SUPPLEMENTARY INFORMATION APPENDICES

Informational determinants of large-area hurricane evacuations
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2. **Experiment Online Replication Link & Instructions**

Use the replication link and password below to access the experiment online and replicate any treatment. You will be prompted with several choices on the first screen. These include: treatment number, group code, and password. For the treatment number, you can select any treatment you would like. Short text descriptions of the treatment conditions are presented. The group code is used for classroom education purposes for training students in courses such as risk analysis and emergency management, so we ask you to keep your group code on *alpha*. You can type the below password into the last text box and press continue when ready.

<table>
<thead>
<tr>
<th>Access Web Link</th>
<th>Password</th>
<th>Group Code</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="https://resiliencedecision.org.ohio-state.edu/sites/pages2.0/index.php">https://resiliencedecision.org.ohio-state.edu/sites/pages2.0/index.php</a></td>
<td>decision</td>
<td><em>alpha</em></td>
</tr>
</tbody>
</table>
3. Supplemental Statistical & Econometric Analyses & Robustness Checks

Table SI-3.1 and SI-3.2 provide pairwise correlations between each treatment and numeracy as identified by a correct response on the single-item Berlin Numeracy Test. It is a dichotomous variable. In general, all correlations presented in both tables are relatively low and provide some evidence indicating that numeracy is uncorrelated with treatment assignment.

### Table SI-3.1 Pairwise Correlations between Numeracy and Treatments (Professional Subjects)

<table>
<thead>
<tr>
<th>Numeracy</th>
<th>Professional Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Treatment 1</td>
</tr>
<tr>
<td>Numeracy</td>
<td>-0.0598</td>
</tr>
</tbody>
</table>

### Table SI-3.2 Pairwise Correlations between Numeracy and Treatments (Student Subjects)

<table>
<thead>
<tr>
<th>Numeracy</th>
<th>Student Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Treatment 1</td>
</tr>
<tr>
<td>Numeracy</td>
<td>0.1034</td>
</tr>
</tbody>
</table>

Table SI-3.3 and SI-3.4 provide pairwise correlations between treatments and sociological features. As in the previous case, numbers in these tables only represent positive or negative associations between sociological feature (rows) and treatment (columns). Correlations presented in both tables are low. For instance, in analyzing the association between personal hurricane experience and treatment 4, we can see that the correlation is positive for both subject types, professional and student, although it is slightly higher for professionals (0.1922) than for students (0.0772). All pairwise correlations in 3.1-3.4 are non-statistically significant at the .05 level.
Table SI-3.3 Pairwise Correlations between Sociological Features and Treatments (Professional Subjects)

<table>
<thead>
<tr>
<th>Sociological Features</th>
<th>Professional Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Treatment 1</td>
</tr>
<tr>
<td>Age</td>
<td>-0.0769</td>
</tr>
<tr>
<td>Veteran</td>
<td>-0.0034</td>
</tr>
<tr>
<td>First Responder</td>
<td>0.0385</td>
</tr>
<tr>
<td>Personal Disaster Experience</td>
<td>0.0802</td>
</tr>
<tr>
<td>Personal Hurricane Experience</td>
<td>-0.0311</td>
</tr>
<tr>
<td>Personal Hurricane Experience &amp; Evacuated</td>
<td>0.0034</td>
</tr>
</tbody>
</table>

Table SI-3.4 Pairwise Correlations between Sociological Features and Treatments (Student Subjects)

<table>
<thead>
<tr>
<th>Sociological Features</th>
<th>Student Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Treatment 1</td>
</tr>
<tr>
<td>Age</td>
<td>-0.0571</td>
</tr>
<tr>
<td>Veteran</td>
<td>-0.0626</td>
</tr>
<tr>
<td>First Responder</td>
<td>-0.0584</td>
</tr>
<tr>
<td>Personal Disaster Experience</td>
<td>-0.0064</td>
</tr>
<tr>
<td>Personal Hurricane Experience</td>
<td>0.0085</td>
</tr>
<tr>
<td>Personal Hurricane Experience &amp; Evacuated</td>
<td>0.0388</td>
</tr>
</tbody>
</table>

Table SI-3.5 provides survival regression models where the failure time variable is the advisory number in which subjects recommended voluntary evacuation. It is important to note from these regressions that subject decisions are explained predominantly by informational properties rather than sociological features. Sociological variables, and personal experience with hurricanes and disasters, fall short of commonly-accepted statistical significance levels. The models provide both the Cox PH model as well as the most robust (based on log-likelihood) alternative parametric model, the exponential hazard.
Table SI-3.5 Survival Regression Analysis of Voluntary Evacuation Decision Making (with Sociological Determinants)

<table>
<thead>
<tr>
<th></th>
<th>Model 1 (Cox PH)</th>
<th>Model 2 (Exponential Hazard)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Student Subjects</td>
<td>Professional Subjects</td>
</tr>
<tr>
<td>Treatment 2</td>
<td>1.525 (0.514)</td>
<td>2.942* (1.921)</td>
</tr>
<tr>
<td>Treatment 3</td>
<td>1.981** (0.648)</td>
<td>3.368* (3.106)</td>
</tr>
<tr>
<td>Treatment 4</td>
<td>2.243** (0.754)</td>
<td>4.913** (3.277)</td>
</tr>
<tr>
<td>Numeracy</td>
<td>0.889 (0.147)</td>
<td>1.583 (0.544)</td>
</tr>
<tr>
<td>Age</td>
<td>0.986 (0.021)</td>
<td>0.980 (0.017)</td>
</tr>
<tr>
<td>Veteran</td>
<td>0.98** (0.135)</td>
<td>1.532 (0.609)</td>
</tr>
<tr>
<td>First Responder</td>
<td>1.489 (0.794)</td>
<td>0.788 (0.276)</td>
</tr>
<tr>
<td>Personal Disaster</td>
<td>1.162 (0.299)</td>
<td>0.975 (0.458)</td>
</tr>
<tr>
<td>Experience</td>
<td>1.093 (0.445)</td>
<td>0.978 (0.473)</td>
</tr>
<tr>
<td>Personal Hurricane</td>
<td>2.134 (1.217)</td>
<td>0.941 (0.427)</td>
</tr>
<tr>
<td>Experience &amp; Evacuated</td>
<td>0.091*** (n/a)</td>
<td>0.056*** (n/a)</td>
</tr>
<tr>
<td>Constant</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Log-likelihood Ratio</td>
<td>-769.949 (227)</td>
<td>-193.864 (81)</td>
</tr>
</tbody>
</table>

*p<.1, **p<.05, ***p<.01. Models report hazard ratios with standard errors in parentheses. Failure time variable is advisory in which subject recommended voluntary evacuation. Breslow method utilized for handling tied failures in Cox models. In all models, Treatment 1 is omitted as a reference category.

Table SI-3.6 presents alternative model specifications, parametric (exponential) and semiparametric (Cox models) that complement those results presented in Table 1. The failure time variable is the advisory number in which the subject recommended voluntary evacuation. Models 1 and 2 do not control for numeracy whereas models 3 and 4 do, as can be observed in Table SI-3.6. As mentioned in the main text, for the Cox models with numeracy, among professional subjects, numeracy increased the hazard ratio by 1.7 (p<.10). Numeracy is not statistically significant, though, in exponential models.
### Table SI-3.6 Survival Regression Analysis of Voluntary Evacuation Decision Making (Numeracy only)

<table>
<thead>
<tr>
<th></th>
<th>Model 1 (Cox PH)</th>
<th>Model 2 (Exponential Hazard)</th>
<th>Model 3 (Cox PH)</th>
<th>Model 4 (Exponential Hazard)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Professional Subjects</td>
<td>Student Subjects</td>
<td>Professional Subjects</td>
<td>Student Subjects</td>
</tr>
<tr>
<td><strong>Treatment 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.705</td>
<td>1.384</td>
<td>2.536</td>
<td>1.341</td>
</tr>
<tr>
<td></td>
<td>(1.735)</td>
<td>(0.449)</td>
<td>(1.624)</td>
<td>(0.435)</td>
</tr>
<tr>
<td><strong>Treatment 3</strong></td>
<td>3.282*</td>
<td>1.736*</td>
<td>2.895*</td>
<td>1.678</td>
</tr>
<tr>
<td></td>
<td>(2.029)</td>
<td>(0.549)</td>
<td>(1.787)</td>
<td>(0.529)</td>
</tr>
<tr>
<td><strong>Treatment 4</strong></td>
<td>4.553**</td>
<td>1.989**</td>
<td>3.614**</td>
<td>1.902**</td>
</tr>
<tr>
<td></td>
<td>(2.952)</td>
<td>(0.662)</td>
<td>(2.333)</td>
<td>(0.632)</td>
</tr>
<tr>
<td><strong>Numeracy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td>n/a</td>
<td>n/a</td>
<td>0.029***</td>
<td>0.068***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.017)</td>
<td>(0.019)</td>
</tr>
<tr>
<td><strong>Likelihood Ratio</strong></td>
<td>7.39*</td>
<td>6.07</td>
<td>5.28</td>
<td>5.44</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>81</td>
<td>227</td>
<td>81</td>
<td>227</td>
</tr>
</tbody>
</table>

* p<.1, ** p<.05, *** p<.01. Models report hazard ratios with standard errors in parentheses. Failure time variable is advisory number in which subject recommended voluntary evacuation. Breslow method utilized for handling tied failures in Cox models. In all models, Treatment 1 is omitted as a reference category.

