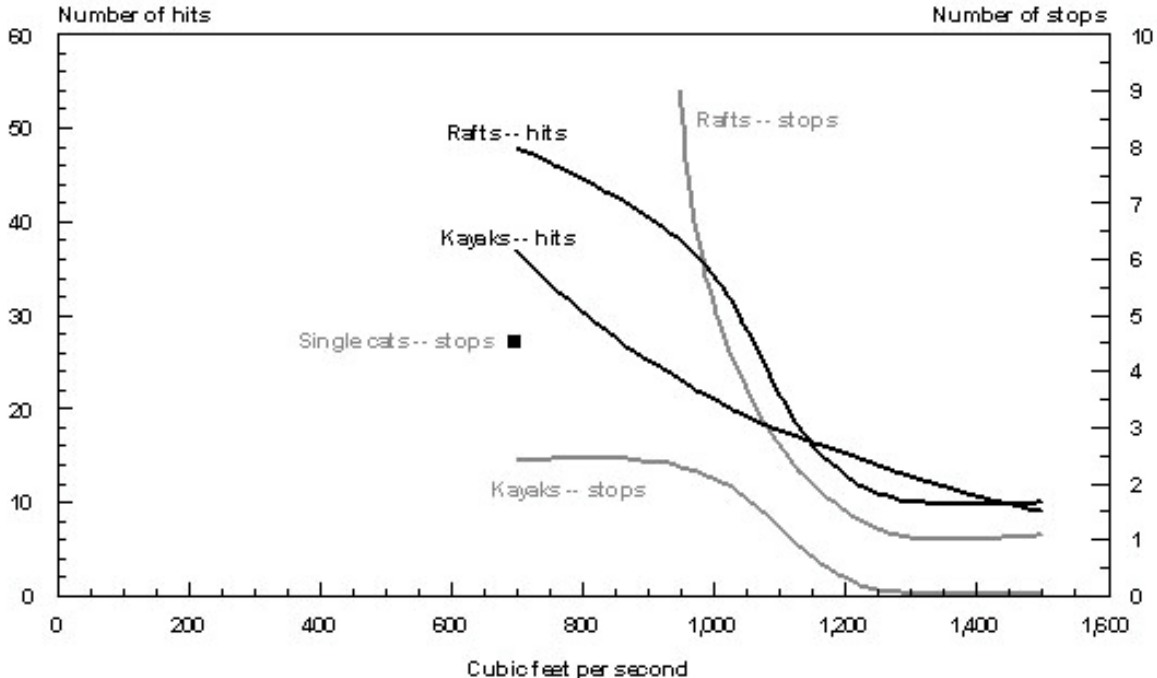


Figure H-2. Average number of “hits” and “stops” reported at different flow levels.

Hits = contact with an in-channel rock without loss of momentum.

Stops = contact that causes boat to stop; progress can continue with push of paddle.

Kayakers had an average of two “boat drags” at 690 cfs but none at other flows. Rafters averaged four boat drags at 960 cfs, and the two single-person catarafts averaged 2.5 at 690 cfs. There were no boat drags at the two higher flows, although one raft was pinned for a short period on a rock at 960 cfs (all passengers got off the boat, and deflating a tube allowed them to pull it off the rock).

The only portages during the study were at Sidecast Slide. At 960 cfs, 78 percent of the rafters portaged the rapid; at 690 cfs, both catarafters portaged it. No rafters had to portage this rapid at the two higher flows. Among kayakers, all but one kayaker portaged the slide at 690 cfs, and one kayaker reported portaging it at 960 cfs. The kayaker who ran the slide at 690 cfs became pinned in shallow water for a short period but managed to extricate himself without getting out of his boat.

Boaters were also asked to report their tolerances for hits, stops, boat drags, and portages on a segment like the J. C. Boyle bypass reach. Mean tolerances are given in Table H-1 and suggest that most kayakers will tolerate about 15 to 25 hits and 2 to 3 stops, but they have less tolerance for boat drags or portages. Rafters appear willing to accept 20 to 30 hits and 3 to 4 stops, with a similar lower tolerance for portages.

