The City of Austin

State of Our Environment

Report

2016

Prepared for
City Council

Mayor
Steve Adler

Council Members
Ora Houston, District 1
Delia Garza, District 2
Sabino “Pio” Renteria, District 3
Gregorio “Greg” Casar, District 4
Ann Kitchen, District 5
Jimmy Flannigan, District 6
Leslie Pool, District 7
Ellen Troxclair, District 8
Kathie Tovo, District 9
Alison Alter, District 10

Interim City Manager
Elaine Hart

Prepared by
Chuck Lesniak, Environmental Officer
Watershed Protection Department
April 2017

With special thanks to the following people for their help in creating this report:

Watershed Protection Department
Andrea Bates
Brent Bellinger
Nathan Bendik
Mary Love Bigony
Kaela Champlin
Andrew Clamann
Jean Drew
Nico Hauwert
Aaron Hicks
Scott Hiers
Chris Herrington
David Johns
Mike Kelly
Chuck Lesniak
Joe Pantalion
Mike Personett
Mateo Scoggins
Katie Sternberg
Jessica Wilson

Development Services Department
Christopher Dolph
Michael Embesi
Leah Haynie
Emily King
Keith Mars

Austin Transportation Department
Cari Buetow

Office of Sustainability
Lucia Athens
Zach Baumer
Amy Petri

Austin Water
Sherri Kuhl
Cait McCann
Lisa O’Donnell
Kevin Thuesen

Table of Contents

Foreword 5

Creeks 6

Lakes and Rivers 10

Aquifers 14

Urban Forest 18

Open Space and Habitat 22

Air Quality 26

Climate Change 29

Foreword

Welcome to the State of Our Environment report for 2016. This year, as I reviewed the draft report in early 2017, I was struck by the contrast between what we as a community are doing here in Austin, Texas and the changes that are occurring or being discussed at the state and federal level. Austin has made environmental protection a community priority for well over 30 years. That ongoing effort is documented in these pages and the fruits of that work are seen in Austin's almost unmatched economic vitality and growth and in the fact that Austin has been able to preserve and protect our environmental resources during that growth.

In these pages you will see over and over that our citizens "walk the walk" of environmental protection. It's not just paid City staff, time after time our residents step up over and over by getting their hands dirty on creek restoration projects, attending Council and Commission meetings to air their environmental concerns, and working to make sure that environmental protection continues to be a priority as we manage Austin' growth.

Please join me in taking a few minutes to look through this year's report. If you find things you would like to know more about, go to the referenced websites or contact the staff to learn how you can get involved or support those efforts. Regardless of what kind of changes we see happening around Texas and the country, we as a community can continue to make the protection of our environment a priority at the local level. Doing so will give us a healthy environment and vibrant economy for generations to come.

Chuck Lesniak
Environmental Officer
Watershed Protection Department

Creeks

Healthy creeks reconnect our increasingly urban lives to the social benefits of nature.

Excellent water quality enables contact recreation and elevates our quality of life

Importance

Creeks are cradles for the waters that flow into our drinking water supply. But creeks offer much more than a source of water. Properly managed, they can support critical habitat for wildlife and provide a landscape resilient to floodwaters. Our community is greatly enhanced with opportunities to hike, bike, fish, swim, and relax alongside healthy streams with diverse vegetation. Development and pollution can quickly reduce the quality of these creeks and eliminate the benefits they provide. So the City implements routine monitoring and special studies to drive policy decisions and solutions to preserve the integrity of our waters. The integrity of our creeks and floodplains is a barometer for our environmental stewardship.

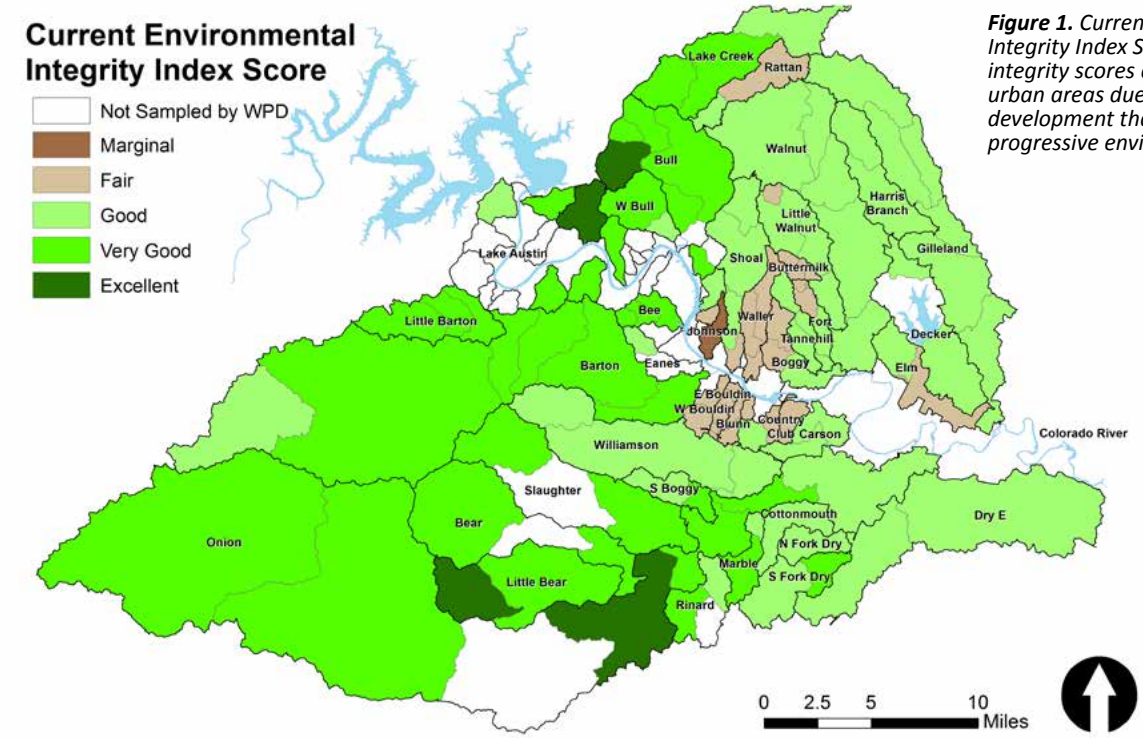


Figure 1. *Current Environmental Integrity Index Scores. Lower integrity scores are typical in urban areas due to intense historic development that did not have progressive environmental rules.*

Status and Trends

The Environmental Integrity Index[1] (EII) is one of the programs that evaluate the chemical, physical, and biological health of Austin's creeks. Routine sampling of 49 watersheds provides spatial and temporal resolution to aspects such as nutrients, bacteria, aquatic life, and pollutants in sediment.

Data from the EII indicates that fecal bacteria contamination from sources such as leaking wastewater pipes, pets, and humans continues to be a problem in many creeks. The EII has recently been enhanced with the new Bacteria Source Isolation (BSI) protocol for responding to high bacteria levels and has already identified specific sources of contamination for some creeks.

One of the biggest threats to water quality is the overloading of nutrients from the discharge of treated wastewater. Excess nutrients, such as nitrate and phosphorus, trigger algal blooms that can cause fish kills and bad odor. In 2016, the City of Austin took the following steps to reduce degradation from high nutrient levels in creeks:

- The Anderson Mill Wastewater Treatment Plant was decommissioned, reducing excess nutrients in Lake Creek.
- The Watershed Protection Department (WPD), Austin Water, and the Parks and Recreation Department initiated a new partnership to reduce the use of reclaimed wastewater near creeks and floodplains. This ensures that valuable reclaimed wastewater will be used in a way that does not degrade streams.
- Austin continues to collaborate with the City of Dripping Springs and other regional partners to find a viable alternative to their proposed discharge of 995,000 gallons of treated wastewater per day into Onion Creek that meets the needs of Dripping Springs to manage their explosive growth but is still protective of water quality.
- WPD successfully petitioned the Texas Commission on Environmental Quality to add flexibility to the rules for land application of treated wastewater to encourage more beneficial reuse of effluent. The effort was an attempt to incentivize water conservation and water quality protection for the Highland Lakes and Barton Springs.

Water quality testing of this culvert in the Taylor Slough South watershed indicated high bacteria. Fluorescent green dye and smoke testing by Austin Water helped identify the source of the failing wastewater line to ultimately resolve the problem.

[1] www.austintexas.gov/department/environmental-integrity-index
[2] http://www.ci.austin.tx.us/edims/document.cfm?id=232733

Water quality data are maintained in a publicly accessible data portal[3] , which includes more than 2 million sample results spanning several decades. In 2016, environmental monitoring staff produced 16 new scientific reports using this rich data source. These reports are available to the public through WPD's publications search tool[4]. Information on current projects can be found at www.austintexas.gov/watershedprojects.

In Lake Creek, treated wastewater previously caused algal blooms (left), but the water quality has greatly improved now that treated wastewater is no longer discharged to the stream (right).

