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HOMELAND SECURITY

DHS Risk-Based Grant Methodology Is Reasonable, But Current Version's Measure of Vulnerability is Limited

GAO-08-852

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Highlights

Highlights of GAO-08-852, a report to congressional committees

HOMELAND SECURITY

DHS Risk-Based Grant Methodology Is Reasonable, But Current Version's Measure of Vulnerability is Limited

Why GAO Did This Study

Since 2002, the Department of Homeland Security (DHS) has distributed almost $20 billion in funding to enhance the nation's capabilities to respond to acts of terrorism or other catastrophic events. In fiscal year 2007, DHS provided approximately $1.7 billion to states and urban areas through its Homeland Security Grant Program (HSGP) to prevent, protect against, respond to, and recover from acts of terrorism or other catastrophic events. As part of the Omnibus Appropriations Act of 2007, GAO was mandated to review the methodology used by DHS to allocate HSGP grants. This report addresses (1) the changes DHS has made to its risk-based methodology used to allocate grant funding from fiscal year 2007 to fiscal year 2008 and (2) whether the fiscal year 2008 methodology is reasonable. To answer these questions, GAO analyzed DHS documents related to its methodology and grant guidance, interviewed DHS officials about the grant process used in fiscal year 2007 and changes made to the process for fiscal year 2008, and used GAO's risk management framework based on best practices.

What GAO Recommends

GAO recommends that DHS formulate a methodology to measure variations in vulnerability across states and urban areas. In comments to our draft report, DHS components concurred with our recommendation.

What GAO Found

For fiscal year 2008 HSGP grants, DHS is primarily following the same methodology it used in fiscal year 2007, but incorporated metropolitan statistical areas (MSAs) within the model used to calculate risk. The methodology consists of a three-step process—a risk analysis of urban areas and states based on measures of threat, vulnerability and consequences, an effectiveness assessment of applicants' investment justifications, and a final allocation decision. The principal change in the risk analysis model for 2008 is in the definition of the geographic boundaries of eligible urban areas. In 2007, the footprint was defined using several criteria, which included a 10-mile buffer zone around the center city. Reflecting the requirements of the Implementing Recommendations of the 9/11 Commission Act of 2007, DHS assessed risk for the Census Bureau's 100 largest MSAs by population in determining its 2008 Urban Areas Security Initiative (UASI) grant allocations. This change altered the geographic footprint of the urban areas assessed, aligning them more closely with the boundaries used by government agencies to collect some of the economic and population data used in the model. This may have resulted in DHS using data in its model that more accurately estimated the population and economy of those areas. The change to the use of MSA data in fiscal year 2008 also resulted in changes in the relative risk rankings of some urban areas. As a result, DHS officials expanded the eligible urban areas in fiscal year 2008 to a total of 60 UASI grantees, in part, to address the effects of this change to MSA data, as well as to ensure that all urban areas receiving fiscal year 2007 funding continued to receive funding in fiscal year 2008, according to DHS officials.

Generally, DHS has constructed a reasonable methodology to assess risk and allocate funds within a given fiscal year. The risk analysis model DHS uses as part of its methodology includes empirical risk analysis and policy judgments to select the urban areas eligible for grants (all states are guaranteed a specified minimum percentage of grant funds available) and to allocate State Homeland Security Program (SHSP) and UASI funds. However, our review found that the vulnerability element of the risk analysis model has limitations that reduce its value. Measuring vulnerability is considered a generally-accepted practice in assessing risk; however, DHS's current risk analysis model does not measure vulnerability for each state and urban area. Rather, DHS considered all states and urban areas equally vulnerable to a successful attack and assigned every state and urban area a vulnerability score of 1.0 in the risk analysis model, which does not take into account any geographic differences. Thus, as a practical matter, the final risk scores are determined by the threat and consequences scores.

To view the full product, including the scope and methodology, click on GAO-08-852. For more information, contact William O. Jenkins, Jr., (202) 512-8777, jenkinswo@gao.gov.

Contents

Letter 1

Results In Brief 4
Background 5
Shifting to Urban Area Boundaries Defined by MSA was the Primary Change to DHS's Risk-Based Methodology in 2008 16
DHS's Risk-based Methodology is Generally Reasonable, But the Vulnerability Element of the Risk Analysis Model Has Limitations that Reduce Its Value 20
Conclusions 25
Recommendations 26
Agency Comments 26

Appendix I **Briefing for Congressional Committees, February 11-25, 2008** 27

Appendix II **Identifying Eligible Urban Areas** 53

Appendix III **DHS's Model is Robust for Tier 1 UASI Areas** 65

Appendix IV **Contacts and Staff Acknowledgments** 67

Table

Table 1: Urban Areas Eligible for UASI Grants: Fiscal Year 2006 Footprint vs. 2008 by Metropolitan Statistical Areas (New UASI grantees are in italics) 54

Figures

Figure 1: Risk Management Framework 6
Figure 2: Evolution of DHS's Risk-based formula 8
Figure 3: Overview of the Grant Allocation Methodology for UASI and SHSP 10
Figure 4: DHS's Risk Analysis Model Used in Determining Relative Risk Scores 12

Figure 5: Chicago, IL Urban Area Footprint: Center City + 10 mile radius vs. MSA. 18

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United States Government Accountability Office
Washington, DC 20548

June 27, 2008

The Honorable Robert C. Byrd Chairman
The Honorable Thad Cochran Ranking Minority Member
Subcommittee on Homeland Security
Committee on Appropriations
United States Senate

The Honorable David E. Price, Chairman
The Honorable Harold Rodgers, Ranking Minority Member
Subcommittee on Homeland Security
Committee on Appropriations
House of Representatives

Since 2002, the Department of Homeland Security (DHS) has distributed almost $20 billion in federal funding through various DHS grant programs that provide funding to public jurisdictions and private owners/operators for planning, equipment, and training to enhance the nation's capabilities to respond to terrorist attacks and, to a lesser extent, natural and accidental disasters.[1] In fiscal year 2007, DHS provided approximately $1.7 billion to states and urban areas through its Homeland Security Grant Program (HSGP) to prevent, protect against, respond to, and recover from acts of terrorism or other catastrophic events and plans to distribute approximately $1.6 billion under this program in fiscal year 2008.

The majority of funding from the Homeland Security Grant Program is provided through two of its five component programs: the State Homeland Security Program (SHSP) and the Urban Areas Security Initiative (UASI).[2] SHSP supports building and sustaining capabilities at the state and local levels through planning, equipment, training, and exercise activities and helps states to implement the strategic goals and objectives included in state homeland security strategies. SHSP provides funding to all 56 states

[1] This figure includes such DHS grant programs as the Homeland Security Grant Program, Infrastructure Protection Programs, and the Emergency Management Performance Grants.

[2] In addition, HSGP encompasses three smaller grant programs: the Law Enforcement Terrorism Prevention Activities, the Metropolitan Medical Response System, and the Citizen Corps Program, which do not use a risk-based methodology to allocate funds to grantees.

and territories based on a combination of assessing relative risk, and determining the effectiveness of states' proposed investments.[3] UASI addresses the unique multi-disciplinary planning, operations, equipment, training, and exercise needs of high-threat, high-density urban areas. The program provides funding to high-risk urban areas based on determinations of risk and assessments of the effectiveness of the plans for using the funds. DHS used this same risk-based methodology to allocate $852 million in fiscal year 2008 under the Infrastructure Protection Program, according to DHS.[4]

The distribution of HSGP funds, including UASI funding, has raised congressional interest about DHS's methods in making such determinations. For the third consecutive year, GAO has been mandated as part of DHS's annual appropriation to review and assess the HSGP's risk analysis model and risk-based allocation methodology[5] for determining risk and distributing funds.[6] We responded to the mandate in February 2008 by briefing the staffs of congressional committees on the results of this review (see Appendix I). This report and the accompanying appendices supplements and transmits the information provided during those briefings.

In response to a mandate in the Consolidated Appropriations Act, 2008,[7] GAO reviewed the methodology used by DHS to allocate HSGP grants. This report addresses the following questions:

1. How has the risk-based methodology DHS uses to allocate grant funding changed from fiscal year 2007 to fiscal year 2008?

[3] Each state and territory receives a statutory minimum percentage of available funds.

[4] The Infrastructure Protection Program supports specific activities to protect critical infrastructure, such as ports, mass transit, highways, rail and transportation. The grant programs included here are Transit Security Grant Program, Port Security Grant Program, Buffer Zone Protection Program, Trucking Security Program, and Intercity Bus Security Grants.

[5] For example, GAO *Homeland Security Grants: Observations on Process DHS Used to Allocate Funds to Selected Urban Areas*, GAO-07-381R (Washington, D.C.: Feb 7, 2007)

[6] For the purposes of this report, we use "risk analysis model" to refer to DHS's application of its risk calculation formula to score and rank states and urban areas. We use "risk-based allocation methodology" to refer to the three-step process it uses in determining and making grant fund allocations—risk analysis, effectiveness analysis, and final allocation decisions.

[7] Pub. L. No. 110-161, 121 Stat. 1844, 2063 (2007)

2. How reasonable is the fiscal year 2008 methodology?

To answer these questions, we analyzed DHS documents, including the risk analysis models for fiscal years 2007 and 2008, grant guidance, and presentations. To provide a basis for examining efforts at carrying out risk management, we applied a framework for risk management that GAO developed based on best practices and other criteria.[8] We used our risk management framework to examine DHS's risk-based methodology—which includes its risk analysis model. Our analysis includes the extent to which:

- Information used in DHS's methodology—such as specific measures and weights—was sufficient and reliable;
- Attributes of DHS's methodology that potentially include both government and non-government items were identified by a reasoned process;
- DHS could justify the aggregation or calculations of these attributes;
- DHS documented its processes and applied written criteria when using methods to obtain scores or weights (ie. peer review), or when ranges or categories (ie. tiers) are used;
- Relative risk rankings are sensitive to incremental changes in assumptions or alternative perceptions related to grantee eligibility or funding levels; and
- DHS has procedures in place to update their methodology if new information becomes available.

Finally, we interviewed DHS officials about the HSGP grant determination process used in fiscal year 2007 and about changes made to the process for fiscal year 2008. We performed this performance audit from September 2007 through April 2008, in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

[8] GAO Risk Management: Further Refinements Needed to Assess Risks and Prioritize Protective Measures at Ports and Other Critical Infrastructure, GAO-06-91 (Washington, D.C.: Dec 15, 2005).

Results In Brief

For fiscal year 2008 HSGP grants, DHS is primarily following the same methodology it used in fiscal year 2007, but incorporated metropolitan statistical areas (MSAs) within the risk analysis model used to calculate risk. The methodology consists of a three-step process—risk analysis, effectiveness assessment, and final allocation decisions. The principal change in the model for 2008 is in the definition of the geographic boundaries, or footprint, of the UASI areas. In 2007, the footprint was defined using several criteria, which included a 10-mile buffer zone around the center city. Reflecting the requirements of the Implementing Recommendations of the 9/11 Commission Act of 2007 (9/11 Act),[9] DHS assessed risk for the Census Bureau's 100 largest MSAs by population in determining its 2008 UASI grant allocations. This change altered the geographic footprint of the urban areas assessed, aligning them more closely with the boundaries used by government agencies to collect some of the economic and population data used in the model, which may have resulted in DHS using data in its model that more accurately estimated the population and economy of those areas. As a result, DHS officials expanded the eligible urban areas in fiscal year 2008 to a total of 60 UASI grantees, in part, to address the effects of this change to MSA data, as well as to ensure that all urban areas receiving funding in fiscal year 2007 received funding in fiscal year 2008, according to DHS officials.

Generally, DHS has constructed a reasonable methodology to assess risk and allocate funds within a given fiscal year. The risk analysis model DHS uses as part of its methodology includes empirical risk analysis and policy judgments to select the urban areas eligible for grants (all states are guaranteed a specified minimum percentage of the grant funds available) and to allocate SHSP and UASI funds. However, our review found that the vulnerability element of the risk analysis model has limitations that reduce its value. Measuring vulnerability is considered a generally-accepted practice in assessing risk; however, DHS did not measure vulnerability for each state and urban area. Rather, DHS considered all states and urban areas equally vulnerable to a successful attack and assigned every state and urban area a vulnerability score of 1.0 in the risk model. Thus, as a practical matter, the final risk scores are determined by the threat and consequences scores. By not measuring variations in vulnerability, DHS ignores differences across states and urban areas.

[9] 6 U.S.C. §§ 601(5), (8), 604(b).

To strengthen DHS's methodology for determining risk, we are recommending that the Secretary of DHS formulate a method to measure variations in vulnerability across states and urban areas, and apply this measure in future iterations of the risk analysis model. In email comments on the draft report, FEMA and I&A concurred with our recommendation that they formulate a method to measure vulnerability in a way that captures variations across states and urban areas and apply this vulnerability measure in future iterations of the risk-based grant allocation model. FEMA, NPPD and I&A also provided technical comments, which we incorporated as appropriate.

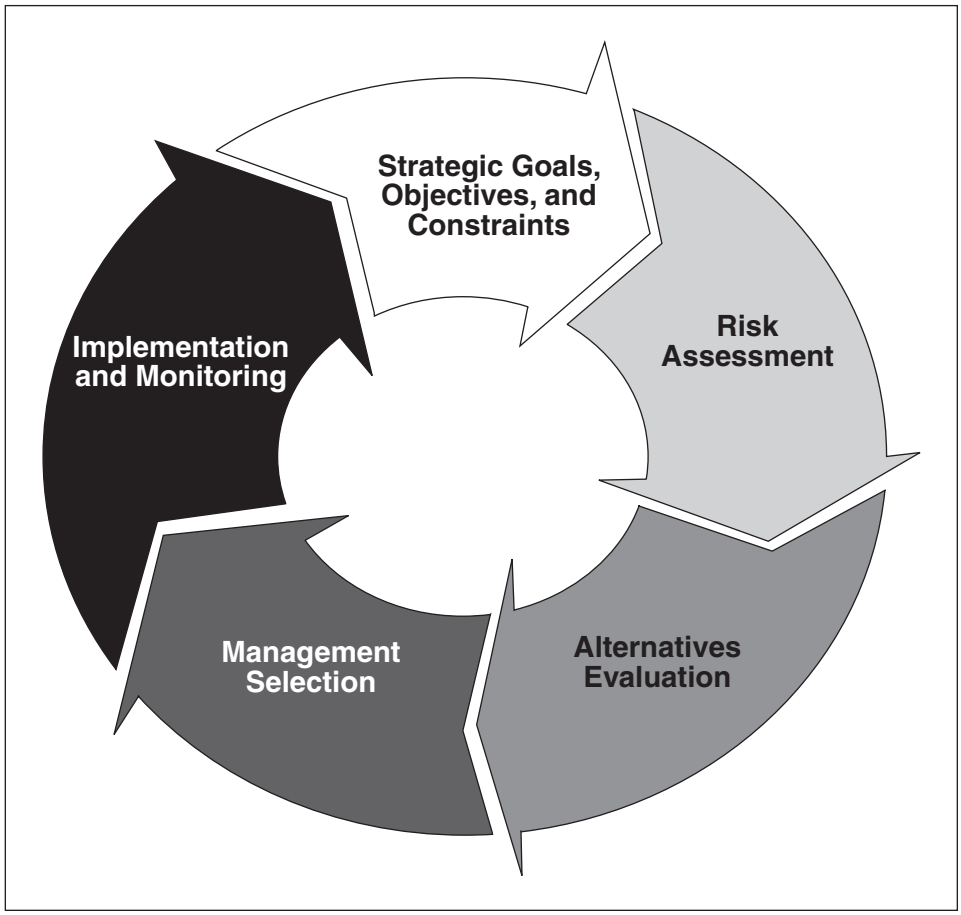
Background

Risk management has been endorsed by Congress, the President, and the Secretary of DHS as a way to direct finite resources to those areas that are most at risk of terrorist attack under conditions of uncertainty. The purpose of risk management is not to eliminate all risks, as that is an impossible task. Rather, given limited resources, risk management is a structured means of making informed trade-offs and choices about how to use available resources effectively and monitoring the effect of those choices. Thus, risk management is a continuous process that includes the assessment of threats, vulnerabilities, and consequences to determine what actions should be taken to reduce or eliminate one or more of these elements of risk.

