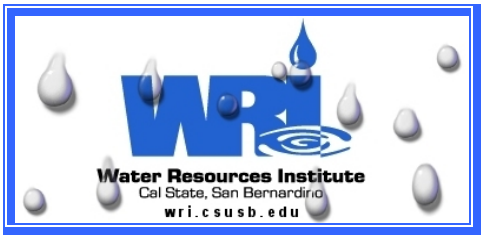
Alluvial Fan Task Force



California Department of Water Resources Project

FINAL Minutes from Plenary Meeting #2
January 4, 2008
La Casa Del Zorro Desert Resort
3845 Yaqui Pass Rd
Borrego Springs, CA 92004

Members Present: Riverside County Supervisor Marion Ashley, Kern County Supervisor Jon McQuiston, San Diego County Supervisor Bill Horn, Paul Novak (for Los Angeles County Supervisor Michael Antonovich), Danielle Borish (for San Bernardino County Supervisor Paul Biane), Mike Fox, Rick Iger, Georgia Celehar, Dusty Williams, Chris Stone, Sara Agahi, Paul Quill, Dale Casey, Tom Davis, Duane Young, Tom Scott, Joan Taylor, Norman Meek, Stephanie Pincetl, Kathleen Webb, Tom O'Keefe, Marty Teal, Ralph Wagner, Eric Shamp, Scott Steinmetz, Lee Reader, John McCarthy

State and Federal Representatives Present: Ray Lenaburg, Tammy Conforti, Ricardo Pineda, Mark Stuart, Stephan Lorenzato, Pete Sorenson, Greg Kryzs, Chris Adams, Steve Cowdin, Salomon Miranda

Technical Consultants Present: Susan Lien Longville, Susan Carpenter, Cameron Barrows, Bo Cutter, Doug Hamilton, Massoud Rezakhani, Adolph Lugo, Tom Spittler, Bill Short, Lisa Pierce, Suzie Earp, Boykin Witherspoon, Lynn Merrill, Gigi Hanna

Members Absent: Paul Biane, Ali Sahabi, Mark Grey, Ray Torres, Mark Pisano, Sergio Vargas, Dave Mlynarski

Technical Consultants Absent: Jeremy Lancaster, Kent Schofield

State and Federal Representatives Absent: Mike Anderson, Dave Gutierrez, Scott Dawson, Maria Lorenzo-Lee, Rebecca Wagoner

Others Present: Mekbib Degaga, Stuart McKibbin, Chris Champine, Joan Wonsley, Dustin Steiner, Steven Hernandez, Susan Cannon, Jono Hildner, Jeff Beehler

Meeting called to order: at 9:30 a.m. by AFTF Facilitator, Susan Carpenter.

Welcome:

- Meeting Host, San Diego Supervisor Bill Horn

Meeting Theme: Examining the behavior of alluvial fans and the magnitude of risk associated with development on alluvial fans.

Panels/Presentations: (All PowerPoint presentations are available to participants on the password-protected AFTF website at http://www.alluvialfantaskforce.info Individuals needing a new passwords or having trouble with their password should contact ghanna@csusb.edu)

1. **Individual Exercise Ranking Issues to Measure Tolerance for Risk**
   Boykin Witherspoon, Land Use Consultant to the Task Force, continued his discussion of the risk dial introduced in Meeting 1: Probability and consequence drive our turning of the "risk dial," a graphic representation of our tolerance for risk. This in turn manifests into jurisdictions, ordinances and definitions—tools we use to protect ourselves from risk.

   He introduced a modified Delphi exercise in which individual members were asked to anonymously rank issues and degree of risk associated with development on alluvial fans. The issues were:
   - Flooding
   - Private property rights
   - Earthquakes
   - Cost to county/municipalities for O&M;
   - Ecology/habitat;
   - Historical lessons learned;
   - Population growth;
   - Water quality and supply; mitigation measures (impacts to developers and homeowners); and
   - Vulnerable populations

   Participants did the exercise, which Witherspoon tallied and returned later with the results.

2. **Expert Panel One: Assessing and Communicating Alluvial Fan Flood Risk**
   Moderator Susan Longville, AFTF coordinator. Panelists Ray Lenaburg (FEMA), Steve Cowdin (DWR Division of Planning and Local Assistance), Tammy Conforti (ACOE), and Marty Teal (Floodplain Management Association). Moderator asked three questions:
   - Define risk and the challenges of communicating it to the public and the adequacy of the 100-year flood or the one-percent-chance flood as a tool.
   - Describe how their respective agencies assess risk;
   - Offer advice for reducing risk

Conforti: The Corps breaks probability into two parts: the probability of an event happening and the probability of a failure of a feature already in place, such as a levee. When local communities are assessing their risks, they have to keep in mind that once you introduce a feature and build more structures beyond that, you are increasing risk. Recently, the Corps has expanded its determination of risk to include public safety and loss of life. Also changing is the concept of 100-year-flood (to lessen misconceptions about what it means). The preferred term is a "one-percent chance in any year flood."

