Image courtesy of Eklutna Inc.

Workers descend 300 feet to the worksite located in a canyon bed.

Deconstructing the Eklutna Dam

Multiple agencies come together to remove obsolete structure

By Jessica Rohloff

Decades after it became obsolete and was abandoned, the lower Eklutna dam is finally being removed. Construction is ahead of schedule, under budget, and expected to be complete this fall. But it may only be the first step of a two-part process, and part two could prove to be more difficult. "The project is moving faster and going better than anyone expected," says Brad Meiklejohn, Alaska state director for The Conservation Fund. "Because it's gone faster, we've been able to stay under budget."

One of the ingredients that has contributed to the success of the Eklutna dam removal project was careful planning. The planning stage alone took fifteen months, according to Sam Barber, construction manager for Eklutna Construction and Maintenance, the company contracted to remove the dam. That time was spent evaluating different scenarios for tearing down the dam in a way that is both safe and cost-effective. "There have been a lot of challenges, but it [has] gone way faster and better than we expected, and, because it [has] gone faster, it's been able to stay under budget," says Meiklejohn. "We had a limited amount of money, and we said, 'Hey, let's see if we can pull this off with the time and money that we have.'"

So far, so good.

Eklutna Construction and Maintenance

Planning began in January 2015 and was finalized by February 2016, allowing preconstruction to begin. The Conservation

Aerial view of the large crane used to lower equipment to the deconstruction site.

Image courtesy of Eklutna Inc.

Fund raised $7.5 million for the project and contracted with Eklutna Construction and Maintenance for the work.

Because Eklutna Construction and Maintenance is a wholly-owned subsidiary of Eklutna, Inc., the Alaska Native Corporation that owns the land on which the dam resides, "They're motivated [and] have a lot of skin in the game," Meiklejohn says. "They're being very creative and responsible, finding the most cost efficient ways to do the work."

This is not a typical worksite. Workers must descend 300 feet down into the canyon to reach the work site. To accommodate this, a 400-step aluminum staircase was constructed to allow workers to get in and out of the canyon. During pre-construction, the crew removed trees from the canyon and put structures in place for emergencies. A helicopter pad was built, as well as a floodplain in the event workers need to get to high ground in a hurry.

There are additional factors complicating the deconstruction: the dam is constructed of seventy feet of century-old concrete, and because concrete continues to harden after it cures—even underwater—this particular concrete presents even more difficulties for those removing it.

By late July, workers had removed the top six feet of the dam. This part of the job was especially slow-going because the top ten feet of the dam are reinforced with rebar.

The original plan was to use hydraulic chippers to break apart the concrete dam, but that wasn't going as quickly as planned. So workers began drilling holes in the dam and filling them with a substance that expands overnight to crack the concrete. The material is similar to spray foam insulation used in residential homes, but it's strong enough to break 100-year-old concrete and is completely inert (so it does not impact water quality).

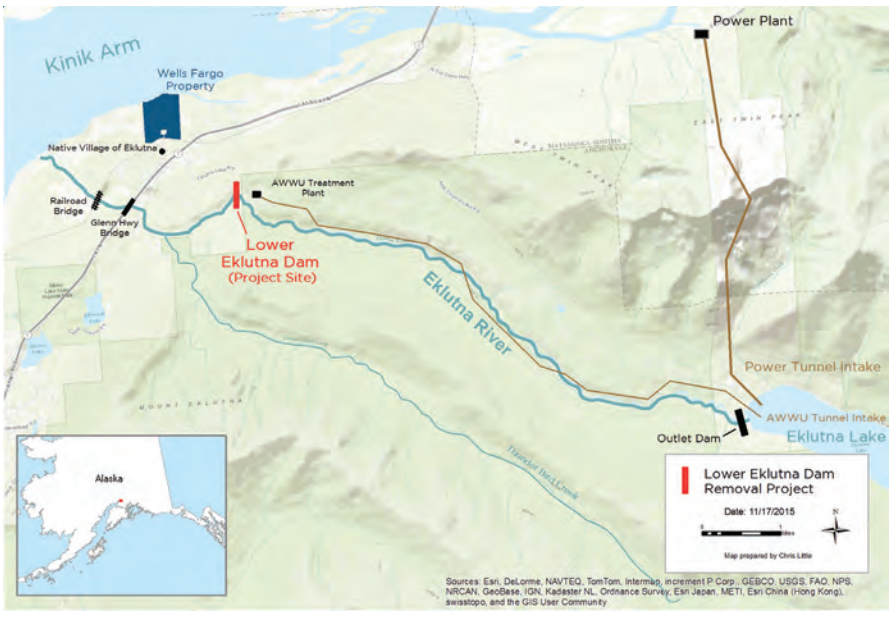
The next step for the workers is to install pipes to divert water that's coming through the dam around the worksite, so the sediment removal and concrete-breaking cycle can continue.

