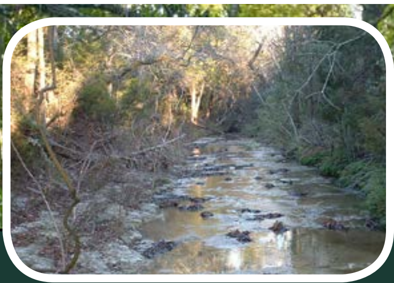

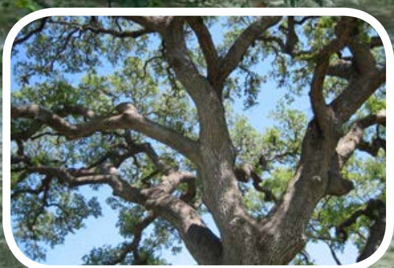

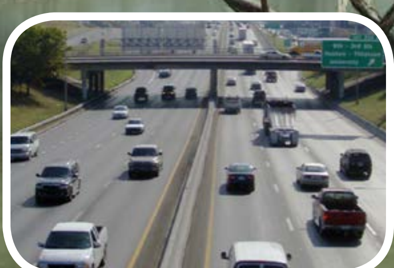

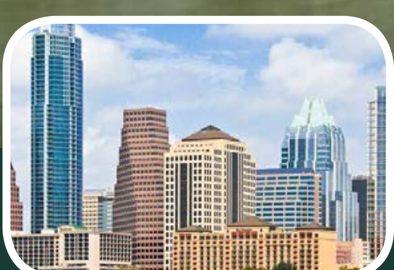

The City of Austin

State of Our Environment

Report

Photo: Theodore Sadler

2015

Prepared for
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April 2015

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Dedicated to the memory of Dr. Mary Gay Maxwell, Chair of the City of Austin’s Environmental Commission.

Table of Contents

Foreword

Welcome to the State of Our Environment Report for 2015! For me, the word that best describes 2015 is transition. Austin is a city in transition. Our central core is becoming denser, infill development is occurring in older neighborhoods, major roads are undergoing or planning major expansions, new roads such as the controversial SH45 Southwest are being planned, and even our form of government has changed, with the City Council moving from at-large to single-member districts.

All of these changes have the potential to impact Austin's environment, some changes obvious and some not so obvious. New density and infill development in the urban core helps prevent sprawl, provides residents with transportation options, and can reduce traffic congestion, but it also creates concerns about increased flooding, tree and water quality impacts, and other problems. City staff and others are looking hard at those issues. We're also engaged with the designers of SH45 Southwest so that if the road is built it gets built in the most environmentally protective way possible.

Booming development and highway expansions are two obvious impacts of the influx of new residents. One of the less obvious impacts of growth – but potentially most significant – is the change in the community's understanding of Austin's environmental history. While one of the primary reasons people and companies move to Austin is the city's natural beauty, many of these folks may not realize that the beauty is not an accident. It's the result of thirty plus years of focused effort and commitment by the community, the City Council, the staff, and volunteers who have worked hard with the development community to manage Austin's growth in a way that preserves and protects Austin's natural beauty while understanding the need for a strong, vibrant economy.

Today our challenge is to embrace those new residents, help them understand the need for a continued commitment to protecting Austin's environment, and engage them in that work so that what makes Austin so great is preserved for future generations.

We recently lost one of our great environmental leaders, Dr. Mary Gay Maxwell. One of her greatest worries was how to help our new residents understand Austin's sensitive environment and how to engage them in environmental protection. I hope this report on the State of Our Environment helps us in that effort.

Chuck Lesniak
Environmental Officer
Watershed Protection Department

Creeks

Bull Creek near Loop 360 and Lakewood Drive

Importance

Creeks flow into reservoirs that provide our drinking water. Creeks also are critical habitat for aquatic life and provide recreational opportunities for people. The health of Austin's creeks and the riparian areas adjacent to them is a direct measure of the City's success in managing land resources and protecting the environmental health of our community.