To provide a basis for examining efforts at carrying out risk management, GAO developed[10] a framework for risk management based on best practices and other criteria. The framework is divided into five phases: (1) setting strategic goals and objectives, and determining constraints; (2) assessing the risks; (3) evaluating alternatives for addressing these risks; (4) selecting the appropriate alternatives; and (5) implementing the alternatives and monitoring the progress made and the results achieved (see Fig.1).

[10] GAO-06-91.

Figure 1: Risk Management Framework



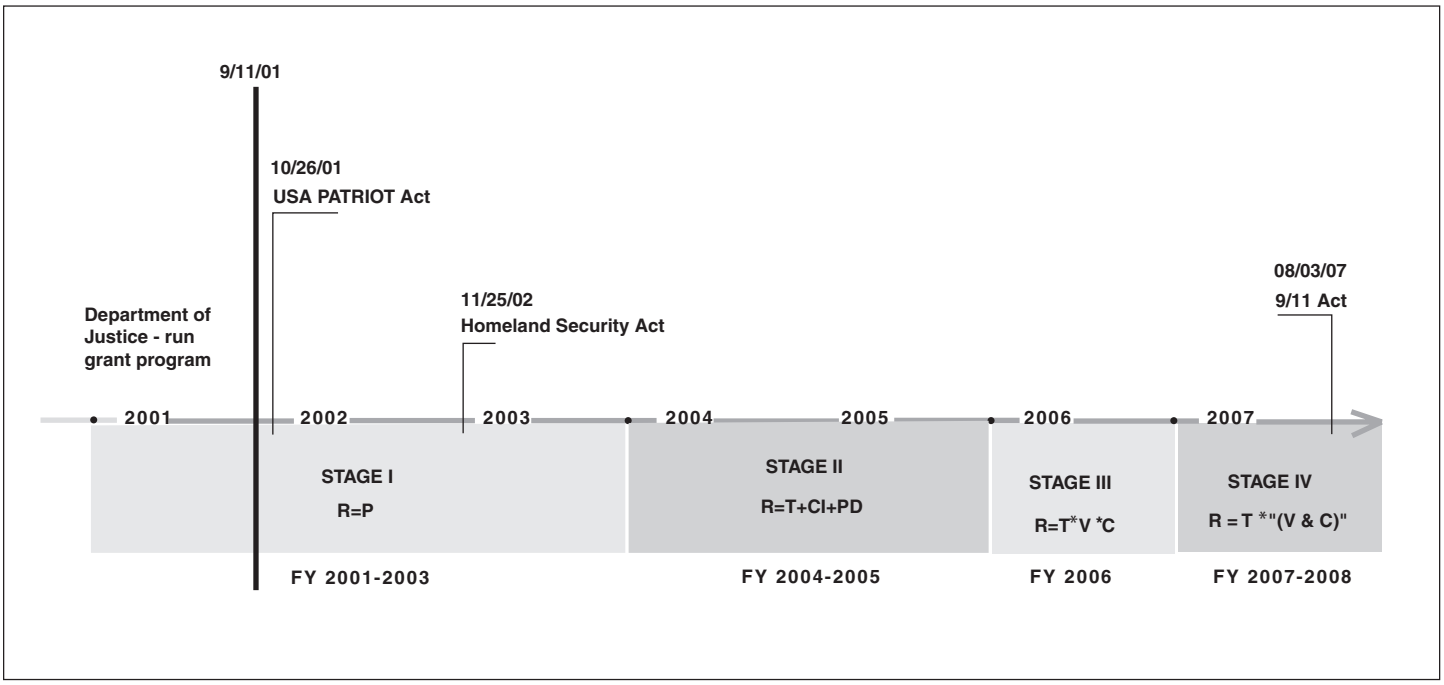
Source: GAO.

Because we have imperfect information for assessing risks, there is a degree of uncertainty in the information used for risk assessments (e.g., what the threats are and how likely they are to be realized). As a result, it is inevitable that assumptions and policy judgments must be used in risk analysis and management. It is important that key decision-makers understand the basis for those assumptions and policy judgments and their effect on the results of the risk analysis and the resource decisions based on that analysis.

DHS has used an evolving risk-based methodology to identify the urban areas eligible for HSGP grants and the amount of funds states and urban areas receive (see Fig 2). For example, the risk analysis model used from

fiscal year 2001 through 2003 largely relied on measures of population to determine the relative risk of potential grant recipients, and evolved to measuring risk as the sum of threat, critical infrastructure and population density calculations in fiscal years 2004 and 2005.

Figure 2: Evolution of DHS's Risk-based formula



Source: GAO analysis based on Congressional Research Service.

Notes:

Definitions for the formulas above:

- R = P represents Risk = Population;
- R = T+CI+PD represents Risk = Threat plus Critical Infrastructure plus Population Density;
- R = T*V*C represents Risk = Threat times Vulnerability times Consequences; and
- R = T* "(V&C)" represents DHS's presentation of the risk calculation formula used in their risk analysis model for 2007 and 2008: Risk = Threat times the combination of Vulnerability and Consequences. However, in the 2007 and 2008 risk analysis models, the combination of vulnerability and consequence is still calculated as the product of V times C, or R = T*V*C.

Federal legislation affecting DHS's risk-based methodology:

- United and Strengthening America by Providing Appropriate Tools Required to Intercept and Obstruct Terrorism Act (USA PATRIOT Act) of 2001: Legislated statutory minimum funding levels for states and territories to receive under SHSP (0.75 percent of SHSP appropriations for states, the District of Columbia and Puerto Rico; 0.25 percent for territories).
- Homeland Security Act of 2002: Moved the Department of Justice's Office for Domestic Preparedness grant programs into DHS.
- 9/11 Act: Legislated (a) minimum funding levels for state and territories to receive under SHSP (0.375 percent of all funds appropriated for SHSP and UASI for states, the District of Columbia and Puerto Rico (0.008 percent for territories) for FY 2008 with the state percentage decreasing each fiscal year down to 0.35 percent by FY2012, (b) that DHS is to assess the risk for 100 most populous Metropolitan Statistical Areas (MSAs), and (c) based on that assessment, designate high-risk urban areas that may apply for UASI grants.

The fiscal year 2006 process introduced assessments of threat, vulnerability and consequences of a terrorist attack in assessing risk. In addition to modifications to its risk analysis model, DHS adopted an effectiveness assessment for fiscal year 2006 to determine the anticipated effectiveness of the various risk mitigation investments proposed by urban areas, which affected the final amount of funds awarded to eligible areas. For the fiscal year 2007 allocation process, DHS defined Risk as the product of Threat times Vulnerability and Consequences, or "R= T* (V & C)"[11] and applied a three-step risk-based allocation methodology which incorporates analyses of risk and effectiveness to select eligible urban areas and allocate UASI and SHSP funds (see Fig. 3). The three steps include:

1. Implementation of a Risk Analysis model to calculate scores for states and urban areas, defining relative Risk as the product of Threat, Vulnerability and Consequences;

2. Implementation of an Effectiveness Assessment, including a process where state and urban area representatives acting as peer reviewers assess and score the effectiveness of the proposed investments submitted by the eligible applicants. This process is also known as peer review.

3. Calculation of a Final Allocation of funds based on states' and urban areas' risk scores as adjusted by their effectiveness scores.

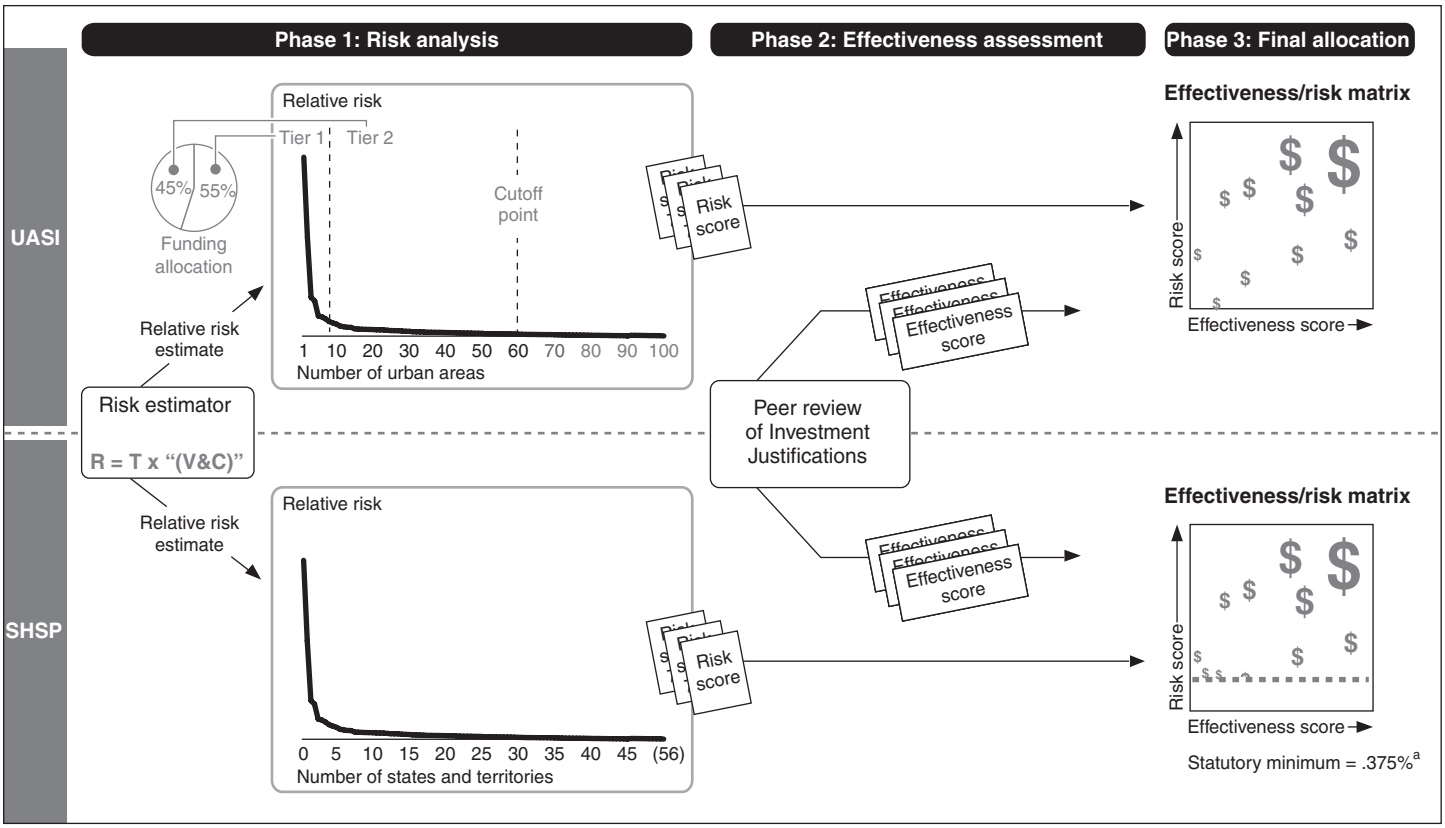
The Post-Katrina Emergency Management Reform Act places responsibility for allocating and managing DHS grants with the Federal Emergency Management Agency (FEMA).[12] While FEMA is responsible for implementing the above 3-step process, FEMA relies on other DHS components such as the National Protection and Programs Directorate (NPPD) and the Office of Intelligence and Analysis (I&A) in the

[11] While DHS documents express their risk analysis model as a function of Threat times the combination of Vulnerability and Consequences,; mathematically, the 2007 risk analysis model was still calculated as the product of T times V times C, or R = T*V*C. The risk model considers the potential risk of international terrorism to people, critical infrastructure, and the economy to estimate the relative risk of terrorism faced by a given area. Risk is the product of Threat, the likelihood of an attack occurring, and Vulnerability and Consequence, the relative exposure to and expected impact of an attack.

[12] The Post-Katrina Emergency Management Reform Act of 2006 was enacted as Title VI of the Department of Homeland Security Appropriations Act, 2007, Pub. L. No. 109-295, 120 Stat. 1355, 1394 (2006).

development of the risk analysis model, which we will discuss in greater detail below.

Figure 3: Overview of the Grant Allocation Methodology for UASI and SHSP



Source: GAO analysis of DHS documents and information provided in interviews.

[a]The statutory minimum of 0.375 percent of the total funds appropriated for SHSP for fiscal year 2008. In fiscal years 2006 and 2007, the statutory per state minimum equaled 0.75 percent of funds appropriated for SHSP and UASI.

