



Temperature Control Device at Shasta Reservoir – Photo Credit: Winetta Owens

Dramatic declines in winter-run Chinook salmon populations resulted in their listing as a protected species in 1989 under the federal and California state Endangered Species Acts. One of several factors limiting salmon populations is egg and fry mortality associated with elevated water temperatures in the upper Sacramento River. Before the installation of the Temperature Control Device, cool water was bypassed through the spillway from 1987 through 1996 at an estimated cost of \$63 million to supply approximately 1,500,000 megawatt hours of replacement power.

The TCD was a two-year project completed in 1997 at a cost of \$80 million to design, fabricate and install. The 9,000 ton, 300-foot tall steel frame structure is supported on the upstream face of the dam, and includes a low level intake structure. A series of gates open and close to take water from various levels of the reservoir. In the summer months, water temperatures in Shasta Lake can vary from 80 degrees Fahrenheit near the surface to 45 degrees near the bottom. The TCD allows operators to open a combination of gates which access cold water needed to meet the 56 degree water temperature target.

Results have been dramatic. This "fish-friendly" device provides flexibility to operate Shasta Dam for salmon protection and recovery, hydroelectric power production and deliver Reclamation's critical water obligations downstream. During the first two years of TCD operation, reducing bypass flows provided for 300,000 megawatt hours of power generation.

The Shasta TCD represents a winning collaboration of technology, biology, and economics working to meet the needs of our customers and the environment. On April 23, 2002, the National Hydropower Association presented the Bureau of Reclamation with a 2002 Hydro Achievement Award in the category of Technical Solutions for its state-of-the-art Shasta Temperature Control Device.

For more information on the Temperature Control Device, please visit:  
[www.usbr.gov/pmts/hydraulics\\_lab/pubs/PAP/PAP-0845.pdf](http://www.usbr.gov/pmts/hydraulics_lab/pubs/PAP/PAP-0845.pdf)