Comparing reported boatability problems with reported tolerances suggests that the two higher flows (1,230 cfs and 1,480 cfs) provided “acceptable” boatability. However, 960 cfs flow was probably close to marginal boatability for rafts, and 690 cfs was close to marginal for kayaking.

Table H-1. Average tolerance levels for boatability problems.

	Hits		Stops		Boat Drags		Portages	
	Kayaks	Rafts	Kayaks	Rafts	Kayaks	Rafts	Kayaks	Rafts
Mean	24	27	3.4	4.4	0.9	2.4	0.9	0.7
Median	15	20	2.0	3.0	1.0	1.0	1.0	1.0

Post-run Evaluations

Following each run, boaters were asked to rate nine attributes of their whitewater trips on a seven-point acceptability scale (1=unacceptable, 4= marginal, and 7=acceptable). The attributes included: boatability, safety, availability of technical rapids, availability of powerful hydraulics, overall challenge, availability of good playboating, aesthetics, rate of travel, and length of segment. Mean scores at each flow were used to develop flow evaluation curves for each attribute. Figures H-3 to H-6 show results for individual attributes for rafts and kayakers, as well as overall post-run evaluation curves. Discussion is organized by groups of attributes.

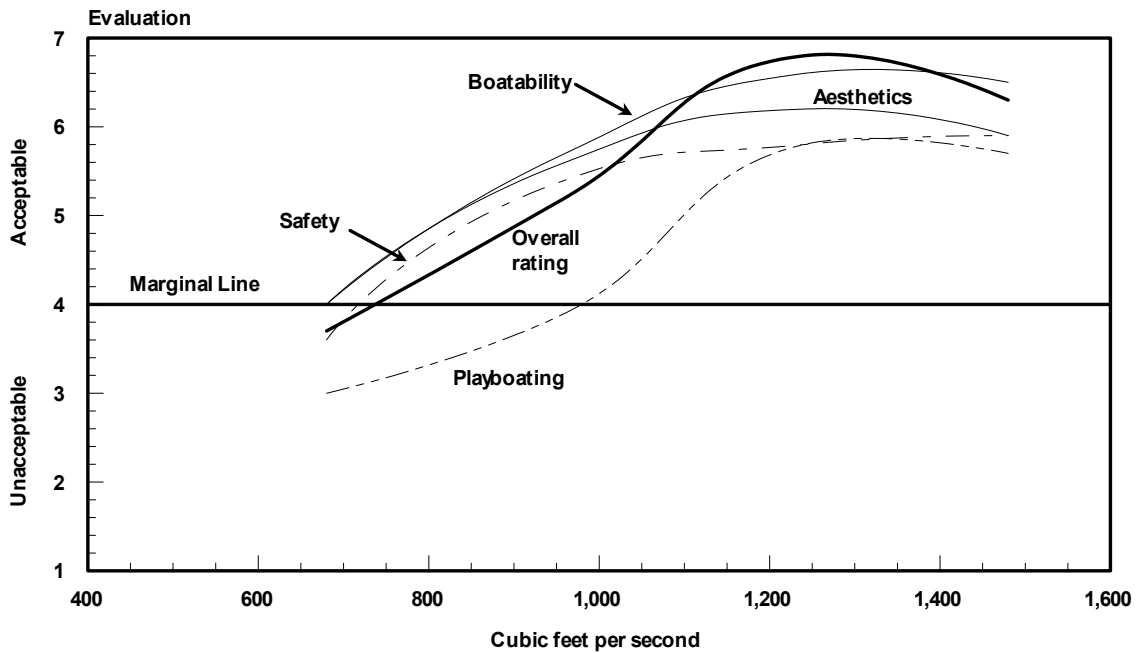


Figure H-3. Average post-run evaluation curves among kayakers for boatability, safety, aesthetics, and the availability of playboating; overall post-run evaluations are also shown.

