Clackamas River Hydroelectric Project
An assessment of potential playboating locations

Prepared for
Portland General Electric
121 SW Salmon Street • Portland, Oregon 97204

Prepared by
Bo Shelby and Doug Whittaker
Confluence Research and Consulting
3600 NW Thrush • Corvallis, Oregon 97331
6324 Red Tree Circle • Anchorage, Alaska 99516

September 2004

Executive Summary

Whitewater boaters involved in PGE's Clackamas relicensing process have suggested there may be opportunities to develop or enhance whitewater recreation, particularly kayak playboating, through channel modifications. This report evaluates potential sites, lists their advantages and disadvantages, and reviews issues to be considered if the utility, agencies, and/or stakeholders choose to pursue the idea further.

Evaluation criteria were developed in consultation with local boaters and PGE staff. Major categories included physical characteristics of suitable reaches, channel or flow modification options, site amenities, site access, regional access, local economic benefits, and impacts on other resources. Within each category, more specific criteria and rating scales helped focus discussion.

Reconnaissance was conducted on January 15, 2004; eight participants included consultants, utility staff, and local boaters. Reconnaissance was conducted from on-land, although most paddlers had been on most of the river segments at several flows. Participants traveled in a single van to facilitate logistics and encourage discussion; they visited 12 sites and rated each one. Overall, results suggest the Faraday Diversion and Milo McIver State Park reaches stand out, while the Pump Station reach rated highest among the closer-to-Portland locations.

The ***Faraday Diversion Reach*** is a 2.2 mile reach characterized by steep canyon walls and limited trail access from PGE roads. The reach is a steep pool-drop river with seven major rapids. As a bypass reach, it currently does not provide quality boating at base flows provided for fish, although Class III/IV opportunities are available when flows are above 600 cfs. The Faraday Reach has the best physical attributes and modification options of all the locations, but lacks reliable "mid-range" summer flows. The reach offers a good channel and scenery, but not enough water. Modifications would be needed to make whitewater features that work at lower flows, and there are some access and management challenges. The attraction of the reach for whitewater boaters is likely to hinge on the number and quality of features and whether these were boatable in summer. This site may require a greater upfront investment than the Pump Station site, but less than the reach along Milo McIver State Park. Design options probably depend on the eventual flow regime, which will be driven by fish needs.

The ***Milo McIver State Park Reach*** is about three miles long and includes the area immediately downstream of River Mill Dam along McIver Park. It probably has the best existing recreation amenities of the locations evaluated, as well as several good physical attributes for a playboating area (steeper gradients, existing rapids, and higher flows through the summer). However, it is not as easy to reach and it has more challenging modification issues. Successful modifications would depend on whether a feature or features can be engineered to withstand high flow events in a large alluvial channel with few solid anchor points. Unless a side channel can be used and protected from high velocities in floods, this site probably requires a larger effort and investment compared to the Pump Station or Faraday. In summary, the McIver site has plenty of water and nice

amenities, but a poor channel. There are also potential impacts to fisheries and other forms of water-based recreation, such as tubing and boat-based angling.

The ***Pump Station*** is a locational playboating site just upstream from Interstate 205 and accessible from River Road on the left (south) side of the river. The Pump Station is clearly a lower quality option, but it is relatively close to Portland. It has modest aesthetics and challenging site access, but it also has physical attributes that could produce a good playboating feature. Other major disadvantages include limited ability to access the site with heavy equipment and private ownership of the land surrounding the feature.

Bob's Hole and the reach from ***Fish Creek to Bob's Hole*** were evaluated for comparison purposes. Bob's Hole sets the standard for a popular playboating area, and its chief advantages are exceptional physical characteristics (waves and holes at different flow levels) and easy access (a parking shoulder across the highway with an easy scramble to the river). On the negative side, the site has lower quality scenery, limited toilet or changing facilities, no high quality areas for spectators or boaters to relax, seasonal limitations (it is available about three months a year), and it is about 45 to 60 minutes from Portland. The reach upstream from Bob's Hole offers more (but lower quality) playboating features, although it has better scenery, multiple access options, and better facilities (launches, picnic areas, and campgrounds).

Participants visited and evaluated seven other locations on the Clackamas River (Clackamette Park, High Rocks, Riverside Park, Carver Boulder, Squirt Ranch, Barton County Park, and Lower Three Lynx). These sites have substantial problems that would probably preclude further consideration.

The development of playboating features at the McIver or Faraday reaches have the potential to attract considerable use, but both would require substantial effort. Use levels would depend on the number and quality of features, the time of year when they were available, and the availability of good access and other recreation amenities. Regardless of the site, potential impacts on fish or other recreation uses would need to be considered.

Table of Contents

Introduction

The Clackamas River drains more than 940 square miles of the Lower Willamette River watershed before joining the Willamette River near Portland. The Clackamas River Hydroelectric Project includes four hydroelectric developments in the basin, one on the Oak Grove Fork and three on the main stem Clackamas just east of Estacada, Oregon (about 25 miles southeast of Portland). The four developments are operated by Portland General Electric (PGE), which is applying to the Federal Energy Regulatory Commission (FERC) for a license to continue to operate these facilities (FERC No. 2195).

Recreation users, particularly whitewater boaters, are interested in the potential effects of power generation on recreation in the basin. Two previous reports (PGE, 2001; 2002) addressed this topic, describing river recreation opportunities that occur in the basin, estimating the flow requirements for those opportunities, and examining how current flow regimes affect their availability and quality. This report provides additional information about a recreation issue that has developed since those reports, a preliminary assessment of potential kayak playboating opportunities in the Clackamas Basin.