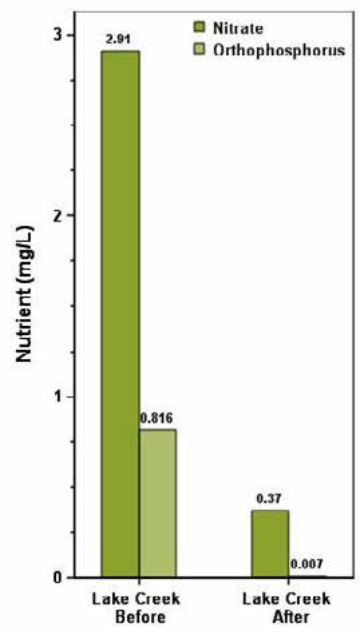


Figure 2. *Nutrient levels were far too high when the treated wastewater was discharged into Lake Creek, but are now much better after decommissioning the treatment plant*

Onion Creek has low nutrients now, but it is in jeopardy of increased nutrients and algal blooms from a proposed direct discharge of treated wastewater from the City of Dripping Springs.

Annual Focus

Grow Zones (www.austintexas.gov/creekside)

Our Grow Zone program keeps growing! The first Grow Zones established in 2012 look strikingly different now than when the program started, with vegetation helping to prevent erosion, provide shade for the creeks, increase the ability of soil to infiltrate water from storms, and filter out pollutants. These creekside areas also provide habitat for wildlife such as birds and butterflies. With miles of creeks throughout Austin, we hope to keep adding many more acres of Grow Zones throughout the city.

Buttermilk Creek Grow Zone: 12/2012 (above left) 04/2013 (above middle) 05/2016 (above right). Four years after mowing ceased, vegetation is recovering, providing many benefits to our creeks. Our program has also expanded by adding new Grow Zones. Creekside healthy vegetation is now allowed to grow naturally in 46 Austin creeks. Thanks to our partnership with Keep Austin Beautiful, (www.keepaustinbeautiful.org/program/adopt-creek) many of these creekside areas are now adopted by community members who volunteer their time to remove trash, plant trees, and help improve the health of these creeks.

[3] https://data.austintexas.gov/Environmental/Water-Quality-Sampling-Data/5tye-7ray
[4] http://www.austintexas.gov/watershed_protection/publications/default.cfm

Ready, Set, Plant! events in collaboration with Tree Folks, Keep Austin Beautiful, and the PARD Forestry program. Williamson Creek at Emerald Wood (upper left and center) Walnut Creek tributary at Copperfield Nature Trails (upper right and bottom). Photos courtesy of Tree Folks www.treefolks.org

Oak springs trickle channel: mowed area before restoration in 2014 (top), channel reconfiguration (center), and two years after construction in April 2016 (bottom). Straight concrete channel in mowed area removed and reconfigured into a meandering channel with native plants.

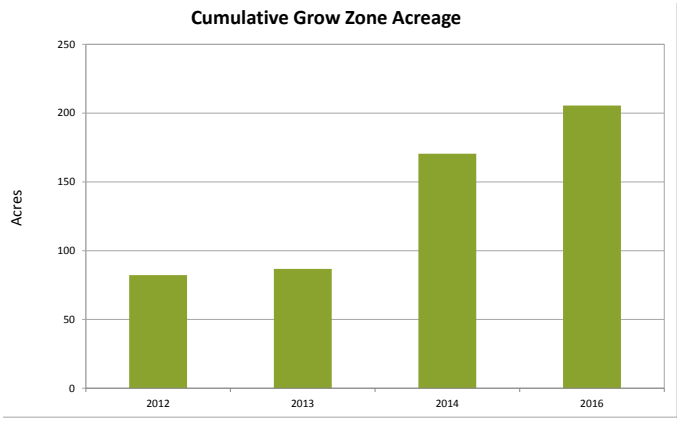


Figure 3. *Grow Zone Cumulative Acreage. Beginning with a little more than 82 acres in 2012, the Grow Zone program continues growing. In 2016, the total acreage under sustainable creek restoration management was 206 acres.*

Oak Springs Channel Restoration

Urban environments substantially change drainage patterns and creeks throughout the city. In some urban areas, stormwater moves through straight concrete channels with no ecological function. Runoff moving along these channels receives no treatment and pollutants remain in the water until it reaches the receiving creeks or water quality control device. These concrete channels have no connectivity with the surrounding soil and plants. Often, these straight channels increase the risk of erosion downstream due to fast-moving stormwater. The Oak Springs Channel restoration project removed one such concrete channel, which carries spring flow and street runoff to a wet pond. The restoration transformed it into a meandering channel, restored the connection with the soil and the water table, and planted wetland and riparian plants along its edges.

Two years after completion of the channel reconfiguration and planting vegetation, a vigorous wetland plant community is thriving. This has resulted in improved water quality, wildlife habitat, and ecological function. Trees and shrubs are becoming established through planted saplings and natural tree recruitment. A diverse riparian forest is the bright future of this urban creek.

Lakes and Rivers

Importance

The City of Austin manages and monitors three reservoirs: Lake Austin, Lady Bird Lake, and Walter E. Long Lake. The Lower Colorado River Authority manages and monitors Lake Travis, northwest of Austin. These reservoirs are impoundments along the main stem of the Colorado River, except for Walter E. Long, which is off-channel but receives Colorado River water for the purposes of cooling the Decker Power Plant. The majority of our drinking water comes from Lake Austin and Lake Travis. All of the reservoirs provide additional ecosystem services, including flood control and protection, recreation, stormwater conveyance, and habitat for aquatic organisms. Austin's ability to thrive as our climate and land use patterns change is contingent on our ability to maintain high integrity reservoirs, which support our water needs and recreational enjoyment.

Status & Trends

The City of Austin monitors the overall condition of Austin's reservoirs and assesses this data using the Austin Lakes Index (ALI). Staff routinely sample water and sediment chemistry, algae, aquatic insects, and the shoreline and nearshore habitat structure and composition. Recent sampling found that the overall condition of Lake Austin and Lady Bird Lake declined for the fourth year and remains near a marginal condition with a score of 50 (Figure 1). These two reservoirs suffer various maladies including non-native vegetation, a lack of native vegetation, nutrient enrichment, low clarity, and algae blooms (reflected in the "eutrophication" ALI score).

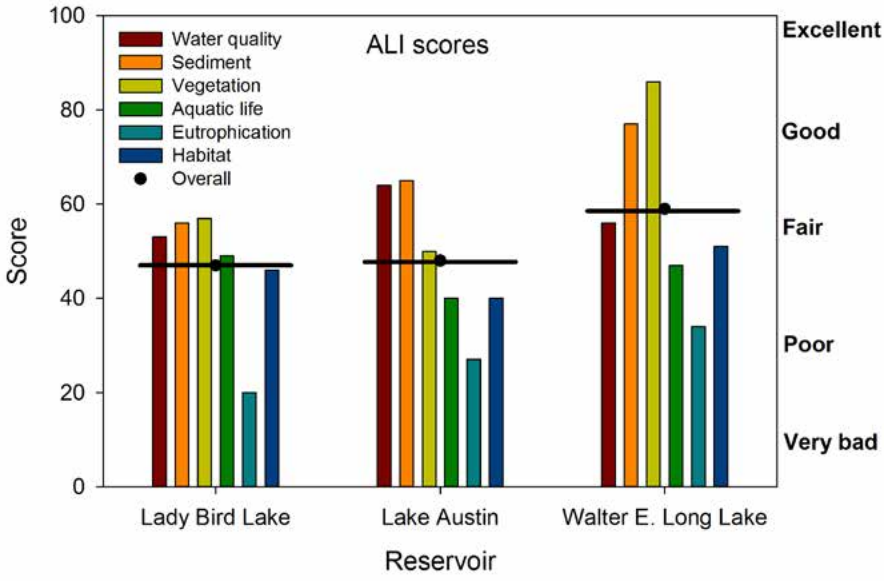


Figure 1. *Five components are measured during the year to evaluate the condition of each of Austin's reservoirs. The target goal for the reservoirs is an overall score of 64, which is considered to be "good" condition. More information on scoring can be found at www.austintexas.gov/lakesindex.*

Figure 2. *Interior of a 20' x 50' herbivore exclusion pen in Lake Austin near Commons Ford Park. From an initial planting of 27 water celery evenly spaced within the cage, plants rapidly spread to fill-in the entire area. In the absence of herbivore grazing pressure, additional aquatic vegetation including cattail (upper right), filamentous algae (stringy material near upper center), as well as Chara and pondweeds (not visible), have been observed.*

Walter Long Lake's overall score increased for the second straight year, driven by increased vegetation coverage and decreased sediment contaminant levels.

An important ALI component involves monitoring and actively managing for is aquatic vegetation. Aquatic vegetation provides important ecosystem services, including fish and invertebrate habitat, nutrient sequestration, and enhanced water clarity. Watershed Protection Department staff strive to maintain healthy aquatic plant communities in each reservoir by planting native vegetation and managing exotic species. Staff found that Lake Austin continues to lack free-growing aquatic vegetation due to rapid consumption by herbivores, including stocked triploid grass carp, turtles, and waterfowl. As shown in Figure 2, herbivore exclusion pens restrict access to vegetation. WPD staff have expanded pen installation efforts in recent years to compensate for vegetation losses and to establish large founder colonies that will expand as herbivore pressure declines.