Figures SI-3.1, SI-3.2, and SI-3.3 present Kaplan Meier failure estimates respectively for all pooled subjects and for professionals and students independently. The horizontal axis represents the advisory number in which a subject recommended voluntary evacuation and the vertical axis represents probability of failure (i.e., probability of a subject within a treatment to recommend voluntary evacuation). We can observe, for instance, that a subject in treatment 4 has, on average, a probability of 0.75 to issue a voluntary evacuation recommendation in the ninth advisory. This probability is similar for both subjects, professionals and students (see Figures SI-3.2 and SI-3.3). However, when we compare an evacuation recommendation decision between professionals and student subjects from treatment 1, we notice that the probability of a student issuing an evacuation recommendation in the ninth advisory is above 0.50, on average, whereas a professional has a probability near 0.25, on average. As seen in Table SI-3.6, this probability is higher among numerate professionals.
Figure SI-3.1. Survival Function Plot by Treatment (All Subjects Pooled)

Figure SI-3.2. Survival Function Plot by Treatment (Professional Subjects)
Table SI-3.7 presents the informational parameters used in the study. The table includes checkmarks indicating which informational parameters were present to subjects in each treatment. These parameters were also available for individuals in treatment 2 who were additionally presented with the forecast center track and the forecasted warning and watch areas. Subjects in treatment 3 received the same parameters as those in treatment 2 and additionally received on the hurricane’s cone of uncertainty. Finally, participants in treatment 4 saw the same parameters from treatment 3 plus the forecasted maximum wind speed.
Table SI-3.7 Informational Parameters by Treatment Condition

<table>
<thead>
<tr>
<th>Informational Parameter Provided to Subjects</th>
<th>Treatment 1 (Control Group)</th>
<th>Treatment 2 (Historic, Current, and Limited Forecast Info)</th>
<th>Treatment 3 (Historic, Current, and Full Forecast Info)</th>
<th>Treatment 4 (Treatment 3 + Forecasted Max Wind Speed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Historic Center Track</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Current Center Location</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Max Sustained Wind Speed</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Hurricane Category (Saffir-Simpson Index)</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forecast Center Track</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forecasted Warning and Watch Areas</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cone of Uncertainty</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forecasted Max Wind Speed</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

A checkmark indicates the specified informational parameter was available to subjects who were assigned to the specified treatment.

Table SI-3.8 provides values indicating the mean item responses on subjects’ 1-3 scale ranking of their reliance on the informational parameter in their voluntary evacuation recommendation decision. In the post-survey portion of the experiment, subjects were asked to rate the extent to which they relied upon each informational parameter presented to them during the experiment (as listed in Table SI-3.7). It was ranked on a scale from 1 to 3, where 3 indicates greatest reliance. Results indicate that professional and student subjects in the control group (i.e., treatment 1) relied the most, on average, on the current center location of the hurricane (mean is 2.182 and 2.136, respectively). However, professional and student subjects presented with information about the forecast center track, as in treatment 2, identified it as the most relied-upon parameter, on average (mean is 2.227 and 2.192, respectively). Subjects in treatments 3 and 4 also reported having relied the greatest, on average, on the forecast center track.
Table SI-3.8 Informational Determinant Importance by Treatment and Subject Type

<table>
<thead>
<tr>
<th>Informational Parameter</th>
<th>Control Group (Historic and Current Info Only)</th>
<th>Treatment 2 (Historic, Current, and Limited Forecast Info)</th>
<th>Treatment 3 (Historic, Current, and Full Forecast Info)</th>
<th>Treatment 4 (Treatment 3 + Forecasted Max Wind Speed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>µ(P)  µ(S)     p</td>
<td>µ(P)  µ(S)     p</td>
<td>µ(P)  µ(S)     p</td>
<td>µ(P)  µ(S)     p</td>
</tr>
<tr>
<td>Historic Center Track</td>
<td>0.818 0.682 0.037</td>
<td>0.182 0.384 0.306</td>
<td>0.281 0.310 0.484</td>
<td>0.063 0.354 0.171</td>
</tr>
<tr>
<td>Current Center Location</td>
<td>2.182 2.136 0.918</td>
<td>1.182 1.137 0.889</td>
<td>1.156 1.155 0.951</td>
<td>0.500 0.729 0.440</td>
</tr>
<tr>
<td>Current Max Sustained Wind Speed</td>
<td>1.636 0.682 0.022</td>
<td>0.364 0.452 0.867</td>
<td>0.406 0.250 0.253</td>
<td>0.875 0.250 0.069</td>
</tr>
<tr>
<td>Current Category (Saffir-Simpson Index)</td>
<td>1.364 1.500 0.765</td>
<td>1.318 0.959 0.254</td>
<td>1.063 0.679 0.150</td>
<td>0.813 0.771 0.642</td>
</tr>
<tr>
<td>Forecast Center Track</td>
<td>~ ~ ~</td>
<td>2.227 2.192 0.723</td>
<td>1.750 1.940 0.498</td>
<td>1.938 1.792 0.617</td>
</tr>
<tr>
<td>Forecasted Warning and Watch Areas</td>
<td>~ ~ ~</td>
<td>0.727 0.876 0.631</td>
<td>0.875 0.679 0.285</td>
<td>0.938 0.917 0.913</td>
</tr>
<tr>
<td>Cone of Uncertainty</td>
<td>~ ~ ~</td>
<td>~ ~ ~</td>
<td>~ ~ ~</td>
<td>0.469 0.988 0.028</td>
</tr>
</tbody>
</table>

νValues indicate the mean item response on the 1-3 self-reported scale ranking of subject’s reliance on the informational parameter in their voluntary evacuation recommendation decision (stage 1 experiment). µ(P) and µ(S) indicate mean value of professional and student sub-samples, respectively. p-values report Mann-Whitney non-parametric hypothesis tests of equality of mean values within sub-sample.

Table SI-3.9 presents information on the average number of advisories taken to issue an evacuation recommendation. The values in the first column for student subjects and third column for professional subjects indicate the mean advisory at which subjects in a given treatment recommended voluntary evacuation of coastal and low-lying areas. For instance, the average number of advisories that student subjects in treatment 1 took to issue an evacuation recommendation was 6.417. This average number falls to 4.784 for student subjects in treatment 4. On the other hand, professionals in treatment 1 took, on average, 7.667 advisories to issue an evacuation recommendation whereas professionals in treatment 4 took, on average, 6.617 advisories.
Table SI-3.9 Average Number of Advisories Prior to Evacuation Decision

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Treatment 1</th>
<th>Treatment 2</th>
<th>Treatment 3</th>
<th>Treatment 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Group</td>
<td>Historic and Current Info Only</td>
<td>Historic, Current, and Limited Forecast Info</td>
<td>Historic, Current, and Full Forecast Info</td>
<td>Treatment 3 + Forecasted Max Wind Speed</td>
</tr>
<tr>
<td>Average Number of Advisories Taken to Issue Evacuation</td>
<td>6.417</td>
<td>5.130</td>
<td>4.817</td>
<td>4.784</td>
</tr>
<tr>
<td>Subjects Not Evacuating before Warning Issued (%)</td>
<td>45.45%</td>
<td>36.99%</td>
<td>28.57%</td>
<td>22.92%</td>
</tr>
<tr>
<td>Average Number of Advisories Taken to Issue Evacuation</td>
<td>7.667</td>
<td>6.615</td>
<td>6.619</td>
<td>6.617</td>
</tr>
<tr>
<td>Subjects Not Evacuating before Warning Issued (%)</td>
<td>72.73%</td>
<td>40.91%</td>
<td>34.38%</td>
<td>25.00%</td>
</tr>
</tbody>
</table>

Note: Values reflect the mean advisory at which subjects in a given treatment recommended voluntary evacuation of coastal and low-lying areas. Subjects who never called for an evacuation (i.e., who ran out of time before a hurricane warning was issued by NWS for the area) are omitted from the calculation. The percent of subjects never recommending evacuation are provided in the second and fourth columns.

