Trip Report for Travel to Arizona the Week of January 23rd, 2006.

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Itinerary: Traveled to Tucson on Monday, January 23, 2006; and returned from Tucson to Salt Lake City on Friday January 27, 2006. During the week I was accompanied by **Michael Schaffner, Service Hydrologist, Tucson**. Mike prearranged field logistics (including the borrowing of survey equipment) that provided for a very productive and conducive trip.

- Monday night – Tucson
- Tuesday night – Tucson
- Wednesday night – Safford
- Thursday night – Safford

Part of Tuesday, Mike and I were joined by **Elise Moore, County Floodplain Manager, Pinal County Department of Public Works, P.O. Box 727, Florence, AZ 85232**.

Noon Creek. Photo by Mike Schaffner (January 2006).

Purpose: To visit river forecast points, meet with hydrologic customers, evaluate flood hazards at locations removed from stream gages, and collect hydrologic data related to recent burn-area peak flows. The later will be included in a peer-review journal article that Bill and Mike are completing related to post-burn runoff. (*See picture previous page:* Bill Reed measuring depth of peak flow water surface with survey rod. A tape measure has been stretched across the channel to correspond to the water surface at time of peak flow. Noon Creek is a 3 square mile watershed in the Pinaleno Mountains of Graham County. Water encompassed a cross sectional area 110 feet wide and a minimum of 10.5 feet deep at the time of peak flow to yield a peak flow in excess of 2,500 cfs.)

Accomplishments:

Monday:

- Madera Canyon. Conducted slope-conveyance to estimate peak discharge from 2005 monsoon off of Florida Burn Area. Dry.

Tuesday:

- San Pedro River near Benson (SPBA3). Reactivated USGS gage. Site not found first try.
- San Pedro River near Redington (SPRA3). Guidance River Forecast Point. Elise Moore from Pinal County Public Works Department joins us. We caravan in two vehicles. Dry.
- Alder Canyon at Redington Road. Observed junk cars that have been placed in the channel as riprap. Dry.
- Campo Bonito near Oracle slope-area reach (burned basin). Site visited and high water marks observed. Dry.
- San Pedro River at Mammoth. No gage at site. Visually inspected channel and compared to flood flows from Redington gage. Dry.
- Aravaipa Creek near Mammoth (ARVA3). Evaluated for flood stages / forecast point. Flowing. Elise Moore departs.
- San Pedro River at Dudleyville. Evaluated potential flood flows at the George Gordon Memorial Low-Water Crossing. No gage. Flowing.
- San Pedro River near Benson (SPBA3). Reactivated USGS gage. Site not found second try.

Wednesday:

- Brawley Wash at Milewide Road (BMWA3) downstream terminus of guidance forecast reach. Site of 6,125 cfs flood from Aug 14, 2005 monsoon. Dry.
- Brawley Wash near Three Points (BWTA3) Guidance River Forecast Point. USGS gage. Site of 11,800 cfs flood from Aug 14, 2005 monsoon. Dry.
- San Pedro River near Saint David. No gage. Flowing.
- San Pedro River at Fairbank. San Pedro Riparian National Conservation Area. No gage. Flowing.
- Dragoon Wash at Sibyl Road near Saint David. Flash Flood Concern. Dry.

- Noon Creek near Highway 366. Conducted slope-conveyance to estimate peak discharge from 2004 monsoon season off of Nuttall Burn Area. Flowing.

Thursday:

- Eagle Creek near Morenci (ECMA3). Guidance River Forecast Point. Flowing.

- Blue River near Clifton (BLCA3). Flowing.

Observations and Field Notes:

Madera Canyon: Madera Canyon is a 4.00 square mile watershed in the Santa Rita Mountains. On August 8, 2005, 0.70 inches fell in about 45 minutes. The basin average precipitation frequency for Madera Canyon event was less than a 2-year event. On January 23, 2006, we conducted a field survey of the high water mark and associated channel geometry for Madera Creek near the U.S. Forest Service amphitheater. The high water mark was 7 feet above the channel thalweg. The cross section perpendicular to the direction of the flood flow was trapezoidal with a top width of 38.2 feet and a base of 15 feet resulting in a cross sectional area of 186.2 square feet. Channel slope through this cross section was 0.094 feet/feet. Manning's "n" was estimated at 0.24. The velocity of the peak flow was calculated to be 4.79 feet/sec. The peak flow was calculated as 891.8 cfs +/- 10 percent. Such a flow would be in the range of an 8-year return flow. This is a post-burn peak discharge increase of at least 3.3 times greater than pre-burn peak discharge. The 5-year post-burn flood is therefore estimated using this ratio to be greater than 2,170 cfs.