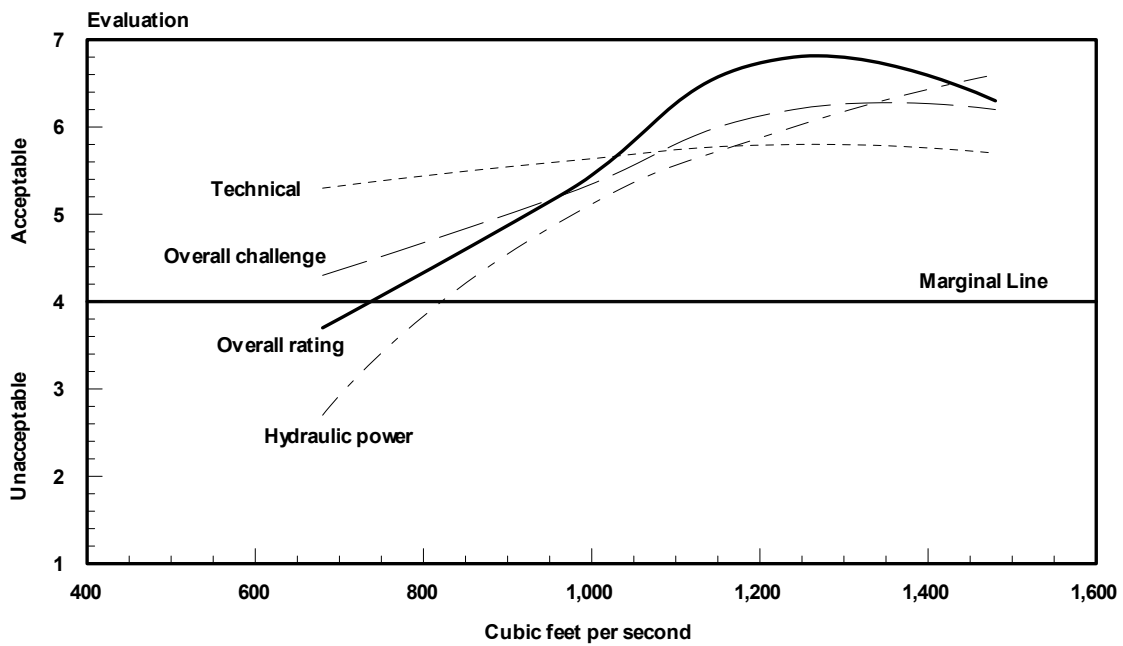


Figure H-4. Average post-run evaluation curves among kayakers for the availability of technical whitewater, powerful hydraulics, and overall whitewater challenge; overall post-run evaluations are also shown.