Playboating is a style of kayaking where boaters utilize whitewater features (usually a wave or hole) to perform "freestyle" maneuvers (e.g., surf, cartwheel, etc.). In many cases, boaters can re-access playboating features from nearby eddies to extend the time they spend at a location.

Study Overview and Objectives

Whitewater boaters (particularly kayakers) involved in the Clackamas relicensing effort have suggested there may be opportunities to develop or enhance playboating in the basin through channel modifications. The construction of whitewater features for kayaking opportunities has increased dramatically in the past decade in North America (Whittaker and Shelby, 2004), but there are no sites of this type in the Portland area. This report evaluates potential sites, lists their advantages and disadvantages, and reviews issues to be considered if the utility, agencies, or stakeholders choose to pursue the idea further.

Study objectives include:

- Develop criteria for evaluating existing and potential locational playboating opportunities.
- Develop a list of existing and potential playboating locations in the lower Clackamas River.
- Conduct reconnaissance with a team of researchers, kayakers, and PGE staff to apply evaluation criteria and discuss development or management challenges associated with developing playboating opportunities.
- Summarize findings and recommendations.

Methods

The study had two major components. The first focused on developing evaluation criteria to assess the most important attributes of a potential playboating location. The second component used those criteria during an on-site reconnaissance with study consultants, local boaters, and utility staff in January 2004 to identify sites and their advantages and disadvantages.

Evaluation criteria

Evaluation criteria were developed in consultation with local boaters and PGE staff. Major categories included physical characteristics, modification options, site amenities, site access, regional access, local economic benefits, and impacts on other resources. Within each category, more specific criteria and rating scales helped focus discussion.

Physical characteristics of stream reach

- Locational gradient (estimate feet in main drop)
- Summer base flow range (likely cfs in July)
- Power generation lost if playboating flows were provided? (yes, no, or partially)
- Season when available (likely months; compare with likely Bob's Hole season)

Channel modification options

- Existing channel potential (are some rapids currently at site?)
- Boulder availability (are large boulders available at the site for modifications?)
- Access for machinery (easy or hard to get large machinery into site?)
- Extent of modification needed (major to minor)

Amenities

- Scenery (poor to excellent)
- Place to "hang out" (poor to excellent)
- Distance to gas, food, services (miles)
- Distance to camping (miles and type of camping)
- Restrooms (existing or ease of development)
- On-site picnicking options (poor to excellent)

Site access

- Existing road to site (poor gravel, good gravel, paved/low use, paved high use)
- Parking lot /staging area options (poor to excellent)
- Legal access issues (note ownership: PGE, USFS, other public, private)
- Vehicle to water distance (short to long)
- Vehicle to water difficulty (easy to difficult)
- Is site part of a longer run or is it only a "locational playboating" site?

Regional access/proximity
- Distance to downtown Portland (estimated miles).

Community economic benefit
- Nearby local community (identify primary city/town; estimate distance to town)
- Community economic benefit (assess high/medium/low level of benefit)

Impacts on other resources
- Potential for fish impacts (negligible to major)
- Potential for Wild and Scenic impacts on "outstandingly remarkable" values (negligible to major)
- Potential for other recreation impacts (negligible to major)

January 2004 reconnaisance

Reconnaissance was conducted on January 15, 2004. Participants were selected with assistance from Keith Jensen (a local kayaker and American Whitewater representative active in the Clackamas relicensing process) and Tim Shibahara (PGE fish biologist and local kayaker). Participants included:

- Keith Jensen (Alder Creek and American Whitewater)
- Brian Fields (local kayaker)
- Bob Patterson (local kayaker)
- Kenny Pitta (local kayaker)
- Tony Dentel (PGE recreation manager)
- Tim Shibahara (PGE fish biologist and local kayaker)
- Bo Shelby (Confluence Research and Consulting [CRC])
- Doug Whittaker (CRC)

Reconnaissance was conducted from the shore, although most paddlers had been on most of the river segments at several flows. Participants traveled in a single van to facilitate logistics and encourage discussion. Notes taken throughout the day were integrated into this report.

Participants rated twelve sites, generally traveling upstream from the river mouth to Big Eddy. At each site, they reviewed criteria and discussed ratings for each category and the overall site. They also discussed advantages and disadvantages and compared the sites to each other and existing playboating areas. After the first few sites, there was general consensus about important criteria and the overall category and site ratings, so numeric ratings for individual items became a secondary focus.

There was general consensus about which sites/reaches had more potential (Faraday Diversion, McIver Park/River Mill Dam, and Pump Station) versus those that appear more problematic (Clackamette Park, High Rocks, Riverside Park, Carver Boulder, Squirt Ranch, Barton County Park, lower section of Three Lynx reach) . Findings for

better sites are explored more extensively in this report. We have also included some information about existing playboating areas (Bob's Hole, Fish Creek to Bob's Hole reach) for comparative purposes.

Other information sources

A list of existing and proposed human-built whitewater features in North America and overseas (Whittaker & Shelby, 2004) provided additional context for the present study. The list includes information about site features, investment levels, and some physical characteristics such as length, width, and flow ranges. These helped the team to evaluate sites, although there is considerable diversity among developments.

