



FLOOD-FREQUENCY ESTIMATES FOR THE STATE OF HAWAII



Cooperative Project
Hawaii State Department of Transportation
U.S. Geological Survey

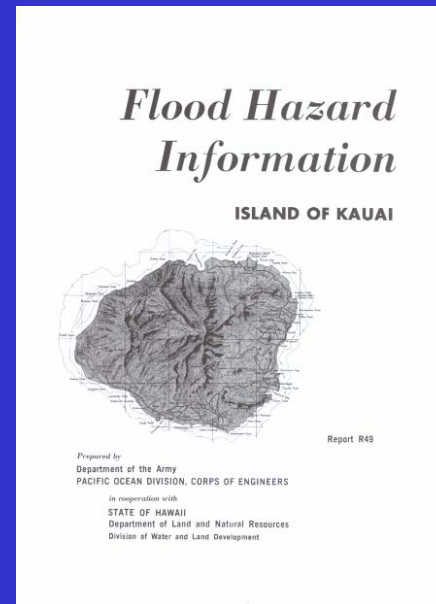
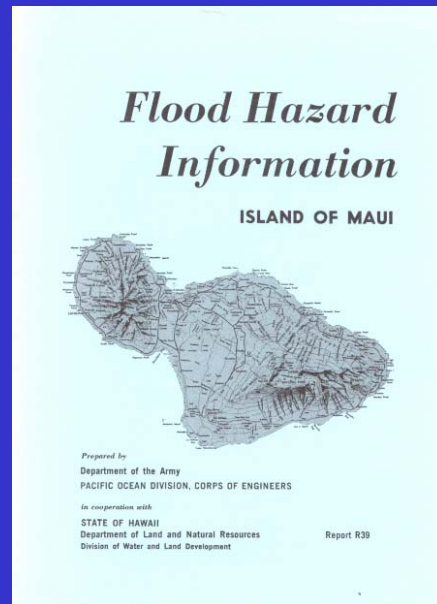
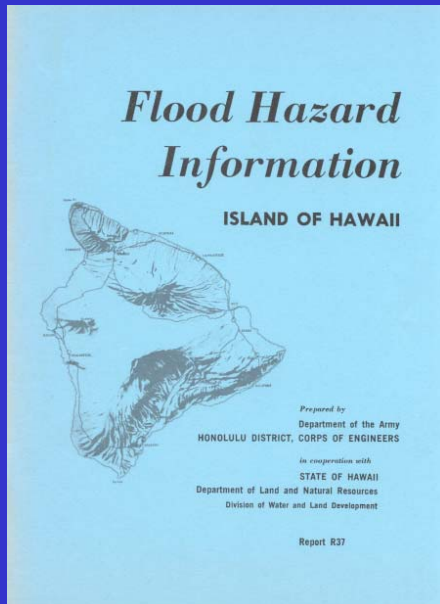
PROJECT SCOPE

- **Collect Data**
- **Install additional gage stations**
- **Develop peak-flow magnitudes and frequencies**
- **Develop Regression Equations**

HISTORY OF FLOOD-FREQUENCY STUDIES DONE IN HAWAII

- **1957 - Began data collection program for Island of Oahu**
- **1962-63 – Extended data collection program to other islands of the State**
- **1970-73 – Developed frequency curves for gaged streams**
- **1980-90 – Installed gage stations**
- **1994 – Developed Regression Equations for Island of Oahu**

PREVIOUS FLOOD-FREQUENCY STUDIES IN HAWAII



**Hawaii
1970**

**Maui
1971**

**Kauai
1973**

**Oahu
1994**

RATIONALE FOR UPDATED STUDY

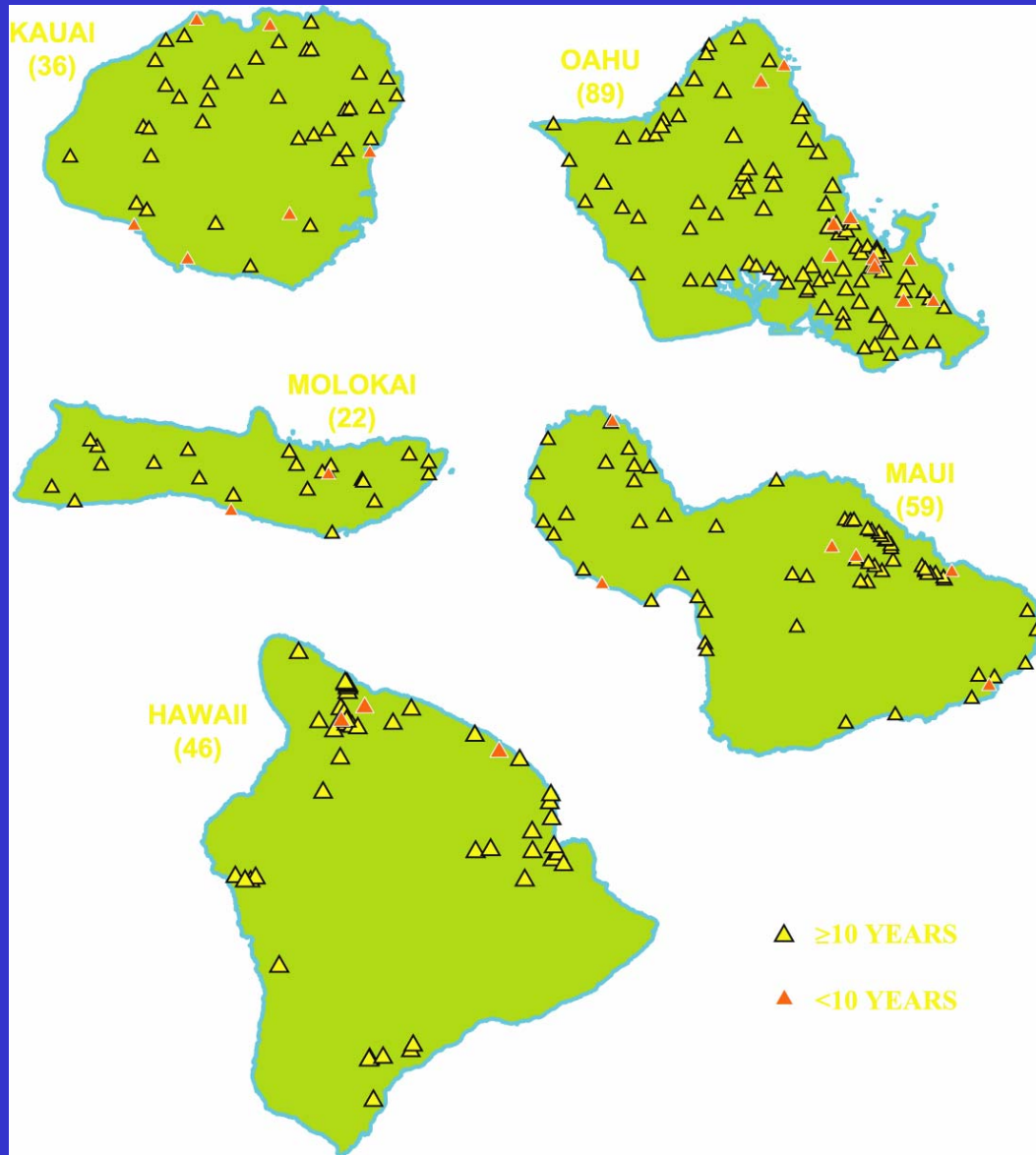
- **More data, better accuracy**
- **More economical design of flood related facilities**
- **Recent technology**
- **Consistency**