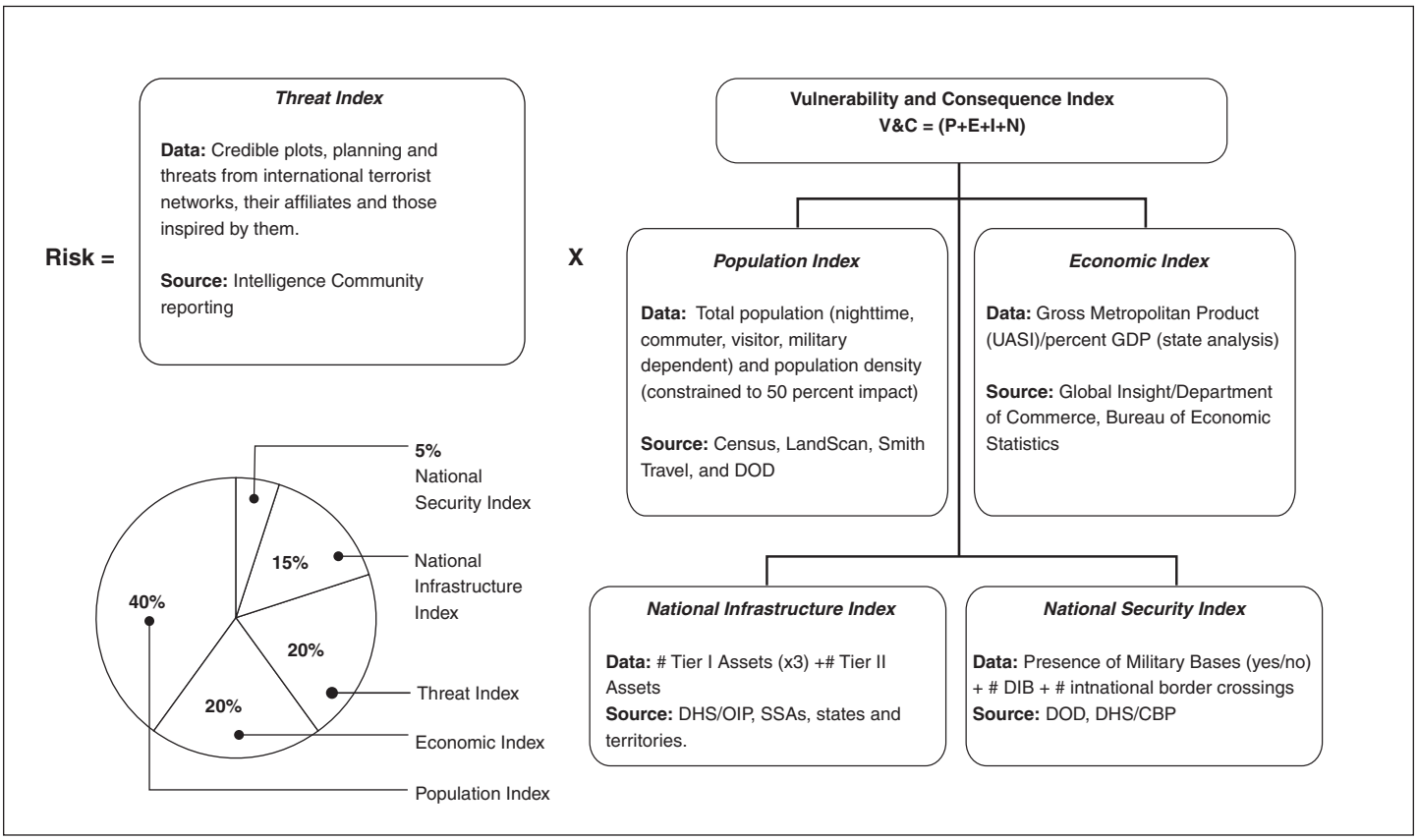
Risk Analysis Model

DHS employs a risk analysis model to assign relative risk scores to all states and urban areas under the SHSP and UASI grant programs. These relative risk scores are also used to differentiate which urban areas are eligible for UASI funding. These eligible areas are divided into two tiers: Tier 1 UASI grantees and those eligible for Tier 2.[13] In fiscal year 2007, 45

[13] This tiering process was first used for the UASI grant program in fiscal year 2007. Its effect on funding allocation will be discussed in greater detail later in this report.

candidates were eligible to apply for funding under the UASI program, and eligible candidates were grouped into two tiers according to relative risk. Tier 1 included the six highest risk areas; Tier 2 included the other 39 candidate areas. Figure 4 provides an overview of the factors that are included in the risk analysis model for fiscal year 2007 and their relative weights. The maximum relative risk score possible for a given area was 100. The Threat Index accounted for 20 percent of the total risk score; the Vulnerability and Consequences Index accounted for 80 percent.

Figure 4: DHS's Risk Analysis Model Used in Determining Relative Risk Scores



Source: DHS.

Note: "DHS/OIP" stands for DHS's Office of Infrastructure Protection. "SSAs" stands for Sector-Specific Agencies, which are Federal departments and agencies identified in the National Infrastructure Protection Plan as responsible for critical infrastructure protection activities. "DHS/CBP" stands for the DHS's Customs and Border Protection. "DIB" stands for "defense industrial base," which includes a count of Department of Defense, government, and private sector industrial complex with capabilities to perform research and development, design, produce, and maintain military weapon systems, subsystems, components and parts to meet military requirements. "GDP" stands for Gross Domestic Product.

The Threat Index accounted for 20 percent of the total risk score, which was calculated by assessing threat information for multiple years (generally, from September 11, 2001 forward) for all candidate urban areas and categorizing urban areas into different threat tiers. According to DHS officials, the agency's Office of Intelligence and Analysis (I&A) calculated the Threat Index by (1) collecting qualitative threat information with a

nexus to international terrorism,[14] (2) analyzing the threat information to create threat assessments for states and urban areas, (3) empanelling intelligence experts to review the threat assessments and reach consensus as to the number of threat tiers, and (4) assigning threat scores. This process, according to DHS officials, relied upon analytical judgment and interaction with the Intelligence Community, as opposed to the use of total counts of threats and suspicious incidents to calculate the Threat Index for the 2006 grant cycle. The final threat assessments are approved by the Intelligence Community—the Federal Bureau of Investigation, Central Intelligence Agency, National Counterterrorism Center, and the Defense Intelligence Agency—along with the DHS Under Secretary for Intelligence and Analysis and the Secretary of DHS, according to DHS officials.

The Vulnerability and Consequences index accounts for 80 percent of the total risk score. Because DHS considered most areas of the country equally vulnerable to a terrorist attack given freedom of movement within the nation, DHS assigns vulnerability a constant value of 1.0 in the formula across all states and urban areas. Therefore, DHS's measurement of vulnerability and consequences is mainly a function of the seriousness of the consequences of a successful terrorist attack, represented by four indices: a Population Index, an Economic Index, a National Infrastructure Index, and a National Security Index.

Population Index (40 percent). This index included nighttime population and military dependent populations for states and urban areas, based upon U.S. Census Bureau and Department of Defense data. For urban areas, factors such as population density, estimated number of daily commuters, and estimated annual visitors were also included in this variable using data from private entities. DHS calculated the Population Index for urban areas by identifying areas with a population greater than 100,000 persons and cities that reported threat data during the past year, then combined cities or adjacent urban counties with shared boundaries to form single jurisdictions, and drew a 10-mile buffer zone around identified areas.

Economic Index (20 percent). This index is comprised of the economic value of the goods and services produced in either a state or an urban area. For states, this index was calculated using U.S. Department of Commerce data on their percentage contribution to Gross Domestic

[14] This threat information does not consider either domestic terrorism or natural hazards such as hurricanes or earthquakes, according to DHS's Office of Intelligence and Analysis.

Product. For UASI urban areas, a parallel calculation of Gross Metropolitan Product was incorporated. [15]

National Infrastructure Index (15 percent). This index focused on over 2,000 critical infrastructure/key resource (CIKR) assets that were identified by DHS's Office of Infrastructure Protection. These particular critical infrastructure assets are divided into two rankings that, if destroyed or disrupted, could cause significant casualties, major economic losses, or widespread/long term disruptions to national well-being and governance capacity. The Tier 2 CIKR assets include the nationally-significant and high-consequence assets and systems across 17 sectors.[16] Tier 1 assets are a small subset of the Tier 2 list that include assets and systems certain to produce at least two of four possible consequences if disrupted or destroyed: (1) prompt fatalities greater that 5,000; (2) first-year economic impact of at least $75 billion; (3) mass evacuations with prolonged (6 months or more) absence; and (4) loss of governance or mission execution disrupting multiple regions or critical infrastructure sectors for more than a week, resulting in a loss of necessary services to the public. Tier 1 assets were weighted using an average value three times as great as Tier 2 assets.

The National Security Index (5 percent). This index considered three key national security factors: whether military bases are present in the state or urban area; how many critical defense industrial base facilities are located in the state or urban area; and the total number of people traversing international borders. Information on these inputs comes from the Department of Defense and DHS.

Effectiveness Assessment

In addition to determining relative risk using the risk analysis model, DHS added an effectiveness assessment process in fiscal year 2006 to assess and score the effectiveness of the proposed investments submitted by

[15] For the urban areas in Puerto Rico, DHS split the total GDP of Puerto Rico published in the CIA World Factbook into Puerto Rico's constituent municipios according to the municipios' percentage of total non-farm employees, a figure provided by the Bureau of Labor Statistics.

[16] The 17 critical infrastructure sectors and key resources include agriculture and food, banking and finance, chemical, commercial facilities, dams, defense industrial base, emergency services, energy, government, information and telecommunications, national monuments and icons, postal and shipping, public health, transportation, and water sectors.

grant applicants. To assess the anticipated effectiveness of the various risk mitigation investments that states and urban areas proposed, DHS required states and urban areas to submit investment justifications as part of their grant applications. The investment justifications included up to 15 "investments" or proposed solutions to address homeland security needs, which were identified by the states and urban areas through their strategic planning process. DHS used state and urban area representatives as peer reviewers to assess these investment justifications. The criteria reviewers used to score the investment justifications included the following categories: relevance to national, state and local plans and policies such as the National Preparedness Guidance states' and urban areas' homeland security plans, anticipated impact, sustainability, regionalism, and the applicants' planned implementation of each proposed investment. Reviewers on each panel assigned scores for these investment justifications, which, according to DHS officials, were averaged to determine a final effectiveness score for each state and urban area applicant.

In fiscal year 2007, DHS provided states and urban areas the opportunity to propose investment justifications that included regional collaboration to support the achievement of outcomes that could not be accomplished if a state or urban area tried to address them independently. States and urban areas could choose to submit multi-state or multi-urban area investment justifications which outlined shared investments between two or more states or between two or more urban areas. Such investments were eligible for up to 5 additional points on their final effectiveness score, or up to 8 more effectiveness points for additional proposed investments, although these additional points would not enable a state's or urban area's total effectiveness score to exceed 100 points. These proposed investments were reviewed by one of two panels established specifically to consider multi-applicant proposals. Points were awarded based on the degree to which multi-applicant investments showed collaboration with partners and demonstrated value or outcomes from the joint proposal that could not be realized by a single state or urban area.

Final Allocation Process

DHS allocated funds based on the risk scores of states and urban areas, as adjusted by their effectiveness scores. DHS officials explained that while allocations are based first upon area risk scores, the effectiveness scores are then used to determine adjustments to states and urban areas allocations based on an "effectiveness multiplier." States and urban areas with high effectiveness scores received an additional percentage of their

risk-based allocations, while states and urban areas with low effectiveness scores had their risk-based allocations lowered by a percentage.[17]

In addition to determining funding by risk score as adjusted by an effectiveness multiplier, urban areas that received funds through the UASI grant program were subject to an additional tiering process that affected funding allocation. For example, in fiscal year 2007, the 45 eligible urban area candidates were grouped into two tiers according to relative risk. The Tier 2 UASI grantees included the 6 highest-risk areas; Tier 2 UASI grantees included another 39 candidate areas ranked by risk. The 6 Tier 1 UASI grantees were allocated fifty-five percent of the available funds, or approximately $410.8 million, while the 39 Tier 2 UASI grantees received the remaining forty-five percent of available funds, or approximately $336.1 million.

Shifting to Urban Area Boundaries Defined by MSA was the Primary Change to DHS's Risk-Based Methodology in 2008

DHS's risk-based methodology had few changes from fiscal year 2007 to 2008. DHS changed the definition it used to identify the UASI areas included in the risk analysis model in 2008 from an urban area's center city plus a ten-mile radius to metropolitan statistical areas (MSAs) as defined by the Census Bureau.[18] DHS made this change in response to the 9/11Act requirement to perform a risk assessment for the 100 largest MSAs by population.[19] Because the change in definition generally expanded the geographic area of each potential UASI grant recipient, the change had an effect on the data used to assess threat and consequences, and it may also have resulted in the use of more accurate data in the risk analysis model. The change to the use of MSA data in fiscal year 2008 also resulted in changes in the relative risk rankings of some urban areas. As a result, DHS officials expanded the eligible urban areas in fiscal year 2008 to a total of 60 UASI grantees, in part, to address the effects of this change to MSA data, as well as to ensure that all urban areas that received fiscal year 2007

[17] States are statutorily required to receive a minimum percentage of the total funds appropriated for SHSP and UASI, and adjustments based on their effectiveness cannot lower a state's risk-based allocation below that threshold. UASI urban areas do not have a similar minimum.

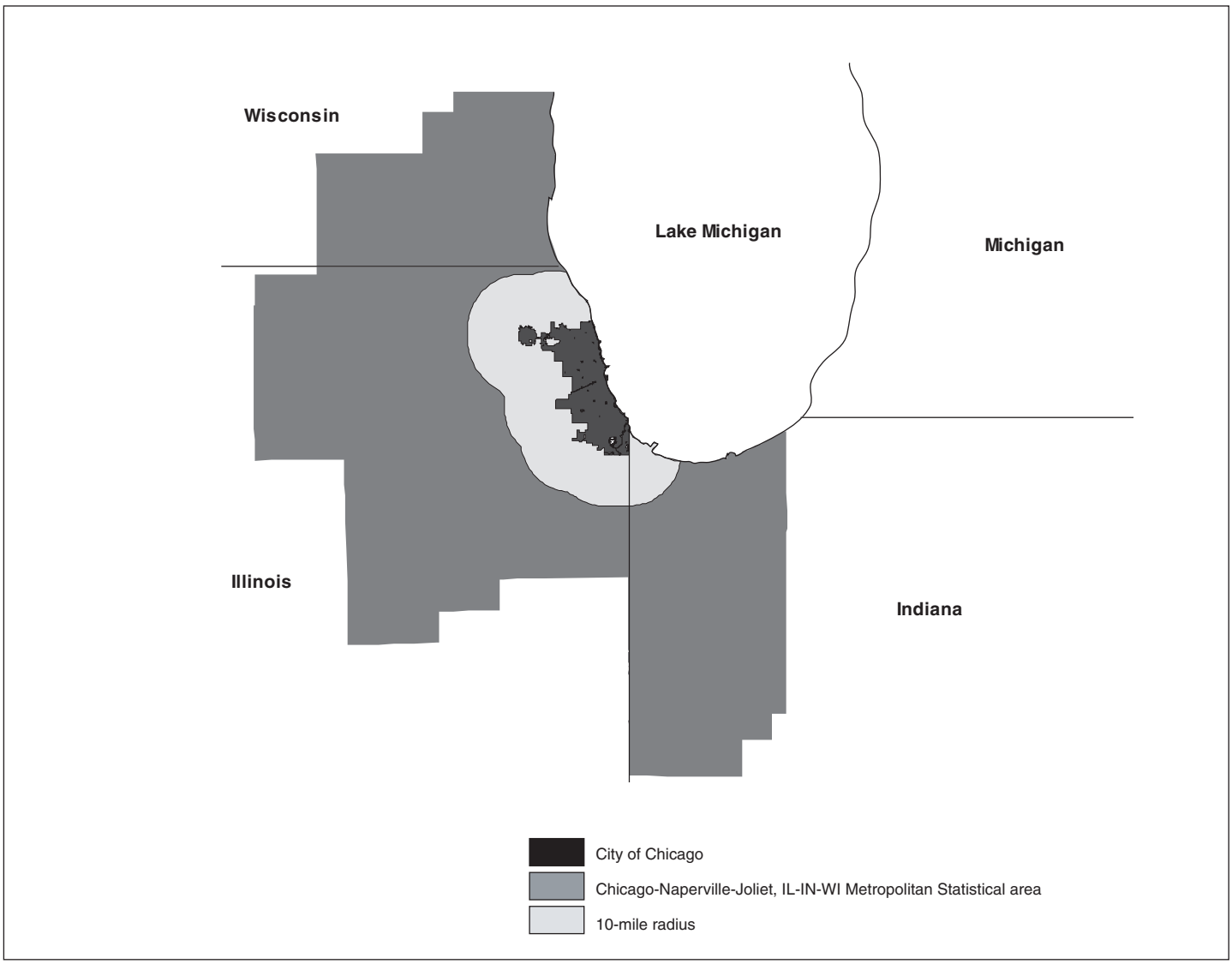
[18] Additionally, fiscal year 2008 is the first year that FEMA has had responsibility for the risk assessment and grant allocations for these grants.

