



November 2023

DEPARTMENT OF HOMELAND SECURITY

Reporting on Border Security Metrics Could Be Improved

Accessible Version

GAO Highlights

Highlights of [GAO-24-106277](#), a report to congressional committees

Why GAO Did This Study

The U.S. has approximately 6,000 miles of land borders, 95,000 miles of coastline, and more than 300 ports of entry where travelers and cargo are inspected. Securing U.S. border areas is a key part of DHS's mission. Its ability to measure border security activities is essential to managing its responsibilities effectively.

The 2017 NDAA requires DHS to report annually on 43 border security metrics. The act also includes a provision for GAO, within 270 days of receipt of the first report and biennially for the following 10 years, to review and report on DHS's report.

GAO issued its initial report in March 2019. This third report evaluates DHS's 2021 *Border Security Metrics Report* compared to its 2019 report. Specifically, this report assesses DHS's 2021 report for (1) progress since 2019 in reporting the metrics outlined in the 2017 NDAA and engagement with its components and Congress on the report, and (2) efforts to improve the quality of information in DHS's 2021 report. To do this, GAO assessed the methodology and data in DHS's report, analyzed DHS's use of statistical models, and interviewed officials from DHS offices and components involved in developing the metrics.

What GAO Recommends

GAO is making four recommendations, including that DHS engage with components and Congress to more fully report border security metrics; assess its statistical model of deterrence; and update the model, as appropriate. DHS concurred with these recommendations.

View [GAO-24-106277](#). For more information, contact Rebecca Gambler at (202) 512-8777 or GamblerR@gao.gov.

November 2023

DEPARTMENT OF HOMELAND SECURITY

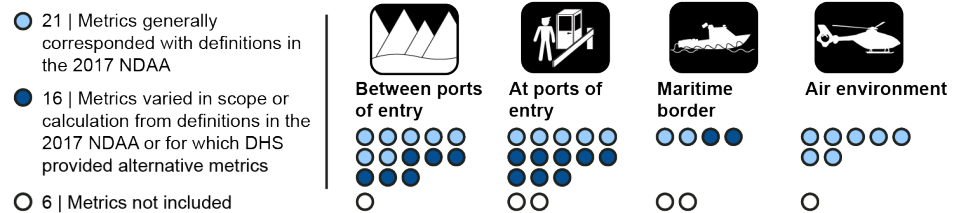
Reporting on Border Security Metrics Could Be Improved

What GAO Found

The National Defense Authorization Act for Fiscal Year 2017 (2017 NDAA) requires the Department of Homeland Security (DHS) to develop an annual report containing 43 specific metrics to measure the effectiveness of border security. In its 2021 *Border Security Metrics Report*, DHS reported on 37 of 43 metrics, the same set of metrics in DHS's 2019 report. As shown below, GAO found that 21 of the 37 metrics in the 2021 report generally corresponded with their definitions in the 2017 NDAA—three more than in its 2019 report.

Department of Homeland Security's (DHS) Reporting on the 43 Metrics Required by the National Defense Authorization Act for Fiscal Year 2017 (2017 NDAA)

Metrics included in DHS's 2021 *Border Security Metrics Report* by domain



Source: GAO analysis of DHS's 2021 *Border Security Metrics Report*, GAO icons. | GAO-24-106277

Accessible Data for Department of Homeland Security's (DHS) Reporting on the 43 Metrics Required by the National Defense Authorization Act for Fiscal Year 2017 (2017 NDAA)

Metrics included in DHS's 2021 *Border Security Metrics Report* by domain

- 21 | Metrics generally corresponded with definitions in the 2017 NDAA
- 16 | Metrics varied in scope or calculation from definitions in the 2017 NDAA or for which DHS provided alternative metrics
- 6 | Metrics not included

Category	Metrics generally corresponded with definitions in the 2017 NDAA	Metrics varied in scope or calculation from definitions in the 2017 NDAA or for which DHS provided alternative metrics	Metrics not included
Between ports of entry	7	6	1
At ports of entry	5	8	2
Maritime border	2	2	2
Air environment	7	0	1

Source: GAO analysis of DHS's 2021 *Border Security Metrics Report*, GAO icons. | GAO-24-106277

DHS may be missing opportunities to fully report the metrics and improve the usefulness of the report. DHS components collect the data that underlie the metrics, but GAO found that in some cases, DHS did not fully report available data. For example, DHS reported data on passenger inspections, but did not

report available data on cargo and commercial traffic, as outlined in the 2017 NDAA. By engaging with DHS components that collect relevant data, DHS could more fully report the metrics as defined by the 2017 NDAA. Additionally, DHS did not generally provide periodic briefings to Congress to help refine its metrics reporting, as its 2021 report states it would do. GAO identified instances where such engagement could help DHS identify next steps and address challenges it has faced reporting metrics. Such engagement could also help DHS ensure the information it reports is useful to Congress.

DHS improved the quality of some information in its 2021 report by implementing a prior GAO recommendation to include measures of statistical uncertainty for all metrics that rely on its statistical model. Implementing GAO's remaining prior recommendations to develop and implement a process to systematically review the reliability of data and then communicating relevant limitations would position DHS to maximize the quality of information. It would also provide Congress and the public with contextual information needed to evaluate the metrics.

DHS uses a statistical model of deterrence—the rate at which individuals who are apprehended attempting to cross the border decide not to make another attempt—to report three metrics related to unlawful entries. GAO found that DHS did not assess and update its deterrence model between when it was developed in 2016 and the 2021 report. However, DHS data show that aspects of the population of individuals attempting to unlawfully cross the border have changed, including by volume and country of origin. Those changes increase the risk that the deterrence model is no longer as reflective of current border conditions.

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Abbreviations

AMO	Air and Marine Operations
CBP	U.S. Customs and Border Protection
DHS	Department of Homeland Security
IDA	Institute for Defense Analyses
2017 NDAA	National Defense Authorization Act for Fiscal Year 2017
OFO	Office of Field Operations
OIS	Office of Immigration Statistics

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November 13, 2023

The Honorable Gary C. Peters
Chairman
The Honorable Rand Paul, M.D.
Ranking Member
Committee on Homeland Security and Governmental Affairs
United States Senate

The Honorable Mark E. Green, M.D.
Chairman
The Honorable Bennie G. Thompson
Ranking Member
Committee on Homeland Security
House of Representatives

Securing the nation's borders against illegal entries, smuggling of drugs and contraband, and terrorist activities is a key part of the Department of Homeland Security's (DHS) mission. According to DHS, the U.S. has approximately 6,000 miles of land borders, 95,000 miles of coastline, and 328 ports of entry.¹ DHS's ability to measure border security inputs, outputs, and outcomes is essential for the department to make evidence-based decisions about resource allocation and manage its border security responsibilities effectively. In our prior work, we have reported on the need for DHS to improve its measures for assessing its border security efforts.²

The National Defense Authorization Act for Fiscal Year 2017 (2017 NDAA) requires DHS to develop an annual report containing 43 specific metrics to measure the effectiveness of border security between ports of entry, at ports of entry, at the maritime border, and with respect to the air

¹Ports of entry are officially designated facilities (seaports, airports or land border locations) that provide for the controlled entry into, or departure from, the U.S.

²See, for example, GAO, *Northern Border Security: CBP Identified Resource Challenges but Needs Performance Measures to Assess Security Between Ports of Entry*, [GAO-19-470](#) (Washington, D.C.: June 26, 2019); and *Coast Guard: Actions Needed to Enhance Performance Information Transparency and Monitoring*, [GAO-18-13](#) (Washington, D.C.: Oct. 27, 2017).

environment.³ These metrics span several DHS components, and the law requires DHS to consult with the heads of appropriate DHS components and to ensure that it uses authoritative sources to develop the metrics.⁴ DHS is required to provide the report to the appropriate congressional committees and the Comptroller General. As of October 2023, DHS has issued six *Border Security Metrics Reports* in response to the 2017 NDAA reporting requirement. This report focuses on DHS's fifth report, the 2021 *Border Security Metrics Report*, which DHS issued in April 2022.⁵

In addition, the 2017 NDAA includes a provision for us to analyze the suitability and statistical validity of the data and methodology in DHS's first report and complete biennial reviews for the following 10 years.⁶ As part of our review, we are to, as appropriate, include recommendations on improvements needed to the metrics and the feasibility of other suitable metrics. We met the requirement to issue our first assessment of DHS's first report in March 2019.⁷ We found that DHS reported on 35 of the 43 metrics called for by the NDAA and generally used quality information in those metrics, but did not identify some data limitations. We made four recommendations to improve the quality of the information presented in the *Border Security Metrics Report*. DHS agreed with our recommendations.

³Pub. L. No. 114-328, div. A, title X, subtitle G, § 1092, 130 Stat. 2000, 2429-36 (2016) (classified at 6 U.S.C. § 223). In particular, see 6 U.S.C. § 223(b), (c), (d), (e). The 2017 NDAA refers to the fourth domain (air environment) as "Air and Marine security metrics in the land domain," which it defines as aviation assets and operations of Air and Marine Operations. 6 U.S.C. § 223(e).

⁴DHS is also required to consult or work with other relevant agencies, as appropriate.

⁵Department of Homeland Security, *Border Security Metrics Report: 2021* (Washington, D.C.: Apr. 27, 2022). The 2021 report responds to the reporting requirement for fiscal year 2021 and contains data through fiscal year 2020. In prior *Border Security Metrics Reports*, DHS used "fiscal year" to refer to the report, but did not do so for the 2021 report. For the purposes of this report, we refer to all *Border Security Metrics Reports* by the year indicated by DHS in the title.

⁶6 U.S.C. § 223(g)(2). This provision requires that GAO conduct a review and submit a report to Congress within 270 days of receipt of DHS's first report, and biennially for the following 10 years with respect to every other DHS report.

⁷GAO, *Border Security: DHS Should Improve the Quality of Unlawful Border Entry Information and Other Metric Reporting*, [GAO-19-305](#) (Washington, D.C.: Mar. 21, 2019).

We issued our second assessment of DHS's third report (known as the 2019 report) in November 2021.⁸ We found that DHS had implemented one of our recommendations by conveying the sensitivity of key assumptions for the statistical model it uses to calculate certain metrics, but had not yet implemented our other three recommendations. We discuss the status of DHS's actions to address our recommendations later in this report.

This report assesses DHS's 2021 *Border Security Metrics Report* compared to its 2019 report.⁹ Specifically, it assesses DHS's 2021 report for (1) progress since 2019 in reporting the metrics as outlined in the 2017 NDAA and engaging with its components and Congress, and (2) efforts to improve the quality of information. This report also provides information on other metrics we have identified in our reports since 2021 that may be used to measure the effectiveness of border security. Appendix I contains a description of these other metrics.

To address our first objective on DHS's progress since 2019 in reporting the metrics as outlined in the 2017 NDAA in its 2021 *Border Security Metrics Report*, we compared DHS's 2021 report to its 2019 report. We compared information in these two DHS reports.¹⁰ Through this comparison, we identified the metrics that DHS included and omitted from each report and how they had changed since the 2019 report. For metrics DHS included in its 2021 report, we identified key differences in the scope or methodology from the 2019 report. Further, we assessed how the metrics DHS included were similar to, or different from (i.e., corresponded to), the metrics as defined in the 2017 NDAA. As part of this assessment, we leveraged information from our prior assessment of DHS's 2019 report.¹¹ Where we identified changes to the scope or methodology of the reported metrics or clear differences between the metrics DHS reported and those defined in the NDAA, we obtained perspectives from DHS officials to determine the reasons.

⁸GAO, *Border Security Metrics: Progress Made, but DHS Should Take Additional Steps to Improve Information Quality*, [GAO-22-104651](#) (Washington, D.C.: Nov. 16, 2021).

⁹This report does not assess DHS's 2022 *Border Security Metrics Report*, which the department issued in July 2023.

¹⁰To identify any additional changes that may have occurred in the 2020 *Border Security Metrics Report*, but not the 2021 report, we also reviewed the 2020 report.

¹¹[GAO-22-104651](#).

Additionally, we analyzed documentation and interviewed DHS officials regarding their efforts to improve the reporting of metrics as outlined in the 2017 NDAA, including through engagement with DHS components and Congress. We interviewed U.S. Customs and Border Protection (CBP) officials and reviewed documentation to obtain information on a possible alternative approach that DHS is considering to model unobserved events and report unlawful entry metrics.¹² To assess engagement with DHS components, we interviewed officials from the Office of Immigration Statistics (OIS), CBP, and the U.S. Coast Guard.¹³ As part of these interviews, we sought to understand the extent of their communication while developing the *Border Security Metrics Report*.

To further understand the engagement that officials described, we analyzed how OIS communicated with CBP to request data for the 2021 *Border Security Metrics Report*. We assessed this information against OIS's most recent strategic plan and 2017 NDAA requirements to understand OIS's role in developing the report.¹⁴ To assess DHS's engagement with Congress, we analyzed documentation from DHS to Congress regarding the *Border Security Metrics Report*, spoke with congressional staff, and interviewed DHS officials on the extent they held briefings with Congress. We further compared this information against the 2021 *Border Security Metrics Report*, DHS's directive on information quality, and guidance implementing that directive.¹⁵ In addition, we compared this information against the principle related to using quality information in *Standards for Internal Control in the Federal Government*.¹⁶

To address our second objective on DHS's efforts to improve the quality of information used in its metrics, we first compared information on the

¹²Some of the metrics required by the 2017 NDAA necessitate advanced statistical methods because they involve estimating unobserved events, such as the number of undetected unlawful entries. These include certain metrics related to unlawful entries between ports of entry that we discuss later in this report.

¹³We interviewed CBP officials from the Office of Field Operations, Air and Marine Operations, and U.S. Border Patrol.

¹⁴U.S. Department of Homeland Security, Office of Policy, Office of Immigration Statistics, *Strategic Plan Fiscal Years 2016-2020* (Sept. 2016). Pub. L. No. 114-328, § 1092, 130 Stat. at 2429-36 (classified at 6 U.S.C. § 223).

¹⁵Department of Homeland Security, *Information Quality*, Directive 139-02 (Washington, D.C.: Nov. 21, 2019); and *Information Quality Implementation*, Instruction 139-02-001 (Washington, D.C.: Nov. 27, 2019).

¹⁶*Standards for Internal Control in the Federal Government*, [GAO-14-704G](#) (Washington, D.C.: Sept. 10, 2014).

unlawful entry metrics in the 2021 *Border Security Metrics Report* to the 2019 report. We analyzed changes to information related to the statistical model DHS used to estimate these metrics and interviewed OIS officials regarding the changes. Based on our analysis, we assessed DHS's progress in implementing the recommendation from our March 2019 report related to conveying statistical uncertainty of the unlawful entry metrics.¹⁷

Additionally, we analyzed the code files underlying a separate statistical model from the one described above.¹⁸ DHS uses this model to estimate a deterrence rate, which the department's broader statistical model for estimating unlawful entry metrics requires. We identified changes DHS made to the code it used for the 2021 *Border Security Metrics Report*. We interviewed OIS and CBP officials to obtain information on their efforts to assess, update, or replace the deterrence model. We compared this information to statistical principles and our key practices on artificial intelligence, which includes predictive statistical modeling.¹⁹ We also compared this information to documentation requirements of internal control standards and the principle related to management identifying information requirements through an iterative process in *Standards for Internal Control in the Federal Government*.²⁰

Further, we updated the assessments about the quality of information that we made in our March 2019 and November 2021 reports. Specifically, we identified the metrics for which DHS used different methodologies or data sources in the 2021 *Border Security Metrics Report* compared with the 2019 report. For metrics that used different methodologies or data sources, we collected information from DHS to determine what processes are in place to ensure the overall reliability and quality of the information reported. Additionally, we conducted interviews with DHS headquarters officials from OIS and DHS component officials from CBP—including the Office of Field Operations (OFO), Air and Marine Operations (AMO), and U.S. Border Patrol—as well as the Coast Guard. In these interviews, we obtained information about any changes made to the methodology or

¹⁷[GAO-19-305](#).

¹⁸DHS refers to this model as its deterrence model.

¹⁹Gareth James, et al., *An Introduction to Statistical Learning: with Applications in R*, 2nd ed. (New York: Springer, 2021), 29-37.; GAO, *Artificial Intelligence: An Accountability Framework for Federal Agencies and Other Entities*, [GAO-21-519SP](#) (Washington, D.C.: June 30, 2021).

²⁰[GAO-14-704G](#).

data collection that would affect how DHS reported the metrics. During our interviews with OIS officials, we also obtained information on steps OIS takes to assess the reliability of data included in the report and to identify relevant limitations. We analyzed this information to assess DHS's progress in addressing the recommendations we made in our March 2019 report.²¹

To identify other metrics that may be used to measure border security effectiveness, we reviewed border security-related reports that we and DHS's Office of Inspector General issued from October 2021 to September 2023.²² We also obtained information on the status of recommendations we previously identified in our March 2019 and November 2021 reports.

