

AN ESTIMATE OF THE U.S. POPULATION SUBJECT TO THE ONE-PERCENT ANNUAL CHANCE (100-YEAR) COASTAL FLOOD HAZARD

*Mark Crowell, Federal Emergency Management Agency
Kevin Coulton, Watershed Concepts, AECOM Water*

KEYWORDS: FEMA, coastal population, VE Zones, National Flood Hazard Layer, 100-year flood

The Federal Emergency Management Agency (FEMA) recently completed a coastal demographics study of the United States and U.S. Territories. As part of this effort, FEMA estimated the U.S. population subject to the one-percent annual chance (100-year) coastal flood hazard.

Areas subject to one-percent annual chance (100-year) floodwaters are termed “Special Flood Hazard Areas” (SFHAs). FEMA categorizes riverine and some coastal SFHAs as “AE Zones.” In riverine areas AE Zones (hereafter Riverine AE Zones) are determined using hydrologic and hydraulic numerical models. In coastal areas, AE Zones (hereafter Coastal AE zones) are determined using coastal storm surge models, or tide gage analyses based on long-term tide gage records. Another type of SFHA, found exclusively in coastal areas, is called the “VE Zone.” VE Zones are determined using the same coastal storm surge analyses used in determining Coastal AE Zones, with the exception that the landward boundary of the VE Zone is generally determined by the inland limit of significant wave action, high velocity waters, or the inland toe of the primary frontal dune (therefore, the VE Zone generally lies seaward of the Coastal AE Zone). Unfortunately, FEMA does not differentiate and delineate Coastal AE Zones (or the Coastal AE/Riverine AE boundary line). As such, methods had to be developed to estimate locations in AE Zones where coastal flooding dominates riverine flooding in order to estimate the location of the Coastal AE Zone/Riverine AE Zone boundary.

The determination of the Coastal AE Zone/Riverine AE Zone boundary, and the population located within the resulting Coastal AE Zone and VE Zone areas, followed a three step process:

1. create a national digital flood hazard database by compiling the best available coastal-proximate digital flood hazard area data. This was accomplished by identifying one-percent annual chance flood hazard zones in coastal areas using FEMA’s National Flood Hazard Layer dataset, supplemented by FEMA’s older Q3 data; and, where the these datasets were not available, using the U.S. Geological Survey (USGS) National Elevation Data terrain data combined with estimates of the 1-percent annual chance stillwater elevations;
2. develop a systematic method to separate the Coastal and Riverine AE Zones and delineate this new boundary onto the national digital flood hazard database, and;
3. combine 2000 census data with the national digital flood hazard database and the Coastal AE/Riverine AE boundary using a Geographic Information System. This

enabled tallies of the U. S. population subject to the one-percent annual chance coastal flood.
The analysis was conducted at the census block group level, with census block group populations (permanent residents) assumed to be uniformly distributed across each block group.

The results demonstrate that about 8,670,000 people live in Coastal AE Zones and VE Zones (that is, areas subject to the one-percent annual chance coastal flood hazard). When this coastal population estimate is compared to the total 2000 U.S. population (including territories) of about 285,620,000, this means that approximately 3.0-percent of the U.S. population lives in areas subject to the one-percent annual chance (100-year) coastal flood hazard.

Mark Crowell
500 C Street, SW
Washington, DC 20472
Mark.crowell@dhs.gov