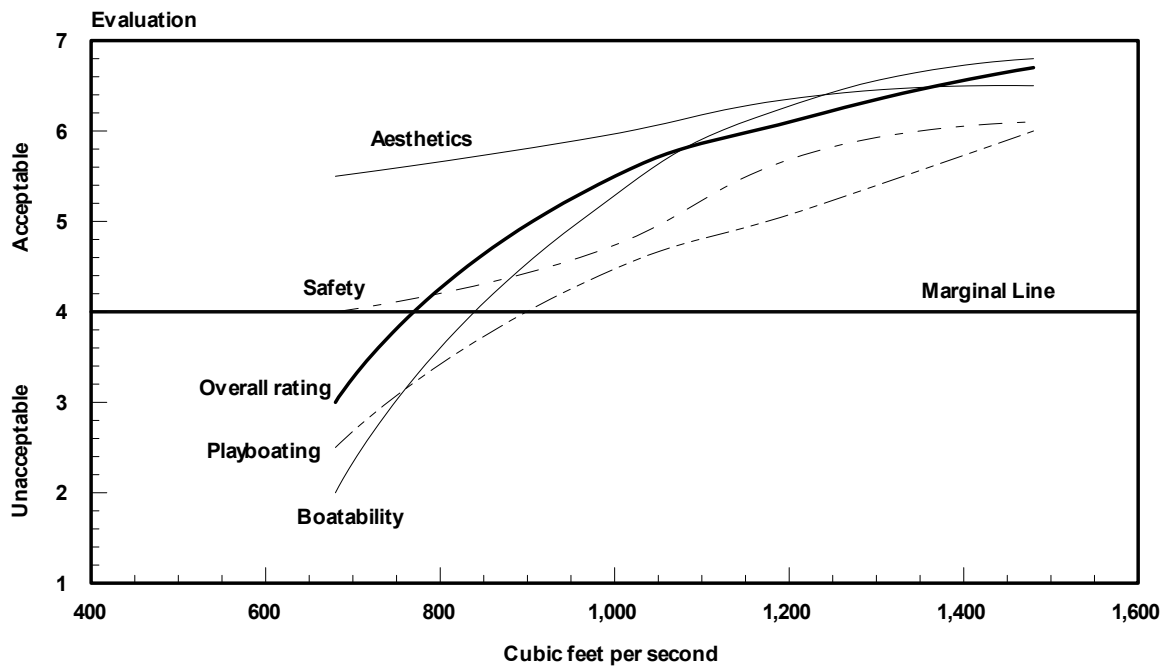


Figure H-5. Average post-run evaluation curves among rafters for boatability, safety, aesthetics, and the availability of playboating; overall post-run evaluations are also shown.

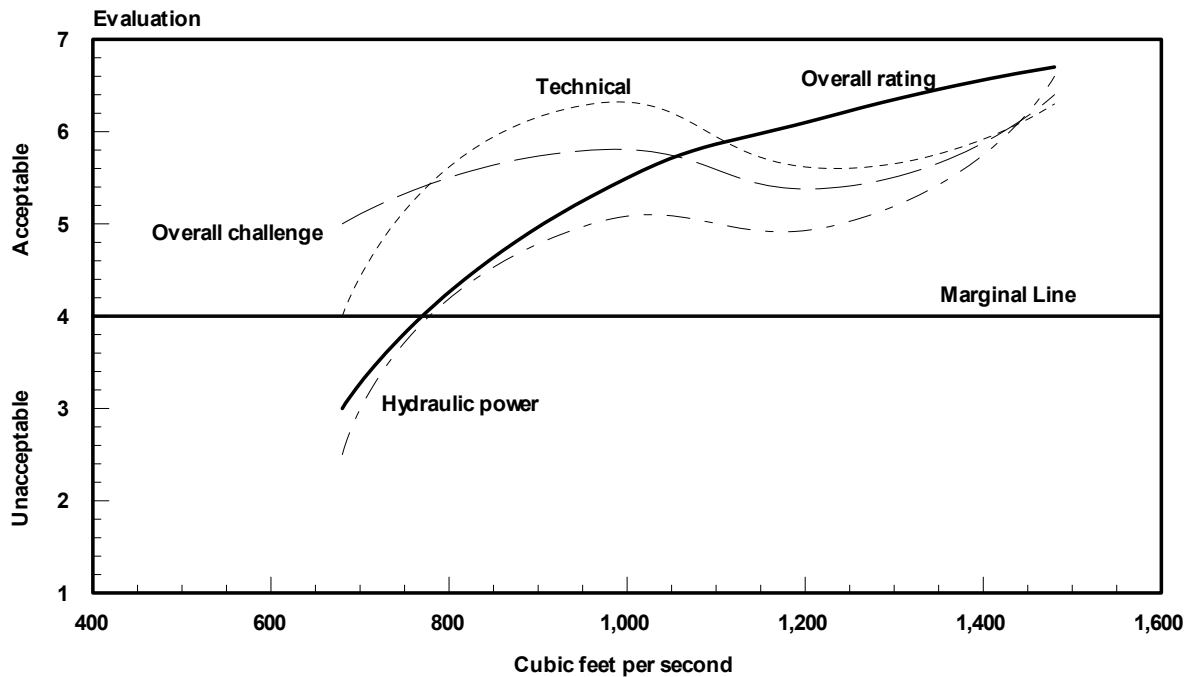


Figure H-6. Average post-run evaluation curves among rafters for the availability of technical whitewater, powerful hydraulics, and overall whitewater challenge; overall post-run evaluations are also shown.