Noon Creek: Noon Creek is a 3.00 square mile watershed in the Pinaleno Mountains. On August 17, 2004, 0.94 inches fell in about 25 minutes. The basin average precipitation frequency for Noon Creek event was about a 2-year event. On January 25, 2006, we conducted a field survey of the high water mark and associated channel geometry for Noon Creek about 1,000 feet upstream of Highway 366. The high water mark was 10.5 feet above the channel thalweg. The cross section perpendicular to the direction of the flood flow was triangular with a top width of 110 feet and an unobstructed area of about 75% resulting in a cross sectional area of 433 square feet. Channel slope through this cross section was determined from topographic coverage of the area to be 0.18 feet/feet. Manning's "n" was estimated at 0.25. The velocity of the peak flow was calculated to be 6.20 feet/sec. The peak flow was calculated as 2,684 cfs +/- 10 percent. Such a flow would be in the range of an 250-year event. This is a post-burn peak discharge increase of 141 times greater than the pre-burn peak discharge. The 5-year post-burn flood is therefore estimated using this ratio to be 12,126 cfs.

San Pedro River: From the Mexico border the San Pedro River flows northwest to its confluence with the Gila River near Hayden. The San Pedro River was flowing upstream at Fairbank and near Saint David. The mid-reach around Redington and Mammoth was dry. The reach at Dudleyville was flowing do to Arivaipa Creek's contribution. At the time of our visits to the upstream sites, the USGS gage at Charleston was reporting 14 cfs and we estimated the stream flow at Fairbank to be about 15 cfs. At the time of our visit to Arivaipa Creek, the USGS gage was reporting a stage of 1.40 feet at 12 cfs. At Dudleyville we estimated the flow to be about 3-4 cfs.

Flooding at Dudleyville can be caused by flooding of San Pedro River because of: 1) upstream flooding of the San Pedro routed downstream during large events and 2) Arivaipa Creek flooding flowing into the San Pedro River upstream of Dudleyville. Therefore forecast for this reach should consider both contributions.

The Dudleyville flood depths were observed to be similar to upstream at Mammoth.
Eagle Creek: The USGS gage was reporting 1.6 feet at 24 cfs. Although the flood flows for this site are above the rating curve, the extension program should work well given the site's stable geometry and channel control. (*See picture below:* Looking downstream to right edge of photo. Control is a small "feeder" dam.)

Eagle Creek. Photo by Mike Schaffner (January 2006).

Blue River: The USGS gage was reporting 4.19 feet at 11 cfs. At this site high flows may temporarily bypass gage, possibly giving the appearance of a steady flow or drop when actually the flood flow is still increasing. (*See picture next page:* Looking upstream to right edge of photo.)

Blue River. Photo by Mike Schaffner (January 2006).

Action Items:

1. Calculate flows associated with observed high water marks (Madera Canyon & Noon Creek). Done.
2. Prepare trip report. Done.
3. Revise manuscript: Effects of Wildfire in the Mountainous Terrain of Southeast Arizona: An Empirical Formula to Estimate 5-Year Peak Discharge from Small Post-Burn Watersheds by William B. Reed and Mike Schaffner. Done.
4. Submit revised manuscript to Journal of Hydrometeorology. Done.

APPENDIX (Additional Photos)

Alder Wash (abandoned cars as riprap). Photo by Bill Reed (January 2006).

Upper Campo Bonito (high water marks still clearly visible). Photo by Bill Reed (January 2006).

San Pedro River at Fairbank (flowing). Photo by Bill Reed (January 2006).

San Pedro River near Redington (looking downstream of bridge, dry). Photo by Bill Reed (January 2006).

Aravaipa Creek (looking from near gage on right bank to left bank, flowing). Photo by Bill Reed (January 2006).

Madera Canyon (looking downstream). Photo by Mike Schaffner (January 2006).

Bradley Wash at Milewide Road. Photo by Bill Reed (January 2006).