We conducted this performance audit from October 2022 to November 2023 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.

Background

DHS Components with Responsibilities Related to Border Security

Within DHS, CBP and the Coast Guard have the primary responsibility for border security. CBP and its subcomponents are charged with securing U.S. borders at and between ports of entry by preventing inadmissible

²¹These recommendations related to developing and implementing a process to systematically review the reliability of metric data and identify and communicate limitations of the metrics. [GAO-19-305](#).

²²We selected this time period to update the information in our March 2019 and November 2021 reports, which identified relevant metrics we and the DHS Office of Inspector General recommended in reports issued from August 2009 through September 2021. [GAO-19-305](#) and [GAO-22-104651](#). For the purpose of this report, we reviewed 28 reports from our prior work and 73 DHS Office of Inspector General reports.

people and illicit goods from entering the U.S., among other responsibilities. Within CBP, the primary offices and components involved in border security are OFO at ports of entry, Border Patrol between ports of entry, and AMO for air and marine security. The Coast Guard and CBP's AMO share responsibility for security of the nation's maritime borders.

Border Security Metrics

DHS's Office of Immigration Statistics (OIS), within the Office of Strategy, Policy, and Plans, is responsible for developing DHS's annual report on the 43 metrics as required by the 2017 NDAA.²³ To prepare the report, OIS officials stated that they obtained data and information related to each NDAA metric from the administrative records of the DHS components with primary responsibilities for border security in the four domains. Table 1 shows examples of border security metrics by domain and the DHS components that collect the associated data.

Table 1: Examples of Border Security Metrics by Domain and Department of Homeland Security (DHS) Component

Domain	Relevant DHS component	Example of a metric
Between ports of entry	U.S. Customs and Border Protection (CBP) and U.S. Border Patrol	The number of apprehensions in each Border Patrol sector ^a
At ports of entry	CBP Office of Field Operations	A secondary examination rate that measures the frequency of secondary examinations at each land port of entry ^b
Maritime border	U.S. Coast Guard and CBP Air and Marine Operations (AMO)	The rate at which illicit drugs are removed by DHS maritime security components
Air environment ^c	CBP AMO	The number of missions cancelled by AMO due to weather compared with the total planned missions

Source: GAO analysis of DHS 2021 *Border Security Metrics Report*. | GAO-24-106277

^aBorder Patrol divides responsibility for border security operations geographically among 20 sectors, each with its own sector headquarters. Each sector is further divided into varying numbers of stations, each with its own area of responsibility. There are nine sectors along the southwest border, eight along the northern border, and three in the Gulf Coast and Caribbean regions.

^bA secondary examination is when a CBP officer at a port of entry refers a traveler to a separate area, outside the primary inspection area, to complete the inspection or examination process without causing delays for other travelers. Reasons why a traveler may be referred for a secondary

²³In 2022, DHS established the Office of Homeland Security Statistics, which will subsume the Office of Immigration Statistics. According to DHS, this new office will expand over time to conduct independent reporting and analysis on all DHS statistical data. DHS officials stated that, as of July 2023, DHS plans to finish standing up the Office of Homeland Security Statistics in late September 2023.

examination include, for example, when the CBP officer cannot verify a traveler's information or a traveler does not have all the required documentation.

²⁴The National Defense Authorization Act for Fiscal Year 2017 refers to this domain as "Air and Marine security metrics in the land domain," which it defines as aviation assets and operations of AMO. 6 U.S.C. § 223(e).

The 2017 NDAA defined the required border security metrics, which include a mix of counts, rates, estimates, or a combination of these types of metrics, spanning each of the four border domains.²⁴ For example, the NDAA defined one metric, a count, as the number of apprehensions in each Border Patrol sector.²⁵ For some metrics, the NDAA defined them as rates compared to the last 5 years, such as rates at which illicit drugs were seized compared to the average over the last 5 years at ports of entry and between ports of entry.²⁶ The NDAA also requires an estimate of the number of undetected unlawful entries, as well as several metrics the law defined as a combination of observed data and estimates. For example, one of these combination metrics is the cocaine seizure effectiveness rate at ports of entry. This combination metric divides the amount of cocaine seizures at ports of entry—a known quantity—by an estimate of total cocaine flow through ports of entry, which cannot be directly measured.²⁷

The 2017 NDAA did not specifically define three of the 43 metrics. For example, while the NDAA called for an examination of each consequence under the Consequence Delivery System, it did not specify how the examination is to be carried out or what it should include.²⁸ We provide descriptions for all of the metrics in appendix II. Figure 1 shows the

²⁴See 6 U.S.C. § 223. Rate metrics compare one value or number against another. Estimates measure activities that are largely undetected and, therefore, cannot be measured directly. We refer to metrics that are comprised of a count or a rate and use an estimate as part of their computation as "combination metrics."

²⁵6 U.S.C. § 223(b)(1)(E).

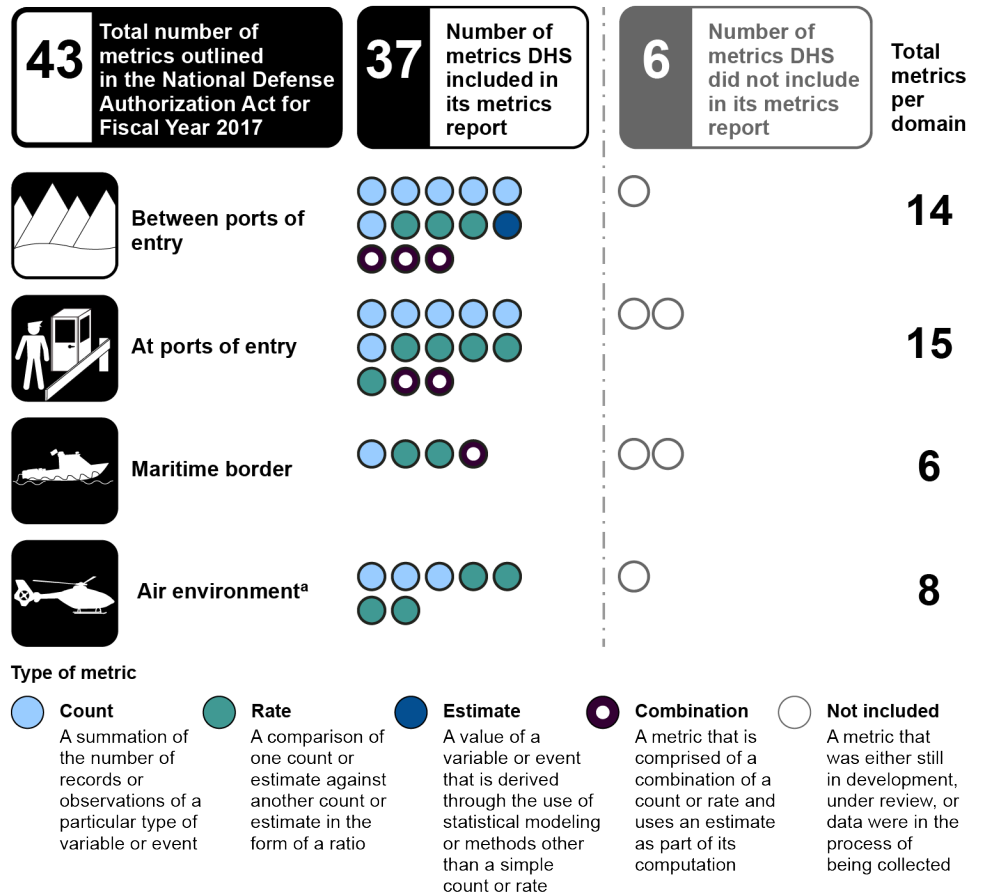
²⁶6 U.S.C. § 223(b)(1)(H), (c)(1)(C).

²⁷6 U.S.C. § 223(c)(1)(E). Another combination metric is the unlawful border crossing effectiveness rate—the percentage that results from dividing the number of apprehensions and turn backs by the sum of the number of apprehensions, estimated undetected unlawful entries, turn backs, and got aways—in each U.S. Border Patrol sector. *Id.* at § 223(b)(1)(C).

²⁸6 U.S.C. § 223(b)(1)(J). The Consequence Delivery System refers to the series of consequences applied by Border Patrol in collaboration with other federal agencies to persons unlawfully entering the U.S. in order to prevent unlawful border-crossing recidivism. *Id.* at § 223(a)(2).

number of metrics required by the 2017 NDAA that DHS did and did not include in its 2021 *Border Security Metrics Report* by type of metric.

Figure 1: Number and Type of Metrics Included in the Department of Homeland Security's (DHS) 2021 *Border Security Metrics Report*



Source: GAO analysis of DHS's 2021 *Border Security Metrics Report*, GAO icons. | GAO-24-106277

Accessible Data for Figure 1: Number and Type of Metrics Included in the Department of Homeland Security's (DHS) 2021 *Border Security Metrics Report*

- Total number of metrics outlined in the National Defense Authorization Act for Fiscal Year 2017: 43
- Number of metrics DHS included in its metrics report: 37
- Number of metrics DHS did not include in its metrics report: 6

Category	Count (A summation of the number of records or observations of a particular type of variable or event)	Rate (A comparison of one count or estimate against another count or estimate in the form of a ratio)	Estimate (A value of a variable or event that is derived through the use of statistical modeling or methods other than a simple count or rate)	Combination (A metric that is comprised of a combination of a count or rate and uses an estimate as part of its computation)	Not included (A metric that was either still in development, under review, or data were in the process of being collected)	Total metrics per domain
Between ports of entry	6	3	1	3	1	14
At ports of entry	6	5		2	2	15
Maritime border	1	2		1	2	6
Air environment ^a	3	4			1	8

Source: GAO analysis of DHS's 2021 Border Security Metrics Report, GAO icons. | GAO-24-106277

^aThe National Defense Authorization Act for Fiscal Year 2017 refers to this domain as "Air and Marine security metrics in the land domain," which it defines as aviation assets and operations of AMO. 6 U.S.C. § 223(e).

OIS calculates or estimates many of the metrics required by the 2017 NDAA using data provided by the components, but certain metrics require advanced statistical methods and technical expertise. For example, DHS uses a statistical model to estimate undetected unlawful entries. In the model, DHS focuses on individuals who unlawfully cross the border, are apprehended by Border Patrol, and then removed from the country across the U.S.-Mexico border, and attempt to cross the border again. In our March 2019 assessment of DHS's first *Border Security Metrics Report*, we reported that DHS did not validate all of the assumptions it used to develop the model.²⁹ We recommended that DHS conduct an analysis of how changing the assumptions might affect the accuracy of the model—a process known as sensitivity analysis. To address this recommendation, DHS conducted a sensitivity analysis and published the results in the 2019 *Border Security Metrics Report*. This sensitivity analysis will allow Congress, policymakers, and the public to better understand potential limitations of DHS's statistical model and more fully evaluate the validity of the border security metrics derived from the model.

²⁹[GAO-19-305](#).

DHS's Use of Border Security Metrics

In addition to reporting metrics in response to 2017 NDAA requirements, DHS officials use some of the metrics reported in the *Border Security Metrics Report*, or conceptually similar measures, as DHS GPRAMA Modernization Act of 2010 performance measures.³⁰ For example, *DHS's Annual Performance Report for Fiscal Years 2021–2023* includes a measure of migrant interdiction effectiveness in the maritime environment—a measure that DHS also reported in the 2021 *Border Security Metrics Report*.

Additionally, CBP officials told us they use the metrics in the *Border Security Metrics Report* to inform component decision-making and operational understanding. For example, Border Patrol officials stated that certain metrics, such as the number of apprehensions, “got aways”, and “turn backs”, collectively provide a picture of the current state of the northern and southwest border.³¹ These officials told us they look at the metrics to understand the success of Border Patrol’s tactical approach and shift resources as needed. AMO officials told us that the metric on the AMO readiness rate helps officials to understand when issues other than weather, such as personnel issues, may have contributed to a cancelled aviation mission.³²

³⁰The Government Performance and Results Act of 1993 (GPRAMA), as updated and expanded by the GPRAMA Modernization Act of 2010 (GPRAMA), requires agencies to establish annual performance goals with target levels of performance to measure progress toward those goals. See Pub. L. No. 111-352, 124 Stat. 3866 (2011) (updating Pub. L. No. 103-62, 107 Stat. 285 (1993)).

³¹The 2017 NDAA defines “got aways” as individuals who are directly or indirectly observed entering unlawfully, are not apprehended, and are not turn backs. See 6 U.S.C. § 223(a)(3). The 2017 NDAA defines “turn backs” as individuals who, after making an unlawful entry into the U.S., respond to U.S. enforcement efforts by returning promptly to the country from which they entered. *Id.* at § 223(a)(9).

³²As defined by the 2017 NDAA, the AMO readiness rate compares the number of aviation missions flown by AMO to the number of aviation missions cancelled by AMO due to maintenance, operations, or other causes. 6 U.S.C. § 223(e)(1)(C).

DHS Made Limited Progress Reporting Required Metrics and Did Not Fully Engage Components or Congress

DHS Reported Three More Metrics That Correspond with Their NDAA Definitions Since Its 2019 Report

DHS made limited progress toward reporting all of the metrics required by the 2017 NDAA since the 2019 *Border Security Metrics Report*. In the 2021 *Border Security Metrics Report*, DHS reported 37 of the 43 metrics required by the NDAA. The set of metrics included in the 2021 report did not change since the 2019 report and DHS's reporting on some metrics improved.³³ Specifically, DHS reported three of the metrics in the 2021 report such that they corresponded with their definitions in the NDAA; in the 2019 report, these metrics did not correspond with those definitions.³⁴ In addition, two metrics DHS reported in the 2021 report more closely corresponded with their NDAA definitions than in the 2019 report, but these metrics still differed from their NDAA definitions.³⁵ As a result, 21 of the 37 reported metrics generally corresponded with their NDAA definitions in the 2021 report, compared to 18 of the 37 metrics in the 2019 *Border Security Metrics Report*, as shown in table 2.

³³In November 2021, we reported on the number of metrics DHS included in its 2019 *Border Security Metrics Report*. [GAO-22-104651](#).

³⁴For the purposes of this report, we use the word "correspond" to describe how the metrics DHS included in its 2021 *Border Security Metrics Report* were similar to, or different from, their definitions in the 2017 NDAA.

³⁵For the two metrics that more closely corresponded to the NDAA definition, apprehensions of family units and apprehensions of unaccompanied children, DHS provided data on the southern, northern, and coastal borders in the 2021 report but did not report the northern and coastal borders by border sector as specified in the 2017 NDAA. For the apprehension of unaccompanied children metric, the statute uses the term "unaccompanied alien child". See 6 U.S.C. §§ 223(b)(1)(F), 279(g)(2). DHS also provided data on the number of family units and unaccompanied children expelled under Title 42, along with the apprehensions in each border patrol sector metric. In March 2020, CBP began to assist the Centers for Disease Control and Prevention in the enforcement of a series of public health orders issued under Title 42 of the U.S. code, and thus processed and expelled certain noncitizens under this public health authority, rather than processing them under Title 8 immigration enforcement and removal authority. Title 8 refers to the title of the U.S. Code that pertains to immigration and nationality. Title 42 refers to the title of the U.S. Code pertaining to public health and welfare. The expiration of the public health emergency at the end of May 11, 2023 caused the then-operative Title 42 order to end.

Table 2: Metrics in the 2021 and 2019 Border Security Metrics Reports (BSMR) and Their Correspondence with the Fiscal Year (FY) 2017 NDAA

Correspondence of reported metrics with definitions in FY 2017 NDAA	2021 BSMR	2019 BSMR
Metric generally corresponds with definition in the NDAA	21	18
Metric differs from definition in NDAA because it uses a different scope or calculation	15 ^a	18
Metric differs from definition in NDAA because Department of Homeland Security provided an alternative measure to what is defined in the NDAA	1	1

Source: GAO analysis of Department of Homeland Security 2021 *Border Security Metrics Report*. | GAO-24-106277

Note: FY 2017 NDAA = The National Defense Authorization Act for Fiscal Year 2017.

^aTwo of these metrics, related to apprehensions and nationality of family units and unaccompanied children, more closely corresponded with their definitions in the NDAA, but still differed.

The 21 metrics that generally corresponded with their definitions spanned each of the four border domains. For example, in the between ports of entry domain, DHS reported the number of apprehensions of individuals attempting to unlawfully cross the border for each border sector, as required by the law.³⁶ Also within this domain, in prior *Border Security Metrics Reports* DHS presented three metrics related to unlawful entries—(1) detected unlawful entries, (2) turn backs, and (3) got aways—only for the southwest border.³⁷ Consistent with the NDAA requirement for reporting standardized data across all Border Patrol sectors for metrics within the between ports of entry domain, DHS included data for the northern and coastal borders in its 2021 report for these three metrics.³⁸ Table 3 lists the metrics that generally corresponded with their definitions in the NDAA by domain.