Goals

One of the City's broad environmental goals is to protect and improve Austin's creeks for human use and the support of aquatic life. Specific goals for creeks include:

- Maintain or achieve Environmental Integrity Index scores of "good" or better in all monitored creeks
- Restore the quantity and quality of baseflow in degraded creeks
- Preserve the existing quantity and quality of baseflow in healthy creeks
- Reduce pollutant loads to all creeks
- Restore riparian vegetation communities along degraded creeks

Imagine Austin Policies

CE P6. Enhance the protection of creeks and floodplains to preserve environmentally sensitive areas and improve the quality of water entering the Colorado River through regional planning and improved coordination.

CE P7. Protect and improve the water quality of the city's creeks, lakes, and aquifers for use and the support of aquatic life.

CFS P8. Reduce pollution in all creeks from stormwater runoff, overflow, and other non-point sources.

CFS P11. Protect the health of creeks and prevent public and private property damage by minimizing erosion.

CFS P46. Foster the use of creeks and lakes for public recreation and enjoyment in a manner that maintains their natural character.

Ongoing Challenges & Responses

Encroachment by development, loss of bank vegetation, increased impervious cover (with associated increases in stormwater runoff), leaking wastewater infrastructure, uncollected pet waste, and improper fertilizer use all contribute to degraded water quality. These threats can result in creeks that are not safe for human contact, are choked with nuisance algae and aquatic plants, have unstable eroding stream banks, and have low dissolved oxygen levels that negatively impact aquatic life. The Watershed Protection Department and its partners address these problems through a combination of solutions including public education, regulations, programs, restoring riparian areas, controlling invasive plants, and capital improvement projects. Learn more at austintexas.gov/watershed.

This Year's Challenges & Responses

Algae blooms downstream of wastewater discharges in the South Fork of the San Gabriel River (above) and Lake Creek (left)

The City of Austin continues to evaluate the impacts of wastewater effluent on Central Texas creeks. Even highly treated wastewater causes significant adverse water quality impacts when discharged directly into a creek. A recent study identified specific changes in the composition and amount of algae downstream from wastewater discharges across a range of different types of creeks. Wastewater effluent increases the concentrations of nutrients in creeks, leading to increases in the frequency, duration and severity of algae blooms. Wastewater effluent adds chemicals from pharmaceutical and personal care products that affect fish populations, particularly fish reproductive organs. www.austintexas.gov/watershed_protection/publications/document.cfm?id=236448.

This research has important practical applications. In 2015, the City of Dripping Springs submitted an application to the Texas Commission on Environmental Quality (TCEQ) for a new wastewater discharge permit to upper Onion Creek, upstream of the Barton Springs Recharge Zone and in an area that provides recharge to the Trinity Aquifer. City of Austin staff continues to monitor existing water quality and collaborate with the City of Dripping Springs to find alternatives to a wastewater discharge that will protect the existing water quality of Onion Creek.

WPD geologists measuring flow in Onion Creek

The impervious cover associated with urban development changes the amount of water that flows into creeks and increases the speed at which rainfall reaches creeks during storms. These changing flow patterns can exacerbate erosion and degrade aquatic habitat. The City of Austin developed a new Stream Stability Index to identify and prioritize watershed-scale restoration needs and help with interpretation of biological monitoring data. Staff assessed geomorphic, hydrologic and riparian parameters at 21 long-term monitoring sites to determine the creek characteristics that most effectively predict which stream channels are or will become unstable. This analysis helps staff not only understand the specific parameters that should be targeted for management activities to restore creeks, but also can be used to objectively identify the creek reaches that are most in need of restoration.

Example of exposed and leaking wastewater infrastructure on Buttermilk Creek in north Austin

Fecal contamination from leaking wastewater infrastructure, domestic pets, and humans continues to be a problem in many of Austin's urban creeks. The City of Austin continues to find and remediate the sources of fecal bacteria at affected sites, and has developed a new method to conduct source investigations once high bacteria levels are discovered. This method enables the City to respond quickly to find and fix the source of fecal contamination once elevated bacteria levels are observed during routine water quality monitoring. Learn more: www.austintexas.gov/watershed_protection/publications/document.cfm?id=232733.

Sensitive aquatic insect larvae (mayfly, stonefly, caddisfly) found in Austin creeks

A large-scale analysis identified specific thresholds for impervious cover at which aquatic life in Austin creeks is degraded, and found that biological communities in intermittent creeks may be more severely degraded by development in the future due to changing climate. Impervious cover and the permanence of flow can be directly related to the health of aquatic life in Austin creeks. Loss of sensitive species occurs at watersheds with impervious cover levels less than 10%.

