

## Weiser River Flood of 28 February 2006

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### **1) Pre flood situation:**

A mild air mass persisted over Southwest Idaho during the last week of February with temperatures warming into the 50s and low 60s in the lower elevations of the Weiser Basin. This mild stretch of weather followed a very wet and stormy December and January which left an abundant snow pack at low and mid elevations in the Weiser Basin. The wet pattern was followed by a dry and seasonally cold two week period just prior to the flood. By February 26<sup>th</sup>, temperatures climbed to unseasonably warm levels. Night time temperatures were in the 50s which is uncommon in the heart of winter. This mild and moist air mass produced wet bulb temperatures in the 30s and 40s allowing rapid melt for several days. Rainfall over much of the area averaged two to four tenths of an inch during a wet Pacific System crossing the area. This amount of rain alone should not have been enough to produce the flood. However, a localized amount of nearly one inch at spotter Kevin Gray's residence 10 miles north of Council Idaho fell over the headwaters of the Weiser Basin. The stage was now set for the flood to occur as there were mild temperatures combining with heavy rain and a well above average snow pack.

### **2) Chronological timeline of events leading up to the flood:**

- The evening shift on the 27<sup>th</sup> continues to monitor area streams and rivers. The Weiser River stage at Weiser is 5.6 feet. The NWRFC has the trend rising steadily with a forecast crest of 9.2 feet the following evening, about 24 hours from the present time. This forecast was made based on a model run executed before they left for the evening. At this time a decision to not warn was made due to a high degree of uncertainty and ample time to refine and make further decisions. Instead, at 855 pm the Lead Forecaster issued an RVS Hydrologic Statement with these latest stages and trends.
- The midnight shift is briefed on the situation and continues to monitor the river during the night. At 5am the Weiser River at Weiser is 7.6 feet with a rising trend. There is no new forecast from the NWRFC as they are not on duty at this time. The river has risen two feet in nine hours but is still two feet from flood stage of 9.5 feet. A decision to not warn was made based on a continuing high degree of uncertainty. A new RVS statement was issued instead with the latest stages and trends. The judgment is that there is still time for a warning later if needed and with ample lead time.
- At 610 am the midnight shift Lead Forecaster calls to the station Hydrologist giving the latest readings on the river and trends. The river continues to rise but flood stage has not yet been reached. The call to the WFO Hydrologist serves to gather information and pass on the latest known information. The Hydrologist agrees to come into the office early to monitor the situation. A decision to not warn was made waiting for further expert assessment on the situation.

- At 620 am a call was made to the NWRFC by the Boise Lead Forecaster seeking out additional guidance and passing on the latest stages and trends on the Weiser River. The new stages and trends reinforced the fact that the forecast crest is low and too late as the river is rising higher and faster. NWRFC personnel were not on duty at this time but information was passed to the Portland Weather Forecast Office Lead Forecaster. He agreed to notify the NWRFC as soon as they arrive which is 6am Pacific Standard Time. The callback numbers to the NWRFC were not used because of the remaining uncertainty in the situation.
- The Boise Meteorologist in charge and WFO Hydrologist arrive at the office within minutes of each other around 650 AM. They receive a briefing by the midnight Lead Forecaster. At this time it was the Forecaster's judgment that everything was OK even though the river was rising faster than the Hydro models were indicating. Still, there is concern as the duties were handed off to the on coming day shift. There is no warning issued for the Weiser River at this time. The Station Hydrologist is now handling the Weiser River situation.
- At 819 am a Flood warning (FLWBOI) for the Weiser River is issued . The stage at this time was 9.0 feet which is a half foot below the flood stage of 9.5 feet. A new crest of 10.0 feet is now forecast by the NWRFC after a new model run with the latest data. The decision was made to warn at this point based on the rising hydrograph, a new higher crest by the RFC and a forecast to flood of 1 to 2 hours if routing time from the gauge to Weiser is applied.
- At 1015 AM the WFO Hydrologist issues an FLS statement with the latest forecast crest. The duties are then passed to the day shift Lead Forecaster. The Weiser River stage is now 9.5 feet (flood stage) and rising. The river finally crested at 11.0 feet Tuesday evening 02/28/06 then began to recede after cooler air arrived and rain ended. The actual crest ended up one foot above the original NWRFC forecast crest and warning lead time was two hours.