In Lady Bird Lake, the native aquatic plant fanwort spread for four years. This year the plant was completely removed from the reservoir due to extraordinary rain events that flushed the plant out of the system. Prior to the early summer rains, fanwort was observed growing in the upper half of the reservoir. However, pens continue to maintain standing stocks of native vegetation.

Walter E. Long Lake maintains excellent aquatic vegetation coverage (Figure 3). However, this year staff measured a near doubling of the non-native plant hydrilla in the area since the 2014 survey.

Figure 3*. Shallow water vegetation in Walter Long Lake, including cattail, coontail, hydrilla, and floating algae mats. The dense and diverse vegetation supports a large variety and density of aquatic animals and insects that fuels the food web of the reservoir.*

Figure 4. *Commercial chemical applicators spray giant cane with herbicide in the basin of Lady Bird Lake. Herbicide treatment will be repeated over the next several years to ensure the colony is eliminated. Once chemical treatments cease, WPD staff will re-establish native shoreline and riparian vegetation in order to minimize the likelihood of giant cane recolonization.*

In late summer of 2015, the City of Austin carried out management efforts to slow the spread of two invasive species along the shoreline of Lady Bird Lake: giant cane and elephant ear. Efforts included herbicide treatments for both species (Figure 4) as well as manual removal of elephant ear coupled with re-planting of native vegetation (Figure 5 and Figure 6).

Figure 5. *Manual removal of elephant ear along the north shoreline under the 1st St. Bridge.*

Annual Focus

During the extended drought from 2011 to 2015 incidents of taste-and-odor problems for Austin Water Utility (AWU) customers increased due to cyanobacteria blooms and low dissolved oxygen levels within Lake Austin. In an effort to understand the influence of the drought on the change in Lake Austin's water quality, WPD staff analyzed more than 20 years of monitoring data for relationships between water chemistry, dam discharge volumes, and algal biomass. The results provide AWU with an approximate timing and intensity of algae blooms based on discharge volumes from the spring through fall.

Between 2012 and 2015, Lake Austin experienced some of the largest cyanobacteria blooms observed for the period of record analyzed (back to 1992). Staff found that daily discharge volume from Tom Miller Dam was related to cyanobacteria abundance dynamics. Under normal hydrologic conditions, large daily discharges disrupted water stability and flushed cyanobacteria biomass, resulting in an overall short period of optimal growing conditions. The total number of days experiencing a bloom from 1992-2010 was only 356 measurement days. However, during the drought

when discharge volumes were reduced in order to conserve water supplies, conditions conducive to cyanobacterial growth developed earlier in the summer and were sustained into the fall. The result was that cyanobacteria biomass began increasing nearly two months earlier and peaked approximately three weeks later than during non-drought years. The extended growing season resulted in more bloom days observed during the drought period than for the entire previous eighteen-year period. In addition, during non-drought years Lake Austin waters were cooler and held more oxygen. Conversely, during the drought, waters were warmer and had less oxygen for longer periods in the summer. Together with the larger cyanobacterial blooms, AWU had greater incidents of taste-and-odor problems during the drought period.

In years when June and July discharge volumes have been reduced to conserve water supply, AWU should anticipate earlier onset and larger cyanobacteria blooms, as well as greater potential for intake of warm, low-oxygen waters, both of which contribute to taste-and-odor problems. Staff are researching additional tools for increasing dissolved oxygen levels and minimizing cyanobacteria biomass near water intake structures when flow regulation is not an option.

Figure 6. *Texas Conservation Corps workers replant native vegetation where elephant ear had been removed.*

Aquifers

Importance

Aquifers (water-bearing rocks) provide important base flow to area creeks through springs and seeps. They also provide critical habitat for endangered and threatened species, and supply drinking water for thousands of Central Texas residents. Major aquifers in the Austin area are the Edwards and the Trinity aquifers. The Barton Springs segment of the Edwards Aquifer is best known for feeding the Barton Springs Pool and also providing habitat for endangered salamanders. In north Austin, small springs discharging from the Northern Edwards Aquifer provide critical habitat for the threatened Jollyville Plateau salamander. The Trinity Aquifer covers large areas of the watersheds that feed Barton Springs via storm water runoff and spring discharge in addition to supplying private and public water supply wells to communities west of Austin.

Status and Trends

When development is proposed on a property, biologists and geologists in the Watershed Protection Department (WPD) provide technical assistance for identification, evaluation, and protection of critical environmental features (CEFs) such as karst recharge features, springs and seeps, wetlands, rimrocks and bluffs. They also review void mitigations plans, Environmental Resource Inventory Report waivers, and administrative variances for critical environmental features. During the summer of 2016, staff inspected vegetation, erosion, and human disturbance within the buffers of 54 randomly selected cave or sinkhole CEFs. They found that the smallest CEF buffers located next to highly paved areas had more invasive plant species and higher levels of human disturbance, such as trash, than the largest CEF buffers on City of Austin parks or preserves.

Other water-related accomplishments include an updated analysis on water quality trends in the primary spring outlets from the Barton Springs Edwards Aquifer (Barton, Eliza, Old Mill, Upper Barton, Cold and Backdoor Springs) and identifying increasing trends of many chemical elements. These increases suggest changes in recharge water quality likely related to urban growth, and rainfall in late 2015 and early 2016. This rainfall led to high flows in creeks recharging the aquifer and high water levels in the aquifer that caused springs to flow on the banks of Barton Creek in Gus Fruh Park, which last flowed in the late winter of 1991 and spring of 1992. These springs are likely associated with an ancestral spring pre-dating Barton Springs in the Airman's Cave area.

To help investigate subsurface spaces, a unique tool was built for WPD to measure and photograph the interior of underground

Koko Spring along the banks of Barton Creek in Gus Fruh Park. These springs last flowed in the winter of 1991 and spring of 1992.

voids. The tool will facilitate inspection and evaluation of voids to allow appropriate mitigation measures for protecting caves in the Edwards Aquifer recharge zone.

Reconstruction of the stream that discharges from Eliza Spring commenced, with completion expected in the first half of 2017. This will expand salamander habitat adjacent to the largest population in Eliza Spring. More than 100 Barton Springs salamanders were observed within Barton Springs pool this fall, and population estimates at Eliza Spring ranged from 126 to 195 through 2016.

Annual Focus

Clean water is as necessary for rare cave invertebrates as it is for people who drink water from wells or swim in spring-fed pools. In 2016, the City completed a multi-year study of water sources to Flint Ridge Cave, which provides important habitat for endangered cave invertebrates. Flint Ridge Cave is one of the deepest, longest, and most ecologically diverse of the 62 caves that the City of Austin and Travis County are committed to preserving through the 1996 Balcones Canyonland Conservation Plan federal permit, which protects both endangered songbirds and rare cave invertebrates. Flint Ridge Cave extends 150 feet below proposed State Highway 45 SW. Highway construction and operation may impact water quality in both the cave and the Edwards Aquifer. The City studied the water sources for the cave by injecting tracers

Runoff flowing into the entrance of Flint Ridge Cave following heavy rain in May 2016. Note the clarity of the water.

CEF Identified by ERM review process				
CEFs Type	**CEFs Identified Fiscal Year 2015-16**	**CEFs Identified Year to Date**	**Area/Length Year to Date**	**Units**
Spring/Seep	65	1258		Count
Karst Points	132*	1255		Count
Wetlands	166	1345	677 ac	Acres
Rimrock/Bluff	47	1027	207,949	Linear Feet
CEF Buffer Area	105 (or 280.2 -acres)	1694	6,600	Acres

*123 of Karst Points were identified along SH45 south on COA property

Table 1. *The number of Critical Environmental Features (CEF's) identified by ERM staff during FY2016.*

