THE FARMERS SCREEN

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In the spring of 1996, a 100-year flood on the north slope of Oregon's Mt. Hood caused massive destruction to roads and highways as well as to the irrigation infrastructure that supplies water to the Hood River Valley's fruit orchards. The Farmers Irrigation District (FID) lost their entire diversion and conveyance system. Before the flood, FID had been spending approximately $90,000 a year in maintenance, cleaning, and regular repairs to their river intake screens, which were vertically oriented. Faced with rebuilding their irrigation system, FID partnered with local farmers, irrigation district employees, engineers, agencies, and nonprofits with the goal of producing a fish screen with no moving parts, that is self-cleaning, and that is safe for anadromous fish at all life stages.

The result of a decade of research and development is the Farmers Screen: a horizontal, self-cleaning flat plate fish screen with no moving parts (Figure 1). The Farmers Screen is designed to be installed in an off-stream channel. It handles high sediment and debris loads very well. This is especially important on glacially fed rivers and streams or systems with high organic debris loads. Biological and hydraulic testing as well as ongoing monitoring at several operational screen installations has demonstrated that the Farmers Screen is safe for fish at all life stages. Since the installation of the Farmers Screen at FID's surface water diversions, FID's maintenance costs have decreased and revenue has increased as a result of uninterrupted flow through FID hydroelectric power plants. Surplus dollars are invested in other irrigation system improvements to conserve water, which in turn helps to protect fish and agriculture alike.

Figure 1. The Farmers Screen in Operation, Farmers Irrigion District's Davenport Screen (80 cfs) was the first installation installed in 2002.

HOW IT WORKS

The Farmers Screen uses the physics of water movement to reliably screen water while safely sweeping fish and debris back to the river system. Simply put, water enters and flows across the screen surface at a high velocity (4-6 feet per second) while water moves very slowly through the screen on the vertical axis (0.1-0.4 feet per second). The combination of a high sweeping velocity and a very low approach velocity keep fish and debris moving across the screen without impinging against the screen.

A solid weir wall maintains the water depth over the screen as well as regulating the flow through the screen (Figure 2). A taper wall decreases the cross-sectional area of the screen flume as water is taken through the screen, which maintains the high sweeping velocity through the entire length of the screen. Also, there is an oscillating velocity that occurs randomly and at all times on the screen which creates a pulsing action that continually flushes back up through the screen material. High velocities under the screen keep sediment from settling out.

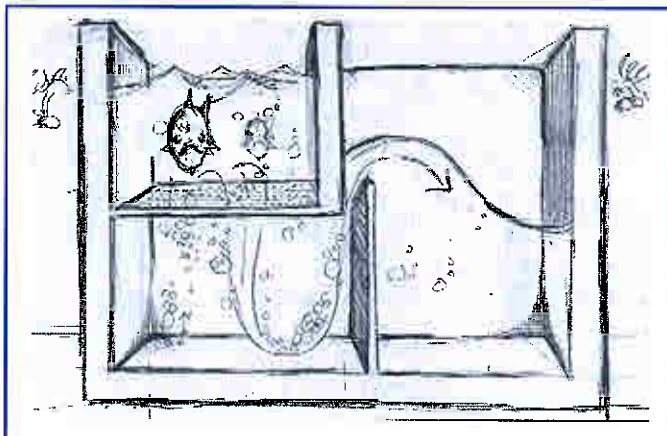

Figure 2. Cross Section View Illustrates Diverted Water Flowing Through Screen Material and Over Weir Wall to Attenuation Bay.

The Farmers Screen is available in modular designs for diversions from 0.25 cfs to 16 cfs. Larger diversions can be accommodated through custom designs including dual configurations that can accommodate wide flow ranges. The Farmers Screen can be scaled to effectively screen any diversion size.

HOW IT WORKS FOR COMMUNITIES

FID patented the new screen technology and licensed the patent to the nonprofit Farmers Conservation Alliance (FCA), charging FCA with the duty to take the screen to market and invest all profits into programs that benefit fish and farms. FCA officially began operation in

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