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## **Kleinschmidt Project Concludes Successful River Restoration in Maine**

The Penobscot River Restoration Trust (PRRT) restoration was one of the largest river restoration projects in the United States that encompassed several hydroelectric projects and multiple dams. The project involved removing two seaward dams (Great Works and Veazie), improving fish passage at three sites, constructing two powerhouses to replace lost energy generation, and culminated in the decommissioning of the Howland Dam and design/construction of an innovative fish bypass channel. Although the dam removals, new powerhouses, and improved fish passages were at the heart of PRRT's 16-year efforts, the crowning achievement was the Howland Decommissioning and Bypass Channel Design.

The function of the bypass channel balances river hydraulics, geomorphic principles and biological needs in an innovative, interdisciplinary design that is unique to applied fish passage engineering. The hydraulic design required a delicate balance of maintaining impoundment levels while maximizing the amount of flow that enters the fish bypass channel during the fish passage season to facilitate fish use, providing suitable water velocities for fish to swim against, while also providing a suitably robust condition to withstand flood flows over a large range in design flows, and doing so with a passively operated, low-maintenance system.



The project design was fully collaborative between the science and engineering teams, the project proponents, and regulatory and resource agencies – all of whom resoundingly agree on the multi-faceted success of the project. Fish passage effectiveness studies have shown that fish passage survival and efficiency is near 100% and exceeds the performance standards set by agencies to support species recovery. The project has also meet the needs of the local population to assure agreed-upon impoundment levels, and to provide an amenity to the Town of Howland.

Kleinschmidt Associates works primarily with energy companies in North America to protect and enhance the environment without compromising performance. We work at the intersection of regulatory requirements, environmental science, and engineering solutions. For half a century, Kleinschmidt has been bringing new ideas to the table, offering practical solutions to tough problems and sensitive issues. Our goal is to bring energy, water, and the environment into balance.