The LIDAR void inspection tool being tested in the Goat Cave Karst Preserve

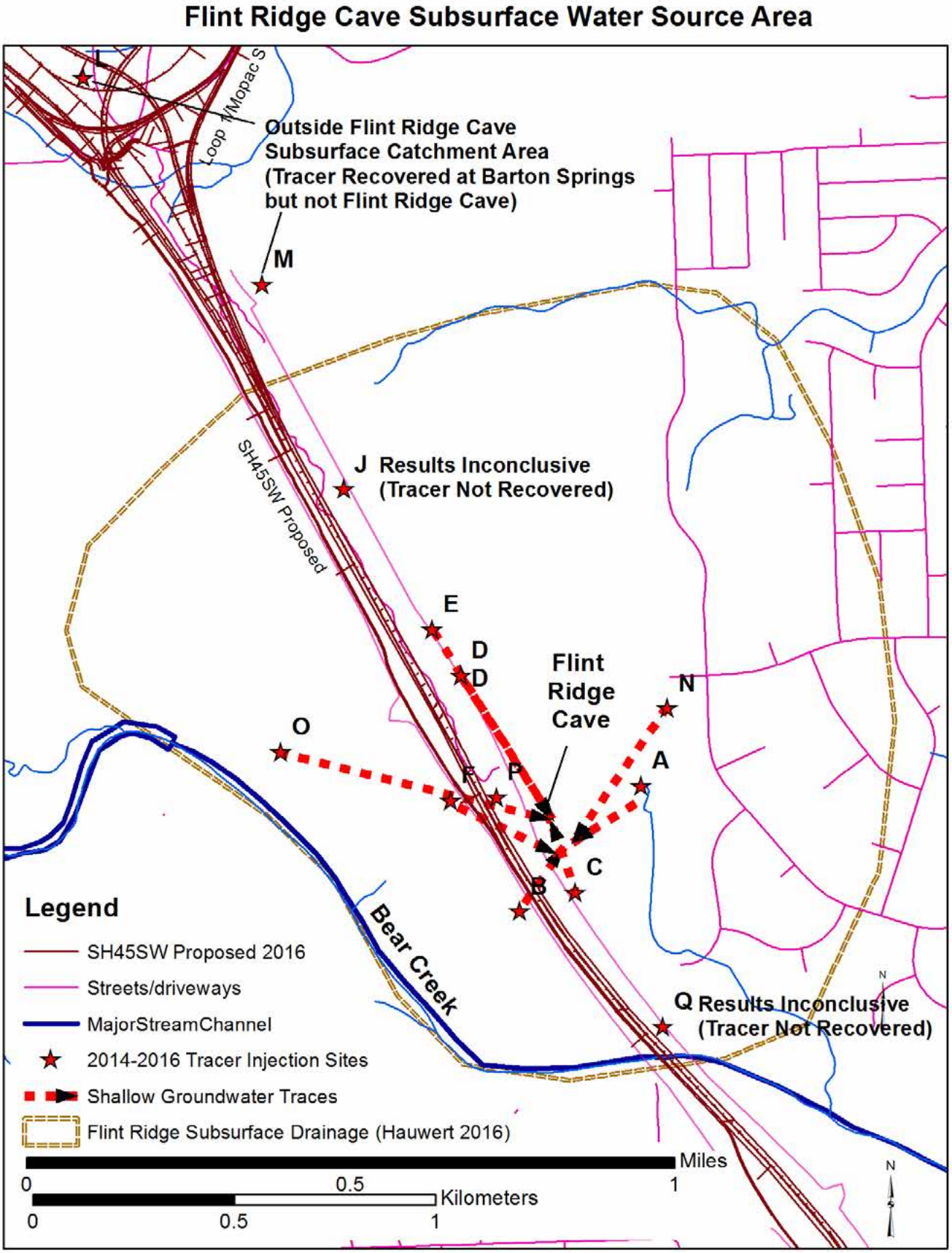


Figure 1. *Preliminary results of tracing define the subsurface drainage area to Flint Ridge Cave. Note that areas south of Bear Creek and north near the current MoPac/SH45 intersection are interpreted to be outside the contributing subsurface basin.*

as far as a half mile north, northeast, and northwest of Flint Ridge Cave, which were then recovered in some of the 32 drip sites monitored for the study. Tracers injected near SH 45 SW were also recovered in wells and at Barton Springs less than two days after injection. These tracing studies along SH 45 SW are important because they demonstrate how spills of hazardous material can negatively impact drinking water and Barton Springs.

COA staff are monitoring the initial ground clearing for the highway for any impacts to remaining adjacent Water Quality Protection Lands and Bear Creek, and will continue monitoring WQPL for construction and operations impacts. A deeper understanding of the local groundwater flow is critical for protecting this unique underground Austin heritage.

Dye injection in cave at the intersection of MoPac and SH45SW. This dye was not detected in Flint Ridge Cave but was detected more than 9 miles away in Barton Springs.

Urban Forest

Austin is dedicated to creating more options for multimodal transportation. In our hot Texas climate, trees help to shade pedestrians and calm traffic.

Importance

Since the early 1980s, the City of Austin has recognized that the urban forest provides social, ecological, and economic benefits that enhance the quality of life for Austin residents. The urban forest is a community asset and an important part of Austin's infrastructure network, but it is not static; the forest's health and the environmental benefits it provides can be impacted by insect and disease infestations, invasive plants, aging trees, and the ability to adjust to the changes that come with population growth and land development. To maintain a thriving and resilient urban forest, the City strives to preserve and maintain trees and vegetation; protect lands for their environmental services; manage and educate about tree diseases; and replant trees and vegetation.

Status & Trends

The preservation and health of the urban forest are perennial challenges in one of the fastest-growing cities in the United States.

Data from 2012 to 2016 show that most tree removal is caused by land development activities. Approximately 472,000 caliper inches of trees were permitted for removal on commercial and

This photo shows a tree that measures 5 caliper inches in diameter at 4 ½ feet from the ground.

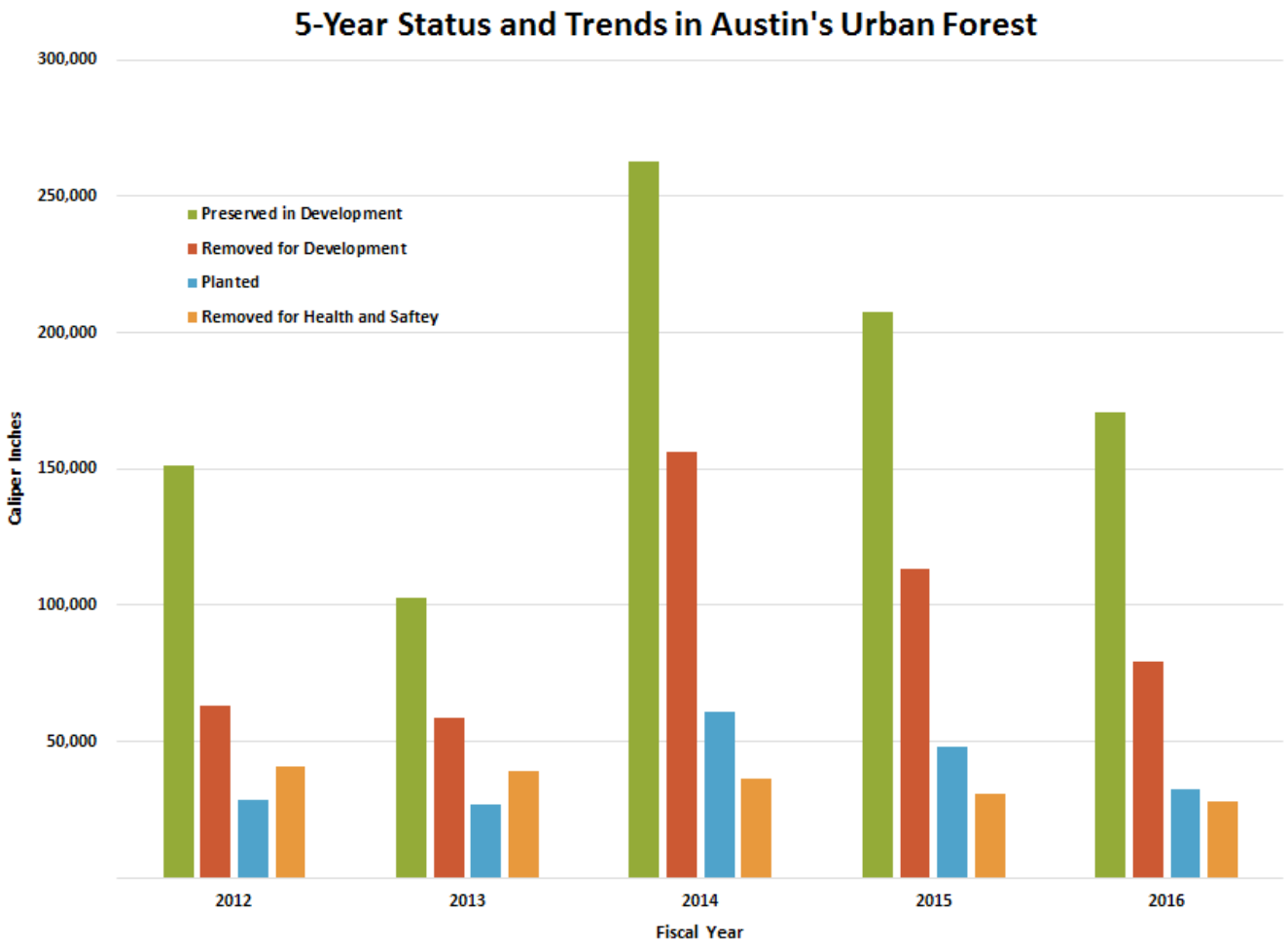
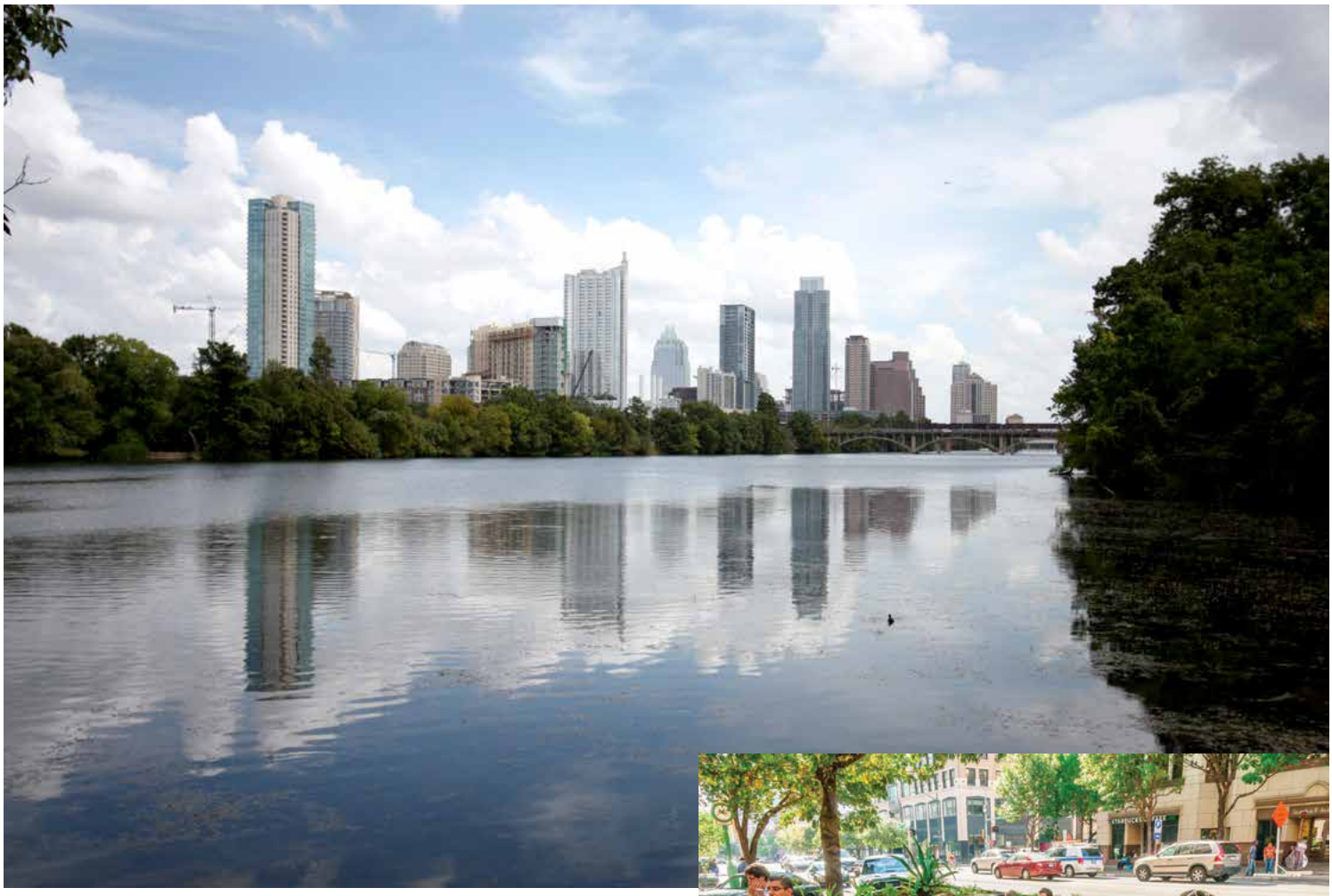