Overall Evaluations

Overall evaluations were acceptable at all but the lowest flow, generally increasing through the range (the highest flow was rated slightly lower than 1,230 cfs flow, although this was not a statistically significant difference). Ratings for the two highest flows were highly acceptable. Rafting evaluations were lower than kayaking evaluations at the lower flows. Overall evaluations from the end of study surveys (after all four flows had been run) offer a more complete picture and are highlighted in the main body of the report.

Boatability and Safety

Boatability and safety ratings were similar, improving steadily as flows increased, but leveling off at the two higher flows. Safety ratings never approached near-optimal levels, indicating that the river has some safety issues at all the study flows.

Availability of Technical Rapids and Powerful Hydraulics

The availability of technical rapids was rated acceptable at all four study flows for kayaks and showed only a slight increase through the range. The J. C. Boyle bypass reach has technical rapids that require precise maneuvering at most flows. Technical rapids ratings for rafters were marginal at 690 cfs, indicating that boatability issues were substantial and detracted from the enjoyment of technical routes through the rapids. In contrast, all three higher flows provided acceptable hydraulic power in the river. The “dip” in rafter ratings for technical boating appears associated with sample issues (fewer boaters rated the 1,230 cfs flow, and those who did generally rated flows lower).

Whitewater Challenge and Availability of Play Features

The best kayak playboating was available at the two higher flows, but ratings never approached optimal levels. The reach simply does not offer stellar playboating features at the flows studied, although they improve substantially from the two lowest flows. Whitewater challenge generally increased as flows increased, with the two highest flows considered best.

Aesthetics

Aesthetics were rated highly acceptable at all three higher flows, but were marginal at 690 cfs.

Post-run Preferences for Higher or Lower Flows

After each run, boaters were asked to indicate their preference for similar, higher, or lower flow levels (Table H-2). Results indicate that most boaters prefer higher flows than the three lowest study flows, but that a majority of kayakers and about half the rafters thought the 1,480 cfs level was about right. About 44 percent of the rafters were interested in slightly higher flows than 1,480 cfs.

Table H-2. Post-run preferences for flow levels (percent preferring flows higher, the same, or lower).

Response option	690 cfs		960 cfs		1,230 cfs		1,480 cfs	
	Kayaks	Rafts	Kayaks	Rafts	Kayaks	Rafts	Kayaks	Rafts
Prefer much lower	0	0	0	0	0	0	0	0
Prefer lower	0	0	0	0	0	0	11	6
Prefer the same	0	0	33	0	20	20	68	44
Prefer higher	0	0	58	61	80	80	22	50
Prefer much higher	100	100	8	39	0	0	0	0

Post-Run Likelihood of Return

Boaters were also asked whether they would be likely to return at the flow level they just ran (Table H-3). Results suggest that the three higher flows are likely to attract many return visits, and particularly the two highest study flows. There were few differences between kayakers and rafters for this variable. Discussion in focus groups indicated that although lower flows were boatable, the hydraulic power and lack of boatability issues at higher flows would make those much more enticing.

Table H-3. Post-run likelihood of returning for future boating.

Response option	690 cfs		960 cfs		1,230 cfs		1,480 cfs	
	Kayaks	Rafts	Kayaks	Rafts	Kayaks	Rafts	Kayaks	Rafts
Would not return	57	100	0	0	0	0	0	0
Possibly return	29	0	18	13	0	0	0	6
Probably return	0	0	27	30	20	0	22	0
Definitely return	14	0	55	57	80	100	78	94

Survey Comments

The following are verbatim comments written by boaters on their survey forms. The comments are organized by flow. The type of craft used by the respondent is also noted.