MORE DATA AVAILABLE RELATIVE TO EXISTING STUDIES

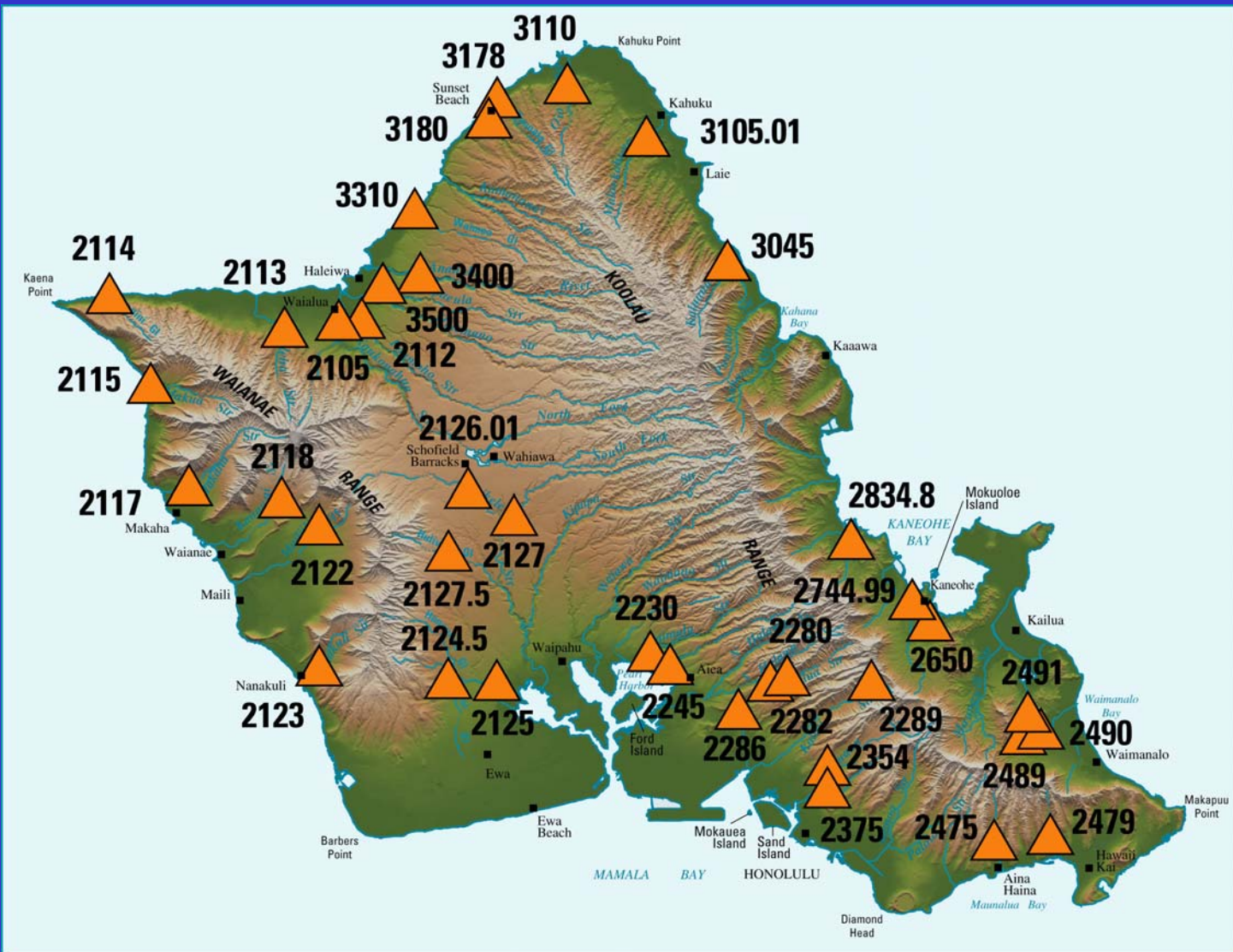
Number of Gaged Sites Available

Island	Previous Studies	Current Project
Oahu	79	89
Maui	19	59
Kauai	20	36
Hawaii	9	46
Molokai	none	22