Figure 1. *5-year status and trends according to Community Tree Preservation Division data*

residential sites over that period. Analysis reveals that the majority of development-related removals occurred in Austin's central region, though the most impactful removal sites are located in in Austin's outskirts. A total of 175,000 caliper inches were permitted for removal due to poor condition. Disease, increasing frequency of natural death for certain species, and changes in climate conditions have influenced the total number of removals.
Despite these challenges, the average preservation rate for development is approximately 65 percent, amounting to nearly 900,000 inches preserved throughout the City. Increased levels of rainfall in recent years likely contributed to a decreasing number of tree removals for health and safety. Additionally, the City Oak Wilt Program proactively addresses the health of the urban forest through education and adopting innovative, high-tech means of collecting data to suppress the disease. Considerable efforts have been made to plant new trees and require replacement of trees removed for development. The concerted efforts of City departments and partners resulted in nearly 200,000 inches of native trees either newly planted or replaced, exceeding the number of trees removed for health and safety. These trees contribute to the high proportion of young trees in the Austin area, a condition favorable to long-term health and sustainability.



Annual Focus

Austin is known for its love of trees and tree-protection policies, and those efforts were recently acknowledged in a report, Austin's Urban Forest, released in February 2016 by the United States Department of Agriculture (USDA) Forest Service. Austin was selected for the study due to its strong leadership and history of tree preservation. The report represents a significant planning and management tool for the City of Austin, and directly relates to topics identified in Austin's Urban Forest Plan. The findings will be used for planning purposes, long-term monitoring, and analysis of Austin's urban forest.

The report, which is the first of its kind, is the product of the Urban Forest Inventory and Analysis Program (UFIA). UFIA is an urban forest monitoring program that produces estimates of the quantity, health, composition, and benefits of urban trees and forests. The report is a summary and analysis of the field work and data collection conducted by the Texas A&M Forest Service. Field data will be collected on an annual basis to monitor and analyze Austin's urban forest, including trends, threats, and opportunities. Additional components of the project include My City's Trees, an online application that allows easy manipulation of the data collected and produces custom analyses and reports.

The City of Austin works to support the urban forest as an integral green infrastructure asset that adds economic and environmental benefits to the community.

Austin's Urban Forest report found that trees in Austin:

- Contribute significantly to the environment, the economy, and residents' well-being
- Include an estimated 33.8 million trees and 30.8 percent tree canopy cover
- Store approximately 1.9 million tons of carbon (valued at $242 million)
- Reduce annual residential energy costs by an estimated $18.9 million per year
- Reduce storm water runoff by an estimated 65 million cubic feet per year
- Are valued at an estimated $16.0 billion (compensatory value)

Downtown Austin thrives under the cover of shade trees.

Old Baldy is a bald cypress located in McKinney Falls State Park. It's estimated to be more than 550 years old.

Bald cypress on Lady Bird Lake

The USDA's Austin's Urban Forest report can be found online at www.treesearch.fs.fed.us/pubs/50393, and My City's Trees at http://tfsfrd.tamu.edu/mycitystrees. Austin's Urban Forest Plan is available online at www.austintexas.gov/trees-planning.

Open Space and Habitat

Importance

Austin is known and celebrated for its protection of open space and habitat. Austin's open spaces and preserves shape city planning, reduce infrastructure costs, and provide recreation, clean air and water, cooler temperatures, and biodiversity.

The City of Austin prioritizes the protection of open spaces and environmentally sensitive areas through Austin Water's Wildland Conservation Division (referred to as Wildlands). Wildlands encompasses two programs: the Balcones Canyonlands Preserve (BCP) and Water Quality Protection Lands (WQPL). The primary goal of the BCP is to protect and enhance the habitat of endangered and rare species as mitigation for development in western Travis County. WQPL's goal is to restore grassland ecosystems and healthy riparian corridors, which will produce the optimal level of high quality water to recharge the Barton Springs segment of the Edwards Aquifer.

WILDLAND CONSERVATION DIVISION

Open Space - Austin's Wildlands*
41,971 total acres
28,361 WQPL acres
13, 610 BCP acres

* Wildland Conservation Division properties including voluntary conservation partnerships and dual managed tracts

Volunteer guides plan a new interpretive day hike on the WQPL. Volunteers contributed more than 4,000 hours to Wildlands this year. Photo credit: Linda Chayra

Wildlands staff prepare for a prescribed fire on the Onion Creek Management Unit. A total of 1,027 acres were treated with prescribed fire in 2016 to restore native grasses and counter the spread of woody and invasive species.

Hikers look at a salamander during a nighttime walk on the BCP. Wildlands offered more than 60 guided hikes this year.

Middle school students examine the natural world up close on a field trip to Reicher Ranch. More than 1,000 children visit the City's Wildlands every year.

Status & Trends

Austin's commitment to protect our Golden-cheeked Warblers (GCWA) began more than twenty years ago with the creation of the Balcones Canyonlands Conservation Plan. Now, BCP biologists are delving into demographic and vegetation data gathered from a 5-year study of the GCWA, which was conducted under contract with the U.S. Forest Service and the University of Missouri and with the help of BCP partners and many volunteers. The study examined 4 key questions:

1. How many Golden-cheeked Warblers are there on the Balcones Canyonlands Preserve?

The BCP currently supports an estimated 1,800 male GCWAs. Color-banding individual GCWAs is critical to accurately estimate population size and trends, including the number of birds that return from their wintering grounds each year.