One way to assess risk is to determine where our data is lacking and improve that, she said. The Corp analyzes expected annual damages: it considers every type of flood that could occur in an area and uses that data in deciding whether a potential project merits federal investment. Additionally, the Corp considers the probability of a structure, such as a levee, withstanding a 1% event to rate the structure (this is called conditional non-exceedance probability).

The Corps is investing in a national risk communications team to determine how best to communicate risk to the public. The Corps is also using an existing engineering regulation for explaining risk, and working with FEMA to find consistent language about risk.

The Corps is trying to communicate that risk remains, even if there is a structure in place. The Corps has changed the terminology from flood control to flood damage reduction to do that. The Corps does not tell communities what their acceptable risk is, but provides the community with information so the community and the Corps can make a combined decision.

Ultimately, the Corps wants collaborative solutions.

Cowdin: DWR's definition of risk is probability and consequences, but we need to take into account the probability of fires within the watershed. There are adverse effects of flooding, such as loss of life and structures, but there are also beneficial consequences that we need to consider. Additionally, consequences mean different things to different people. In considering a 1% chance of flooding, there might not seem to be a lot to worry about, but the scenario plays out differently if one considers how that chance affects a 30-year mortgage.

In identifying risk DWR identifies the hazard (the frequency, extent depth, velocity, debris generation and speed of debris generation), identifies the assets at risk (people) and communicates the risk (via local media, web site, community workshops, and direct mailers)—whether the flooding is riverine, coastal or alluvial fan.

The department instituted a notification program in the Central Valley to make residents aware of potential risks to their property. The department also uses FEMA HASIS model for loss estimation.

In offering advice, he said to modify susceptibility to flooding by modifying the development in the first place (i.e. elevate and flood-proof buildings), incorporate flood forecasting in warning systems, modify impact of flooding with planning, communication, post-recovery planning and modify the flooding itself with structural solutions, but keep the focus on preserving and restoring natural floodplain resources.

Teal: The Floodplain Management Association uses the Corps and FEMA's definitions of risk, and coordinates with the two on new regulations.

Like a step function, though, a small increase in flood elevation can have much greater overall damages. People think they are not at risk because where they live has never flooded, but we need to dispel that inaccuracy.
In looking at risk management on alluvial fans, you have three choices: regulate/prohibit development, provide non-structural methods of protection, or structural methods (such as levees an dykes).

He recommends using existing guidelines in forming ordinances: from FEMA's Appendix G, the ACOE guidance on Alluvial fans and other states' findings (especially Arizona and Nevada). He suggested applying computational models to available data to determine outcomes of flooding. And also suggested that any ordinance must be practical, and based on some of the work already done.

Lenaburg: We use the engineering definition of risk. But that is not exact. It is the public perception that it is our job to protect them. But the one-percent risk can be exceeded; all it takes is one event to change the statistical analysis.

In assessing risk, we have a regulatory approach, found in Appendix G, and guidelines and specifications in Part 6513. For example, FEMA will only accept a complete structural measure that contains the flood from its apex al the way downstream. It is important to look at every watershed because they are all different, with different characteristics.

There are many flood control districts with different guidelines; we need to study those to know what is being done. He suggested looking at Maricopa County's efforts, including setback standards and areas where building is prohibited. Look at structural and non-structural answers, such as putting a golf course or grazing where structures cannot be. And, ultimately, there must be public support and involvement in the process.

3. **PowerPoint Presentation: Geologic Behavior of Alluvial Fans and Risks Associated with Development**
By Tom Spitler, California Geological Survey.
The potential hazards of developing on alluvial fans include sediment erosion, seismic issues, surface eruption, liquefaction and collapsible soils, with controlling factors of slope of the fan, the channel geometry, tectonic activity and fire and land use. These should be considered in development decisions on an alluvial fan.