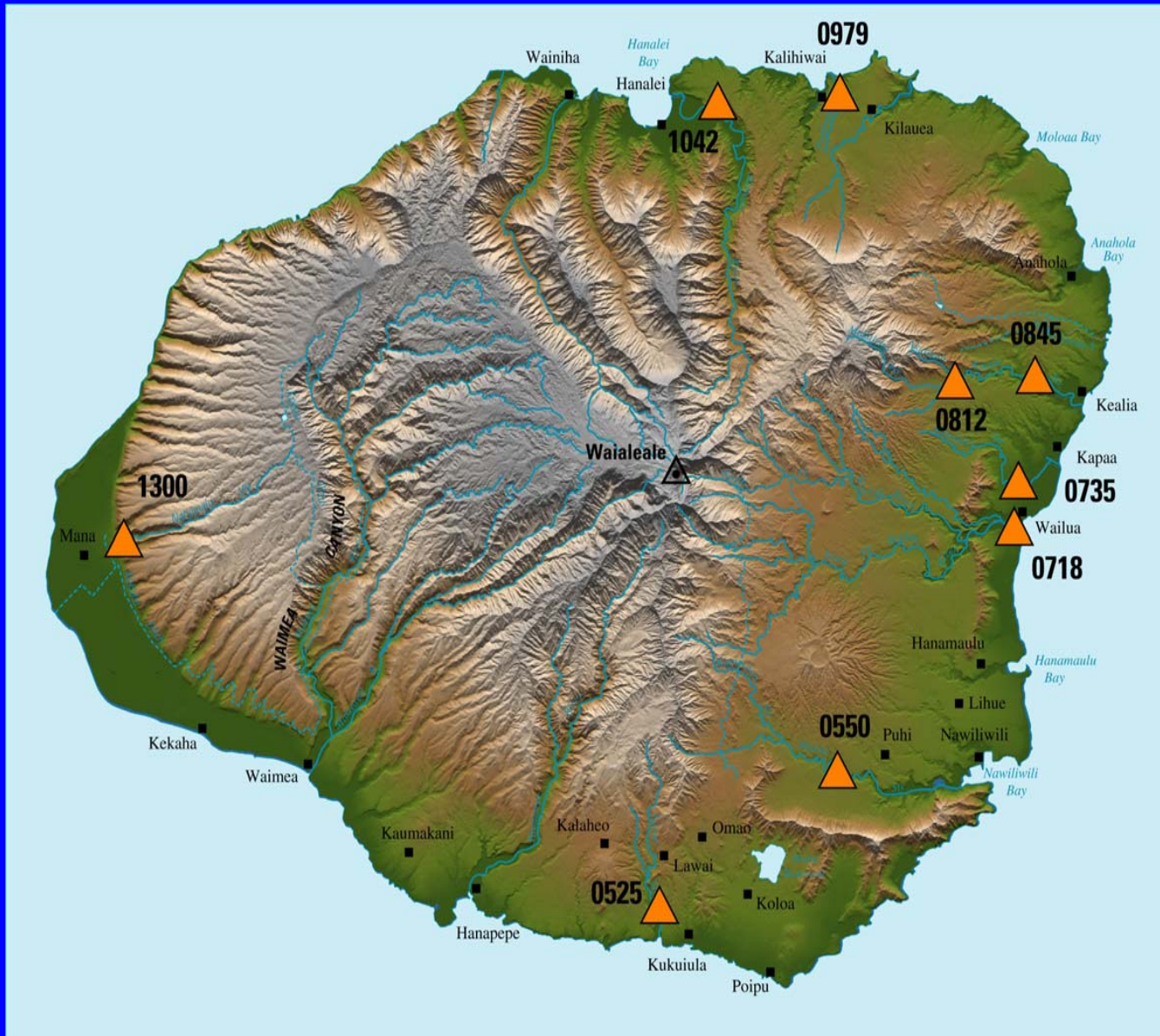
CURRENT GAGE STATION NETWORK (252 STATIONS)



