Flood Warning System Webinar
12-04-2017

Response to Questions Raised Via Chat Function

Chat Log:

1. **Patrice Kent (to Everyone)**: 12:12 PM: What was the cost estimate from the needs assessment? (other than "a very big number")

   With everything from the "wants" list, the total could have easily been in the $1-2 million range. In addition, some of the requests were not only expensive initially but costly to maintain as well. In any case, the total "wants" was much higher than the anticipated $250,000 budget.

   Our approach then became:
   1. Leverage existing gage resources to the maximum extent possible and avoid duplicating efforts.
   2. Identify and fill key gaps in gage network coverage based on experiences from the 2007 and 2009 flood events.
   3. Implement a web- or cloud -based data storage, management and display system that eliminated local computer equipment and IT staff needs.
   4. Develop inundation maps to graphically show areas of inundation for specific flood elevations. A library of inundation maps covering the anticipated range of flood elevations was prepared for each forecast location.

2. **French Wetmore (to Everyone)**: 12:48 PM: There are not many National Weather Service inundation maps at gage sites. Centralia's is almost the only one in the Northwest. What did the Flood Authority have to do to get one in its territory?

   Both the NWS and USGS have inundation map display websites. Both charge users to display the maps. In the case of the NWS, the cost to the Flood Authority for hosting the inundation maps on the NWS website was $30-40,000 which was in addition to the cost for all the hydraulic modeling and GIS mapping work to develop the maps in the first place. The additional cost would have simply been a duplication of that portion of the Flood Authority website.

3. **Scott Boettcher (to Everyone)**: 12:50 PM: What are the challenges of keeping and maintaining the Flood Warning System?

   Floods by definition, especially the larger events, are relatively rare. One locality may go years or even decades between significant events. Social and political interest can wane during long inter-flood periods which has the tendency to diminish support for necessary maintenance and inevitable technology upgrades needed over time. It is always my recommendation to develop a flood warning system with multiple purposes in mind. If the system serves agriculture, hydropower, fisheries, recreation, fire weather support, education, etc., system utility will be more consistent, and the community will have a broader base of social and political support to keep the system functioning effectively in the long term.

4. **Patrice Kent (to Everyone)**: 12:50 PM: Follow up: How does the original needs estimate compare with the current system (e.g., - finding existing infrastructure, etc.)

   The initial investment for the equipment, installation, inundation mapping, and start up was about $250,000 with an additional $50-60,000 for additional capital equipment and upgrades. Annual operations, maintenance and support costs have averaged about $60,000.

5. **Bryan Martinez (to Everyone)**: 12:50 PM: Excellent work. It seems that you have a robust flow data. Do you use the flow data to update the hydrologic models?

   The flow data for stream gages in the network are managed by the USGS. The two non-USGS gage, Chehalis near Centralia, and Skookumchuck at Centralia, were upgraded to provide more accurate and consistent stage readings and rating curves. The data are already being used operationally by the NWS for improved forecasts. After the new non-USGS gages were installed, it quickly became apparent that the existing gages were reporting unreliable data that were negatively impacting NWS forecasts in Centralia.

6. **Bob Montgomery (to Everyone)**: 12:51 PM: It appears you are working to improve NWS predictions - is the data you are collecting being used in any way in their forecast model? also - any opinion on their forecast model? Is there room to improve? Thx

   The precipitation and temperature gages initially installed by the Flood Authority, immediately began to contribute to improved NWS forecasts by filling gaps in coverage. The most recent additions, upgraded gages for the Chehalis River near Centralia and the Skookumchuck River at Centralia have had a measurable impact on NWS forecasts. The new gages and the new rating curves help the NWS better understand how flows are routed through that critical mid-basin region. The old gages' performance had deteriorated due to both aging gage technology and sediment buildup at the gage site, especially for the Chehalis near Centralia.

7. **Antonio Cotroneo (to Everyone)**: 12:52 PM: What are the cost of these systems for kilometers of river? Thanks.

   This is nearly impossible to answer in any definitive way due to the wide variety of watershed conditions (size, shape, topography, etc.), community needs, technologies deployed, and available financial resources needed for both initial estimate and on-going operations and maintenance. A very critical point is the critical need for local support and commitment to system operations and maintenance.

8. **Bob Montgomery (to Everyone)**: 12:58 PM: Do you mean real-time hydraulic modeling?

   Where I think the NWS can provide added flood forecast and warning is to implement real-time hydraulic modeling on the Chehalis. Currently, the NWS uses hydrologic routing to forecast the movement of flood waters downstream to Grays Harbor. Hydrologic routing does not work where there is significant backwater, tidal influences, or storm surge at the downstream locations. That's why the NWS river forecast stop at Porter with no specific forecasts of river elevations available at Montesano, for example, or Grays Harbor. Implementing hydraulic models on the lower Chehalis would enable the development of river forecast services on the lower 50 miles of the Chehalis River.

   The NWS has implemented real-time hydraulic models on other major rivers in the Pacific Northwest but haven't implemented them yet on the Chehalis.