Building on slopes is different than the issues for those building on the bottom of fans (There are higher consequences for building on the bottom). Steep slopes also mean more material coming off during a flood. You need to consider where the potential development lies on the curve of the water flow. Also, fires and fire suppression efforts such as removal of vegetation will affect those downstream. If you remove the vegetation in a steep slope area (for fire suppression), the material that is supported behind it can tumble into the stream, becoming a source of debris sediment during debris flows; it can also lead to rapid run-off. Similar to controlled development along the San Andreas Fault, development along alluvial fans can occur in a logical, systematic manner by defining the flood hazards in advance.

Urban development does provide a greater degree of complexity because it can be harder to determine the behavior of a flow, but that points to a greater need for detailed analysis using the sources of information already available, including maps and age-dating of fans. His conclusions:

- Development on alluvial fans can be designed to avoid or mitigate hazards such as floods, debris flows, soil erosion, seismic shaking, surface fault eruption, liquefaction, and collapsible soil; and
- Regional and site-specific investigations are the tools for this.

4. **PowerPoint Presentation: USGS Post-fire Debris Flow Hazard Mapping**
Dr. Sue Cannon discussed the Post-fire Debris Flow Hazards in Southern California.
Burn in the watershed above a fan is something to be concerned about. The effects of fire can be significant because fire dries the soil, generating wood ash coating and water repellent soil, which dramatically decreases infiltration, leading to spectacular runoff and debris flows.

In burn areas, the response from a rain event can be larger than imagined, and flows can vary from two to eight times the historical unburned flow peaks. Additionally, the first storm after a burn can produce some of the largest responses. (For example, the Christmas day 2003 storm in San Bernardino). After a fire we cannot afford to wait a couple of months for rainfall accumulation. These initial floods can be triggered by small unremarkable rain events.

The USGS is defining threshold rainfall conditions in Southern California by comparing rainfall in storms that produced debris flows from burned areas to those that did not produce debris flows. Findings include: Small frontal storms (a two year or less reoccurrence event) have triggered most of these debris flows; most (80-90%) of the material is eroded from the channels, not the hillsides, and the eroding has resulted in debris flows from 174 to 864,00 cubic meters.

In order to assess the post-fire debris-flow hazards, you must consider: How big the debris flow will be or what volume of material will come out of the basin mouth; where it will happen; and where the material is going. In studying this, the USGS has created a model for probability, based on analysis of 57 data points in Southern California. There is a model for probability with a larger data set, but its results have not been as thoroughly tested. The USGS has applied the models to the October 2007 firestorms, and the 11 biggest fires. See the USGS website to see the map specific to each fire studied. The third question has not been adequately answered (research in progress), but FEMA has a series of maps available that show potential volume and food inundation areas.

The data is specific to specific storms and debris flows, but USGS is starting to consider how fuel loads are changing in different ecological systems.

Ricardo Pineda said that the group needs to consider how effective historic structures are in dealing with current events.

Others raised the issue of government fund availability for expediting the cleaning out of debris basins. And that a debris basin does not necessarily equate to safety.

5. **PowerPoint Presentation: Virtual Tour of San Diego County Alluvial Fans**
Sara Agahi, San Diego County Department of Public Works, Watershed Protection Program, provided a historical virtual tour of Borrego Springs, the county's largest alluvial fan area.

While there is a history of extreme flood events in the county and a high demand to develop in the county, the county is committed to allowing legal development while protecting public safety. The county is in the NFIP, which means it has a plan for flooding on alluvial fans as well as a flood hazard map. The county also adopted a general plan for flood control improvements in Borrego Springs and a countywide flood damage prevention ordinance.

San Diego guidelines for risk reduction include:

- Elevation criteria that includes elevating the lowest floor above the highest adjacent grade to at least the number specified on the FIRM.
- Open space criteria mandating at least 50% of the lot be open unobstructed space with adequate drainage paths around structure; and

- Design criteria that require structures be built so flood flows will not be diverted and become a danger to other structures. (The county also provides design guidance, such as suggesting elevated driveways, piers and floodwalls).

6. Group Exercise Ranking Issues to Measure Tolerance for Risk

Boykin Witherspoon summarized the individual exercise given in the morning. The room wide summary found the top issue was flood control, followed in rank by water quality/supply; cost to county; ecology; earthquake; population growth; vulnerability; mitigation measures; private property and historical lessons learned. The general conclusion was that the most important issues were communal. The numbers were less important than the conversations that ensued.

Each table also received a summary for the table. Witherspoon polled the tables to see if members were in basic agreement about the important issues, and if not, where they weren't. All but two tables said they basically agreed with one group disagreeing over the importance of private property rights and the other stating that earthquakes seemed unnecessary to consider because of the number of earthquake standards already in place.

