Panel 2: State-of-the-Practice in Identifying and Quantifying Extreme Flood Hazards

Thanks to our Rapporteurs:

- Mark McBride, NRC (NRO)
- Randy Fedors, NRC (NMSS)
- Joseph Giacinto, NRC (NRO)

Panel 2: State of the Practice

- Identifying and quantifying flood hazards
  - Extreme events (AEP 10^{-2} to 10^{-3})
  - Extremely extreme events (AEP 10^{-4} to 10^{-6})
- Acknowledging events not historically observed or anticipated (i.e., "black swans")
- Uncertainties

Panel 2 Presentations

- Will Thomas, Michael Baker, Jr.
- Jery Stedinger, Cornell University
- Jim O'Connor, USGS
- Douglas Clemetson, USACE
- John England, BoR

Roles for Both Deterministic and Probabilistic Approaches

- Approaches dependent on
  - Site
  - Question at hand
  - Rarity of event
- Complexity of approach varies
  - Physics
  - Conceptual models
  - Stochastic approaches
  - Mixtures
- Procedures for moderate to extreme events (10^{-2}) have been applied broadly with generally satisfactory results
- Multiple approaches can be complementary

Some Issues

- Multiple possible considerations
  - Peak discharges
  - Volumes
  - Duration
- Paleoflood data, though possibly chellenging to acquire, helps to define frequency of extreme events
- Paleoflood data can greatly reduce uncertainty
- Various methods for evaluating uncertainty of extreme events

Need for multidisciplinary teams

- No one person has all necessary expertise
- Effective approaches may include
  - Hydrologists
  - Paleohydrologists
  - Statisticians
  - Modelers
  - ...

Uncertainty

- For events that are frequent with respect to our data, aleatory uncertainty limits our ability to predict future events

- For rare (10^{-4} to 10^{-6}) events, epistemic uncertainty begins to be important

- One need to consider both aleatory and epistemic uncertainty

- Point estimates (PMF) are comforting but, by ignoring epistemic uncertainty, foster false sense of confidence

Does Epistemic Uncertainty Really Matter?

N=100
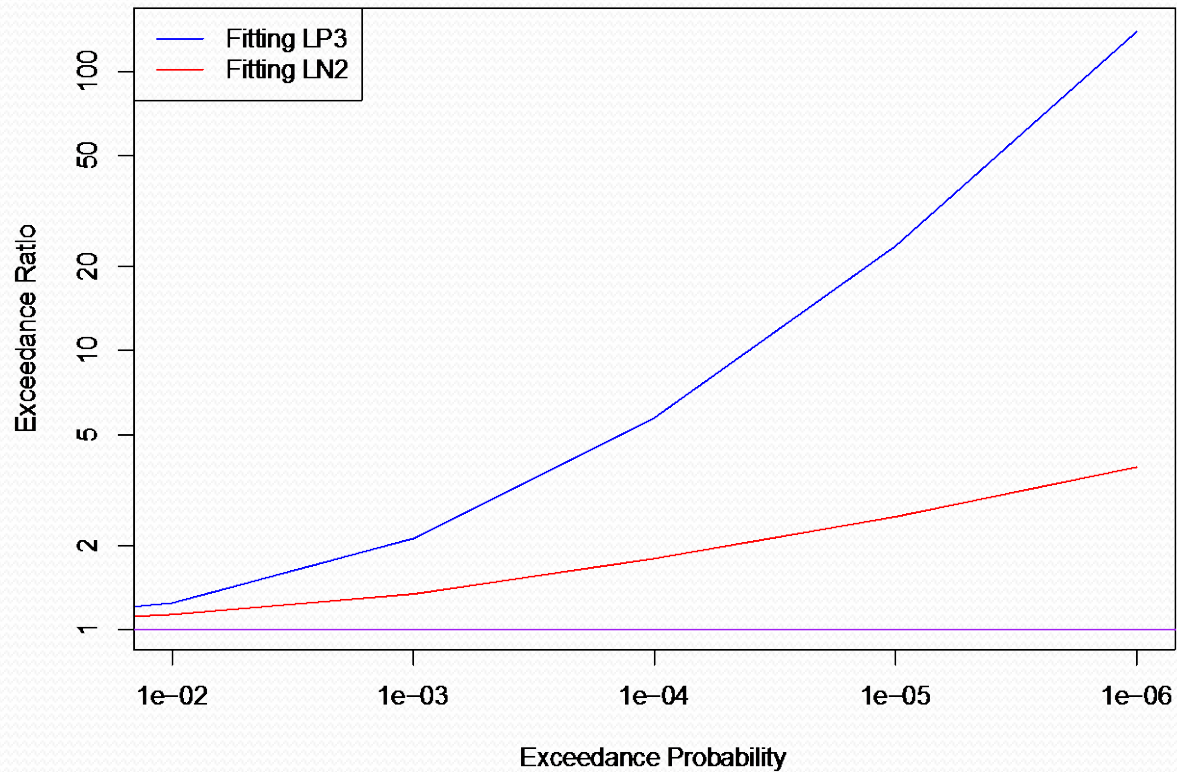
Some Questions

- Contributions or impacts of climate change
- Applicability of paleoflood data (changing climate, channel assumptions)
- Bulletin 17B,C (i.e., prescribed methods) may stifle innovation
- Choice of duration versus sequencing for maximum precipitation event input
- Incorporation of orographic effects

Impediments to Implementation

- Shortage of expertise
- Inadequate training/curricula
- Inconsistent definitions
- Culture ("Just try it...")
- Lack of imagination

Concerns

- Delusional Precision
  - If we're going to present uncertainties, we had better compute them correctly
- Terminology matters ("risk," "uncertainty," etc.)
- Education: Training future analysts

Questions

- How can we improve our PRAs
- Can or should SSHAC-like process be followed?

Questions?