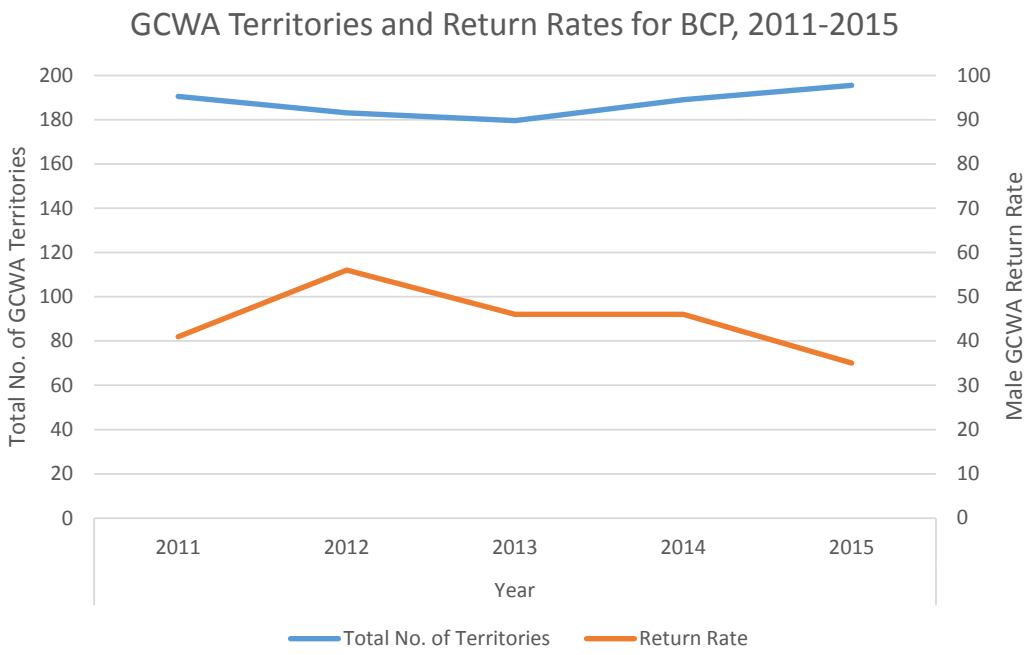


Figure 1. *GCWA Territories and Return Rates for BCP, 2011-2015*

2. How do demographics such as density, productivity, and survival vary with landscape and habitat factors?

Large tracts of closed-canopy forests of Ashe juniper (aka "cedar") and oak trees are critical for GCWA conservation. Larger, taller trees support higher GCWA densities. Nest survival increases with higher densities of Ashe juniper trees, woody understory, and relatively level land (such as plateau tops).

3. How viable are these populations?

Researchers are using the data collected to run population viability models. We know that adult and juvenile survival, productivity, and dispersal are all critical and need to be as high as possible to ensure long-term viability.

4. How do various management scenarios influence viability?

The BCP must provide large forested tracts of mature Ashe juniper and oaks that include uplands with minimal urban edge, a closed canopy, and diverse understory.

Adaptive management techniques on previously degraded land include installing berms and swales to capture, spread, and infiltrate water; removing non-native plants; and using locally available materials such as native mulch, fungi, soil amendments, seeds and plants. These techniques help rebuild soils, control erosion, increase diversity, promote regeneration of woody plants, and ultimately enhance endangered species habitat.

Annual Focus

During the summer of 2016, recharge function was restored to two caves in the bed of Onion Creek on Water Quality Protection Lands, once again allowing water to flow underground into the Edwards Aquifer through these features. These two caves in the creek bed, which are called swallets, together take in about 10,000,000 gallons of water per day when Onion Creek is flowing. This allows high-quality water to reach the aquifer and Barton Springs. City staff from Wildland Conservation and Watershed Protection, volunteers, and the Barton Springs Edwards Aquifer Conservation District all had a hand in making it happen.
The water's trip through these caves and underground to Barton

Volunteers dig organic material out of the smaller swallet.

Staff and volunteers restore functionality to the large swallet.

Springs can take as little as three days. This short travel time means that water emerges in much the same condition as it went in. Healthy land (such as the WQPL) ensures recharge waters are clean before they enter the aquifer. Grassland restoration plays an important role in maintaining water quality and is a major strategy that WQPL employs.

The story of these two recharge features does not begin on the day they were re-opened. It goes back over years of relationship-building with the previous landowner. City staff became aware of the larger of the two features during conversations with the owner more than a decade ago. Because Austin voters value conservation, in 2014 the City was able to purchase the land using voter-approved bond funding.

This long-time frame between the identification of critical natural features and their legal protection is indicative of the sustained commitment required to make large-scale conservation happen. The re-opening of Searcy Swallet, which took only a single day's work, was at least fifteen years in the making. The people of Austin and Hays County, as well as the creatures that call Barton Springs home, now benefit from this work.

11:59 AM *12:04 PM* *12:43 PM*

Remarkable volumes of high quality water quickly enter the aquifer via the swallet

When rains once again brought water to Onion Creek in September, staff placed temporary grates over the swallets to prevent flood debris from obstructing water recharge.

Air Quality

Importance

The goal of the City's Air Quality Program is to promote healthy outdoor air for all residents. The primary air quality concern in Austin is ground-level ozone, as elevated ozone levels can have a significant impact on human health. Ground-level ozone causes many individuals to experience increased respiratory illnesses. Vulnerable populations, including children, older adults, and those with lung diseases such as asthma, are more prone to be affected by increased ozone levels.

Ozone forms when nitrogen oxides (NOx) and volatile organic compounds (VOCs) combine and "cook" in the sunlight. Contributing to the formation of ground-level ozone are man-made sources of NOx and VOCs, such as vehicle engines, electric generation units, industrial facilities, and many everyday activities. Learn more air quality basics at aircentraltexas.org/en/regional-air-quality/what-is-ground-level-ozone.


Photo: Nathan Wilkes

Status & Trends

In 2015, the United States Environmental Protection Agency (EPA) tightened the National Ambient Air Quality Standard for ozone from 75 parts per billion (ppb) to 70 ppb. In 2017, the EPA will reevaluate the region's ozone designation using data from the 2014, 2015, and 2016 ozone seasons to make a final attainment designation under the new 2015 federal ozone standard. To learn more, visit epa.gov/ozone-pollution/2015-national-ambient-air-quality-standards-naaqs-ozone.

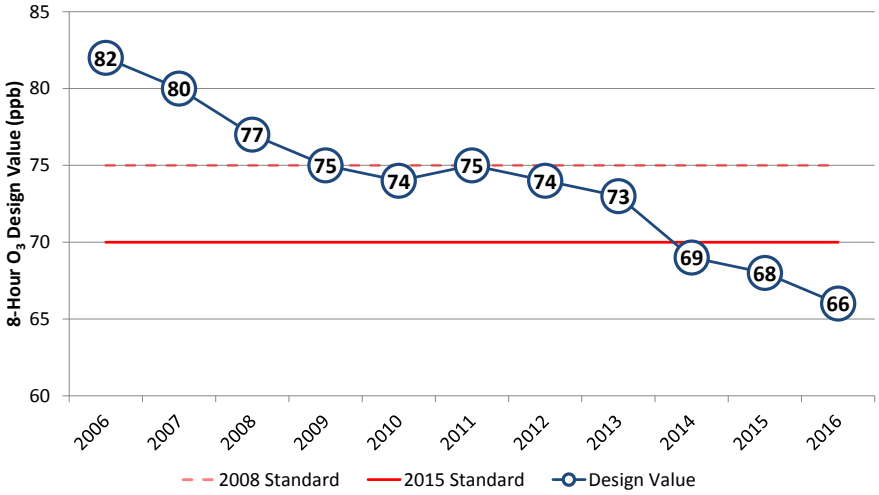


Figure 1. *Ozone Design Value Trend 2006-2016. Graphic courtesy of the Capital Area Council of Governments (capcog.org)*

The Austin area ended the 2016 ozone season in attainment of the 2015 ozone standard with an ozone design value of 66 ppb. The design value is a statistic that reflects the region's average ozone level. Average ozone levels in the Austin area have been decreasing for more than a decade.

The downward trend in ozone design value is almost certainly the result of cleaner emission sources, such as cars and trucks that are equipped with improved emission control systems, both in Austin and in areas upwind of Austin. The region-wide inspection and maintenance program has also contributed to the reduction of ozone by ensuring that local vehicles are maintained.

In addition to tracking long-term trends, it is important monitor air quality daily. The Air Quality Index is a color-coded guide used nationwide to help individuals understand how healthy the air quality may be on a particular day. Figure 2 shows each air quality level of health concern and the matching color indicator. Austin has "good" ozone levels most days of the year. Figure 3 shows the number of days with moderate or worse ozone levels from 2006 to 2016. In 2016, 45 days experienced moderate ozone levels and one day had levels considered unhealthy for sensitive groups.

