Flood Risk for Agriculture in the Clear Creek Area

Agriculture in the Clear Creek area faces complex flood risk from a number of vulnerabilities in the flood protection system, which is not resilient.

PHOTO CREDIT: Pierce County

How does flooding affect agricultural viability?

The level of risk from flooding varies for each individual farm due to differences in elevation, topography, crops grown, location, and techniques used. In general, the types of risks that floods pose to farms in the Clear Creek area include:

- Human health and safety is threatened, particularly for farmers who live on their farms in the floodplains
- Crops can be killed or their growth stunted from standing water
- Edible crops coming into contact with floodwaters are not suitable for human consumption
- Flooding can prevent or discourage farmers from planting cover crops
- Flooding can inundate and damage agriculture equipment and structures, such as barns
- Flooding is a risk to livestock

What is a resilient flood system?

Flood events are inevitable and, with climate change, are expected to increase in frequency and magnitude. Because there will be flood events on the Puyallup River and Clear Creek, a resilient flood system is needed to protect the viability of agriculture in the Clear Creek area.

A resilient flood system can be defined as one that can bounce back and recover from a flood event. Based on the following attributes, the Clear Creek area does not have a resilient flood system.

- Robustness (the capacity to withstand a disturbance without functional degradation) – flooding damages homes, threatens farm businesses, and requires evacuations
- Redundancy (the extent to which system components are substitutable) – a number of flood management system components are vulnerable and failure could cause significant flood damage
- Rapidity (the capacity to restore the system in a timely manner) – depending on the time of year and extent of damage, some farms may not be able to be rapidly restored

DEFINITION OF AGRICULTURAL VIABILITY

Agricultural viability can be defined as the ability of a farmer or group of farmers to:

- Productively farm on a given piece of land or in a specific area,
- Maintain an economically viable farm business,
- Keep the land in agriculture long-term, and
- Steward the land so it will remain productive into the future.

Puyallup River Flooding

The Clear Creek area was historically part of the floodplain of the Puyallup River, but was disconnected from the floodplain when River Road Levee was constructed in the 1910s. The Lower Puyallup River experienced major flooding most recently in 1996, 2006, and 2009. When the Puyallup River floods, Clear Creek can't drain and starts backing up, flooding the Clear Creek area.

River Road Levee

Farms in the Clear Creek area are protected from direct inundation from Puyallup River floodwaters by River Road Levee. Flood modeling conducted in 2004 concluded that the levee does not provide adequate freeboard (extra height above the 100-year flood elevation). In recent flood events, such as the 2009 flood, floodwaters have nearly reached the top of the levee. If the levee were to overtop or breech, farms in the Clear Creek area would be inundated.

Mud Mountain Dam

Mud Mountain Dam is located on the White River, a tributary that joins the Puyallup River just upstream of Puyallup. The dam is operated to lower peak flood flow on the Puyallup River. In recent years, aggradation (accumulation of sediment) in the White River channel has required a slower release of floodwaters from Mud Mountain Dam. During a flood event, this could keep the elevation of Puyallup River waters high for longer in the Clear Creek area.

Clear Creek Flooding

The Clear Creek area is regulated as a floodway due to the lack of freeboard on River Road Levee. Even if the levee were accredited, large portions of the Clear Creek area would be mapped within the 100-year floodplain due to backwater flooding of Clear Creek when Puyallup River levels are high. Floodwaters reached an elevation of 18 feet above sea level in the Clear Creek area in the 2009 flood and over 10 people had to be rescued.

Tide Gates

The Clear Creek tide gates close when the Puyallup River is flooding, stopping Puyallup floodwaters from entering the Clear Creek area. Flood modeling recently conducted by Pierce County shows that the tide gates protect farmland between the 16 and 20 foot elevations. However, one of the tide gates is old and poorly maintained, leading to concern it could fail in a flood event. Operations of the other tide gate have been unreliable and may have contributed to flooding in 2009.

Climate Change

Flood risk throughout Puget Sound is projected to increase with climate change. Heavy rainfall events are projected to become heavier, increasing peak flows. Sea levels are projected to rise. At the same time, sediment loads are projected to increase and the Puyallup River is predicted to aggrade, reducing channel capacity to handle the increase peak flows.

What can be done to protect agriculture in the Clear Creek area from flooding?

In addition to federal and local flood regulations and emergency management activities that help protect people and infrastructure from flooding, two projects that would reduce flood risk in the Clear Creek area are currently being pursued: the Corps of Engineers General Investigation for the Lower Puyallup and the Clear Creek Floodplain Restoration Project. Both projects could negatively impact farmland depending on the project design, but could also increase protection for farmland as well.

Other potential actions that could be taken to protect farms in the Clear Creek area from flooding include:

- Directly protecting agricultural properties from flooding,
- Reducing runoff from upstream areas of the Clear Creek Basin,
- Improving freeboard on River Road Levee,
- Altering the tide gates to improve the reliability of their operation and increase conveyance of flows from Clear Creek to the Puyallup River,
- Replacing undersized culverts in the area, particularly those under 44th Street East and Gay Road,
- Elevating homes, farm structures, and farm equipment in the floodplain, and
- Constructing "critter pads," elevated areas where livestock can gather during flood events.

More information on flood risk in the Clear Creek area is included in the ***Existing Flood Risk Conditions for Agriculture in the Clear Creek Area Technical Memorandum***, which can be found online at: **farmingthefloodplain.org/resources/**

How is the Farming in the Floodplain Project Involved?

Information in this factsheet was developed as part of the Farming in the Floodplain Project (FFP). The 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.farmingthefloodplain.org**.