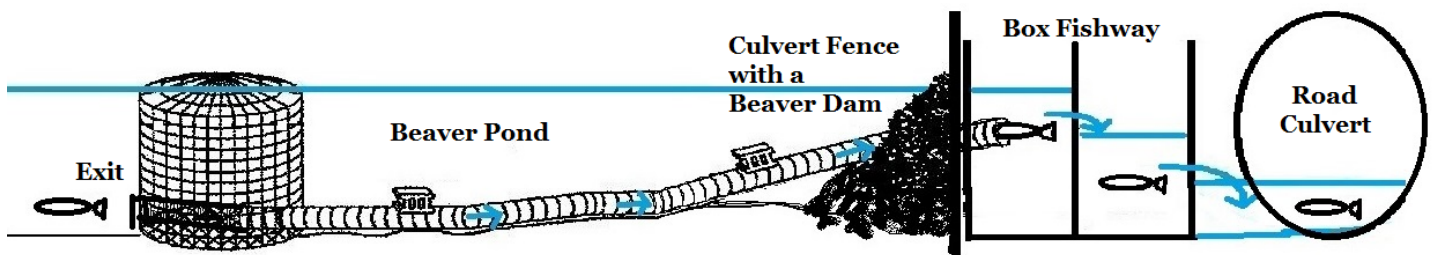# *The Snohomish Pond Leveler*

Beavers commonly dam road culverts because with relatively little work the roadbed becomes a big dam. Road culverts dammed by beavers can be major road safety and maintenance problems, and can also obstruct fish passage. In very dry seasons freestanding beaver dams can also be obstacles to fish movement. Breaching dams, opening culverts and removing beavers can be difficult, labor intensive and expensive. The most cost-effective, long-term and fish-friendly solution to this problem could be the installation of a Snohomish Pond Leveler. See the diagram below.

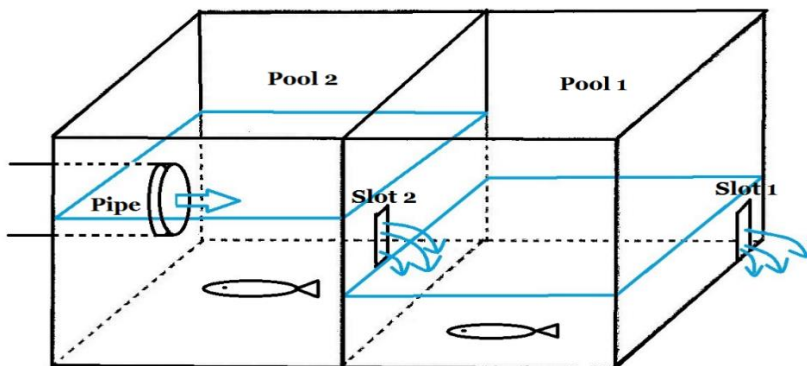## Snohomish Pond Leveler Diagram

Beaver and salmon have coevolved over millennia. Scientific research has shown that beaver dams on natal streams increase juvenile salmon survival and growth. More beaver dams on salmon producing streams generally means more salmon. Therefore the best management practices for salmon include beaver dams.

Most road culverts can be protected from beaver damming with a properly designed Fence and Pipe flow device, but traditional designs often blocked adult salmon passage. The Snohomish Pond Leveler (SPL) is an innovative flow device that cost-effectively protects road culverts from beaver damming while facilitating adult salmon migration. The SPL has fish-friendly adaptations at both ends of a traditional pond leveler flow device.

As a migrating adult salmon exits a road culvert it is attracted to the slotted box fishway by water gushing from Slot 1. See diagram below. Using its burst speed an adult salmon can quickly swim through Slot 1 into Pool 1. It is then attracted the flow of water at Slot 2, through which it can swim into Pool 2. Pool 1 is 15"- 18" deep and Pool 2 is 30"- 36" deep. The fish can rest in the eddy outside Slot 1, or in Pools 1 or 2.

Two Slot Fishway Diagram
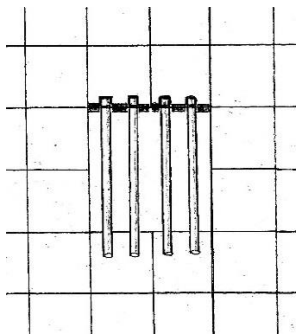

Box Dimensions:
3'W x 8'L x 4'H

Slot Area =
50% of Pipe Area
to create the pools.

Once in Pool 2 a salmon will next be attracted to the outflow of the 30-40 foot long pond leveler pipe. The water velocity in the 15" diameter pipe is well below salmon sustained swimming capabilities. The pipe creates a direct hydrologic connection between the beaver pond and Pool 2. The fish can easily swim from Pool 2, through the pipe, and into the beaver pond. This route bypasses the culvert protective fence and beaver dam obstacles. Since water seeks its own level, the beaver pond surface is nearly equal to the water level in Pool 2.
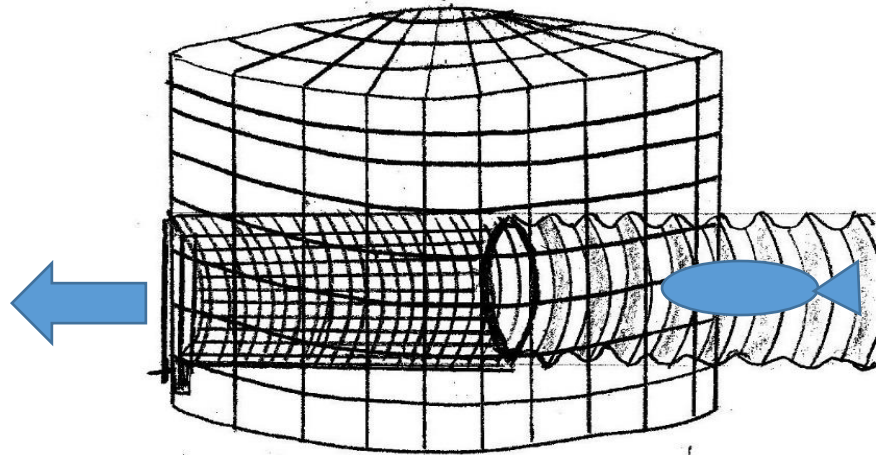
One key to the effectiveness of the Snohomish Pond Leveler is the restricted slot area. The area of each slot is reduced to half the cross-sectional area of the 15 inch diameter pond leveler pipe. Small slots create pools in the box. Each pool dissipates water energy, creates eddies, and decreases the water velocity in the pipe by 50%. In addition the Pool 2 backfills the entire pipe with water. All of these design factors assist adult salmon passage.

As a salmon exits the pond leveler pipe a wire mesh cylinder over the pipe safely guides it straight through a one-way door exit to the open water of the beaver pond. See diagrams below. The one-way door allows the fish to safely and easily exit the device and prevents beavers from getting inside the fence to block the pipe. Once through the one-way door exit the salmon are free to continue their upstream spawning journey.

<div align="center">

One-Way Door Exit   SPL Intake Fence with Fish Passage

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The Snohomish Pond Leveler makes it possible to better manage two Keystone species, beavers and salmon. It is the most cost-effective, long-term, and fish-friendly option available for salmon passage at beaver damming sites. Rather than trapping beavers and breaking their dams this device allows beavers to remain on the landscape which can increase salmon populations as well as the myriad of species that rely on these two Keystone species for their survival. The Snohomish Pond Leveler is an innovation that can profound improve salmon recovery.

<div align="center">

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