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The two-dimensional nature of the lower Skagit River basin and its implication in making tough political decisions

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The Skagit River Basin located in Northwest Washington State (US) drains an 8,068 square kilometer basin. The river in the lower basin is confined between a 152.4 meter wide levee corridor for up to a 4% recurrence flood (25-year flood) but, in the event of levee failure, the river regains an 324 square kilometer floodplain that drains North to Samish Bay, West to Padilla Bay, and South to Skagit Bay.

In the 1970's, a flood insurance study was performed for the Federal Emergency Management Agency (FEMA) to determine the 1% recurrence flood (100-year flood) water surface elevations in an attempt to provide guidance on safer development in the floodplain. Without the sophisticated computer simulations that are being developed today, many simplifying assumptions had to be made. This included assumptions about how water would split in the various directions out to the bays. Issues such as elevated roads and development blocking flow routes were not factored in. An isolated levee failure from a flood in 1990 created water surface elevations that were 1.52 meters higher than the study predicted despite only being a 3% recurrence flood.

In 2001, a new study was commissioned using a FLO-2D model for the entire lower basin to better define the 1% recurrence flood. This model is a two-dimensional floodplain model that encompasses the entire lower basin by breaking this area into 24,000 121.9 meter by 121.9 meter grids. This model has all of the roads, levees, and sea dikes that direct flow coded in as well as removing the conveyance area that is blocked from development.

The current analysis is evaluating the flood elevations that occur from different levees failing and others remaining intact to better define the risk. Many runs are being done

to define conveyance corridors that will define a floodway where development will be restricted so the most dangerous areas of the floodplain are not developed and most of the flow can move through to the bays efficiently.

Some of the political challenges that are already being faced are that some of the 1% recurrence base flood elevations are up to 2.13 meters higher than the past study in some areas and it is unlikely the conveyance corridors will be able to avoid key parts of the cities. These political challenges will require using a variety of tools to convey the reasons behind these large changes in the assessment of their flood risk and to help with the tough decisions that will have to be made to improve this situation.