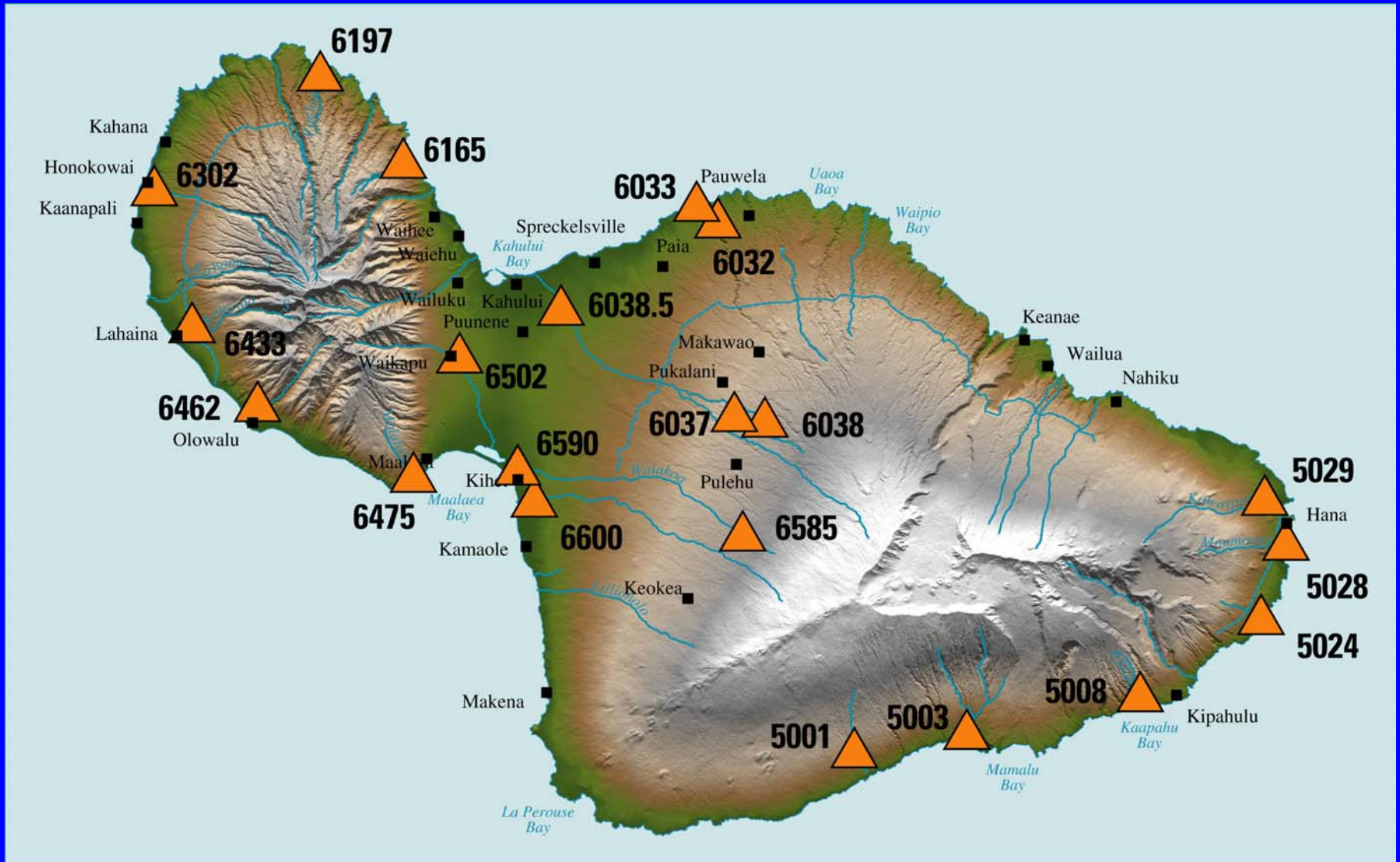
Crest-Stage Gage Network on Oahu



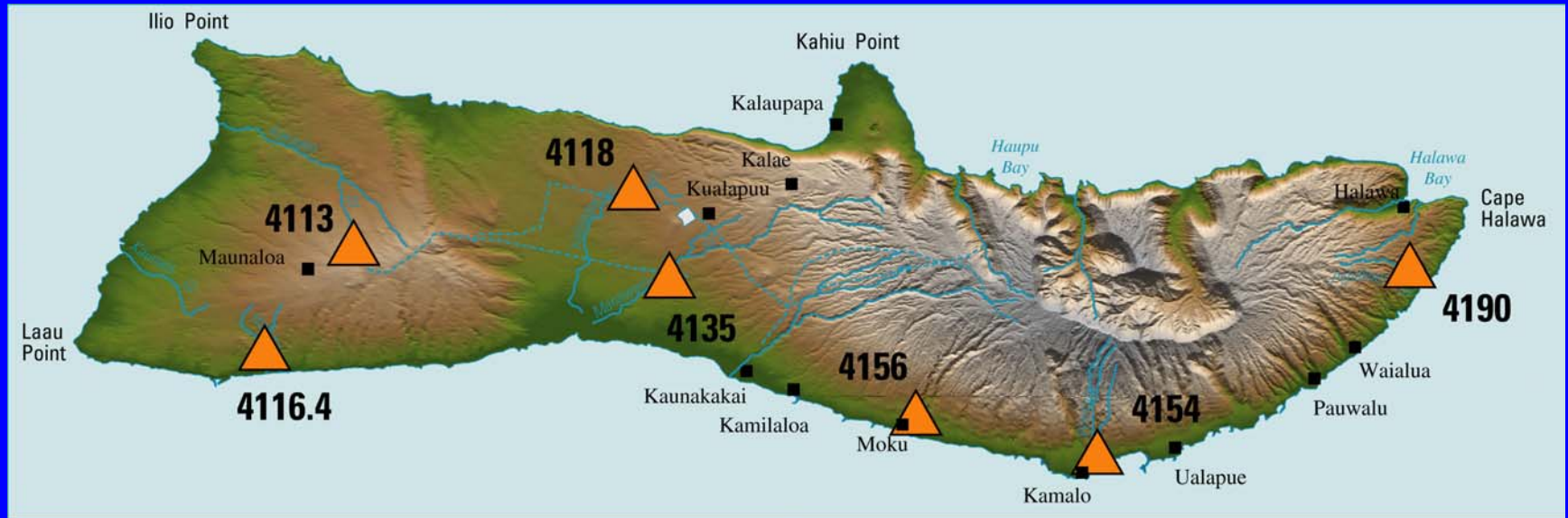
Crest-Stage Gage Network on Kauai



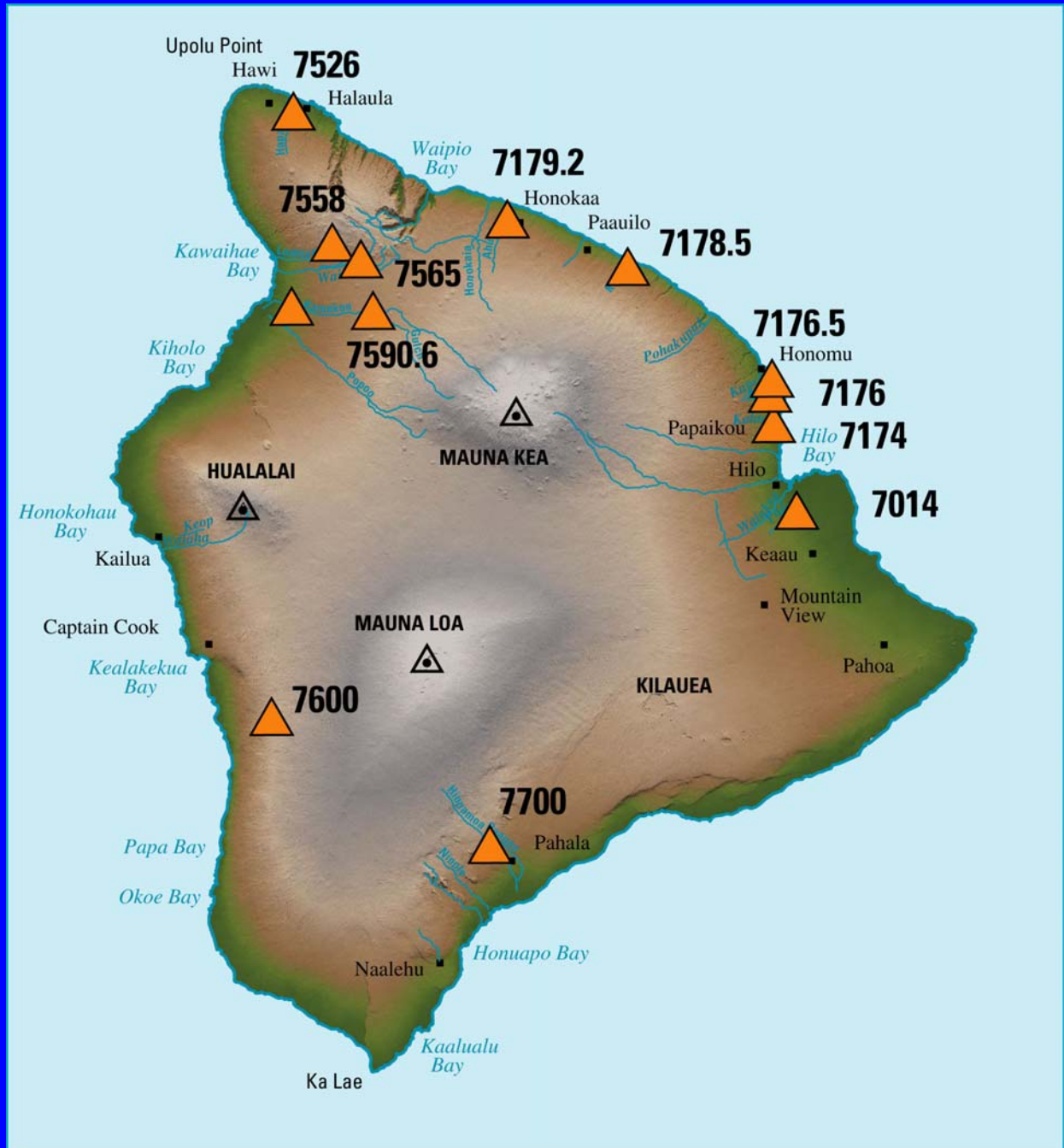
Crest-Stage Gage Network on Maui



Crest-Stage Gage Network on Molokai



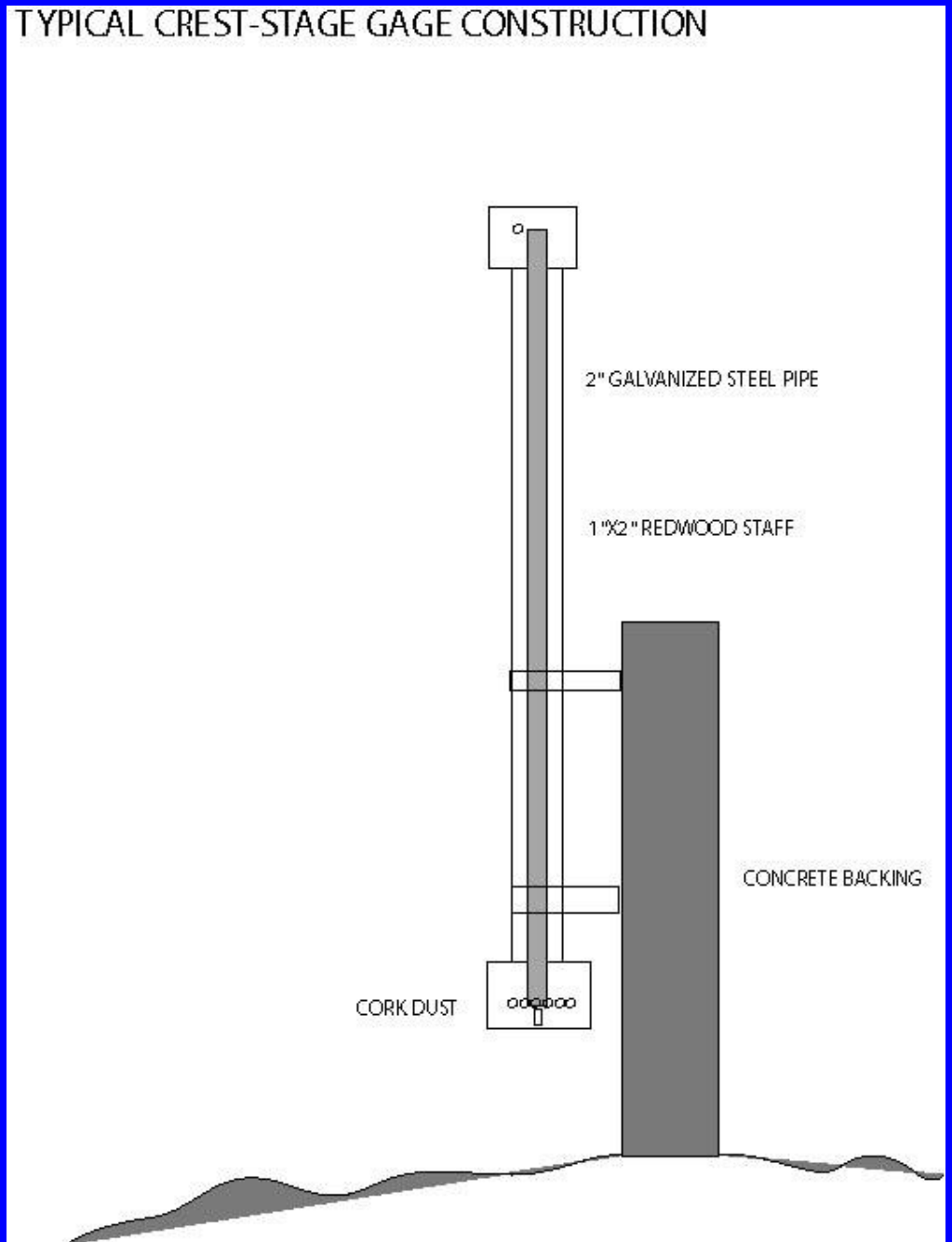