In order to get bulldozers and other heavy equipment down into the canyon, project managers employed the services of the largest crane in Alaska. The crane was initially slated to be used at a different job site this summer, but Barber says they expect to have it back around the middle of September. It should take six to eight weeks to chip the dam down and prepare the riverbed so fish will be able to make passage "if and when there is more water," Barber says.

When the crane comes back, it will be to

Images of the lower Eklutna dam.

Images courtesy of The Conservation Fund



Map courtesy of The Conservation Fund

Map of the "plumbing" of the Eklutna River valley.

take equipment back out of the canyon—work is expected to be complete sometime this fall.

Sediment Management

When the lower Eklutna dam was decommissioned in 1955, it began to fill up with silt, sand, and gravel. To remove the concrete dam, the crew has to deal with seventy years' worth of built-up sediment.

None of the sediment is being removed from the canyon. Instead, it is being relocated so that the construction team can expose the dam face and chip it apart. The crew is working on the upstream side to push sediment back and over the top of the dam. "It's kind of an ongoing ballet to expose segments of the concrete itself," Meiklejohn says.

Significant thought went into sediment management because "we don't want a gigantic slug of sediment going downstream as the dam is removed," Meiklejohn says. "There are still five species of salmon in the lower river, so one goal of sediment management is to avoid inundating their habitat."

To be safe, The Conservation Fund hired a consulting firm to conduct a sediment transport analysis, since today there is infrastructure that did not exist when the lower Eklutna dam was built. As part of the conditions for one of the five permits needed for this project, infrastructure monitoring must be done. If sediment changes the hydraulics of any of the bridges downstream, it's likely that someone will have to come in and dredge the channel.

However, that is a relatively unlikely scenario because only ten cubic feet per second of water currently moves through the river. At that rate, it will take a very long time to wash away the sediment plug. This should give the entire ecosystem—both fish and infrastructure—plenty of time to adapt. Sediment is, of course, important to fish habitat. "The idea was that if we remove the dam, sediment would be allowed to return to the aquatic system," says Amanda Heath of the US Army Corps of Engineers. "Right now the Eklutna River doesn't have a great deal of gravel for fish to utilize for habitat."

It's a condition experts call a "sediment starved system." When the dam is removed, the fish habitat should be healthier. That said, without an increase in the volume of water in the river, "there's no certainty that additional fish habitat would form" and support the fish that are in the system, says Heath.

A Dream Made Reality

"Removing a dam is a big deal," Heath says. "You're asking for the environment that's already adjusted to having this dam go back to life without it." That's a big change but a welcome one for many involved in the Eklutna dam project.

There's been talk of taking down the lower Eklutna dam for decades. The Native Village of Eklutna even tried to raise money for the project in 2002. They inherited the obsolete dam through ANCSA in the 1970s, by which time the dam had already been abandoned by its previous owners.

Turnagain Marine Construction

Kodiak Channel Transient Float Replacement Results: Design-Build Ideal

When the City of Kodiak recently replaced its antiquated 1960s Channel Transient Float facility, it opted to solicit design-build proposals seeking a single entity—a design builder—to design and construct its new facility. "We wanted to make the project as economical as possible and take advantage of the opportunity for designers and builders to work together on the same team," says Kodiak Harbor Master Lon White.