Environmental monitoring staff with the Watershed Protection Department published a number of new scientific reports in 2015. More than 470 technical reports generated by City scientists and engineers are available in the department's online, searchable database. Read more about Austin's water resources: www.austintexas.gov/watershed_protection/publications/default.cfm.

Status & Trends

The City of Austin tracks the long-term health of creeks and identifies priority areas for specific projects using the Environmental Integrity Index (EII). The EII assesses water chemistry, sediment toxicity, contact recreation, aquatic life, physical integrity, and aesthetics using direct field sampling in 49 watersheds across Austin. More information on the EII is available here:
http://austintexas.gov/department/environmental-integrity-index.

The overall EII score is a comprehensive reflection of the health of Austin's creeks. It can be used to identify where problems occur (see figure 1) and may be used to track the success of Austin's water quality protection efforts over time (see figure 2). Approximately 61 percent of the watersheds assessed in 2014 and 2015 maintained "good" or better overall EII scores.

Annual Focus

Sewage from homes and businesses in urban areas is typically piped to wastewater treatment plants, where it is treated to remove some pollutants and harmful microorganisms. The treated wastewater effluent is then disposed of or reused. Wastewater disposal is regulated by the Texas Commission on Environmental Quality (TCEQ), which issues two types of wastewater permits: a discharge permit that allows treated effluent to be discharged directly to a creek or lake, and a land application permit that allows treated effluent to be irrigated on the ground in a specific disposal area.

Treated wastewater has very high concentrations of nutrients relative to natural levels in Central Texas streams and lakes. The direct discharge of wastewater into small water bodies can harm aquatic life and have dramatic negative impacts, including algae blooms that impair the recreational use of water bodies.

Land application of wastewater effluent is therefore environmentally preferred, especially in sensitive areas. However, with expansive population growth in Central Texas, land costs are rapidly increasing. This is driving some wastewater treatment providers to seek discharge permits rather than land disposal permits, which require large amounts of land to be dedicated to wastewater disposal.