7. PowerPoint Presentation: Ecological Behavior of Alluvial Fans and Risks Associated with Development

Dr. Cameron Barrows, UCR Center for Conservation Biology.
Barrows discussed the importance of alluvial fans, in the context of climate change (they provide linkage between habitats as sensitive and endangered animal and plant species move); habitat (several endangered species rely solely on alluvial fans for habitat. There is a different functionality for alluvial fans, depending on the individual species); natural processes and services (all the alluvial fans are feeding the habitat and supply the needed substrate to support species. Even when open space is preserved, such as in agricultural areas, if the natural process has been stopped, there is loss of habitat); and cultural resources (many alluvial fan areas are also sites of rock art and ancient fish traps).
His main points:

- Failure to identify and protect the ecological values and services that alluvial fans provide can put regional conservation planning efforts in jeopardy;
- regional conservation plans provide assurances to both conservation and development;
- Water supplies are going to be an increasingly important concern and alluvial fans can be part of a solution to those concerns.
- In addition to ecological services, alluvial fans can provide economic (aggregate mining) and quality of life amenities (recreation, increased property values for adjacent parcels).

Ultimately, he said, there are compromises to be made. We need to consider: if we keep an alluvial fan area open, can we improve groundwater recharge, and allow the passage of alluvial soil? A good example of how this is being done is

the Coachella Valley Water Recharge area project (by Coachella Valley Water District).

8. **Expert Panel: Watersheds and Impacts Associated with Development on Alluvial Fans**
Moderator Susan Longville, AFTF coordinator. Panelists Jeff Beehler (SAWPA); and Stefan Lorenzato (DWR).

Jeff Beehler discussed SAWPA's efforts following the fires of 2003, using the USFS Burned Area Emergency Response (BAER) model.

"What we hadn't thought about in watershed planning was that fire impacts operate at multiple levels. We thought about the fire effect at the local level. But most thinking stopped at the immediate risk and immediate danger," We found that there were profound downstream impacts as a result of land use decision, both in the forests and the urban-wildland interface that we had never considered, planned for, or quantified.

Shortly after the fires, SAWPA used the BAER model to quantify acres affected, then dispatched a team to quickly assess and act to minimize impacts. The goal was to distribute the results to the community, consider what was coming next, develop advocacy tools, and get help for forest and fire officials.

They found that the water quality and supply had an increased turbidity—an important issue in an area where 70 percent of the water supply is groundwater. 70 percolation basins needed to recharge groundwater had to be cleaned of debris quickly; ash in the mountains moved to recharge basins in Orange County within one day. They found that one endangered species of frog may have been wiped out, and the breeding cycle of other animals halted due to the flows.

SAWPA now uses an integrated approach and has divided the watershed into issue areas, or pillars, which are asked to meet in small groups to consider not what they need, but rather what they can offer others.

His main points:

- You need collaboration; it makes good sense to leverage each other's resources.
- Fire management is important; from a public policy standpoint, the importance of what firefighters do far exceeds fighting fires.

Stefan Lorenzato discussed the importance of "knowing your system," i.e. be aware of the natural process, build with awareness, use streets and open space to distribute flows on active fans and prepare for contributions from the upper watershed.

He recommended using the framework in the Science Advisory Board report by EPA to craft assessments of watershed health. It sets out six ecological attributes to consider, and DWR added one (that planning should be happening simultaneously in a functioning watershed). We still set the goals and objectives, but can analyze how those goals pertain to the attributes. It is a way to organize our thinking.

9. Guidance for Model Ordinance and Decision Guidelines

Small Group Question: What guidelines do you have for the technical team?

Table 1

1. Identify and map each fan in jurisdiction
2. Identify characteristics of each:
    a. Hydrology
    b. Habitat
    c. Age
    d. Socio-economics, etc.
3. Review other ordinance/jurisdiction models
    a. i.e. Maricopa County:
        i. Elevate Pads
        ii. Structural Measures
        iii. Channeling
        iv. Density Appropriate, etc.
4. Provide for Communication of Risk
5. Provide for a multi-disciplinary approach
6. Assure for a Community Wildfire Protection Plan for each
7. Provide for .5% and 1% risk analysis with and without fire
8. Watershed analysis
9. Risk/Benefit analysis of development for entire fan
10. Involve all jurisdictions above and below fans

