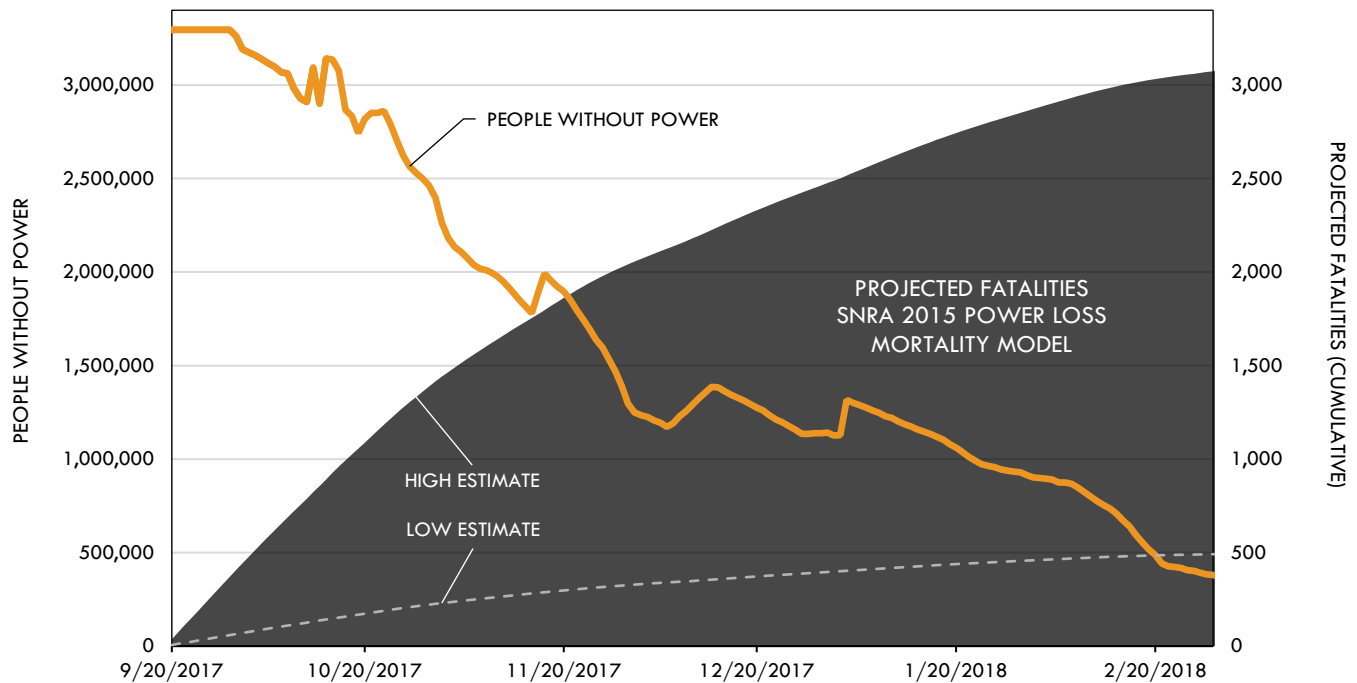


FIGURE 3. PUERTO RICO POWER RESTORATION AND EXPECTED FATALITIES, FEMA 2015 STRATEGIC NATIONAL RISK ASSESSMENT (SNRA) POWER LOSS MORTALITY MODEL



Power loss mortality model: Linear extrapolation of best-estimate (90) excess fatalities, New York City 14-15 August, 2003 East Coast Blackout, Anderson et al (2012) (*Epidemiology* 23(2) 189-193, NIH public access <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3276729/pdf/nihms348988.pdf>) to total person-days without electric power. Low estimate (1.8 fatalities/million person-days) assumes the 90 NYC fatalities represented all fatalities from the multi-state blackout (50 million person-days without power in U.S. and Canada); high estimate (11.25 per million person-days) assumes the 90 NYC fatalities represented impacts only in NYC (8 million person-days). The SNRA used the low-estimate-assumptions for the electric-power-related hazard events which FEMA added in 2015 (space weather & physical attack on the power grid). FEMA also included indirect fatalities in other events added or revised in 2015 where defensible numbers were available, but these were not specific to electric lifeline failure.

Maria power restoration curve: Assumption 100% without power 20-21 September, remainder from figure 10, Kwasinski et al (2019) (*IEEE Power and Energy Technology Systems Journal* 6(1) 85-94; at <https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8644031>). Population, GWU displacement scenario. Direct fatalities not included in totals.

