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24 March 2015

Christina Schroeder  
USCOE  
1600 North Avenue West  
Suite 105  
Missoula, MT 59801

Re: Application # NOW-2010-01566

Dear Christina:

Please accept these comments from Montana Trout Unlimited (Montana TU) regarding the application of the City of Missoula and Brennan's Wave, Inc., for a permit under Section 404 of the Clean Water Act for proposed whitewater drop structures and other constructed features in the Clark Fork River in downtown Missoula. Montana TU represents more than 3,800 conservation-minded anglers, including around 600 in its Missoula-based chapter. Montana TU and its volunteers have been active for five decades in advocating for conservation and restoration of the Clark Fork River, its water quality and its fishery. We have an acute interest in any activity that seeks to modify the function and form of the Clark Fork River. Please consider these comments as complimenting those you might receive from the WestSlope Chapter of Trout Unlimited.

### **Proposal Purpose and Need**

The primary purpose and need of the project is unclear because the proposal speaks to at least five separate activities, most of which could be considered independently. They include:

- **Improving the diversion for the Flynn-Lowney Ditch** – The stated purpose is to reduce the need for periodic maintenance of the diversion and to create a safer structure for river recreationists. This activity, which project proponents often state is a primary priority of the proposal, could occur in the absence of all the other activities. It is unclear if in the absence of this

application from the City of Missoula and Brennan's Wave, Inc., and their willingness to pay for the work, whether the Hellgate Valley Irrigation District, the owner of the ditch and diversion structure, would be seeking approval to improve the diversion. The District is not a named applicant in the Corps permit application, or in the 124 permit being reviewed by Montana FWP.

- **Construction of whitewater drop structures** – Improvement of the diversion, and all other features in the permit application do not depend on construction of the whitewater drop structures. Some in-stream structures, such as several large, wings and the aquatic organism passage (AOP) channels are only necessary if the drop structures are constructed.
- **Aquatic Organism/Novice Boater Passage Channels (AOP)** – These structures are necessary only if whitewater drop structures are approved. They have no relationship to the diversion or any other of the proposed activities.
- **Shore improvements and access** – All these features could be constructed without the drop structures and enhanced diversion structure. Similarly, the rock deflector for the island is not needed to improve the shore and public access. ADA-compliant trails could be constructed anywhere in the Clark Fork corridor, and an upstream vein could be constructed to enhance the existing poorly located boat ramp without all the other activities proposed in the permit application.

The Corps should consider analyzing the effects of a proposal that simply improves the diversion structure, which is often cited as a primary objective of the whole proposal. It appears, however, the proposal to improve the diversion, construct access features and shore improvements, and build passage features for fish and boaters are meant solely to enhance public acceptance of the primary objective of this proposal: The construction of artificial whitewater structures spanning the active channel of the Clark Fork River. The fact that the applicant is the City of Missoula and Brennan's Wave, Inc., and not the Hellgate Valley Ditch Company reinforces this. It is entirely possible to accomplish every stated benefit of the proposal – aside from creating artificial whitewater opportunities – without constructing whitewater drop structures. This would result in added safety for floaters, significantly less fill placed in waters of the U.S., and far less disturbance and manipulation – and need for mitigation -- of the active channel, floodplain and aquatic community. Further, it would significantly reduce the need for monitoring and maintenance.

It is worth noting that the need for the whitewater features is somewhat obviated by the presence of Brennan's Wave, an existing artificial whitewater feature constructed upstream eight years ago.

