

Border 2020: US-MEXICO ENVIRONMENTAL PROGRAM

State of the Border Region Indicators Interim Report 2016



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1. REPORT OVERVIEW

The *State of the Border Region 2016 Interim Report* provides information on the status and trends of environmental quality in the U.S.-Mexico border region. In doing so, it also illustrates progress made under the U.S.-Mexico Border 2020 program.

This report builds on the flagship 2005 *State of the Border Region* report and the 2010 *State of the Border Region* report. It refreshes and updates key indicators from 2010 and adds new indicators to reflect new areas of Border 2020 focus and activity. As with previous reports, this report is structured around the goals of Border 2020 with chapters on air, water, land, environmental readiness and response, and enforcement and compliance.

Indicators are presented with brief data source information below each indicator. Complete underlying data and details on indicator data sources are available in a companion document, *State of the Border Region 2016 Interim Update: Indicator Metadata and Data Tables*.

Border 2020

Border 2020 is an eight-year cooperative program between the United States and Mexico. It was initiated in 2013 as a successor to Border 2012. Border 2020's mission is to "protect the environment and public health in the U.S.-Mexico border region, consistent with the principles of sustainable development." Through Border 2020, federal, state, tribal, and local institutions and agencies collaboratively work to produce prioritized and sustained actions that consider the needs of border communities. The actions implemented under Border 2020 are guided by a series of results-oriented goals and objectives. Border 2020's goals and objectives were updated at the end of the Border 2012 period to reflect new needs and opportunities in the region.

Border 2020 is the latest cooperative initiative implemented under the 1983 La Paz Agreement. It builds on the previous efforts, particularly Border XXI, which marked the first binational effort to develop environmental indicators for the border region.

How Were Indicators Developed for This Report?

The starting point for indicators included in this report was the 2010 *State of the Border Region* report. A key guiding principle carried forward from the 2010 report is that indicators should be as relevant as possible to the work of achieving Border 2020 goals and objectives. Border 2020 working groups identified which indicators were most important to update for 2016 and what new indicators should be introduced. Working groups also provided new annual data. In some cases, they updated data originally reported in 2010 where data sources improved or were more complete. As with the 2010 report, the indicator development process focused on identifying comparable binational data specific to the border region (defined as 100 kilometers north and south of the

Border 2020 Goals

- Goal 1:** Reduce Air Pollution
- Goal 2:** Improve Access to Clean and Safe Water
- Goal 3:** Promote Materials Management, Waste Management, and Clean Sites
- Goal 4:** Enhance Joint Preparedness for Environmental Response
- Goal 5:** Enhance Compliance Assurance and Environmental Stewardship

Each of the Border 2020 goals is accompanied by specific objectives and sub-objectives related to specific border environment issues.

international border). In many cases, data sources and policies differed enough between the U.S. and Mexico that separate but related indicators needed to be reported for both countries. Data specific to the border region were not always available. If they were available, they often were reported at the municipal or county-level or even at the level of U.S. and Mexico border states, requiring data aggregation or interpretation in order to describe the border region.

What Indicators Are Included and How Are They Described?

The first chapter of the report focuses on general information about the border region. It provides the context for many of the current environmental and health challenges in the region. The five chapters that follow present indicators related to specific Border 2020 program goals and objectives.

The graphic on the next page illustrates how indicators are presented in the report. Indicators are grouped according to questions. Each indicator is accompanied by a reference to the indicator type (i.e., pressure, need, output, or outcome as described in the call-out box on this page). For each indicator, the report includes a chart or table to accompany the indicator text. The report identifies the most relevant Border 2020 objective or sub-objective for each group of indicators. Additionally, each indicator description addresses the questions:

- Why is this indicator important?
- What is this indicator showing?
- What influences this indicator and what can be done in the future?
- What technical considerations are important for understanding this indicator and its limitations?

We hope that you find this report informative and useful, and we invite your feedback on future indicators to help measure environmental quality and environmental health in the border region.

Types of Indicators

Pressure: Indicators that describe human activities that place stresses on the environment.

Need: Indicators that inform our understanding of the magnitude or type of need for a programmatic response.

Output: Indicators that measure activities, products, or services resulting from a project or program.

Outcome: Indicators that measure changes in the state of the environment or the effects of environmental conditions on human and/or ecological health.

Reduce Water Contamination

Are homes in the U.S.-Mexico border region being connected to safe drinking water and wastewater treatment services?

Indicators

- Number of Unserved Homes Connected to Safe Drinking Water through the Border Water Infrastructure Program **OUTPUT**
- Number of Unserved Homes Connected to Wastewater Collection and Treatment Services through the Border Water Infrastructure Program **OUTPUT**

Objective: Promote the increase in the number of homes connected to safe drinking water and adequate wastewater treatment.

Indicator Name

Why Are These Indicators Important?

Poor quality drinking water and inadequate wastewater collection and treatment can pose a significant public health risk. Exposure to contaminated water and wastewater can lead to environmental contamination. Access to safe drinking water and adequate wastewater treatment is a key goal of the protection of public and ecological health through adequate wastewater collection and treatment. This is a key goal of U.S.-Mexico border programs.

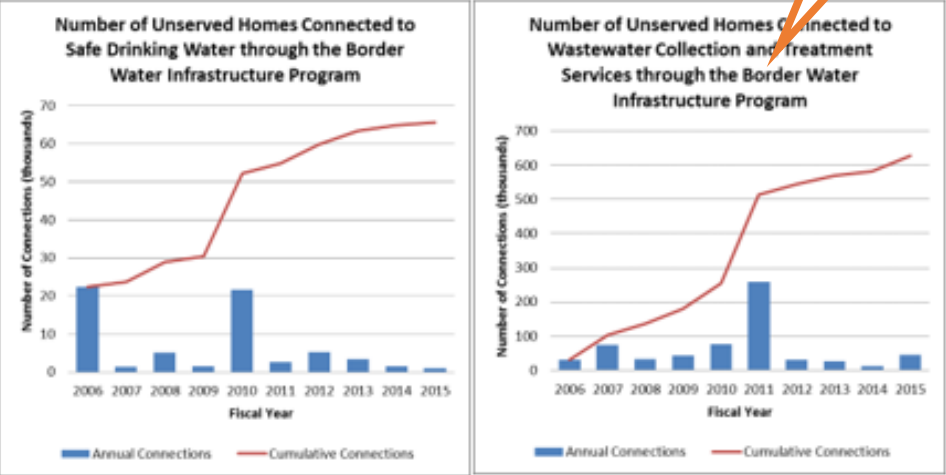
Indicator Type

Border 2020 Objective

What Are These Indicators Showing?

No comprehensive data on drinking water and sanitation infrastructure needs along the border is available for comparison purposes. However, EPA has tracked the number of homes provided with first-time access to essential drinking water and wastewater services through the BWIP. The figures below show annual and cumulative connections that resulted from these projects since 2006. Cumulatively, 626,631 homes were connected to a safe community drinking water system and 626,631 homes were connected to adequate wastewater collection and treatment service during this ten-year period.

Indicator Chart



2. THE U.S.-MEXICO BORDER REGION

The U.S.-Mexico border region, as defined by the 1983 La Paz Agreement, is the area within 100 kilometers (about 62.5 miles) on either side of the U.S.-Mexico border. It extends 3,141 kilometers (1,952 miles) from the Gulf of Mexico on the east to the Pacific Ocean on the west. The region is comprised of 10 states (four U.S. and six Mexican), which are organized through the Border 2020 program into four Border Regional Workgroups. The region is also home to 26 federally-recognized tribes in the U.S., and a number of indigenous communities in Mexico. The Border 2020 program recognizes 15 “sister city” pairs along the border, which are adjacent U.S. and Mexico border cities that share significant social and economic ties.

U.S.-Mexico Border Region



Source: Natural Earth dataset

Although divided by an international border, the region is connected by historical, cultural, family, and economic ties. It is also united by shared air and water resources, habitats, and climates that do not observe political boundaries. These connections create common cause for the people living in the border region to sustain and improve their shared environment.

The region's environmental quality and environmental health are influenced by trends in population, the economy, and industrial activity. These forces have created some of the challenges being addressed by current Border 2020 activities, and they will continue to create new challenges for managing environmental quality and improving environmental health in the region.

This overview of the U.S.-Mexico border region covers border region population and population growth projections.

U.S.-Mexico Border Region

What are the population trends in the border region?

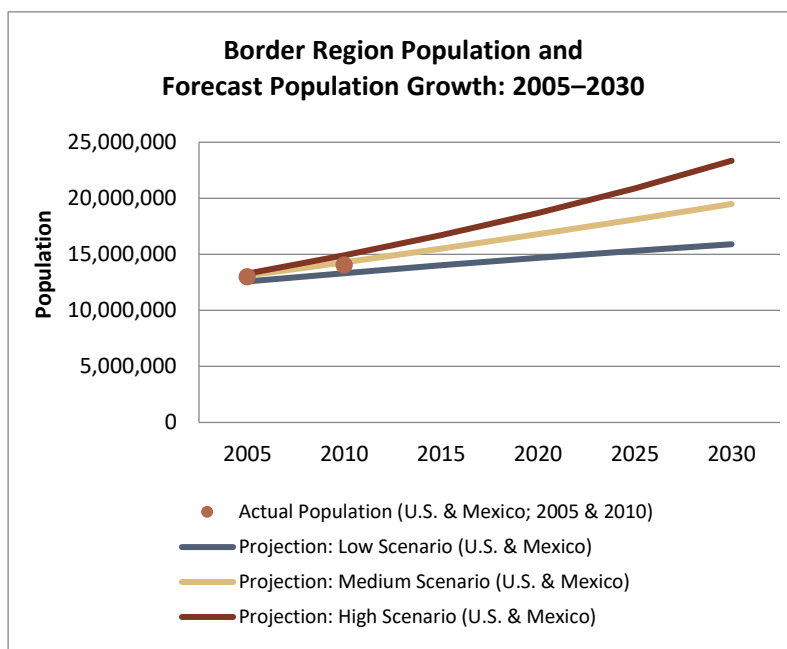
Indicators:

- ➔ **Border Region Population and Forecast Population Growth: 2005–2030** PRESSURE
- ➔ **Census and Projected Border Region Population (U.S.): 2005–2015** PRESSURE
- ➔ **Comparison of Population Projections (Mexico): 2005–2030** PRESSURE

Between 1983 and 2010, the border region population grew from 6.9 million people to just over 14 million people. Projections based on the 2010 census estimate that the border region population in 2015 is over 15.3 million. The vast majority reside in 15 paired inter-dependent sister cities; the remaining residents live in smaller tribal and indigenous communities or in rural areas.

Why Are These Indicators Important?