Table 3: Border Security Metrics in the 2021 Border Security Metrics Report That Generally Corresponded with Their Definitions in the National Defense Authorization Act for Fiscal Year 2017 (2017 NDAA)

Domain	Metric ^a
Between ports of entry	Apprehensions in each U.S. Border Patrol sector
Between ports of entry	Between ports of entry illicit drug seizure rate
Between ports of entry	Detected unlawful entries ^b

³⁶6 U.S.C. § 223(b)(1)(E).

³⁷As noted in the 2021 *Border Security Metrics Report*, previous versions of the table containing data on turn backs misreported total turn backs as being only turn backs at the southern border in some years.

³⁸6 U.S.C. § 223(b)(3). Data for between ports of entry shall be collected and reported in a consistent and standardized manner across all U.S. Border Patrol sectors, informed by situational awareness. The three other domains also have this requirement for the manner of collection. See 6 U.S.C. § 223(c)(3), (d)(3), (e)(3).

Letter

Domain	Metric ^a
Between ports of entry	Estimates of the impact of the Consequence Delivery System on recidivism
Between ports of entry	Examination of each consequence under the Consequence Delivery System
Between ports of entry	Got aways ^{b,c}
Between ports of entry	Turn backs ^{b,d}
At ports of entry	Illicit drugs seized at ports of entry
At ports of entry	Port of entry illicit drug seizure rate
At ports of entry	Average wait times and traffic volume
At ports of entry	Infrastructure capacity utilization rate
At ports of entry	Number of potentially “high-risk” cargo containers
Maritime border	Known maritime migrant flow rate
Maritime border	Cocaine removal effectiveness rate
Air environment	Flight hour effectiveness rate
Air environment	Funded flight hour effectiveness rate
Air environment	Air and Marine Operations (AMO) readiness rate
Air environment	AMO weather-related cancellation rate
Air environment	AMO individuals detected
Air environment	AMO apprehensions assisted
Air environment	Illicit drug seizures assisted by AMO

Source: GAO analysis of Department of Homeland Security 2021 *Border Security Metrics Report*. | GAO-24-106277

^aWe refer to the 43 metrics enumerated in the 2017 NDAA by the titles provided by DHS in the 2021 *Border Security Metrics Report*. See app. II for definitions and legal citations of all of the mandated metrics.

^bMetric newly corresponded with its NDAA definition since our previous review of the 2019 *Border Security Metrics Report*.

^cThe NDAA defines “got aways” as individuals who are directly or indirectly observed entering unlawfully, are not apprehended, and are not turn backs. See 6 U.S.C. § 223(a)(3).

^dThe NDAA defines “turn backs” as individuals who, after making an unlawful entry into the U.S., respond to U.S. enforcement efforts by returning promptly to the country from which they entered. 6 U.S.C. § 223(a)(9).

Sixteen of the metrics in the 2021 *Border Security Metrics Report* continued to differ from their definitions in the 2017 NDAA. A variety of factors contributed to these differences, such as DHS’s statistical model not calculating estimates with the needed granularity, DHS’s systems not maintaining data in the units of measurement required by the NDAA, and DHS not fully reporting available data, as shown in table 4. For example, although DHS included some information about apprehensions of family units and apprehensions of unaccompanied children at northern and coastal borders, it did not report those data for every border sector as required by the NDAA.³⁹ OIS officials told us they have this information,

³⁹6 U.S.C. §§ 223(b)(1)(F), (G); 279(g)(2).

but the numbers for northern and coastal border sectors are very small, such that the tables for border sectors would mostly contain values of zero. In July 2023, OIS officials told us that they would consider summarizing the available data for the northern and coastal border sectors in the narrative section of future reports.

Another gap in the reported data relates to the secondary examination rate metric.⁴⁰ At a port of entry, a secondary examination takes place when a CBP officer refers individuals or vehicles for additional inspection, such as to verify documents or ask further questions. The 2021 *Border Security Metrics Report* included data for secondary examinations of passengers, but not data OFO maintains on cargo or commercial traffic. We further discuss this gap later in this report.

⁴⁰6 U.S.C. § 223(c)(1)(F)(iii).

Table 4: Factors Contributing to Differences between Metrics in the 2021 *Border Security Metrics Report* and Their Definitions in the National Defense Authorization Act for Fiscal Year 2017 (2017 NDAA)

Factor	Metric that differed ^a
DHS bases metric in whole or in part on a statistical model that does not calculate estimates for the northern and coastal borders, which are to be included consistent with the 2017 NDAA.	Attempted unlawful border crosser apprehension rate
DHS bases metric in whole or in part on a statistical model that does not calculate estimates for the northern and coastal borders, which are to be included consistent with the 2017 NDAA	Estimated undetected unlawful entries
DHS bases metric in whole or in part on a statistical model that does not calculate estimates for the northern and coastal borders, which are to be included consistent with the 2017 NDAA	Probability of detection rate
DHS bases metric in whole or in part on a statistical model that does not calculate estimates for the northern and coastal borders, which are to be included consistent with the 2017 NDAA	Unlawful border crossing effectiveness rate
DHS components collect data needed for metric, but DHS does not fully report available data.	Major infractions at ports of entry
DHS components collect data needed for metric, but DHS does not fully report available data.	Secondary examination rate
DHS components collect data needed for metric, but DHS does not fully report available data.	Apprehensions of unaccompanied children
DHS components collect data needed for metric, but DHS does not fully report available data.	Apprehensions of family units
DHS's systems do not maintain data in the units of measurement required by the 2017 NDAA.	Potentially high-risk cargo containers scanned before arrival at a U.S. port of entry
DHS's systems do not maintain data in the units of measurement required by the 2017 NDAA.	Potentially high-risk cargo containers scanned upon arrival at a U.S. port of entry
DHS's systems do not maintain data in the units of measurement required by the 2017 NDAA.	Ratio of potentially high-risk cargo containers scanned relative to high-risk containers entering in previous fiscal year
DHS has not developed a means to estimate unknown inadmissible individuals who seek admission at U.S. ports of entry reliably, which is information department officials said it needs to report these metrics.	Refusal and interdiction rates at ports of entry
DHS has not developed a means to estimate unknown inadmissible individuals who seek admission at U.S. ports of entry reliably, which is information department officials said it needs to report these metrics.	Total inadmissible travelers at ports of entry
DHS relies on other federal agencies for cocaine flow estimates and there is not an estimate available for the share of the total cocaine flow through land ports of entry as required by the 2017 NDAA.	Cocaine seizure effectiveness rate
DHS reports data for drug removals by the Coast Guard only, because it has not yet validated data from other maritime security components, which the 2017 NDAA requires.	Illicit drugs removal rate
DHS provided an alternative measure.	Situational awareness achieved in the maritime environment

Source: GAO analysis of Department of Homeland Security (DHS) 2021 *Border Security Metrics Report* and interviews with DHS officials. | GAO-24-106277

^aWe refer to the 43 metrics enumerated in the 2017 NDAA by the titles provided by DHS in the 2021 *Border Security Metrics Report*.

In its 2021 *Border Security Metrics Report*, DHS continued not to report information on six required metrics that it has omitted from all of its prior reports. These six metrics spanned all four domains as shown in table 5 below.

According to the 2021 *Border Security Metrics Report* and agency officials, DHS has plans to include all six omitted metrics in future reports. In its 2022 *Border Security Metrics Report*, issued in July 2023, DHS reported on two of these metrics—the DHS known maritime threat response rate and a related metric, the intergovernmental actionable maritime threat response rate.⁴¹ OIS officials stated that they focused on engaging with the Coast Guard to include information for these two metrics. According to Border Patrol and AMO officials, they are working towards reporting the two metrics in the between ports of entry and the air environment domains, respectively.

The remaining two metrics—the unlawful entries at ports of entry and the secondary examinations effectiveness rate—relate to the at ports of entry domain. DHS’s 2021 and 2022 reports stated that DHS does not characterize secondary examinations as either effective or ineffective and thus cannot report on the secondary examinations effectiveness rate metric. OIS officials told us in July 2023 that, despite this challenge, OFO had provided OIS with information for both of the metrics in the at ports of entry domain, and OIS plans to report on them in the 2023 report. Table 5 describes DHS’s rationale for omitting each of the six metrics and the reporting year DHS plans to include the metric or reported on the metric.

⁴¹As defined by the 2017 NDAA, the DHS known maritime threat response rate is a response rate that compares the ability of DHS maritime security components to respond to and resolve known maritime threats, whether inside or outside a transit zone, by placing assets on-scene, with the total number of events with respect to which the department has known threat information. 6 U.S.C § 223(d)(1)(E). The intergovernmental actionable maritime threat response rate is a response rate that compares the ability of the maritime security components of DHS or other U.S. government entities to respond to and resolve actionable maritime threats, whether inside or outside a transit zone, with the number of such threats detected. 6 U.S.C. § 223(a)(8), (d)(1)(F). The 2017 NDAA included a provision for us to review DHS’s first *Border Security Metrics Report*, and biennially for the following 10 years with respect to every other DHS report, to review and report our findings to Congress. We will analyze the 2022 *Border Security Metrics Report* as part of a future review.

Table 5: Six Metrics the Department of Homeland Security (DHS) Omitted from its 2021 *Border Security Metrics Report* (report)

Domain	Metric omitted	DHS reported rationale for omitting metric	Reporting year DHS plans to include metric or reported on metric
Between ports of entry	A measurement of situational awareness achieved in each U.S. Border Patrol sector	The 2021 report states that Border Patrol is refining measures for this metric as part of a larger effort to measure performance and success in securing the border between ports of entry. Border Patrol officials told us they planned to complete these efforts by fiscal year 2024, and DHS tentatively plans to report on the metric in the 2024 report.	2024
At ports of entry	Unlawful entries at ports of entry	The 2021 report states that the Compliance Examination program is unable to reliably estimate successful unlawful entries due to the nature of the survey, including insufficient sample size. ^a According to the report, it is highly unlikely that DHS will ever be able to provide data for successful unlawful entries. Although DHS's 2022 report also noted this challenge, DHS officials told us they plan to provide information on this metric in the 2023 report.	2023
At ports of entry	Secondary examinations effectiveness rate	The 2021 report states that the U.S. Customs and Border Protection (CBP) does not categorize a given secondary examination as 'effective' or 'ineffective' and therefore, does not report on this metric. DHS officials told us they will continue to consider approaches to developing a secondary examination effectiveness rate. DHS officials told us they plan to provide information on this metric in the 2023 report.	2023
Maritime border	DHS maritime threat response rate	The 2021 report states that DHS has data on cocaine-response activities but not all maritime threats, and that DHS cannot separate DHS activities from intergovernmental data. DHS reported on this metric in the 2022 report, which it issued in July 2023. We will analyze the information DHS reported for this metric as part of a future review.	2022
Maritime border	Intergovernmental maritime threat response rate	The 2021 report states that DHS has data on cocaine-response activities but not all maritime threats, and that DHS cannot separate DHS activities from intergovernmental data. DHS reported on this metric in the 2022 report, which it issued in July 2023. We will analyze the information DHS reported for this metric as part of a future review.	2022
Air environment ^b	Air and Marine Operations (AMO) actionable intelligence	AMO officials told us they are working to define this metric and quantify it in their system of record. The 2021 report states that AMO is in the process of creating a dashboard of historic data on sensor surveillance to help inform the development of this metric. AMO officials said the dashboard contains data on remotely piloted assets and information on how AMO used intelligence to inform targeting.	2024

Source: GAO analysis of DHS 2021 and 2022 *Border Security Metrics Reports* and interviews with DHS officials. | GAO-24-106277

Note: We refer to the 43 metrics listed in the National Defense Authorization Act for Fiscal Year 2017 by the titles provided by DHS in the 2021 *Border Security Metrics Report*.

^aThis program is a statistical survey in which vehicles cleared for entry into the U.S. by CBP are selected for a comprehensive audit through a computer-generated random sample. CBP is to conduct an audit of the selected vehicles by doing a secondary inspection, using a standardized system of checks to identify any violations that were missed during the routine inspection.

^bThe National Defense Authorization Act for Fiscal Year 2017 refers to this domain as "Air and Marine security metrics in the land domain," which it defines as aviation assets and operations of AMO. 6 U.S.C. § 223(e).

DHS's Policy Office Obtains Data from Components but Has Not Engaged with Them to More Fully Report Metrics as Outlined in the NDAA

OIS—within DHS's Office of Strategy, Policy, and Plans—has engaged with components to obtain data for developing the *Border Security Metrics Report* and to encourage the future reporting of metrics it has previously omitted. In particular, OIS engaged with components by emailing them to obtain the latest data for the 2021 *Border Security Metrics Report*. However, for those metrics that do not fully correspond with their NDAA definition, OIS has not engaged with components to determine whether data and information are available that would help them improve their reporting on those metrics.

OIS's most recent strategic plan identifies OIS as the leader of DHS's effort to develop rigorous metrics of border security, including producing the *Border Security Metrics Report*.⁴² As part of this effort, the strategic plan states that OIS will engage with internal stakeholders, including DHS components, such as CBP and the Coast Guard. Although OIS is responsible for producing the *Border Security Metrics Report*, DHS components are responsible for collecting the data that underlie the metrics within the report. As such, engaging with DHS components is necessary for OIS to report on the 43 required metrics as outlined in the 2017 NDAA.

When preparing the annual *Border Security Metrics Report*, OIS engages components to request and receive updated data for metrics it has previously included in the report. We reviewed OIS's outreach to CBP for the 2021 *Border Security Metrics Report*, which included its outreach to Border Patrol, OFO, and AMO. To conduct this outreach, OIS emailed CBP its request for data, and asked that the components enter data from

⁴²U.S. Department of Homeland Security, Office of Policy, Office of Immigration Statistics, *Strategic Plan Fiscal Years 2016-2020* (Sep. 2016). The strategic plan was operational in fiscal year 2020, which is the latest data included in the 2021 *Border Security Metrics Report*. In April 2023, OIS officials told us that the office drafted a new strategic plan, but paused its implementation as OIS transitions to the new Office of Homeland Security Statistics. According to a memo establishing this office, OIS leads official immigration reporting and has had the long-standing mission to disseminate high-quality information that is relevant and timely to inform policymakers, Congress, and the public about the effects of immigration in the U.S. OIS is also responsible for overseeing the analysis and reporting of all DHS statistical data. U.S. Department of Homeland Security, *Establishing an Office of Homeland Security Statistics* (July 25, 2022).

the most recent fiscal year in a template containing data tables OIS had included in the prior report.

While this outreach to components allowed OIS to obtain data on previously reported metrics, it was not thorough or comprehensive enough to ensure that OIS was aware of all available data or component efforts to improve metric reporting. For example, OIS officials told the components that the office was repeating last year's report format and did not plan substantive updates beyond updating the report with the most recent year's data. Further, OIS did not ask any questions related to improving the reporting of metrics that continue to differ from, or did not correspond to, their definitions in the NDAA—as described above in table 4.

We found two specific instances where OIS missed an opportunity to engage with components to help previously reported metrics better correspond to their NDAA definitions. These instances consisted of opportunities where OIS could have engaged components to understand or provide input regarding: (1) available data for a reported metric, and (2) CBP's efforts to develop a statistical model.

- **Available data for a reported metric.** OIS did not actively engage with OFO to understand all available data to report on the secondary examination rate metric as defined in the 2017 NDAA.⁴³ In the 2021 *Border Security Metrics Report*, DHS's reporting on the secondary examination rate metric did not generally correspond with its definition in the 2017 NDAA. Specifically, the metric differed in scope. DHS reported data on the percentage of passengers subject to secondary inspection at each land port of entry, but did not report data on cargo or commercial traffic. However, according to OFO officials and documentation, OFO maintains data on secondary examinations of cargo and commercial traffic. OFO officials told us they had not provided these data to OIS for inclusion in the *Border Security Metrics Report* because officials were waiting for OIS's leadership to define what relevant data were needed to report information on the metric, such as cargo and commercial traffic. By not asking OFO officials about the availability of data on secondary examinations of cargo and commercial traffic, OIS is missing an opportunity to report the secondary examination rate metric as defined in the 2017 NDAA.

⁴³6 U.S.C. § 223(c)(1)(F)(iii).

- **CBP's efforts to develop a statistical model.** DHS's current statistical model calculates estimates of unlawful entries for the entire southwest border. The model cannot provide estimates for each Border Patrol sector because DHS has not yet produced and validated such estimates. As a result, DHS's reporting of four metrics related to unlawful entries does not fully correspond with the metrics' definitions in the 2017 NDAA.⁴⁴ The NDAA calls for one of these metrics to include estimates for each Border Patrol sector and for all four metrics to include estimates for the southwest, northern, and coastal borders. Thus, these metrics differed in scope from their definitions in the NDAA. To improve the reporting of these and other border security metrics, CBP has been developing a different statistical model, called the Operational Performance Simulator, since 2017.⁴⁵ However, OIS has not actively engaged CBP to understand or provide input into its efforts to develop a statistical model that could improve the reporting of the four metrics related to unlawful entries.

