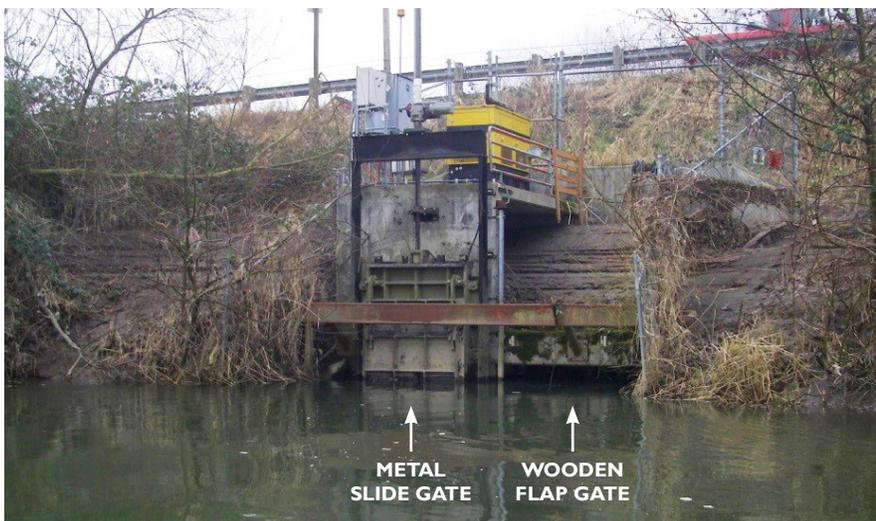


## Clear Creek Tide Gates

The tide gates where Clear Creek drains into the Puyallup River are unreliable and bad for agricultural drainage and fish passage. How can they be improved?



Clear Creek drains one of the most unique agricultural areas in the Puget Sound region, with a mix of large wholesale farms and smaller direct-market farms all within a five-minute drive of Tacoma and I-5. However, agriculture in the area is limited at times by poor drainage and flood risk. Before draining into the Puyallup River, Clear Creek flows through two tide gates which are intended to prevent backwater flooding.

The tide gate on the right in the photo above is a wooden flap gate. No one knows who owns and is responsible for maintaining this gate.

The tide gate on the left is a newer metal slide gate installed by the Port of Tacoma in 1997 as part of a mitigation project. The slide gate operates using a float-trigger system which triggers raising and lowering the slide gate when water levels in the Puyallup River meet certain pre-set elevations.

### Operation of the tide gates is not ideal for:

#### AGRICULTURAL DRAINAGE

The longer the tide gates are open during non-flood conditions, the faster water can drain from Clear Creek into the Puyallup. However, the wooden gate defaults to shut and, prior to September 2017, the slide gate closed more frequently than designed.

#### FLOOD PROTECTION

The wooden gate is in poor physical condition, creating concern that it could fail in a flood event. In the past, the slide gate has not necessarily been reliable, and it may have been open during the 2009 flood event.

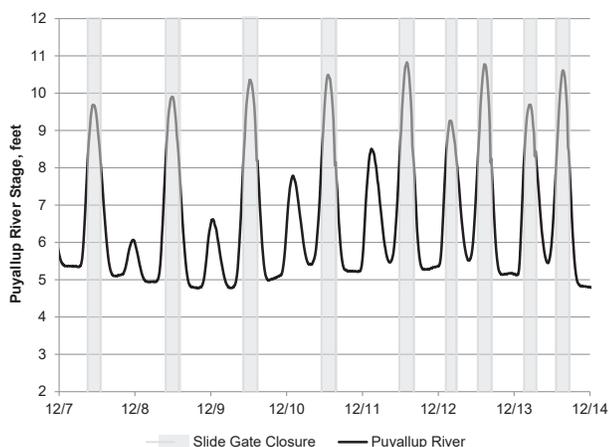
#### FISH PASSAGE IN NORMAL CONDITIONS

The wider the tide gates are open, the easier it is for fish in the Puyallup River to pass through the gates and access habitat in the Clear Creek area. As noted for drainage, however, the tide gates are not operating to maximize the width and duration of opening.

#### FISH PASSAGE IN FLOOD CONDITIONS

During a flood, the tide gates are fully closed in order to prevent backwater flooding. However, this also prevents fish access to potential refugia (i.e., shelter from high flows and predators) in the Clear Creek area.

## The Farming in the Floodplain Project conducted an assessment of how the tide gates operate – and how they could be improved.



Using water level data gathered by Pierce County Surface Water Management, the Farming in the Floodplain Project (FFP) assessed how the tide gates are currently operating. One major finding was that the slide gate raised and lowered at river elevation 8.2 feet. The graph to the left shows the elevations of the Puyallup River and the periods when the slide gate was closed for a week in December 2016. The graph shows that partway through the week the gate started to close twice a day instead of once a day.

Design documents for the tide gate show the gate is supposed to close when the river reaches 12.5 feet and open again when the river is at 12 feet. If the tide gate were operating as designed, it would have lowered no more than twice in a year, as opposed to once or twice per day.

### What can be done with the tide gates to improve conditions in the Clear Creek area?

Pierce County plans to remove the tide gates in order to reconnect the Puyallup River to refugia habitat. This is part of the proposed Clear Creek Floodplain Reconnection Project, which would also include a new levee in the Clear Creek area to replace the flood protection currently provided by the tide gates. Because it could take years for the proposed Floodplain Reconnection Project to be designed and constructed, the FFP looked at potential actions that could lead to interim improvements in how the tide gates operate, including:

#### Changing the open/close trigger of the slide gate

The FFP recommended resetting the slide gate to the design trigger elevation in order to improve drainage and fish passage and to reduce wear and tear on the mechanisms of the gate.

#### Modifying the wooden gate

The FFP also recommends modifying the wooden tide gate to allow it to open more frequently. This could be done with a winch and cord that would support a portion of the gate's weight.

#### Replacing the wooden gate

The wooden tide gate could be replaced with a new, more reliable flap gate. A lightweight metal side-hinged gate would open and close more easily.

#### Installing orifices for fish passage during flood events

Small orifices could be installed that would allow fish passage from the Puyallup River to Clear Creek when flows are high. This is an unconventional idea that has been implemented in King County near Duvall.

Pierce County and the Port of Tacoma have already taken action to implement the first recommendation. In September 2017, the Port of Tacoma and Pierce County reset the trigger elevation of the slide gate to approximately 12 feet, the design elevation. This will allow water from Clear Creek to drain into the Puyallup River more efficiently and will hopefully reduce maintenance problems since the motor will be functioning much less frequently.



The **Clear Creek Tide Gate Assessment Technical Memorandum** can be found online at: [farminginthefloodplain.org/resources/](http://farminginthefloodplain.org/resources/)

### What is the Farming in the Floodplain Project?

The Farming in the Floodplain Project (FFP) is a collaborative project seeking to increase the understanding of agricultural viability and to analyze the impact of proposed changes to flood and hydrology systems on farmlands in the Clear Creek area of the Puyallup River Basin. The long-term goal of the FFP is to advance progress toward a collectively agreed upon plan for lands in Clear Creek that supports a thriving agricultural community while also meeting fish and flood interests. For more information, visit [www.farminginthefloodplain.org](http://www.farminginthefloodplain.org).