

# Probable Maximum Precipitation Study for Virginia

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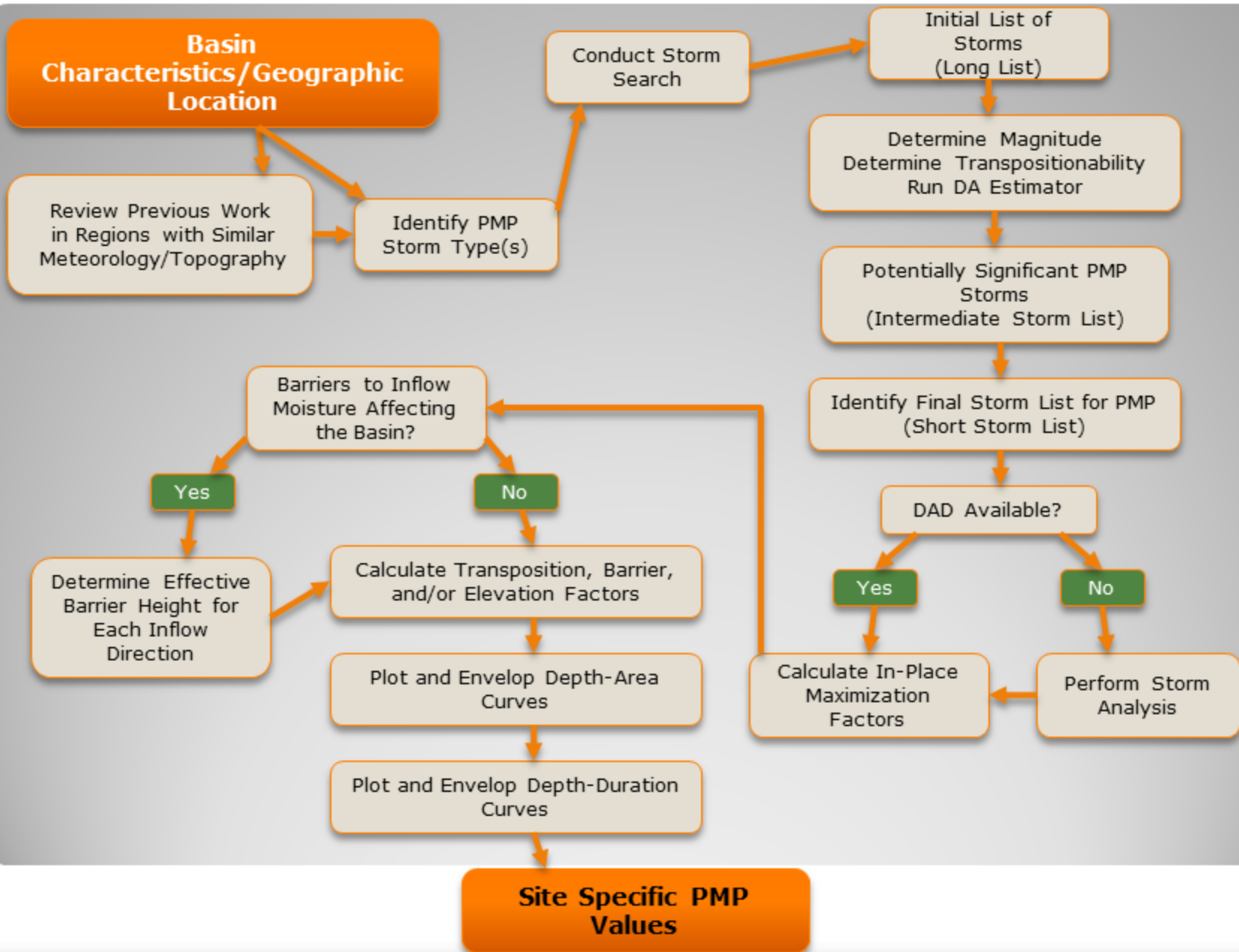
**Fourth Virginia PMP Meeting**

