Reeling in the Leaks: Adaptive Engineering Solutions for a Historic Dam Rehabilitation

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Built in 1925, the Panther Pond Dam in Raymond, Maine has long served as both a recreational resource and a critical fishery management structure for the Maine Department of Inland Fisheries and Wildlife (IFW). The dam regulates flows from Panther Pond into Sebago Lake and is used to attract spawning landlocked salmon from downstream waters. During peak spawning season, hundreds of salmon can be seen ascending the dam's fish ladder, an iconic scene for local residents and biologists alike. The dam consists of two concrete ogee spillways, a sluice gate, earthen embankments, a fish ladder, and a fish hatchery building along the downstream riverbank. After nearly a century of service and numerous patch repairs, the dam was showing its age, including a persistent leak at the right embankment adjacent to the downstream spillway retaining wall, an issue documented as far back as the 1980s. Over the years, multiple failed attempts had been made to address the leak and the sinkholes that developed as a result. Recognizing the need for major rehabilitation, IFW partnered with GEI Consultants to design improvements that would ensure long-term reliability, address the persistent leak, and improve flow control for salmon management. The plan included driving new 35-foot-long sheet piles upstream of the spillway, as well as demolishing and reconstructing the spillway and sluice gate structure for improved flow management. After the new sheet piles and spillway were in place, the upstream cofferdam was removed, and almost instantly the downstream leak reappeared. However, this time it was pouring into an open excavation where the new downstream retaining wall was to be rebuilt. With dye testing inconclusive and the salmon spawning season quickly approaching, GEI, IFW, and the contractor collaborated to implement a solution involving well point dewatering and design adjustments to capture the leak within a filtered seepage collection system. The system worked, allowing construction to continue, and when all was backfilled, the leak was fully controlled. This presentation will explore the century-long struggle with this stubborn leak, the adaptive engineering decisions made in the field, and how innovative design and collaboration restored the dam's safety, reliability, and ecological function—just in time for the salmon run.