Crest-Stage Gage Network on Hawaii



TYPICAL CREST-STAGE GAGE CONSTRUCTION

Crest-Stage Gage Design

- **Steel Pipe**
- **Redwood Staff**
- **Cork Dust**
- **Concrete Backing**



Typical Crest-Gage Mounting





Typical Crest-Gage Mounting

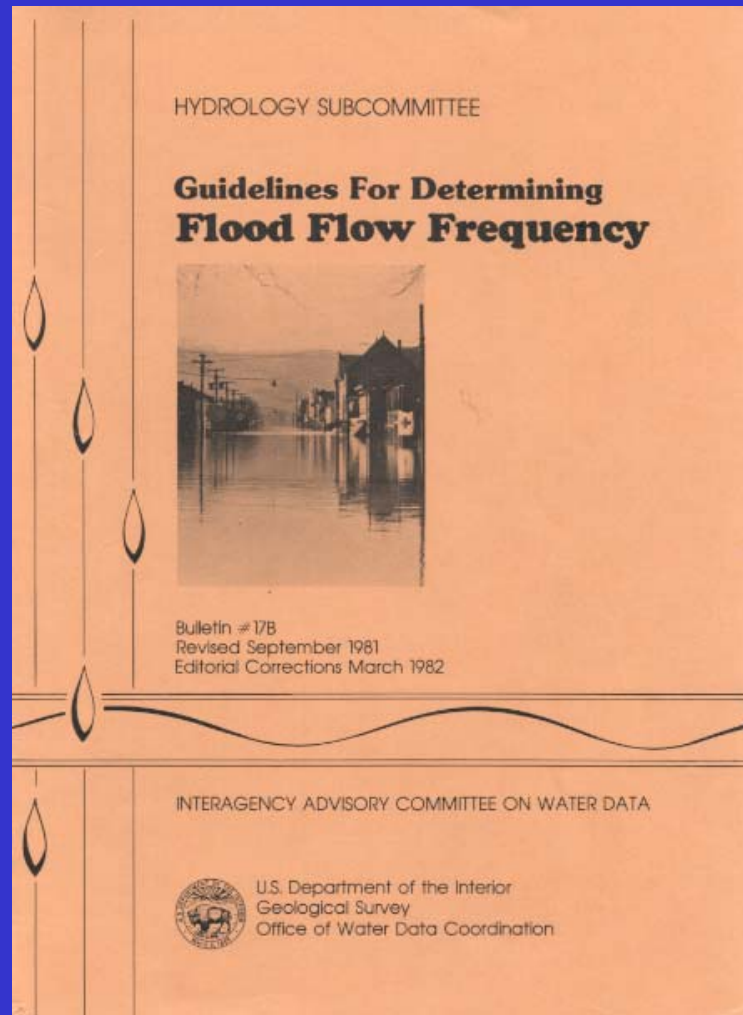


Typical Crest-Gage Mounting