OIS officials told us they have not taken an active role in the Operational Performance Simulator's development because they view it as CBP's responsibility. While CBP requested feedback from OIS on the model during a February 2023 briefing, OIS officials told us it is too early to know whether the model can be used to report sector-level estimates. Currently, the model can only report station-level estimates for the northern and southwestern borders. OIS officials said they expect CBP to reach out further for feedback as needed, but do not consider the model's development a priority for OIS. OIS's latest strategic plan specifically notes that OIS is to lead DHS's effort to develop estimates of unlawful entries. By not actively engaging with CBP on the model's development, OIS is missing opportunities to

⁴⁴These four metrics include: (1) the attempted unlawful border crosser apprehension rate, (2) the number of estimated undetected unlawful entries, (3) the probability of detection rate, and (4) the unlawful border crossing effectiveness rate. As defined by the NDAA, each of these metrics is an estimate or a combination metric that includes an estimate. In its 2021 report, DHS used its statistical model to report the first three metrics and observational data to report the fourth metric.

⁴⁵We have previously reported that DHS's current statistical model may not accurately reflect conditions at the southwest border because the model does not fully account for the changing population of unlawful border crossers. For example, the model excludes all individuals who are not Mexican nationals from the count of unlawful border crossers. [GAO-22-104651](#). DHS has previously referred to the Operational Performance Simulator as a model developed by the Johns Hopkins Applied Physics Laboratory. This model uses a combination of statistical modeling and data from sensors along the border to estimate the total number of unlawful border entries between land ports of entry, including entries both detected by Border Patrol and those not detected by Border Patrol.

provide input that could improve the reporting of the four unlawful entry metrics.

OIS's prior efforts to elicit support from and engage with components in developing *Border Security Metrics Reports* yielded positive results. In particular, with support from a DHS component, OIS was able to report on previously omitted metrics, and thus strengthened the department's reporting. For example, OIS and Coast Guard officials told us that engagement between them had been notable during the development of the 2022 report. According to Coast Guard officials, OIS reached out to them in September 2022 to request a proposal to develop these previously omitted metrics, which they submitted. As a result of such efforts, the most recently issued report includes two metrics that DHS had previously omitted.

OIS officials told us they have not undertaken similar engagement to more fully report the metrics that DHS already reports according to their 2017 NDAA definitions because components are ultimately responsible for determining what data and information to provide for the report. Component officials are also responsible for making decisions around developing alternative reporting methods, according to OIS officials. However, according to OIS's strategic plan, it is to lead the department's efforts to develop rigorous border security metrics, including through engagement with DHS components. By engaging with components, OIS could obtain information needed and guide relevant efforts to more fully report DHS border security metrics according to their 2017 NDAA definitions. Such engagement could include, for example, requesting relevant component data and providing input on component efforts to develop a statistical model.

DHS Has Not Periodically Engaged with Congress to Improve the Usefulness of Its Reports

DHS has documented that it will engage with Congress to refine its border security metrics reporting and ensure that the information it includes in its reports is useful to Congress. The 2021 *Border Security Metrics Report* states that, in addition to issuing the report, DHS will update Congress on its progress toward refining the metrics through periodic briefings. The report also states that DHS will continue to refine the metrics through external engagement and collaboration, including with Congress. Additionally, DHS Directive 139-02 on Information Quality requires DHS to ensure and maximize the utility of the information it

disseminates to the public.⁴⁶ Guidance on implementing that directive states that DHS should consider the usefulness of the information to its intended users, which includes Congress.⁴⁷ One aspect of the usefulness of information in the report is its timeliness, and internal control standards note that quality information is to be timely.⁴⁸ However, OIS has not periodically engaged with Congress to improve its *Border Security Metrics Reports*.

During the course of our audit work, we identified instances where engaging with Congress could help DHS identify next steps and address challenges it has faced in fully reporting border security metrics as defined by the 2017 NDAA. For example, DHS did not include six metrics required by the NDAA in its first five iterations of the *Border Security Metrics Report*.⁴⁹ One of those metrics, which DHS plans to include in future reports, is the Air and Marine Operations actionable intelligence metric.⁵⁰ OIS officials told us that defining the scope of information they should report for this metric has been a challenge. In November 2021, we reported that AMO officials told us that the component does not use the term “actionable intelligence” and thus does not have a way to measure it.⁵¹ In February 2023, AMO officials told us they are in the process of developing a dashboard to report this metric. Given DHS’s challenges with defining this metric, engaging with Congress on its informational needs for the metric could help inform AMO’s efforts to develop the dashboard and ensure its usefulness.

Likewise, for the two metrics DHS plans to report in the 2023 *Border Security Metrics Report*—unlawful entries at ports of entry and the secondary examinations effectiveness rate—engaging with Congress could help DHS identify steps it could take toward reporting information for the metrics that would be most useful to Congress. According to the

⁴⁶Department of Homeland Security, *Information Quality*, Directive 139-02 (Washington, D.C.: Nov. 21, 2019).

⁴⁷Department of Homeland Security, *Information Quality Implementation*, Instruction 139-02-001 (Washington, D.C.: Nov. 27, 2019).

⁴⁸[GAO-14-704G](#).

⁴⁹DHS reported on two of these metrics in its 2022 *Border Security Metrics Report* and officials told us the department plans to include the remaining four metrics in future reports.

⁵⁰6 U.S.C. § 223(e)(1)(H).

⁵¹[GAO-22-104651](#).

2021 *Border Security Metrics Report*, it is “highly unlikely” for DHS to report on the unlawful entries at ports of entry metric.⁵² DHS uses the Compliance Examination, or COMPEX, program to measure the effectiveness of CBP’s inspections at ports of entry.⁵³ However, according to the report, COMPEX does not have a sufficient sample size to generate an estimate of unlawful entries at ports of entry, as required by the NDAA. In addition, OFO officials told us that they suspended COMPEX at land ports of entry in March 2020 and at airports in January 2021, and they are analyzing possible enhancements to the program’s methodology. As DHS considers possible enhancements, engaging with Congress could help the department understand congressional needs for the metric and inform the department’s next steps.

DHS could also benefit from engaging with Congress regarding the 16 metrics it included in its 2021 report but that continued to differ from their NDAA definitions. For example, for three of these metrics, DHS’s systems and processes do not track information in a way that positions the department to report them according to 2017 NDAA requirements. In particular, CBP’s data system does not distinguish between containers and shipments, or between its three methods of cargo inspection: (1) reviewing, (2) scanning, and (3) assessing.⁵⁴ As a result, three metrics related to high-risk cargo containers scanned by CBP differed from their definitions in the 2017 NDAA. Engaging Congress could help DHS identify any refinements the department could make to these metrics to best meet Congress’s needs.

DHS could also benefit from further engaging with Congress on the usefulness of the *Border Security Metrics Report* with respect to its timeliness, and to resolve related concerns. OIS officials told us that congressional staff have raised concerns about the timeliness of the

⁵²6 U.S.C. § 223(a)(11), (c)(1)(A)(iii).

⁵³The COMPEX program is a statistical survey in which vehicles cleared for entry into the U.S. by CBP are randomly selected for a comprehensive audit through a computer-generated sample. CBP is to conduct an audit of the selected vehicles by doing a secondary inspection, using a standardized system of checks to identify any violations that were missed during the routine inspection.

⁵⁴Comparison of potentially high-risk cargo containers scanned by OFO at sea ports of entry during a fiscal year to total high-risk containers entering at such sea ports in the previous fiscal year. 6 U.S.C. § 223(c)(1)(G)(ii); Potentially high-risk cargo containers scanned upon arrival at a U.S. sea port of entry. *Id.* at § 223(c)(1)(G)(iii); Potentially high-risk cargo containers scanned before arrival at a U.S. sea port of entry. *Id.* at § 223(c)(1)(G)(iv).

report. Specifically, OIS officials told us congressional staff raised concerns about the time frame in which DHS issues the report each year. OIS officials told us that DHS responded to this concern by stating that DHS was meeting its obligation under the law to issue the report annually. While DHS has issued the report annually as required by the 2017 NDAA, the time frame in which it has issued the report has varied.

For example, DHS has issued each of its first six *Border Security Metrics Reports* 4 to 11 months after the end of the fiscal year for which the report was issued. Further, the latest data included in each report was generally 2 years old by the time the report was published. For example, to meet the annual reporting requirement for fiscal year 2021, DHS issued its *Border Security Metrics Report* in April 2022, and the most recent data the report included was for fiscal year 2020. Table 6 shows the timing of the *Border Security Metrics Reports* issued as of July 2023. By periodically engaging with Congress, DHS could better understand, and work toward addressing, concerns with the reports' timeliness.

Table 6: Timing of *Border Security Metrics Reports* Issued Pursuant to the National Defense Authorization Act for Fiscal Year (FY) 2017, as of July 2023

Reporting year	Date of issuance	Latest data included
Fiscal year (FY) 2017	May 1, 2018	FY 2016
FY 2018	February 26, 2019	FY 2017
FY 2019	August 5, 2020	FY 2018
FY 2020	September 16, 2021	FY 2019
FY 2021	April 27, 2022	FY 2020
FY 2022	July 3, 2023	FY 2021

Source: GAO analysis of Department of Homeland Security *Border Security Metrics Reports*. | GAO-24-106277

While the *Border Security Metrics Report* states DHS will update Congress on its progress refining the metrics through periodic briefings in addition to issuing the report, OIS officials told us that DHS has not conducted such briefings. Further, OIS officials told us they have not generally engaged with Congress to help refine the information the department includes in the report to improve its usefulness to Congress. The officials explained that they consider producing the reports for Congress as a form of engagement. However, transmitting the report is a separate activity from the briefings that DHS's report says it will provide, and does not allow for dialogue. For example, during a briefing, congressional staff could ask questions and DHS could obtain information to better understand congressional needs and inform its report development. By periodically engaging with Congress, OIS may be able

to identify potential opportunities to refine the metrics and ensure the information in its report is useful to Congress.

DHS Improved the Quality of Some Information in Its 2021 Report but Has Not Fully Assessed Its Deterrence Model or Identified Limitations for Reported Metrics

DHS Has Improved Information Quality by Conveying Statistical Uncertainty for Model-Based Metrics

DHS improved the quality of information of several metrics it reported in the 2021 *Border Security Metrics Report* compared to its 2019 report. In particular, DHS improved the quality of three unlawful entry metrics: (1) the attempted unlawful border crosser apprehension rate (model-based apprehension rate), (2) the estimated number of undetected unlawful entries, and (3) the probability of detection rate.⁵⁵ These metrics contain information on estimates derived from a statistical model. One of the inputs into this model is an estimated deterrence rate.

DHS uses this model to estimate the three unlawful entry metrics. This model is focused on individuals who unlawfully crossed the border between ports of entry, who Border Patrol apprehended and removed from the country across the U.S.-Mexico border. These individuals also

⁵⁵In general, the attempted unlawful border crosser apprehension rate is the rate of apprehension of attempted unlawful border crossers (6 U.S.C. § 223(b)(1)(A)(i)). In the *Border Security Metrics Reports*, DHS presents both observed and modeled apprehension rates. For the purposes of this discussion, we focus on the modeled rates and refer to the metric as the "model-based apprehension rate." Undetected unlawful entries are an estimate of the number of undetected unlawful border crossers who enter the U.S. and are not apprehended by a DHS border security component (6 U.S.C. § 223(a)(11), (b)(1)(A)(iii)). The probability of detection rate compares the estimated total unlawful border crossing attempts not detected by Border Patrol with the unlawful border crossing effectiveness rate (i.e., the percentage resulting from dividing the number of apprehensions and turn backs by the sum of the number of apprehensions, estimated undetected unlawful entries, turn backs, and got aways). 6 U.S.C. § 223(a)(10), (b)(1)(C), (D)).

made subsequent reentry attempts.⁵⁶ Within the model's framework, when an individual's first attempt at unlawfully crossing the border is successful, the individual enters the U.S., and no apprehension is made. However, if Border Patrol apprehends an individual, the agency records it in a DHS data system.⁵⁷ Within the model's framework, the individual is then returned across the U.S.-Mexico border.⁵⁸ A Mexican research center subsequently surveys certain individuals about their intentions to attempt to enter the U.S. again.⁵⁹ DHS uses the results from this survey to estimate the rate at which individuals are deterred from crossing again—the estimated deterrence rate.⁶⁰ Should the individuals make a second attempt to cross the border unlawfully, they may succeed in entering the U.S. unlawfully or be apprehended by Border Patrol. Figure 2 provides information on the process DHS uses to calculate unlawful entry metrics, including the estimated deterrence rate.

⁵⁶This type of statistical model is known as a “repeated trials model” because, in this case, it extrapolates from a subset of individuals who unlawfully crossed the border and attempted to cross again. This subset consists of Mexican adults who were removed from the country across the U.S.-Mexico border (not to the Mexican interior or other locations) and who have not ever requested asylum, among other characteristics. We discuss this model in more detail later in this report.

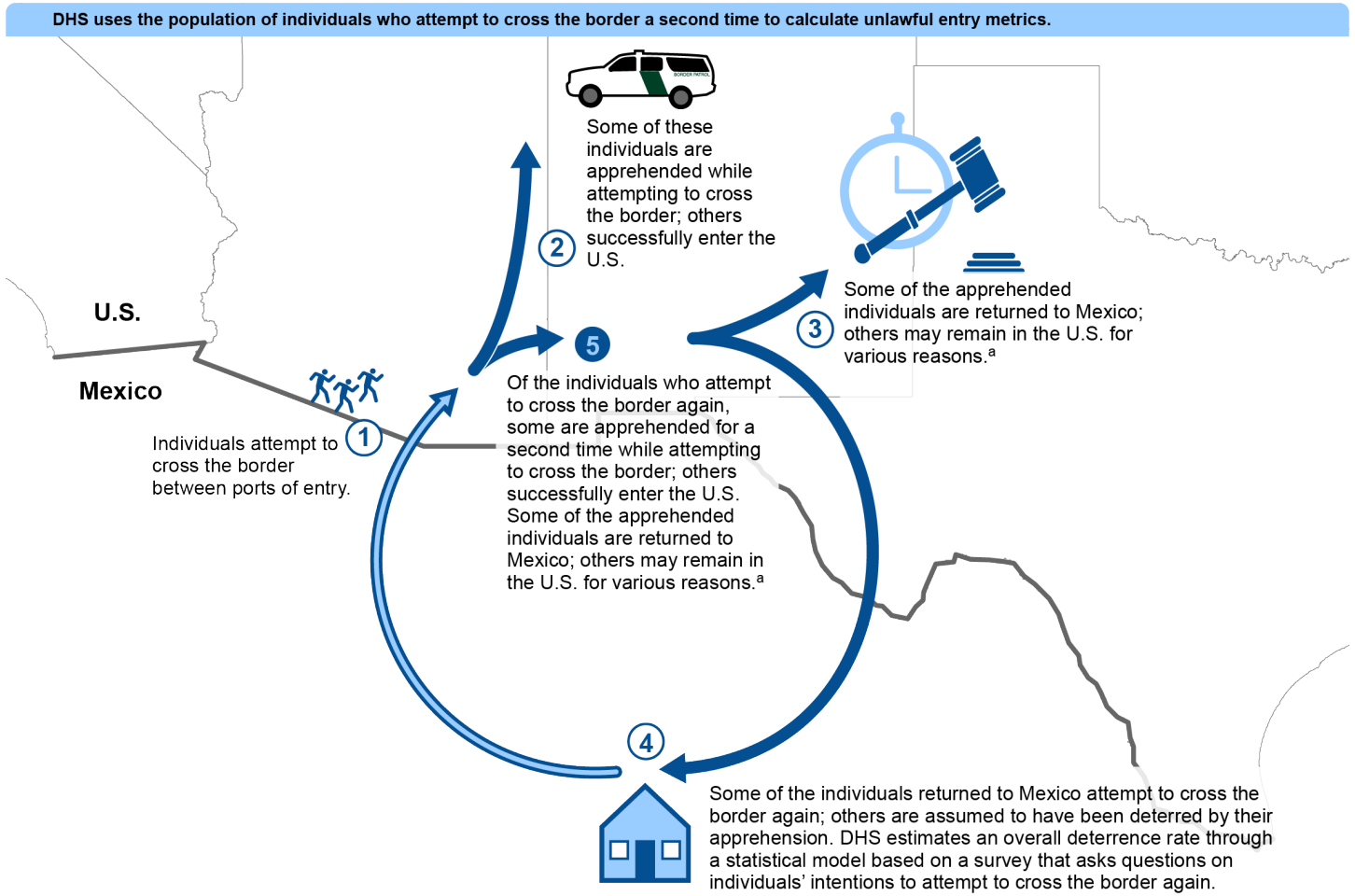
⁵⁷The apprehended individual is potentially subject to consequences for entering unlawfully, such as administrative enforcement and removal, criminal prosecution, or being barred from legally entering the U.S. in the future.