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# Probable Maximum Precipitation Determination Flowchart



# Probable Maximum Precipitation

**Definition:** The *theoretically* greatest depth of precipitation for a given duration that is *physically possible* over a given storm area at a particular *geographic location* at a certain time of year (HMR 59, 1999)



# Probable Maximum Precipitation Study for Virginia

## Task 1

### Review of previous studies for applicability

1. AWA PMP studies (Virginia, Ohio, Tarrant, Quad Cities, etc)
2. HMRs 33, 51, 52, 53, etc
3. TVA HMRs 41, 45, 47, 56
4. USACE and USGS storm and flood analyses



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## Task 2

### Storm Search and Short List Development

- Complete a storm search to identify the most significant storms that could have occurred over the region where storms are transpositionable to Virginia
- Identify storms used in HMRs and other PMP studies
- Identify the most significant flood events that have occurred in region
- Identify extreme rainfall-producing storm types and seasons associated with those storms
- Use SPAS to analyze extreme rainfall events that have not previously been analyzed
- Use SPAS to reanalyze extreme rainfall events



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## Task 3

### SPAS Storm Analysis

All storms used for PMP develop analyzed with SPAS

SPAS produces gridded rainfall analysis and required data sets

USACE storms will need to be re-analyzed



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## Task 4

### Storm Maximizations/Transpositioning/Orographics

- Utilize the updated maximum dew point climatology for use in storm maximization and transpositioning
- Maximum average dew point values
  - 6-hour
  - 12-hour
  - 24-hour
- SST climatology for some events