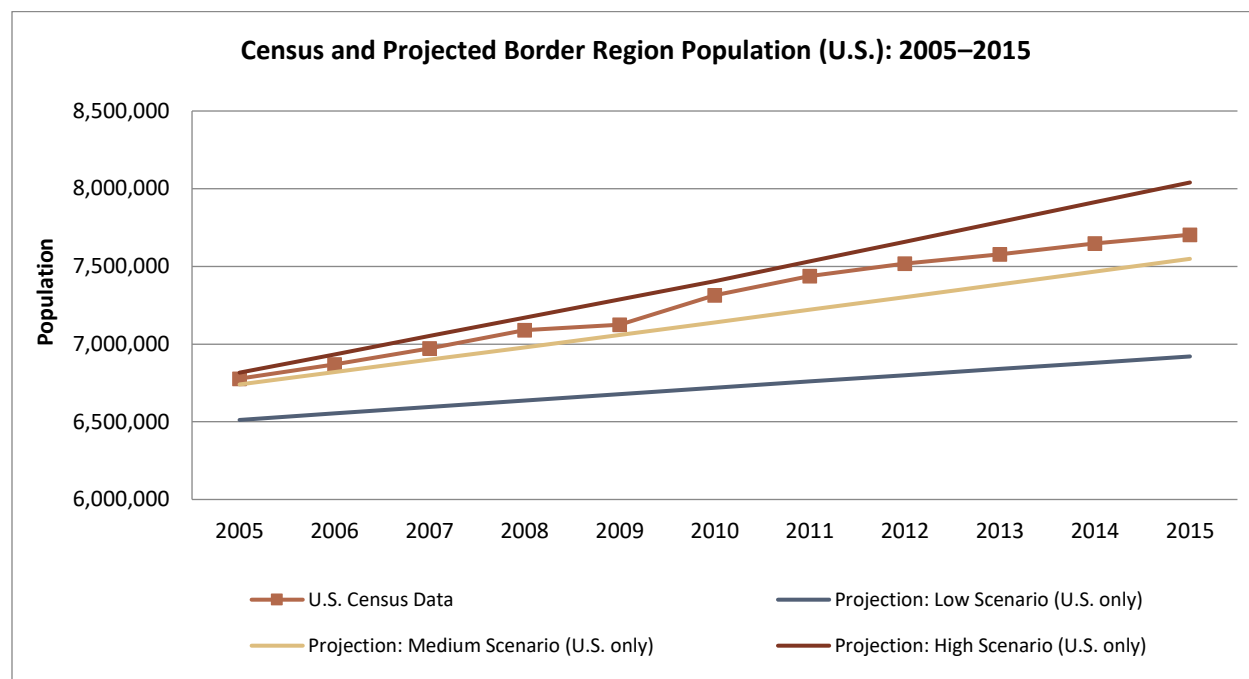
Population growth in the region puts pressure on air, water, and land. It also creates additional demand for services—such as water supply and wastewater treatment—to ensure a safe and healthy living environment. Growth puts pressure on surrounding land and habitat. In metropolitan areas, growth increases regional concentrations of air emissions—particularly from transportation sources—and heightens demand on drinking water and wastewater infrastructure. In rural areas, growth creates new challenges to provide services to isolated populations, colonias (unincorporated communities or settlements in rural areas as well as adjacent to cities and towns), and to tribal and indigenous communities, which may have substandard housing and unsafe drinking water or wastewater systems.



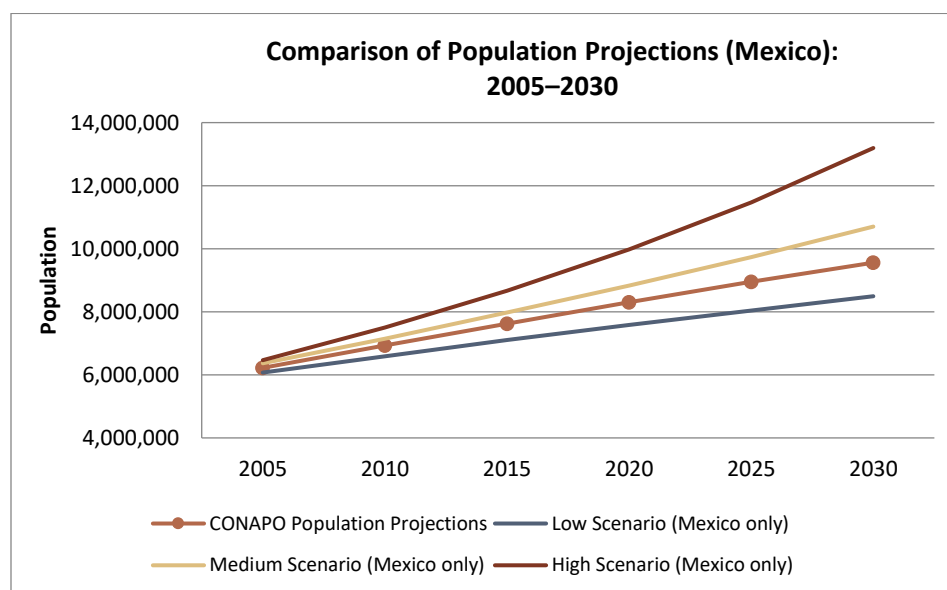
What Are the Indicators Showing?

The most recent actual population data available from census agencies in the U.S. and Mexico is for 2010. It shows a regional population of 14 million. Actual regional population as a whole is trending along a medium growth path estimated—along with high and low growth paths—in a 2003 study of anticipated border region population growth by Peach and Williams.

Near-term projections based on census data for the U.S., which are available through 2015, suggest that the U.S. side of the border region may be on a path between the medium and high Peach and Williams growth scenarios.



Official population projections for the Mexico border region from Consejo Nacional de Población (CONAPO) for the period 2005–2030 suggest that Mexico’s border region may grow on a path between the medium and low Peach and Williams scenarios.



What Influences These Indicators, and What Can Be Done in the Future?

Population growth is a function of birth rates, death rates, and net migration. For the border region, migration is a key factor as people move to the urbanized and industrialized areas of northern Mexico and to major U.S. metropolitan areas such as San Diego and El Paso.

Technical Considerations

Current population statistics in the U.S. and Mexico are estimates developed by the respective countries' census agencies. Both the U.S. and Mexico are implementing a complete national census in 2020, which will provide an update on population and demographic data. Estimates of border region population are based on county-level data in the U.S. and municipality-level data in Mexico. Some border counties in the U.S. extend beyond the 100 kilometer border region (which will tend to over-count the region's population).

Data Sources

- J. Peach and J. Williams. 2003. "Population Dynamics of the U.S.-Mexican Border Region." Unpublished, forthcoming SCERP Monograph. San Diego: SCERP/SDSU Press
- U.S. Census, Annual Estimates of the Resident Population for Counties of CA, AZ, NM, TX
- INEGI, Indicadores demográficos - por municipio, 2005 and 2010
- CONAPO, 2005–2030 projections

3. AIR

Air quality in the border region is impacted by pollutants from a number of sources. Motor vehicles, power plants, industrial facilities, agricultural operations, mining, dust from unpaved roads, and open burning (e.g., for heating, cooking and trash disposal) all affect urban and regional air quality along the U.S.-Mexico border. The most common and harmful pollutants from these sources include suspended particulate matter (PM₁₀ and PM_{2.5}) and ground-level ozone.

Ozone is a photochemical oxidant and the major component of smog. It is formed through complex chemical reactions between precursor emissions of volatile organic compounds (VOCs) and oxides of nitrogen (NO_x), which are emitted by transportation and industrial sources. It is reactive and damages lung tissue, reduces lung function, and increases sensitivity to other irritants.

Particulate matter with an aerodynamic diameter of 10 microns or less (PM₁₀) consists of ground geologic material. Fine particulate matter (diameter of 2.5 microns or less) or PM_{2.5} consists of sulfates, nitrates, other gases, soot, and finer ground geologic materials. Exposure to PM₁₀ and PM_{2.5} can cause impaired breathing, aggravation of respiratory and cardiovascular disease, and premature death. Recent studies have shown that PM_{2.5} may be the greater health risk, as these smaller particles are more easily inhaled into the lungs.

The U.S. and Mexico continue to collaborate to help safeguard the health of border residents by protecting and improving shared air basins. The two federal governments—in partnership with border tribal, state, and local governments—have worked collaboratively to increase knowledge about pollution sources and impacts, establish monitoring networks in several key areas, develop emissions inventories, demonstrate the benefits of using cleaner fuels, retrofit diesel vehicles, collaborate on projects to reduce emissions, and build local emergency response capacity through training.

Although substantial gains have been made, air quality is still a major concern throughout the border region. The pressures associated with industrial and population growth, differences in governance and regulatory frameworks, and topographic and meteorological conditions combine to present a challenging context in which to address air quality management.

This chapter provides information on days exceeding particulate matter (PM₁₀ and PM_{2.5}) and ozone air quality standards.

*Reduce Air Pollution***What is the quality of border region air compared to health standards?****Indicator:****→ Number of Days Exceeding Air Quality Standards in Border Monitoring Areas****NEED**

Objective: By 2020, reduce pollutant emissions in order to approach attainment of respective national ambient air quality standards in the following airsheds: San Diego/Tijuana; Imperial County/Mexicali; Ambos Nogales; Paso del Norte (El Paso/Juarez/Sunland Park)

Air quality standards are established in order to protect people from potential harmful exposures to air pollutants. Levels of air pollution that exceed a numeric standard are associated with potential impacts to human health. Air quality can be inferred by the number of days that a standard is exceeded within a monitored area. The most persistent and pervasive pollutants found in the border region are ozone and particulate matter.

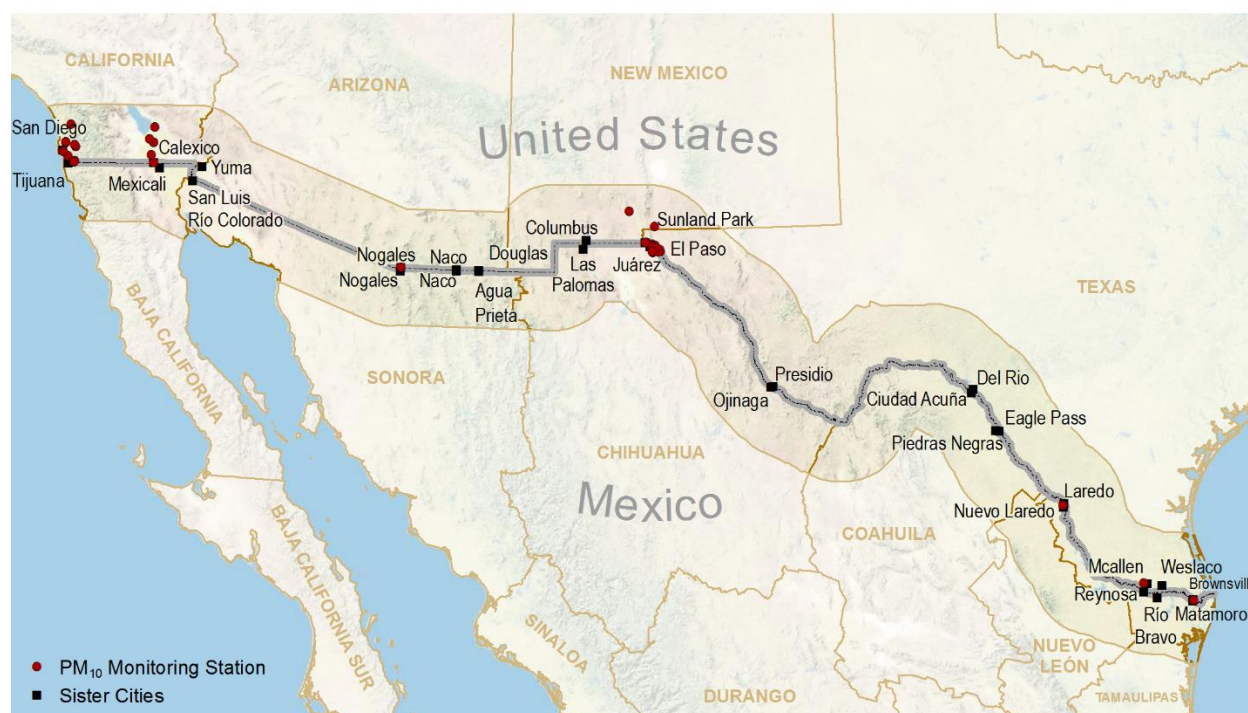
This report uses U.S. ozone, PM₁₀, and PM_{2.5} standards in force in 2014, the most recent year described for these indicators. They are:

- Ozone: 0.075 ppm (8-hour average)
- PM₁₀: 150 µg/m³ (24-hour average)
- PM_{2.5}: 35 µg/m³ (24-hour average)