[19] In addition to the change to the definition DHS used to identify the UASI areas, DHS also incorporated population density for the SHSP risk analysis model and the presence of international waterways, based on the language of the Implementing Recommendations of the 9/11 Commission Act of 2007.

funding also received funding for fiscal year 2008, according to DHS officials.

Changing the boundaries had an effect on the data by which risk is calculated because the change in boundaries resulted in changes in the population and critical assets within the new boundaries. Figure 3 below uses the Chicago, IL urban area to illustrate this change. One benefit of the change to MSAs was that the UASI boundaries align more closely with the boundaries used to collect some of the economic and population data used in the model. Consequently, the fiscal year 2008 model may have resulted in more accurate data. Because the 2007 boundaries were based on distance, areas inside the boundaries may have included partial census tracts or partial counties, each of which would have required DHS to develop rules as to how to handle the partial areas. By contrast, the MSAs are based on counties and allow DHS to use standard census data instead of developing an estimated population within the defined boundaries. Additional information describing the boundaries of UASI urban areas for fiscal year 2007 versus fiscal year 2008 is presented in Appendix II.

Figure 5: Chicago, IL Urban Area Footprint: Center City + 10 mile radius vs. MSA.



Source: GAO analysis.

DHS calculated the Population Index of MSAs by: (1) using census data to determine the population and population density of each census tract; (2) calculating a Population Index for each individual census tract by multiplying the census tract's population and population density figures; and (3) adding together the population indices of all of the census tracts making up the MSA. DHS did not use average population density because

using an average resulted in losing information about how the population is actually distributed among the tracts. Using averages for population density over census tracts with dissimilar densities could have yielded very misleading results, according to DHS officials.

The change to MSAs for fiscal year 2008 resulted in an increase of almost 162,000 square miles across the total area of urban area footprints. While 3 urban areas actually lost square mileage because of the change, the other areas all increased their square mileage footprint by almost 2,700 square miles on average. The increased size of urban areas' footprints increased the number of critical infrastructure assets that were counted within them. We analyzed the number of Tier 1 and Tier 2 critical infrastructure assets associated with UASI areas between fiscal year 2007 and 2008, and found a higher number of total Tier 1 and Tier 2 critical infrastructure assets assigned to urban areas in 2008, and–individually—almost all urban areas increased the number of assets assigned to them.

This change to the use of MSAs also resulted in changes in urban areas rankings, including the increase of the relative risk scores for such urban areas as Albany, Syracuse and Rochester, NY, and Bridgeport, CT. As a result, DHS officials expanded the eligible urban areas in fiscal year 2008 to a total of 60 with the top seven highest risk areas comprising UASI Tier 1 grantees, and the 53 other risk-ranked UASI Tier 2 grantees. As in fiscal year 2007, the top seven UASI Tier 1 grantee areas will receive fifty-five percent of the available funds, or approximately $429.9 million, and the remaining 53 UASI Tier 2 grantees will receive forty-five percent of the available funds, or approximately $351.7 million. According to DHS officials, the decision to expand the eligible urban areas to a total of sixty was a policy decision largely driven by two factors: the 9/11 Act requirement that FEMA use MSAs; and the desire to continue to fund urban areas already receiving funding.

DHS's Risk-based Methodology is Generally Reasonable, But the Vulnerability Element of the Risk Analysis Model Has Limitations that Reduce Its Value

The risk-based methodology DHS uses to allocate HSGP grant dollars is generally reasonable. It includes and considers the elements of risk assessment—Threat, Vulnerability, and Consequences—and, as DHS's risk-based methodology has evolved, its results have become less sensitive to changes in the key assumptions and weights used in the risk analysis model.[20] Furthermore, the indices that DHS uses to calculate the variable constituting the greatest portion of the risk analysis model—Consequences—are reasonable. However, limitations such as the absence of a method for measuring variations in vulnerability reduce the vulnerability element's value. Although DHS recognized and described the significance of Vulnerability in its FY 2006 model, the model DHS used for fiscal years 2007 and 2008 used a constant value of 1.0 in its formula, rather than measuring variations in vulnerability across states and urban areas.

DHS's Risk Analysis Model is Reasonable Because it Contains the Key Elements of Risk Assessment, Relies on Reasonable Indices to Measure Consequences, and is Less Sensitive to Changes in Variables

One measure of the reasonability of DHS's risk-based methodology is the extent to which DHS's risk analysis model provides a consistent method to assess risk. Risk assessment helps decision makers identify and evaluate potential risks facing key assets or missions so that countermeasures can be designed and implemented to prevent or mitigate the effects of the risks.[21] In a risk management framework, risk assessment is a function of Threat, Vulnerability, and Consequences, and the product of these elements is used to develop scenarios and help inform actions that are best suited to prevent an attack or mitigate vulnerabilities to a terrorist attack. Threat is the probability that a specific type of attack will be initiated against a particular target/class of targets, and analysis of threat-related data is a critical part of risk assessment. The Vulnerability of an asset is the probability that a particular attempted attack will succeed against a particular target or class of targets. It is usually measured against some set of standards, such as availability/predictability, accessibility, countermeasures in place, and target hardness (the material construction characteristics of the asset). The Consequences of a terrorist attack measures the adverse effects of a successful attack and may include many

[20] A model is sensitive when a model produces materially different results in response to small changes in its assumptions. Ideally, a model that accurately and comprehensively assesses risk would not be sensitive, and such a model exhibiting little sensitivity could be said to be more robust than a model with more sensitivity to changes in assumptions underlying the model.

[21] A countermeasure is any action taken or physical equipment used principally to reduce or eliminate one or more vulnerabilities.

forms, such as the loss of human lives, economic costs, and adverse impact on national security. The risk analysis model used by DHS is reasonable because it attempts to capture data on threats, vulnerabilities, and consequences—the three types of information used in evaluating risk.

Because DHS considered most areas of the country equally vulnerable to a terrorist attack given freedom of movement within the nation, DHS assigns vulnerability a constant value of 1.0 in the formula across all states and urban areas. Therefore, DHS's measurement of vulnerability and consequences is mainly a function of the seriousness of the consequences of a successful terrorist attack. Because the risk analysis model is consequences-driven, another measure of the model's overall reasonableness is the extent to which the indices used to calculate the consequences component of the model are reasonable. As previously described, the consequences component of the model is comprised of four indices – a Population Index, an Economic Index, a National Infrastructure Index, and a National Security Index – each assigned a different weight. These indices are generally reasonable.

Both the population and economic indices are calculated from data derived from reliable sources that are also publicly available, providing additional transparency for the model. For example, according to DHS officials, the fiscal year 2008 analysis used Gross Metropolitan Product (GMP) estimates prepared by the consulting firm Global Insight for the United States Conference of Mayors and the Council for the New American City that were published in January 2007, and reported on the GMP for 2005. In addition, the National Infrastructure Index focused on over 2,000 Tier 1and Tier 2 critical infrastructure/key resource assets identified by DHS's Office of Infrastructure Protection (IP). For both fiscal years 2007 and 2008, DHS used a collaborative, multi-step process to create the Tier 2 CIKR list. First, IP works with sector-specific agencies to develop criteria used to determine which assets should be included in the asset lists. Second, these criteria are vetted with the private-sector through sector-specific councils, who review the criteria and provide feedback to IP. Third, IP finalizes the criteria and provides it to the sector-specific agencies and State and Territorial Homeland Security Advisors (HSAs). Fourth, IP asks states to nominate assets within their jurisdiction that match the criteria. Fifth, assets nominated by states are reviewed by both the sector-specific agencies and IP to decide which assets should comprise the final Tier 2 list. For example, to identify the nation's critical energy assets, IP will work with the Department of Energy to determine which assets and systems in the energy sector would generate the most serious economic consequences to the Nation should they be destroyed or

disrupted. Further, in the fiscal year 2008 process, IP added a new, additional step to allow for the resubmission of assets for reconsideration if they are not initially selected for the Tier 2 list. In addition, the National Security Index comprises only a small fraction of the model – 5 percent – and has also evolved to include more precision, such as counting the number of military personnel instead of simply the presence or absence of military bases. To identify the nation's critical defense industrial bases, the Department of Defense analyzes the impact on current warfighting capabilities, recovery and reconstitution, threat, vulnerability, and consequences of possible facility disruption and destruction, and other aspects.

DHS's approach to calculating threat, which accounts for the remaining 20 percent of the model, also represents a measure of the model's overall reasonableness. DHS uses analytical judgments to categorize urban areas' threat, which ultimately determines the relative threat for each state and urban area. DHS has used written criteria to guide these judgments, and DHS provided us with the criteria used in both of these years for our review. The criteria are focused on threats from international terrorism derived from data on credible plots, planning, and threats from international terrorist networks, their affiliates, and those inspired by such networks. The criteria provided guidance for categorizing areas based on varying levels of both the credibility and the volume of threat reporting, as well as the potential targets of threats. Results of this process are shared with the DHS Undersecretary for Intelligence and Analysis, the FBI, and the National Counterterrorism Center, all of whom are afforded the opportunity to provide feedback on the placements. Additionally, DHS develops written threat assessments that indicate whether states are "high," "medium," or "low" threat states. States can provide threat information that they have collected to DHS, but in order for that information to affect a state's tier placement and threat level, the information must be relevant to international terrorism, according to DHS officials. We reviewed several examples of these assessments from 2007, which included key findings describing both identified and potential threats to the state. The classified assessments addressed potential terrorist threats to critical infrastructure in each of the 56 states and territories. However, DHS shared assessments only with state officials who had appropriate security clearances. According to DHS officials, states without officials with sufficient clearances will receive an unclassified version of their state's assessment for the fiscal year 2009 grant process. DHS is also developing a process by which they can share the threat assessments with UASI areas, including those UASI areas whose boundaries cross state lines; however, currently the assessments are

transmitted only to the DHS state representatives and state officials, and the states and representatives are responsible for sharing the information with the UASI areas, according to DHS officials.

Another measure of the overall reasonableness of DHS's risk analysis model is the extent to which the model's results change when the assumptions and values built into the model, such as weights of variables, change. A model is sensitive when a model produces materially different results in response to small changes in its assumptions. Ideally, a model that accurately and comprehensively assesses risk would not be sensitive, and such a model exhibiting little sensitivity could be said to be more robust than a model with more sensitivity to changes in assumptions underlying the model. A robust calculation or estimation model provides its users greater confidence in the reliability of its results. For both fiscal years 2007 and 2008, substantial changes had to be made to the weights of any of the indices used in the risk model to calculate state and urban area risk scores before there was any movement in or out of the top 7 (or Tier 1) ranked UASI areas. In other words, the model provides DHS with a level of assurance that the highest at-risk areas have been appropriately identified. While Tier 1 UASI areas were similarly robust in both FY 2007 and FY 2008, the sensitivity of Tier 2 UASI areas to changes in the weights of indices used to calculate risk scores was significant in FY 2007, but improved in FY 2008. In FY 2007, very small changes in the weights for the indices used to quantify risk (for Tier 2 UASI areas at the eligibility cut point) resulted in changes in eligibility; however, FY 2008 results are more robust, as eligibility of urban areas is much less sensitive to changes in the index weights in the FY2008 model than it was in the FY2007 model. Appendix III provides an in-depth description of the sensitivity of the model to specific changes in the relative weights of each index for Tier 1 and Tier 2 UASI areas.

Vulnerability Element of the Risk Analysis Model Has Limitations that Reduce Its Value

Although the methodology DHS uses is reasonable, the vulnerability element of the risk analysis model—as currently calculated by DHS—has limitations that reduce its value for providing an accurate assessment of risk. DHS considered most areas of the country equally vulnerable to a terrorist attack in the risk analysis model used for fiscal years 2007 and 2008 and assigned a constant value to vulnerability, which ignores geographic differences in the social, built, and natural environments across states and urban areas. Although DHS recognized and described the significance of vulnerability in its FY 2006 model, the model used for fiscal years 2007 and 2008 did not attempt to measure vulnerability. Instead, DHS considered most areas of the country equally vulnerable to a terrorist

attack due to the freedom of individuals to move within the nation. As a result, DHS did not measure vulnerability, but assigned it a constant value of 1.0 across all states and urban areas.

Last year we reported that DHS measured the vulnerability of an asset type as part of its FY2006 risk analysis.[22] DHS used internal subject matter experts who analyzed the general attributes of an asset type against various terrorist attack scenarios by conducting site vulnerability analyses on a sample of sites from the asset type in order to catalog attributes for the generic asset. These experts evaluated vulnerability by attack scenario and asset type pairs and assigned an ordinal value to the pair based on 10 major criteria. In describing its FY 2006 methodology, DHS acknowledged that because all attack types are not necessarily applicable to all infrastructures, the values for threat must be mapped against vulnerability to represent the greatest likelihood of a successful attack. DHS also acknowledged that vulnerability of an infrastructure asset was also a function of many variables and recognized that it did not have sufficient data on all infrastructures to know what specific vulnerabilities existed for every infrastructure, what countermeasures had been deployed, and what impact on other infrastructures each asset had. At that time, DHS noted it would require substantial time and resource investment to fully develop the capability to consistently assess and compare vulnerabilities across all types of infrastructure.

Vulnerability is a crucial component of risk assessment. An asset may be highly vulnerable to one mode of attack but have a low level of vulnerability to another, depending on a variety of factors, such as countermeasures already in place. According to our risk management framework, the vulnerability of an asset is the probability that a particular attempted attack will succeed against a particular target or class of targets. It is usually measured against some set of standards, such as availability/predictability, accessibility, countermeasures in place, and target hardness (the material construction characteristics of the asset). Each of these four elements can be evaluated based on a numerical assignment corresponding to the conditional probability of a successful attack. Additionally, other research has developed methods to measure vulnerability across urban areas. For example, one study described a quantitative methodology to characterize the vulnerability of U.S. urban centers to terrorist attack for the potential allocation of national and

[22] GAO-07-831R

regional funding to support homeland security preparedness and response in U.S. cities.[23] This study found that vulnerability varied across the country, especially in urban areas. The study noted that "place matters," and a one-size-fits all strategy ignores geographic differences in the social, built, and natural environments. Furthermore, in February of 2008 the Secretary of DHS said that "as we reduce our vulnerabilities, the vulnerabilities change as well." However, while earlier iterations of the risk analysis model attempted to measure vulnerability, DHS's risk analysis model now considers the states and urban areas of the country equally vulnerable to a terrorist attack and assigns a constant value to vulnerability, which ignores geographic differences.