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## Task 5

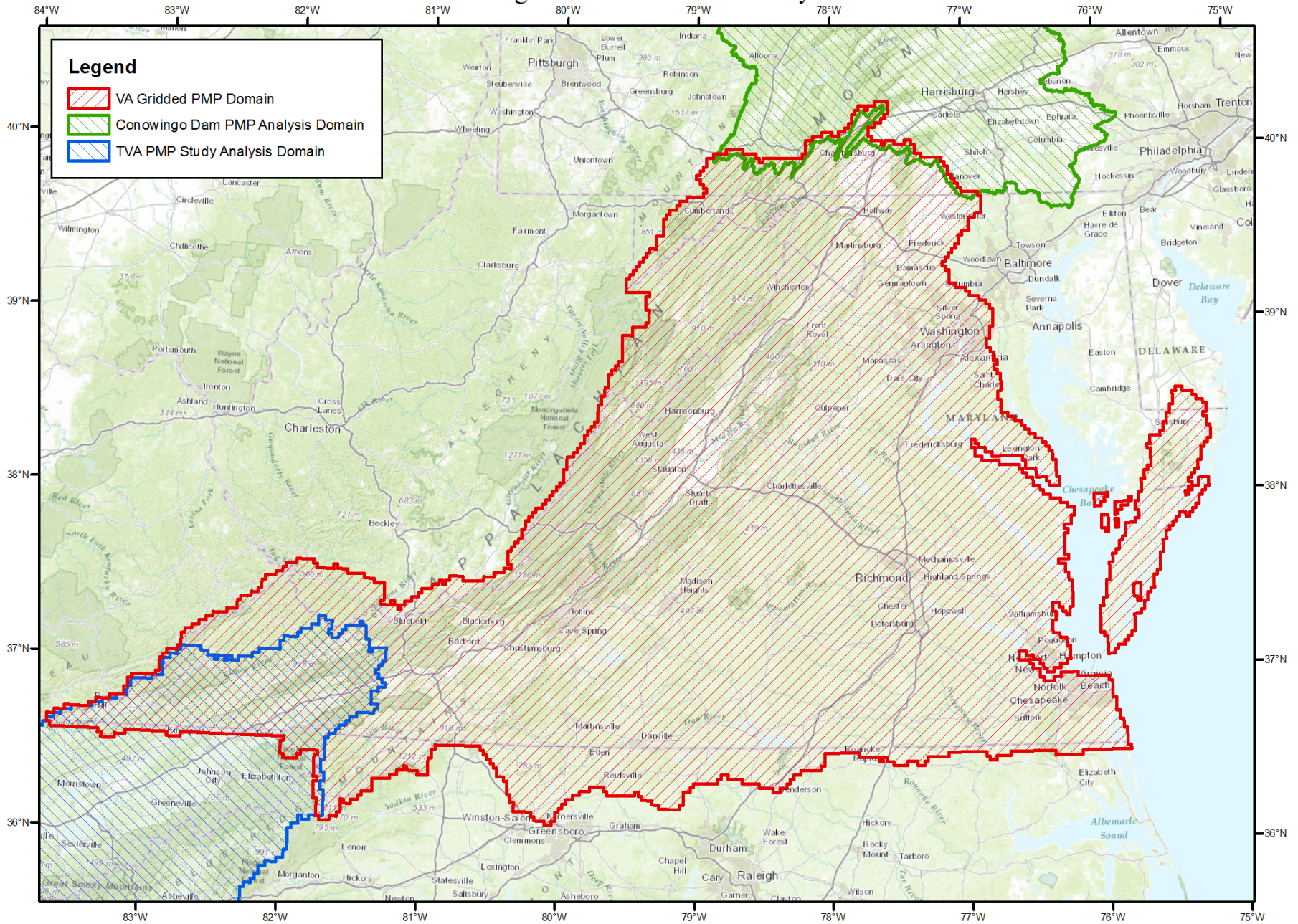
### Develop PMP Values

- Utilize gridded basis
- Pre-run for known basins
- How to apply
- How information is structured/made available