Figures SI-3.4 to SI-3.6 represent distributions of voluntary evacuation by advisory. The side-by-side bar charts are organized by subjects respectively—all pooled subjects, professionals, and students—and by treatment. In Figure SI-3.6, for instance, 7.143% of student subjects in treatment 3 issued a voluntary evacuation recommendation in the first advisory. The percentage of students who did not recommended evacuation in treatment 3 was 28.57%.
Figure SI-3.4 Distribution of Voluntary Evacuation by Advisory (All Subjects Pooled)
Note: Vertical red line indicates when NWS issued a hurricane warning (i.e., prior to the tenth advisory issued after the storm’s upgrade from tropical storm)

Figure SI-3.5 Distribution of Voluntary Evacuation by Advisory (Professional Subjects)
Note: Vertical red line indicates when NWS issued a hurricane warning (i.e., prior to the tenth advisory issued after the storm’s upgrade from tropical storm)
Figure SI-3.6. Distribution of Voluntary Evacuation by Advisory (Student Subjects)
Note: Vertical red line indicates when NWS issued a hurricane warning (i.e., prior to the tenth advisory issued after the storm’s upgrade from tropical storm)

Table SI-3.10 Pairwise Correlations between Numeracy and Time Taken

<table>
<thead>
<tr>
<th>Numeracy</th>
<th>Time Taken for Numeracy Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All Subjects</td>
</tr>
<tr>
<td>Numeracy</td>
<td>-0.0507</td>
</tr>
</tbody>
</table>

We also tested for the potential relationship between time spent on the Berlin Numeracy test and the correct response on that assessment. As Cokely et al. (2018) identify a potential relationship between time in deliberation on a decision task and its accuracy, we evaluate this by time stamping the start and stop times of subjects on the numeracy test. Table 3.10 provides pairwise correlations for this assessment, separately by subject type and overall. All pairwise correlations are low and non-statistically significant at .05, indicating that numeracy and time expended on the decision task are not directly related in this experiment.
4. Experiment Software & User-Interface (UI) Design Rationale

4.1 Overview of UI & Design Rationale
The user interface (UI) and database structure were designed with the primary goals of accessibility and consistency in mind. Students, emergency managers, and public safety professionals, young and old, all needed to be able to use the online environment intuitively. Therefore, every clickable action is labeled on the website from enlarging images to image changes on selection. Additionally, all buttons and links change when they are hovered over to indicate to the subject that each item is clickable with an icon change or font color change.

To maintain consistency in designing survey questions, each yes or no survey question in the experiment is identical with the no answer on the left and the yes answer on the right to avoid any potential bias or subject confusion in responding. Furthermore, to avoid order and recency bias in listed-ordered queries, all list items were ordered randomly for each subject and reordered with each new page reloaded.

A key feature included in the website is the ability to differentiate between experts (e.g., emergency managers and public safety professionals) and student subjects. Each subject population was given an identifier in the database. This permitted payment remuneration differentiation across subject types.

Additionally, this experiment was designed exclusively for a computer; therefore, if the subject attempted to access the experiment from a mobile device such as a phone or tablet, we coded the UI such that they were presented with a screen stating they could only access the experiment from a computer.

The bottom bar of the website included two options: Help and Exit Experiment. If the help button was clicked, the subject was sent to a Qualtrics Help Form where they could explain their issue with the experiment. This help form information was immediately emailed to the team, who would respond via the subject’s preferred method of communication. All help forms were answered within 24-48 hours of being submitted. The Exit Experiment button was included to allow the
subjects to explicitly leave the experiment if they felt uncomfortable or did not wish to participate further. Most subjects chose to close out of the window rather than explicitly exit the experiment.

To allow flexibility in completing the experiment, particularly for professional subjects, continuous completion was not required and subjects were allowed to revisit the experiment after completing portions of it. During the design and pilot phase of the experiment, we considered alternative methods, such as discontinuation and forced exit, and forced restart of the experiment. We chose the most open and flexible option possible to provide the greatest flexibility for professional subjects as possible, including providing readily-available instructional content access (e.g., videos, text transcripts) on all decision-making screens.

4.2 Experiment Walk Thru and Rationale

4.2.1 Welcome Page

The Welcome Page is the first page of the experiment that the subject sees after they click the access link. First, when the subject clicks on the link to enter the online experiment, the subject’s treatment number is assigned using the randomized least count algorithm (see section 4) to ensure both random and uniform treatment assignment. Second, a query was made to the database to save an event when a subject pressed continue. Events were also saved at the start and end of the experiment, start and end of the Numeracy Test, and the start and end of the decision-making stages.
4.2.2 Consent Form

The consent form was relatively straightforward and constructed to address all of the main concerns for the experiment such as the research purpose, risks and benefits, incentives, confidentiality, and contact information. Separate consent language was used for professional versus student subjects to address payment details. Subjects not agreeing to the consent form language were sent to a page thanking them for their time and informing them that access to the experiment was discontinued.
Thank you for your time and participation. By participating, you are playing an important role in helping policymakers better understand how to manage and prepare for natural disasters.

This experimental survey is best accessed from a PC or Laptop and should not be accessed from a mobile device (you will be viewing large area maps), if you are currently accessing this form from a mobile device or tablet, please re-open the link from a PC or Laptop.

By participating in this experiment, most subjects can expect to earn between $25 and $30 for completing the survey in the form of an Amazon Gift Card. You will receive instructions throughout the survey on how earnings are determined, and your total earnings will be totaled at the end of the survey where you will sign up for electronic delivery of your payment.

Subject Consent:
This is a consent form for research participation. It contains important information about this study and what to expect if you decide to participate. Your participation is voluntary.

Please consider the information carefully. If you decide to participate, you will be asked to sign this form electronically and can receive a copy of this form by printing this screen.

Research Purpose: The purpose of this research is to study individual decision-making in the presence of natural disasters.

Research Procedures: This research is conducted as an online survey. Participation includes your decision inputs during the survey. Participation includes reading the survey, watching two brief instructional videos, and making decisions based upon the scenarios and information provided. It will not require heavy reading or strenuous physical effort on your part. This is a performance-based survey. Participants will only receive a payment after completing the survey. In order to receive those payments, you will need to complete the survey in its entirety.

Duration: Your participation today will be approximately 30 minutes; however, this will vary depending upon the time you take to make your decisions and your reading speed. You may exit the survey at any time. If you decide to stop participating in the study, there will be no penalty to you.

Expected Benefits and Risks:
Risks and Benefits: There are no direct benefits for your participation, but subjects will receive the benefit of societal contribution. The knowledge that will be developed from this research may help to improve the way government agencies at the federal, state, and local levels cope with and plan for natural disasters and catastrophic events. In this series, millions of persons in all risk populations have the potential to be directly benefited if this research achieves its objectives of improving large-area evacuation decision-making. On the other hand, although the risks for participants are minimal and are no greater than those encountered in daily life, it is important to recognize that some persons might have negative emotional effects regarding making a large-scale evacuation decision in the context of hypothetical life of the inundated area. The benefits of the proposed work: The proposed project will provide a significant improvement in the area of storm surge modeling through the development of a novel, dynamically coupled modeling system consisting of hydrodynamic and topographical modeling components. Specifically, the modeling approach will have the ability to adapt the mesh resolution in specific regions of interest to response to changing conditions of the inundated areas. Ultimately, this will allow for a more accurate depiction of the inundated areas and will improve the ability of forecasters to provide accurate guidance in real-time. This project will also represent a significant advancement in behavioral analysis in that it will assess the degree to which various types of risk information affect decision making. The approach will also provide a model for others seeking to find an approach to limit the behavioral effects of scientific innovations in engineering and other fields.

Broader Impacts of the Proposed Work: This project will contribute to the transfer of technology and findings to federal, state, and international agencies, and other academic institutions, through peer-reviewed publications, research reports, and online and in-person scholarly presentations. In addition, we believe that these efforts will prepare the next generation of engineers and scientists for an increasingly challenging world and enhance the resilience of communities in coastal areas.

Confidentiality: (Forms will be made to keep your study-related information confidential. However, there may be circumstances where this information must be released. For example, personal information regarding your participation in this study may be disclosed if required by law. We will work to make sure that no one sees your survey responses without approval and your name and email information will never be compiled in the same file with your survey responses. However, because we are using the Internet, there is a remote chance that someone could access your online responses without permission. University researchers and the OCG’s office have taken precautions to minimize this risk to the degree possible. In some cases, this information could be used to identify you.)

Also, your records may be reviewed by the following groups (as applicable to the research):
- Office for Human Research Protections or other federal, state, or international regulatory agencies;
- The Ohio State University Institutional Review Board or Office of Responsible Research Practices;
- The funders, The National Science Foundation.

Incentives: Earnings during the survey will vary among participants and are structured by performance. Participants will be given clear instructions on the decision rules, and the survey will make decisions throughout a series of scenarios presented to you, and your pay can vary depending upon your success in responding to the decision scenarios. Finally, you will receive additional $5 for completing a short set of survey questions following the scenario that you are presented with. Most subjects can expect to earn between $25 and $30 in total, depending upon your performance. You will not receive any payment, however, if you do not complete the survey. And, because this is an online experiment, no show-up payment will be provided.

Participant Rights: You may refuse to participate in the study without penalty or loss of benefits to which you are otherwise entitled. If you are a student or employee at Ohio State, your decision will not affect your grades or employment status. If you choose to participate in the study, you may discontinue participation at any time without penalty or loss of benefits. By signing this form, you do not give any personal legal rights you may have as a participant in the study.

An Institutional Review Board responsible for human subjects research at The Ohio State University reviewed this research project and found it to be acceptable, according to applicable state and federal regulations and University policies designed to protect the rights and welfare of participants in research.

Contacts and Questions: For questions, concerns, or complaints about the study, or if you feel you have been

For questions about your rights as a participant in this study or to discuss other study-related concerns or complaints with someone who is not part of the research team, you may contact Ms. Sandra Meadows in the Office of Responsible Research Practices at 614-292-8251.

Digital Signature: By providing your digital signature here, you are providing your consent to participate in this survey.

Would you like to continue with this survey? By selecting yes you are providing your digital signature here and consenting to participate in this survey. (Please select one.)

