BUILDING SURF WAVES AND REMOVING DAMS ON THE ARKANSAS RIVER

Mike Harvey

Photo: Badfish SUP

Photo: Badfish SUP

THE STEEL TRACKS OF A VOLVO 340 D EXCAVATOR make a high pitch screech as they crawl along our high desert environment in Salida, CO. When an end dump truck drops a load of granite boulders on the ground you can feel the ground shake from 100 yards away. For me, these are familiar sensations and the soundtrack to the process of building river projects.

For the past 23 years, I have worked as a whitewater park designer for Recreation Engineering and Planning (REP, www.repwaterparks.com). Whitewater Parks are sort of a generic brand name that have been assigned to a wide variety of river improvement projects that all share the goal of increasing access to public waterways. The vast majority of rivers in the US have been impacted by industry and development. From dams to flood control projects, rivers in most towns are, "working" rivers, modified to suit the needs of the humans that live along their banks. Whitewater Parks are a solution some communities turn to to reimagine their river corridors as hubs of recreation that bring people closer to their river environment and drive economic stimulus.

I started working on developing a whitewater park in Salida back in 1999. Salida has a long history of whitewater paddling, sitting in the middle of the Upper Arkansas River Valley and surrounded by over 80 miles of world-class whitewater. Salida also hosts North America's oldest whitewater competition, the FIBArk Festival.

In the early days, Whitewater Parks were designed around whitewater kayakers. In 2009, I was working with the City of Salida to plan for two new whitewater features. At that time, my friend Zack Hughes had already started to shape river surfing boards in his garage. We were playing around with river surfing, looking for waves to ride all over the State of Colorado. I had the idea that instead of designing the typical, foamy-style hole favored by kayakers, we could try to make a wave that would stand up and have a green face to ride on a board.

The two features were completed in the spring of 2010 and were named the Office Wave and Scout Wave. Both waves worked well and the combination of these waves and Zack's boards were the inspiration for us to start our company, Badfish. While these waves were successful for the era, they only really worked well at high flows, which limited the surf season in Salida to years with big snowpacks and long runoffs.

Over the past 12 years, river surfing has exploded and it's fair to say that in most whitewater parks around the Country, river surfers have become the dominant user group. There have also been improvements in the technology used to create the waves. In places like Bend, OR, Boise, ID, and Denver, CO, there are modern waves that allow surfers to ride shortboards and make more powerful, ocean-style turns.

The downside to these modern features is they have operable elements that require constant attention and semi-regular maintenance. There are also increased capital construction costs associated with this type of structure.


Photo: Evan Stafford

In Salida, this type of feature was a non-starter for reasons related to the costs and permitting requirements. So, when we set out to come up with a design plan for the Scout Wave 2.0, which would replace the structure built back in 2010, we had to meet the challenge of designing a modern surf wave that wouldn't require a bunch of moving parts. Additionally, the Arkansas has flows between 250 cfs-1000 cfs for 85% of the year. Instead of a wave that only functioned at the highest range of flows, what if we could have a rideable wave during most of the year?

For this project, I was working with Spencer Lacy and his brother Mason Lacy. Spencer and Mason are the sons of the REP founder Gary Lacy, who is a legend in whitewater park design, as well as my mentor. Spencer was able to travel to Europe to check out some waves, including the legendary Eisbach Wave in Munich. I did a couple of trips to the CityWave at Lakeside Surf in Lake Chelan, WA. This is a completely artificial wave pool, but we were interested in studying the hydraulics up close and it ended up serving as a major source of inspiration.

Our team took all this research and combined it with our understanding of the existing structure and the local conditions in the Arkansas River in Salida to develop a design we thought would work. Thought is the operative word here. Ultimately, rivers are unforgiving to mistakes and we never know for sure what we've built until we have water flowing over a structure.

We started the Scout Wave 2.0 project construction in early September 2022, with a team of contractors we have worked with extensively over the years. Working in a river channel requires some very specific techniques, including the construction of temporary cofferdams to "dry out" your work area. Spencer and I were on site nearly every day working with the contractor to ensure that the geometry of the structure was achieved, and our contractors were a great check against ideas that we had that weren't very easily constructed.

One of the coolest parts of the project was working with Spencer who is 18 years younger than me and someone I have watched grow up. In addition to being a world-class paddler, Spencer is an engineer with a master's degree from UC Berkeley. I come to the table with a lot of experience all over North America in building structures in rivers, but Spencer had new ideas and a fresh perspective that helped push me out of my comfort zone.

The day we turned the water loose was among the most stressful days of my life. We had invested so much into this design and we were about to see if our assumptions would be borne out by the water flowing downhill over our concrete and rock feature. Seeing the results is never automatic. You have to shape the pool below the drop and the run in above,

Photo: Badfish SUP

Dangerous Low-Head Dam on the Arkansas Finally Removed!

While the Scout Wave has attracted a lot of attention over the past year another project has gone a long way to improving conditions for river runners on the Upper Arkansas River. The Mt. Shavano fish hatchery dam was built in the 1950s to divert water for the hatchery. The dam was classic low head dam, 6' high and river wide. The shape of the dam created a "drowning machine" style hydraulic at the base and was the location of multiple drownings over the years. In 1988 the State of Colorado modified the dam to include a boat by-pass and the City of Salida built a boat ramp in an effort to encourage boaters to float into town.