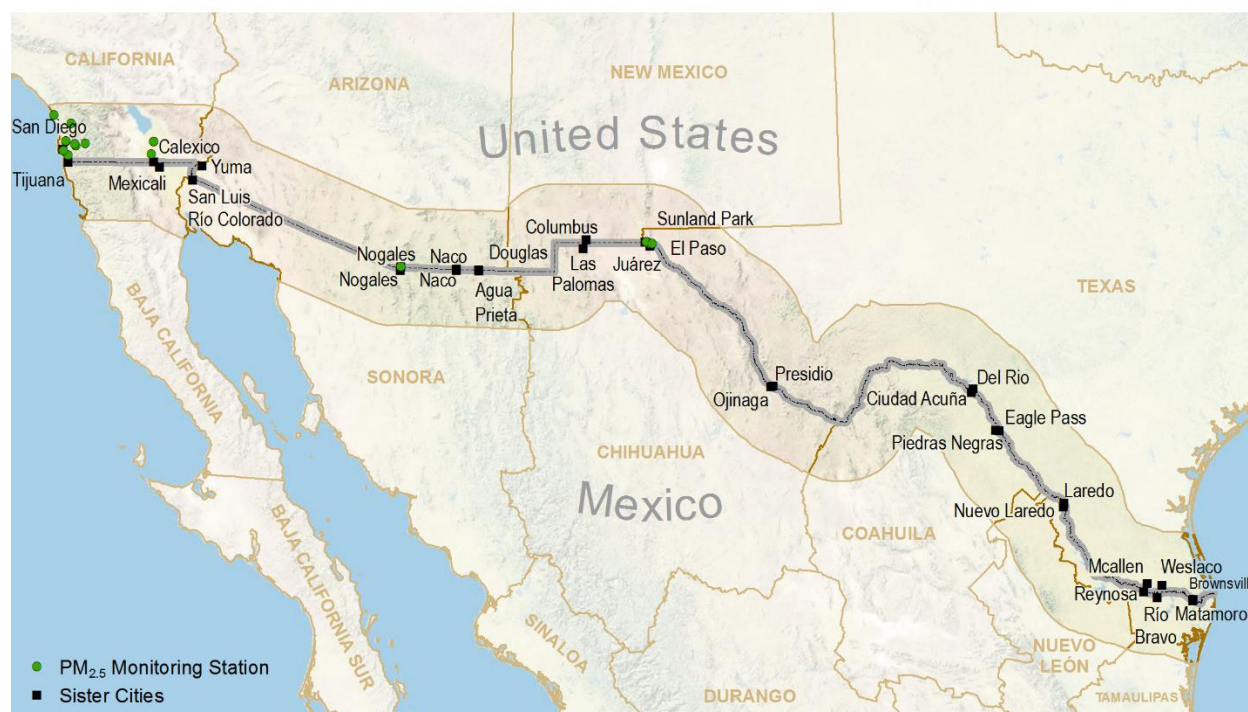
As a reference point, the current U.S. standard for ozone is 0.070 ppm (daily 8-hour maximum standard), which came into force in 2015. Mexico's current ozone standard is also 0.070 ppm. Mexico's standard for PM₁₀ is 75 µg/m³ and for PM_{2.5} it is 45 µg/m³ (both 24-hour average standards).

Air quality data come from five regional monitoring areas in the border region. One of these—Ciudad Juarez/El Paso—includes air monitoring data from both sides of the border. The other monitoring areas—San Diego, Imperial Valley, Nogales and Lower Rio Grande Valley—include only air monitoring data from the U.S. side of the border (see “Technical Considerations” below for a discussion of the air monitoring system in Mexico's border region).

Monitoring Locations for PM₁₀ in the Border Region

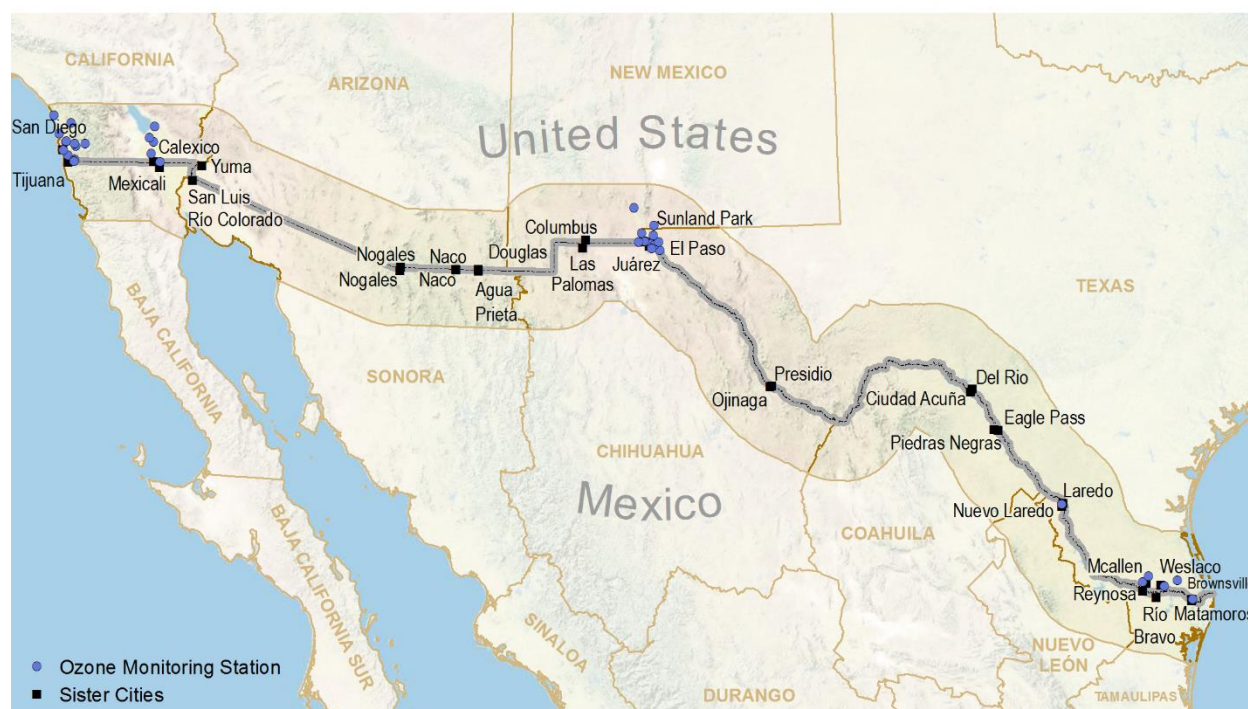


Monitoring Locations for PM_{2.5} in the Border Region



Note: There are no PM 2.5 monitoring stations in Ciudad Juarez.

Monitoring Locations for Ozone in the Border Region



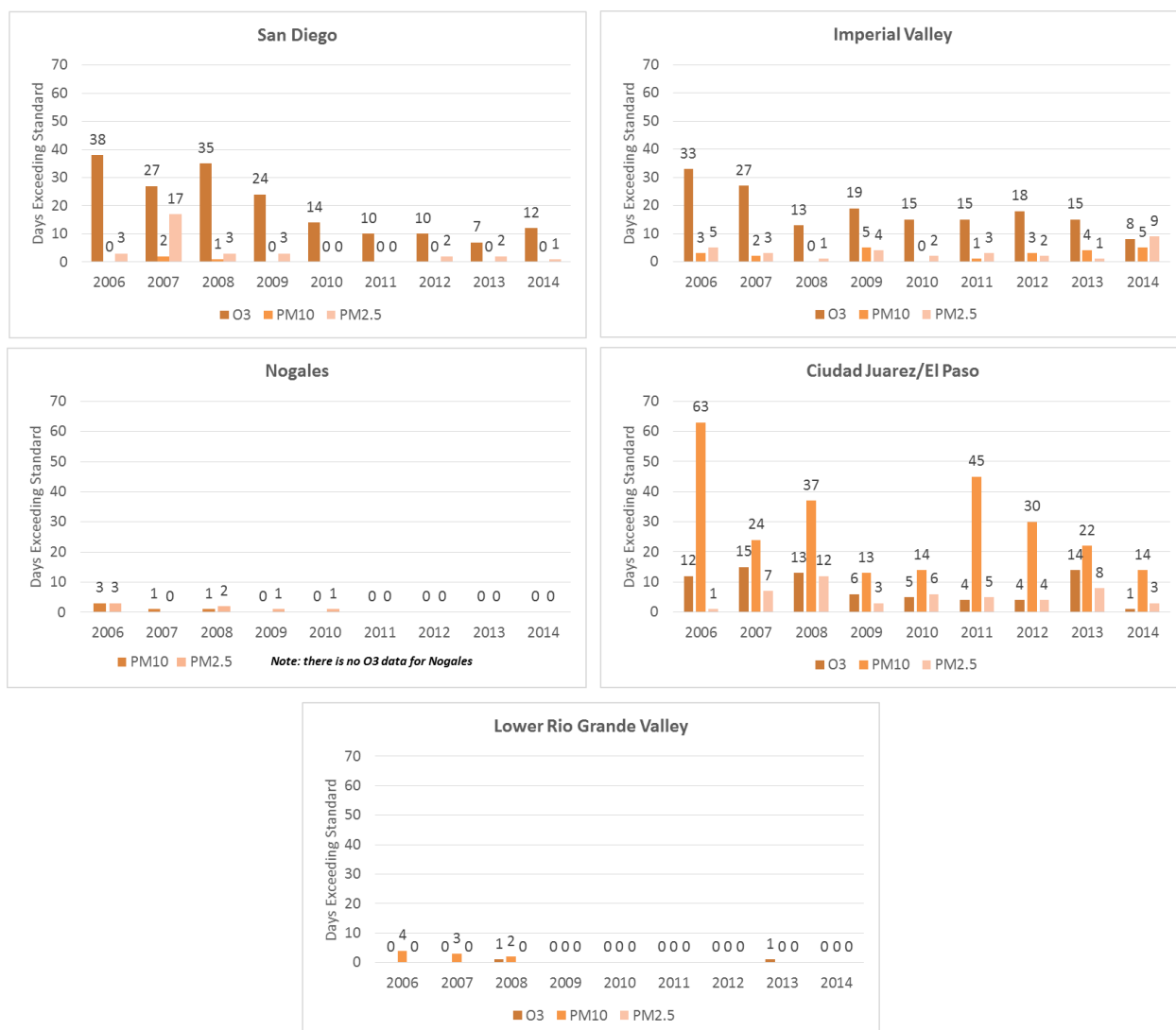
Why Are These Indicators Important?

Ozone and particulate matter are the most prevalent air pollutants in the border region that are tracked because of their impacts on human health, the environment, and aesthetics (e.g., visibility).

What Are These Indicators Showing?

Based on the number of days exceeding the ozone standard (0.075 ppm), PM₁₀ standard (150 µg/m³) and PM_{2.5} standard (35 µg/m³) over 2006–2014, air quality varies significantly across the border region. Nogales and the Lower Rio Grande Valley experienced few exceedance days throughout the 2006–2014 period, whereas San Diego, Imperial Valley, and Ciudad Juarez/El Paso had several exceedance days per year over that time. Ozone is responsible for most of the exceedances in San Diego and the Imperial Valley, and PM₁₀ is responsible for most of the exceedance days in Ciudad Juarez/El Paso. The number of ozone exceedance days in San Diego declined from 38 in 2006 to 12 in 2014. Similarly, the number of ozone exceedance days in the Imperial Valley declined from 33 in 2006 to 8 in 2014. The PM₁₀ exceedance days in Ciudad Juarez/El Paso have exhibited more inter-annual variability but have also declined from 63 in 2006 to 14 in 2014.

Number of Days Exceeding Air Quality Standards in Border Monitoring Areas



Note: All monitoring areas except El Paso/Juarez cite data from monitors in the U.S. only. Data from elsewhere in Mexico were not included because they do not meet the quality assurance standards generally used for determining compliance with air quality standards in the U.S. (see “Technical Considerations” below).

What Influences These Indicators, and What Can Be Done in the Future?