Example of a direct wastewater discharge outfall

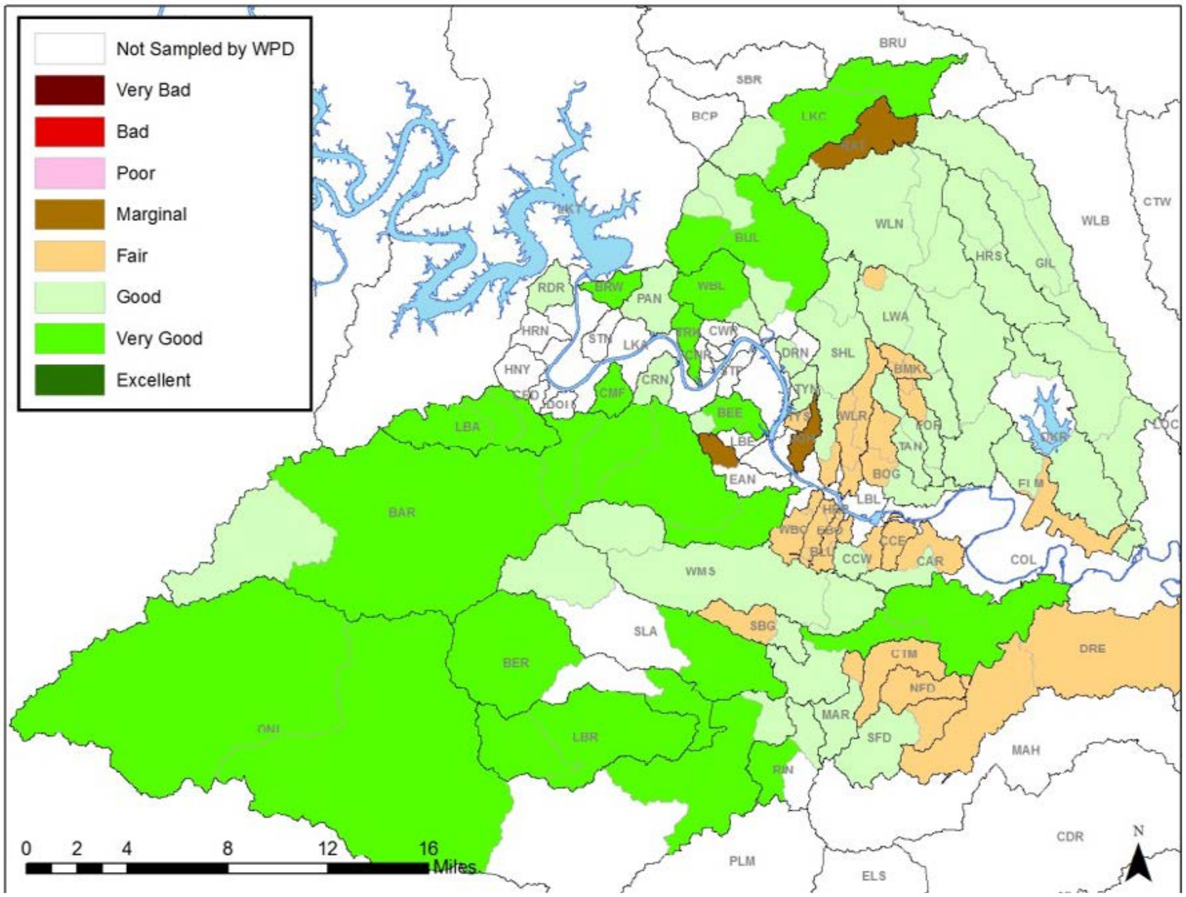
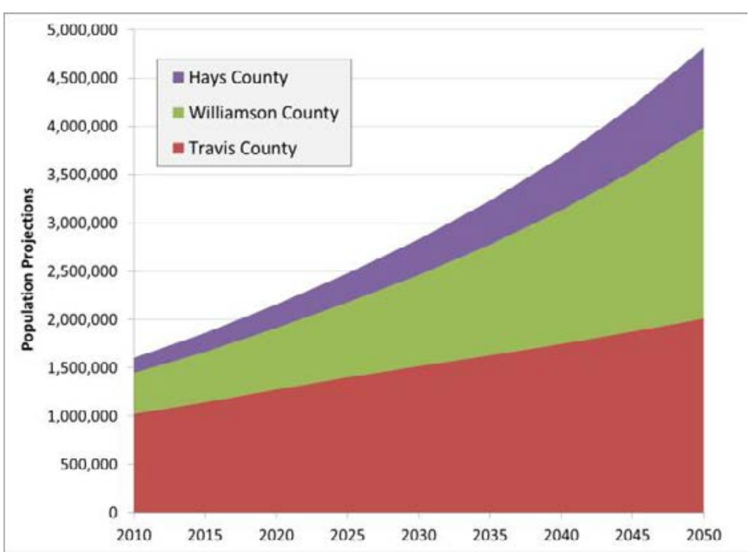


Figure 1. *Current Environmental Integrity Index score by sampling area (2014-2015)*



(Above) *Example of a wastewater land application facility with spray irrigation*

Figure 3. (left) *Estimated future population growth in Travis, Hays and Williamson counties*

With either a discharge permit or a land application permit, a wastewater treatment facility can get authorization from TCEQ to beneficially reuse the effluent in other areas to help offset demands on potable water supplies. Led by Mayor Steve Adler of Austin and Mayor Todd Purcell of Dripping Springs, Austin convened a new regional stakeholder group to discuss petitioning TCEQ to change wastewater permitting rules for land application facilities. The proposal would help make land application less expensive by encouraging wastewater utilities to expand the beneficial reuse of effluent. If adopted by the TCEQ, the proposal would not only protect water quality by avoiding new discharge permits, but also help reduce demands on area lakes for potable water by incentivizing more wastewater reuse. Learn more: http://austintexas.gov/department/proposed-wastewater-management-rule-revisions.

Lakes and Rivers

Importance

All of Austin's drinking water comes from the Colorado River, which includes water stored by the Lower Colorado River Authority (LCRA) in the region's water supply reservoirs, lakes Travis and Buchanan. Lakes Travis and Buchanan are managed by LCRA, as is the entire lower Colorado River system from the watersheds flowing into Lake Buchanan down to Matagorda Bay on the Texas Coast.