We greatly appreciate your cooperation and respect your personal privacy.

Yes, I do not give my consent
Yes, I give my consent
4.2.3 Pre-Experiment Survey

Following the consent form, subjects began by responding to a small number of demographic background questions in a pre-experiment survey. The pre-survey queried subjects on their sex, education level, veteran status, and first responder status. These questions were explicitly added into the pre-survey instead of the post-survey because these questions collected informational data about our subjects.
Background Questions

What is your age?

Select one...

Continue »

Background Questions

Based upon your profession, would you consider yourself a "first responder" in the event of a natural disaster?

○ No  ○ Yes

Continue »
4.2.4 Endowment Generation via the Berlin Single-Item Numeracy Assessment

To simultaneously build subject endowment and assess numeracy, subjects were given the single-item version of the Berlin Numeracy Test (Cokely et al. 2012) upon completion of the pre-experiment survey. The numeracy test served two important purposes. It provided a well-established numeracy metric to be used as an econometric control. It also served to induce subject endowment for the loss aversion frame of the experiment consistent with Induced Value Theory. (Smith 1976). The exact text of the presentation to subjects was:

“Out of 1,000 people in a small town 500 are members of the choir. Out of these 500 members in the choir 100 are men. Out of the 500 inhabitants that are not in the choir 300 are men. What is the probability that a randomly drawn man is the member of the choir?”

Remuneration margins were adjusted upward for expert subjects to be consistent with a rate of $60 per hour based on the median subject completion time and earned point total identified in the experiment’s pilot.

To discourage cheating, we programmed a text lock-out to prevent copying and pasting of the test text. This, along with the overall success rate on the test, provided a validity check on the instrument given that the answer could not be easily queried in search engines. We also verified
that the question, if entered into a query on popular search engines, such as Google, would not readily yield the answer as of the date of the experiment’s administration.

When deciding on the language on the pre and post endowment pages, we wanted to emphasize to the subject that they were earning points from the numeracy test to tie the points earned in this test to the subject’s maximum possible earnings, thus inducing the subject’s aversion to losing these points. To avoid introducing potential negativity bias due to an incorrect answer, subjects were not informed whether they answered the question correctly or incorrectly; rather, we simply informed them that they earned points for their response to the question. In both the incorrect and correct answer cases, subjects received 200 points as a starting endowment and were not informed of the correct answer.
Before We Begin...

Out of 1,000 people in a small town 500 are members of a choir. Out of these 500 members in the choir 100 are men. Out of the 500 inhabitants that are not in the choir 300 are men. What is the probability that a randomly drawn man is a member of the choir?

Select one... %

Next »

Before We Begin...

For your response, you have earned 200 points. Points can be taken away in the experiment based on your performance. At the end of the experiment, each point you have remaining will be worth $.15.

You will now begin the experiment. Instructions will be provided in a short video. Click Continue to begin the video.

Continue »
4.2.5 Instructional Videos

Subjects were presented with one of three voluntary evacuation video instructions based on their assigned treatment number. The video instructions explain the scenario for the subjects. The full transcript can be found in Section 4.3 (below). The subjects are placed in the role of a Senior Advisor of the Office of Emergency Management to the Governor on his decision to evacuate the Houston-Galveston Area from Hurricane Rebecca (actually Rita). The video also provides details about evacuations, considerations, and instructions on reading advisories.

Instructional videos were developed separately for each treatment of the experiment, and for each decision-making stage (both voluntary and mandatory evacuation decisions). Some researchers opt to institute post-instruction comprehension tests to ensure that subjects understand the experimental instructions. That was infeasible in this experiment for three reasons. First, instructions were given at each stage and were segmented by decision scenario. Second, time was an important experimental design consideration as longer duration experiments tend to result in lower completion and response quality. Third, the integrated numeracy assessment and endowment
generator already instituted a pre-assessment instrument. Subject comprehension was also
evaluated during the piloting phase of the experiment, and the research team generally concluded
that the video instructions provided sufficient detail to ensure subject comprehension of the
decision environment.

Additionally, significant efforts were taken to ensure subject comprehension of the instructions
contained in the videos. Professional video-editing was performed by a media and communications
team at The Ohio State University. Instructions were delivered on the videos by Darryl Anderson,
Interoperability Coordinator for the U.S. Dept. of Homeland Security Office of Emergency
Communications, and Commandant Ret. of the Ohio Highway Patrol Academy. Anderson was
also Director of the Ohio Multi-Agency Radio Communications (MARCS) Program that
developed the Nation’s first secure 800 MHz voice and data transmission network for emergency
communications systems, since adopted in multiple states. Separate video tracks were developed
for each treatment group. Videos also contain treatment-specific instructions for reading advisories
taken from a different storm, Ophelia (2005). The experiment interface was coded to prevent fast-
forwarding or skipping of the videos. Closed captioning was manually revised to 100% accuracy
and auto-enabled.

To prevent subjects from skipping or advancing the video without fully watching the instructions,
three precautions were taken. First, a text request to not advance the video forward was placed at
the bottom of the screen for each video. Second, using the YouTube API, the subject’s video
viewing time was captured and subsequently utilized to clean experiment results data. Third, each
subject was required to spend at least the video’s duration less 15 seconds on the page containing
the video. Additionally, the “next” button to advance the experiment was not made accessible until
this time threshold was met. If the subject attempted to fast forward without completing the
requirements, the button to the next page would not appear until these requirements were
satisfied.

Further efforts to ensure accessibility were taken. To ensure 100% accuracy of the YouTube close
captioning, the research team fully edited the closed captioning text to exactly match the text video
instructions as spoken by Darryl Anderson. We note that this effort was not completely necessary
given that emergency managers and first responders tasked with emergency management functions in disasters are not permitted to serve in those roles with precluding disabilities.

<table>
<thead>
<tr>
<th>Video Instructions</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1: Treatment 1</td>
<td><a href="https://www.youtube.com/watch?v=p9mVF-cQGs4">https://www.youtube.com/watch?v=p9mVF-cQGs4</a></td>
</tr>
<tr>
<td>Stage 1: Treatment 2</td>
<td><a href="https://www.youtube.com/watch?v=5YyniRQclto">https://www.youtube.com/watch?v=5YyniRQclto</a></td>
</tr>
<tr>
<td>Stage 1: Treatment 3 &amp; 4</td>
<td><a href="https://www.youtube.com/watch?v=M8xeADIDbmA">https://www.youtube.com/watch?v=M8xeADIDbmA</a></td>
</tr>
<tr>
<td>Stage 2: Mandatory Evacuation</td>
<td><a href="https://www.youtube.com/watch?v=UpWmFaf3hM8">https://www.youtube.com/watch?v=UpWmFaf3hM8</a></td>
</tr>
</tbody>
</table>

4.2.6 Voluntary Evacuation Instructions

After completing the Stage 1 instructions video, subjects were again shown the Stage 1 Payment Information. Through feedback during the pilot, the subjects felt that the information presented in the video could be overwhelming because of all the information presented and recommended a way to access the information during the decision-making stage as a reference. To help subjects process important information, this page restating the Stage 1 Payment Information from the video was added. Subjects advanced to the decision-making page after reviewing the information on this page.
4.2.7 Stage 1: Voluntary Evacuation

Subject endowment was presented on all decision-making pages to mimic the loss (as opposed to gain) frame consistent with adverse emergency management decisions on the ground. At the first stage, or voluntary evacuation decision stage of the experiment, subjects were presented with a payment information page. The subject was subsequently presented with the first of nine advisories. Each treatment presented subjects with information consistent with their randomly-assigned treatment.

The images and information about each advisory were based on treatment and assignment to a treatment was performed using the randomized least count algorithm. To further address access, we programmed an option to click a button/link that would pop up a blown-up version of the advisory graphic image onto the screen. Just below the question on the screen, the subject had three more buttons/links. Each of these buttons/links led to information that the subject had seen in a previous screen, including the voluntary evacuation video, the voluntary evacuation video transcript, and the voluntary evacuation payment information. At the bottom of the content view, subjects were provided two buttons: “Do not Recommend Evacuation” and “Recommend
Evacuation.” If the subject chose “Do not Recommend Evacuation,” he or she was taken to the next advisory. A subject could go through all nine advisories in the experiment without choosing to recommend evacuation. This decision is appropriately listed in the database as never evacuated. If the subject chose “Recommend Evacuation,” he or she was instead taken to the voluntary evacuation results page.

4.2.8 Stage 1: Voluntary Evacuation Results

The Voluntary Evacuation Results page was presented immediately following the decision to call for a voluntary evacuation. This page displayed several pieces of information to the subject. The score for his or her decision for the Voluntary Evacuation stage was shown as well as an explanation telling the subject why he or she lost points for the previous decision. Furthermore, this page contained information setting the scene for the mandatory evacuation decision (stage 2). After conducting the experiment with a focus group of students following the pilot experiment,
these students were a little confused where in time they were after the voluntary evacuation recommendation. In addition, they were unsure of the location of the hurricane when making the subsequent stage 2 decision. Several subjects thought that the hurricane was still positioned at the location where they made a voluntary evacuation recommendation. To rectify this issue, the tenth advisory was added. This advisory is identical to all previous advisories presented to the subject to maintain consistency. This served the function of positioning all subjects, after their heterogeneous stage 1 decisions, at the same starting point for the beginning of the stage 2 mandatory evacuation decision.
4.2.9 Stage 2: Mandatory Evacuation Instructions

The stage 1 and 2 video instructions requirements were identical. The subject was still required to remain on the page containing the video for the total time of the video less 15 seconds and the continue button would not appear until five seconds remained in the video.