Graphic courtesy of the Capital Area Council of Governments

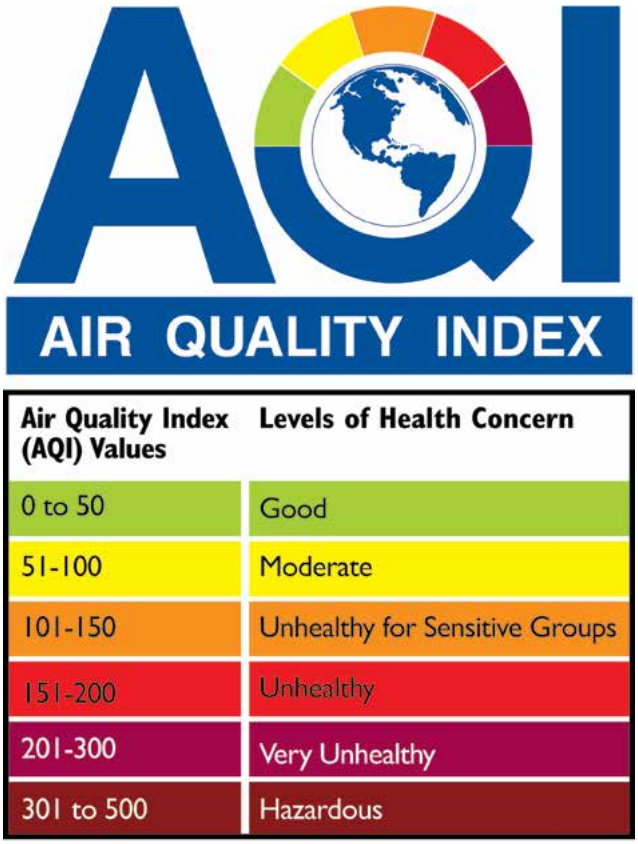


Figure 2. *Air Quality Index. Graphic courtesy of AirNow (airnow.gov)*

For more information about the region's air quality, including a daily air quality forecast, visit aircentraltexas.org.

Photo courtesy of Michael Knox

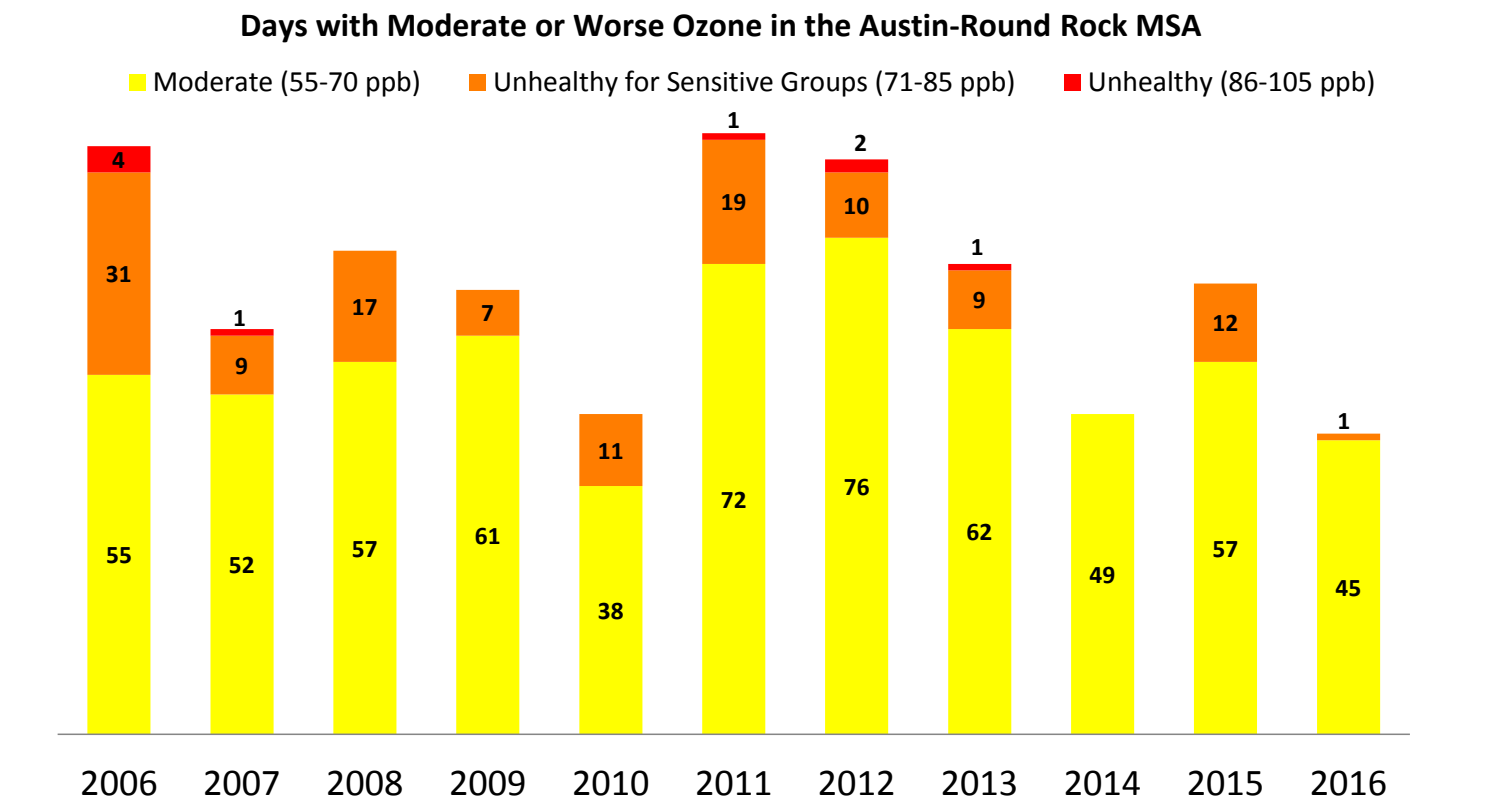


Figure 3. *Ozone Air Quality Index Trend. Graphic courtesy of the Capital Area Council of Governments.*

Annual Focus

The City of Austin has a history of participating in proactive air quality initiatives with regional partners. Austin has been an active member of the Central Texas Clean Air Coalition (CAC) since 2002 and currently participates in the CAC's Ozone Advance Program Action Plan. This voluntary initiative allows Austin to take action toward improving ozone pollution levels rather than waiting for a required and prescribed federal nonattainment process.

The City has committed to more than thirty emission-reduction activities in the plan and remains a leader in the efforts to improve air quality in Central Texas. The plan also provides the City with the opportunity to maximize ozone reductions while reaping the additional benefits of reduced carbon emissions, cleaner fleets, and congestion management. The City continued its commitment to support the Capital Area Council of Governments and the CAC in regional air quality program coordination. This included participating in the development and launch of the new Air Central Texas website, aircentraltexas.org, which encourages individuals, businesses, nonprofits, and local governments to take steps to reduce emissions. Learn more about the CAC at capcog.org/committees/clean-air-coalition.

Graphic courtesy of the Capital Area Council of Governments

In 2016, the City continued its support of the CLEAN AIR Force of Central Texas by serving on the CLEAN AIR Force board. Additionally, the City of Austin and CLEAN AIR Force co-hosted a "Lunch and Learn" for local media and meteorologists. Learn more about the CLEAN AIR Force at cleanairforce.org.

Attendees of the media and meteorologist Lunch and Learn. Photo courtesy of the CLEAN AIR Force of Central Texas.

The goal of the event was to provide valuable information about the current EPA ozone standard and the status of air quality in our region. Attendees learned about the relationships between ground level ozone, transportation, public health, and the environment, including tips for adding ozone alerts to media and weather broadcasts.

The City remained an active member on the Movability Austin Board throughout 2016 and continued to support the implementation of the 2016 Mobility Challenge. The Mobility Challenge provides employers with the tools, training, and consulting support to build and grow mobility programs to remove more of their employees from traffic and offer mobility options. Learn more at movabilityaustin.org and mobilitysolution.org.

Climate Change

Extreme weather events like flooding are expected to increase for Central Texas in the future. (Photo by Victor Ovalle)

Importance

In recent years, Austin's changing climate has resulted in wildfires, floods, extreme temperatures, and drought. Austin's rapid population growth could exacerbate the impacts of climate change by creating additional greenhouse gas emissions and an increasing number of residents who are vulnerable to weather extremes.

To address these impacts, the Austin City Council set a goal to achieve net-zero community-wide greenhouse gas emissions by 2050. In 2015, Council adopted the Austin Community Climate Plan, which identifies 130 actions that will reduce emissions from energy, transportation, and waste sources to achieve the net-zero goal. These actions will also help address other challenges facing Austin, including affordability and transportation issues. Implementing the Climate Plan will improve the quality of life for current residents and help create a vibrant, healthy, and safe Austin for future generations.

Status and Trends

The Austin Community Climate Plan identifies interim emissions reduction targets for Austin to achieve prior to the 2050 net-zero goal. By 2020, emissions must be reduced to 11.3 million metric tons of carbon-dioxide equivalent. More than 50 actions have been prioritized as Phase 1 actions to meet this first target.

Phase 1 actions are grouped in nine reduction strategies, as shown in Figure 1.

Greenhouse gas emissions from power generation are projected to decrease more than any other category. Renewable energy is projected to be the largest single power generation source in Austin Energy's portfolio by 2017.

Transportation Demand Management programs provide the second-largest group of avoided emissions. These programs focus on reducing the number of vehicle miles traveled by Austin residents through ridesharing, use of public transportation, and alternative work schedules. If fully implemented, these programs will decrease greenhouse gas emissions resulting from transportation sources by 19.6 percent by 2020.