A series of dams forms lakes along the lower Colorado River. Upstream of Austin, Lake Travis is formed by Mansfield Dam and Lake Buchanan by Buchanan Dam. Tom Miller Dam creates Lake Austin and Longhorn Dam forms Austin's Lady Bird Lake. Lake Walter E. Long (also known as Decker Lake) is an Austin Energy power plant cooling lake created by a dam on Decker Creek with additional water supply pumped into the lake from the Colorado River.

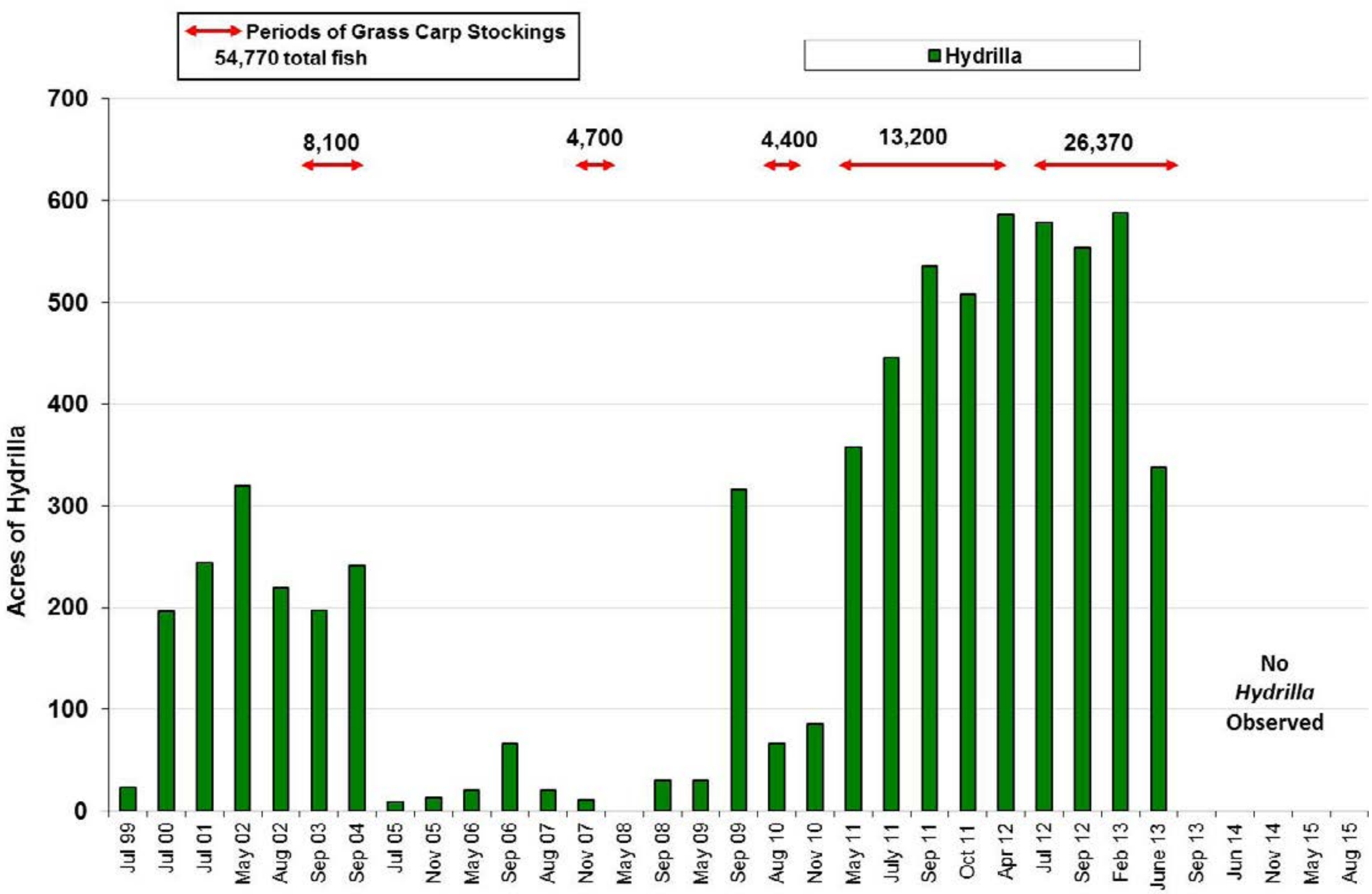
All of the lakes in the Austin area are regionally important recreational resources that provide critical habitat for fish and wildlife. The lakes are the primary receiving waters for stormwater runoff from urban areas and pollutants can collect in lake sediments for long periods of time.