### **3) What went right or turned out OK:**

- A. No major damage from flooding occurred. Property damage was minimal in and around the low lying agricultural areas adjacent to the Weiser River as it flows south through Adams and Washington counties. Roads were not impeded until early Tuesday evening, many hours after the warning was issued.
- B. Actual flooding of the River occurred at a time when a warning was in place and emergency response had sufficient time to pre-position resources and mitigate flood damage.
- C. Staffing remained adequate throughout the event. Both routine and non routine products were issued on time and the public was kept well informed by FLS statements and additional RVS statements.

D. Positive feedback from Washington County Emergency managers was received. They felt they were well informed throughout the event.

**4) Things that could have been done better:**

A. Greater Flood warning lead time. This may have been possible but a combination of factors led to uncertainty with a delayed warning issuance.

B. Closer coordination with the NWRFC on the potential for flooding on the Weiser and a more proactive use of NWRFC callback numbers alarmed at the Lead Forecaster workstation.

C. A better effort to anticipate how much snow melt was contributing to the rapid rise in the level of the river. Snow melt modeling may not be adequate in all situations and needs to be adjusted on a case by case basis.

D. Make better use of the Flood Watch product in advance of the actual flooding event.

E. Compare observed precipitation in the Weiser Basin (including MPE) against the previous QPF forecast used by the RFC for the model run and against current QPF expectations. If more precipitation occurred or is now expected to occur than in the previous forecast, the river forecasts will be under-done.

**5) Analysis and decisions with lessons for future improvement in Weiser River forecasting:**

Although situational awareness was high during the event there were clearly things that could have been done in a more vigilant and proactive manner. Uncertainty was very high in this case. Perhaps a feeling of complacency fell over the forecast team as they were overly influenced by the existing RFC forecast. Studies have shown that complacency affects vigilance which in turn can have a more serious consequence of situational awareness breakdown. This was clearly not the case here but it is something to learn from and not let happen. The Weiser River is a complex river to forecast for and is flashy. It has challenged us many times and will continue to do so in the future. Through our collective experiences, skills, training, and diligence, we will have a better understanding on how the river will behave under a given set of circumstances. In this event, there were a combination of things coming together simultaneously to produce this flood. All of the facts were not completely known or anticipated correctly. A heavy low and mid elevation snow pack combined with moderate to heavy rain along with warm temperatures in winter will likely cause a flood on the Weiser River in Idaho. Pattern recognition is extremely important in flooding situations as it is in other severe and high impact weather events. It appears that excessive runoff from snow melt must be taken into consideration when making a flood forecast for the Weiser especially in Winter and

Early Spring and when high wet bulb temperatures exist over the basin. In this case, the WFO and NWRFC clearly underestimated the amount of snow melt taking place. Had this been understood more fully, a Flood warning would have been issued several hours earlier with a higher and faster crest time.

## **6) Recommendations:**

Forecasters need to be proactive with the NWRFC and have them run additional HYDRO models as needed. It is very important that they have all the data you have otherwise models may be run with inaccurate output. It is also imperative that the NWRFC be involved in the forecast to flood process. Warning and forecast services are a team effort and these areas of expertise should be brought into the critical decisions when appropriate. It may mean having them stay beyond their normal work hours in the evening or coming in early when there is a problem in the middle of the night. We must also be ready to use the NWRFC callback numbers during flooding and potential flooding events.

A more liberal use of the Flood Watch product would be helpful rather than relying on an RVS product. A watch is not expected to always be following up with a warning (about 50% of the time it will not be). A Flood Watch is a stronger product than the RVS and invokes call to action and a higher state of alertness. This is much better than having nothing out or being late with a warning. We must be able to anticipate and recognize distinct patterns as this is important information that will go a long way in providing the best forecast and warning service we can give to the public.