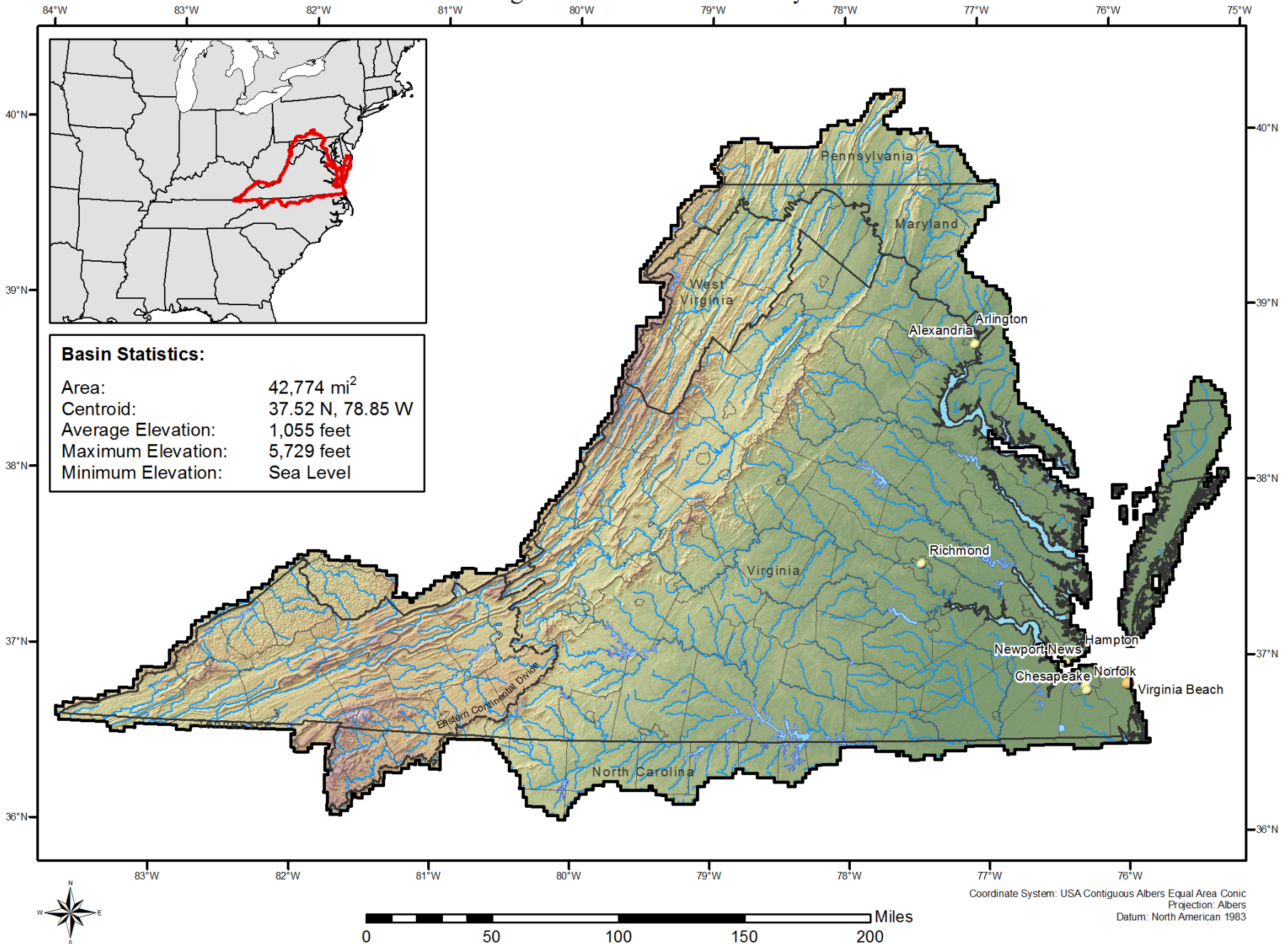


# Gridded PMP Analysis Domain Virginia Statewide PMP Study



# Elevation Statistics

## Virginia Statewide PMP Study



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## Task 6

### Quality Control and Sensitivity

- Compare results
  - HMR PMP values
  - NOAA Atlas 14 precip frequency data
- Discuss sensitivity of various parameters and assumptions on the final PMP values



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## Task 7

### Review Meetings

- Present and review the approach and procedures to be used as well as work completed
  - Pre-meeting packages will be provided to reviewers prior to each meeting
- Conference calls with reviewers and Virginia Dam Safety are planned between formal meetings to discuss technical issues
- A final meeting to present the results and provide discussions on the draft final report