## **Project design and modeling**

The project design, and stated benefits and impacts, depends on flawed or incomplete hydraulic monitoring (River Design Group 2015). The model calibration appears to underestimate 95 percent exceedance flows, and overestimate 5 percent exceedance flows. Coefficients used for determining substrate roughness included values not expected to be found in the Clark Fork River. Further, the hydraulic analysis for the AOP was completed using side slopes of 4:1, when the drawings submitted for the permit indicated the geometry would be trapezoidal in form at 1:1. RDG concludes that HEC-RAS modeling was not appropriate because it is not well suited for calculating split flows, which is prominent in this proposal. It is probable that both 2-D and even 3-D models can't capture the full range of hydraulic conditions expected in this proposal while still accommodating fish passage of all species and life stages (Kolden 2013). Nowhere in the applicants' document could we find an analysis of how the project will affect sediment transport and morphology. It would be important to include this because it could better inform how much future maintenance will be required. Because the amount of fill involved and the modification of form and function associated with this project is significant, it is essential that modeling and design be rigorous and that conclusions resulting from it include a high degree of scientific certainty. The information provided for the application falls substantially short.

## **Fish passage and entrainment**

It seems reasonable the Corps should ensure that any structures it permits in the Clark Fork River downtown provide for upstream fish passage of all fish species and life stages present at most if not all flows. Certainly it makes sense now that the Corps and other agencies have ensured that the Clark Fork system is open for movement of fish and other aquatic organisms after being blocked for 100 years by a dam at Milltown. Telemetry, trapping and tagging data collected by Montana FWP indicates that the Clark Fork River in downtown Missoula is a key migratory corridor for fish moving among the upper and lower Clark Fork, lower Bitterroot, Blackfoot and Rock Creek mainstems, as well as into key spawning tributaries such as Rattlesnake Creek, Marshall Creek, Deer Creek and other streams.

The website ([www.maxmissoula.org](http://www.maxmissoula.org)) of the public proponents of Max Wave (a group that is organized under the existing entity Brennan's Wave, Inc.) says this about their proposal: "*Structures placed in the river are designed to not only function as a recreational amenity but also not affect the floodplain, not affect the river's sediment transport systems and not inhibit native species fish migration.*" Further, the site says: "*We plan to work with fish biologists on the design and studies have actually shown increased fish populations in whitewater parks.*"

The proposal fails to meet these objectives. First, based on the design and the likelihood that fish passage will be impaired, it does not appear Brennan's Wave,

Inc., and the City of Missoula did indeed “work with” professional fishery biologists in designing the project. Further, the proposal before the Corps provides no evidence that fish abundance increases in whitewater parks. A recent review of published literature (Aqua Dulce Freshwater Consulting 2015) uncovered no research backing this up. However, there is empirical evidence that whitewater parks can impair fisheries. Fox (2013), in fact, found that measured fish biomass (trout sp.) in a whitewater park (WWP) in Colorado was lower than reference sites, and that movement of even adult trout (>150 mm) through the WWP was up to 30 percent less than in the reference reach. Kolden (2013) used a 3-D model to characterize hydraulics at the same location and found that even 3-D models did not accurately characterize hydraulics of features constructed for WWPs. This underscores that 1-D modeling presented by the City and Brennan’s Wave is not sensitive enough to demonstrate that the drop structures provide hydraulics that are friendly to fish seeking cover, which is a common claim of project advocates. Toe velocities and grouted surfaces, among other issues, could reduce the value of the structures as holding areas.

Besides the studies that looked at the impacts of whitewater parks on fish, the published literature is rich in studies demonstrating unequivocally that fish passage is reduced or eliminated when structures such as low-head dams (which the whitewater structures resemble), culverts, rock weirs and other features modifying river hydraulics are present.

The AOP channels are problematic for fish passage. First, the trapezoidal geometry lacks hydraulic complexity, and the depths and velocities are uniform. Further, the use of grout in the substrate will limit roughness and the ability of certain fish species or life stages with low-burst speeds from using the features. In addition, the minimal interstitial spaces in the AOP channels reduce the ability of small or young fish to evade predators.