⁵⁸While some apprehended individuals are returned to Mexico, others may remain in the U.S. for various reasons such as awaiting removal to their home country, resolution of immigration proceedings, resolution of criminal proceedings, or serving terms of imprisonment.

⁵⁹The survey Encuesta sobre Migración en la Frontera Norte de México is conducted by a Mexican research and educational institution, El Colegio de la Frontera Norte. The survey website can be accessed at <http://www.colef.mx/emif/>.

⁶⁰If an individual does not make another attempt to unlawfully cross the border, the statistical model makes no further assumption about the individual's actions.

Figure 2: Framework for the Department of Homeland Security’s (DHS) Statistical Model for Unlawful Entry Metrics



Source: GAO analysis of DHS's model-based apprehension rate, GAO icons. | GAO-24-106277

Accessible Data for Figure 2: Framework for the Department of Homeland Security’s (DHS) Statistical Model for Unlawful Entry Metrics

DHS uses the population of individuals who attempt to cross the border a second time to calculate unlawful entry metrics.

1. Individuals attempt to cross the border between ports of entry.
2. Some of these individuals are apprehended while attempting to cross the border; others successfully enter the U.S.

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3. Some of the apprehended individuals are returned to Mexico; others may remain in the U.S. for various reasons.^a
 4. Some of the individuals returned to Mexico attempt to cross the border again; others are assumed to have been deterred by their apprehension. DHS estimates an overall deterrence rate through a statistical model based on a survey that asks questions on individuals' intentions to attempt to cross the border again.
 5. Of the individuals who attempt to cross the border again, some are apprehended for a second time while attempting to cross the border; others successfully enter the U.S. Some of the apprehended individuals are returned to Mexico; others may remain in the U.S. for various reasons.^a

Source: GAO analysis of DHS's model-based apprehension rate, GAO icons. | GAO-24-10627

Note: Some individuals who cross the border unlawfully respond to U.S. enforcement efforts by choosing to return promptly to the country from which they entered (called a turn back).

^aThese reasons include awaiting removal to their home country, resolution of immigration proceedings, resolution of criminal proceedings, or serving terms of imprisonment.

In March 2019, we reported that DHS did not provide information on the level of uncertainty related to this statistical model in the 2017 *Border Security Metrics Report*. For example, DHS provided a single model-based apprehension rate that did not fully convey the uncertainty of estimating these metrics. We reported that, like all statistical models, DHS based its estimate on a limited sample of data that may have been affected by random variation, among other things. That is, the estimates derived from the model included some level of uncertainty. We recommended that DHS include measures of statistical uncertainty for all metrics based on estimates derived from statistical models in its annual *Border Security Metrics Report*.⁶¹

In its 2019 *Border Security Metrics Report*, DHS took steps toward implementing this recommendation by conveying the statistical uncertainty of the model-based apprehension rate and of the total number of unlawful entries in a report appendix.⁶² Specifically, OIS officials told us they allowed key assumptions to vary by as much as twice the confidence interval for the estimated apprehension rate for a particular subset of

⁶¹[GAO-19-305](#).

⁶²Within the between ports of entry domain, the 2017 NDAA mandates that DHS report separately on detected unlawful entries and estimated undetected unlawful entries. In the 2019 *Border Security Metrics Report*, DHS conveyed statistical uncertainty for the total number of unlawful entries, which is the sum of detected and undetected unlawful entries.

border crossers—a key input into the statistical model.⁶³ According to OIS officials, this uncertainty reflected sampling and prediction error in estimating the probability of deterrence.

In its 2021 *Border Security Metrics Report*, DHS fully addressed our recommendation by conveying statistical uncertainty for all three relevant unlawful entry metrics.⁶⁴ Specifically, DHS noted the confidence interval it used—95 percent—and displayed the range (i.e., lower and upper bounds) for each of these estimates. For example, DHS estimated that 66 percent of individuals were apprehended in fiscal year 2020, and the remaining 34 percent entered the U.S. To display the range of that estimate, DHS used the confidence interval to determine that the true value of the percentage of individuals apprehended was likely to exist within the range of 60 percent to 74 percent.

By conveying statistical uncertainty in the 2021 *Border Security Metrics Report*, DHS met the intent of our recommendation. The Office of Management and Budget’s statistical standards for federal agencies state that the possible variation of estimates should be noted, such as by reporting the range of each estimate.⁶⁵ Measures of statistical uncertainty, such as confidence intervals, help to convey the amount by which estimates might vary due to randomness in the data and allow consumers of the estimates to evaluate their accuracy. These actions should allow Congress, policymakers, and the public to more fully evaluate the extent to which the metrics are valid.

⁶³DHS, using a survey of Mexican individuals who were apprehended and returned to the border region of Mexico by U.S. immigration authorities, calculated the estimated apprehension rate—as well as a 95 percent confidence interval—for this particular subset of border crossers. A margin of error (or confidence interval) provides the range around a statistical estimate where the true value is likely to exist. If an estimate’s margin of error is small, the estimate has a lower amount of random error and is therefore more precise and known with greater certainty.

⁶⁴DHS did not convey statistical uncertainty for a fourth metric, the unlawful border crossing effectiveness rate, because it did not report on the metric using its statistical model. Instead, DHS reported on an alternative metric (the interdiction effectiveness rate) using known data that did not require estimation, and therefore, did not involve statistical uncertainty. The model-based apprehension rate is also known as the attempted unlawful border crosser apprehension rate. The probability of detection rate is the ratio of detected unlawful entries to estimated total unlawful entries.

⁶⁵Office of Management and Budget, *Standards and Guidelines for Statistical Surveys* (Washington, D.C.: September 2006).

DHS Has Not Assessed or Updated Its Deterrence Model to Reflect Current Conditions

As previously noted, DHS's statistical model for estimating the three unlawful entry metrics requires an estimated deterrence rate—the share of individuals who decide not to attempt to reenter the U.S. after being apprehended. As an input to this model, DHS uses a separate statistical model to estimate deterrence, referred to as the deterrence model. However, DHS has not assessed or updated the deterrence model since its development in 2016, raising questions about the extent to which the model reflects current southwest border conditions.

DHS developed the deterrence model by contracting with the Institute for Defense Analyses (IDA) in 2016.⁶⁶ IDA developed this deterrence model using an academic survey of individuals returning to Mexico and DHS administrative data.

- **Survey.** A research center linked to a Mexican university has regularly surveyed Mexican individuals who have been apprehended and returned across the U.S.-Mexico border about their intentions to stay close to the border and reenter the U.S.⁶⁷ Specifically, this survey has asked individuals about their intention to attempt to reenter after certain intervals of time, such as 7 days and 90 days. Using these responses, IDA developed estimated deterrence rates for individuals who took the survey, based on how various individual characteristics and experiences, such as gender, birth state, and age, predicted the probability of deterrence.
- **Administrative data.** IDA used these estimated deterrence rates, developed based on the survey, to estimate deterrence for the broader population of Mexican individuals in its administrative data, using individual characteristics and experiences that each data source measured. IDA estimated deterrence for all apprehended individuals from Mexico in DHS's administrative data that met scoping criteria, not only individuals who took the survey, and adjusted for

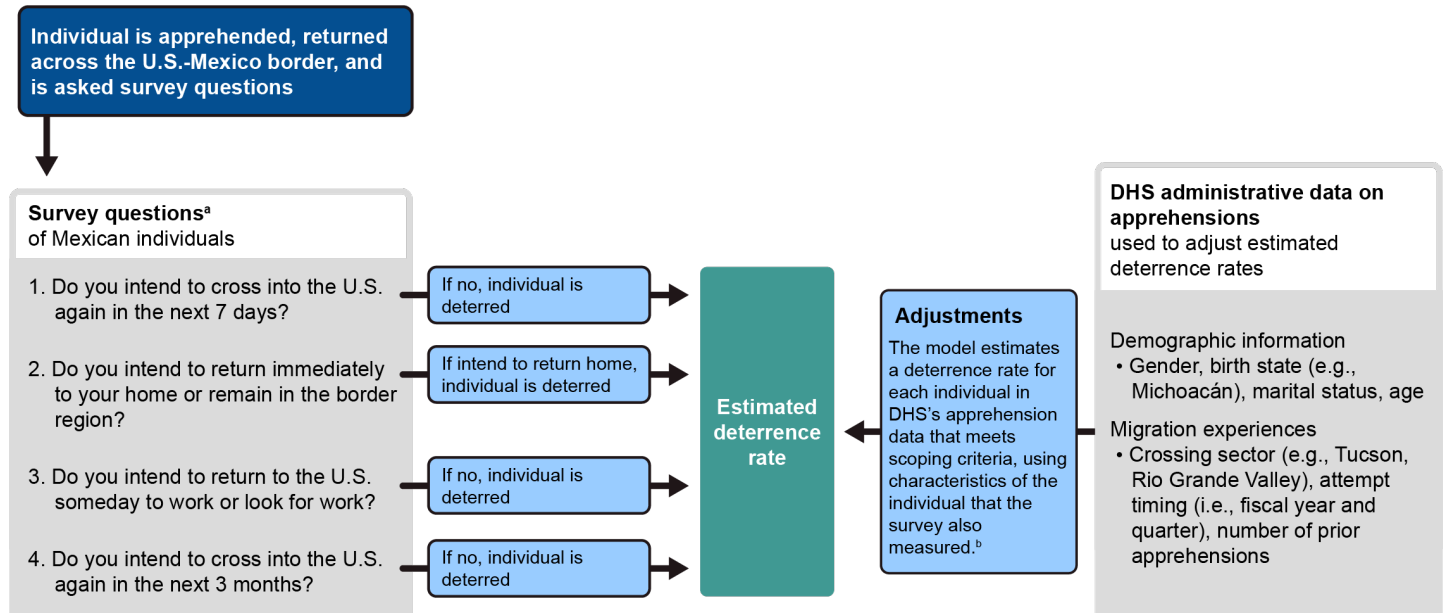
⁶⁶IDA is a non-profit corporation that operates three federally-funded research and development centers to provide analyses of national security issues, particularly those requiring scientific and technical expertise.

⁶⁷The survey Encuesta sobre Migración en la Frontera Norte de México is conducted by a Mexican research and educational institution, El Colegio de la Frontera Norte. The survey website can be accessed at <http://www.colef.mx/emif/>.

characteristics and experiences that may affect reentry attempts.⁶⁸ In its 2021 *Border Security Metrics Report*, DHS estimated that 71 percent of individuals who were apprehended in 2020 were deterred from attempting to enter the U.S. again.

Figure 3 shows the model DHS adapted from IDA to estimate a deterrence rate.

Figure 3: Model the Department of Homeland Security (DHS) Uses to Estimate a Deterrence Rate



Source: GAO analysis of DHS and Institute for Defense Analyses documentation. | GAO-24-106277

Accessible Data for Figure 3: Model the Department of Homeland Security (DHS) Uses to Estimate a Deterrence Rate

- Individual is apprehended, returned across the U.S.-Mexico border, and is asked survey questions
 - Survey questions^a of Mexican individuals
 - Do you intend to cross into the U.S. again in the next 7 days?
 - If no, individual is deterred

⁶⁸IDA applied the same scoping criteria used to estimate the unlawful entry metrics that included a subset of individuals. For example, IDA excluded non-Mexican nationals.

- Estimated deterrence rate
 - Do you intend to return immediately to your home or remain in the border region?
 - If intend to return home, individual is deterred
 - Estimated deterrence rate
 - Do you intend to return to the U.S. someday to work or look for work?
 - If no, individual is deterred
 - Estimated deterrence rate
 - Do you intend to cross into the U.S. again in the next 3 months?
 - If no, individual is deterred
 - Estimated deterrence rate
- DHS administrative data on apprehensions (used to adjust estimated deterrence rates)
 - Demographic information (Gender, birth state (e.g., Michoacan), marital status, age)
 - Adjustments (The model estimates a deterrence rate for each individual in DHS's apprehension data that meets scoping criteria, using characteristics of the individual that the survey also measured.^b)
 - Estimated deterrence
 - Migration experiences (Crossing sector (e.g., Tucson, Rio Grande Valley), attempt timing (i.e., fiscal year and quarter), number of prior apprehensions)
 - Adjustments (The model estimates a deterrence rate for each individual in DHS's apprehension data that meets scoping criteria, using characteristics of the individual that the survey also measured.^b)
 - Estimated deterrence rate

Source: GAO analysis of DHS and Institute for Defense Analyses documentation. | GAO-24-106277.

^aThe survey Encuesta sobre Migración en la Frontera Norte de México is conducted by a Mexican research and educational institution, El Colegio de la Frontera Norte. When developing the model, the Institute for Defense Analyses made additional assumptions regarding the responses to the survey questions if an individual answered "yes" to one question, but "no" to a different question.

^bFor example, the scoping criteria excluded non-Mexican nationals and apprehended individuals who had missing data on the factors used to predict deterrence.

When developing the deterrence model for each *Border Security Metrics Report*, DHS has mainly used the same deterrence model that IDA developed in 2016. Based on the border conditions and available data in 2015, IDA developed the deterrence model, a predictive statistical model. Specifically, IDA developed the model based on survey responses from 2002 through 2015, the latest data available at the time of development. IDA also chose administrative data, such as gender, that predicted deterrence at the time.

DHS has made some refinements to the model over time and uses updated data in the model to re-estimate the deterrence rate for each *Border Security Metrics Report*. For example, in its 2021 *Border Security Metrics Report*, DHS refined the deterrence model by adjusting its methods for calculating sampling uncertainty.⁶⁹ After making these refinements, the model's estimated deterrence rate decreased by 1 to 3 percentage points and the estimated model-based apprehension rate decreased by up to 7 percentage points. OIS officials stated that they made these refinements to avoid using the survey data improperly and to better reflect the underlying assumptions of the survey sample design. Moreover, for each report, OIS typically re-estimates the deterrence rate by inputting both updated survey data and DHS administrative data into the deterrence model. For example, in the 2021 report, DHS used survey data from fiscal years 2012 through 2020 in its deterrence model. OIS officials told us that subject matter experts examined the deterrence model to consider the current year's estimated deterrence rate against those from prior years. OIS officials also told us they did so as a way to examine the accuracy of the estimated deterrence rate.

OIS has also identified issues with the deterrence model and its inputs. Consequently, the office is considering ways to address them. For example, the academic survey of returning Mexican individuals used in the model was discontinued from April to June 2020 and all of 2021, due

⁶⁹Specifically, DHS refined the deterrence model by incorporating two statistical techniques: (1) survey weights and (2) robust standard errors. Survey weights are values used to make data more representative of the population. Robust standard errors are a mathematical tool used to calculate how accurately a set of data represents the actual population.

to the COVID-19 pandemic.⁷⁰ More broadly, southwest border conditions have changed substantially from 2015 to 2021, with DHS experiencing a significant increase in the number of individuals encountered at, or apprehended between, U.S. ports of entry along the southwest border, along with a significant increase in the number of non-Mexican individuals unlawfully crossing the border. This has implications for the deterrence model because its inputs are the survey of returning Mexican individuals and DHS administrative data on apprehended individuals from Mexico. According to DHS data, the agency encountered or apprehended about 331,000 individuals in fiscal year 2015 and about 1.7 million individuals in fiscal year 2021.⁷¹

DHS noted the implications of these changing conditions on its reporting of metrics in the 2021 *Border Security Metrics Report*, stating that the characteristics of those crossing the border unlawfully between ports of entry has changed. In particular, the report noted that the statistical model used for estimating unlawful entry metrics has used only about 20 percent of southwest border apprehensions in recent years because it excludes all individuals who are not Mexican nationals from the count of unlawful border crossers, among other reasons. The report also noted that the number of individuals apprehended from Central American countries has been increasing. For example, according to DHS data, the agency apprehended about 33,000 individuals from Honduras in fiscal year 2015 and about 142,000 individuals from Honduras in fiscal year 2021.

OIS officials told us they are considering some steps to address these issues, but have not yet made decisions on those steps, and related time frames are uncertain. For example, officials said they do not currently know how they will update or replace the deterrence model without updated survey data on intended reentry attempts. They are, however, considering using historical survey data in future years. OIS is also considering leveraging information from the Operational Performance

⁷⁰In its 2022 report, OIS did not provide data from fiscal year 2021 for metrics based on estimates derived from a statistical model. It did not do so because the Mexican research center did not conduct surveys in 2021, which made estimating the deterrence rate for that fiscal year unfeasible, according to the report.

⁷¹Department of Homeland Security, *Border Security Metrics Report: 2022* (Washington, D.C.: July 3, 2023). Beginning in March 2020, CBP data includes individuals who CBP processed under both Title 8 immigration enforcement and Title 42 public health authorities. On May 11, 2023, CBP's authority to expel certain recent border crossers for public health reasons under Title 42 expired. According to the 2022 *Border Security Metrics Report*, CBP processed approximately 63 percent of the 1.7 million individuals under Title 42 and approximately 37 percent under Title 8.