This stage 2 video explained that in the second decision, the subject would be making a recommendation to the Governor of Texas for a spatial mandatory evacuation. The video first gave context to instruct the subjects that the storm was currently 36 hours from landfall and a Hurricane Warning had been issued by the NWS. The subject would then decide which zones they would recommend for evacuation. To assist them in this decision, the three inundation projections were presented to the subjects. In the concluding part of the video, subjects were told that the population exposed to flooding and storm surge would determine their payment.

4.2.10 Mandatory Evacuation

After the subject completed the stage 2 video instructions, the subject was again shown the Stage 2 payment information. Through feedback during the pilot, the subjects identified concerns involving the amount of information presented and focus group questions identified the best solution as presenting the payment information in text with an example for each case—over- and
under-evacuation. Following review of this page, subjects proceeded to the stage 2 mandatory evacuation decision.

4.2.11 Stage 2: Mandatory Evacuation

The decision page for the spatial mandatory evacuation decision has several unique design elements. The goal when designing this page was to make it as simple and intuitive as possible while providing all of the relevant information the subject might need to access in order to make their decision. The top of the page had text explaining the three inundation maps and setting the scenario for the subject just below the text. Each image listed with capital letters what direction the hurricane veers in each particular inundation projection map. Moreover, below each inundation projection map, a button/link states “click here to enlarge images.” If clicked, this link will open a pop-up with the image as large as the subject’s screen. Beneath the inundation maps, the subject was asked which of the Houston-Galveston Metro Area’s established evacuation zones he or she wanted to recommend for mandatory evacuation. On the left side of the screen, the subject was
presented with the areas that he or she could choose to evacuate. Each choice listed the zones and total population included in that evacuation decision.

Additionally, to improve subject accessibility, we programmed the selection tool to be interactive with the graphic. The subject was able to hover over or select an option to visualize his or her decision on the map. Just below the selections and the map, more information was presented to help the subject make his or her decision. This information included a reminder of the payment information from the previous page, the transcript of the video, the video, and the current advisory. The subject could only move on to the next page once they had selected the zones to evacuate.
Note, the above interactive zone map altered the color of the selected zones to indicate to subjects the selected zone, in the following way:
4.2.12 Stage 2: Mandatory Evacuation Results

After the subject completed the stage 2 decision, two results pages appeared. First, after the mandatory evacuation decision, another results page was displayed for the subject explaining how his or her decision affected their total points for the experiment. Second, following the results page, the results for both stages were presented to the subject including their total points remaining after both of their decisions. The subject was also told how much money they had earned in the experiment as well as an incentive to complete the post-experiment survey for an additional five dollars for professional subjects and three dollars for student subjects.
4.2.13 Post-Experiment Survey

The post survey included 10 questions in total. It was adaptive with fold-out questions and randomized selection ordering. The first question presented asked the user if they had ever experienced a natural disaster. If the subject had experienced a natural disaster, a second question was presented that asked if the disaster experienced was a hurricane. If the subject answered affirmatively to both disaster experience questions and pressed continue, the next question presented asked if he or she had been evacuated in the context of a natural disaster. If the subject answered no to either disaster experience question, the follow-up evacuation question would be skipped and recorded in the database as not applicable.

The subjects were next provided a list of the informational characteristics from the stage 1 decision corresponding to the set or subset of informational parameters to which they were exposed in their assigned treatment. The subjects were prompted to identify their three most relied upon informational parameters, with validation included to ensure no more than three options were selected. Information characteristics were shuffled randomly for every subject and would shuffle every time the page was reloaded to avoid biasing the response items. The next page took the three informational characteristics the subject selected on the previous screen and presented them with
a drop-down menu. This drop-down menu let them rank order these characters from 1 (Least Important) to 3 (Most Important), following a linear numeric scale, with the ranking labelled 3 notated as most important and the ranking labelled 1 notated as the least important characteristic to the subject. To maintain consistency with subsequent linear scale questions, we kept the highest scale value [3] associated with the most criterion and the lowest scale value [1] associated with the least criterion. Similar to the last page, this page also implemented shuffling of the informational characteristics to avoid any order bias.

The next question was a simple yes/no question regarding the subject’s perceived accuracy of the advisories in stage 1. The subsequent question queried the subject on which of the three inundation maps they most relied. To maintain consistency with the inundation maps on the stage 2 decision selection page, the three options were presented on the left for the left track of the hurricane, center for the center track of the hurricane, and right for the right track of the hurricane.

Human exposure was subsequently presented as a survey item. It asked subjects if they evacuated any zone(s) even if they felt the risk of human exposure to flooding was low. The second to last question asked the subject how accurate they thought the inundation maps were using a scale from 1 to 5 with 1 being the not accurate and 5 being very accurate. This linear numeric scale identified the highest rank value [3] preceding the lowest rank value [1]. This was used to maintain consistency with the rank order question. The last question asked the user if anything was unclear about the experiment. If the subject answered yes, a text field appeared that allowed the subject to write anything he or she felt was unclear about the experiment.
Exit Survey

Have you personally experienced a major natural disaster (a hurricane, large earthquake, tornado, etc.)?

- No
- Yes

Have you personally experienced a hurricane?

- No
- Yes
Exit Survey

Have you ever personally been evacuated in the context of a natural disaster?

☐ No  ☐ Yes

Continue »
Exit Survey

When making your Mandatory Evacuation Decision, which of the three projected inundation maps did you rely upon most when making your decisions? (select only one)

- Left track (worst case scenario)
- Center track (middle case)
- Right track (best case)

Continue »

Exit Survey

Please identify which of the following informational characteristics you relied on most when making your Voluntary Evacuation Recommendation.

Select the three you most relied on.

- Hurricane and Tropic Storm Advisory and Warning Areas
- Category of Storm
- Forecast of Storm Path
- Maximum Sustained Wind Speed
- Current Center Location
- Historical Track of Storm (greenline)

Continue »
Exit Survey

Please rank order the information you most relied on.

Forecast of Storm Path        2
Category of Storm             1(Least Important)
Hurricane and Tropic Storm Advisory and Warning Areas  3(Most Important)

Continue »

Exit Survey

When making your Voluntary Evacuation Recommendation, did you feel that the hurricane advisories gave you accurate information?

☐ No   ☐ Yes

Continue »
Exit Survey

On a scale from 1-5, how accurate did you perceive the three projected inundation area maps to be?

- 1: Very inaccurate
- 2: Somewhat inaccurate
- 3: Neither accurate nor inaccurate
- 4: Somewhat accurate
- 5: Very accurate

Exit Experiment

Help

Exit Survey

Did you choose to evacuate any zone(s) even though you thought the likelihood of human exposure to flooding was low?

- No
- Yes

Exit Experiment

Help
4.3 Text Transcripts of Experiment Instructions Videos

4.3.1 Stage 1: Control (T1)

By participating in today’s experiment, you will be playing an important role in helping emergency managers make more informed disaster evacuation decisions.

In this experiment, you will be taking on the role of a Senior Advisor at the Texas Office of Emergency Management (OEM). Your job will be to advise the Governor of Texas on his decision to evacuate the Houston-Galveston Metropolitan area—one of the largest metro areas in the country, in the context of a hurricane.

Evacuation orders are an important emergency management function. If populations remain in areas devastated by seawater inundation or storm surge, there can be a high volume of human casualties—unnecessary loss of life. High winds can devastate homes and structures, airborne or waterborne debris can lead to death and injury, and flooding and power outages can curtail access to police, fire and emergency response units.

At the same time, the process of evacuation can devastate communities. Roads and highways can be crowded leaving stranded passengers on roadsides. There can be shortages of gasoline, food and other necessary commodities. There can be looting in abandoned areas.

Elected officials, such as the Governor, can pay a heavy price politically if the process of evacuation is administered poorly. This can be an even greater concern if communities are evacuated and the storm ends up turning away and not having any real effect on evacuated communities. You will have unnecessarily evacuated thousands, or hundreds of thousands of people. It is critically-important that you get this decision right.

In a few moments, we will start the experiment. You will be given a simulated hurricane scenario and asked to make an evacuation recommendation. A tropical cyclone in the eastern Gulf of Mexico
has just made the critical transition to a full hurricane. It is currently off the coast of Florida and it is heading west toward the Mexico-Texas border. It may turn upward toward Houston.

Every five to six hours, new information about the hurricane will become available from the National Hurricane Center (NHC) at the National Oceanic and Atmospheric Administration, or NOAA. These are called ‘Advisories.’ In this experiment, each advisory will be a different round that will last about a minute or so for you. In each of these rounds, you will be asked to make a recommendation to the Governor about whether or not he should call for a voluntary evacuation of the coastal and low-lying areas. A voluntary evacuation is not mandatory, persons can decide to stay behind and shelter in place.