The hydraulic analysis the applicants submitted focused almost solely on accommodating upstream passage for bull trout, which are among the strongest swimmers of the fish species found in this reach of the Clark Fork. Published literature on swim speeds indicates that though the AOP channels might accommodate adult forms of salmonid species, it is unlikely, given uniformity of discharge, depth and lack of roughness that juvenile salmonids and even adults of native non-game forage species such as suckers or sculpins, can navigate the passages. And therefore, it appears the proposal does not comport with the proponents’ stated goal that the project will not impede movement of native fishes.

The location of the AOP channels will almost certainly increase entrainment of fish in the ditch. Once fish ascend the channels they are likely to rest at the head of the ditch because it is the first slow water they will encounter. Entrainment studies indicate this could result in some fish entering the ditch and drifting with its current. It is also possible that downstream moving fish could be entrained at higher densities in the ditch because the new diversion structure is designed to be more

efficient at diverting river flows, and, the design for the drop structures could move the thalweg further north at some river stages. The proposed project does not include a fish screen to deal with entrainment, which could implicate an unauthorized take of one ESA listed species, bull trout.

It is worth noting that the AOP channels are also meant to serve novice boaters and other recreationists who choose not to navigate the whitewater drops. Presumably many of these recreationists will want to use the formal boat ramp on the south side of the river. The Corps is being asked to approve a rock deflector on the upstream of this ramp, presumably to make it more serviceable to more folks. The problem is that novice boaters who navigate the AOP channels will be hard put at most discharge stages to ferry across the river from the exit of the lower channel in order to get to the ramp. Some may opt (in fact the project sponsors cite this as an acceptable option) to take out on the island on the north side, thereby increasing foot-traffic impacts on the riparian restoration site the applicants say will serve as wetland mitigation for the project. The location and design of the whitewater features could very well be unfriendly to floaters who want to avoid the drop structures. This impact has not been accounted for.

## **Mitigation**

The applicants propose mitigating the project's impacts to wetlands and form and function of the active channel, banks and floodplain by enhancing vegetation on the 4.4-acre island formed by the irrigation ditch. The details we have seen in the application materials are vague. They don't describe the species or planting density to be employed, nor the physical and biological outcome they are shooting for. The application talks about species that *might* be used. Importantly, they don't explain how you can mitigate wetland loss by enhancing vegetation on a tract that they are also promoting as a site for heavy public recreation. In addition, the diversion structure, rock wings of the AOP channels and rock deflector at the bottom of the re-vegetated island will constrain floodplain function and sediment movement, which seems counter to wetland restoration. The proposed mitigation is of little value, and it does not offset the significant disturbance this project entails.

Though not necessarily in the purview of the 404 permit, the activities proposed for the south bank above the low-water mark are similarly contradictory as site improvements. The applicants say they will improve the appearance and biological function of the bank by removing the current riprap material. But they also plan on hardening some of the bank and slope to the low-water mark with rock wings and access paths. In addition, they laud the natural values they will purportedly restore with "interspersed pockets" of native riparian plants and trees on the bank – but plan on locating rock terraces there for public use. Encouraging public use in an area where restoration of native vegetation is a priority is like planting willows along grazed-over banks then locating salt blocks for cattle in the same area. It is not going to work.

We can't comment in detail on whether the methods for construction include a minimum-impact approach, nor on the proposed mitigation. The descriptions of how construction will occur, and how impacts will be mitigated are too general. A description of how fish will be salvaged during construction is not apparent in the application materials. It should be.

### **Life of project and maintenance**

We cannot find any description of the life of project in any of the applicants' materials. Nor are there descriptions of anticipated maintenance needs. It is apparent, however, that the modeling for determining shear stress as and potential scour needs validation in order to determine with confidence the long-term stability of all the structures proposed for the active channel and floodplain. Determining project life and future maintenance needs is important for reasons of cost, but also, critically, to anticipate how much future disturbance will be required to maintain the structures. A primary selling point of the applicants is that this project will reduce the frequency of the ditch company disturbing the river channel to modify its diversion. However, if these structures degrade or fail, the type of disturbance necessary to repair them – channel dewatering, construction of coffer dams, significant release of sediment and bank disturbance – could exceed what currently occurs with the existing structure.