Redwood Staff w/ Cork Dust

FLOOD-FREQUENCY GUIDELINES



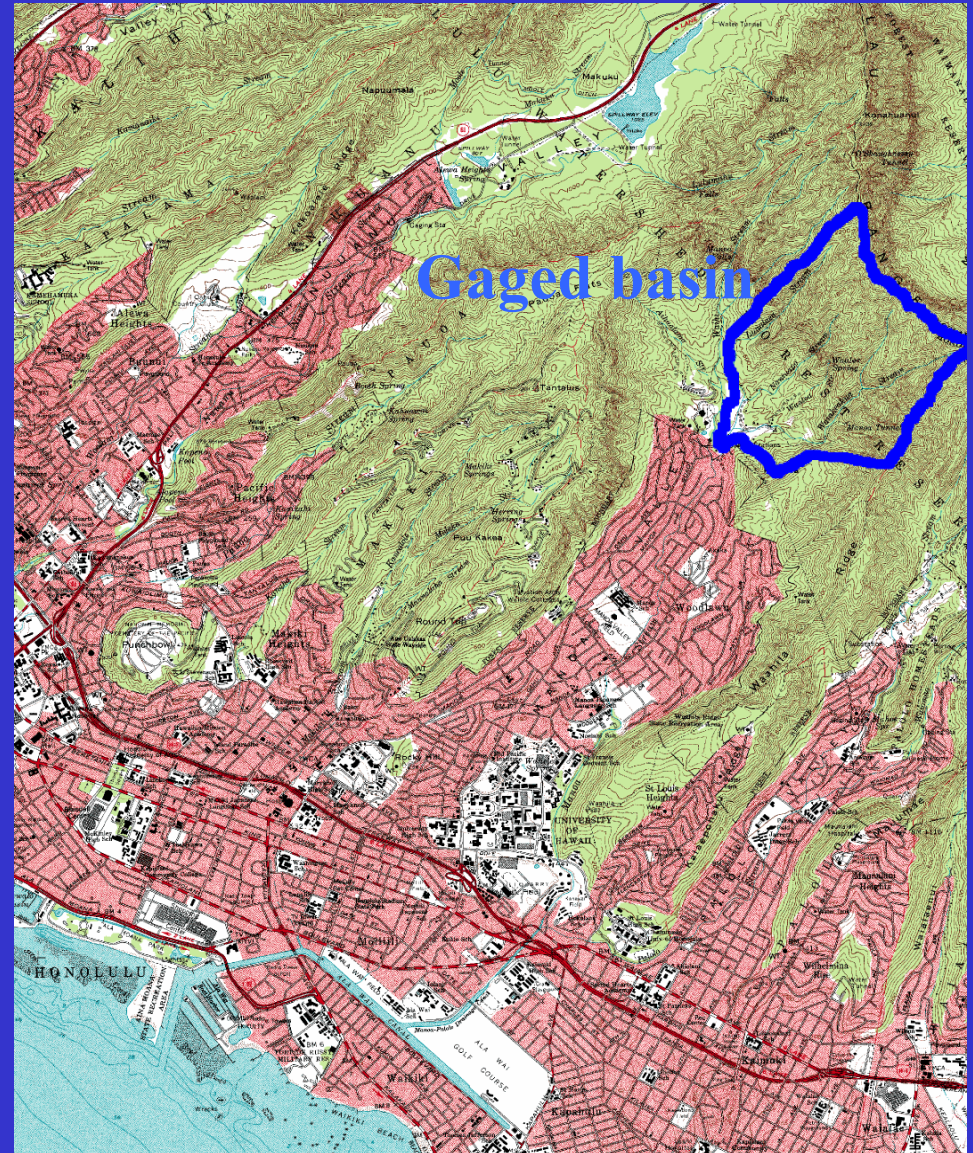
**Bulletin 17B, Interagency Advisory Committee on
Water Data, 1982**

STEPS IN FLOOD-FREQUENCY ANALYSIS

- 1. Quantify drainage basin characteristics**
- 2. Estimate skew using sites with 25 or more years of data**