Ozone is formed through complex chemical reactions between precursor emissions of volatile organic compounds (VOC) and oxides of nitrogen (NO_x), which are emitted by transportation and industrial sources. Particulate matter (PM) is fine grained geologic material, that enters the air through both human-caused and natural sources. These sources include agricultural processes, unpaved roadways, quarry and cement manufacturing, and incomplete combustion of diesel fuels. In some areas, dust storms that suspend fine particulates in the air can cause peak concentrations of PM as well.

A number of efforts are underway in the border region to reduce ozone and PM emissions through stricter standards on vehicle emissions, cleaner fuels, vehicle anti-idling programs, and other efforts. Some sources of PM₁₀, such as dust storms, are not amenable to control strategies. However, some strategies, such as road paving, can control the suspension of particulates due to winds or vehicle use.

Technical Considerations

Data on PM₁₀, PM_{2.5} and ozone come from EPA's system for tracking air quality data, the Air Quality System (AQS). Exceedances were calculated by totaling the number of days above the standard on any site within each monitoring area; exceptional events were included in the calculation, and multiple exceedances on the same day within each monitoring area were counted as one.

Only data for one of the five monitoring areas come from monitors maintained in both the U.S. and Mexico (Ciudad Juarez/El Paso). The monitoring data from Tijuana and Mexicali were not included in this report because they do not meet the quality assurance standards generally used for determining compliance with air quality standards in the U.S.

Data Sources

- EPA Air Quality System (AQS)

4. WATER

Water is an extremely limited resource in many parts of the border region. Population growth—along with growth in agriculture and other economic activity—places increasing stress on water quantity and quality. Protecting the quality of rivers, oceans, and other water is important for ecological and human health in the region.

Developing infrastructure to deliver safe drinking water to people and to reduce untreated discharges to rivers, aquifers, and oceans is a high priority of Border 2020, building on previous binational environmental programs.

Rapid population growth in the border region, combined with lack of infrastructure, is a major public health and environmental concern for both countries due to the significant raw sewage discharges on a daily basis. The U.S.-Mexico Border Water Infrastructure Program (BWIP) was created in the 1990s under the La Paz Agreement as a binational effort to provide border communities with safe drinking water and sanitation. EPA and CONAGUA coordinate with U.S. and Mexican federal, state, and local agencies to fund drinking water and wastewater infrastructure projects, recognizing that access to these basic public health services is of the highest priority. These high priority projects include providing first-time safe drinking water and adequate wastewater collection and treatment services to existing communities lacking those services. The program also provides critical drinking and wastewater system upgrades so that treatment levels meet applicable U.S. and Mexican federal and state standards.

This chapter provides indicators related to access to safe drinking water and adequate wastewater collection and treatment.

*Improve Access to Clean and Safe Water***Are homes in the U.S.-Mexico border region being connected to safe drinking water and wastewater treatment services?****Indicators**

- ➔ **Number of Unserved Homes Connected to Safe Drinking Water through the Border Water Infrastructure Program** **OUTPUT**
- ➔ **Number of Unserved Homes Connected to Wastewater Collection and Treatment Services through the Border Water Infrastructure Program**

OUTPUT

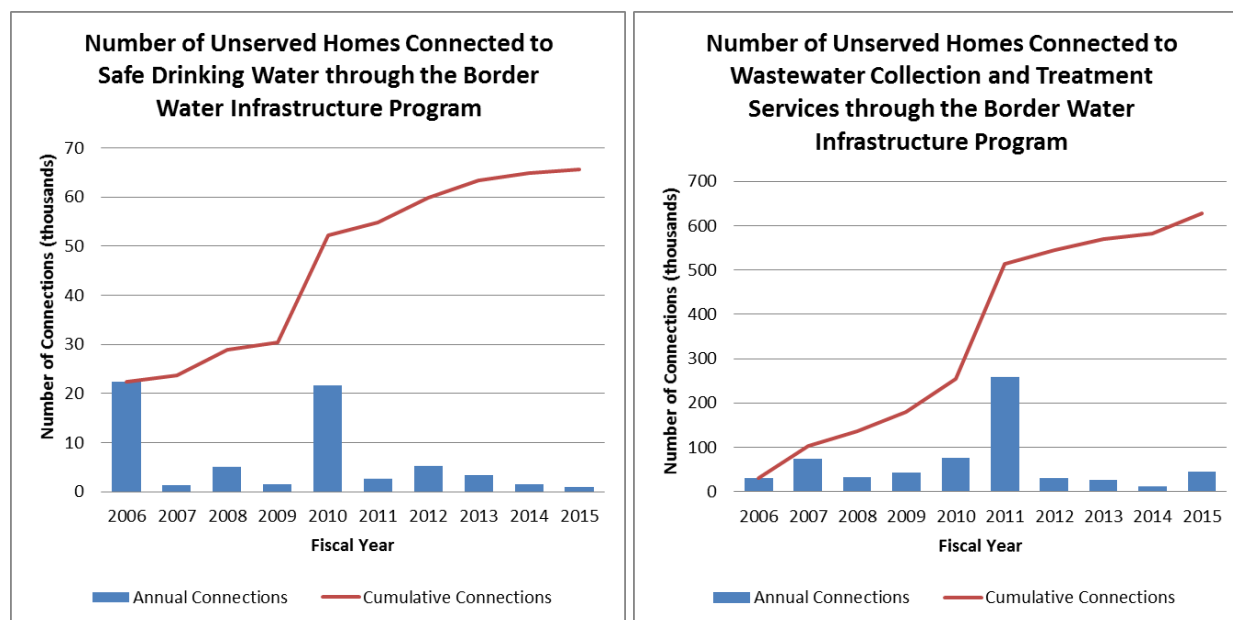
Objective: Promote the increase in the number of homes connected to safe drinking water and adequate wastewater treatment.

Why Are These Indicators Important?

Poor quality drinking water and inadequate wastewater collection and treatment can pose serious risks of water-borne disease exposure and transmission and environmental contamination. Access to safe drinking water and the protection of public and ecological health through adequate wastewater collection and treatment are long-standing goals of U.S.-Mexico border programs.

What Are These Indicators Showing?

No comprehensive data on drinking water and sanitation infrastructure needs along the border is available for comparison purposes. However, EPA has tracked the number of homes provided with first-time access to essential drinking water and wastewater services through the BWIP. The figures below show annual and cumulative drinking water and wastewater connections that resulted from these projects since 2006. By 2015, a cumulative 65,665 homes were connected to a safe community drinking water system and 626,631 homes were connected to adequate wastewater collection and treatment service.



What Influences These Indicators, and What Can Be Done in the Future?

The number and size of projects leading to new drinking water and wastewater connections are influenced by the availability of funding, unplanned growth, lack of planning and zoning programs/enforcement, and the timing of quality applications for infrastructure that meets community needs.

Technical Considerations

Data on annual and cumulative drinking water connections represent piped service into the home. Data on annual and cumulative wastewater connections represent connections to wastewater collection and treatment.

Data Sources

- EPA U.S.-Mexico Border Program: National Water Program Performance Measure Results Reported Annually under the EPA National Water Program Strategic Plans for 2003–2008, 2006–2011 and 2011–2015 and the FY2010 Guidance
- EPA, U.S.-Mexico Border Water Infrastructure Program
- 2011–2015 Update from Office of Water Management - Office of Water, US EPA

5. LAND

Land in the border region can be impacted by air and water pollution, improper disposal of solid waste, and impacts from urban, industrial, and agricultural activities. The Border 2020 program focuses on addressing land contamination from inadequate management and disposal of solid and hazardous waste and sites contaminated by solid or hazardous waste. One focus is sustainable materials management, which is an approach to serving human needs by using or reusing resources most productively and sustainably throughout their life cycles, generally minimizing the amount of materials involved and all the associated environmental impacts. Border 2020 is building capacity through education and demonstration projects to enable and encourage sustainable materials management.

This chapter provides indicators related to:

- Per-capita solid waste generation and disposal
- Electronics refurbishers and recyclers in the border region certified to R2 or e-Stewards electronics recycling certification standards

*Promote Materials Management, Waste Management, and Clean Sites***How much per-capita solid waste is being disposed of in the border region?****Indicators:**

- **Per-Capita Municipal Solid Waste Disposal in U.S. Border States and Counties** **NEED**
- **Per-Capita Municipal Solid Waste Generated in Mexican Border States** **NEED**

Objectives: By 2020, increase local and state-level institutional knowledge and experience in the area of sustainable material management practices

By 2014, identify priority waste streams and by 2020 develop sustainable material management practices that strengthen their respective market values

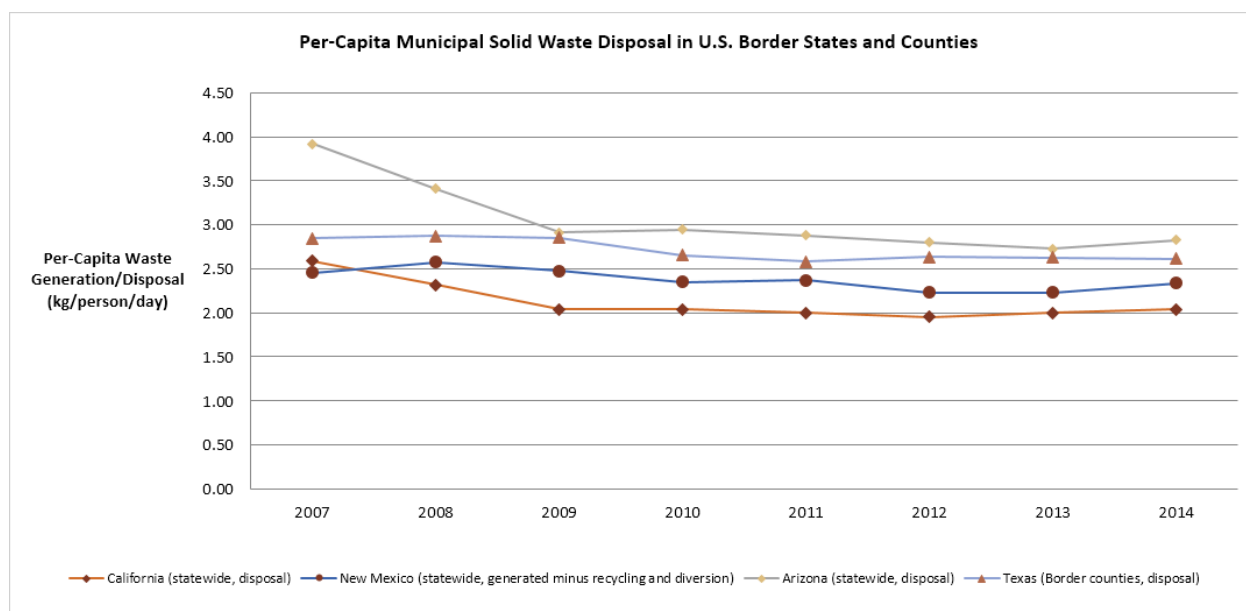
Solid waste generated by residents of the border region may be recycled, diverted to other uses, disposed of in adequately designed and permitted solid waste facilities, or disposed of improperly. To promote more environmentally sound management of solid waste, programs can be developed to encourage recycling and diversion of materials (e.g. plastics, paper, organics) that would ordinarily be disposed of in landfills. Programs may also focus on reducing the production of solid waste by reducing waste generation at its source.

Why Are These Indicators Important?