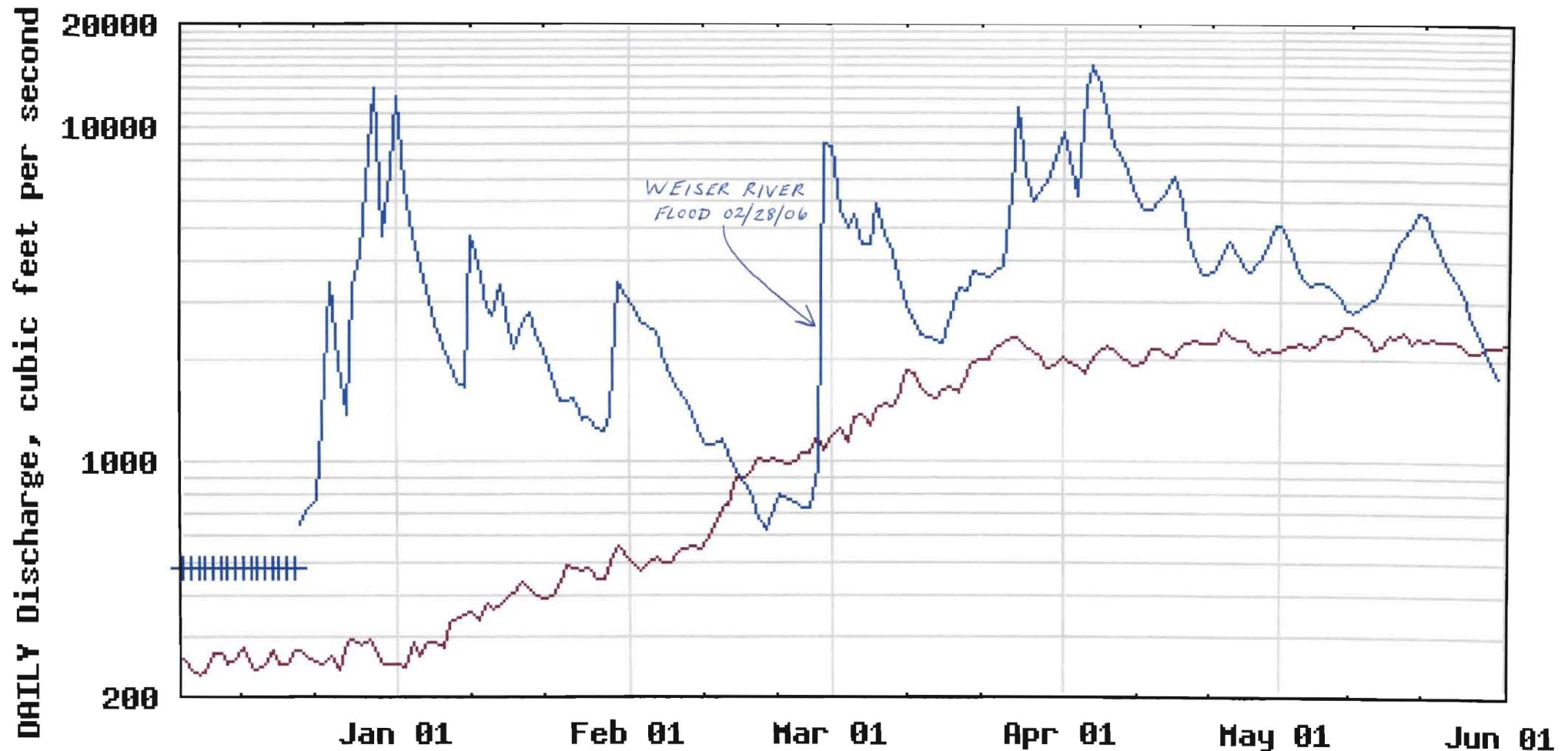
Lastly, qualitative assessments can be made by the forecaster to modify RFC forecasts. For the Weiser River:

- 1 The typical routing time for a crest at Cambridge to a crest at Weiser is about 6 hours. So, if Cambridge hasn't crested yet, don't expect the crest at Weiser for a while.
- 2 Use MPE to evaluate precipitation in the Weiser basin and compare that to forecast precipitation at McCall. The RFC model uses McCall precipitation as forecast precipitation for the Weiser basin – adjust the forecast accordingly.
- 3 Low elevation snow pack is very hard to assess. Typically, the RFC model underestimates the available water in this low elevation snow pack.
- 4 Historically, the RFC model forecasts tend to under-estimate Weiser River water volumes in rain on low elevation snow situations.

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USGS 13266000 WEISER RIVER NR WEISER ID



----- EXPLANATION -----

- MEDIAN DAILY STREAMFLOW BASED ON 64 YEARS OF RECORD
- DAILY MEAN DISCHARGE
- + Flow at station affected by ice