Type of Boater	Comment
690 cfs	
Kayaker	Definitely below minimum acceptable.
Catarafter	Too low for rafts and cataracts, not a reasonable recreational release flow. Too technical.
960 cfs	
Rafter	The low water presented an increased safety risk for the unfortunate swimmer.
Rafter	Thanks for the wonderful opportunity.
Rafter	A little rocky but fun. Could I live without rafting this? Probably.
Kayaker	Need to see more flows to determine optimum and minimum acceptable.
Kayaker	I think this is start of optimum for a standard trip with 1300-1500 as high challenge optimum.
Rafter	Awesome stretch, more water preferably.
Rafter	We had a bad wrap, very hard to navigate at this flow. Very technical rafting, lots of rocks. This was a great run, very busy, long rapids. Need more water 300-600 cfs?
Rafter	This is a beautiful run. Very manageable in an R-2. More water necessary for commercial rafting success (400 cfs more). Very worthy stretch of water.
Rafter	I haven't had much experience, only a few months. It was great fun, exciting. We had an excellent guide (David Payne).
Rafter	The flow was OK. I would have liked it a little bit higher, so it wasn't so much hit and drag, more fun and less technical.
Rafter	Good time. Fun.
Rafter	Need much higher flow for raft. Several stops were strategic for scouting or assisting other boaters.
Rafter	Hit lots of rocks. Most were hidden. Landed on several and had to push off. Lots of scouting and waiting due to "new" run. Need more water to take rafts down safely. Very technical and challenging. Strong hydraulics. Beautiful scenery except for canal and penstocks/generators. Lots of fun except for the one portage. Just need more water!
Rafter	Too low, not forgiving enough. This flow makes for a good run, but a little too dangerous. More water would make it a great run.
Rafter	Pulled major high side at center of last huge drop. On the rise at end, really fun level as the higher pulse arrived. At 1000 cfs you really work a paddle crew on technique. Thanks for the invite, hope to see flows in here for commercial rafting in the future.
Kayaker	Excellent whitewater run. You really had to use all skills to have good lines. The

	scenery was gorgeous! I wish I could run it every day.
Rafter	More water.
Catarafter	Runnable but definitely on the low side.
Rafter	I hope to see it ran commercially.
Kayaker	Loved the run, had the time to make move. Not extremely pushy. Some sneaky underwater rocks. Hydraulics were flushing nicely.
Kayaker	Mas aqua por favor!
Rafter	Great stuff!
1,230 cfs	
Rafter	Another 200 cfs plus is optimal!
Catarafter	This is a wonderful run and a great flow. I know lots of private boaters (rafters and others) that would come from California to run this, especially in August and September. One of the best runs in the region. Overall this is a topnotch run if there is sufficient water (i.e.: 1100+). It can be a whitewater gem for the whole region.
Kayaker	Give me more!
Kayaker	Good play.
Rafter	Better at this flow!
1,500 cfs	
Rafter	This run was perfect flow. The rocks were covered. Big white water, fun, better safety. I was stuck in the same rapid, not bad. Great run.
Kayaker	Was an excellent run and I would return with many friends. A lot safer. Plenty of time to pick clean lines. I would gladly run at commercial flow 1700+. No need for less.
Kayaker	Great flow for kayaks and rafts.
Rafter	Super run, would make ideal one-day run and two day with stop and train.
Rafter	Much better than 1000 cfs, better openings through rock gardens.
Catarafter	A very fun and safe level. Best flow for commercial guests. It isn't important to provide a variety of flow levels. One good flow is the priority i.e. 1300-1500 cfs.
Rafter	I really had a great time and look forward to running it in the future.
Rafter	1500 cfs is an outstanding water level. High potential for commercial runs. Much easier flow than 1000 cfs. Easy logistics to run multiple "day trips" commercially. Great opportunity to combine the bypass reach with Hells Corner to provide world class multiple day whitewater run.
Rafter	Totally awesome fun! Beautiful scenery (except for canal and penstocks). Long, continuous rapids with big waves and holes. Lots of technical maneuvering. Most rocks covered up, able to glide over most. High quality, highly marketable run. Optional one-two day run (when including Hells Corner run). Did I love this run? Yea! Do I want this run? Yea! Do we need this run? Of course!
Rafter	Much, much better than 1000, cleaner lines and fewer hits.
Rafter	Great run.