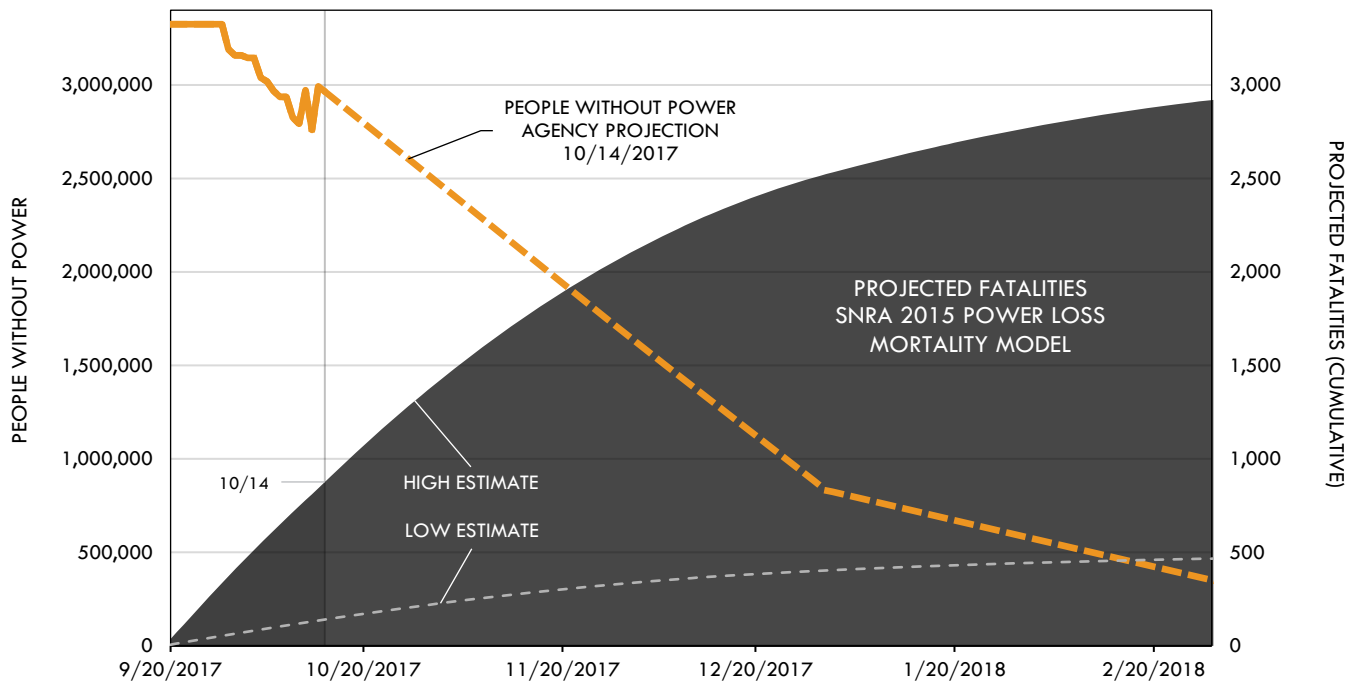
In April, I discovered that the power loss mortality model of the 2015 Strategic National Risk Assessment (SNRA) appears to have accurately projected the magnitude of excess fatalities from Hurricane Maria in Puerto Rico (figure 3) at the high estimate, when I had previously believed otherwise.<sup>10</sup> This appears to be true not just retrospectively but also prospectively (figure 4).<sup>11</sup> I have spent the months since trying to confirm or disconfirm this on my own, but experts outside the Government will need to do this definitively.

I am requesting the currently non-public information that I know outside experts will need to validate the SNRA's power loss mortality model, and other relevant information.

<sup>10</sup> U.S. Department of Homeland Security (2015, June). The Strategic National Risk Assessment (SNRA). DHS Office of Risk Management & Analysis (RMA), DHS/FEMA National Integration Center (NIC). June 2015 revision, FEMA/NIC. Unclassified SNRA 2015 Technical Appendix pp. 16-18, 33-34, 40, 49-50, 54, 57-58, 63-72. Unclassified SNRA 2015 Findings, page 1.

<sup>11</sup> 'Prospective' = using the information available in October 2017 as inputs to project mortality in the following months. The calculation itself and the chart based on it (figure 4) are retrospective because they were made in 2020. (By contrast, the data and the chart of figure 3 are both retrospective.) I used the word 'retrospectively' in the figure title to emphasize that the chart itself was not made in October 2017, but years later.

FIGURE 4. RETROSPECTIVELY PROJECTED FATALITIES BASED ON THE AGENCY'S OCTOBER 2017 PROJECTIONS OF POWER RESTORATION TO THE ISLAND



Power loss mortality model: Linear extrapolation of best-estimate (90) excess fatalities, New York City 14-15 August, 2003 East Coast Blackout, Anderson et al (2012) (*Epidemiology* 23(2) 189-193, NIH public access <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3276729/pdf/nihms348988.pdf>) to total person-days without electric power. Low estimate (1.8 fatalities/million person-days) assumes the 90 NYC fatalities represented all fatalities from the multi-state blackout (50 million person-days without power in U.S. and Canada); high estimate (11.25 per million person-days) assumes the 90 NYC fatalities represented impacts only in NYC (8 million person-days). The SNRA used the low-estimate-assumptions for the electric-power-related hazard events which FEMA added in 2015 (space weather & physical attack on the power grid). FEMA also included indirect fatalities in other events added or revised in 2015 where defensible numbers were available, but these were not specific to electric lifeline failure.

Maria power restoration curve: 9/20-10/13, FEMA senior leadership briefing (SLB) 10/13/17 1700 EDT (<https://oversight.house.gov/sites/democrats.oversight.house.gov/files/Senior%20Leadership%20Briefing%20and%20Recovery%20Snapshots.pdf>); projected 10/14-3/31 (linear interpolation), FEMA daily operations brief 10/14/17 (<https://www.hsdl.org/?view&did=804878>). Assumption of constant population (Census July 2017). Official fatality total (47 as of 10/14) not included in chart.