We also conducted limited interviews with other local boaters who commented on the potential contribution of a playboating feature in the area. These included:

Rene Beus	Private boater and kayak shop manager
Sam Drevo	Private boater, kayak guide, instructor, and freestyle competitor
Pete Girodano	Private boater
Sam Haas	Private boater; "PDX kayaker" website moderator
John Hart	Private boater and kayak shop owner
Dave Johnson	Private boater, slalom organizer/racer
Jason Rackley	Private boater and Portland area steep creek webpage creator.
Luke Spenser	Private boater, kayak retail sales manager
Jed Weingarden	Private boater

Findings

Summary of Category Ratings

Seven evaluation criteria were defined (see Table 1). Participants rated each site on a five point-scale (with 1=low or worse and 5=high or better). Shading has been used to highlight higher scores (4 or 5). There was not always perfect consensus about a numeric rating, but there was general agreement about the basis for evaluations. In cases where ratings differed, we have provided the higher rating with an asterisk. Additional discussion is in the site-by-site descriptions that follow the table.

Table 1. Category ratings for potential/existing whitewater playboating areas .

	Proximity to Portland	Community benefit	Site access	Physical characteristics	Modification options	Scenery & amenities	Resource impacts	Overall
Clackamette Park	5	2	3	1	1	3	1	2
High Rocks	5	2	2	2	3	1	2	2
Pump Station	5	2	4	2	4	2	3	3
Riverside Park	5	2	4	1	1	2	2	1
Carver Boulder	4	3	3	2	3	2	2	2
Squirt Ranch	4	3	3	1	1	2	2	1
Barton County Park	4	3	4	1	1	3	2	1
River Mill / McIver Park	3	4	5*	4	3	4	3*	4
Faraday Diversion	2	5	4*	5	4	4	4*	4
Lower Three Lynx	1	2	4	1	1	4	1	1
Bob's Hole	1	2	4	5	n/a	2	n/a	4
Fish Ck. to Bob's Hole	1	2	5	5	n/a	5	n/a	5

*With some major issues or lack of consensus by participants.
Note: Evaluation scale ranges from a high of 5 (best condition) to 1 (worst condition).

Overall, results in Table 1 suggest the McIver Park and Faraday Diversion reaches stand out, while the Pump Station rated highest among the closer-to-Portland locations. Even before the numeric ratings were compiled, it was obvious these three sites were the consensus choices for additional attention.

Highest rated locations

Evaluations of the three locations with better playboating potential are described below. They are listed in order from highest to lowest potential.

Faraday Diversion Reach

This is a 2.2-mile reach from Faraday Dam to the powerhouse (near the confluence with Estacada Lake). The reach is characterized by steep canyon walls and limited trail access from PGE roads that are generally high above the river. There is no public vehicle access to these roads, and recreation access is generally limited to people who walk or ride bicycles. The boatable segment between the Faraday diversion and the powerhouse is a short but relatively steep pool-drop river, with about seven major rapids. The reach currently offers a technical boating run at lower flows (600 to 1,000 cfs), with boulder-dodging and a few ledge drops. At higher flows (which occur only when the dam is spilling), the rapids have stronger hydraulics and less technical routes (Whittaker & Shelby 2003).

Physical characteristics. The Faraday Reach has several physical advantages over other locations on the river. Dropping approximately 80 feet per mile, it has more gradient in existing rapids. Some of the rapids already provide playboating at flows above about 800 cfs (Whittaker & Shelby, 2003), and most could probably be modified to "work" at lower flows between 150 to 300 cfs.

Flow ranges in the reach are the primary physical weakness for this location. Current base flows for fisheries are about 120 cfs. Higher flows occur flows exceed Project capacity (4,400 cfs) or when PGE releases "fish spills" to reduce entrainment of juvenile salmonids at North Fork Dam. Providing higher base flows or periodic releases during drier times of the year would result in lost power generation. Boaters speculated about whether fisheries studies will recommend higher base flows or periodic pulse flows, and about how much flow would be necessary to provide high quality summertime boating if channel modifications were made. Although one playboating area in Oregon (24/7 near Eugene) operates at less than 100 cfs, most playboating areas are developed to operate at flows of 300 to 600 cfs or higher.

Modification options. The Faraday Reach has substantially better modification options than other reaches. Existing rapids already constrict the channel, and the substrate at most of the drops is large. Moving a few larger boulders to force water into distinct chutes could make rapids runnable at much lower flows than those in the Faraday boating study; this might also create playspots.

Engineering and some trial and error efforts would be required to create a high quality feature or features using existing boulders. An unknown variable concerns access for heavy equipment to do this work in the steep canyon. On the positive side, the large boulders and bedrock in the reach are engineering assets for creating and anchoring features, and roughly 5,000 cfs is typically removed from the channel during high flow

periods so modifications may not need to be as robust as those considered for a "full flow" (non-bypass) reach.

Land in the Faraday Reach is owned by PGE, so modifications are likely to be easier to plan and manage. This is an advantage compared to the Pump Station and McIver State Park locations, where coordination with other agencies or landowners would be more complicated.

Amenities. Scenery in the Faraday reach is high quality, despite some visible hydroelectric facilities. Roads usually are not visible. There are not particularly good places for picnicking and "hanging out" near the logical put-ins and take-outs, but nice areas are accessible from angler trails. If these coincided with good play features, they would probably become popular for boaters and spectators. Services (gas, groceries, restaurants) are close by in Estacada, and camping is available at Promontory Park or farther upstream. There are satisfactory existing parking and toilet facilities on site (Hall, 2004).