- 3. Determine flood frequency and magnitude at gaged sites**
- 4. Estimate flood frequency and magnitude at ungaged sites**

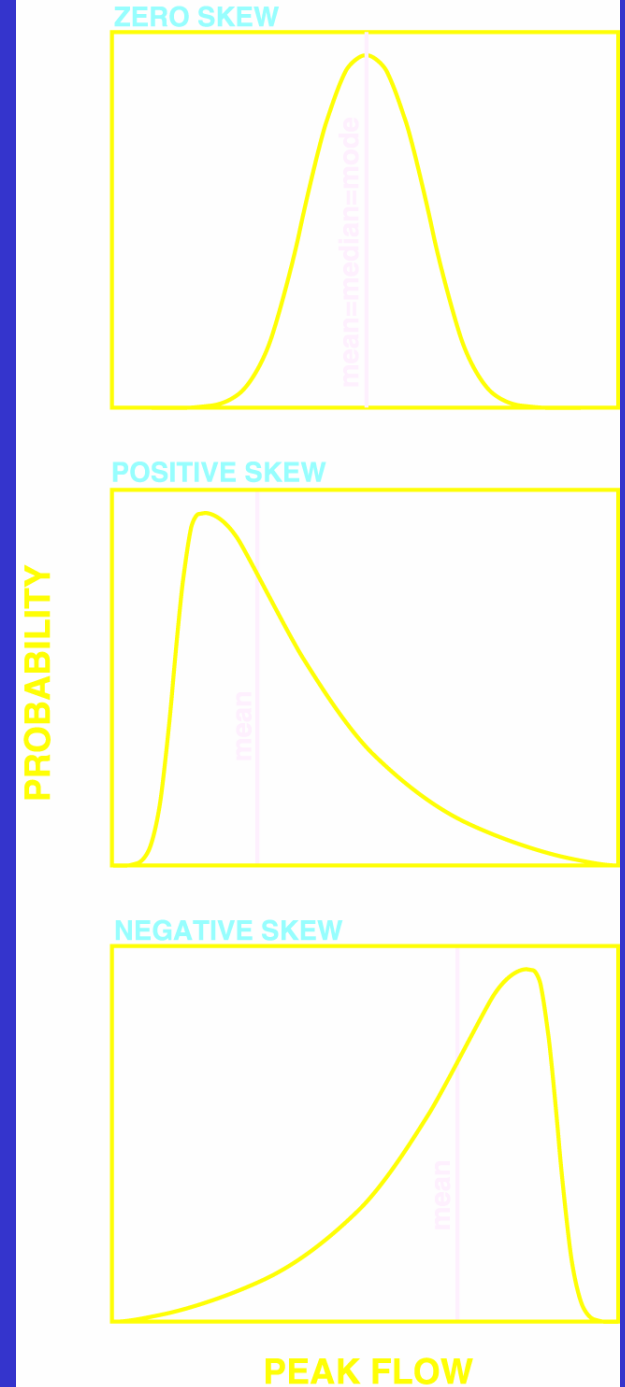
1. DRAINAGE-BASIN CHARACTERISTICS

- Automatic delineation of basins
- Automatic determination of basin characteristics (area, slope, relief, shape, etc.)