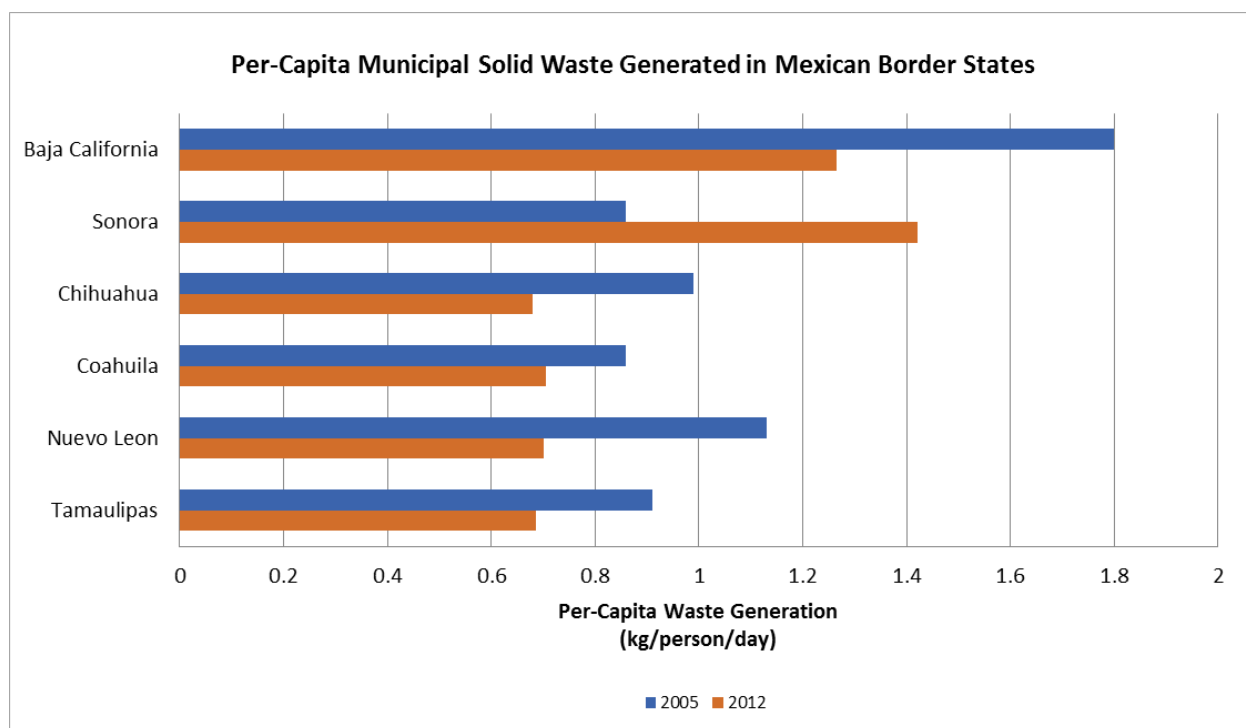
Reduction in the generation of solid waste—along with recycling and adequate disposal—prevents waste from being disposed of improperly. Proper disposal of waste can generate local economic activity in sectors like recycling and waste management, which has the potential to reduce greenhouse gas emissions through improved landfill management practices. Recycling metal and electronics, for example, has the potential to reduce environmental damage from extractive industries by decreasing demand for raw materials. Improper disposal contributes to urban blight, contaminates land and water (especially when hazardous waste is mixed with solid waste), creates nuisances such as odor and pests, and wastes resources that might otherwise be used productively. Using waste reduction as an indicator helps monitor and track progress in reaching Border 2020 objectives aimed at increasing sustainable management practices in the border region.

What Are These Indicators Showing?

The states along the U.S.-Mexico border do not all collect and publish the same type of data related to the generation and disposal of municipal solid waste. The data for California, New Mexico and Arizona are at the state level. The data for Texas are presented at the county level, focusing only on the counties that share a border with Mexico. While data for California, Arizona, and Texas are for disposal, data for Arizona reflect generation minus recycling and diversion as a proxy for disposal.



Based on the data available, per-capita waste disposal has declined since 2006 in California, New Mexico, Arizona and Texas border counties. The data also show that the range of kilograms/person/day of solid waste disposed of in each state has shrunk, suggesting relatively similar per-capita disposal rates for the four states along the U.S.-Mexico border.



For Mexico, waste data are not available for all years between 2005 and 2012, but a comparison of those two years shows that per-capita waste generation declined in five out of the six border states. Sonora had the highest per-capita solid waste generation in 2012 and was the only state where per-capita generation increased between 2005 and 2012. Chihuahua, Coahuila, Nuevo Leon, and Tamaulipas had the lowest per-capita waste generation rates in 2012—each around 0.7 kg/person/day. All of these Mexican border states have per-capita waste generation rates (ranging from 0.68 to 1.42 kg/person/day) that are lower than U.S. border states and counties based on data available.

What Influences These Indicators, and What Can Be Done in the Future?

The total amount of solid waste generated is a function of per-capita generation and population, while the amount disposed of properly is a function of the availability of adequate facilities, systems for collection and transport of waste, and behaviors and choices of individuals. A key focus of recent investments, especially in the Mexico border region, has been building adequate solid waste disposal facilities.

Technical Considerations

Solid waste data are reported in many different ways, not all of which are comparable. Some states in the U.S. report data on total solid waste generation, which needs to be converted to per capita data based on census population figures. It is not known how much total waste is generated in the border region. Therefore, we cannot currently determine what portion of municipal solid waste is being effectively managed border-wide.

Data Sources

- California: CalRecycle, *California's Statewide Per Resident, Per Employee, and Total Disposal Since 1989*
- Arizona: Arizona Department of Environmental Quality, Waste Programs Division (waste data); Arizona Office of Employment & Population Statistics (population data)
- New Mexico: New Mexico Environment Department, Solid Waste Bureau (waste data); University of New Mexico Bureau of Business & Economic Research (population data)
- Texas: Texas Commission on Environmental Quality, *Municipal Solid Waste in Texas: A Year in Review*
- Mexico: INECC/SEMARNAT, *Diagnóstico Básico para la Gestión Integral de los Residuos, 2012* (waste data); CONAPO, *Población, 2006–2012* (population data); BECC, *Diagnóstico de Infraestructura Ambiental Básica para el estado de [estado]*

Highlight: Creating the Foundation for Tracking the Number of Open Dumps Closed in the U.S.-Mexico Border Region

Open dump sites are a concern along the U.S.-Mexico Border because they directly threaten human health and the environment. U.S. EPA and SEMARNAT (Secretaría de Medio Ambiente y Recursos Naturales) are working to close open dumps and redirect solid waste to landfills, which are properly constructed and managed. In addition, efforts are being made to divert recyclable materials away from landfills.

As part of this effort, EPA and SEMARNAT are working to increase the information available regarding open dumps, including developing an indicator for the next *State of the Border Region* indicators report.

Why develop an open dumps indicator?

Open dumps will likely persist unless they are documented and information is more widely available. Open dumps can be cleaned up using city, county, state, or federal funds. It is important that information is available regardless of the funding mechanism or coordinating government or non-governmental organization that is closing and remediating an open dump.

What information do we have now?

Currently, we have detailed information on one open dump that was closed in the state of Baja California. This information is useful to raise awareness and provide an example regarding the type of verifying information that can be reported for open dumps closed by other government agencies or non-governmental organizations.

In the future, we hope to have more information on the state of open dumps in the border region. While specific site information is valuable, we'd like to work toward an indicator that includes hard data on all open dumps closed within a given period of time. The inventory will need to be updated periodically as closed dump sites are re-established or new ones emerge.

The photographs below show the cleanup and closure of open dumps over an approximately 13 hectares area of Paso del Aguila in the municipality of Tecate, Baja California. The project was supported with resources from SEMARNAT (4.55 million Mexican pesos in fiscal year 2014). It was completed in 2015.

Site Before Cleanup



Site Following Cleanup



*Promote Materials Management, Waste Management, and Clean Sites***What is the capacity in the border region for sustainable materials management of electronics?****Indicator:**

➔ **Number of Electronics Refurbishers and Recyclers in the Border Region Certified to R2 or e-Stewards®** **OUTCOME**

Objectives: By 2020, increase local and state-level institutional knowledge and experience in the area of sustainable material management practices

By 2014, identify priority waste streams and by 2020 develop sustainable material management practices that strengthen their respective market value

EPA encourages all recyclers to become certified through independent third-party audits to specific standards for the safe recycling and management of used electronics. Currently EPA recognizes two accredited standards: the e-Stewards® Standard for Responsible Recycling and Reuse of Electronic Equipment® (e-Stewards®) and the Responsible Recycling Standard for Electronics Recyclers (R2). Border 2020 makes clear the commitment to inform border stakeholders broadly about certified recyclers and encourage everyone to recycle electronics responsibly.

Why Is This Indicator Important?

The two electronics recycling certifications programs set the standard for responsibly recycling electronics. Increases in certification will provide more options for individuals, businesses, and governments to responsibly recycle electronics.

What Is This Indicator Showing?

As of July 2016:

- There were 19 certified recyclers within the 100-kilometer U.S.-Mexico border area
- Eleven recyclers were located in the United States and eight were located in Mexico
- Seventeen recyclers were certified to R2 and two were certified to both R2 and e-Stewards®

The 2016 data presented here will be used as a baseline, and compared against future indicators reports to establish growth in certified facilities.

Location of Recycling and Refurbishing Facilities in the Border Region



What Influences This Indicator, and What Can Be Done in the Future?

Several factors influence the number of certified electronics recyclers in a city, state, or region. A few common influences are supply of used electronics in the region; education on the environmental, public health, and safety best practices in handling and recycling of electronics; and compliance with local, state, and federal laws that promote the safe recycling and refurbishment of electronics. In addition, there are international standards that promote safe recycling as well as a U.S. federal Executive Order that calls for government equipment to be recycled by certified facilities.

There are also factors that limit the number of certified electronics recyclers. Some examples include the cost of certification and compliance, the lack of local or state laws that encourage recycling, and the fluctuation of commodities prices, which directly impacts revenue for electronics recyclers. In the U.S.-Mexico border region, California and Texas have state laws governing end-of-life management of electronics, but New Mexico and Arizona currently do not.

While over 600 facilities are already certified globally, education and outreach will help promote certification in the U.S. and beyond. There are currently 18 certified recycling and refurbishing facilities in Mexico. By bringing educational outreach to border communities, Border 2020 hopes to support an increase in the quantity of electronics recycled as well as demand for certified electronics recyclers and refurbishers. This year's baseline data can be used in future reports to compare the growth of certified electronics recyclers along the U.S.-Mexico border region.

Technical Considerations

It is important to note that the information regarding certified facilities is a snapshot in time. Both certifying bodies have established a rigorous multi-step certification process that is usually completed over a number of months. New facilities in the U.S.-Mexico border region may become certified during the development of this report and others may become certified between its publication and that of the next *State of the Border Region* report. In addition, it is possible that some of the facilities that were certified when this report was released will lose their certification, voluntarily or involuntarily. To confirm certification, it is always best to check the websites of the certifying bodies directly.

Data Sources

- U.S. EPA, Office of Resource Conservation and Recovery
- <http://e-stewards.org/>
- <https://sustainableelectronics.org/r2-standard>

6. JOINT READINESS FOR ENVIRONMENTAL RESPONSE

Preparing for a possible emergency in the border region improves the probability of adequately responding to incidents and protecting the environment and public from hazards that could result in serious environmental or health impacts.

Annex II of the 1983 La Paz Agreement on Cooperation for the Protection and Improvement of the Environment in the Border Area established the Mexico-U.S. Joint Contingency Plan (JCP) to provide a binational coordination mechanism for protecting human health and the environment and responding to significant chemical and oil contingencies or emergencies that affect the inland border area between the U.S. and Mexico. The La Paz Agreement also established the Joint Response Team (JRT), which has coordinating authorities for both Mexico and the U.S. The JRT is composed of representatives from U.S. and Mexico federal, state and local agencies responsible for emergency prevention, preparedness, and response in the border region.

The work of the JRT is supported by a robust system for the binational notification of emergency response incidents, drills, and threats and local Emergency Response Plans developed jointly by sister cities along the border. It is also supported by extensive training to provide capacity building that will enhance response readiness, cross-border coordination and training continuance for hazmat emergency response capabilities of both countries.