Focus Group Notes

960 cfs (first run, first day)

Advantages

Routes available
Good play spot
Clean lines
Playful for kayak
Rapids come up slow
Nice eddies
Clean eddies
Busy – some excitement
Kept you looking ahead
Long rapids
Easy portage at Sidecast

Disadvantages

Boney
Technical routes
Swimming – bumps & bruises
One rapid – boney
One problem rapid
Rocks not covered
Abrasive rocks
Lacks oar space
Need lighter boat & crew
Not commercial
Pinning opportunities
Side cast complex – portage
Class IV= class V swimming

1,230 cfs (second run, first day)

Advantages

Fun
Cleaner
A hoot a blast
Bigger
Portage is gone
Even play spots
Almost easier
Still not too pushy
Rocks covered
Holes were split
More forgiving holes
Play on the run
Prettier than downstream
smooth run – no problems
More fun rapids
More routes

Disadvantages

Some eddies gone
Over too quick
Harder to eddy out
Stayed class IV
Nettles & overgrown
Awesome
Could be a longer swim
Tough rescue in the middle

Could it be run commercially?

Yes, 4 pack w/ oars or paddles - \$
Wouldn't want 6-pack

1,480 cfs (first run, second day)

Advantages

More water
Clean lines
Safer, less rocks & wrap ups
Safest line, more fun
Picks up speed
Safer upside down
Nice continuous long rapids
High quality whitewater
Some play on the fly
Cleaner not out of control
Bigger holes
Better holes
Nice wave trains
Thrill of portages gone

Disadvantages

Faster
Tougher if swimmers
Smaller recovery zones
Deeper
Not as challenging (technical)

If flow were higher?

Higher – maybe better, might go to 2000 before too hard.
Same characteristics as downstream, a little busier than downstream, but easier logistics.
Scenery is nice, harder than Hell's Corner.
Different class IV. May get easier as you learn routes.
Outstanding commercial run. Do it w/ and overnight. Or do short ½ day trip. Or long trip w/ taper down to train.
Good especially for tourists (easier access from Ashland).
Best if in August-Sept., OK if in June. Would run in March and April if we had info.

690 cfs (second run, second day)

Advantages

Plenty of time to make your moves
Good scouting from portage perch
Boatable in a cat
Interesting to see the rocks

Disadvantages

Rocks!
Sharp rocks even car sized
Hazardous – pin potential
Wasn't too pushy, except Fat Man
Abrasive rocks
"I'd rather mow my lawn"
Rocks in turning places
Nettles in portage
No rafting possible
Lack of power
"It stinks"

What was it like 60 years ago?

Rapid Name Nominations

The following are suggested names for some of the rapids. We have tried to put them in order downstream, but additional work may be necessary to precisely locate each suggestion.

Location	Nominated name	Other options
Immediately below dam	Spillway	
Main portage rapid near end of canal	Sidecast Slide	Manslide Falls, Slide Falls, Grant's Pass
Sidecast related rapid associated with emergency spillway	Boyle's Blunder	
Main boulder garden rapid	Heart of the Boyle	Festering Boyle, Slalom
Steep drop with hole downstream of Heart	Topsy's Hole	Ball's Deep
???	Liquid Interstate	
.25 mile rapid with hole at the bottom	Fat Guys Swimming	Darin's disaster, Flounder
???	Noah's Trailer Trash	