Simulator model that CBP is developing. The Operational Performance Simulator calculates a simulation-based estimate. We reported in November 2021 that OIS officials stated a simulation-based estimate would rely on fewer assumptions about the types of individuals who unlawfully cross the border as compared with the current deterrence model.⁷² OIS officials told us they do not plan to incorporate data from the Operational Performance Simulator in the 2023 *Border Security Metrics Report*, but are considering incorporating these data in future versions of the report.

Given that OIS does not plan to use the Operational Performance Simulator model for the 2023 *Border Security Metrics Report*, it would be beneficial for OIS to assess and update other inputs to its deterrence model to better ensure that the model reflects border conditions. As previously mentioned, for each *Border Security Metrics Report*, OIS typically re-estimates the deterrence rate by inputting both updated survey data and DHS administrative data into the deterrence model. However, DHS has not substantially updated the model or reassessed its predictive accuracy since the model was developed in 2016. Two examples illustrate how OIS could more immediately assess and update its deterrence model in the near term, as appropriate:

- **DHS administrative data.** When developing the deterrence model in 2016, DHS incorporated administrative data on specific characteristics to help predict whether an individual was deterred from attempting to reenter the U.S. after apprehension. For example, DHS incorporated the location an individual crossed into the U.S. into its model. While DHS is considering how to address issues identified with the survey of returning Mexican individuals, DHS could take more immediate steps. For example, it could assess whether the specific DHS administrative data characteristics it currently uses are reflective of existing border conditions and help to predict deterrence. DHS could also assess whether other administrative data characteristics could be useful. DHS could use the results of its assessment to update the model, as appropriate.
- **Type of statistical model.** DHS chose to use a particular type of statistical model, known as logistic regression. This type of model estimates the probability of an event occurring based on a set of characteristics. DHS could assess whether this type of model remains

⁷²[GAO-22-104651](#).

the most appropriate to predict deterrence, compared to alternative types of predictive modeling methods.

OIS officials agreed that it would be beneficial for the office to assess and update the deterrence model. However, OIS has not yet considered doing so beyond how it could address issues with the survey and with DHS administrative data accounting only for Mexican individuals. Our key practices for continuous monitoring of performance call for artificial intelligence systems—such as predictive statistical models, including the deterrence model used by DHS—to be routinely re-evaluated to ensure the system produces desired results.⁷³ The key practice related to drift (i.e., a reduction in the model’s predictive power) calls for agencies to establish the range of data and model drift that is acceptable to ensure the model produces desired results, such as a predicted rate of deterrence.

In addition, statistical principles and standards for internal control support the need for DHS to assess and update its deterrence model, considering changes to the southwest border’s conditions. Statistical principles call for predictive models, such as the deterrence model, to be developed and validated using data sampled from the populations where they will be used.⁷⁴ Models developed for one population may not predict as well when applied to different populations, such as when a population changes over time. As a result, predictive models should be updated regularly as their target populations change. *Standards for Internal Control in the Federal Government* states that management should identify information requirements in an iterative and ongoing process.⁷⁵ As changes in the entity occur, management should change information requirements as needed to meet these modified objectives and address these modified risks. Further, *Standards for Internal Control in the Federal Government* states that documentation is a necessary part of an effective internal control system.⁷⁶

⁷³GAO, *Artificial Intelligence: An Accountability Framework for Federal Agencies and Other Entities*, [GAO-21-519SP](#) (Washington, D.C.: June 30, 2021).

⁷⁴Gareth James, et al., *An Introduction to Statistical Learning: with Applications in R*, 2nd ed. (New York: Springer, 2021), 29-37.

⁷⁵GAO, *Standards for Internal Control in the Federal Government*, [GAO-14-704G](#) (Washington, D.C.: Sept. 10, 2014).

⁷⁶[GAO-14-704G](#).

DHS could better ensure that the deterrence model reflects current southwest border conditions by assessing the extent to which its choice of input administrative data and statistical model type remains sufficiently predictive, and by documenting the results. This assessment is particularly important if OIS uses historical survey data. Further, by using the results of its assessment to update or inform its efforts to replace its statistical model of deterrence, as appropriate, DHS could have better assurance the model reflects current southwest border conditions.

DHS Does Not Yet Have a Systematic Process for Reviewing the Reliability of Data to Identify Limitations

In March 2019, we reported that DHS did not have a process to systematically review the reliability of data used in its *Border Security Metrics Report* and identify limitations with the data and methodologies that underlie the metrics.⁷⁷ DHS officials told us at that time that they largely relied on the DHS components from which they collected the data to assess the data's reliability and communicate identified limitations. The specific processes DHS components used to ensure data reliability varied from metric to metric. For example, we reported that Border Patrol officials issued guidance and monitored the implementation of it, while AMO officials conducted supervisory reviews of data entries to ensure data reliability.

We concluded in our March 2019 report that having a process to systematically review the reliability of the data would help improve the quality of the information available to Congress. We recommended that the Secretary of Homeland Security develop and implement a process to systematically review the reliability of the data used in its *Border Security Metrics Report* and comprehensively identify any limitations with the data and methodologies that underlie its metrics. DHS concurred with our recommendation. In July 2022, DHS officials stated that they did not yet have sufficient resources to implement this recommendation. In July 2023, OIS officials stated that they have ongoing conversations to examine their processes and determine how they can systematically review the reliability of the operational data.

⁷⁷GAO-19-305. According to *Standards for Internal Control in the Federal Government*, data are considered reliable when they are reasonably free from error and bias. Quality information is derived from relevant and reliable data and is considered to be complete, accurate, and timely. [GAO-14-704G](#).

We also recommended in March 2019 that DHS communicate the limitations of the metrics that the department identifies through its systematic review of information in the *Border Security Metrics Report*. DHS concurred with this recommendation. In December 2022, OIS officials told us they would address this recommendation after developing a process to systematically review the reliability of the data and identify data limitations.

DHS took steps to improve the quality of information reported in its 2021 *Border Security Metrics Report*. As discussed above, DHS conveyed statistical uncertainty for relevant metrics. In addition, DHS clarified the source of the data used in all tables of the report by adding source lines to them. For example, a table showing the number of enforcement flight hours and apprehensions assisted by aircraft identified the source of the data as AMO.⁷⁸

However, our review of DHS's 2021 *Border Security Metrics Report* also identified issues with the quality of information in the report. Some of these issues relate to the persistence of data reliability issues that we identified in our previous reports. Our review of DHS's 2017 *Border Security Metrics Report* identified 21 metrics that had limitations that DHS did not disclose in that report. Our review of the 2021 *Border Security Metrics Report* found that 17 of these 21 metrics still had limitations, which DHS did not disclose in its report. The number of limitations DHS did not disclose remained the same from our last review. For example, we reported in March 2019 that commercial vehicle wait time data—part of the average wait times and traffic volume metric—were unreliable for fiscal years 2012 through 2016.⁷⁹ The 2019 and 2021 *Border Security Metrics Reports* did not disclose that some of the commercial vehicle wait time data presented in the report were not reliable.

Other quality issues related to newly-identified instances of inaccurate information in the 2021 *Border Security Metrics Report*. For example, prior to 2021, the *Border Security Metrics Reports* inaccurately labeled nationwide turn back and got away data as southwest-border only. DHS acknowledged this error in a table note in the 2021 *Border Security Metrics Report*. According to OIS officials, they discovered the errors after

⁷⁸As defined by the 2017 NDAA, the number of apprehensions assisted by AMO are those apprehensions assisted through the use of unmanned aerial systems and manned aircraft. 6 U.S.C. § 223(e)(1)(F).

⁷⁹[GAO-19-305](#).

being prompted during our review of the 2019 *Border Security Metrics Report*. We previously reported that these metrics did not correspond with their NDAA definitions because DHS labeled these metrics as pertaining to the southwest border.

Another example is OIS's labeling of actions CBP officials take when encountering noncitizens. Specifically, OIS labeled expulsions of noncitizens for public health reasons under Title 42 of the U.S. Code as "apprehensions" in certain tables in the 2021 *Border Security Metrics Report*. Border Patrol officials told us that using the term "apprehension" is inaccurate. Rather, using the terms "encounter" or "expulsion" would have been accurate. OIS officials acknowledged that they were aware CBP does not use the term "apprehension" to describe individuals expelled from the U.S. under Title 42, but did not correct or update the term in the titles of these tables in the 2021 *Border Security Metrics Report*.

According to DHS Directive 139-02 on Information Quality, DHS is to ensure and maximize the quality, objectivity, utility, and integrity of the information that it disseminates to the public.⁸⁰ Guidance implementing that directive states that DHS should have a process for reviewing the quality of information before it is disseminated.⁸¹ The guidance also states that the quality of information involves a focus on ensuring accurate information. Additionally, *Standards for Internal Control in the Federal Government* state that management officials should evaluate data sources for reliability and communicate quality information, including relevant data from reliable sources, to achieve an agency's objectives.⁸² The quality information can then be used by agency management and external stakeholders, such as policymakers, to make informed decisions and evaluate performance.

By implementing our prior recommendation to develop and implement a process to systematically review the reliability of data, DHS would be better positioned to comprehensively identify and fully disclose metrics' limitations and to maximize the quality of the data. Thereafter, by communicating the data or methodological limitations with the metrics, it

⁸⁰Department of Homeland Security, *Information Quality*, Directive 139-02.

⁸¹Department of Homeland Security, *Information Quality Implementation*, Instruction 139-02-001.

⁸²[GAO-14-704G](#).

would facilitate a better understanding and appropriate interpretation of the data in the context of the *Border Security Metrics Report*.

Conclusions

Since 2018, DHS has issued an annual *Border Security Metrics Report* containing metrics related to border security efforts, a key part of DHS's mission. This report makes an important contribution to understanding these efforts by providing data and information to policymakers and the public spanning multiple border domains and years.

OIS coordinated with multiple DHS components to provide updated data for the metrics it included in its 2021 *Border Security Metrics Report*, but DHS made limited progress in aligning certain metrics it already reports with their 2017 NDAA definitions. By better engaging with components, OIS could help obtain additional information needed and guide relevant DHS component efforts to more fully report the metrics according to their 2017 NDAA definitions. DHS also could benefit from engaging with Congress about metrics that have been challenging to report and that it has previously omitted. By periodically engaging with Congress, OIS could identify potential opportunities to refine the metrics and ensure the information is useful to Congress.

DHS improved the quality of information related to some metrics in its 2021 report. However, it has not fully assessed its deterrence model or identified limitations related to its methods, or the reliability of data it uses to report metrics. DHS uses a statistical model that estimates a deterrence rate to report on three metrics, but DHS has not assessed or updated the model since 2016. By conducting and documenting an assessment, and then updating or informing its efforts to replace the deterrence model, as appropriate, DHS can better ensure its choice of input administrative data and model type remains sufficiently predictive, and reflective of current southwest border conditions. In addition, we have continued to find that DHS has not addressed data limitations we have previously identified. We continue to believe that it would be beneficial to develop and implement a process to systematically review the reliability of data, and then communicate relevant limitations, consistent with our 2019 recommendations. Taking these actions would better position DHS to comprehensively identify and fully disclose metrics' limitations, and to maximize the quality of the data in the *Border Security Metrics Report*.

Recommendations for Executive Action

We are making the following four recommendations to DHS:

The Under Secretary for the Office of Strategy, Policy, and Plans should take steps to engage with components to more fully report the metrics as defined by the 2017 NDAA in its *Border Security Metrics Report*. (Recommendation 1)

The Under Secretary for the Office of Strategy, Policy, and Plans should periodically engage with Congress to improve the usefulness of information in its *Border Security Metrics Report*. (Recommendation 2)

The Under Secretary for the Office of Strategy, Policy, and Plans should assess the extent to which its choice of input administrative data and model type for its statistical model of deterrence remains sufficiently predictive, and document the results. (Recommendation 3)

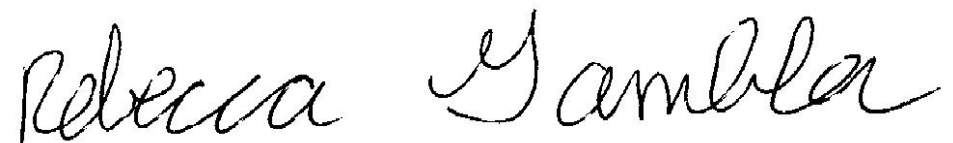
The Under Secretary for the Office of Strategy, Policy, and Plans should use the results of its assessment to update or inform its efforts to replace its statistical model of deterrence, as appropriate. (Recommendation 4)

Agency Comments and Our Evaluation

We provided a draft of this report to DHS for review and comment. DHS provided written comments, which are reproduced in appendix III. DHS also provided technical comments, which we incorporated as appropriate. DHS concurred with all four of our recommendations and described actions planned or underway that, if implemented fully, should address the intent of three of the recommendations. For the remaining recommendation, in addition to engaging with components to newly report metrics, DHS should ensure that it also engages with components to more fully report metrics already included in its *Border Security Metrics Report* according to their 2017 NDAA definitions.

We are sending copies of this report to the appropriate congressional committees and the Secretary of Homeland Security. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact Rebecca Gambler at 202-512-8777 or gablerr@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix IV.

A handwritten signature in black ink that reads "Rebecca Gambler". The signature is written in a cursive, flowing style.

Rebecca Gambler
Director, Homeland Security and Justice

Appendix I: Other Metrics for Measuring the Effectiveness of Border Security

In prior GAO reports, we have identified other metrics the Department of Homeland Security (DHS) could use to help measure the effectiveness of border security, in addition to the National Defense Authorization Act for Fiscal Year 2017 (2017 NDAA) metrics. These metrics spanned the four domains in the 2017 NDAA—between ports of entry, at ports of entry, the maritime border, and the air environment, respectively.¹ In our March 2019 and November 2021 reports, we identified 14 recommendations from 11 prior GAO reports.² We noted that implementing these recommendations would provide DHS with additional indicators and metrics that could provide important insights into the state of border security.

¹Pub. L. No. 114-328, div. A, title X, subtitle G, § 1092, 130 Stat. 2000, 2429-36 (2016) (classified at 6 U.S.C. § 223). The statute refers to the final domain as “Air and Marine security metrics in the land domain,” which it defines as aviation assets and operations of U.S. Customs and Border Protection’s (CBP) Air and Marine Operations. 6 U.S.C. § 223(e). In our 2019 report, we referred to this as “air and marine security in the land domain.”

²In our March 2019 report, we identified 11 recommendations from nine reports issued from August 2009 through January 2019 related to measures for assessing border security. In our November 2021 report, we identified three recommendations from two reports issued from January 2019 through September 2021. GAO, *Border Security: DHS Should Improve the Quality of Unlawful Border Entry Information and Other Metric Reporting*, [GAO-19-305](#) (Washington, D.C.: Mar. 21, 2019); and *Border Security Metrics: Progress Made, but DHS Should Take Additional Steps to Improve Information Quality*, [GAO-22-104651](#) (Washington, D.C.: Nov. 16, 2021). For the purpose of this report, we also reviewed 28 reports from our prior work and 73 DHS Office of Inspector General reports issued from October 2021 through September 2023. Through this review, we identified one relevant recommendation in a September 2023 DHS Office of Inspector General report addressing CBP efforts to inspect international mail. The DHS Office of Inspector General recommended that CBP update its August 2001 *International Mail Operations and Enforcement Handbook* to include, among other things, key performance metrics and targeting goals to assess the effectiveness of mail operations. CBP did not concur with the recommendation. The DHS Office of Inspector General considers this recommendation open and unresolved. DHS OIG, *CBP Did Not Effectively Conduct International Mail Screening or Implement the STOP Act*, OIG-23-56 (Washington, D.C.: Sept. 25, 2023).

Appendix I: Other Metrics for Measuring the Effectiveness of Border Security

The following tables provide updates on the recommendations included in our March 2019 and November 2021 reports.³ Of the 14 recommendations, seven have been implemented, four have been closed and not implemented, and three remain open as of September 2023. Implementing the open recommendations would provide DHS with additional indicators and metrics that could provide important insights into the state of border security. Tables 7–10 chronologically list the three open recommendations and four recommendations that have been implemented since our November 2021 report by domain. The tables also provide the status of DHS’s implementation of those recommendations as of September 2023.