This chapter contains indicators related to:

- Number of incident notifications in the border region received by the National Response Center (NRC)
- Number of incident notifications in the border region received by COATEA/CENACOM
- Emergency response training and capacity building events including binational sister city Joint Contingency Plan exercises and drills

*Enhance Joint Preparedness for Environmental Response***How many chemical or oil emergency incidents have been reported in the border region?****Indicators:**

- **Number of Incident Notifications in the Border Region Received by the National Response Center (NRC)**

OUTPUT

- **Number of Incident Notifications in the Border Region Received by COATEA/CENACOM**

OUTPUT

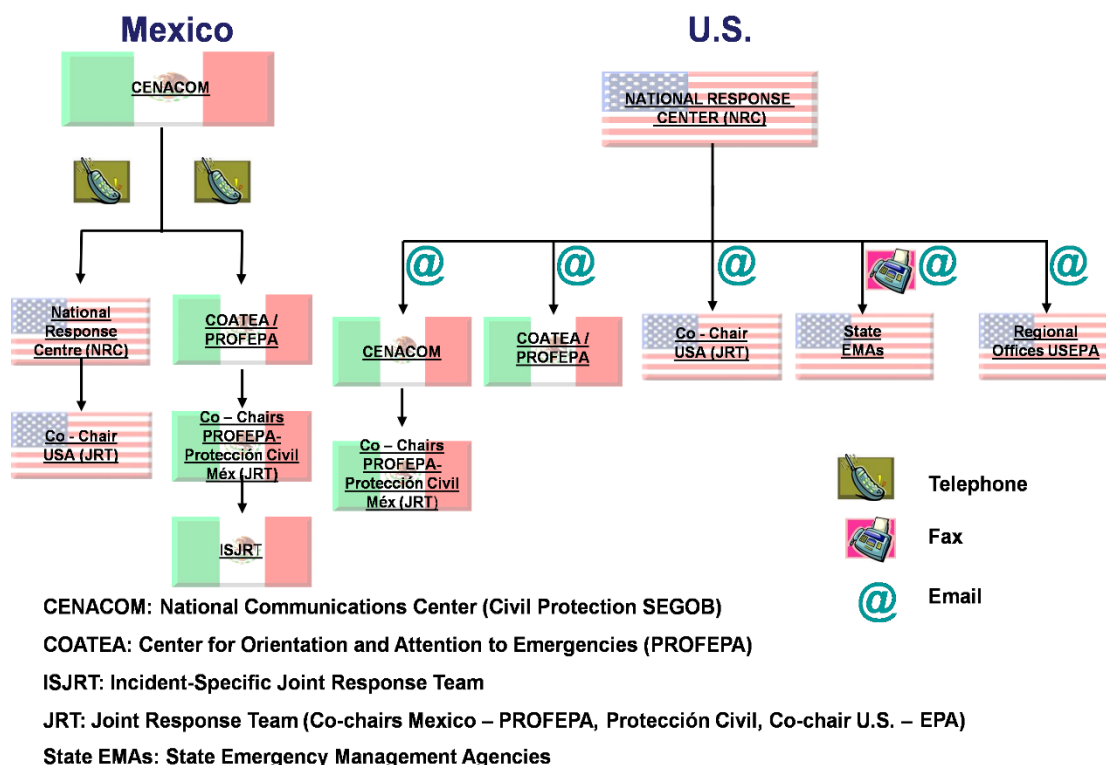
Objective: Update as necessary, the current Mexico-U.S. Joint Contingency Plan and on an annual basis, continue to evaluate and update the emergency notification mechanism between Mexico and the United States.

The JCP established a binational notification system that alerts agencies in the U.S. and Mexico about emergency response incidents. Any actual or threatened incidents involving releases of chemicals from non-mobile machinery, refineries, manufacturing plants, and other fixed facilities that have the potential to affect the other country are reported.

Notifications of incidents are received by the National Response Center (NRC) in the U.S. In Mexico, notifications are received by the Centro Nacional de Comunicaciones de México (National Communications Center, CENACOM), which is part of the Sistema Nacional de Protección Civil (Civil Protection). Notifications in Mexico are also received by the Centro de Orientación para la Atención de Emergencias Ambientales (Center for Environmental Emergencies, COATEA) of the Procuraduría Federal de Protección al Ambiente (Federal Attorney General for Environmental Protection, PROFEPA). In Mexico, Civil Protection takes the lead on emergency responses, while PROFEPA is responsible for inspection and enforcement. Both agencies work together during emergencies. CENACOM and NRC are available to receive notifications 24 hours a day, 7 days a week.

The U.S.-Mexico Emergency Preparedness and Response Border-wide Workgroup will continue to evaluate the binational notification system when conducting annual exercises to reflect changes in technology and protocol.

U.S.-Mexico Bi-National Notification System

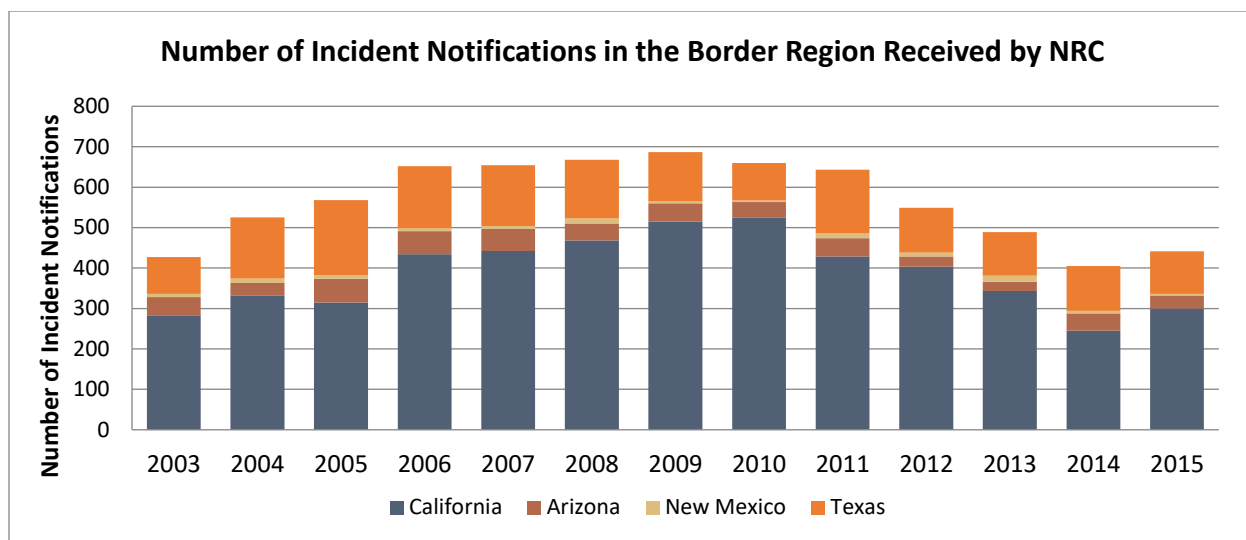


Why Are These Indicators Important?

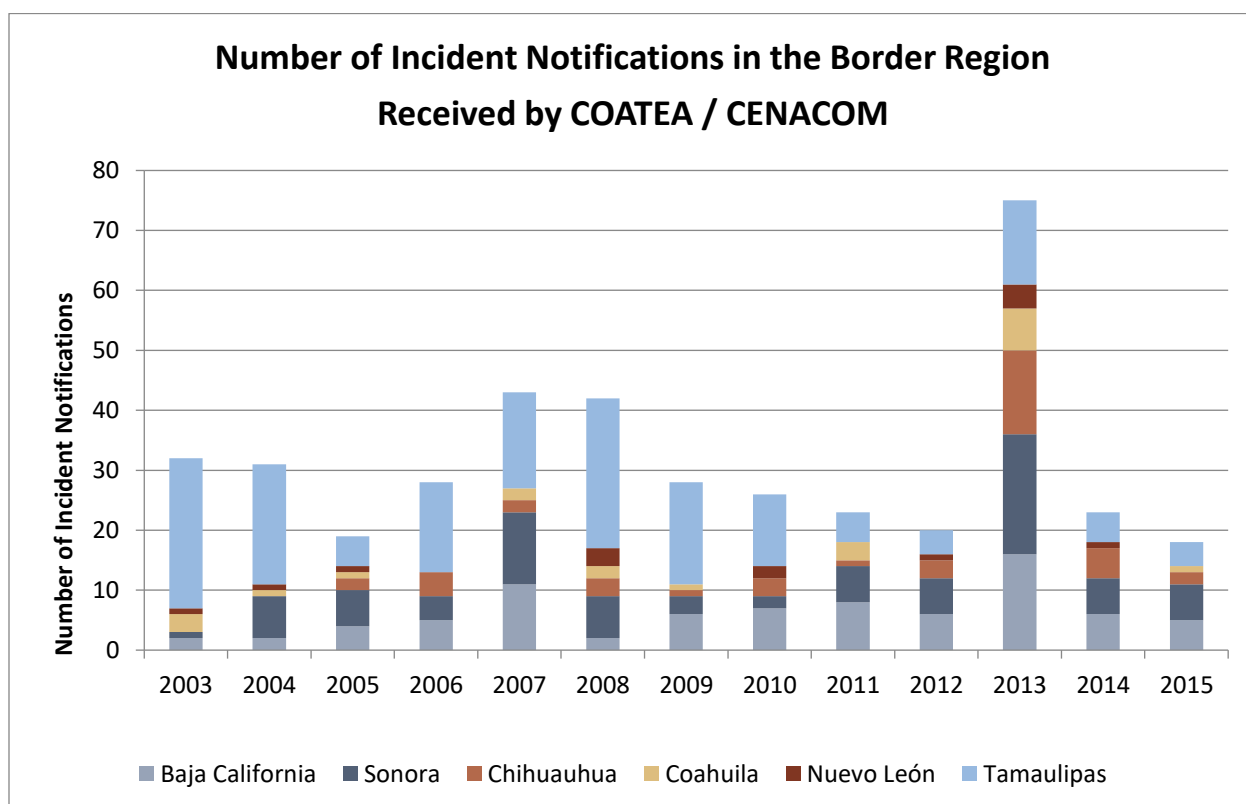
An adequate cross-border notification system is critical to a robust emergency response system so that local emergency responders can be alerted about emergencies. Upon receipt, notifications are responded to through the execution of local response plans (i.e., Sister City plans) and/or the U.S.-Mexico Joint Contingency Plan. In some cases, local emergency responders are the first to respond to an incident, and if necessary, the JRT may be activated for significant events to provide support.

What Are These Indicators Showing?

Notifications to the NRC of incidents occurring in U.S. border counties showed a general annual increase from 2003 to 2009 (when it peaked at 687) and then a general decrease from 2009 to 2013 at which time they stabilized through 2015 to between 400–500 incidents per year. Although increases may reflect an increase in the number of emergency incidents, they may also show that the notification system was more effectively being used for incidents that occurred (that is, a higher percentage of incidents were being reported.) More recent decreases suggest a decreasing number of emergency incidents in border counties. The largest number of notified incidents occur in California border counties.



Notifications received by COATEA/CENACOM for incidents along the border in Mexico ranged from 18 to 75 per year between 2003 and 2015 (averaging around 31 per year). With the exception of 2013, incident notifications dropped off in 2011 to a range between 18 to 23 per year through 2015, paralleling the decline and stabilization of the number of U.S. incident notifications over recent years. Between 2003 and 2011, Tamaulipas accounted for the most notifications each year, but those numbers have dropped substantially. Baja California and Sonora accounted for the highest number of incident notifications from 2012 to 2015.



What Influences These Indicators, and What Can Be Done in the Future?

These indicators are influenced by both the number of incidents and the percentage of incidents that are reported. While much of the work on emergency response is aimed at reducing the number of incidents that occur (which would reduce this indicator), it is also important that incidents that do occur get reported (which could increase the indicator). Ideally these indicators should be complemented with the number of total incidents and the percentage of incidents that are notified.

Technical Considerations

Data on the number of incident notifications to NRC, CENACOM, and COATEA provide only part of the picture of how many emergencies happen in the border region. It is not known how many incidents go unreported nor whether those that are reported are the most significant emergencies. Likewise, the NRC does not track how many incidents are responded to or whether the binational notification system triggered a response.