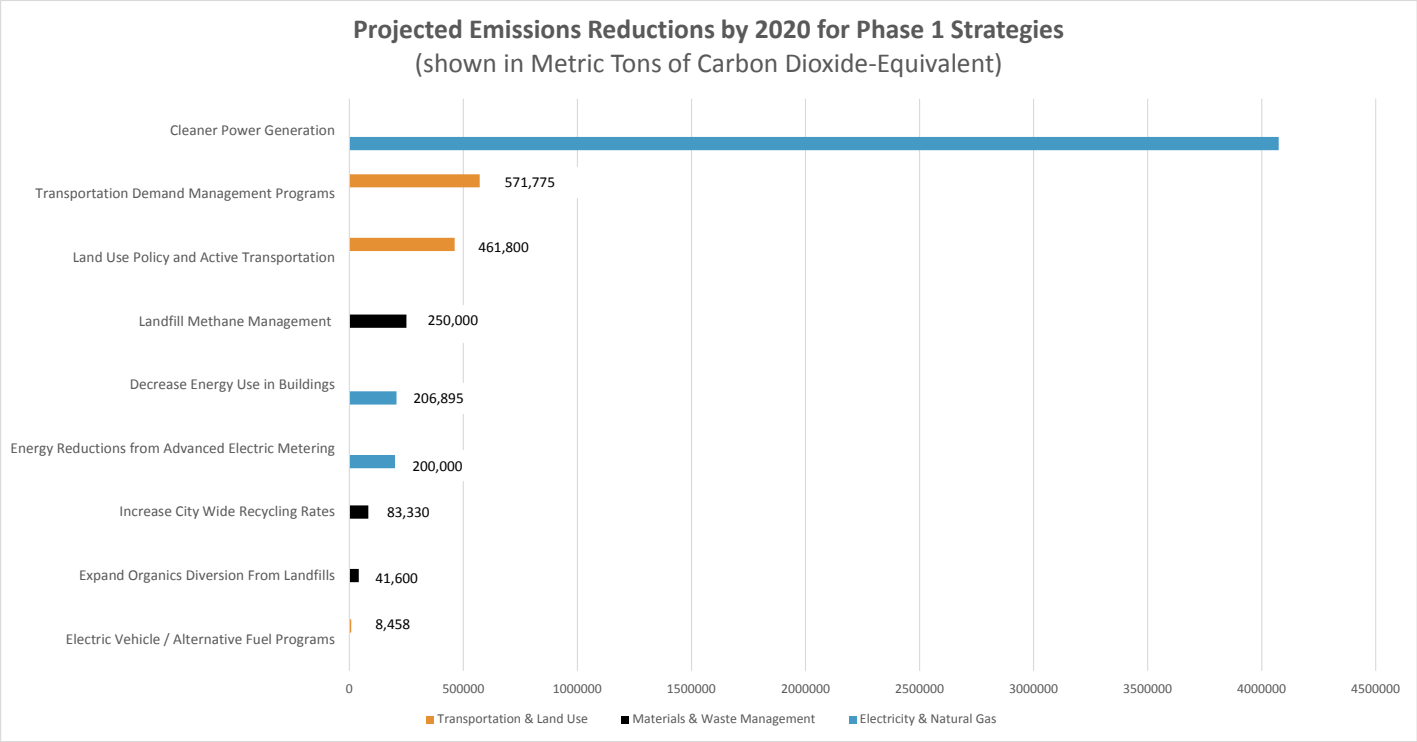


Figure 1. *Projected emissions reductions by 2020 for Phase 1 Strategies*

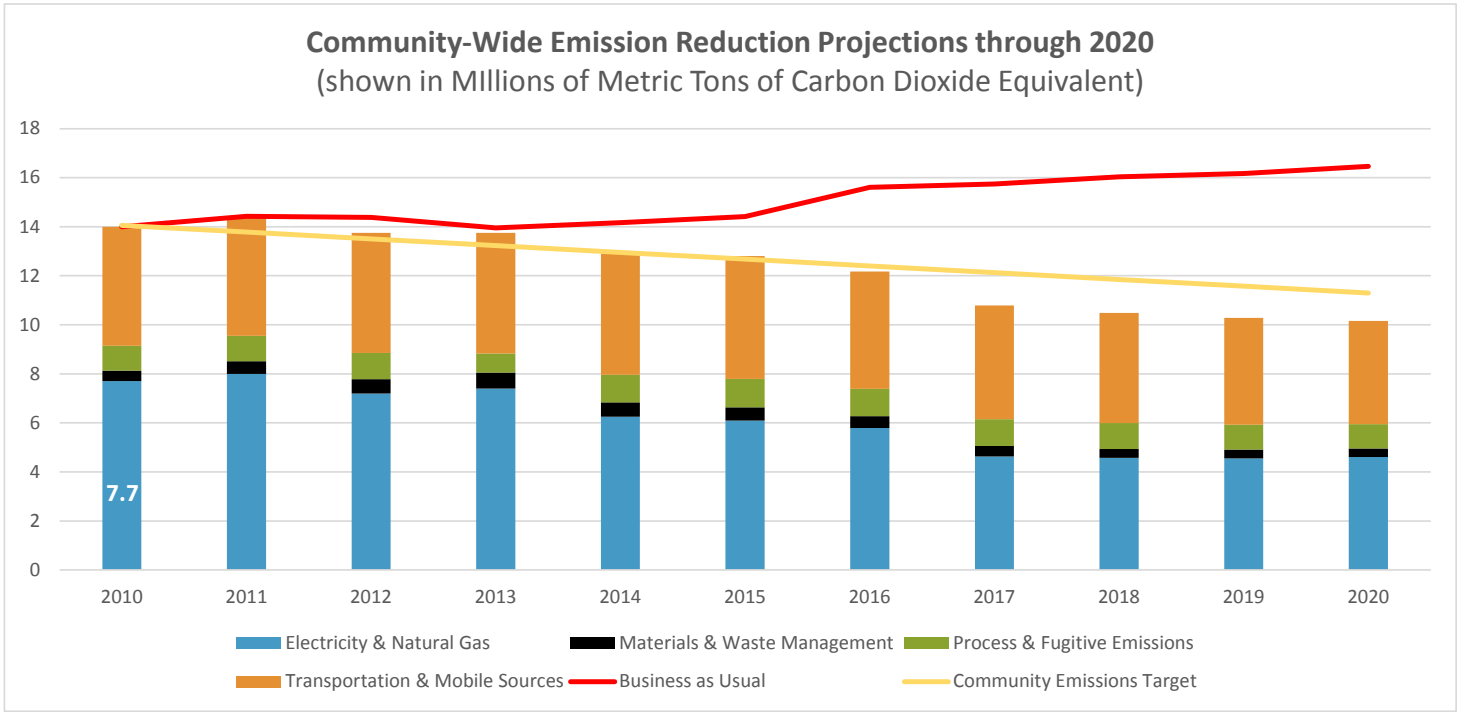


Figure 2. *Community-wide Emission Reduction Projections through 2020*

Figure 2 shows community-wide greenhouse gas emissions projections from 2010 through 2020.

The red line represents a "Business As Usual" baseline, showing the projected amount of community-wide emissions if Phase 1 strategies are not implemented. In this scenario, total emissions would increase by 17 percent by 2020 based on current population growth projections. The yellow line illustrates the reductions needed each year to achieve the 11.3 million metric tons target by 2020.

The columns in Figure 2 reflect the reductions for each emissions source identified in Figure 1, subtracted from the Business As Usual baseline. These estimates indicate that Austin will surpass the 2020 interim target and reduce emissions to 10.2 million metric tons of carbon-dioxide equivalent.

Annual Focus

The Office of Sustainability has been working closely with other City departments and community organizations to implement all Phase 1 actions to reduce emissions from electricity and natural gas,

transportation, and materials- and waste-management sources. To date, 95 percent of Phase 1 actions are in development or underway. Some notable early activities include:

- Austin Energy is developing the first community solar program in Texas, starting with a 1-2 megawatt project at the Kingsbery substation in East Austin.
- Austin Energy received a $4.3 million award from the Department of Energy to develop and test emerging technologies that optimize distributed renewable energy resources such as rooftop solar and battery storage.
- As part of the 20/20 Mobility Challenge and the Transportation Congestion Action Plan, the City of Austin and Movability Austin are working with City employees and other major employers to reduce peak-hour drive-alone commuting. To date, City employees have attained a 23 percent reduction.
- Implementation of the Universal Recycling Ordinance is underway, and Austin Resource Recovery combined and expanded the Household Hazardous Waste and Resource Recovery Center into the Reuse and Recycling Drop-Off Center.

In the coming year, the following will be major areas of focus:

- The Office of Sustainability will update the Austin/Travis County Community Carbon Footprint based on emissions data for calendar year 2016. This information will be used to validate projections for meeting the 2020 interim target and track progress toward the 2050 net-zero goal.
- With passage of the Mobility Bond, the City will begin implementing local mobility projects, such as sidewalks, urban trails, and bikeways to increase transportation and mobility options. Working with a consultant, the Austin Transportation Department will also develop an overall a Corridor Construction Program.
- Austin Resource Recovery will begin rollout of residential organics collection in 2017; the service will be available city-wide by 2020 and will increase curbside collection of compostable materials from 32,951 tons to 79,000 tons annually.

Community solar options through Austin Energy offer renters the opportunity to choose 100% locally-generated solar energy.

Corridor improvements that are part of the Mobility Bond will provide improved and expanded bike lanes to offer zero-emissions commute options for more Austinites.

100% Recycled

2016