Site access. This site has highway access, good areas for parking, and paved roads to likely put-ins and take-outs. However, the access road to the fish ladder put-in (which is the logical site of a single feature) has been gated to prevent vehicular access since September 11, 2001. These restrictions will not be lifted and will continue to limit access. At the logical take-out below the last rapid, access from the existing parking lot on river right is steep, but a staircase with resting areas might make the climb acceptable.

It is also possible for boaters to paddle three miles down Estacada Lake to the PGE boat launch, but study participants thought few playboaters would do this and it makes the shuttle longer. There are no simple ways to get kayakers out of the river at the lake/river confluence, which has extensive private land and inadequate space for people, boats, and vehicles at the bridge crossing.

Regional access/proximity. This location is farther from Portland (about 25 miles), but access is slightly easier than McIver Park and 15 minutes closer than Bob's Hole. It is probably less likely to be used for very short after-work boating sessions than locations near the confluence with the Willamette, but it can be reached in 45 minutes from many parts of metropolitan Portland. A survey of kayakers on a nationwide message board ("BoaterTalk") indicated that 60% preferred sessions within an hour's drive.

Community economic benefit. Adjacent to the town of Estacada, the Faraday Reach is likely to have greater local economic benefits than either McIver Park (because it is on the opposite side of the river) or Pump Station (because it is closer to a larger urban area with more service options that would dilute community benefits). In addition, other recreation alternatives in the area (e.g., swimming, hiking, fishing) enhance local economic benefits.

Impacts on other resources. In addition to potential impacts of channel modifications on fish (a topic outside the scope of this study), a disadvantage to the Faraday site is

potential conflict with anglers. However, fewer than ten are likely to be fishing at any given time. Hall (2004) reports an average of 14 vehicles in the Faraday Lake parking lot over the 2003 season. Concurrent visitor counts identified over 20 people at the lake, but no information about the number on the river (presumably because most are found on the lake).

It is unknown how anglers would respond to channel modifications or higher flow regimes, even if their potential effects on fish populations are neutral or beneficial. However, there may be some conflicts if boater use levels become high and steady through the day (especially if a play site was located at a good fishing hole). If a series of playboating features were developed, this conflict might be more substantial because more boaters would probably traverse the entire reach. Zoning by space or time can limit this kind of conflict, particularly if it includes timed flow regimes that demarcate boating and fishing periods, however such "zoning" can be challenging to manage.

Summary. The Faraday Reach has the best physical attributes and modification options of all the locations. Because it lacks reliable "mid-range" summer flows, however, modifications would need to be designed to work at lower flows. It has some access and management challenges.

The attraction of the reach for whitewater boaters is likely to hinge on the number of playboating features and whether these were boatable in summer and early fall. A single "park and surf" feature (unless it were as high quality as Bob's Hole or "worked" when Bob's Hole doesn't) would attract less use than a series of features because the location is relatively far from Portland and access is awkward.

This site might require a greater upfront investment than the Pump Station, but less than McIver. Design options probably depend on the eventual flow regime, which will be directed by fish needs. If higher flows were available, consideration of a playboating enhancement at the site may deserve closer attention.

River Mill Dam/McIver State Park

This reach is about three miles long and includes the area immediately downstream of River Mill Dam along McIver Park. It is already used for playboating and general river running (particularly kayak instruction). Some people take longer trips down to Barton (8 mile) or Carver (13 miles), while others take a short run through the park (about 3 miles). The typical put-in is a boat ramp at the east end of the park (not the dam), with a take-out option at the end of the park property. The run is also popular with canoeists, tubers, and driftboat anglers. A whitewater feature (or features) could enhance existing rapids, be created in an existing side channel, or be developed in the main channel.

Physical characteristics. McIver Park Reach has some good physical characteristics for whitewater enhancements, including an average gradient of 25 feet per mile and a few existing rapids with mild playboating opportunities. Low flows are not an issue in this reach because the lowest summer flows are typically 600 to 800 cfs. However, the

McIver Reach receives the full flow of the river in winter, requiring more robust channel modifications.

Modification options. Compared to Faraday, McIver Park Reach appears to have fewer channel modification options due to channel geomorphology. Existing rapids appear to be in active alluvial channels and have changed dramatically from year-to-year. Substrate size is also smaller. At the first rapid downstream of the boat ramp, the channel appears to be actively cutting a nearly vertical canyon wall. Engineering issues would be a factor at this location, because features could easily be lost to scouring, erosion, or deposition. Heavy equipment use may also be problematic because the reach usually has more water in it (unlike Faraday, which has much less during base flow periods).

An alternative to modifying main stem rapids or creating artificial features anchored to the bank is to develop whitewater features in a side channel. Some designers of whitewater features on larger rivers have adopted this strategy, limiting exposure to high flow "blow-outs." Reconnaissance for this study did not explore such possibilities, but maps indicate some islands and side channels between River Mill Dam and the end of McIver Park.

Amenities. Facilities and aesthetics at McIver Park are among the best in the basin. The spacious park has good parking areas, launches, roads, trails, toilets, shelters, and camping areas, as well as a mix of natural and landscaped areas. This would provide excellent spectator "hang-out" options as well as alternative recreation for boaters and others. While a series of whitewater features might have implications for social and facility capacities in the park (which would require coordination and planning with State Park staff), there is probably no better location on the river to handle such impact.