Keep in mind that a hurricane that is near Florida will take about three days to get to Texas. So, you do not need to make an evacuation recommendation immediately. You will have multiple advisories, or rounds, to make your decision. This is important because hurricanes often turn and go a different direction. Many hurricanes in the past have entered the Gulf and then turned up to Louisiana or Mississippi, not presenting any danger to Texas. So, it is important that you think critically about the information that you are given and make the best decision possible.

If the hurricane approaches the Houston Metro Area, and does not turn and go somewhere else, the last possible opportunity you will have to call for voluntary evacuation will be when the NHC issues a Hurricane Warning, which means that death or injury from high winds is imminent within approximately 24 hours. By that point, it will be too late for a voluntary evacuation, and mandatory evacuations may be issued. So, if the hurricane approaches Houston, your time to make this decision runs out when a Hurricane Warning is issued. Your payment will be based on the accuracy and timing of your evacuation recommendation.

- If you make an inaccurate decision—meaning that you recommend evacuation and the storm ends up turning away from the Houston Area, OR you do not recommend evacuation and the storm does affect Houston—you will lose 100 points.

- If you do not recommend evacuation and the storm turns away and never affects the Houston Area, you will not lose any points.

- If the storm does affect the Houston Area and you do recommend evacuation, there will still be property damage and you will only lose 50 points. HOWEVER—you can improve your payment if you give people more time to evacuate. For every additional hour that you give people to evacuate before a Hurricane Warning is issued, you will get back one point.
  - For example, if you recommend evacuation and a Hurricane Warning is issued 30 hours later, you will only lose 20 points [50 get back 30].

Finally, it is important to remember that evacuations are only issued once. So, if you make an evacuation decision too soon, you will not be able to later wait to see how the storm plays out, and later change your decision. You only get one shot at this. Before you are asked to make an actual evacuation recommendation, I am going to show you an example of the type of information you will be getting from a previous hurricane, from Hurricane Ophelia back in 2005.

Each round the advisories will look like this.

Right now, you are looking at an example of the type of hurricane advisory you will see in the experiment

- The orange circle represents the current location of the storm at 5 PM EDT on Tuesday Sept 13.
• The green line is a track of past positions of the storm.

• The maximum sustained wind of the storm at 5 PM EDT on Tuesday Sept 13 is 70 mph.

• The current movement of the storm at 5 PM EDT on Tuesday Sept 13 NNW is 3 mph

Ok, now that you have seen an example, we are going to begin the experiment. Remember, you will get updates when each new advisory becomes available.

4.3.2 Stage 1: Treatment 2 (T2)

By participating in today’s experiment, you will be playing an important role in helping emergency managers make more informed disaster evacuation decisions.

In this experiment, you will be taking on the role of a Senior Advisor at the Texas Office of Emergency Management (OEM). Your job will be to advise the Governor of Texas on his decision to evacuate the Houston-Galveston Metropolitan area—one of the largest metro areas in the country, in the context of a hurricane.

Evacuation orders are an important emergency management function. If populations remain in areas devastated by seawater inundation or storm surge, there can be a high volume of human casualties—unnecessary loss of life. High winds can devastate homes and structures, airborne or waterborne debris can lead to death and injury, and flooding and power outages can curtail access to police, fire and emergency response units.

At the same time, the process of evacuation can devastate communities. Roads and highways can be crowded leaving stranded passengers on roadsides. There can be shortages of gasoline, food and other necessary commodities. There can be looting in abandoned areas.

Elected officials, such as the Governor, can pay a heavy price politically if the process of evacuation is administered poorly. This can be an even greater concern if communities are evacuated and the storm ends up turning away and not having any real effect on evacuated communities. You will have unnecessarily evacuated thousands, or hundreds of thousands of people. It is critically important that you get this decision right.

In a few moments, we will start the experiment. You will be given a simulated hurricane scenario and asked to make an evacuation recommendation. A tropical cyclone in the eastern Gulf of Mexico has just made the critical transition to a full hurricane. It is currently off the coast of Florida and it is heading west toward the Mexico-Texas border. It may turn upward toward Houston.

Every five to six hours, new information about the hurricane will become available from the National Hurricane Center (NHC) at the National Oceanic and Atmospheric Administration, or NOAA. These are called ‘Advisories.’ In this experiment, each advisory will be a different round that will last about a minute or so for you. In each of these rounds, you will be asked to make a recommendation to the Governor about whether or not he should call for a voluntary evacuation of the coastal and low-lying areas. A voluntary evacuation is not mandatory, persons can decide to stay behind and shelter in place.

Keep in mind that a hurricane that is near Florida will take about three days to get to Texas. So, you do not need to make an evacuation recommendation immediately. You will have multiple advisories, or rounds, to make your decision. This is important because hurricanes often turn and go a different direction. Many hurricanes in the past have entered the Gulf and then turned up toward Louisiana or Mississippi, not presenting any danger to Texas. So, it is important that you think critically about the information that you are given and make the best decision possible.
If the hurricane approaches the Houston Metro Area, and does not turn and go somewhere else, the last possible opportunity you will have to call for voluntary evacuation will be when the NHC issues a Hurricane Warning, which means that death or injury from high winds is imminent within approximately 24 hours. By that point, it will be too late for a voluntary evacuation, and mandatory evacuations may be issued. So, if the hurricane approaches Houston, your time to make this decision runs out when a Hurricane Warning is issued.

Your payment will be based on the accuracy and timing of your evacuation recommendation.

- If you make an inaccurate decision—meaning that you recommend evacuation and the storm ends up turning away from the Houston Area, OR you do not recommend evacuation and the storm does affect Houston—you will lose 100 points.

- If you do not recommend evacuation and the storm turns away and never affects the Houston Area, you will not lose any points.

- If the storm does affect the Houston Area and you do recommend evacuation, there will still be property damage and you will only lose 50 points. HOWEVER—you can improve your payment if you give people more time to evacuate. For every additional hour that you give people to evacuate before a Hurricane Warning is issued, you will get back one point.

  o For example, if you recommend evacuation and a Hurricane Warning is issued 30 hours later, you will only lose 20 points [50 get back 30].

Finally, it is important to remember that evacuations are only issued once. So, if you make an evacuation decision too soon, you will not be able to later wait to see how the storm plays out, and later change your decision. You only get one shot at this.

Before you are asked to make an actual evacuation recommendation, I am going to show you an example of the type of information you will be getting from a previous hurricane, from Hurricane Ophelia back in 2005.

Each round the advisories will look like this.

Right now, you are looking at an example of the type of hurricane advisory you will see in the experiment

- The orange circle represents the current location of the storm at 5 PM EDT on Tuesday Sept 13.

- Black circles ahead of the current location represent forecast center positions. The letters on the black circles stand for Hurricane (H) and Storm (S). A hurricane implies sustained winds greater than 73 mph. A storm implies sustained winds between 39 – 73 mph.

- The green line is a track of past positions of the storm.

- The maximum sustained wind of the storm at 5 PM EDT on Tuesday Sept 13 is 70 mph.

- The current movement of the storm at 5 PM EDT on Tuesday Sept 13 NNW is 3 mph

- The red area along the coast is a hurricane warning. This means that hurricane conditions (sustained winds of 74 mph or higher) are expected.
The pink area is a hurricane watch. This means that hurricane conditions (sustained winds of 74 mph or higher) are possible within the specified area. A hurricane watch is issued 48 hours in advance of the anticipated onset of tropical-storm-force winds in an area.

The yellow area is a tropical storm watch. This indicates a chance of a tropical storm, with winds from 39 to 73 miles per hour, hitting a specified area within 48 hours.

The blue area is a tropical storm warning. This indicates a chance of a tropical storm, with winds from 39 to 73 miles per hour, hitting a specified area within 36 hours or less.

Ok, now that you have seen an example, we are going to begin the experiment. Remember, you will get updates when each new advisory becomes available.

### 4.3.3 Stage 1: Treatment 3 (T3) & Treatment 4 (T4)

By participating in today’s experiment, you will be playing an important role in helping emergency managers make more informed disaster evacuation decisions.

In this experiment, you will be taking on the role of a Senior Advisor at the Texas Office of Emergency Management (OEM). Your job will be to advise the Governor of Texas on his decision to evacuate the Houston-Galveston Metropolitan area—one of the largest metro areas in the country, in the context of a hurricane.

Evacuation orders are an important emergency management function. If populations remain in areas devastated by seawater inundation or storm surge, there can be a high volume of human casualties—unnecessary loss of life. High winds can devastate homes and structures, airborne or waterborne debris can lead to death and injury, and flooding and power outages can curtail access to police, fire and emergency response units.

At the same time, the process of evacuation can devastate communities. Roads and highways can be crowded leaving stranded passengers on roadsides. There can be shortages of gasoline, food and other necessary commodities. There can be looting in abandoned areas.

Elected officials, such as the Governor, can pay a heavy price politically if the process of evacuation is administered poorly. This can be an even greater concern if communities are evacuated and the storm ends up turning away and not having any real effect on evacuated communities. You will have unnecessarily evacuated thousands, or hundreds of thousands of people. It is critically important that you get this decision right.

In a few moments, we will start the experiment. You will be given a simulated hurricane scenario and asked to make an evacuation recommendation. A tropical cyclone in the eastern Gulf of Mexico has just made the critical transition to a full hurricane. It is currently off the coast of Florida and it is heading west toward the Mexico-Texas border. It may turn upward toward Houston.