Conclusions

In fiscal year 2008, DHS will distribute approximately $1.6 billion to states and urban areas through its Homeland Security Grant Program – a program that has already distributed approximately $20 billion over the past six years – to prevent, protect against, respond to, and recover from acts of terrorism or other catastrophic events. Given that risk management has been endorsed by the federal government as a way to direct finite resources to those areas that are most at risk of terrorist attack under conditions of uncertainty, it is important that DHS use a reasonable risk-based allocation methodology and risk analysis model as it allocates those limited resources.

DHS's risk-based allocation methodology and risk analysis model are generally reasonable tools for measuring relative risk within a given fiscal year, considering its use of a generally-accepted risk calculation formula; key model results' decreased sensitivity to incremental changes in the assumptions related to Tier 1 UASI grantees or the eligibility for Tier 2 UASI funding, the reliability of the consequence variable component indices, and its adoption of MSAs to calculate urban area footprints. However, the element of vulnerability in the risk analysis model could be improved to more accurately reflect risk. Vulnerability is a crucial component of risk assessment, and our work shows that DHS needs to measure vulnerability as part of its risk analysis model to capture variations in vulnerability across states and urban areas.

[23] See Society for Risk Analysis *Benchmark Analysis for Quantifying Urban Vulnerability to Terrorist Incidents* Piegorsch, Walter W., Susan L. Cutter and Frank Hardisty Risk Analysis Vol. 27, No. 6, 2007.

Recommendations

To strengthen DHS's methodology for determining risk, we are recommending that the Secretary of DHS take the following action:

- Instruct FEMA, I&A, and NPPD - DHS components each responsible for aspects of the risk-based methodology used to allocate funds under the Homeland Security Grant Program - to formulate a method to measure vulnerability in a way that captures variations across states and urban areas, and apply this vulnerability measure in future iterations of this risk-based grant allocation model.

Agency Comments

We requested comments on a draft of this report from the Secretary of Homeland Security, FEMA, I&A, and NPPD, or their designees. In email comments on the draft report, FEMA and I&A concurred with our recommendation that they formulate a method to measure vulnerability in a way that captures variations across states and urban areas and apply this vulnerability measure in future iterations of the risk-based grant allocation model. FEMA, I&A, and NPPD also provided technical comments, which we incorporated as appropriate.

We are sending copies of this correspondence to the appropriate congressional committees, and the Secretary of Homeland Security.

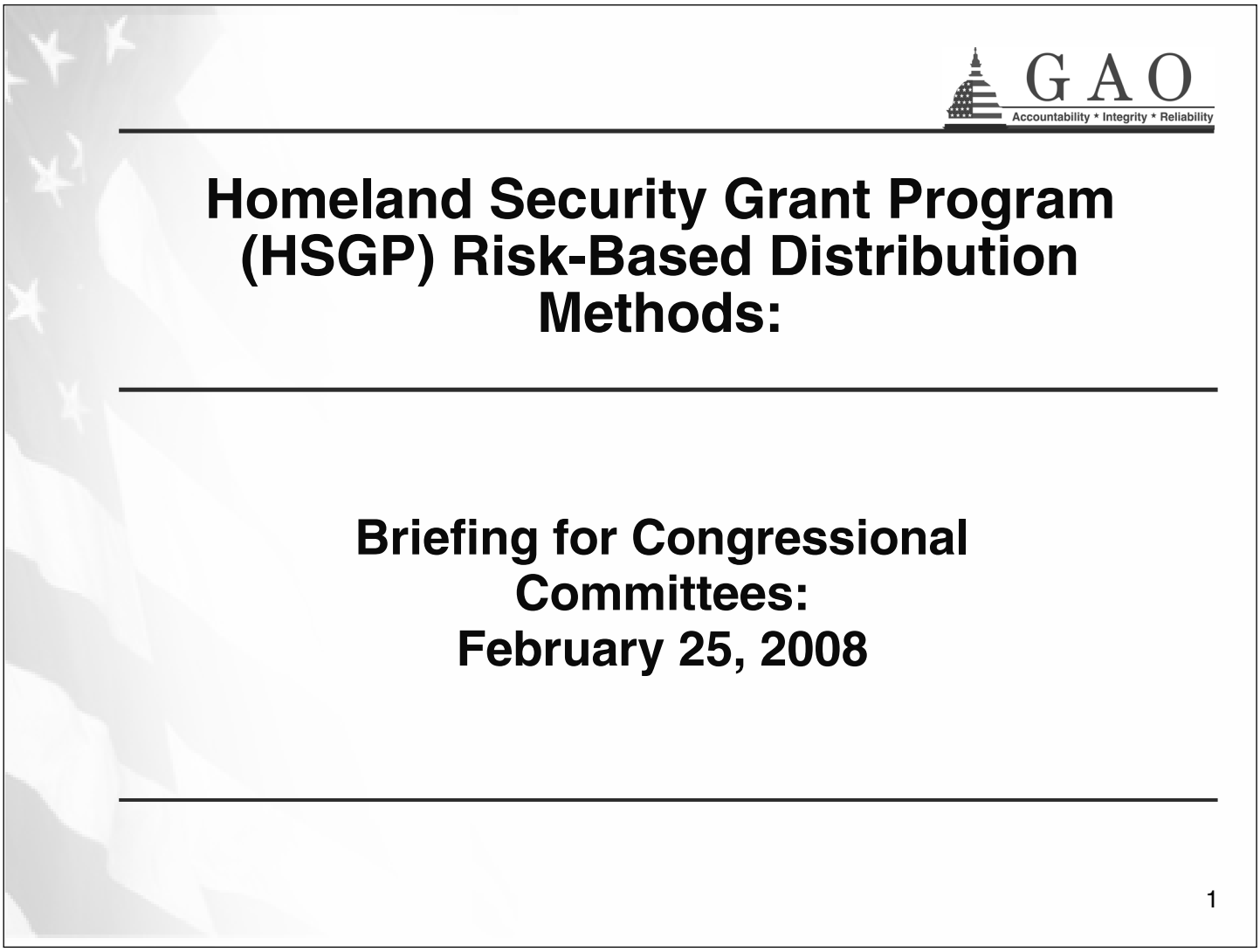
Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. For further information about this report, please contact William Jenkins, Jr., Director, GAO Homeland Security and Justice Issues Team, at (202)-512-8777 or at jenkinswo@gao.gov. GAO staff members who were major contributors to this report are listed in appendix IV.

William Jenkins, Jr., Director,
Homeland Security and Justice Issues Team

Appendix I: Briefing for Congressional Committees, February 11-25, 2008

For the third consecutive year, GAO has been mandated as part of DHS's annual appropriation to review and assess the HSGP's risk analysis model and risk-based allocation methodology for determining risk and distributing funds. We responded to the mandate in February 2008 by briefing the staffs of congressional committees on the results of this review. During the course of our engagement, we had ongoing dialog with DHS officials regarding the extent to which written criteria were used in the development of the Threat Index. At that time, officials from DHS's Office of Intelligence and Analysis stated that the criteria were not documented. As a result, we noted in the accompanying presentation slides that DHS's approach to measuring threat did not include specific, written criteria to use when determining the threat tiers into which states and urban areas are placed.

As part of GAO's agency protocols, we convened an exit conference with DHS officials which occurred on April 14, 2008. We provided them with a statement of facts to reflect the information gathered during our engagement. At this exit conference an official from the Office of Intelligence and Analysis said DHS had used criteria in 2007 and 2008 for categorizing cities and states based on threat, and in further discussions with DHS we were able to independently review these documents and confirm that such criteria were used in the development of the Threat Index, which is reflected in the letter above. However, we did not modify the accompanying presentation contained in this appendix.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Homeland Security Grant Program (HSGP) Risk-Based Distribution Methods:
Briefing for Congressional Committees:
February 25, 2008
1

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Introduction

According to the Department of Homeland Security (DHS), in fiscal year 2007:

- DHS provided approximately $1.7 billion to states and urban areas through its Homeland Security Grant Program (HSGP) to prevent, protect against, respond to, and recover from acts of terrorism or other catastrophic events. DHS plans to distribute about $1.6 billion for these grants in fiscal year 2008.
- The HSGP risk-based allocation process is used for the State Homeland Security Program (SHSP) and Urban Area Security Initiative (UASI).
- In addition, DHS used this same approach to allocate $655 million in fiscal year 2007 under the Infrastructure Protection Program.

2

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Objectives

In response to a legislative mandate and discussions with relevant congressional staff, we addressed the following questions:

1. What methodology did DHS use to allocate HSGP funds for fiscal years 2007 and 2008, including any changes DHS made to the eligibility and allocation processes for fiscal year 2008 and the placement of states and urban areas within threat tiers, and why?

2. How reasonable is DHS's methodology?

3

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Scope and Methodology

We analyzed DHS documents including the FY2007 and FY2008 risk analysis models, grant guidance, presentations, and interviewed DHS officials about:

- The HSGP grant determination process in FY07—and any changes to the FY08 process—including:
  - The process by which DHS's risk analysis model is used to estimate relative risk: Risk = Threat*(Vulnerability & Consequences);
  - How the effectiveness assessment process is conducted;
  - How final allocation decisions are made.
- DHS's methodology for ranking grantees by tiered groups and the impact of this ranking on funding allocations.

We did our work from September 2007 and February 2008, in accordance with generally accepted government accounting standards (GAGAS).

4

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Background:

We've reviewed this program for the last 3 years. In previous reviews we reported:

- DHS has adopted a process of "continuous improvement" to its methods for estimating risk and measuring applicants' effectiveness.
- Inherent uncertainty is associated with estimating risk of terrorist attack, requiring the application of policy and analytic judgments. The use of sensitivity analysis can help to gauge what effects key sources of uncertainty have on outcomes.

5

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Results in Brief

This year, in our review of DHS's allocation methodology, we found:

- For FY 2008, DHS is using the same 3-step process – Risk Analysis, Effectiveness Assessment, and Final Allocation decisions – that includes empirical analytical methods and policy judgments, to select eligible urban areas and allocate SHSP and UASI funds.
- Generally, DHS has constructed a reasonable methodology to assess risk and effectiveness and allocate funds within that given year. However, DHS could take an additional step to evaluate the reliability and validity of the peer review process.

6

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Overview of the Grant Determination Process for UASI and SHSP for FY 2007 and FY 2008.

In both years, DHS applied a 3-step process–using empirical analytical methods and policy judgments–to select eligible urban areas and allocate SHSP and UASI funds:

1. Use of a ***Risk Analysis*** formula – R = T*(V&C) – with the same indices and weights--except for the Population Index used.

2. Implementation of an ***Effectiveness Assessment***, including a peer review process, to assess and score the effectiveness of the proposed investments submitted by the eligible applicants.

3. Calculation of a ***Final Allocation*** of funds based on states and urban areas' risk scores as adjusted by their effectiveness scores.

7

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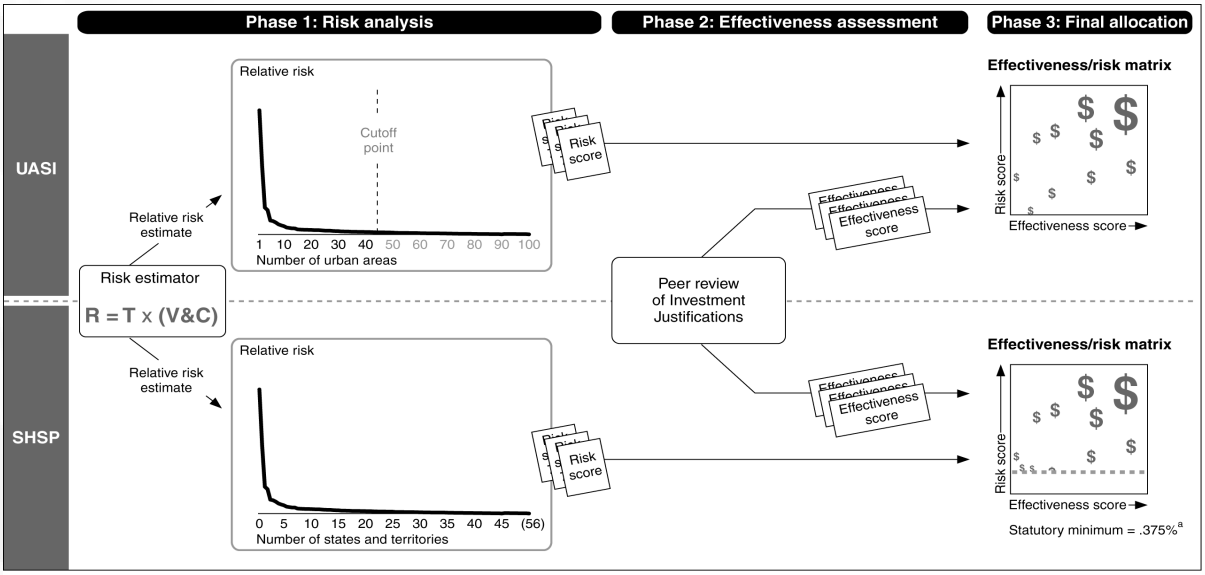
Overview of the Grant Allocation Methodology for UASI and SHSG



Source: GAO analysis of DHS documents and information provided in interviews.

[a] FY 2008 statutory minimum = 0.375% of all funds appropriated for SHSP and UASI.

8

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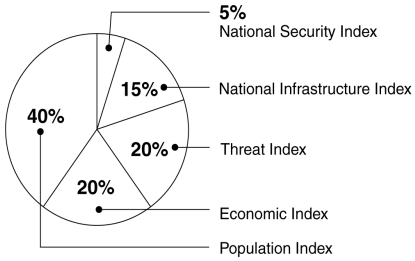
Risk Analysis: DHS's Model Used in Determining Relative Risk Scores

Risk = **Threat Index**
T

Data: On-going plot lines, credible reporting, relevant investigations to create threat tiers
Source: DHS Chief Intelligence Officer, intelligence community data



Source: DHS.

X **Vulnerability and Consequence Index**
V&C = (P+E+I+N)

Population Index *(P)*
Data: Total population (nighttime, commuter, visitor, military dependent) and population density (constrained to 50 percent impact)
Source: Census, LandScan, Smith Travel, and DOD

Economic Index *(E)*
Data: Gross Metropolitan Product (UASI)/percent GDP (state analysis)
Source: Global Insight/Department of Commerce, Bureau of Economic Statistics

National Infrastructure Index *(I)*
Data: # Tier I Assets (x3) + # Tier II Assets
Source: DHS/OIP, SSAs, States

National Security Index *(N)*
Data: Presence of Military Bases (yes/no) + # DIB + # intnl border crossings
Source: DOD, DHS/CBP

9

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Risk Analysis Model: Calculating *Threat*

Threat Index – Reflects the Intelligence Community's best assessment of areas of the country and potential targets most likely to be attacked.

- According to DHS officials, for FY2007 and FY2008, the DHS calculated the threat index by:
  1. Collecting qualitative threat information having a nexus with international terrorism or its affiliates (and not, for example, domestic terrorists or separatist groups);
  2. Analyzing the threat information to create threat assessments for states and urban areas;
  3. Empanelling intelligence experts to review the threat assessments and reach consensus as to the number of threat tiers and the placement of urban areas within threat tiers; and
  4. Assigning threat scores to states and each urban area based on their threat tier placement.