In the 1990's the rise of whirling disease, an ailment that impacted rainbow trout grown in the State's hatchery, became such a problem that essentially all the rainbows died out of the Arkansas. A state law prevented hatcheries from using river water so the dam became obsolete. Throughout the early 2000's there were conversations regarding the need to remove this dam. I wrote a report in 2008 for the Arkansas Headwaters Recreation Area that detailed the remaining impediments to downstream navigation and proposed solutions at each structure. The "Silver Bullet" irrigation diversion downstream of Buena Vista was the first to be improved and in 2019 the diversion structure in Granite was improved to include safe boat passage. The Salida low-head dam was the last to come out, but this fall it was finally removed along with the boat passage. From the Stone Bridge takeout below Browns Canyon to Salida we now have ten miles of Class I-II. This section of river has grown in popularity with anglers and boaters alike over the years and the dam continued to be a hassle at best and a deadly hazard at worst.

The river through this reach has been restored in the character of the reach, Class I-II moving through large granite boulders. While it will take a few years for vegetation to move back into the overbank areas that were inundated by the dam; in a few years most people passing through the area will not be able to tell there ever was a dam.

to get the proper hydraulic response. The result was about a day and a half of Spencer and I chewing our fingernails and running back and forth waiting for the magic moment when the wave would (hopefully) appear.

I always pour myself into these projects. There's really no other way, but this one had so many layers of meaning for me personally. Salida is my home. My friends would be riding this wave and my kids love to surf and they have grown up playing in the Arkansas. So yeah...I was a nervous wreck. And then, when the last scoop of cobble had been moved out of the pool, we saw it. The wave popped. It literally changed from a foamy hole to a green wave in a matter of seconds, and I was euphoric.

I hugged Spencer and called my son Miles and Zack to get down there and surf. When I saw Miles rip across the wave the first time it was just pure joy. The river was only running 350 cfs. If we had a wave at this flow, I knew it was possible that we had achieved what we had set out to do.

The Scout Wave 2.0 worked extremely well over a large range of flows from 300 cfs to 1600 cfs. At high flows last summer, for a short period, the wave turned into a powerful hole and posed a hazard for some crafts, especially fishing rafts that often run this stretch of river through town. Spencer and I spent the better part of five weeks minding the feature and testing modifications to the drop in real time with large sandbags placed by a crane and smaller sandbags placed by hand. We also continually tested the safety of the feature by swimming through the hole and running it in a variety of craft.

Anytime you try something new, you know going in there will be a learning curve and the Scout Wave taught us a lot. The opportunity to do 1:1 modeling of modifications to the drop at higher flows was a powerful learning experience for us and we have a project planned for January 2024 to revise the drop to address the issues we experienced at high flows.

Over the past season, the river surfing community has descended on Salida to experience the Scout Wave 2.0. River surfers are by far and away the fastest-growing segment of river users here in Colorado. River surfing is bringing an entirely new population of people to the river and this is both exciting and raises some challenges. Traditional whitewater paddle sports have a degree of mentorship built in and a longer learning curve, which promotes a culture of safety. River surfing has a much shorter learning curve with some people achieving a level of competency in the first few days. This means as we welcome these users to the river communities like Salida and Colorado Parks and Wildlife face new challenges around safety and creating regulations that address the needs and concerns of a completely novel user group. The most exciting aspect of river surfing for me to witness is the way that it has energized local kids. I raised two whitewater paddlers in Salida, and I know first hand the investment of time and money required to teach a kid to be a whitewater paddler is not realistic for many families. However, river surfing's lower barrier to entry has allowed a diverse group of local kids to develop a passion for the Arkansas. A common site in Salida in the summer is a local kid riding their bike with a PFD on and a bodyboard under one arm. I am encouraged that river surfing is helping to grow the next generation of river advocates.

The Upper Arkansas River has been a working river since the late 1800s when Europeans first settled this valley. From the mines near the headwaters in Leadville to ranches along the river between Buena Vista and Salida, the Upper Arkansas River served the local industries through the late 19th century through the first half of the 20th century. Salida, or "exit" in Spanish sits roughly in the middle of the valley between the high alpine headwaters and where the river spills onto the eastern plains downstream of Canon City. In 1949 a new "industry" was born when the town of Salida put on a parade and race for some traveling European kayakers. The first FIBArk (First In Boating on the Arkansas) festival is in many ways a watershed moment where the extractive industries of the past began to fade from prominence and a new economy around the recreational opportunities afforded by the Arkansas began to take center stage.

Few locals watching competitors launch their canvas-covered fold boats into the Arkansas that June in 1949 could have imagined a future where local kids ride surfboards in the river just as dam builders a few years later could not have imagined that their work would someday be removed to accommodate hundreds of thousands of people floating the river. While the Upper Arkansas River continues to face the challenges of water availability and overuse; the transition to a healthier river and local economy continues. ■