Kodiak retained Amanda Wilson, president of Windward Project Solutions, to help initiate the project. Together, they devised a RFP that spelled out the owner's preferences and goals, along with performance-based specifications. The RFP served as evidence that the project was "shovel-ready," aiding the grant application process. "Design-build is a project-first mindset where meeting the performance criteria is of equal interest and value to the design builder as it is to the owner," Wilson says. "Clear expectations in a well-defined contract serve as the basis for getting what you want."

The RFP sought to identify a proposal that would provide the best value based on the proposer's technical response and price. Turnagain Marine Construction was selected as the design-builder, working with AJD Engineering as the designer and Transpac Marinas as the float builder.

The team finished the facility in record time. "A mere four months after [the] contract award, the project is complete and the float is operational," says Traci Stark of Transpac Marinas. "The project was delivered on time and below the owner's budget with no change orders or cost escalations."

The end product is a very heavy-duty, high-quality float system. Its design incorporated simple but new concepts that should have a long design life. "We will look at using the design concept for future float replacement projects," White says. "We are confident the design-build approach was the most cost-effective and efficient way to do the project."

Kodiak's project is a prime example of how design-build can be more advantageous than design-bid-build or low-bid project delivery, which are more prevalent in Alaska.

Design-build gives owners a greater chance of receiving a high-quality product. "The contractor is building a design that he helped develop," says Allen Danskine of AJD Engineering. "It's a design he is comfortable with and will work well with his particular skill set. And since he helped develop it, he wants it to work."

Additionally, design-build reduces the owner's risk and enables quicker delivery and better cost efficiencies since the contractor and designer are constantly working together. "All of the parties have a greater stake in the project," says Jason Davis, President of Anchorage-based Turnagain Marine. "Owners get more certainty of having a successful project and less chance of costs overruns and changes. They get the highest possible overall value."

For more information about the benefits of design-build project delivery, contact Turnagain Marine or visit the Design Build Institute of America's website at www.dbia.org.

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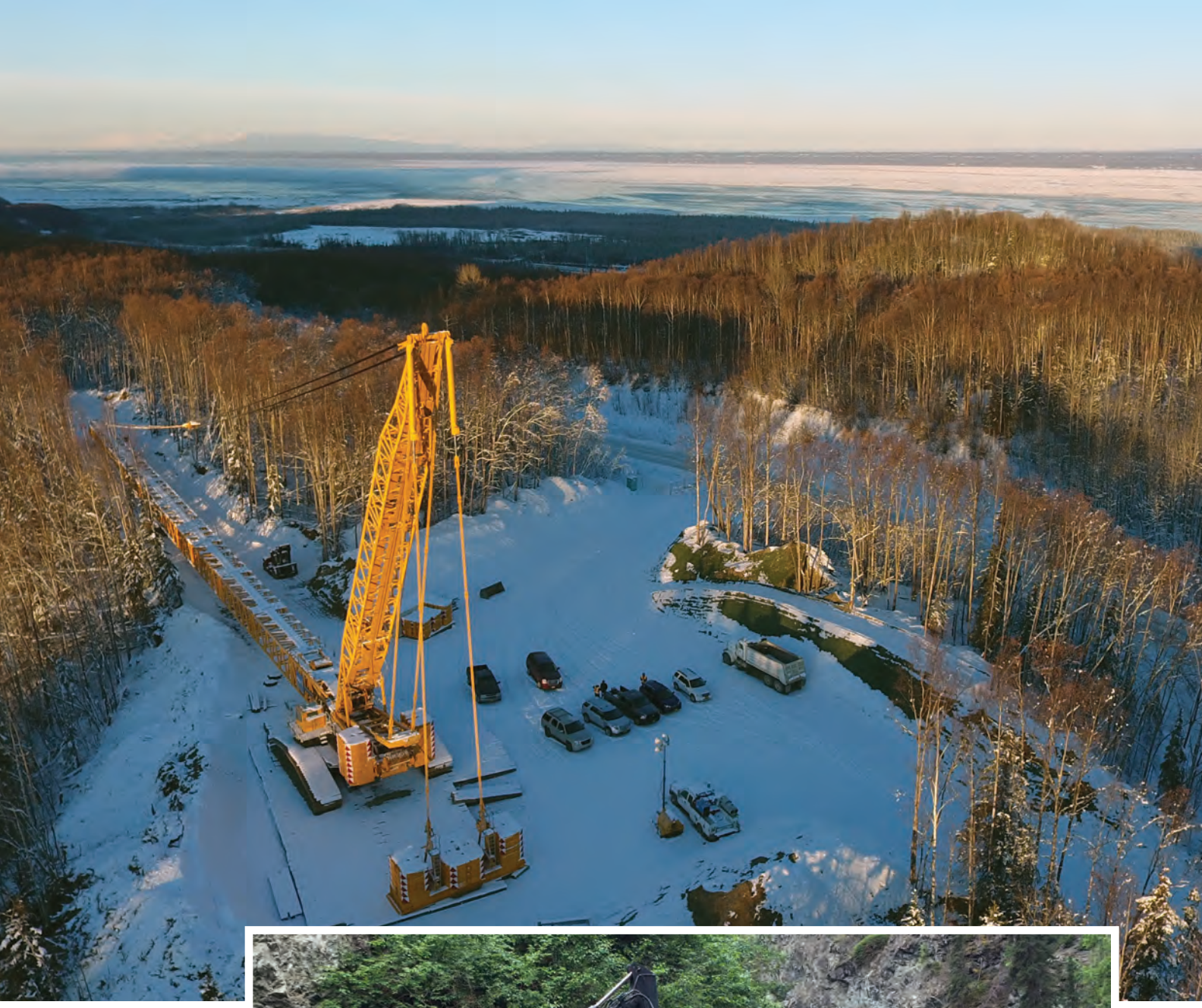