Data Sources

- Subprocuraduría de Inspección Industrial, Procuraduría Federal de Protección al Ambiente. Cd. de México, Méx. Junio, 2016. Dirección de Administración de Emergencias, Dirección General de Protección Civil de la Secretaría de Gobernación. Cd. de México, Méx. Junio, 2017
- Centro de Orientación para la Atención de Emergencias Ambientales (COATEA) (2010)
- U.S. EPA Region 6. “EPA Region 6 Border Accidental Release Information: 1999–2009”

*Enhance Joint Preparedness for Environmental Response***How are we building emergency response capacity in the border region?****Indicator:**

→ **Binational Capacity Building and Training Events** **OUTPUT**

Objective: By 2020, at least eight (8) of the sister city joint contingency plans will be supplemented with preparedness and prevention related activities such as certified training, risk analysis, and/or capacity building.

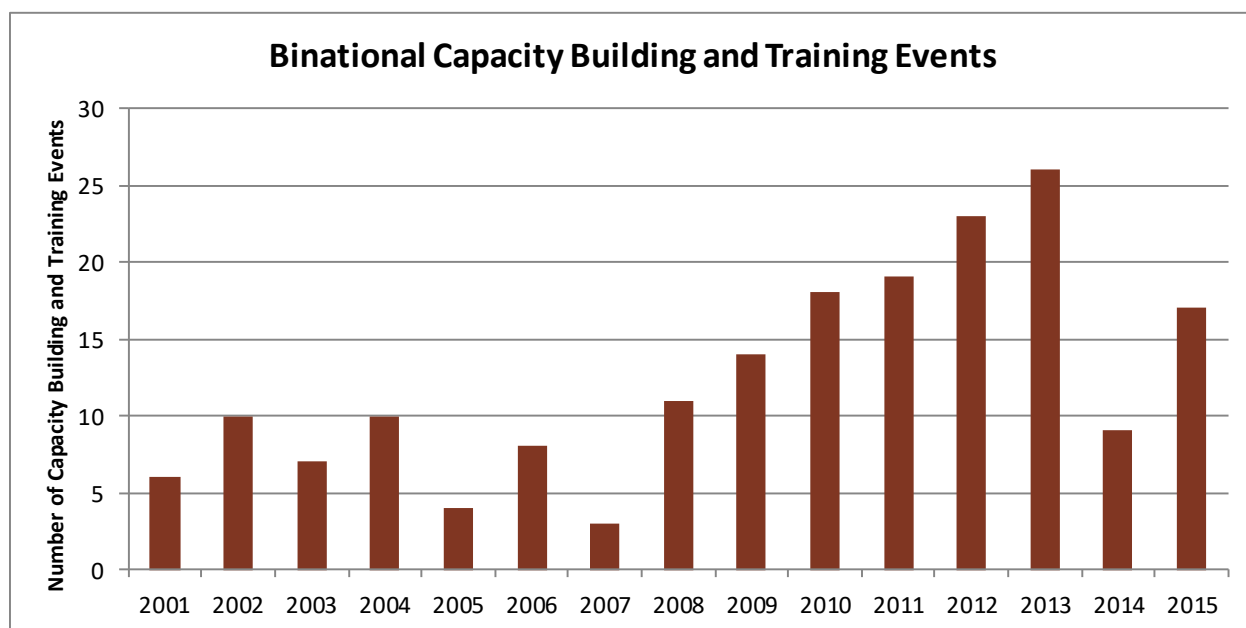
The U.S.-Mexico Emergency Preparedness and Response Border-wide Workgroup has expanded its extensive training to provide capacity building that will enhance response readiness, cross-border coordination and training continuance for hazardous materials emergency response capabilities of both countries.

Why Is This Indicator Important?

Capacity building and training activities ensure that emergency responders along the border are ready if emergencies occur. Typically conducted in border cities, these activities include courses, workshops, and hands-on training. In addition, sister city field and table-top exercises ensure that the Joint Contingency Plan and Sister City Binational Emergency Response Plans are up to date and can be implemented during emergencies. Results of these exercises are used to prepare reports, which set the stage for plan revisions.

What Is This Indicator Showing?

Between 2001 and 2015, there were between three and 26 capacity building and training exercises in the border region each year. At least ten activities per year occurred in seven out of the most recent eight years, indicating a strong binational commitment to training and capacity building.



What Influences This Indicator, and What Can Be Done in the Future?

The number of capacity building and training events conducted is largely a function of funding and the capacity of emergency response personnel to host them and participate.

Technical Considerations

Only binational capacity building and training activities are captured in this indicator. Other state or local activities are not included. Capacity building and training activities that include multiple sister cities are counted as one exercise.

Data Sources

- U.S. EPA, SEMARNAT, Civil Protection. “U.S. Mexico Border 2020 Training Events, 2001-2015”

7. ENVIRONMENTAL PERFORMANCE THROUGH COMPLIANCE, ENFORCEMENT, POLLUTION PREVENTION, AND PROMOTION OF ENVIRONMENTAL STEWARDSHIP

Environmental regulatory programs on both sides of the border establish and enforce rules to limit pollutant discharges to air, water, and land, as well as to manage the generation, transportation, storage, and treatment of hazardous wastes. In addition to these regulatory programs, both the U.S. and Mexico have developed programs that encourage voluntary activities to protect human health and the environment that go beyond what is legally required. Border states, tribes, local governments and the federal government all play key roles in establishing and enforcing rules and promoting voluntary action.

This chapter focuses on regulatory programs. It includes indicators related to:

- Regulated U.S. and Mexico facilities in the border region
- U.S. and Mexico inspections of facilities in the border region
- Pollution reductions from enforcement activities

These indicators measure implementation of environmental programs. Unlike other chapters, they are not linked to specific objectives but rather provide the context for implementation of air, water, land, and other environmental programs in the region.

*Enhance Compliance Assurance and Environmental Stewardship***How many regulated facilities are in the border region?****Indicator:**→ **Total Number of Facilities Regulated Under Federal Programs: U.S.-Mexico Border Region**

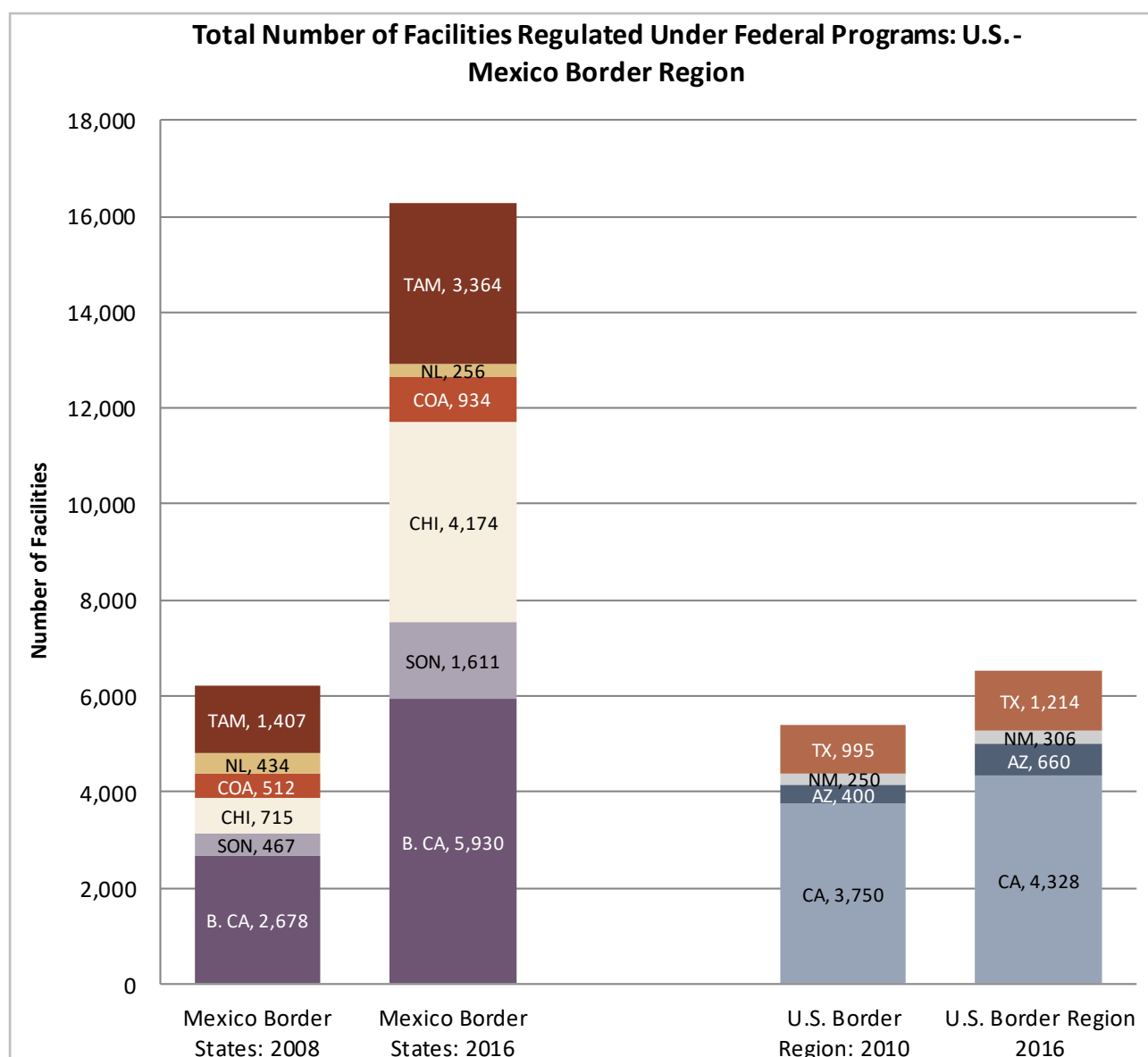
NEED

Many facilities in the U.S.-Mexico border region are regulated under U.S. and Mexican federal regulatory programs covering air pollution, water pollution, and waste. In the U.S., these facilities are regulated through permits issued under various statutes and statutory programs: the Clean Air Act, Clean Water Act, and Safe Drinking Water Act for possible impacts to air and water; the Resource Conservation and Recovery Act for the generation, storage, treatment, or disposal of hazardous waste; and/or the Toxic Release Inventory for the reporting of pollutant releases.

In Mexico, inspection and monitoring of industrial and service establishments under federal jurisdiction is conducted through an Annual Environmental Program of Inspection. As a result of inspections, facilities are classified as in compliance, in partial compliance, or out of compliance. This may result in a determination of whether violations are non-serious or serious, which may lead to temporary, partial, or total closure of facilities.

Why Is This Indicator Important?

The number of federally-regulated facilities in the region is an indicator of the size of industrial, manufacturing, and other sectors whose operations put pressure on environmental resources. It is also an indicator of the institutional demands on governments to issue permits, inspect operations, and enforce environmental rules.



What Is the Indicator Showing?

There are currently over 22,000 regulated facilities in the U.S.-Mexico border region—nearly double the number reported in the 2010 *State of the Border Region* report. Mexico accounts for the vast majority of this increase, adding over 10,000 new regulated facilities since 2008. The largest share of facilities is in the San Diego-Tijuana area of California and Baja California.

What Influences This Indicator and What Can Be Done in The Future?

The number of regulated facilities is a function of the scope of federal regulatory programs and the number of facilities that fall under these programs. Increases in industrial economic development will tend to increase the number of regulated facilities, while less economic development or economic shifts toward non-industrial sectors (e.g., service industries) will tend to reduce or slow the growth in the number of such facilities. In the future, it is

important for regulatory agencies in the border region to effectively identify facilities that should be regulated and ensure compliance through permitting, inspections, and other key elements of regulatory programs.