Site access. McIver Park offers excellent site access, with a well-designed park road system providing access to a logical put-in and take-out within the park. Currently only angler trails go upstream of the boat ramp, but there may be opportunities to create better access upstream if a feature or features were located near the dam. Access to the reach from the Estacada side (through the dam or Timber Park on river right rather than through McIver Park) is more challenging because of steep banks and security issues; it also puts vehicles on the wrong side of the river for short runs.

Regional access/proximity. This location is slightly farther from Portland than the Faraday Reach because it is off the highway on the south (river left) side and roads are less direct or smaller (it is still about 15 minutes closer than Bob's Hole). It is less likely to be used for very short after-work sessions than locations near the Willamette River confluence, but it can be reached in 45 to 50 minutes from many parts of metropolitan Portland.

Community economic benefit. Access to Estacada from this park is less direct than from Faraday, so economic benefits to that community are likely to be lower. No other town (e.g., Barton, Carver, Oregon City) is close enough to attract significant economic activity from playboating features at this location.

Impacts on other resources. Playboating modifications at this location could have impacts on fish or other recreation users. It is unknown how aquatic professionals or permitting agencies would view whitewater channel modifications in this reach, which may differ for a modification that changed an existing rapid, or created a new one in the main channel or a side channel. The entire reach is the focus of on-going fishery restoration efforts (e.g., spawning gravel is periodically dumped in the river during high flow events). Substantial changes to the channel would require considerable impact review.

Impacts on other recreation users could also be substantial, but are likely to be fewer than for Faraday (which is a smaller, more confined channel). While a modified channel feature between the dam and the McIver boat ramp is unlikely to affect current users (even though some walk-in anglers fish that area), a playboating feature downstream could change the river for tubers and driftboaters. Finally, modifications in this reach would require extensive coordination and support from Oregon State Parks and other agencies responsible for nearby land, fish, wildlife, or water resources.

Summary. McIver Park has the best amenities of the locations evaluated, as well as several good physical attributes for a whitewater feature (steeper gradients, existing rapids, and higher summer flows). However, distance from Portland is slightly longer and the reach has more challenging channel modification issues. There are also potential impacts to fisheries and other recreation uses (tubing, boat-based angling) to consider.

A key issue is whether features can be engineered to withstand high flow events in a large alluvial channel with few solid anchor points. Unless a side channel can be used (and protected from high velocities in floods), this site probably requires a larger effort and investment compared to the Pump Station or Faraday.

Pump Station

This is a locational playboating site just upstream from Interstate 205 (approximately RM 3.0) and accessible from River Road on the river left (south) side of the river. Boaters could also access the site by paddling down from Barton, Carver, or Riverside Park (taking out at the site or Clackamette Park).

The Pump Station is on a steep rip-rapped bank where the river bends and the road narrows. There is limited public parking at an associated Oregon City utility property 50 yards upstream of the pump station. The feature is another 50 yards upstream of the parking area, adjacent to a private residence. The current feature occurs as the river funnels left over a short ledge (possibly the remains of rip-rap designed to protect the pump station or road); it creates a large hole at high water and a small wave at summer flows. To improve playboating, redirected (concentrated) summer flows would be needed, as would well-placed boulders so boaters can eddy-hop upstream from the parking area.

The site was rated lower than McIver Park or Faraday as a whitewater feature location, but it is probably the best choice among the locations at the lower end of the river (which are closer to Portland). This is the location with the greatest potential for a "modest" but easily accessible feature.

Physical characteristics. The Pump Station site has potential from a physical standpoint because 1) a small feature already exists, and 2) the channel has historically funneled water toward the feature, allowing full use of summer flows (600 to 800 cfs minimum). However, there is probably insufficient gradient for more than one feature and subsidiary eddy/squirt lines. There are also uncertainties about channel changes that might be caused by future floods, which could lose or alter a feature.

Modification options. Modification options appear better than on the McIver Reach. Although the reach is alluvial, this site is hardened by existing rip-rap that might also be incorporated in feature development. Modification challenges include redirecting flow during construction, lack of access to the site (because it is adjacent to private land), and lack of nearby sources of large rock.

Amenities. The Pump Station is not particularly aesthetic, but it is better than Clackamette and High Rocks because it is farther from highway noise and urban views. Facilities at the Pump Station are minimal and would be difficult to develop. There is limited space at the parking /staging area, which may not even be available for this purpose. There is also no public land at the site for spectators or waiting boaters, and the feature is close to a private residence.

Site access. It is probably difficult to paddle to the feature at medium to high flows. It is may be possible to place boulders and wing dams so that boaters could "eddy-hop" upstream, but anchoring these boulders in a full-flow channel could be challenging. Getting on the river from the utility-owned property along the river is easy, but the property is small and has limited parking. From the parking area upstream, the bank is private land. "Overflow" parking along the shoulder is potentially unsafe due to the narrow road. Spectators that wanted to "hang-out" immediately adjacent to the feature would be on private land.

Regional access/proximity. Closer to Portland than any other site except Clackamette Park, the Pump Station is about 12 miles from downtown and probably 20 to 30 minutes from many parts of the city. It also requires some navigation from the interstate through Oregon's City's back streets.

Community economic benefit. Less than two miles from Oregon City and commercial districts in Gladstone, a Pump Station playboating feature could potentially generate economic benefits in those communities. However, the close-by highways offer quick access to other districts in Portland with greater diversity of amenities and services, so benefits would probably be diluted. The immediate surrounding area is steep unoccupied land or residential subdivisions that are not candidates for commercial or recreational development.