Work continues on the Eklutna dam removal.

Images courtesy of The Conservation Fund

Aerial photo of the largest crane in the state of Alaska, standing 396 feet tall. The crane is being used to place heavy equipment into the canyon.

Images courtesy of The Conservation Fund

In fact, according to Charles Cobb, dam safety engineer for the Alaska Dam Safety Program, this particular dam may have been obsolete even before it was replaced in 1955. "It wasn't a good place for a hydroelectric project in the first place," Cobb says. "The old dam was built down in a canyon and quickly filled up with sediment." For that reason alone, it may have been functionally obsolete long before it became officially so. "We were happy to see it go," Cobb says. "It was of no value to anybody and it was out of service."

The Permit Process

Seen from the outside, it's not too much of a stretch to call this project a miracle of bureaucratic efficiency. A massive project that was originally expected to take ten years to

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complete, in fact only took two; and securing the five different permits required to get the work done was no small feat. "The permit process went well because of the level of support we had from all the state and federal agencies involved," Meiklejohn says. He goes on to say the idea "wasn't completely unknown to the state and federal agencies." So when The Conservation Fund proposed to do it, "the constellation of state and federal government was right there. We had a lot of support from all the agencies involved, which was super helpful, especially on the state side."

Although the group didn't need permits from all of the agencies involved, they did need to communicate with all stakeholders in order to move forward. As Heath with the US Army Corps of Engineers points out, "there are a lot of moving parts. A lot of communication is involved in this process, which takes time. But in this case it worked pretty efficiently."

Much of the time it takes to prepare a permit is spent collecting environmental and scientific data. In this case, the US Army Corps of Engineers and the Native Village of Eklutna had already collected much of that data and provided "stacks and stacks of environmental studies" to the consulting firm that helped The Conservation Fund navigate the permitting process, which helped expedite the process greatly.

A Unique Dam Project

According to Heath, "Alaska doesn't take down dams every day"—making this project unique from the start. Meiklejohn points out, "This is the first dam removal for The Conservation Fund." He's already encouraged other people in the organization to cast around for similar projects. "We're having a lot of fun with this project and looking to do more of this kind of work."

Another aspect that's unique about the Eklutna dam removal is that no state or federal money is being used for the project. "That's been the hardest part of my job," Meiklejohn says, "to raise money. We're not done yet."