Technical Considerations

The number of regulated facilities should not be taken as a proxy for the level of pollution in a region. All else equal, it is much better for a potentially polluting facility to be regulated than unregulated. Also, many other sources of pollution exist that are not included in this indicator, such as mobile transportation sources. At the same time, not all regulated facilities are counted here. Data for Mexico are only for federally-regulated facilities. U.S. data are for facilities regulated under federal programs, some of which are delegated to states, or local governments, but not for facilities that are only regulated under state or local programs.

Data Sources

- PROFEPA Facility Registry, 2010 and 2016
- EPA, ECHO database (2010 and 2016)

*Enhance Compliance Assurance and Environmental Stewardship***How many inspections of regulated facilities are conducted in the border region?****Indicator:**

- ➔ **Number of State and Federal Inspections for Federal Programs in the U.S. Border Region** **OUTPUT**
- ➔ **Number of Federal Inspections in the Mexico Border Region** **OUTPUT**

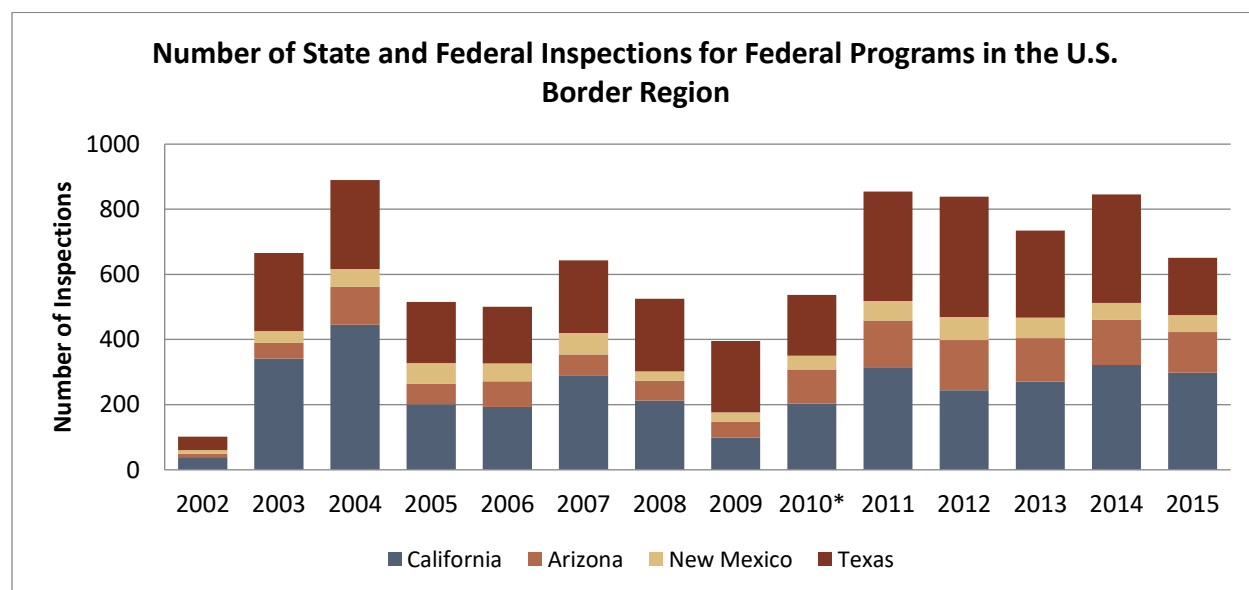
In both the U.S. and Mexico, inspections of regulated facilities are key tools for enforcing environmental laws. In the U.S., inspections are conducted under the rules governing the major federal regulatory programs. In many cases, inspections are carried out by state agencies to which federal programs have been delegated. In Mexico, inspection and monitoring for industrial and service establishments under federal jurisdiction are conducted through an Annual Environmental Program of Inspection and carried out by PROFEPA.

Why Are These Indicators Important?

The number of inspections in the border region is an indication of the level of government activity to ensure compliance with federal environmental laws.

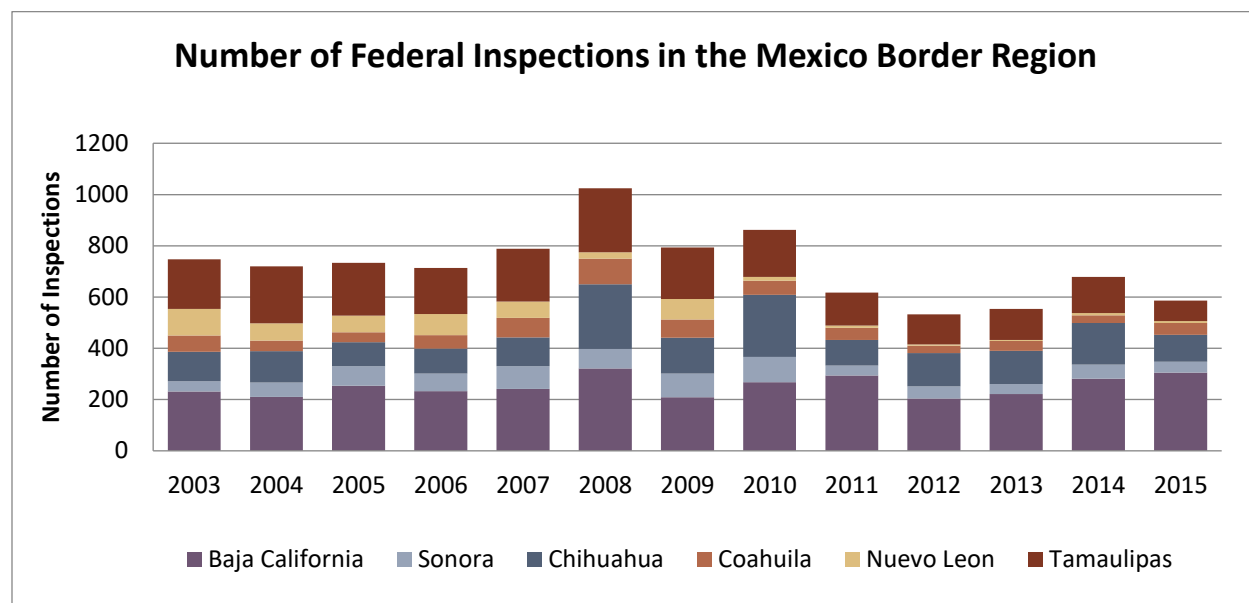
What Are These Indicators Showing?

Since 2003, the number of inspections in the U.S. border region has been between approximately 400 and 900 per year, the majority of which are in California and Texas where large numbers of facilities are located. Although there is no clear year-to-year trend in the number of inspections in the last five years (2011–2015), the average number of annual inspections over these years (785) was higher than nearly all of the annual inspections dating back to 2002.



*2010 data incomplete

Because the methodology for calculating the number of federal inspections in Mexico changed after 2009, direct comparisons should not be made between the 2003-2009 and 2010-2015 periods. The number of federal inspections each year between 2003 and 2009 ranged from a minimum of 720 to a maximum of 1,024, with an average of 788 inspections per year. After a decline in inspections between 2010 and 2012, inspections rose in 2013 and 2014 only to fall again in 2015.



What Influences These Indicators, and What Can Be Done in the Future?

Assuming a stable base of regulated facilities, the number of inspections conducted annually is influenced by both agency priorities for inspection and by the resources available to conduct inspections.

Technical Considerations

In Mexico, facilities are either federally or state regulated—not both. Data from PROFEPA reported here are for federal inspections only. For the U.S., data are for “federally reportable” inspections which may be undertaken by local, state or federal inspectors implementing federal programs. This may not include all state inspections of state-regulated facilities.

Data Sources

- Subprocuraduría de Inspección Industrial, PROFEPA, 2010 and 2016EPA, OECA (2010) data provided based on EPA National Program data systems
- EPA, ECHO database (2015, 2016)

*Enhance Compliance Assurance and Environmental Stewardship***What happens when a facility violates environmental law in the United States?****Indicator:**→ **Pollution Reduction from Federal Enforcement Actions in the U.S. Border Region****OUTCOME**

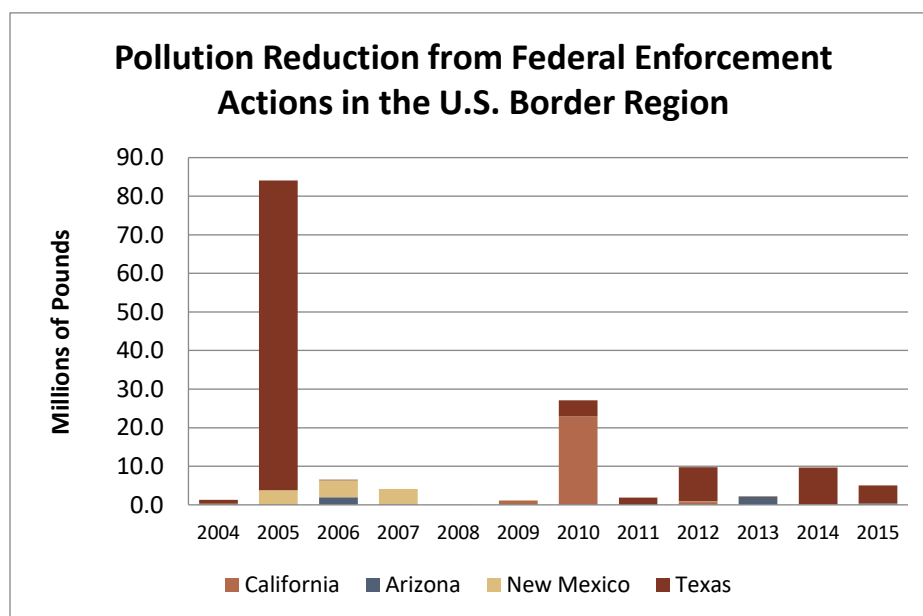
When a facility violates environmental law in the U.S., the regulating agency may impose actions to enforce compliance and may also impose monetary penalties and/or criminal sanctions. Formal enforcement actions in the U.S. may involve administrative (non-judicial) actions, or judicial actions that involve civil or criminal penalties. The amount of pollution reductions from enforcement actions depends upon the type of violation. Pollution reductions reported here include only those involving federal settlements of enforcement cases.

Why Is the Indicator Important?

Enforcement actions, monetary penalties, and/or criminal sanctions deter violations of environmental laws and create an incentive for staying in compliance with environmental statutes and regulations. Penalties are designed to recover the economic benefit of noncompliance as well as reflect the seriousness of the violation.

What Is This Indicator Showing?

Other than a spike in 2005, mainly reflecting the contribution of a single facility in Texas, and another spike in 2010, pollution reductions from enforcement actions in the border region have remained below 10 million pounds annually. Texas accounts for the greatest amount of pollution reductions.



What Influences This Indicator, and What Can Be Done in the Future?

Like data on inspections, data on enforcement actions, penalties, and enforcement-related pollution reductions are a function of agency regulatory priorities and program capacity. Specific national, regional, or sector-based enforcement initiatives may result in higher or lower inspection, penalty, or pollution reduction figures on a yearly basis. One or more high-profile settlement in a particular state in a given year may significantly skew overall year-to-year results.

Technical Considerations

Enforcement actions cannot be imposed unless a violation has occurred and has been detected by the regulatory agency. There is, however, not always a clear connection between a facility polluting the environment and compliance with the law—facilities may legally pollute under the conditions of a permit, and violations may not always result in releases of pollutants. When examining trends over time and differences among states, it is important to consider factors such as federal, state, and local environmental priorities; the number and type of facilities operating in each state; and other environmental management activities not reflected in this indicator, such as compliance assistance and informal enforcement actions (e.g. notices of violations). As noted above, individual enforcement actions that yield large pollution reductions or penalties may significantly contribute to enforcement results within that year, leading to a large impact on overall results.

The approach EPA uses to calculate pollution reductions has changed over time. Recently, EPA has included more types of facilities in the calculation, which is likely to increase the total volume of pollution reductions reported.

Data Source

- EPA, ECHO database (2016)