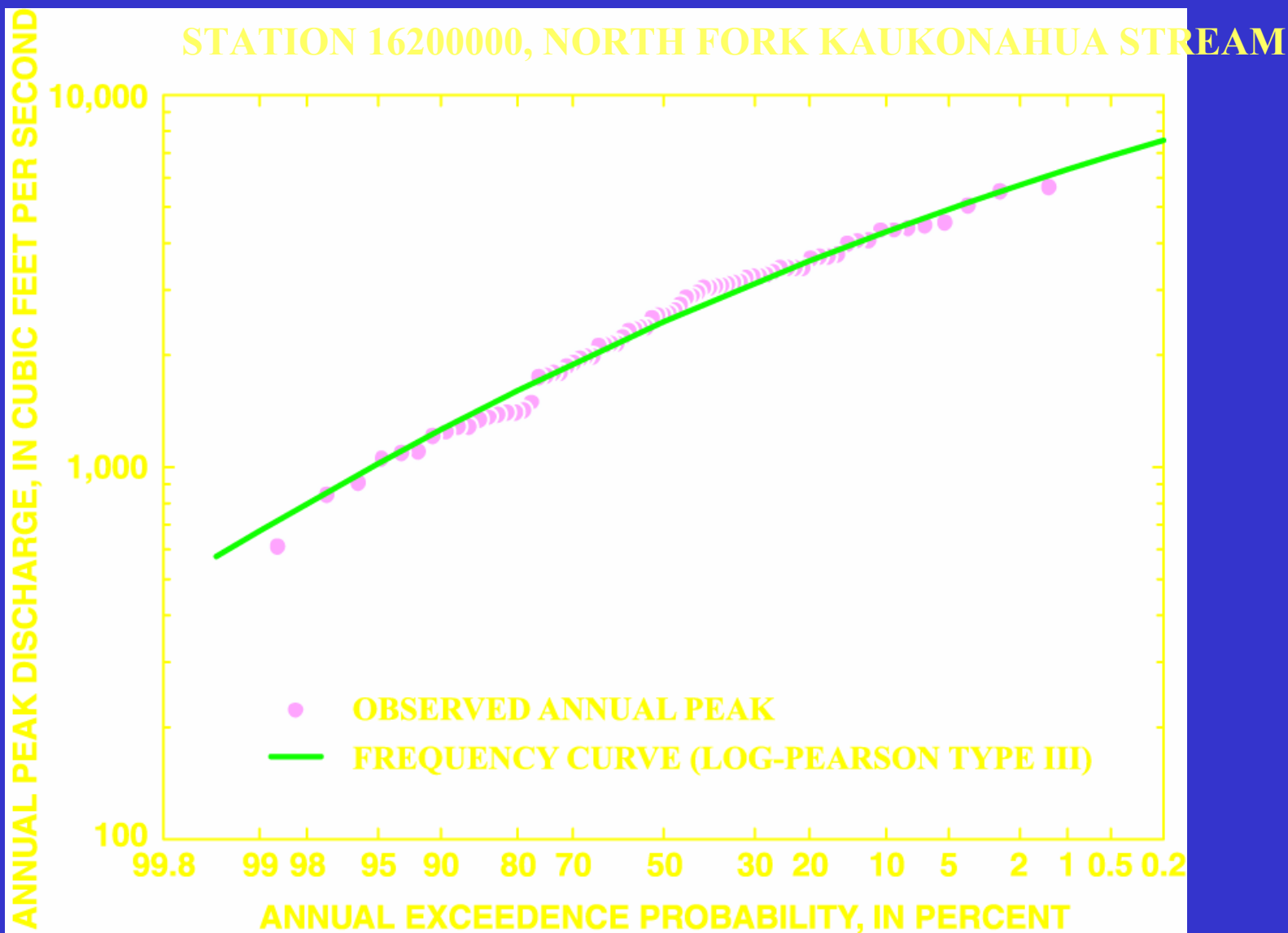


2. SKEW COEFFICIENT

- Required for Log-Pearson Type III distribution
- Station skew sensitive to extreme events
- Difficult to obtain accurate skew estimate from small sample
- Generalized skew estimated by pooling information from nearby sites
- Use sites with 25 or more years of record



3. FLOOD FREQUENCY ESTIMATES AT GAGED STATIONS



4. FLOOD FREQUENCY ESTIMATES AT UNGAGED SITES

- **Identify drainage-basin characteristics**
- **Identify hydrologic regions**
- **Develop generalized least squares regression equations**

STATUS OF THE CURRENT PROJECT

- **Drainage basins delineated**
- **Determining basin characteristics**
- **Determining skew coefficients**

SUMMARY

- **Hawaii studies outdated**
- **Additional data available**
- **Improved flood-frequency estimates will lead to safer and more economical designs of our State bridge/culvert**

ACKNOWLEDGEMENTS

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