He made a strategic decision to stay away from state and federal money, "just to make the project go faster. When you involve state and federal money there's various strings attached. You're tied to those budgets, and they have long budget cycles, so you're in to multi-year appropriations, which is why a lot of these big dam removals have taken decades. You get the money in fits and spurts, and we just decided we're going to short circuit that and take a different approach."

The dam is also technically a historic property and eligible to be on the National Register of Historic Places. The project required a historic evaluation of the dam and approval from the State Historic Preservation Office before it could move forward. "Basically we're taking out a historic structure, so we have to mitigate that removal," according to that office.

In this case, historic mitigation comes in the form of a digital archive. Eklutna, Inc.

is building and will host a website to display and preserve all the documents related to the dam including photos, environmental and historical documents, and videos.

The Native People

The people of the Native Village of Eklutna have endured a past filled with challenges, Meiklejohn says. "They're the largest landowner in Anchorage, and people are beginning to recognize how much the Eklutna [people] have done for the community over the last hundred years."

"That village was put there because of the salmon resource," which the dam negatively affected. "I'm sure they weren't consulted, but that's the way business was done," Meiklejohn says. It's easy to "get into the axe grinding of history, but it's more meaningful to focus on the fact that we're putting that behind us and doing something good," he continues.

Eklutna, Inc. CEO Curtis McQueen agrees: "We prefer to be proactive and lead with carrots rather than sticks. Our belief is that it won't be productive for us to focus on the past, complaining about what happened and that the dam is there."

"In some ways I think things are coming full circle," McQueen continues. "A dam that was built without our permission is coming down, and it's physically being taken down by us. We get to be the ones to take it down, even though we didn't put it up in the first place… We are the aboriginal people," says McQueen. "We're the ones this project is for, and we provided a lot of real estate for infrastructure. We know a city needs drinking water, electricity, and all the things that utilities do. We appreciate those."

With the dam being removed, McQueen says, "We are in the early processes—with a lot of different stakeholders and a tremendous amount of help—we're going to study how much water is needed to make that river whole again."

What Happens Next?

McQueen believes the river will require several years of rehabilitation once the dam is removed. "There will be studies of salmon habitat and discussions with the utilities and [the] City of Anchorage about trying to get some water back into the watershed."

Once the lower dam is removed an in-stream flow study will be conducted. The goal of the study is to "figure out exactly how much water needs to be restored to that river to maintain natural processes and support the salmon," says Meiklejohn.

When the old dam is removed, there is enough water "coming past the dam right now to let some fish get up past. If you make sure they don't have rubble in the way—and I think the construction crew is going to do a good job of that—the fish will be able to pass upstream and lay their eggs," says Rick Sinnott, former Alaska wildlife biologist. "There is some rearing habitat upstream now," he says. "There are pools that probably don't freeze all the way to the bottom in wintertime, and the creek seems to flow all winter long."

A 400-step aluminum staircase was built to access the worksite in the Eklutna River canyon.

Image courtesy of The Conservation Fund

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Work on the dam removal continues even in snow and ice.

Image courtesy of Eklutna Inc.

The Conservation Fund's perspective is that "without water flows, we're wasting our money. We are very focused on defending our investment and making sure that the follow-on steps are coming," Meiklejohn says. He's confident that they are.