# Probable Maximum Precipitation Study for Virginia

## Task 8

### Final Report

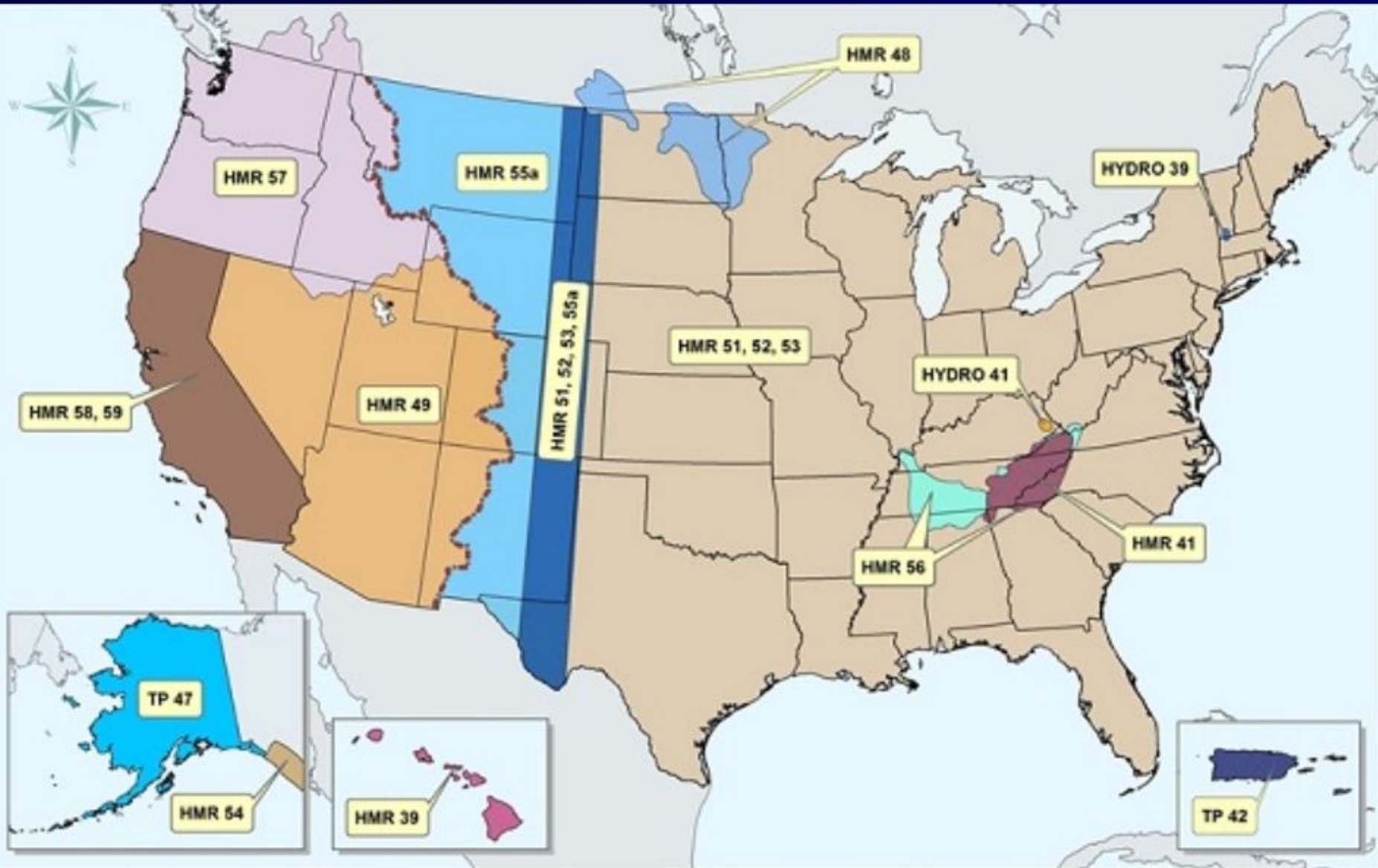
- A Draft final report will be submitted for review
- Review comments will be incorporated into a comprehensive final report as appropriate
- An appendix will be provided with all storm details and calculations used to determine the PMP values throughout the Virginia region
- Maps of PMP values will be provided both in the report as well as in GIS format



# Extra Slides



# Coverage of HMRs



# Probable Maximum Precipitation Virginia

## Transposition Limits

- **Homogeneous meteorology and topography from original location to area of interest (HMR 51 Section 2.4)**
  - **Transposition not permitted across Appalachians**
  - **Tropical storm rainfall not transposed w/out additional adjustment**
  - **Region of large elevation difference, transposition restricted to narrow elevation band (usually 1000 feet of the elevation of the storm center)**
  - **Eastward limits of Central US storms was first upslopes of Appalachians**
  - **Southern limits to transposition not define since other storms produced higher values**





# Probable Maximum Precipitation Virginia

## Transposition Limits

- Subjective judgment is used
- Most choices obvious, it's the “gray” area that matter
- Let the data talk to us
  - OTF very helpful



# Smith et al. 1996

The influence of topographic features on Rapidan rainfall has significant implications for engineering hydrometeorology procedures used for design of high-hazard structures, in particular Probable Maximum Precipitation (PMP) procedures [see *World Meteorological Organization (WMO)*, 1986; *Hansen*, 1987]. A cornerstone of PMP analyses is the storm transposition procedure. Transposition of the Rapidan storm to any other location is physically implausible. This brings into question the practice of transposing storms, like the August 19–20, 1969, Virginia storm, that exhibit strong links to topographic features but for which details of storm structure and evolution are not available.