10

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Risk Analysis Model: Calculating *Threat (continued)*

DHS /HITRAC officials characterized the general approach to measuring threat as empanelling senior intelligence experts who:

- Consider threat information in four categories – detainee reporting, ongoing plot lines, credible reporting, and relevant investigations; and
- Use analytical judgment and discussion to reach consensus as to the number of threat tiers and the placement of urban areas within threat tiers.

- According to DHS officials, final threat assessments are approved by the Intelligence Community -- FBI, CIA, NCTC, DIA, the DHS Undersecretary of I&A and the Secretary of DHS.

11

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Risk Analysis Model: Calculating *Threat (continued)*

This general approach has no written criteria, and DHS program officials expressed concerns about their confidence in the existing threat information.

- The threat tiering system is a method for organizing the threat information for the grant risk calculation model. The application of threat data to the risk determination methodology is process of assigning numbers to qualitative data according to DHS officials.
- Given their concerns about the available threat data, DHS officials expressed limited confidence in the formula's ability to adequately represent threat (T).
- Consequently, threat has a weight of only 20% in the model used to determine relative risk.

12

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Risk Analysis Model: Calculating *Vulnerability & Consequence (V&C)*

- Population Index: this variable included nighttime population and military dependant populations for states and urban areas, based upon U.S. Census Bureau and Department of Defense inputs. In addition, for urban areas, population density, commuters, and visitors were also factored into this variable, using data from private entities.
- National Infrastructure Index: this variable focused on approximately 2,100 Tier I and Tier II critical infrastructure/key resource (CI/KR) assets that were identified by the DHS Office of Infrastructure Protection. Tier I assets or systems are those that if attacked could trigger major national or regional impacts similar to those experienced during Hurricane Katrina or 9/11. Tier II assets are other highly-consequential assets with potential national or regional impacts if attacked.
- Economic Index: this variable considered the economic value of the goods and services produced in either a state or an urban area. For states, this index was calculated using U.S. Department of Commerce data on their percentage contribution to Gross Domestic Product. For UASI urban areas, a parallel calculation of Gross Metropolitan Product was incorporated based on data from Global Insight.
- National Security Index: this variable considered the presence of three key national security factors: whether military bases are present in the state or urban area; how many critical defense industrial base facilities are located in the state or urban area; and the total number of people traversing international borders. Information on these inputs comes from the Department of Defense and DHS.

13

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Risk Analysis Model: Measuring *Vulnerability* & *Consequence (continued)*

Population Index –

- For FY 2007, Urban Areas were defined as: Center city boundary +10-mile radius.
- For FY 2008, DHS used Metropolitan Statistical Areas (MSAs) from the Census Bureau, as provided under the Implementing Recommendations of the 9/11 Commission Act of 2007.[a]
- Consequently, there were a number of changes in the rankings that were driven by the required change in FY2008 to use the MSAs, according to DHS officials.

[a] 6 U.S.C. § 601(5).

14

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Risk Analysis Model: Measuring *Vulnerability* & *Consequence (continued)*

National Infrastructure Index –

- Critical infrastructure assets are divided into 2 tiers that, if destroyed or disrupted, could cause significant casualties, major economic losses, or widespread/long-term disruptions to national well-being and governance capacity.
- Tier 2 includes the nation's highest consequence critical infrastructure and key resources across 17 sectors.
- Tier 1 is a small subset of Tier 2 and includes the most nationally significant assets/systems certain to produce at least two of four consequences:
  1. Prompt fatalities greater than 5,000;
  2. First-year economic impact of at least $75 billion;
  3. Mass evacuations with prolonged (6 months or more) absence;
  4. Loss of governance or mission execution disrupting multiple regions or critical infrastructure sectors for more than a week, resulting in a loss of necessary services to the public.

15

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National Infrastructure Index – Asset Identification Process

According to DHS, it used a collaborative, multi-step process to create the Tier 2 asset list

- Step 1: DHS's Infrastructure Protection office (IP) works with sector-specific agencies (SSAs) to develop criteria used to determine which assets should be placed in a threat tier
- Step 2: The criteria is vetted with private-sector companies through sector-specific councils who review the criteria and provide feedback to IP
- Step 3: IP finalizes the criteria list and provides the list to the sector-specific agencies
- Step 4: IP asks states to nominate assets within their jurisdiction that match the criteria
- Step 5: Nominated assets are reviewed by IP and the SSAs to decide which assets comprise the final Tier 2 list

IP has recently added a new process so SSAs can resubmit for reconsideration assets that are not initially selected for the list.

16

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Sensitivity of the risk analysis

In FY 2007, DHS had developed a greater understanding of the sensitivity of the risk model as a result of its changes to the model.

GAO's analysis of the FY 2007 model:

- It takes sizable changes to the weights of these indices used to quantify risk to change the areas that compose the Tier 1 list.
- For those urban areas ranked near the bottom of Tier 2 list, very small changes in the weights for the indices used to quantify risk can result in changes in eligibility.

According to DHS officials, there were a number of changes in the rankings, and these changes were driven by the required change in FY2008 to use MSAs.

17

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Effectiveness Assessment

- For fiscal year 2007 DHS assessed the applications submitted by states and eligible urban areas.
- DHS used a peer-review process to assess and score the effectiveness of proposed investments by:
  - Engaging the states in identifying and selecting peer reviewers,
  - Having peer reviewers individually score investments, and
  - Assigning peer reviewers to panels to make final effectiveness score determinations.

18

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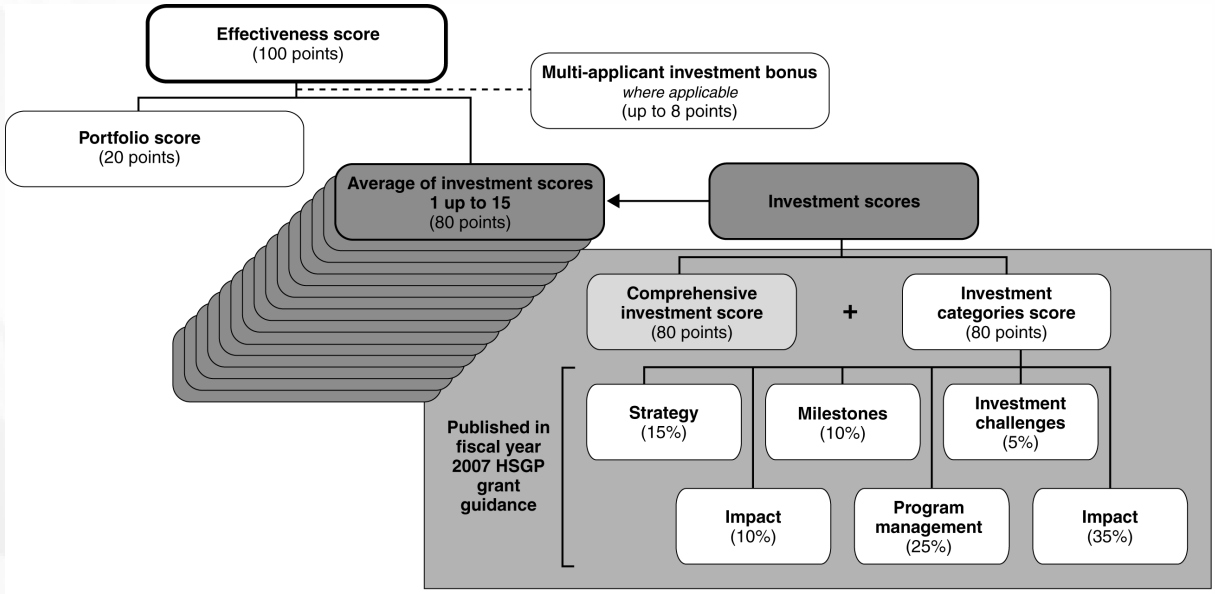
FY 2007 Effectiveness Assessment



Source: DHS.

19

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Effectiveness Assessment: Peer Review Process Quality Assurance and Inter-rater Reliability

As a quality control step, DHS analyzed the results of the peer review process to assess whether the process was affected by human bias.

- DHS analyzed all FY 2007 panels' scores and found no panel's average was more than 2 standard deviations from the mean.
- DHS concluded, from this finding, that their peer review process adequately mitigated human bias.

However, based on GAO's review of DHS documentation, the analysis DHS used did not apply a generally-accepted method to ensure inter-rater reliability.

- One way to effectively assess the potential for human bias is to have a sample of the same applications independently rated by multiple panels to provide a measure of inter-rater reliability.

20

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Final Allocation Process – FY 2007 Grants Based on Both Risk and Effectiveness Scores

DHS allocated funds based on the risk scores of states and urban areas, as adjusted by their effectiveness scores.

SHSP provided a minimum allocation, ensuring no state or territory's allocation falls below the minimum levels established by the USA PATRIOT Act.[a]

For UASI, DHS established maximum and minimum allocation to minimize variations in some urban areas' final allocations between years.

[a] For FY2007 this minimum was 0.75 percent of funds appropriated for SHSP for states and 0.25 percent for territories. FY 2008 statutory minimum = 0.375% of all funds appropriated for SHSP and UASI.

21

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Final Allocation Process – Ranking UASI Grantees by Tiered groups

- Fiscal year 2007, 45 eligible candidates were grouped into two tiers according to relative risk.
- Tiering was established from a policy judgment by DHS leadership, according to DHS grant officials.
- Tier I included the 6 highest risk areas; Tier II included the other 39 candidate areas ranked by risk.
  - **FY 2007 Tier I Urban Areas =** 6 Urban Areas, $410,795,000 allocated (55 percent of available funds).
  - **FY 2007 Tier II Urban Areas =** 39 Urban Areas, $336,105,000 allocated (45 percent of available funds).

22

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Final Allocation Process – Risk Estimates Used to Inform Eligibility Decisions for the UASI Grant Program—Fiscal Year 2008

60 eligible UASI areas in FY 2008:

- Tier I = 7 highest risk areas and eligible for 55 percent of available funds -- $429,896,500.
- Tier II = 53 areas (14 more than FY 2007) and eligible for 45 percent of available funds -- $351,733,500.

According to DHS officials, the expansion to 60 eligible UASI areas for FY2008 is a policy decision largely driven by two factors:

1. The new requirement that FEMA use MSAs;
2. The desire to remain consistent with the funding.

23

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Observations on the Reasonableness of the HSGP Grant Distribution Methodology

As inherent uncertainty is always associated with estimating risk of terrorist attack, policy and analytic judgments are required.

DHS has adopted an overall risk assessment approach that consists of risk factors, and in implementing this approach has made judgments in an attempt to address inherent uncertainties.

Generally, DHS has constructed a reasonable methodology to assess risk and effectiveness and allocate funds within that given year.

24

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Observations on the Reasonableness of the HSGP Grant Distribution Methodology *(continued)*

DHS could take an additional step to evaluate the reliability and validity of the peer review process.

- One way to effectively assess the potential for human bias is to have a sample of the same applications independently rated by multiple panels to provide a measure of inter-rater reliability.
- DHS identified resource constraints as a reason for not measuring inter-rater reliability.

25

Appendix II: Identifying Eligible Urban Areas

As we reported in 2007, DHS first had to determine the geographic boundaries or footprint of candidate urban areas within which data were collected to estimate risk in order to determine the urban areas that were eligible to receive UASI grants,. In fiscal year 2005, the footprint was limited to city boundaries (and did not include the 10-mile buffer zone). DHS chose to further redefine the footprint for fiscal year 2006, on the basis of comments from state and local governments. DHS took several steps to identify this footprint; these included:

- Identifying areas with population greater than 100,000 persons and areas (cities) that had any reported threat data during that past year. For fiscal year 2006, DHS started with a total of 266 cities.
- Combining cities or adjacent urban counties with shared boundaries to form single jurisdictions. For fiscal year 2006, this resulted in 172 urban areas.

Drawing a buffer zone around identified areas. A 10-mile buffer was then drawn from the border of that city/combined entity to establish candidate urban areas.[1] This area was used to determine what information was used in the risk analysis, and represents the minimum area that had to be part of the state/urban areas defined grant application areas.

According to DHS, for fiscal year 2006, it considered other alternatives such as a radius from a city center, although such a solution created apparent inequities among urban areas. DHS incorporated buffer zones at the suggestion of stakeholders, although this action resulted in making the analysis more difficult, according to a DHS official. In addition, DHS officials told us the steps taken to determine the footprint were based on the "best fit," as compared with other alternatives. DHS did not provide details on what criteria this comparison was based on.

A principal change between fiscal year 2007 and 2008 was the method used to identify the footprint, or boundaries, of UASI areas for the purposes of calculating relative risk. In fiscal year 2008, DHS used Metropolitan Statistical Areas (MSAs) from the Census Bureau, as required

[1] Buffer zone extensions were considered for chemical plants (25 miles) and nuclear power plants (50 miles). According to DHS officials, these distances were selected based on plume effects influenced by research conducted by the Department of Energy.

under the Implementing Recommendations of the 9/11 Commission Act of 2007.[2]

Table 1 below provide additional information listing the urban areas by its prior geographic area captures, and the areas captured by MSAs.

Table 1: Urban Areas Eligible for UASI Grants: Fiscal Year 2006 Footprint vs. 2008 by Metropolitan Statistical Areas (New UASI grantees are in italics)

State	Eligible urban area / Geographic area captured in the data count	Metropolitan Statistical Areas used in FY2008[a]
AZ	Phoenix Area: Chandler, Gilbert, Glendale, Mesa, Peoria, Phoenix, Scottsdale, Tempe, and a 10-mile buffer extending from the border of the combined area.	Phoenix-Mesa-Scottsdale, AZ Metropolitan Statistical Area Principal Cities: Phoenix, Mesa, Scottsdale, Tempe; Maricopa County, Pinal County.
		Tucson, AZ Metropolitan Statistical Area Principal City: Tucson; Pima County
CA	Anaheim /Santa Ana Area: Anaheim, Costa Mesa, Garden Grove, Fullerton, Huntington Beach, Irvine, Orange, Santa Ana, and a 10-mile buffer extending from the border of the combined area.	Santa Ana-Anaheim-Irvine, CA Metropolitan Division Orange County .
	Los Angeles /Long Beach Area: Burbank, Glendale, Inglewood, Long Beach, Los Angeles, Pasadena, Santa Monica, Santa Clarita, Torrance, Simi Valley, Thousand Oaks, and a 10-mile buffer extending from the border of the combined area.	Los Angeles-Long Beach-Santa Ana, CA Metropolitan Statistical Area Principal Cities: Los Angeles, Long Beach, Glendale, Irvine, Pomona, Pasadena, Torrance, Orange, Fullerton, Costa Mesa, Burbank, Compton, Carson, Santa Monica, Newport Beach, Tustin, Montebello, Monterey Park, Gardena, Paramount, Fountain Valley, Arcadia, Cerritos Los Angeles-Long Beach-Glendale, CA Metropolitan Division Los Angeles County.
	Sacramento Area : Elk Grove, Sacramento, and a 10-mile buffer extending from the border of the combined area.	Sacramento—Arden-Arcade—Roseville, CA Metropolitan Statistical Area Principal Cities: Sacramento, Arden-Arcade, Roseville, Folsom, Rancho Cordova, Woodland; El Dorado County, Placer County, Sacramento County, Yolo County.
	San Diego Area: Chula Vista, Escondido, and San Diego, and a 10-mile buffer extending from the border of the combined area.	San Diego-Carlsbad-San Marcos, CA Metropolitan Statistical Area Principal Cities: San Diego, Carlsbad, San Marcos, National City; San Diego County.