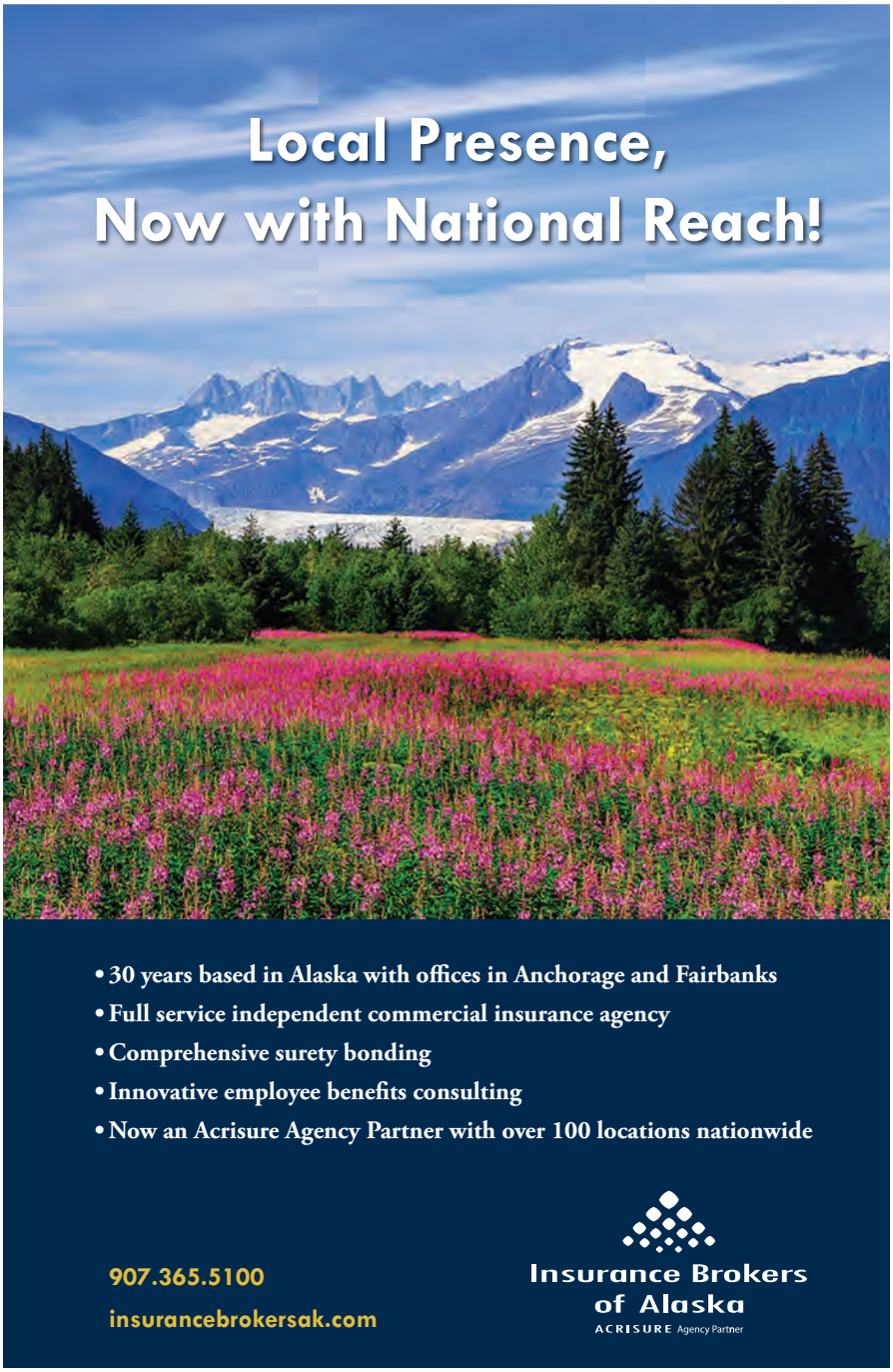
McQueen believes the project is going to have a life for the next five to ten years, but "none of it means anything without that concrete dam coming down."

A Two Step Process

Taking down the dam is really phase one of a two-phase project. "One of the problems with this project is that there's an upper dam, and no water comes out of the Eklutna Lake unless there's a really big storm event," says Ron Benkert, habitat biologist for the Alaska Department of Fish and Game. "Getting more water is going to make or break the response from fish," Benkert says. "There's a watershed there, but as far as we can tell, there's no place else to get water. There's not a whole lot of habitat."

According to Meiklejohn, "The water situation is going to be the harder part of this project, and it's a piece that we don't necessarily control."

Meanwhile, Heath adds, "With no increase to the flow of the river, there's no guarantee that removing the dam would improve the fish habitat." So even though taking down the dam is an improvement, there's still a lot of uncertainty about whether or not additional fish habitat will form.

As far as the ultimate outcome, time will tell. "It's surprisingly complex, but I think it's all solvable," says Meiklejohn. "If I didn't believe it were solvable we wouldn't be spending $7.5 million just to take out a stupid piece of concrete." ☼

Jessica Rohloff is a freelance writer and aspiring Alaskan.