Impacts on other resources. As with the Faraday and McIver reaches, channel modifications have the potential to impact fish and recreation users. However, the modest modifications likely to be proposed for this site are probably less problematic than other sites, and part of the channel has already been modified (rip-rapped). Potential concerns focus on fish passage and issues for drift and jet boats (both craft are common).

Summary. The Pump Station is clearly a lower quality site, but it has physical attributes that could produce a good playboating feature relatively close to Portland. It has modest aesthetics, challenging site access, limited ability to access the site with heavy equipment, and private land at the feature.

Existing Playboating Locations for Comparisons

Bob's Hole

Bob's Hole (and associated features such as Joe Bob's Wave) is an existing playboating area on the Clackamas that is nationally known. Because it sets a standard for quality, it was rated for comparison purposes. Its chief advantages are exceptional physical characteristics (waves and holes at different flow levels) and easy access (a parking shoulder across the highway with an easy scramble to the river).

On the negative side, the site is not particularly scenic due to proximity of the highway and channel rip-rap. It has limited toilet or changing facilities, no high quality "hang-out" areas for spectators or boaters, and it is about 45 to 60 minutes from Portland. Its economic impact on local communities is probably small because it is too far for short trips from the site and the lack of amenities for non-boaters discourages spectators and boaters' friends or family.

Bob's Hole also has seasonal limitations. The play features are "in" for about three months a year (on average) when weather and water temperatures are cooler. If a new playboating area were created through channel modifications, a major goal would be providing boatable features during the summer and early fall when Bob's and other playspots are unavailable.

Fish Creek to Bob's Hole Reach

This section includes a series of play features in the lower half of the Three Lynx Reach from Fish Creek through Big Eddy to Bob's Hole. In comparison to locational boating at Bob's Hole, this reach offers more (but lower quality) features. However, these are accompanied by better scenery, multiple access options, and better facilities (launches, picnic areas, and campgrounds). Because boaters end up at Bob's Hole on this run and can get the "best of both," it is may be unfair to compare use levels for this reach vs. Bob's Hole. However, kayak demand information (Whittaker and Shelby, 2004) suggests that more boaters consider themselves unspecialized river runners rather than

specialized playboaters, so demand for a reach may be higher than for a "park and surf" site – even one as good as Bob's Hole.

Problematic Locations

The group visited and evaluated seven other locations. These sites have substantial problems that would probably preclude further consideration, particularly given the more promising locations discussed above. They are listed in order from the mouth of the Clackamas River going upstream.

Clackamette Park

This is a large park at the confluence of the Clackamas and Willamette rivers (on the south side of the river). It has extensive facilities (e.g., boat ramps, parking lots, sunning areas, open fields, picnic sites, and covered horseshoe pits) and provides a diversity of recreation opportunities.

There are slightly faster currents about a half-mile upstream of the mouth that might be converted into one or two playboating features. Boaters would access them by floating the lower river (from Carver, for example) or by eddy-hopping upstream from the park (as long as summer flows were relatively low; they would probably be unreachable at higher flows).

Although this site in downtown Oregon City is close to Portland and has substantial park facilities and amenities, the area is urban in nature, crowded in summer, and kayaking would compete for facilities and space with existing activities (boat and shore based-fishing, general recreation). Perhaps more importantly, extensive channel modifications would probably be required to create attractive playboating features that could withstand high winter flows. The channel is alluvial, gradients are low (5 to 10 feet per mile), and there are few rocks for anchoring potential modifications.

High Rocks

Just upstream of Clackamette Park, Interstate 205 crosses the river over a short zig-zag rapid through bedrock walls called "High Rocks." This has a slightly steeper gradient than the rest of the river downstream of Barton, and creates swirly eddies and a few lateral waves that may offer some playboating. Despite the proximity of the interstate, hotels, and a shopping center, and unclear land ownership (people must hop fences to access the area), the site is a popular local sunning area and swimming hole in summer. Like Clackamette Park, it is very close to Portland, but this is its only redeeming attribute as a potential whitewater playboating location.

Channel modifications could be made in the area to increase current speed and create one or two playboating features, but the velocities in this tight "gorge" are probably substantial during high water so modifications would have to be very robust (and likely expensive). The uncertain land ownership, lack of aesthetics (the roar of the Interstate is

constant), general lack of amenities, and difficult site access (the bedrock walls are largely vertical) make this a poor choice compared to the Pump Station.

Riverside Park

This is a local park about a mile upstream from Interstate 205 on river right (north) side in a quiet subdivision. It offers good access to the river and appropriate facilities (boat ramp, toilets, parking, and a nice lawn for boaters and their families/friends to enjoy), but lacks any useful physical attributes to create whitewater features. The river gradient is 5 to 10 feet per mile, the channel is alluvial, and there are no large rock outcroppings for anchoring modifications. Channel modification costs would likely be high, with potential for failure during floods. There may also be potential conflict between whitewater enhancements and traditional users of the area (boat-based and shore-based anglers), as well as uncertain impacts on fisheries. Cooperation with local park staff is an additional requirement.

Carver Boulder

Just upstream of Carver (accessible from the river right or north side) there is a large boulder in the right side of a split channel with faster currents. These might offer slightly better modification options than other alluvial reaches on the lower river, although it is probably difficult to create anything more than a single play feature using the rock as an anchor.