Table 7: Other Metrics the Department of Homeland Security (DHS) Could Use to Measure the Effectiveness of Border Security Between Ports of Entry

GAO product title and number	Summary and finding	Recommended metric	Status of recommendation implementation as of September 2023
<p><i>Northern Border Security: CBP Identified Resource Challenges but Needs Performance Measures to Assess Security Between Ports of Entry</i>^a (GAO-19-470)</p>	<p>In June 2019, we reported on northern border security efforts. We found that the U.S. Border Patrol, a component of U.S. Customs and Border Protection (CBP), had performance measures that assessed specific border security operations or programs that included data from the northern border. However, these measures generally combined data with other border regions and, collectively, the measures did not assess effectiveness at securing the northern border between ports of entry. We concluded that without northern border performance measures, Border Patrol cannot assess its effectiveness at securing the northern border between ports of entry.</p>	<p>Border Patrol should develop and implement performance measures to assess its effectiveness at securing the northern border between ports of entry.</p>	<p>Open Border Patrol agreed with this recommendation and in April 2020 stated that it was developing new northern border security metrics. In a July 2023 update, Border Patrol stated that it had developed a catalog of metrics that are relevant to the northern border operational environment to better measure performance. Border Patrol stated that it is in the process of testing the catalog and estimated it will be fully functional in late 2023.</p>

³GAO-19-305. In our November 2021 report, we found that three of the 14 recommendations had been implemented and four had been closed and not implemented. GAO-22-104651.

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GAO product title and number	Summary and finding	Recommended metric	Status of recommendation implementation as of September 2023
<p><i>Southwest Border Security: Additional Actions Needed to Better Assess Fencing's Contributions to Operations and Provide Guidance for Identifying Capability Gaps</i> (GAO-17-331)</p>	<p>In February 2017, we reported on the use of border fencing along the southwest border. We found that Border Patrol collected data that could be useful to assess the contributions of border fencing to border security operations but had not conducted such an assessment.</p>	<p>Border Patrol should develop metrics to assess the contributions of pedestrian and vehicle fencing to border security along the southwest border, using the data Border Patrol already collects, and apply this information, as appropriate, when making investment and resource allocation decisions.</p>	<p>Closed – implemented (priority recommendation)^b DHS agreed with the recommendation. In January 2022, Border Patrol officials provided us with a demonstration of its model that uses quantitative analysis and qualitative field insight. According to these officials, Border Patrol is using the model to depict the overall balance of constraints and enablers that affect a station's current potential to perform its mission-essential tasks within its area of responsibility. Officials added that this model is helping Border Patrol determine what resources, including fencing, would benefit Border Patrol's operations. As Border Patrol is demonstrating that it is using available data to assess the effectiveness of and inform its investment decisions for assets such as pedestrian and vehicle fencing, we closed this recommendation as implemented.</p>

Appendix I: Other Metrics for Measuring the Effectiveness of Border Security

GAO product title and number	Summary and finding	Recommended metric	Status of recommendation implementation as of September 2023
<p><i>Arizona Border Surveillance Technology Plan: Additional Actions Needed to Strengthen Management and Assess Effectiveness</i> (GAO-14-368)</p>	<p>In March 2014, we reported on the status of DHS’s Arizona Border Surveillance Plan—a plan for security technology deployment across the Arizona border that includes a mix of radars, sensors, and cameras to help provide security for the Arizona border. We found that while CBP defined mission benefits for the technology programs under the plan, the agency did not develop key attributes for performance metrics for all surveillance technologies to be deployed as part of the plan.</p>	<p>CBP should analyze available data on apprehensions and seizures and technological assists, in combination with other relevant performance metrics or indicators, as appropriate, to determine the contribution of surveillance technologies to CBP’s border security efforts.</p>	<p>Closed - implemented (priority recommendation)</p> <p>DHS agreed with this recommendation. As of March 2019, Border Patrol was able to generate a performance report, using data collected from multiple systems, on how surveillance technologies have assisted agents during operations, including Border Patrol apprehensions. In January 2022, Border Patrol officials provided us with a demonstration of its model that uses quantitative analysis and qualitative field insight. According to these officials, Border Patrol is using the model to depict the overall balance of constraints and enablers that affect a station’s current potential to perform mission essential tasks within its area of responsibility. Officials added that this model is helping Border Patrol determine what resources, including technology, would benefit Border Patrol’s operations. As Border Patrol is demonstrating that it is using available data to assess the effectiveness of and inform its investment decisions for assets such as surveillance technologies, we closed this recommendation as implemented.</p>

Source: GAO analysis of prior GAO reports related to border security effectiveness metrics. | GAO-24-106277

^aWe issued this report, which identified an additional metric that DHS could use to measure border security effectiveness, in June 2019 and therefore, the metric was not listed in our March 2019 report. This report also appears in table 9 because it also includes a recommendation related to the air environment.

^bA priority open recommendation is one that may significantly improve government operations in the following ways: (1) realizing large dollar savings; (2) aiding in congressional decision-making on major issues; (3) substantially improving major government programs; (4) eliminating mismanagement, fraud, and abuse; (5) ensuring that programs comply with laws and that funds are legally spent; and (6) making progress toward addressing a high-risk or duplication, overlap, and fragmentation issue.

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Table 8: Other Metrics the Department of Homeland Security (DHS) Could Use to Measure the Effectiveness of Border Security at Ports of Entry

GAO product title and number	Summary and finding	Recommended metric	Status of recommendation implementation as of September 2023
<p><i>Land Ports of Entry: CBP Should Update Policies and Enhance Analysis of Inspections^a</i> (GAO-19-658)</p>	<p>In August 2019, we reported on U.S. Customs and Border Protection (CBP) processes for inspections at land ports of entry. We found that CBP uses various sets of performance measures to assess its efforts to detect illegal activity at land ports. We also found that these measures generally reflected key attributes of effective measures; however, CBP had not set an ambitious and realistic target for one measure. Specifically, CBP’s target for the land border interception rate—the estimated percentage of major violations in privately owned vehicles that CBP intercepts out of the projected total number of major violations—was lower than the actual reported rate for fiscal years 2015 through 2018.</p>	<p>CBP should develop a new target for the land border interception rate for passengers in privately owned vehicles with major violations that sets an ambitious and realistic goal on the basis of past performance.</p>	<p>Open CBP agreed with this recommendation. In May 2022, CBP officials stated that the COVID-19 pandemic and associated drop in inbound vehicle traffic at land ports of entry has impacted its ability to analyze the land border interception rate. In January 2023, CBP officials estimated that CBP would establish an updated target by the beginning of 2025. We will continue to monitor CBP’s ongoing efforts to address this recommendation.</p>

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GAO product title and number	Summary and finding	Recommended metric	Status of recommendation implementation as of September 2023
<p><i>Supply Chain Security: CBP Needs to Enforce Compliance and Assess the Effectiveness of the Importer Security Filing and Additional Carrier Requirements</i> (GAO-17-650)</p>	<p>In July 2017, we reported on CBP’s implementation of its Importer Security Filing (ISF) program related to compliance, enforcement, and performance. We found that the ISF rule data have improved CBP’s ability to identify high-risk cargo shipments, but CBP could collect additional performance information to better evaluate program effectiveness.</p>	<p>CBP should identify and collect additional performance information on the impact of the ISF rule data, such as the identification of shipments containing contraband, to better evaluate the effectiveness of the ISF program.</p>	<p>Closed – implemented CBP agreed with this recommendation. In March 2022, CBP officials provided documentary evidence to us that CBP had (1) implemented capabilities to identify and capture unmanifested containers, (2) identified the number of times an ISF entity is also a Customs Trade Partnership Against Terrorism (CTPAT) entity, and (3) developed system capabilities to actively display an indicator of a CTPAT entity in targeting systems for targeting personnel to recognize the lower risk of those entities. These actions should allow CBP to better evaluate whether the ISF program is meeting its intended goal of improving the identification of high-risk cargo shipments. Based on these actions, we closed this recommendation as implemented.</p>

Source: GAO analysis of prior GAO reports related to border security effectiveness metrics. | GAO-24-106277

^aThis August 2019 report identified improvements to another metric outside of those mandated by the National Defense Authorization Act and listed in our March 2019 report.

Appendix I: Other Metrics for Measuring the Effectiveness of Border Security

Table 9: Other Metric the Department of Homeland Security (DHS) Could Use to Measure the Effectiveness of Border Security at the Maritime Border

GAO product title and number	Summary and finding	Recommended metric	Status of recommendation implementation as of September 2023
<p><i>Coast Guard: Actions Needed to Enhance Performance Information Transparency and Monitoring</i> (GAO-18-13)</p>	<p>In October 2017, we reported on the U.S. Coast Guard's performance goals. We found that although the Coast Guard's performance goals were generally aligned with its statutory missions, the Coast Guard did not explain why certain aspects of mission performance were measured while others were not. We concluded that, in the absence of documentation explaining how existing performance goals address each mission, the extent to which the Coast Guard's performance goals encompass all of its mission activities is unclear.</p>	<p>The Coast Guard should either develop new performance goals to address mission activity gaps or explain in the Coast Guard's Annual Performance Report (APR) why certain aspects of mission performance are measured while others are not.</p>	<p>Closed – implemented The Coast Guard agreed with the recommendation and stated that it would add new measures in future APRs and explain what is measured and what is not, as appropriate. In January 2023, the Coast Guard released its fiscal year 2022 APR. Related to its drug interdiction mission, the fiscal year 2022 APR explains that the Coast Guard tracks multiple illicit drugs in the maritime environment. However, cocaine remains the predominate illicit drug moved via non-commercial maritime conveyances. The APR further states that data collected on other illicit drug interdictions compares trends in removal rates from year to year without annual targets. The description in its APR on how existing data sufficiently assess the performance of each mission provides more meaningful information on progress in achieving the Coast Guard's missions to executive branch decision-makers, Congress, and the public.</p>

Source: GAO analysis of prior GAO reports related to border security effectiveness metrics. | GAO-24-106277

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Table 10: Other Metric the Department of Homeland Security (DHS) Could Use to Measure the Effectiveness of Border Security in the Air Environment

GAO product title and number	Summary and finding	Recommended metric	Status of recommendation implementation as of September 2023
<p><i>Northern Border Security: CBP Identified Resource Challenges but Needs Performance Measures to Assess Security Between Ports of Entry</i>^a (GAO-19-470)</p>	<p>In June 2019, we reported on northern border security efforts. We found that while U.S. Border Patrol and Air and Marine Operations (AMO) have performance measures that assess specific border security operations or programs that include data from the northern border, these measures generally combine data with other border regions and, collectively, the measures do not assess effectiveness at securing the northern border between ports of entry. We concluded that without northern border performance measures, AMO cannot assess its effectiveness at securing the northern border between ports of entry.</p>	<p>AMO should implement performance measures to assess its effectiveness at securing the northern border between ports of entry in the air and maritime environments.</p>	<p>Open AMO agreed with this recommendation and in a May 2023 update, AMO stated that in order to ensure the data collection mechanism is reliable, AMO is collecting a full fiscal year's worth of data from 2023. AMO estimated that the performance measures will be implemented by early December 2023. We will continue to monitor AMO's ongoing efforts.</p>

Source: GAO analysis of prior GAO reports related to border security effectiveness metrics. | GAO-24-106277

Note: The National Defense Authorization Act for Fiscal Year 2017 refers to this domain as "Air and Marine security metrics in the land domain," which it defines as aviation assets and operations of AMO. 6 U.S.C. § 223(e).

^aWe issued this report, which identified an additional metric that DHS could use to measure border security effectiveness, in June 2019 and therefore, was not listed in our March 2019 report. This report also appears in table 7 because it also includes a recommendation related to the between ports of entry domain.

Appendix II: Border Security Metrics as Defined in the National Defense Authorization Act for Fiscal Year 2017

This appendix provides the border security metrics the Department of Homeland Security (DHS) is required to report on as defined in the National Defense Authorization Act for Fiscal Year 2017 (2017 NDAA).¹ This appendix organizes the metrics by each of the four domains listed in the NDAA: (1) metrics for securing the border between ports of entry, (2) metrics for securing the border at ports of entry, (3) metrics for securing the maritime border, and (4) Air and Marine security metrics in the land domain.²

Between Ports of Entry

Estimates—using alternative methodologies where appropriate, including recidivism data, survey data, known-flow data, and technologically measured data—of the five following metrics:

Attempted unlawful border crosser apprehension rate. The rate of apprehension of attempted unlawful border crossers.³

Detected unlawful entries. The number of detected unlawful border crossers who enter the U.S. and are not apprehended by a border security component of DHS.⁴

¹Pub. L. No. 114-328, div. A, title X, subtitle G, § 1092, 130 Stat. 2000, 2429-36 (2016) (classified at 6 U.S.C. § 223).

²Previously in this report, we refer to the fourth domain as “air environment” because the 2017 NDAA defines it as aviation assets and operations of Customs and Border Protection’s Air and Marine Operations (AMO). 6 U.S.C. § 223(e)(1).

³6 U.S.C. § 223(b)(1)(A)(i).

⁴Id. at § 223(a)(11), (b)(1)(A)(ii).

Estimated undetected unlawful entries. The number of estimated undetected unlawful border crossers who enter the U.S. and are not apprehended by a border security component of DHS.⁵

Turn backs. The number of unlawful border crossers who, after making unlawful entries into the U.S., respond to U.S. enforcement efforts by returning promptly to the country from which they entered.⁶

Got aways. The number of unlawful border crossers who—(A) are directly or indirectly observed making unlawful entries into the U.S., (B) are not apprehended, and (C) are not turn backs.⁷

Measurement of situational awareness achieved in each U.S. Border Patrol sector. Measurement of the knowledge and understanding of current unlawful cross-border activity, for each U.S. Border Patrol sector, including the following: (A) threats and trends concerning illicit trafficking and unlawful crossings, (B) the ability to forecast future shifts in such threats and trends, (C) the ability to evaluate such threats and trends at a level sufficient to create actionable plans, and (D) the operational capability to conduct persistent and integrated surveillance of the international borders of the U.S.⁸

Unlawful border crossing effectiveness rate in each U.S. Border Patrol sector. For each U.S. Border Patrol sector, the percentage that results from dividing the number of apprehensions and turn backs by the sum of the number of apprehensions, estimated undetected unlawful entries, turn backs, and got aways.⁹

Probability of detection rate. Rate that compares the estimated total unlawful border crossing attempts not detected by U.S. Border Patrol to the unlawful border crossing effectiveness rate, as informed by the attempted unlawful border crosser apprehension rate; the number of

⁵Id. at § 223(a)(11), (b)(1)(A)(iii).

⁶Id. at § 223(a)(9), (b)(1)(A)(iv).

⁷Id. at § 223(a)(3), (b)(1)(A)(v).

⁸Id. at § 223(a)(7), 223(b)(1)(B).

⁹Id. at § 223(a)(10), (b)(1)(C).

detected unlawful entries, turn backs, and got aways; and the number of estimated undetected unlawful entries.¹⁰

Apprehensions in each U.S. Border Patrol sector. The number of apprehensions in each U.S. Border Patrol sector.¹¹

Apprehensions of unaccompanied alien children. The number of apprehensions, and nationality of such unaccompanied children, in each U.S. Border Patrol sector.¹²

Apprehensions of family units. The number of apprehensions of family units, and the nationality of such family units, in each U.S. Border Patrol sector.¹³

Between the ports illicit drug seizure rate. Rate for illicit drugs seized by U.S. Border Patrol between ports of entry, which compares the ratio of the amount and type of illicit drugs seized between ports of entry in any fiscal year to the average of the amount and type of illicit drugs seized between ports of entry in the immediately preceding 5 fiscal years.¹⁴

Estimates of the impact of the Consequence Delivery System on recidivism. Estimates of the impact on the rate of recidivism of unlawful border crossers over multiple fiscal years of the Consequence Delivery System, which is the series of consequences applied by U.S. Border Patrol in collaboration with other federal agencies to persons unlawfully entering the U.S. in order to prevent unlawful border crossing recidivism.¹⁵

Examination of each consequence under the Consequence Delivery System. An examination of each of the following consequences under the Consequence Delivery System: (i) voluntary return, (ii) warrant of arrest or notice to appear, (iii) expedited removal, (iv) reinstatement of removal, (v) alien transfer exit program, (vi) criminal consequence

¹⁰Id. at § 223(a)(3), (9), (11), (b)(1)(D).

¹¹Id. at § 223(b)(1)(E).

¹²Id. at §§ 223(b)(1)(F), 279(g)(2).

¹³Id. at § 223(b)(1)(G).

¹⁴Id. at § 223(b)(1)(H).

