Oregon Farmers Design a Breakthrough for Fish, Growers Alike

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Floods racing off Mount Hood in 1996 nearly destroyed the little Farmers Irrigation District. Its water intakes in the Hood River Valley were in ruins. The small hydroelectric plants that brought in revenue were shut down.

"We were broke," says Jerry Bryan, the district's project manager. "We were fundamentally bankrupt."

The district then did something more befitting NASA or Intel than a bunch of tapped-out apple and pear growers. It launched its own research and development program, employing high-tech design tools and computational fluid dynamics. The goal: Build a better fish screen.

The district wanted a screen that would keep protected salmon out of irrigation intakes while reducing exposure to damaging debris.

Today the district has patented a screen design that could promote a revolution in fish protection while saving farmers time and money. The design is innovative in its simplicity: Unlike traditional screens installed across the Pacific Northwest it has no moving parts and cleans itself.

The new screen freed the district from costly maintenance that almost sank it. No longer do its screens clog with glacial silt washing off Mount Hood, and they're safe from destructive floods. Now the district is making money.

A curious group from New Zealand flew in this year to see how the screen works and is interested in installing some.

The irrigation district launched a nonprofit to take what it calls the Farmers Screen commercial and reinvest the proceeds into rural communities.

"Our deep, dark secret is that taking care of fish makes us a lot of money," Bryan said. "Screening became the key element to our fiscal success."

If the 1996 floods provided the opportunity to create the new fish screen, windsurfing provided its inspiration.

Dan Kleinsmith got a job at Farmers Irrigation District just before the floods hit. The one-time windsurfer ended up helping unclog fish screens so water could keep flowing to the hydroelectric plants.

After the floods, the irrigation district had two choices: Shut down, or try to come up with a better way of drawing water from the unpredictable and silty Hood River.

The way district leaders saw it, there was only one choice.

"The alternative was no alternative at all, which was to give up," Bryan recalls. "There wasn't a lot of vision. There was a lot of desperation."

The district set Kleinsmith up in a windowless building once used for cold storage. He and others, including his brother, Mike Kleinsmith -- now the district manager -- started building models of fish screens, seizing on a new approach a couple of farmers had tried.

They sat around a big round table and tossed around design ideas. Then they'd go build trial versions.

Traditional irrigation diversions often work against the water: They try to manhandle streams, routing them into screens. If the screens are vertical, water shoves fish and debris against them. To a windsurfer like Kleinsmith, that made little sense.

"When you windsurf, you don't try to control the wind -- you try to work with the wind," he said. "It's kind of like a Zen-like thing."

They pursued a different design: The screen is not vertical, it's horizontal. Water flows through a flume and over the flat screen. This, by itself, wasn't new.

But such flat screens long suffered from problems: Water dropping through them pulls fish and debris down against the surface, clogging the flow.

"I probably spent more hours staring at fish screens than anyone I know," Dan Kleinsmith said.

They wanted water to wash fish and debris over the screen. Yes, some water would drop through the screen as it passed. But if the forward current moved fast enough it would propel fish, sticks, stones, leaves and any other debris across and beyond the screen.

The trick was to slow the water dropping through the screen. Then it couldn't draw fish and debris down very hard.

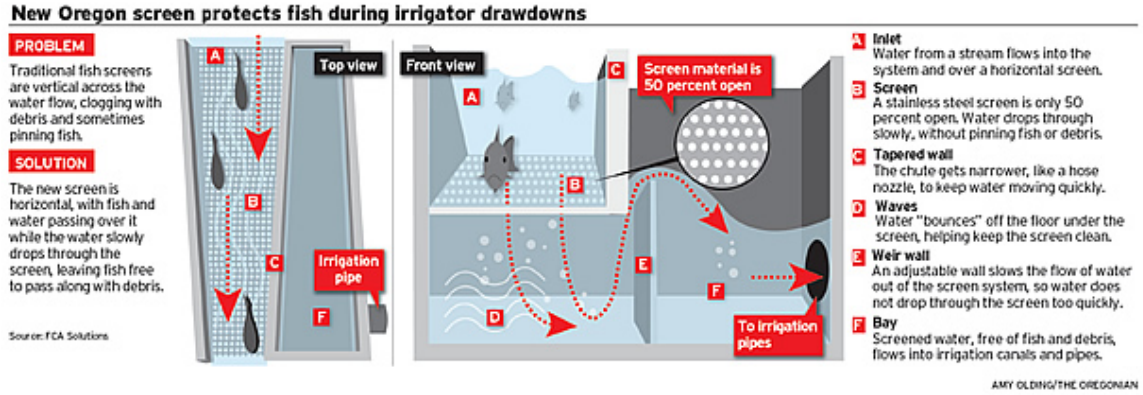
They did this in a few ways: First, the screen itself is a metal plate full of holes and is only 50 percent open. So water passes through it slowly -- only a small fraction of a foot per second.

Also, the water flows forward through a chute that narrows like the nozzle of a hose. That keeps the water moving quickly -- about four to six feet per second. In short, water moves over the screen faster than it drops through the screen.

This keeps fish speeding ahead.

Also, water dropping down through the screen must also rise back up and over an adjacent wall, further slowing it down.

The design is not suited to all conditions: There must be enough slope in a stream to keep the water moving fast enough. But Kleinsmith and others have built commercial versions in all sizes and have a small, modular version that can be quickly assembled.



"If the flood of '96 hadn't come through, none of this would have happened," he says.

When the district started installing the screens in its own diversions, its leaders knew they were on to something.

"It turned our problems around overnight," Bryan recalls.

No more debris clogs. No more shutting down the hydroplants. What was good for fish, it turned out, was good for farmers, too.

This proved as revolutionary as the screen itself.

"You had a relatively conservative bunch of farmers thinking that protecting fish was a fiscally responsible thing to do," Bryan says. "When we started paying attention to fish criteria, our debris problems went away."

It also opened for the Farmers Irrigation District an enormous market opportunity.

More than 50,000 irrigation diversions in Oregon do not have fish screens. Thousands more exist in other Western states. Not all are large, or suck up many fish, but some do.

Every fish that ends up in an irrigation ditch means one less in the rivers -- and for endangered salmon species, one fish can be extremely valuable.

The district patented the screen. It created Farmers Conservation Alliance, a nonprofit corporation in Hood River, to market the screen around the West. The nonprofit will invest revenue back into rural communities to support energy and water conservation projects.

The Natural Resources Conservation Service provided a $529,000 "conservation innovation" grant to promote the design, calling for 56 installations by 2011.

The nonprofit's first installation of the screen is up and running in the Lacomb Irrigation District east of Albany. The Oregon Department of Fish and Wildlife and NOAA-Fisheries in conjunction with the Fish America Foundation all contributed.

"I think it's going to solve a lot of our problems," said Dean Castle, chairman of the board of the Lacomb district.

"These guys came up with an innovative solution to a definite problem," said Kerry Griffin of NOAA-Fisheries, the federal agency that oversees threatened salmon. The agency doesn't normally fund new technology, but it contributed to the Lacomb installation to get the new screen design in place.

"We thought it offered so much promise, we wanted to help move it along," he said.

From the view of farmers, the money saved from not having to unclog screens and the uninterrupted hydropower revenue means more money for improving their irrigation systems to save water. That, in turn, helps fish.

While investing profits back into communities may seem generous, Bryan said, "whenever we address the common good, we do better."