This section of the river is more scenic than downstream locations, although it is slightly farther from downtown Portland (about 14 miles) than Clackamette Park, High Rocks, or Pump Station (about 10 to 12 miles). There are no facilities in the immediate area, although there is a nice local park downstream in Carver, on river left just upstream of the bridge.

Despite the presence of the boulder, other parts of the channel are alluvial, the gradient is only 10 to 15 feet per mile, and modification costs would probably be high. Land ownership status and access options are also uncertain, although boaters could use the site by running from Barton to Carver, and "park and surf" access would not be a problem if public land were available. Impacts on fish and recreation users (particularly driftboat anglers and tubers) may be a concern, depending on the modifications, although tubers and boaters tend to use the other channel.

Squirt Ranch

Immediately upstream of Carver is a faster section of river with interesting eddy lines. Playboaters have nicknamed the area "the squirt ranch" after a type of kayaking ("squirt boating") involving low volume kayaks that allow boaters to perform maneuvers in low energy currents and hydraulics.

This section of the river is nearly identical to Carver Boulder, but without a large rock outcrop for anchoring modifications in the active alluvial channel. It may have slightly better land ownership options (part of the river right or north bank may be Oregon Department of Transportation land), and there is some tradition of local public use (swimming and sunning) in the area. However, there are no facilities, access and parking would have to be developed, and there are potential impacts on fish or recreation in this currently undeveloped (and largely unmanaged) area.

Barton County Park

This is a major regional park on the river right (north) side, with extensive facilities (boat ramps, toilets, shelters, picnic tables, trails, and ball fields) and nice aesthetics in a rural area. If a series of playboating features in a fully modified alluvial channel were considered, this might make a good choice. It is reasonably close to Portland (about 20 miles) and the park has ample space to handle the activity. It also might generate some local economic benefit for the small towns of Barton and Carver, which have a few small businesses that appear to cater to local recreation use (primarily anglers and county park visitors).

However, the physical characteristics of the site are poor for anchoring modifications and any features would have to be generated from scratch. There is limited large substrate, gradient is only 10 to 15 feet per mile, and modifications would have to withstand high winter flows. Competition/conflict with traditional park users would also be an issue because the park already has heavy use on summer weekends. Interest and cooperation from county officials are final questions.

Lower section of Three Lynx reach

The lower few miles of the Three Lynx Reach (downstream of Bob's Hole to North Fork Reservoir) is a low-gradient alluvial channel, and thus suffers from the same "major modification" issues as Clackamette Park, Riverside Park, Carver Boulder, Squirt Ranch, and Barton County Park. It was rated for comparison purposes and to receive feedback on National Wild and Scenic river issues. Participants were generally opposed to channel modifications in federally designated reaches (like Three Lynx), and Section 7 of the Wild and Scenic Rivers Act probably precludes their development in any case. In addition, this reach is not particularly close to Portland and lacks distinctive playboating features like those at McIver Park or Pump Station.

Conclusions

After evaluating all the sites, three appear to offer the most promising combination of attributes: (1) the Faraday Diversion Reach; (2) the McIver Park reach, and (3) the Pump Station. By comparison, seven other sites have either fewer advantages or serious flaws.

The Faraday Diversion channel has the best physical characteristics and modification options for creating a playboating feature or feature(s), including a steeper gradient,

existing rapids, large boulders, and solid banks for anchoring modifications. However, it currently lacks good summer flows because it is a bypass reach. In summary, Faraday offers a good channel and scenery, but not enough water. Facilities and access have limitations, some of which are security-related and cannot reasonably be expected to change. The key missing information is whether aquatic resource discussions will suggest changes in base flows sufficient to make channel modifications attractive.

McIver has the opposite story: plenty of water and nice amenities, but a poor channel. Located in an active alluvial section, it has good summer flows but is susceptible to winter flood erosion and changes in the current that would complicate construction of a sustainable playboating feature or features. There are also few large boulders to use in construction, nor solid places for anchoring modifications. Perhaps the best option in this reach would be development in a side channel that could be protected from the full force of the river during high flow events.

The Pump Station Reach is not really comparable to Faraday or McIver in terms of quality or the potential for multiple features. A playboating enhancement would involve minor modifications of an existing feature created by old rip-rap. Its major advantage is being closer to Portland, but parking and land ownership issues at the site are additional disadvantages.

A single high quality feature or series of features at McIver or Faraday have the most potential to attract considerable use, but these kinds of modifications might require substantial effort. One or two features that are as good as Bob's Hole, or function outside the Bob's Hole season, would probably draw users from Portland on a regular basis. Multiple features that are usable in summer could produce a major kayaking destination, particularly if associated facilities and amenities were developed.

Regardless of the site, potential impacts on fish or recreation uses are major issues. While whitewater channel modifications may provide some benefits or minimal negative impacts for fish, integration with fisheries management objectives would be crucial. Similarly, potential conflicts with anglers, tubers, and other recreation users would require coordination.

The development of whitewater playboating features in natural rivers has increased in recent years (Whittaker and Shelby, 2004). It appears that no features have been developed in a FERC process, although this is under discussion for at least one project (Oroville Dam on California's Feather River). In contrast, many have been developed as part of larger river restoration or greenway projects, with several designed to address environmental problems (erosion or old rip rap) and enhance local economic benefits by integrating whitewater developments with other recreation facilities. In some cases local communities financed the development, phasing construction and financing to fit the budget and coordinate with fund-raising efforts by local boaters or environmental groups. Development of playboating features on the Clackamas may require similar partnerships.