[2] 6 U.S.C. § 601(5).

State	Eligible urban area / Geographic area captured in the data count	Metropolitan Statistical Areas used in FY2008[a]
	Bay Area: Berkeley, Daly City, Fremont, Hayward, Oakland, Palo Alto, Richmond, San Francisco, San Jose, Santa Clara, Sunnyvale, Vallejo, and a 10-mile buffer extending from the border of the combined area.	San Francisco-San Jose-Bay Area: San Francisco-Oakland-Fremont, CA Metropolitan Statistical Area Principal Cities: San Francisco, Oakland, Fremont, Hayward, Berkeley, San Mateo, San Leandro, Redwood City, Pleasanton, Walnut Creek, South San Francisco, San Rafael; Oakland-Fremont-Hayward, CA Metropolitan Division Alameda County, Contra Costa County; San Francisco-San Mateo-Redwood City, CA Metropolitan Division; Marin County, San Francisco County, San Mateo County; San Jose-Sunnyvale-Santa Clara, CA Metropolitan Statistical Area ; Principal Cities: San Jose, Sunnyvale, Santa Clara, Mountain View, Milpitas, Palo Alto, Cupertino San Benito County, Santa Clara County.
		FY 2008 UASI area – Riverside -San Bernardino-Ontario, CA Metropolitan Statistical Area Principal Cities: Riverside, San Bernardino, Ontario, Victorville, Temecula, Chino, Redlands, Hemet, Colton; Riverside County, San Bernardino County.
CO	Denver Area: Arvada, Aurora, Denver, Lakewood, Westminster, Thornton, and a 10-mile buffer extending from the border of the combined area.	Denver-Aurora, CO Metropolitan Statistical Area Principal Cities: Denver, Aurora; Adams County, Arapahoe County, Broomfield County, Clear Creek County, Denver County, Douglas County, Elbert County, Gilpin County, Jefferson County, Park County.
CT		FY 2008 UASI area – Hartford -West Hartford-East Hartford, CT Metropolitan Statistical Area Principal Cities: Hartford, West Hartford, East Hartford, Middletown; Hartford County, Middlesex County, Tolland County.
		FY 2008 UASI area — Bridgeport-Stamford-Norwalk, CT Metropolitan Statistical Area Principal Cities: Bridgeport, Stamford, Norwalk, Danbury, Stratford; Fairfield County.

State	Eligible urban area / Geographic area captured in the data count	Metropolitan Statistical Areas used in FY2008[a]
DC	National Capital Region: National Capital Region and a 10-mile buffer extending from the border of the combined area.	Washington-Arlington-Alexandria, DC-VA-MD-WV Metropolitan Statistical Area Principal Cities: Washington, DC; Arlington, VA; Alexandria, VA; Reston, VA; Bethesda, MD; Gaithersburg, MD; Frederick, MD; Rockville, MD Bethesda-Gaithersburg-Frederick, MD Metropolitan Division Frederick County, Montgomery County; Washington-Arlington-Alexandria, DC-VA-MD-WV Metropolitan Division District of Columbia, DC; Calvert County, MD; Charles County, MD; Prince George's County, MD; Arlington County, VA; Clarke County, VA; Fairfax County, VA; Fauquier County, VA; Loudoun County, VA; Prince William County, VA; Spotsylvania County, VA; Stafford County, VA; Warren County, VA; Alexandria city, VA; Fairfax city, VA; Falls Church city, VA; Fredericksburg city, VA; Manassas city, VA; Manassas Park city, VA; Jefferson County, WV.
FL		
	Fort Lauderdale Area: Fort Lauderdale, Hollywood, Miami Gardens, Miramar, Pembroke Pines, and a 10-mile buffer extending from the border of the combined area.	Fort Lauderdale-Pompano Beach, FL Metropolitan Statistical Area Principal Cities: Fort Lauderdale, West Palm Beach, Pompano Beach, Boca Raton, Deerfield Beach, Boynton Beach, Delray Beach; Broward County, Palm Beach, County.
	Jacksonville Area: Jacksonville and a 10-mile buffer extending from the city border.	Jacksonville, FL Metropolitan Statistical Area Principal City: Jacksonville; Baker County, Clay County, Duval County, Nassau County, St. Johns County.
	Miami Area: Hialeah, Miami, and a 10-mile buffer extending from the border of the combined area.	Miami, FL Metropolitan Statistical Area Principal Cities: Miami, Miami Beach, Kendall; Monroe County, Miami-Dade.County.
	Orlando Area: Orlando and a 10-mile buffer extending from the city border.	Orlando-Kissimmee, FL Metropolitan Statistical Area Principal Cities: Orlando, Kissimmee; Lake County, Orange County, Osceola County, Seminole County.
	Tampa Area: Clearwater, St. Petersburg, Tampa, and a 10-mile buffer extending from the border of the combined area.	Tampa-St. Petersburg-Clearwater, FL Metropolitan Statistical Area Principal Cities: Tampa, St. Petersburg, Clearwater, Largo; Hernando County, Hillsborough County, Pasco County, Pinellas County.

State	Eligible urban area / Geographic area captured in the data count	Metropolitan Statistical Areas used in FY2008[a]
GA	Atlanta Area:	Atlanta-Sandy Springs-Marietta, GA Metropolitan Statistical Area
	Atlanta and a 10-mile buffer extending from the city border.	Principal Cities: Atlanta, Sandy Springs, Marietta; Barrow County, Bartow County, Butts County, Carroll County, Cherokee County, Clayton County, Cobb County, Coweta County, Dawson County, DeKalb County, Douglas County, Fayette County, Forsyth County, Fulton County, Gwinnett County, Haralson County, Heard County, Henry County, Jasper County, Lamar County, Meriwether County, Newton County, Paulding County, Pickens County, Pike County, Rockdale County, Spalding County, Walton County.
HI	Honolulu Area:	Honolulu, HI Metropolitan Statistical Area
	Honolulu and a 10-mile buffer extending from the city border.	Principal City: Honolulu Honolulu County
IL	Chicago Area:	Chicago-Naperville-Joliet, IL-IN-WI Metropolitan Statistical Area
	Chicago and a 10-mile buffer extending from the city border.	Principal Cities: Chicago, IL; Naperville, IL; Joliet, IL; Gary, IN; Elgin, IL; Arlington Heights, IL; Evanston, IL; Schaumburg, IL; Skokie, IL; Des Plaines, IL; Hoffman Estates, IL ; Chicago-Naperville-Joliet, IL Metropolitan Division; Cook County, DeKalb County, DuPage County, Grundy County, Kane County, Kendall County, McHenry County, Will County ,Gary, IN Metropolitan Division Jasper County, Lake County, Newton County, Porter County Lake County-Kenosha County, IL-WI Metropolitan Division Lake County, IL; Kenosha County, WI.
IN	Indianapolis Area:	Indianapolis-Carmel, IN Metropolitan Statistical Area
	Indianapolis and a 10-mile buffer extending from the city border.	Principal City: Indianapolis city (balance),[3] Carmel; Boone County, Brown County, Hamilton County, Hancock County, Hendricks County, Johnson County, Marion County, Morgan County, Putnam County, Shelby County.

[3] Indianapolis (balance) refers to the portion of the consolidated government of Indianapolis city and Marion County minus the separately incorporated places of Clermont, Crows Nest, Cumberland, Homecroft, Meridian Hills, North Crows Nest, Rocky Ripple, Spring Hill, Warren Park, Williams Creek, and Wynnedale within the consolidated city. It excludes the cities of Beech Grove, Lawrence, Southport, and Speedway which are within Marion County, but are not part of the consolidated city.

State	Eligible urban area / Geographic area captured in the data count	Metropolitan Statistical Areas used in FY2008[a]
KY	Louisville Area: Louisville and a 10-mile buffer extending from the city border.	FY 2008 UASI area — Louisville/Jefferson County, KY-IN Metropolitan Statistical Area Principal City: Louisville/Jefferson County (balance), KY,[4] Clark County, IN; Floyd County, IN; Harrison County, IN; Washington County, IN; Bullitt County, KY; Henry County, KY; Jefferson County, KY; Meade County, KY; Nelson County, KY; Oldham County, KY; Shelby County, KY; Spencer County, KY; Trimble County, KY.
LA	Baton Rouge Area: Baton Rouge and a 10-mile buffer extending from the city border.	FY 2008 UASI area — Baton Rouge, LA Metropolitan Statistical Area Principal City: Baton Rouge; Ascension Parish, East Baton Rouge Parish, East Feliciana Parish, Iberville Parish, Livingston Parish, Pointe Coupee Parish, St. Helena Parish, West Baton Rouge Parish, West Feliciana Parish.
	New Orleans Area: New Orleans and a 10-mile buffer extending from the city border.	New Orleans-Metairie-Kenner, LA Metropolitan Statistical Area Principal Cities: New Orleans, Metairie, Kenner; Jefferson Parish, Orleans Parish, Plaquemines Parish, St. Bernard Parish, St. Charles Parish, St. John the Baptist Parish, St. Tammany Parish.
MA	Boston Area: Boston, Cambridge, and a 10-mile buffer extending from the border of the combined area.	Boston-Cambridge-Quincy, MA-NH Metropolitan Statistical Area Principal Cities: Boston, MA; Cambridge, MA; Quincy, MA; Newton, MA; Framingham, MA; Waltham, MA; Peabody, MA Boston-Quincy, MA Metropolitan Division; Norfolk County, Plymouth County, Suffolk County Cambridge-Newton-Framingham, MA Metropolitan Division Middlesex County, Peabody, MA Metropolitan Division Essex County Rockingham County-Strafford County, NH Metropolitan Division Rockingham County, Strafford County.
MD	Baltimore Area: Baltimore and a 10-mile buffer extending from the city border.	Baltimore-Towson, MD Metropolitan Statistical Area Principal Cities: Baltimore, Towson; Anne Arundel County, Baltimore County, Carroll County, Harford County, Howard County, Queen Anne's County, Baltimore city.

[4] Louisville/Jefferson County (balance) refers to the portion of the consolidated government of Louisville city and Jefferson County minus the separately incorporated places. For a complete listing of jurisdictions, see OMB Bulletin No. 07-01, page 39 (Washington, DC. Dec. 16, 2006).

State	Eligible urban area / Geographic area captured in the data count	Metropolitan Statistical Areas used in FY2008[a]
MI	Detroit Area: Detroit, Sterling Heights, Warren, and a 10-mile buffer extending from the border of the combined area.	Detroit-Warren-Livonia, MI Metropolitan Statistical Area Principal Cities: Detroit, Warren, Livonia, Dearborn, Troy, Farmington Hills, Southfield, Pontiac, Taylor, Novi Detroit-Livonia-Dearborn, MI Metropolitan Division; Wayne County, Warren-Troy-Farmington Hills, MI Metropolitan Division Lapeer County, Livingston County, Macomb County, Oakland County, St. Clair County.
MN	Twin Cities Area: Minneapolis, St. Paul, and a 10-mile buffer extending from the border of the combined entity.	Minneapolis-St. Paul-Bloomington, MN-WI Metropolitan Statistical Area Principal Cities: Minneapolis, MN; St. Paul, MN; Bloomington, MN; Plymouth, MN; Eagan, MN; Eden Prairie, MN; Minnetonka, MN; Anoka County, MN; Carver County, MN; Chisago County, MN; Dakota County, MN; Hennepin County, MN; Isanti County, MN; Ramsey County, MN; Scott County, MN; Sherburne County, MN; Washington County, MN; Wright County, MN; Pierce County, WI; St. Croix County, WI.
MO	Kansas City Area: Independence, Kansas City (MO), Kansas City (KS), Olathe, Overland Park, and a 10-mile buffer extending from the border of the combined area.	Kansas City, MO-KS Metropolitan Statistical Area [5] Principal Cities: Kansas City, MO, Overland Park, KS, Kansas City, KS Franklin County, KS; Johnson County, KS; Leavenworth County, KS; Linn County, KS; Miami County, KS; Wyandotte County, KS; Bates County, MO; Caldwell County, MO; Cass County, MO; Clay County, MO; Clinton County, MO; Jackson County, MO; Lafayette County, MO; Platte County, MO; Ray County, MO.
	St. Louis Area: St. Louis and a 10-mile buffer extending from the city border.	St. Louis, MO-IL Metropolitan Statistical Area[6] Principal Cities: St. Louis, MO; St. Charles, MO; Bond County, IL; Calhoun County, IL; Clinton County, IL; Jersey County, IL; Macoupin County, IL; Madison County, IL; Monroe County, IL; St. Clair County, IL; Crawford County, MO (part—Sullivan city);[7] Franklin County, MO; Jefferson County, MO; Lincoln County, MO; St. Charles County, MO; St. Louis County, MO; Warren County, MO; Washington County, MO; St. Louis city, MO.

[5] The title is pursuant to P.L. 98-369, Section 611 (July 18, 1984); all counties specified in that legislation, plus five additional counties, qualify under the 2000 standards and are included in the definition of the Kansas City, MO-KS Metropolitan Statistical Area.

[6] The title and definition reflect the provisions of P.L. 98-473, Section 119A (October 12, 1984), plus six additional counties that qualify under the 2000 standards.

[7] Pursuant to P.L. 100-202, Section 530, the part of Sullivan city in Crawford County, MO was added to the St. Louis, MO-IL Metropolitan Statistical Area effective December 22, 1987.

State	Eligible urban area / Geographic area captured in the data count	Metropolitan Statistical Areas used in FY2008[a]
NC	Charlotte Area: Charlotte and a 10-mile buffer extending from the city border.	Charlotte-Gastonia-Concord, NC-SC Metropolitan Statistical Area Principal Cities: Charlotte, NC; Gastonia, NC; Concord, NC, Rock Hill, SC; Anson County, NC; Cabarrus County, NC; Gaston County, NC; Mecklenburg County, NC; Union County, NC; York County, SC.
NJ	Jersey City/Newark Area: Elizabeth, Jersey City, Newark, and a 10-mile buffer extending from the border of the combined area.	Newark Metropolitan Statistical Area Principal Cities: Newark, Edison, Union, Wayne; Bergen County, Essex County, Hudson County, Hunterdon County, Middlesex County, Monmouth County, Morris County, Ocean County, Passaic County, Somerset County, Sussex County , Union County , Pike County (PA).[8]
NV	Las Vegas Area: Las Vegas, North Las Vegas, and a 10-mile buffer extending from the border of the combined entity.	Las Vegas-Paradise, NV Metropolitan Statistical Area Principal Cities: Las Vegas, Paradise; Clark County.
NY		FY 2008 UASI area — Albany-Schenectady-Troy, NY Metropolitan Statistical Area Principal Cities: Albany, Schenectady, Troy; Albany County, Rensselaer County, Saratoga County, Schenectady County, Schoharie County.
	Buffalo Area: Buffalo and a 10-mile buffer extending from the city border.	Buffalo-Niagara Falls, NY Metropolitan Statistical Area Principal Cities: Buffalo, Cheektowaga, Tonawanda, Niagara Falls; Erie County, Niagara County.
	New York City Area: New York City, Yonkers, and a 10-mile buffer extending from the border of the combined area.	New York-Long Island, NY — Metropolitan Statistical Area Principal Cities: New York, White Plains; Bronx County, Kings County , Nassau County, New York County, Putnam County, Queens County, Richmond County, Rockland County, Suffolk County, Westchester County.
		FY 2008 UASI area — Rochester, NY Metropolitan Statistical Area Principal City: Rochester; Livingston County, Monroe County, Ontario County, Orleans County, Wayne County.
		FY 2008 UASI area — Syracuse, NY Metropolitan Statistical Area Principal City: Syracuse; Madison County, Onondaga County, Oswego County.