Goals

The City's goal is to sustainably manage the water resources to protect the quality and availability of Austin's drinking water. Specific goals include:

- Protect and improve the water quality of area lakes for recreational use and the support of aquatic life
- Plan for and adapt to increased drought, severe weather, and other potential impacts of climate change on the water supply
- Foster the use of lakes for public recreation and enjoyment in a manner that maintains their natural character
- Maintain or achieve Austin Lake Index scores of "good" or better
- Manage invasive plants to prevent impacts to recreation
- Maintain or improve the designated uses of Austin's lakes as determined by the Texas Commission on Environmental Quality

Figure 1. *Acres of Lake Austin covered by the invasive Hydrilla plant and number of sterile Asian grass carp added to eat the plant over time.*



Imagine Austin Policies

CE P7. Protect and improve the water quality of the City's creeks, lakes, and aquifers for use and the support of aquatic life.

CE P8. Improve the urban environment by fostering safe use of waterways for public recreation, such as swimming and boating, that maintains the natural and traditional character of waterways and floodplains.

CFS P5. Plan for and adapt to increased drought, severe weather, and other potential impacts of climate change on the water supply.

CFS P6. Protect the public water supply and the health and safety of users.

Ongoing Challenges & Responses

Increasing nutrient concentrations change the composition and quantity of nuisance algae. As algae increase, lakes become less clear and dissolved oxygen can be reduced. This places stress on aquatic life and can increase water treatment costs. In addition to algae, invasive aquatic plants, toxic pollutants, and trash are ongoing problems. Invasive vegetation alters natural habitat and reduces recreational opportunities. Toxic pollutants can accumulate in sediments at the bottom of the lakes.

In terms of reservoir storage and cumulative inflows over the last several years, the Colorado River Basin has been in a historic drought since 2008, despite recent rains. Drought negatively impacts the lakes, reducing the flow through the lake and increasing temperatures. Drought may result in increased aquatic plant growth, which also negatively impacts recreation.

During this drought and beyond, Austin's core water management strategies have included demand-side management through implementation of the City's Water Conservation Program and Drought Contingency Plans, as well as continued development of water reuse. In addition, Austin Water is leading the development of the Austin Integrated Water Resource Plan (IWRP). This plan is being developed in conjunction with the Austin Integrated Water Resource Planning Community Task Force, which is comprised of eleven voting members appointed by Mayor and Council and representatives of various City departments. The IWRP is discussed in more detail later in this chapter.

This Year's Challenges & Responses

Hydrilla is a rapidly growing invasive aquatic plant, which is managed with lake drawdowns and stocking of sterile Asian grass carp which preferentially eat hydrilla. In 2012, hydrilla levels reached an historic high, covering more than 580 acres of Lake Austin. Additional grass carp were added to the lake in August 2013, and hydrilla has not been observed in Lake Austin since September 2013 (see figure 1, left).

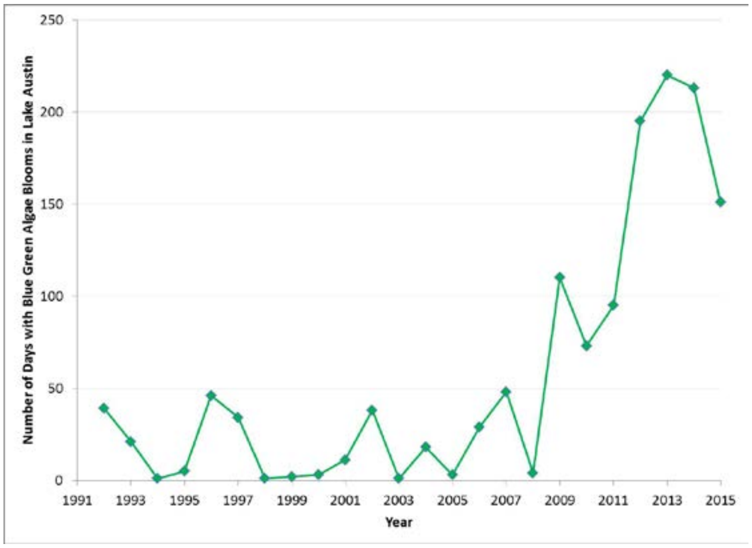


Figure 2. *Number of days in which microscopic nuisance blue-green algae blooms occurred in Lake Austin by year*