References

Hall, T. E. 2004. Faraday Lake: 2002 use levels and survey results. Draft report prepared for Portland General Electric.

Hall, T. E. 2003. Whitewater boating on the upper Clackamas River. Report prepared for Portland General Electric, Portland, Oregon.

Whittaker, D., and Shelby, B. 2001. Clackamas River Hydroelectric Project: Preliminary flow assessment for recreation. Report for Portland General Electric and Recreation Resource Work Group. October.

Whittaker, D., and Shelby, B. 2003. Clackamas River Hydroelectric Project: Faraday Diversion whitewater boating study. Report for Portland General Electric and Recreation Resource Work Group. April.

Whittaker, D., and Shelby, B. 2004. Clackamas River Hydroelectric Project: Regional kayaking demand. Report for Portland General Electric and Recreation Resource Work Group. April.

Appendix A:
Boater comments about whitewater playboating options

The following are paraphrased statements from interviews or excerpts from kayakers on a local message board/website called PDXKayaker. These boaters heard from the "grapevine" about the reconnaissance trip and prospects for whitewater enhancements. They volunteered the following comments, which have been organized by topics. Readers should be aware that these were unsolicited comments that represent individual views and not necessarily those of the broader boating community.

What attributes are important?

- One good feature is better than four mediocre features.

- I would vote for a summer time type spot, since there [isn't anything] to paddle that time of year. [I] like a cartwheeling spot, loops, and hole moves. A wave would be nice too.

- A nice Spencer's type hole [playboating feature on the North Santiam] closer to the Portland area would be a huge plus for the community. Cartwheels and loops minutes away would be a huge plus. A green wave would be nice but this type of feature could require a good amount of water. Ideally, a feature [that] could provide a maintenance opportunity at low flows and grow into a green wave at higher [flows] would meet all these demands.

- I agree about the time and the feature. My read on playboating in the Northwest is during the wet season there is more water than I have time. This is especially the case in good water years.

- An engineered huge 15 foot glassy wave with a little break on top could be fun also when we get the big flows in the winter. How about both???

Building playboating features in free-flowing rivers

- No on modifying natural channels unless [they have] already [been] modified.

- I believe that the best way to build waves is in places that have already been manipulated by man. Build them into dams, or [do] as I am by working with the city of Eugene to build a wave park in a regular park that has water diversion from the river -- basically a concrete canal. An extension of skate parks. If the "gutter waves" can be built by accident, then imagine what we can do on purpose?

- I think one of my biggest concerns is that 1) the rivers of this area are very dynamic, and 2) I think there is varied support on further manipulating these natural areas. The bottom line is anything you do in a natural river channel will need to be hardened (probably concrete), routinely maintained from high water changes, and be

controversial. Ideally a reach that has already been manipulated, like the Faraday dewatered reach, would be a great candidate for this application.

- I don't want to rain on folks' parade, but as much as I love playspots I'm not a huge fan of engineering features into free flowing rivers. However, not being familiar with the areas you are talking about I'm assuming that you are mostly intending to build something in an area that has already been artificially modified (a decommissioned dam, weir, that kind of thing). I think that's a much more sustainable approach, as opposed to ripping up riverbank and altering a riverbed that nature has already done a good job of putting together. (Of course I have 24/7 and Cotton Candy [playboating features in the Eugene area] less than 5 minutes from my apartment, so maybe my tune would change if I had to drive out to Bob's [Hole] for cartwheeling)."

- It seems like there are a lot of different opinions out there on modifying rivers for recreation benefit. I'm with you, keep natural areas natural. If it is already compromised (i.e., diversion reaches, canals, the Willamette, etc.) then I would investigate further. I don't even think I would support the dredging out of Trestle Hole [playboating feature on the Deschutes]. (However I would surf the crap out of it if it came in.) Most boaters I know are in this category…

Difficulties of making features

- Beware of structures in main stem; huge flows will rip it out.

- I have very little faith in the ability to hard-fasten stuff into free flowing rivers (short of a dam). I have done a lot of "stream restoration" in tributaries of the Clackamas. These smaller systems easily rip out everything you put in…I think the mainstem Clackamas could easily modify just about any rip rap in the main channel that an excavator could move in.

- Make sure that construction is open for a few years to tweak it. Just make sure you don't work yourselves into a corner, and get stuck with features you don't like...

- I'm not sure if people engineering playspots already do this, but there's a few empirically derived and field-tested equations modeling river flow and stresses on particles in the beds for all flavors of river channels. If we want to engineer a spot on the Clackamas (or anywhere for that matter) many things should be taken into consideration in order to effectively make a feature out of natural boulders (not concrete, that brings in a whole additional set of potential problems) that would require the least amount of maintenance (for example, boulder and channel particle size, discharge, hydraulic radius, high flow recurrence interval and so on...)

- In my opinion, it's pretty easy to come up with some basic figures using math, but hydrology rarely imitates science, so unless you can do a scale model (like XXX claims to do), you should pretty much plan on taking a while to fine tune it.

Permitting, bureaucracies, etc.

- And the permitting [issue] is also a good point. It is a lot of effort to push something [like this]. Not impossible but [it] would require some tenacity.

- But therein lies the biggest realistic issue…meeting the vast amount of permitting and construction conditions of approval.

- I can assure you that dealing with the numerous obnoxious sovietized agencies will be the biggest challenge. I really really hope I'm wrong, but just be ready...