Table 2

1. Establish Alluvial Fan Flood Risk Hazard Area
    a. Risk Mapping
    b. Hazard Mapping
2. Ordinance needs to be tailored to each fan
3. Sustainability of system
    a. Flood
    b. Recreation
    c. Water Quality
    d. Water Supply
4. Matrix based, with numerical values that are weighted on a case-by-case basis.
5. Process to develop specific ordinance should be dynamic and not static.
6. More definition of active and inactive fans. (Has the question been adequately addressed?)
7. Flood risk disclosure, risk notification, flood risk communication
8. Matrix of quantifiable issues with score for each

Table 3

1. Legally defensible basis for prescriptive measures
    a. Sound Science
    b. What is a fan? (Is there a consistent definition?)
2. Define what is build able in a fan: sensible, safe, sustainable
3. Define Fan. Do you use FEMA definition, or a definition that considers multiple issues, such as debris, ecology, water supply, water quality?
4. Layered guidelines for
    a. All fans
    b. More specific issues

    (A Hazard Matrix with more specific guidelines in different cells in the matrix).
5. Require developer do flood due diligence as part of an ordinance.

Table 4

1. Would an ordinance be part of regular flood management ordinance? (Separate: flood programs already well defined).
2. Transparency/Clarity for developers
    a. Checklist
    b. Predictability

Table 5

1. Examples of other successful ordinances
    a. Planning and Design Guidelines
    b. Assessment Methods ad analytical tools (such as a hazard overlay)
    c. Implementation guidelines
2. Zoning overlay with early phase (pre-project) consultation requirement
    a. Disclosure
3. CEQA-like checklist
    a. Flexible, not one-size-fits-all
4. Requirements clear up front
5. Address grey area between regulatory (FEMA) Flood Zone and Residual Hazard
6. Multi-Objective
7. Provide mechanisms to address capital and maintenance costs.

Table 6

1. Identify active and inactive fans—look for the most appropriate places to develop—assess conditions
2. Determine what study would identify active vs. inactive fans. What would the developer be responsible for?
3. Master planning process to look at the entire fan?
4. Detail characteristics, boundaries, how valuable are features and downstream implications.
5. Risks assess—what can we gain what might we loose from developing the fan?
6. Uniform method to identify critical areas—what storm event to analyze?

7. Define what we want to see in development, not just what is prohibited.
8. Can you establish a uniform method for identification of high risk areas and how to respond to those areas?
9. Is there a significant size of storm event that can serve as a basis for design of management system and future development needs to include
10. How do we put development in context of future conditions—ecological, economic, development, storm, population?
11. Clearly identify technical vs. policy statements
12. Define responses appropriate for various natural conditions "if-then" statements; e.g. if connectivity threatened, then must leave/provide suitable access (if X magnitude of debris, then 50 percent of fan off-limits)
13. Define what appropriate hydro modification is. Do we address that in this ordinance?
14. How do you apply all this? Especially for small developers. How do they know what to do? How much can they afford? What are they responsible for?
15. How to overcome subjective definitions—how can local approval staff understand all this?

Table 7

1. Identify public safety issues
2. Identify nature resource requirements and opportunities (ecology/water/ag/mining)
3. Identify costs, limits of liability and property rights (all costs, direct and indirect)
4. Identify the likelihood of future, major chance conditions (fan and watershed in terms of fire, flood, earthquake, population, climate change)
5. Integrate plans, regulations, existing (grandfathered) facilities—federal, state and local
6. Seek public/private/NGO partnerships (includes developers, not-for-profits, businesses, etc)
7. Develop/use tools and methods
8. Universal truths:
    a. Balance
    b. Sustainability
    c. Integration
    d. Respect
    e. Streamlining
    f. Certainty

Table 8

1. "Sustainability" of development – long-term O&M of flood management infrastructure; watershed impacts (ecological/ water supply/quality)Identify public safety issues; certainty
2. Adequately identify flood impacts
3. Accepted methodology for identifying an active alluvial fan.
4. Integrated development: works in concert with regional plans and infrastructure
5. Identify mechanisms to change
6. Methodologies to identify alluvial fan risk

7. Address features such as fences—diverting flow
8. Mechanism to address changing conditions
9. Mechanism for different "densities" individual, parcelization, planned development
10. Consider geomorphologic considerations; financial/contractual understandings?
11. Identify fan "assets" as well as risks
12. Consider strategies for partially developed fans

Meeting Adjourned: 3 p.m.
Next Meeting: Friday, February 8, 2008
Los Angeles County Fire Station #129, 42110 6th St., Lancaster, CA 93534

Minutes respectfully submitted to the AFTF members by Gigi Hanna, AFTF Administrative Coordinator. Please contact ghanna@csusb.edu if corrections are necessary.