Every five to six hours, new information about the hurricane will become available from the National Hurricane Center (NHC) at the National Oceanic and Atmospheric Administration, or NOAA. These are called ‘Advisories.’ In this experiment, each advisory will be a different round that will last about a minute or so for you. In each of these rounds, you will be asked to make a recommendation to the Governor about whether or not he should call for a voluntary evacuation of the coastal and low-lying areas. A voluntary evacuation is not mandatory, persons can decide to stay behind and shelter in place.
Keep in mind that a hurricane that is near Florida will take about three days to get to Texas. So, you do not need to make an evacuation recommendation immediately. You will have multiple advisories, or rounds, to make your decision. This is important because hurricanes often turn and go a different direction. Many hurricanes in the past have entered the Gulf and then turned up to Louisiana or Mississippi, not presenting any danger to Texas. So, it is important that you think critically about the information that you are given and make the best decision possible.

If the hurricane approaches the Houston Metro Area, and does not turn and go somewhere else, the last possible opportunity you will have to call for voluntary evacuation will be when the NHC issues a *Hurricane Warning*, which means that death or injury from high winds is imminent within approximately 24 hours. By that point, it will be too late for a voluntary evacuation, and mandatory evacuations may be issued. So, if the hurricane approaches Houston, your time to make this decision runs out when a Hurricane Warning is issued.

Your *payment* will be based on the accuracy and timing of your evacuation recommendation.

- If you make an inaccurate decision—meaning that you recommend evacuation and the storm ends up turning away from the Houston Area, OR you do not recommend evacuation and the storm does affect Houston—you will lose 100 points.

- If you do not recommend evacuation and the storm turns away and never affects the Houston Area, you will not lose any points.

- If the storm does affect the Houston Area and you do recommend evacuation, there will still be property damage and you will only lose 50 points. HOWEVER—you can improve your payment if you give people more time to evacuate. For every additional hour that you give people to evacuate before a Hurricane Warning is issued, you will get back one point.

  - For example, if you recommend evacuation and a Hurricane Warning is issued 30 hours later, you will only lose 20 points [50 get back 30].

Finally, it is important to remember that evacuations are only issued once. So, if you make an evacuation decision too soon, you will not be able to later wait to see how the storm plays out, and later change your decision. You only get one shot at this.

Before you are asked to make an actual evacuation recommendation, I am going to show you an example of the type of information you will be getting from a previous hurricane, from Hurricane Ophelia back in 2005.

Each round the advisories will look like this.

Right now, you are looking at an example of the type of hurricane advisory you will see in the experiment

- The orange circle represents the current location of the storm at 5 PM EDT on Tuesday Sept 13.

- Black circles ahead of the current location represent forecast center positions. The letters on the black circles stand for Hurricane (H) and Storm (S). A hurricane implies sustained winds greater than 73 mph. A storm implies sustained winds between 39 – 73 mph.

- The green line is a track of past positions of the storm.

- The maximum sustained wind of the storm at 5 PM EDT on Tuesday Sept 13 is 70 mph.

- The current movement of the storm at 5 PM EDT on Tuesday Sept 13 NNW is 3 mph
• The red area along the coast is a hurricane warning. This means that hurricane conditions (sustained winds of 74 mph or higher) are expected.

• The pink area is a hurricane watch. This means that hurricane conditions (sustained winds of 74 mph or higher) are possible within the specified area. A hurricane watch is issued 48 hours in advance of the anticipated onset of tropical-storm-force winds in an area.

• The yellow area is a tropical storm watch. This indicates a chance of a tropical storm, with winds from 39 to 73 miles per hour, hitting a specified area within 48 hours.

• The blue area is a tropical storm warning. This indicates a chance of a tropical storm, with winds from 39 to 73 miles per hour, hitting a specified area within 36 hours or less.

• The white region is called a “track area” or "cone of uncertainty." This cone represents a probable track, or direction of the storm. This area of uncertainty grows wider as the forecast track of the storm increases, as it is more difficult to predict the storm's future location beyond 24 and 36 hours. You can consider this white area to represent scientific consensus regarding the possible future locations of the storm.

Ok, now that you have seen an example, we are going to begin the experiment. Remember, you will get updates when each new advisory becomes available.

4.3.4 Stage 2: Mandatory Evacuation

Now, the storm is 36 hours from landfall and the National Hurricane Center has issued a Hurricane Warning for the Houston-Galveston Metro Area. This means that sustained winds of 74 MPH or higher are expected in the area. The National Hurricane Center issues these warnings 36 hours in advance of the storm’s expected onset to give the population time to prepare for landfall. Voluntary evacuation orders have also been issued for coastal and low-lying areas.

Now, you will be asked to make another advisory recommendation to the Governor. You will be asked to make a recommendation for the areas that should receive mandatory evacuation orders. A mandatory evacuation is a warning to persons within the designated area that an imminent threat to life and property exists and individuals MUST evacuate in accordance with the instructions of local officials.

The Houston-Galveston Metro Area has pre-identified possible evacuation locations into these four zones. A high-resolution version of this image will be available to you after this video to help you make your decision.

You will be making a recommendation regarding which zones should be mandatorily evacuated. Residents are all expected to know their evacuation zones, which are based on zip codes that have been identified by the Houston-Galveston Area Planning Council. The four zones look like this map you are viewing now. These refer to coastal and low laying areas (in purple), zone A (in yellow), zone B (in green), and zone C (in orange).

To assist you in making this important decision, the National Hurricane Center’s scientists have used the best available storm surge forecasting models to predict potential inundation, or flooding that could occur. They have given you three scenarios—best, worst and medium case scenarios. These scenarios are based on possible forecasts, or tracks, of the storm’s path over the next 36 hours. These show the Houston-Galveston Metro Area—blue areas indicate flooding.

• The best-case scenario represents potential flooding if the storm veers to the right and makes landfall to the northeast of the population center.
• The middle case scenario represents potential flooding if the storm stays on its current path, not turning to the left or the right.
• The worst-case scenario represents potential flooding if the storm veers to the left and makes landfall directly at the Houston-Galveston area.

After this video, high-resolution versions of these scenario maps will also be available to you.

Your payment will be based on the population exposed to flooding and storm surge. After this video, you will get details on how your payment will work. Then you will make your recommendation. Good luck!
5. Least-Count Random Assignment Algorithm

Subjects were randomly assigned to treatments 1 through 4 in the experiment using a conditional least count algorithm. The least-count algorithm was designed to ensure an equal balance of subjects in treatments while simultaneously accounting for potential heterogeneity in completion rates across treatments.

Let $x_k$ be the count of subjects who have completed the experiment in a treatment at a given point in time (i.e., the point at which a subject begins an experiment), and assign a probability weight for each treatment ($a_k$), which will be used as the weight for treatment $k$. $a_k$ provides flexibility to allow for a larger count of subjects in the higher informational treatments as utilized.

Given $x_k$, first find the current observed proportion of subjects who have taken the experiment from treatment $x_k$:

$$Proportion(x_k) = \frac{x_k}{\sum_{i=1}^{4} x_i}$$

Thereafter, the inverse of the observed proportion of each treatment is given by:

$$1 - Proportion(x_k) = 1 - \frac{x_k}{\sum_{i=1}^{4} x_i}$$

Rearranging this equation provides:

$$1 - Proportion(x_k) = \frac{(\sum_{i=1}^{4} x_i) - x_k}{\sum_{i=1}^{4} x_i}$$

Multiplying the weight $a_k$ by the inverse of the observed proportion of $x_k$ provides:

$$1 - Proportion(x_k) = \frac{a_k[(\sum_{i=1}^{4} x_i) - x_k]}{\sum_{i=1}^{4} x_i}$$
To find the probability of selecting treatment $k$ for a given subject $s$ we can therefore use:

$$P(s) = a_k \left[ \frac{\sum_{i=1}^{4} x_i - x_k}{\sum_{i=1}^{4} x_i} \right] * \frac{a_k \left[ \frac{\sum_{i=1}^{4} x_i - x_k}{\sum_{i=1}^{4} x_i} \right]}{\sum_{i=1}^{4} \left[ \frac{a_i \left( \sum_{i=1}^{4} x_i \right) - x_k}{\sum_{i=1}^{4} x_i} \right]^2}$$
6. Scoring Functions

Each subject began the experiment with an initial endowment of 200 points after completing the endowment generation test (i.e., the Berlin Numeracy Text, 1). 100 points were assigned to the first stage and 100 points were assigned to the second. The payment in the first stage was based on the accuracy and timing of the evacuation recommendation. Below we present the information that subjects received when they were informed of how they would be compensated for their participation in the experiment. After completing the first stage, subjects were compensated according to the following rules as presented to subjects:

- If you make an inaccurate decision—meaning that you recommend evacuation and the storm ends up turning away from the Houston Area, OR you do not recommend evacuation and the storm does affect Houston—you will lose 100 points.
- If you do not recommend evacuation and the storm turns away and never affects the Houston Area, you will not lose any points.
- If the storm does affect the Houston Area and you do recommend evacuation, there will still be property damage and you will only lose 50 points. HOWEVER—you can improve your payment if you give people more time to evacuate. For every additional hour that you give people to evacuate before a Hurricane Warning is issued, you will get back one point. For example, if you recommend evacuation and a Hurricane Warning is issued 30 hours later, you will only lose 20 points [50 get back 30].