[8] According to FEMA, for the purposes of DHS' risk analysis, a policy decision was made to utilize the metropolitan division lines to parse out the New Jersey metropolitan divisions from the NYC MSA. The NJ metropolitan divisions of the NYC MSA were attributed to the Newark MSA.

State	Eligible urban area / Geographic area captured in the data count	Metropolitan Statistical Areas used in FY2008[a]
OH	Cincinnati Area: Cincinnati and a 10-mile buffer extending from the city border.	Cincinnati-Middletown, OH-KY-IN Metropolitan Statistical Area Principal Cities: Cincinnati, OH; Middletown, OH; Dearborn County, IN; Franklin County, IN; Ohio County, IN; Boone County, KY; Bracken County, KY; Campbell County, KY; Gallatin County, KY; Grant County, KY; Kenton County, KY; Pendleton County, KY; Brown County, OH; Butler County, OH; Clermont County, OH; Hamilton County, OH; Warren County, OH.
	Cleveland Area: Cleveland and a 10-mile buffer extending from the city border.	Cleveland-Elyria-Mentor, OH Metropolitan Statistical Area Principal Cities: Cleveland, Elyria, Mentor; Cuyahoga County, Geauga County, Lake County, Lorain County, Medina County.
	Columbus Area: Columbus and a 10-mile buffer extending from the city border.	Columbus, OH Metropolitan Statistical Area Principal City: Columbus; Delaware County, Fairfield County, Franklin County, Licking County, Madison County, Morrow County, Pickaway County, Union County.
	Toledo Area: Oregon, Toledo, and a 10-mile buffer extending from the border of the combined area.	FY 2008 UASI area — Toledo, OH Metropolitan Statistical Area Principal City: Toledo; Fulton County, Lucas County, Ottawa County, Wood County.
OK	Oklahoma City Area: Norman, Oklahoma City, and a 10-mile buffer extending from the border of the combined area.	Oklahoma City, OK Metropolitan Statistical Area Principal City: Oklahoma City; Canadian County, Cleveland County, Grady County, Lincoln County, Logan County, McClain County, Oklahoma County.
OR	Portland Area: Portland, Vancouver, and a 10-mile buffer extending from the border of the combined area.	Portland-Vancouver-Beaverton, OR-WA Metropolitan Statistical Area Principal Cities: Portland, OR; Vancouver, WA; Beaverton, OR; Hillsboro, OR; Clackamas County, OR; Columbia County, OR; Multnomah County, OR; Washington County, OR; Yamhill County, OR; Clark County, WA; Skamania County, WA.
PA	Philadelphia Area: Philadelphia and a 10-mile buffer extending from the city border.	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD Metropolitan Statistical Area Principal Cities: Philadelphia, PA; Camden, NJ; Wilmington, DE Camden, NJ Metropolitan Division; Burlington County, Camden County, Gloucester County 37964 Philadelphia, PA Metropolitan Division Bucks County, Chester County, Delaware County, Montgomery County, Philadelphia County Wilmington, DE-MD-NJ Metropolitan Division New Castle County, DE; Cecil County, MD; Salem County, NJ.

State	Eligible urban area / Geographic area captured in the data count	Metropolitan Statistical Areas used in FY2008[a]
	Pittsburgh Area: Pittsburgh and a 10-mile buffer extending from the city border.	Pittsburgh, PA Metropolitan Statistical Area Principal City: Pittsburgh; Allegheny County, Armstrong County, Beaver County, Butler County, Fayette County, Washington County, Westmoreland County.
PR		FY 2008 UASI area — San Juan-Caguas-Guaynabo, PR Metropolitan Statistical Area Principal Cities: San Juan, Caguas, Guaynabo Aguas Buenas Municipio, Aibonito Municipio, Arecibo Municipio, Barceloneta Municipio, Barranquitas Municipio, Bayamón Municipio, Caguas Municipio, Camuy Municipio, Canóvanas Municipio, Carolina Municipio, Cataño Municipio, Cayey Municipio, Ciales Municipio, Cidra Municipio, Comerío Municipio, Corozal Municipio, Dorado Municipio, Florida Municipio, Guaynabo Municipio, Gurabo Municipio, Hatillo Municipio, Humacao Municipio, Juncos Municipio, Las Piedras Municipio, Loíza Municipio, Manatí Municipio, Maunabo Municipio, Morovis Municipio, Naguabo Municipio, Naranjito Municipio, Orocovis Municipio, Quebradillas Municipio, Río Grande Municipio, San Juan Municipio, San Lorenzo Municipio, Toa Alta Municipio, Toa Baja Municipio, Trujillo Alto Municipio, Vega Alta Municipio, Vega Baja Municipio, Yabucoa Municipio.
RI		Providence-New Bedford-Fall River, RI-MA Metropolitan Statistical Area Principal Cities: Providence, RI; New Bedford, MA; Fall River, MA; Warwick, RI; Cranston, RI; Bristol County, MA; Bristol County, RI; Kent County, RI; Newport County, RI; Providence County, RI; Washington County, RI.
TN	Memphis Area: Memphis and a 10-mile buffer extending from the city border.	Memphis, TN-MS-AR Metropolitan Statistical Area Principal City: Memphis, TN; Crittenden County, AR; DeSoto County, MS; Marshall County, MS; Tate County, MS; Tunica County, MS; Fayette County, TN; Shelby County, TN; Tipton County, TN.
		FY 2008 UASI area – Nashville –Davidson, Murfreesboro, Franklin, TN Metropolitan Statistical Area Principal Cities: Nashville-Davidson (balance), [9] Murfreesboro, Franklin; Cannon County, Cheatham County, Davidson County, Dickson County, Hickman County, Macon County, Robertson County, Rutherford County, Smith County, Sumner County, Trousdale County, Williamson County, Wilson County.

[9] Nashville-Davidson (balance) refers to the portion of the consolidated government of Nashville city and Davidson County minus the separately incorporated places of Belle Meade, Berry Hill, Forest Hills, Goodlettesville, Lakewood, Oak Hill, and Ridgetop within the consolidated city.

State	Eligible urban area / Geographic area captured in the data count	Metropolitan Statistical Areas used in FY2008[a]
TX		FY 2008 UASI area — Austin-Round Rock, TX Metropolitan Statistical Area Principal Cities: Austin, Round Rock; Bastrop County, Caldwell County, Hays County, Travis County, Williamson County.
	Dallas/Fort Worth/Arlington Area: Arlington, Carrollton, Dallas, Fort Worth, Garland, Grand Prairie, Irving, Mesquite, Plano, and a 10-mile buffer extending from the border of the combined area.	Dallas-Fort Worth-Arlington, TX Metropolitan Statistical Area Principal Cities: Dallas, Fort Worth, Arlington, Plano, Irving, Carrollton, Denton, Richardson, McKinney Dallas-Plano-Irving, TX Metropolitan Division; Collin County, Dallas County, Delta County, Denton County, Ellis County, Hunt County, Kaufman County, Rockwall County Fort Worth-Arlington, TX Metropolitan Division Johnson County, Parker County, Tarrant County, Wise County.
		El Paso, TX Metropolitan Statistical Area Principal City: El Paso; El Paso County.
	Houston Area: Houston, Pasadena, and a 10-mile buffer extending from the border of the combined entity.	Houston-Sugar Land-Baytown, TX Metropolitan Statistical Area Principal Cities: Houston, Sugar Land, Baytown, Galveston; Austin County, Brazoria County, Chambers County, Fort Bend County, Galveston County, Harris County, Liberty County, Montgomery County, San Jacinto County, Waller County.
	San Antonio Area: San Antonio and a 10-mile buffer extending from the city border.	San Antonio, TX Metropolitan Statistical Area Principal City: San Antonio; Atascosa County, Bandera County, Bexar County, Comal County, Guadalupe County, Kendall County, Medina County, Wilson County.
UT		FY 2008 UASI area — Salt Lake City, UT Metropolitan Statistical Area Principal City: Salt Lake City; Salt Lake County, Summit County, Tooele County.
VA		FY 2008 UASI area — Richmond, VA Metropolitan Statistical Area Principal City: Richmond; Amelia County, Caroline County, Charles City County, Chesterfield County, Cumberland County, Dinwiddie County, Goochland County, Hanover County, Henrico County, King and Queen County, King William County, Louisa County, New Kent County, Powhatan County, Prince George County, Sussex County, Colonial Heights city, Hopewell city, Petersburg city, Richmond city.

State	Eligible urban area / Geographic area captured in the data count	Metropolitan Statistical Areas used in FY2008[a]
		Norfolk- Virginia Beach-Newport News, VA-NC Metropolitan Statistical Area Principal Cities: Virginia Beach, VA; Norfolk, VA; Newport News, VA; Hampton, VA; Portsmouth, VA; Currituck County, NC; Gloucester County, VA; Isle of Wight County, VA; James City County, VA; Mathews County, VA; Surry County, VA; York County, VA; Chesapeake city, VA; Hampton city, VA; Newport News city, VA; Norfolk city, VA; Poquoson city, VA; Portsmouth city, VA; Suffolk city, VA; Virginia Beach city, VA; Williamsburg city, VA.
WA	Seattle Area: Seattle, Bellevue, and a 10-mile buffer extending from the border of the combined area.	Seattle-Tacoma-Bellevue, WA Metropolitan Statistical Area Principal Cities: Seattle, Tacoma, Bellevue, Everett, Kent, Renton Seattle-Bellevue-Everett, WA Metropolitan Division; King County, Snohomish County Tacoma, WA Metropolitan Division Pierce County.
WI	Milwaukee Area: Milwaukee and a 10-mile buffer extending from the city border.	Milwaukee-Waukesha-West Allis, WI Metropolitan Statistical Area Principal Cities: Milwaukee, Waukesha, West Allis; Milwaukee County, Ozaukee County, Washington County, Waukesha County.

Source: GAO analysis of DHS and OMB — a OMB Bulletin No. 07-01, announcing updates to metropolitan and micropolitan statistical areas as of December 2006, based on the Census Bureau's July 1, 2004 and July 1, 2005 population estimates.

Appendix III: DHS's Model is Robust for Tier 1 UASI Areas

Population Index: Neither maximizing nor minimizing the weight of the Population Index resulted in the movement of an area into or out of Tier 1 for either FY 2007 or FY 2008.

Economic Index: In FY 2007, minimizing the weight of the Economic Index had no effect on Tier 1 placement, but increasing the weight of the Economic Index by 12.8% resulted in a new area moving into Tier 1, displacing an area that had previously been ranked in the top 7. In FY 2008, lowering the weight of the Economic Index by 15.25% resulted in a new area moving into the top 7 ranked areas, displacing an area that had been previously ranked as Tier 1, but maximizing the weight of the Economic Index had no effect on Tier 1 placement.

National Infrastructure Index: In FY 2007, maximizing the weights of the National Infrastructure Index did not result in any change in those areas designated Tier 1, but lowering the National Infrastructure Index by 5.53% resulted in a new area moving into the Tier 1 areas, displacing an area that had been previously ranked as Tier 1. In FY 2008, increasing the weight of the National Infrastructure Index by 4.68% resulted in a new area moving into the top 7 ranked areas, displacing an area that had been previously ranked as Tier 1. Similarly, lowering the National Infrastructure Index by 15% resulted in a new area moving into the Tier 1 areas.

National Security Index: In FY 2007, minimizing the weight of the National Security Index also did not result in any change in those areas designated Tier 1, but increasing the National Security Index by 7.5% resulted in a new area moving into Tier 1, displacing an area that had been previously ranked as Tier 1. In FY 2008, lowering the weight of the National Security Index by 3.73% resulted in a new area moving into the top 7 ranked areas, displacing an area that had been previously ranked as Tier 1. Increasing the National Security Index by 10% resulted in a new area moving into Tier 1, also displacing an area that had been previously ranked as Tier 1.

Urban Area Sensitivity to Changes in Consequence Index Weights is Reduced in FY 2008 for Funding Eligibility

While Tier 1 areas were similarly robust in both FY 2007 and FY 2008, the sensitivity of Tier 2 areas to changes in the weights of indices used to calculate risk scores was significant in FY 2007, but improved in FY 2008. In FY 2007, very small changes in the weights for the indices used to quantify risk for Tier 2 urban areas at the eligibility cut point resulted in changes in eligibility; however, FY 2008 results are more robust, as eligibility of urban areas is much less sensitive to changes in the index weights in the FY2008 model than it was in the FY2007 model.

Population Index: In FY 2007, decreasing the weight of the Population Index by 0.4% or increasing the weight of the Population Index by 4% resulted in one area displacing another area with regard to eligibility. However, neither maximizing nor minimizing the Population Index resulted in one area displacing another area with regard to eligibility in FY 2008.

Economic Index: In FY 2007, lowering the weight of the Economic Index by 0.24% or increasing the weight of the Economic Index by 2.4% resulted in one area displacing another area with regard to eligibility. By contrast, FY 2008 required an increase in the weight of the Economic Index by 12.33% or a decrease in the weight of the Economic Index by 10.48% resulted in one area displacing another area with regard to eligibility.

National Infrastructure Index: In FY 2007, changing the weight for the National Infrastructure Index by 1.58% (either increase or decrease) resulted in one area displacing another area with regard to eligibility, while the FY 2008 National Infrastructure Index required an increase in the weight by 5.67% or a decrease the weight by 4.54% to result in one area displacing another area with regard to eligibility.

National Security Index: In FY 2007, increasing the weight for the National Security Index by 0.08% resulted in one area displacing another area with regard to eligibility, but FY 2008 required an increase in the weight for the National Security Index by 2.34% or a decrease in the weight of the National Security Index by 1.37% to result in one area displacing another area with regard to eligibility.

Appendix IV: Contacts and Staff Acknowledgments

For further information about this statement, please contact William O. Jenkins Jr., Director, Homeland Security and Justice Issues, on (202) 512-8777 or jenkinswo@gao.gov.

In addition to the contact named above, the following individuals also made major contributors to this report: GAO Homeland Security and Justice Issues Team—Chris Keisling, Assistant Director; John Vocino, Analyst-in-Charge; Orlando Copeland and Michael Blinde, Analysts; Linda Miller and Adam Vogt, Communications Analysts. Other major contributors to this report include: GAO Applied Methodology and Research Team—Chuck Bausell, Jr., Economist, and Virginia Chanley; and GAO Office of General Counsel—Frances Cook.

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