



The Truth About Culverts...

CULVERTS CREATE PROBLEMS WHEN THEY ARE:

- Undersized
- At the wrong elevation
- At the wrong slope

CULVERTS CAN BE FISH PASSAGE BARRIERS DUE TO:

- Water Surface Drop
- High Velocity
- Low Water Depth
- Low vertical clearance

Improperly designed culverts negatively impact stream processes and fish passage. These culverts interrupt the natural stream processes that build and maintain habitat in a multitude of ways.

HABITAT IMPACTS FROM CULVERTS

Holding back streambed sediment needed to replenish the streambed downstream.

- This results in coarsening of the streambed downstream, where smaller material has washed away and not replenished. This impacts salmon that need specific small gravel for spawning.
- This also causes the streambed elevation to drop downstream of the culvert, disconnecting the stream from its floodplain.
- An over-coarsened bed can cause water to flow subsurface.

Constricting stream flow, which increases the water's velocity as it moves through the culvert.

- This causes unnatural erosion and scour downstream of the culvert.
- This can wash out salmon redds and flush small juvenile salmon out of the stream before they are ready.

"Locking" the stream in at a specific location and elevation, not allowing it to move laterally or vertically.

- This reduces channel complexity and habitat quality for salmon.

Preventing downstream movement of wood, which is important for quality habitat.



Fish passage barrier due to low water depth



Water crossing with restored fish passage

Planning a bridge or culvert project?

- Start by contacting your WDFW Area Habitat Biologist.
- Scan QR Code for more info!



Department of Community Development
Your Partner in Building Safe, Resilient, and Sustainable Kitsap County Communities!

Culvert photos from Washington Department of Fish and Wildlife Fish Passage Inventory, Assessment, and Prioritization Manual (2019).

WHY AREN'T FISHWAYS A LONG-TERM FISH PASSAGE SOLUTION?

The Golf Club Hill Road culvert replacement project included removal of a log weir fishway downstream of the concrete box culvert.

A **fishway** refers to any structure, such as a fish ladder, designed to help fish (typically salmon) pass through, around, or over an impediment.

The log weir fishway consisted of over 15 log weirs spaced apart over approximately 1,000 feet downstream of the culvert. Since the culvert had a concrete bottom set at a fixed elevation, it did not allow the streambed of Chico Creek to move up and down vertically and it held back streambed sediment and gravel that would normally move downstream. The culvert was too small and constricted the stream flow, increasing the velocity of the water exiting the culvert. This high-pressure flow eroded a scour pool at the outlet of the culvert.

Over time, the elevation of the streambed downstream of the culvert dropped because new streambed sediment was not coming down to replace it. The water rapidly exiting the culvert continued to scour out the streambed at the culvert outlet. These impacts combined to create a vertical drop out of the culvert that was difficult for fish to navigate.



The log weir fishway at the outlet of the Golf Club Hill Road culvert caused additional impacts.

FISHWAYS ARE A TEMPORARY FIX

- Fishways are fixed, engineered structures that do not function like a natural stream.
- Fishways impact habitat by altering flows, limiting lateral and vertical movement of the stream channel and bed, and disconnecting the stream from the floodplain.
- Fishways can become fish barriers if not designed and maintained properly.

The log weir fishway was installed as a temporary solution to make up the elevation difference between the perched streambed upstream of the culvert and the degraded streambed downstream of the culvert. The fishway broke up the water surface drop at the culvert outlet into many smaller, more passable drops spaced out over 1,000 feet.

However, the fishway required frequent maintenance and created habitat impacts of its own. For this reason, the culvert replacement project also included removing or cutting the weirs and restoring the stream channel where the fishway was located.



Chum salmon jumping over Chico Creek weir. Photo credit: Alison O'Sullivan, Suquamish Tribe