¹⁵Id. at § 223(a)(2), (11), (b)(1)(I).

program, (vii) standard prosecution, and (viii) Operation Against Smugglers Initiative on Safety and Security.¹⁶

At Ports of Entry

Estimates—using alternative methodologies where appropriate, including recidivism data, survey data, and randomized secondary screening data—of the three following metrics:

Total inadmissible travelers at ports of entry. The total inadmissible travelers who attempt to, or successfully, enter the U.S. at a port of entry.¹⁷

Refusal and interdiction rate at ports of entry. The rate of refusals and interdictions for travelers who attempt to, or successfully, enter the U.S. at a port of entry.¹⁸

Unlawful entries at ports of entry. The number of unlawful entries at a port of entry.¹⁹

Illicit drugs seized at ports of entry. The amount and type of illicit drugs seized by the U.S. Customs and Border Protection's (CBP) Office of Field Operations (OFO) at ports of entry during the previous fiscal year.²⁰

Port of entry illicit drugs seizure rate. Illicit drugs seizure rate for drugs seized by OFO, which compares the ratio of the amount and type of illicit drugs seized OFO in any fiscal year to the average of the amount and type of illicit drugs seized by OFO in the immediately preceding 5 fiscal years.²¹

¹⁶Id. at § 223(b)(1)(J). For more information on the Consequence Delivery System, see GAO, *Border Patrol: Actions Needed to Improve Oversight of Post-Apprehension Consequences*, [GAO-17-66](#) (Washington, D.C.: Jan. 12, 2017).

¹⁷6 U.S.C. § 223(c)(1)(A)(i); 8 U.S.C. § 1182(a).

¹⁸6 U.S.C. § 223(c)(1)(A)(ii).

¹⁹Id. at § 223(a)(11), (c)(1)(A)(iii).

²⁰Id. at § 223(c)(1)(B).

²¹Id. at § 223(c)(1)(C).

Major infractions at ports of entry. The number of infractions related to travelers and cargo committed by major violators who are interdicted by OFO at ports of entry, and the estimated number of such infractions committed by major violators who are not so interdicted. Major violators are persons or entities that have engaged in serious criminal activities at any land, air, or sea port of entry, including the following: (A) possession of illicit drugs, (B) smuggling of prohibited products, (C) human smuggling, (D) possession of illegal weapons, (E) use of fraudulent documents, and (F) any other offense that is serious enough to result in an arrest.²²

Cocaine seizures effectiveness rate. In consultation with the heads of the Office of National Drug Control Policy and the U.S. Southern Command, a cocaine seizure effectiveness rate, which is the percentage resulting from dividing the amount of cocaine seized by OFO by the total estimated cocaine flow rate at ports of entry along the U.S. land border with Mexico and Canada.²³

A measurement of how border security operations affect crossing times, including the four following metrics:

Ratio of average wait times and traffic volume. A wait time ratio that compares the average wait times to total commercial and private vehicular traffic volumes at each land port of entry.²⁴

Infrastructure capacity utilization rate. An infrastructure capacity utilization rate that measures traffic volume against the physical and staffing capacity at each land port of entry.²⁵

Secondary examination rate. Rate that measures the frequency of secondary examinations at each land port of entry.²⁶

²²Id. at § 223(a)(5), (c)(1)(D).

²³Id. at § 223(c)(1)(E).

²⁴Id. at § 223(c)(1)(F)(i).

²⁵Id. at § 223(c)(1)(F)(ii).

²⁶Id. at § 223(c)(1)(F)(iii).

Secondary examinations effectiveness rate. Enforcement rate that measures the effectiveness of such secondary examinations at detecting major violators.²⁷

A seaport scanning rate that includes the four following metrics:

Number of potentially “high-risk” cargo containers. The number of all cargo containers that are considered potentially “high-risk”, as determined by the Executive Assistant Commissioner of OFO.²⁸

Ratio of potentially high-risk cargo containers scanned relative to high-risk containers entering in previous fiscal year. A comparison of the number of potentially high-risk cargo containers scanned by OFO at each sea port of entry during a fiscal year to the total number of high-risk cargo containers entering the U.S. at each such sea port of entry during the previous fiscal year.²⁹

Potentially high-risk cargo containers scanned upon U.S. arrival by sea. The number of potentially high-risk cargo containers scanned upon arrival at a U.S. sea port of entry.³⁰

Potentially high-risk cargo containers scanned before U.S. arrival by sea. The number of potentially high-risk cargo containers scanned before arrival at a U.S. sea port of entry.³¹

Maritime Border

Situational awareness achieved in the maritime environment.

Knowledge and understanding of current unlawful cross-border activity in the maritime environment, including the following: (A) threats and trends concerning illicit trafficking and unlawful crossings, (B) the ability to forecast future shifts in such threats and trends, (C) the ability to evaluate

²⁷Id. at § 223(c)(1)(F)(iv).

²⁸Id. at § 223(c)(1)(G)(i).

²⁹Id. at § 223(c)(1)(G)(ii).

³⁰Id. at § 223(c)(1)(G)(iii).

³¹Id. at § 223(c)(1)(G)(iv).

such threats and trends at a level sufficient to create actionable plans, and (D) the operational capability to conduct persistent and integrated surveillance of the international borders of the U.S.³²

Known maritime migrant flow rate. An unspecified rate of known maritime migrant flow, which flow is the sum of the number of undocumented migrants—(A) interdicted in the waters over which the U.S. has jurisdiction; (B) identified at sea either directly or indirectly, but not interdicted; (C) if not described in (A) or (B), who were otherwise reported, with a significant degree of certainty, as having entered, or attempted to enter, the U.S. through the maritime border.³³

Illicit drugs removal rate. Rate for drugs removed inside and outside of a transit zone, which compares the amount and type of illicit drugs removed, including drugs abandoned at sea, by DHS maritime security components in any fiscal year to the average of the amount and type of illicit drugs removed by such maritime components for the immediately preceding 5 fiscal years. The term “transit zone” means the sea corridors of the western Atlantic Ocean, the Gulf of Mexico, the Caribbean Sea, and the eastern Pacific Ocean through which undocumented migrants and illicit drugs transit, either directly or indirectly, to the U.S.³⁴

Cocaine removal effectiveness rate. In consultation with the heads of the Office of National Drug Policy and the U. S. Southern Command, a rate for cocaine removed inside a transit zone and outside a transit zone that compares the amount of cocaine removed by DHS maritime security components with the total documented cocaine flow rate, as contained in federal drug databases.³⁵

DHS known maritime threat response rate. Rate that compares the ability of the maritime security components of DHS to respond to and resolve known maritime threats, whether inside or outside a transit zone, by placing assets on-scene, with the total number of events with respect to which DHS has known threat information.³⁶

³²Id. at § 223(a)(7), (d)(1)(A).

³³Id. at § 223(a)(4), (d)(1)(B).

³⁴Id. at § 223(a)(8), (d)(1)(C).

³⁵Id. at § 223(a)(8), (d)(1)(D).

³⁶Id. at § 223(d)(1)(E).

Intergovernmental actionable maritime threat response rate. Rate that compares the ability of the maritime security components of DHS or other U. S. government entities to respond to and resolve actionable maritime threats, whether inside or outside a transit zone, with the number of such threats detected.³⁷

Air and Marine Security in the Land Domain

Flight hour effectiveness rate. Rate that compares CBP Air and Marine Operations (AMO) flight hours requirements the number of flight hours flown by AMO.³⁸

Funded flight hour effectiveness rate. Rate that compares the number of funded flight hours appropriated to AMO to the number of actual flight hours flown by AMO.³⁹

AMO readiness rate. Rate that compares the number of aviation missions flown by AMO to the number of aviation missions cancelled by AMO due to maintenance, operations, or other causes.⁴⁰

AMO weather-related cancellation rate. The number of missions AMO cancelled due to weather compared to the total number of planned missions.⁴¹

Individuals detected by AMO. The number of individuals detected by AMO through the use of unmanned aerial systems and manned aircraft.⁴²

Apprehensions assisted by AMO. The number of apprehensions assisted by AMO through the use of unmanned aerial systems and manned aircraft.⁴³

³⁷Id. at § 223(a)(8), (d)(1)(F).

³⁸Id. at § 223(e)(1)(A).

³⁹Id. at § 223(e)(1)(B).

⁴⁰Id. at § 223(e)(1)(C).

⁴¹Id. at § 223(e)(1)(D).

⁴²Id. at § 223(e)(1)(E).

⁴³Id. at § 223(e)(1)(F).

Illicit drug seizures assisted by AMO. The number and quantity of illicit drug seizures assisted by AMO through the use of unmanned aerial systems and manned aircraft.⁴⁴

AMO actionable intelligence. The number of times that actionable intelligence related to border security was obtained through the use of unmanned aerial systems and manned aircraft.⁴⁵

⁴⁴Id. at § 223(e)(1)(G).

⁴⁵Id. at § 223(e)(1)(H).

Appendix III: Comments from the Department of Homeland Security

**Appendix III: Comments from the Department
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U.S. Department of Homeland Security
Washington, DC 20528



**Homeland
Security**

October 31, 2023

Rebecca Gambler
Director, Homeland Security & Justice Issues
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548-0001

Re: Management Response to Draft Report GAO-24-106277, "Reporting of Border Security Metrics Could Be Improved"

Dear Ms. Gambler:

Thank you for the opportunity to comment on this draft report. The U.S. Department of Homeland Security (DHS or the Department) appreciates the U.S. Government Accountability Office's (GAO) work in planning and conducting its review and issuing this report.

DHS leadership is pleased to note GAO's recognition that DHS's fiscal year (FY) 2021 Border Security Metrics Report (BSMR) made improvements on previous reports, such as implementing a prior GAO recommendation to include measures of statistical uncertainty for all metrics that rely on its statistical model. Securing the U.S. borders is a complex undertaking for which DHS has made significant investments over the years. Accordingly, DHS continues to make important contributions in providing data and information on the changing state of border security for stakeholders to understand the effectiveness of these investments.

The DHS Office of Strategy, Policy, and Plans (PLCY) acknowledges the issues, challenges, and limitations GAO found in the FY 2021 BSMR, which were addressed to a notable degree in the development of the FY 2022 and 2023 BSMR. PLCY discussed its efforts to address the FY 2021 BSMR issues with GAO during this audit, including informing the audit team of engagements with Components to interpret metric requirements from Congress to source data, and to report on the last metrics (planned to be complete in 2024 report). PLCY also continued meeting with Congressional staff to

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of Homeland Security**

inform Congress of the new Office of Homeland Security Statistics (OHSS),¹ as well as update committees on DHS's creation of the Migration Analysis Center (MAC),² which both provide modeling capabilities that include focus on border activities and challenges. DHS continues to build rapport for future discussions to get clarity on topics related to border security, highlight OHSS reporting, and solicit requirements for new reporting and to reduce outdated reporting.

The draft report contained four recommendations with which the Department concurs. Enclosed find our detailed response to each recommendation. DHS previously submitted technical comments addressing several accuracy, contextual, and other issues under a separate cover for GAO's consideration.

Again, thank you for the opportunity to review and comment on this draft report. Please feel free to contact me if you have any questions. We look forward to working with you again in the future.

Sincerely,

JIM H CRUMPACKER Digitally signed by JIM H
CRUMPACKER
Date: 2023.10.31 14:37:17 -04'00'

JIM H. CRUMPACKER, CIA, CFE
Director
Departmental GAO-OIG Liaison Office

Enclosure

¹ On September 29, 2023, Secretary of Homeland Security Alejandro N. Mayorkas signed a memorandum formally establishing OHSS. OHSS creates objective, credible, accurate, relevant, timely, and authoritative statistical homeland security data products to increase transparency for the interagency, Congress, and the public and to support internal evidence-based policymaking and leadership decisions.

² The Joint Explanatory Statement accompanying the FY 2022 DHS Appropriations Bill directed the establishment of the MAC and provided funding above President's request to establish the MAC. The MAC works with other parts of DHS, the interagency, and private sector partners to support evidence-based policymaking by leading enterprise-wide research on the causes and consequences of U.S. immigration and the impacts of migration-related policies and programs.

**Enclosure: Management Response to Recommendations
Contained in GAO-24-106277**

GAO recommended the Under Secretary for PLCY:

Recommendation 1: Take steps to engage with components to more fully report the metrics as defined by the 2017 NDAA [National Defense Authorization Act for Fiscal Year 2017] in its Border Security Metrics Report.

Response: Concur. PLCY met with U.S. Coast Guard's (USCG) and U.S. Customs and Border Protection's (CBP) operational sub-components in three meetings in June 2023 to discuss: (1) scoping, sourcing data, and reporting on two additional metrics for the FY 2022 BSMR associated primarily with USCG maritime activities; (2) scoping, sourcing, and reporting on two more metrics for the FY 2023 BSMR associated with CBP activities; (3) scoping, sourcing, and reporting on two metrics for the FY 2024 BSMR associated with CBP activities. In addition, PLCY communicated with the RAND Corporation and CBP regarding a projected model update to address challenges of the interruption to participation in the Mexican survey due to restrictions of social engagement during the Coronavirus Disease 2019 pandemic. PLCY expects the FY 2023 BSMR to be released in November 2023 and the FY 2024 BSMR to be released in late summer of 2024. Estimated Completion Date (ECD): October 31, 2024.

Recommendation 2: Periodically engage with Congress to improve the usefulness of information in its Border Security Metrics Report.

Response: Concur. In FY 2023, PLCY informed, and met with, congressional staff on establishment of the OHSS and updated the U.S House of Representatives Judiciary Committee, House Committee on Appropriations, and U.S. Senate Committee on Appropriations on establishment of the MAC. During these engagements, PLCY highlighted its increasing modeling capabilities to report on border activities as well as challenges in reporting. As OHSS transitions to full capabilities and attains Office of Management and Budget's endorsement as an independent Recognized Statistical Agency or Unit, PLCY expects more direct engagement with congressional staff to share data (such as via a standing weekly provision of data), clarify reporting details, and identify data requirements. ECD: October 31, 2024.

Recommendation 3: Assess the extent to which its choice of input administrative data and model type for its statistical model of deterrence remains sufficiently predictive, and document the results.

**Appendix III: Comments from the Department
of Homeland Security**

Response: Concur. PLCY is exploring alternative methods to produce defensible estimates of unauthorized entries due to challenges with the current model. This may involve assessments of the current statistical model of deterrence, its predictiveness, and use of alternative sources of administrative data. Further discussion of the new methodology and its results will be provided in the future report, once a methodology is finalized. ECD: October 31, 2024.

Recommendation 4: Use the results of its assessment to update or inform its efforts to replace its statistical model of deterrence, as appropriate.

Response: Concur. Any results of assessments of the current model of deterrence are, and will continue to be, used to inform research into alternative methods of producing estimates of unauthorized entries. In August 2023, OHSS worked with the RAND Corporation, the Homeland Security Operational Analysis Center, and Federally Funded Research and Development Centers to deliver an assessment and recommendations for alternative modeling to the CBP Planning, Analysis, and Requirements Evaluation team regarding its Operational Performance Simulator (OPS), which is being considered as the source of FY 2022 estimates of unauthorized entries in the FY 2023 Border Security Metrics Report. Future reports may rely on OPS or may use an alternative methodology. ECD: October 31, 2024.

Accessible Text for Appendix III: Comments from the Department of Homeland Security

October 31, 2023

Rebecca Gambler
Director, Homeland Security & Justice Issues
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548-0001

Re: Management Response to Draft Report GAO-24-106277, “Reporting of Border Security Metrics Could Be Improved”

Dear Ms. Gambler:

Thank you for the opportunity to comment on this draft report. The U.S. Department of Homeland Security (DHS or the Department) appreciates the U.S. Government Accountability Office’s (GAO) work in planning and conducting its review and issuing this report.

DHS leadership is pleased to note GAO’s recognition that DHS’s fiscal year (FY) 2021 Border Security Metrics Report (BSMR) made improvements on previous reports, such as implementing a prior GAO recommendation to include measures of statistical uncertainty for all metrics that rely on its statistical model. Securing the U.S. borders is a complex undertaking for which DHS has made significant investments over the years. Accordingly, DHS continues to make important contributions in providing data and information on the changing state of border security for stakeholders to understand the effectiveness of these investments.

The DHS Office of Strategy, Policy, and Plans (PLCY) acknowledges the issues, challenges, and limitations GAO found in the FY 2021 BSMR, which were addressed to a notable degree in the development of the FY 2022 and 2023 BSMR. PLCY discussed its efforts to address the FY 2021 BSMR issues with GAO during this audit, including informing the audit team of engagements with Components to interpret metric requirements from Congress to source data, and to report on the last metrics (planned to be complete in 2024 report). PLCY also continued meeting with Congressional staff to inform Congress of the new Office of Homeland Security

Statistics (OHSS),¹ as well as update committees on DHS's creation of the Migration Analysis Center (MAC),² which both provide modeling capabilities that include focus on border activities and challenges. DHS continues to build rapport for future discussions to get clarity on topics related to border security, highlight OHSS reporting, and solicit requirements for new reporting and to reduce outdated reporting.

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Appendix IV: GAO Contact and Staff Acknowledgments

GAO Contact

Rebecca Gambler, at (202) 512-8777 or gablerr@gao.gov

Staff Acknowledgements

In addition to the contact named above, Taylor Matheson (Assistant Director), Emily Hutz (Analyst-in-Charge), Benjamin Crossley, Dominick Dale, Michele Fejfar, Sasan J. “Jon” Najmi, Cristina Norland, Christine Stenglein, and Jeff Tessin made key contributions to this report.

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