It is instructive to recognize that the existing Brennan's Wave showed significant degradation from scour only five years after construction was completed. This necessitated equipment and disturbance in the channel for a short-term fix a year later. Missoula County, which approved the project under the Natural Streambed and Land Preservation Act (the "310 law"), expected Brennan's Wave, Inc., to complete the repairs shortly thereafter. On its website, Brennan's Wave, Inc., -- co-applicants to the Corps for the Max Wave project -- told its supporters it would complete repairs in 2013. The work has yet to proceed. A spokesperson for Brennan's Wave told the Missoula City Council at a meeting in February 2015 that the organization did not have the funding for the work, but it would still complete repairs by the fall. Neither the City of Missoula nor the Orchard Homes Ditch Company, which Brennan's Wave, Inc., says owns the structure, has stepped up to repair the feature.

Our point: The projected project life for Brennan's Wave as well as an adequate funding source for expeditious repair was never considered when that feature was approved. One of the co-applicants for the Max Wave is responsible for Brennan's Wave. It is not unreasonable to expect Brennan's Wave, Inc., and its supporters to repair the existing feature – and to establish a fund to ensure future maintenance can occur expeditiously – before the Corps and other regulatory agencies grant the group and City approval to construct a much more complex project.

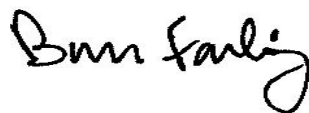
## Recommendations

The Corps should not permit the current proposal. It entails too much adverse impact to natural river processes, aquatic life and recreational use. The modeling, engineering and design simply aren't rigorous enough to ensure impacts will be minimized. However, technical evaluation by FWP and Montana TU indicate the impacts are likely to be significant enough that they cannot be offset through the mitigation options proposed or available. The Corps could, however, consider evaluating, permitting and approving mitigation for improving the irrigation diversion without the whitewater drop structures. Revegetation of the island is simply not appropriate as mitigation. Among the other mitigation measures that could be considered are requiring the ditch company to dedicate some of its water right for instream flows in the Clark Fork. The best way to do this permanently would be to convey a portion of the right to Montana FWP, which could then change the right permanently for instream flow purposes. A termed lease to a private party will not be adequate.

Any approved project should ensure upstream passage of all fish species and life stages present at most if not all flows. The Clark Fork River downtown is simply too critical a movement corridor for the regional fishery, which has significant ecological, recreational and economic values. Any approved project should not increase fish entrainment in the ditch. If increased entrainment is likely, especially any entrainment of bull trout, the project should be required to install a fish screen in the ditch. The screen should be designed to prevent entrainment of adults, juvenile and fry of salmonids. If the Corps approves any project, a third-party should be required to monitor construction to ensure project implementation comports with the approved plans. Finally, we strongly recommend that any approved project include a pre and post-project monitoring plan for fish and the invertebrate community. This should include a baseline biological sampling plan that the Corps and Montana FWP approve. Rigorous monitoring will be critical for determining the accuracy of the predicted effects, while informing proposals for subsequent projects of this type. Because the proponents have committed to create a project that has no negative effects on the biological community, we expect they will agree to this.

Thank you for the opportunity to comment. We look forward to our concerns and recommendations being reflected in the final decision.

Sincerely,

A handwritten signature in black ink that reads "Bruce Farling". The signature is written in a cursive, slightly slanted style.

Bruce Farling

Executive Director

cc.  
DNRC  
USFWS  
Montana FWP

## **References**

Morrison-Maierle. 2014. The Max Wave Project joint application package.

Aqua Dulce Freshwater Consulting. 2015. Memo to Montana FWP, MAX Wave biological resources bibliography.

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Fox, Brian. 2013. Eco-hydraulic evaluation of whitewater parks as fish barriers. Unpublished master's thesis. Department of Civil and Environmental Engineering. Colorado State University.

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