It is important to note that the information provided to subjects stated that the maximum number of points they could lose was 50 points even after recommending evacuation. While not known to subjects, the rationale for this was a simple calculation as part of the experimental design given the fact that, as advisories transpired, subjects had up to 50 hours to recommend a voluntary evacuation. After this time, the mandatory evacuation order was issued for Hurricane Rita.

The compensation rules are summarized in Table SI-6.2. It presents, horizontally, the choice to be made by each subject. After each subject makes a decision, a state of nature occurs (two states of nature associated to this stage). It is important to note that historical data shows that the eye of Hurricane Rita made landfall just north of the Houston-Galveston region in late September 2005, causing very minor ancillary damage to the metro area. Most of the damage identified by Knabb, Brown and Rhome (Knabb et al. 2011) in the official NOAA Geodetic Survey report of damages was located in the coastal and low-lying areas.
In Table 6.1, \( f(t) \) is a function that represents the number of points deducted from a subject’s endowment depending on the round in which the decision was made. The values that \( f(t) \) can take are represented in the last column in Table 6.2, which provides the payment schedules as a function of evacuation time. It can be read in the following way: if a subject chose not to recommend voluntary evacuation of the coastal and low-lying areas after the last round (i.e., 9th round of information), the subject would observe the result on the screen indicating that the hurricane adversely affected the coastal and low-lying areas. As a consequence, the subject would lose 100 points from his/her endowment because the decision was not consistent with the state of nature. Although the second state of nature, “Hurricane does not affect,” will never occur, it is of the utmost relevance to provide this hypothetical state in order to achieve the expected results of the experiment. In other words, scoring function consistency for both disaster outcomes should have aligned because otherwise, it would have given subjects prior knowledge about the outcome of the storm. In this regard, the payout structure should convey the required incentives for the subject to make an evacuation choice only after considering that the information provided is consistent with the state of nature.

**Table SI-6.1 Stage 1 Experiment Scoring Function**

<table>
<thead>
<tr>
<th>Decision</th>
<th>Hurricane Track</th>
<th>Hurricane affects</th>
<th>Hurricane does not affect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evacuation</td>
<td>( f(t) )</td>
<td>-100</td>
<td>0</td>
</tr>
<tr>
<td>No Evacuation</td>
<td>-100</td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

**Table SI-6.2 Stage 1 Experiment Scoring Function Payment Schedule**

<table>
<thead>
<tr>
<th>Round</th>
<th>Actual date and time of the storm’s current location</th>
<th>Time until Landfall (hours)</th>
<th>Time until issuing a Warning</th>
<th>Reduced Points from Endowment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advisory 1</td>
<td>11 am EDT, Tuesday, September 20 2005</td>
<td>71</td>
<td>47</td>
<td>3</td>
</tr>
<tr>
<td>Advisory 2</td>
<td>2 pm EDT, Tuesday, September 20 2005</td>
<td>68</td>
<td>44</td>
<td>6</td>
</tr>
<tr>
<td>Advisory 3</td>
<td>5 pm EDT, Tuesday, September 20 2005</td>
<td>65</td>
<td>41</td>
<td>9</td>
</tr>
<tr>
<td>Advisory 4</td>
<td>11 pm EDT, Tuesday, September 20 2005</td>
<td>59</td>
<td>35</td>
<td>15</td>
</tr>
<tr>
<td>Advisory 5</td>
<td>5 am EDT, Wednesday, September 21 2005</td>
<td>53</td>
<td>29</td>
<td>21</td>
</tr>
<tr>
<td>Advisory 6</td>
<td>10 am CDT, Wednesday, September 21 2005</td>
<td>48</td>
<td>24</td>
<td>26</td>
</tr>
<tr>
<td>Advisory 7</td>
<td>4 pm CDT, Wednesday, September 21 2005</td>
<td>42</td>
<td>18</td>
<td>32</td>
</tr>
<tr>
<td>Advisory 8</td>
<td>10 pm CDT, Wednesday, September 21 2005</td>
<td>36</td>
<td>12</td>
<td>38</td>
</tr>
<tr>
<td>Advisory 9</td>
<td>4 am CDT, Thursday, September 22 2005</td>
<td>30</td>
<td>6</td>
<td>44</td>
</tr>
</tbody>
</table>
The table indicates, for instance, that if a subject decided to issue a voluntary evacuation at advisory 8, 38 points would be deducted from the total endowment of 200 points. This means that after the first stage, the subject would have 162 points remaining. Note that an emergency manager was compensated with $0.15 for each remaining point at the end of the experiment. In the case of a student, the compensation was $0.06.

The scoring function for the stage 2 experiment was as follows, and was designed to simultaneously account for both the possibility of over- and under-evacuation. Subjects were provided in the video instructions a clear indication that some time has passed and now they will be asked to advise on a locational mandatory evacuation recommendation (i.e., which zones must be evacuated mandatorily, if any). In stage 2, subjects would lose some of their endowment for evacuating a zone not observing inundation. They would also lose some of their endowment if they failed to evacuate a zone that ended up observing inundation. These rules are incorporated in the payout structure of the experiment as follows:

- For every 25,000 persons evacuated from zones that do not get flooded, 1 point will be removed from your endowment.
- For every 25,000 persons not evacuated from zones that do get flooded, 2 points will be removed from your endowment.

The rationale behind this scoring function was the dual consideration for over- and under-evacuation. While under-evacuation is associated with clear social and physical consequences, over-evacuation is associated with adverse social and political consequences for the Governor, emergency manager, and other public-sector officials if populations are forced to leave an area that is subsequently observed to have been unexposed.

Final subject payment based on the stage 1 and 2 scoring function was computed after the completion of stage 2 on the payout determination screen. Subject payment ratios differed by subject type. Professional subjects’ conversion rate was 15 cents per point remaining at the end of the experiment. Student subjects’ rate was 6 cents. Rates were set to approximate a rate of $60/hr. and based on the mean duration recorded during pilot experiments with student subjects. Subjects also earned five additional dollars (student subjects three) for completing a post-experiment survey that provided additional explanatory variables. Mean total payouts were $24.47 and $11.62 for professional and student subjects, respectively.
7. Methodology for Approximating Remaining At-Risk Population

We utilize the Houston-Galveston Area Council’s (Houston-Galveston Area Council) four established hurricane evacuation zones identified as coastal, A, B, and C. We identify the established zip codes within each of these zones and identify, from the 2010 US Census, the population estimates for each zone. We then round the zonal population totals to the nearest 50K persons (to simplify for experiment subjects) to determine the initial population at risk prior to any evacuation orders. In other words, this provides an established estimate from the literature of the population affected by the stage 2 mandatory evacuation decision.

Table SI-7.1 Harris County Evacuation Zones Remaining Population Post-Voluntary Evacuation

<table>
<thead>
<tr>
<th>Harris County Evac Zone</th>
<th>Total Population (rounded from 2010 Census)</th>
<th>Estimated Percent Evacuated</th>
<th>Implied Percent Remaining</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coastal</td>
<td>100,000</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>Zone A</td>
<td>250,000</td>
<td>30%</td>
<td>70%</td>
</tr>
<tr>
<td>Zone B</td>
<td>350,000</td>
<td>15%</td>
<td>85%</td>
</tr>
<tr>
<td>Zone C</td>
<td>850,000</td>
<td>15%</td>
<td>85%</td>
</tr>
</tbody>
</table>

We evaluated experimental, observational, and survey-based peer-reviewed studies. The four key studies we identified found voluntary evacuation response rates in the range of 15% to 45% (Pham et al. 2020; Fu et al. 2007; Dow and Cutter 2002; Whitehead et al. 2001). Pham et al. (Pham et al. 2020) surveyed residents in Florida, Georgia, and South Carolina impacted by Hurricane Matthew. As part of their survey, they obtained respondents’ departure/evacuation times and charted it against key evacuation order timings, finding approximately 25-45% of respondents evacuated after voluntary evacuation orders but prior to the issuance of mandatory evacuation orders. Fu et al. (Fu et al. 2007) and Dow and Cutter (Dow and Cutter 2002) both found approximately 25% of survey respondents evacuating post-voluntary order issuance but pre-mandatory order issuance. In a survey that included questions on hypothetical hurricane conditions, between 14 and 27% of respondents indicated they would evacuate after a voluntary evacuation order, depending on the severity of the hurricane (Whitehead et al. 2001).

Based on these benchmarks established in the literature, we developed the above-listed population estimates for the remaining at-risk populations post-voluntary evacuation order. Consistent with literature indicating that people further inland have less propensity to evacuate (Lindell et al. 2005;
Baker 1991; Zhang et al. 2004; Wilmot and Mei 2004), we proportioned the relative values identified in the established literature for evacuation propensity by distance from the coast. After aggregating these zone populations to form evacuation options (coastal only, coastal + A, coastal + B, coastal + A + B, coastal + B + C, coastal + A + B + C), the combined population remaining for each evacuation decision was then rounded to the nearest 25K persons to improve decision clarity for experimental subjects.
References:


