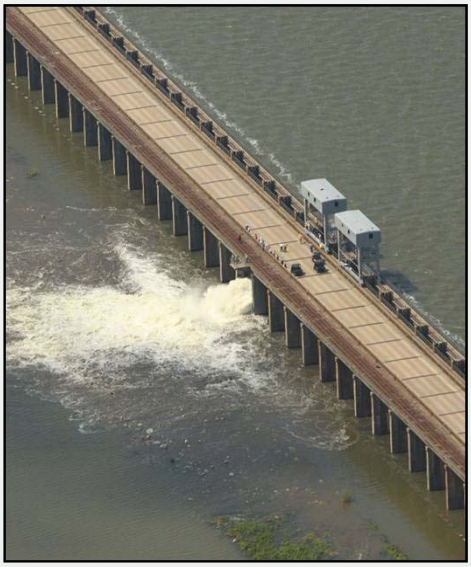
U.S. Army Corps of Engineers (USACE)
BUILDING STRONG®

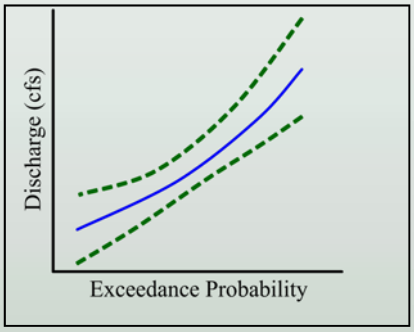
Hydrologic Engineering Center (CEIWR-HEC)
Flood Damage Reduction Analysis (HEC-FDA)

Overview HEC-FDA



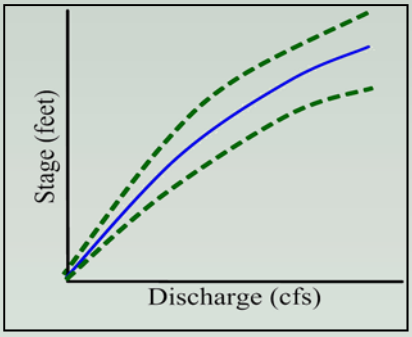
- **Purpose:** HEC-FDA evaluates alternative flood damage reduction plans using annual exceedance probabilities, risk analysis and economic impacts.
- **Input data:** Includes hydrologic, hydraulic, levee, and economic data, all with uncertainty.
- **Output results:** Includes expected annual damage, equivalent annual damage, and project performance.
- **History:** Early versions of HEC-FDA were developed starting in the 1970's and performed evaluations without risk analysis. In 1991, CEIWR-HEC developed a spreadsheet add-on to incorporate risk analysis. In January 1998, CEIWR-HEC released Version 1.0 of HEC-FDA which was written from scratch using object oriented computer programming. CEIWR-HEC has released several revisions since then, and is currently working on Version 2.0, which migrates HEC-FDA to a Java-based platform.
- **Application:** USACE (U.S. Army Corps of Engineers) regulations require the use of risk analysis in flood damage reduction studies. HEC-FDA is the tool that USACE offices apply in these studies. Applications include a range of studies from small ones such as Beargrass Creek in Kentucky to large studies such as the Dallas Floodway in Texas and the Morganza study in

Program Inputs & Data Generation



Hydrology

- **Goal:** Compute without and with plan discharge-probability or stage-probability functions
- **Application:** Model basin under each condition for a wide range of events. Evaluate reservoirs, diversions, flood forecasting, land use control, levees, floodwalls, and channel modifications. Use HEC-SSP to analyze annual peak flows using Bulletin 17B procedures. Results are entered into HEC-RAS and optionally directly into HEC-FDA.



Hydraulics

- **Goal:** Compute without and with plan stage-discharge functions with uncertainty and water surface profiles for stage-damage aggregation.
- **Application:** Compute water surface profiles for a range of events. Evaluate channel modifications, levees, and floodwalls. Results are imported into HEC-FDA.

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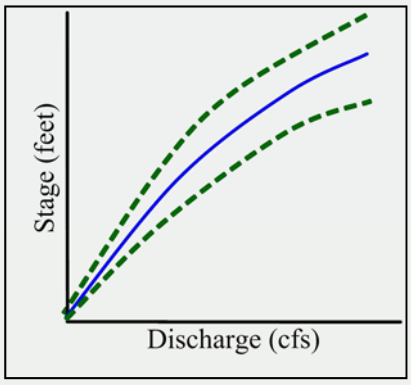


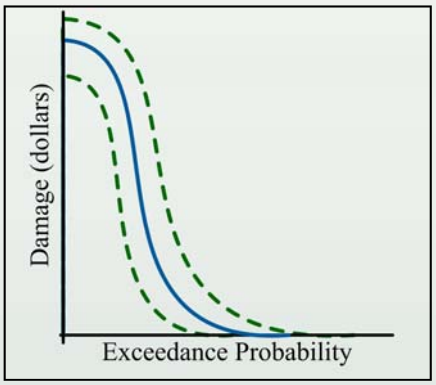
Structure Inventory

- **Goal:** Compute without and with plan stage-aggregated damage functions with uncertainty.
- Aggregate damage for all structures for a wide range of stages. Evaluate flood proofing, relocation, flood warning, and land

Program Outputs

Plan Evaluation

- **Goal:** Compute without and with plan expected annual damage and equivalent annual damage (discounted and annualized) using risk analysis.
- Combines information from hydrology, hydraulics, and structure inventorying. Compute damage-probability functions for several damage categories and plans. Integrate the damage-probability curve to find expected annual damage and compare damage reduction for each plan with uncertainty.



Project Performance

- **Goal:** Compute without and with plan project performance for a target stage such as the top of levee.
- Computes project performance indices for a target stage such as the annual exceedance probability (the chance of exceedance in any one year), the long term risk (the probability that it is exceeded one or more times in a thirty year period), and the assurance probability (the probability that a given flood such as the