Prolonged drought continues to impact the quality and quantity of water in area lakes. The low flow through Lake Austin contributes to increases in the frequency of blooms of microscopic algae, which contribute to unpleasant taste and odor in drinking water. Record number of days with blooms of microscopic blue-green plankton (also known as cyanobacteria) in Lake Austin continued to be observed in 2015, which was the fourth-worst year since observations began in 1992 (see figure 2).

Example of two of the sterile grass carp caught during the investigative harvesting effort

In order to enhance habitat for the resident fish population while native vegetation abundance is low in Lake Austin, the Watershed Protection Department (WPD), Texas Parks and Wildlife Department, and the bass angling community undertook a brush-bundle installation project near Emma Long Metropolitan Park. The project installed twenty bundles of juniper at thirteen sites. Each bundle was

Brush-bundles waiting to be loaded onto boats and sunk into the Lake Austin

submerged in 15 to 20 feet of water to provide additional protection for resident fish while the vegetation in Lake Austin recovers without affecting boating.

WPD also partnered with the University of North Texas to install nine 50- by 20-foot exclusion pens in shallow water in upper Lake Austin. The goal of the pens is to decrease herbivore pressure and increase the coverage of native plants that can naturally compete with hydrilla in the future. Within one month the planted pens were typically more than half filled with spreading native plants.

After eliminating the invasive hydrilla, the Asian grass carp have also eaten most of the other vegetation in Lake Austin as the City and Texas Parks and Wildlife collaborate to develop better grass carp stocking strategies. Some citizens have expressed concerns that the grass carp had begun eating other fish, despite the fact that they are not carnivorous. To address this concern, Texas Parks and Wildlife partnered with the City to recruit nearly two dozen local carp anglers to assist in a small investigative harvesting effort, catching nearly 200 sterile grass carp. Their stomach contents revealed some empty stomachs, some with tree leaves, but none with other fish. The project also discovered that the largest sterile grass carp had been in the lake for more than 10 years.

In mid-2014, a Council-appointed task force recommended the development of an Integrated Water Resource Plan (IWRP). In December 2014, Austin City Council passed a resolution creating the Austin Integrated Water Resource Planning Community Task Force (IWRP Task Force) to support the development of the IWRP. The IWRP Task Force is comprised of eleven members appointed by Mayor and Council. Additionally, the IWRP Task Force includes eight ex officio, non-voting members representing various City departments. The following is the Statement of Purpose of the IWRP:

Example of an installed herbivore exclusion pen (20’ x 50’) planted with rows of native water celery

“The Integrated Water Resource Plan will provide a mid- and long-term evaluation of, and plan for, water supply and demand management options for the City of Austin in a regional water supply context. Through public outreach and coordination of efforts between City departments and the Austin Integrated Water Resource Planning Community Task Force, the IWRP offers a holistic and inclusive approach to water resource planning. The plan embraces an innovative and integrated water management process with the goal of ensuring a diversified, sustainable, and resilient water future, with strong emphasis on water conservation.”

Status & Trends

The long-term health of Austin lakes is monitored as part of Austin's Lake Index (ALI). The ALI includes annual monitoring and assessment of aquatic habitat, insects, water quality, sediment quality, invasive vegetation and floating algae. Higher ALI scores indicate better water quality (see figure 3). Read more about the specific water quality issues affecting the ALI score for Austin lakes at: http://austintexas.gov/austinlakes.

Even though recent rains have significantly increased the levels of Lakes Travis and Buchanan, long-term annual inflows into these lakes remain historically low. Six of the ten lowest years for inflows in the history of Lakes Travis and Buchanan have occurred during the current drought, which began in 2008. Additionally, not only was 2011 the lowest year for inflows in the period of record, 2011 inflows also totaled only about 127,000 acre-feet—which is only about 10% of the annual average inflow amount of approximately 1.22 million acre-feet. In terms of annual inflows, the current drought has produced inflows that are clearly far worse than in any drought that has occurred since the lakes were built in 1942, including the 1950s Drought of Record.

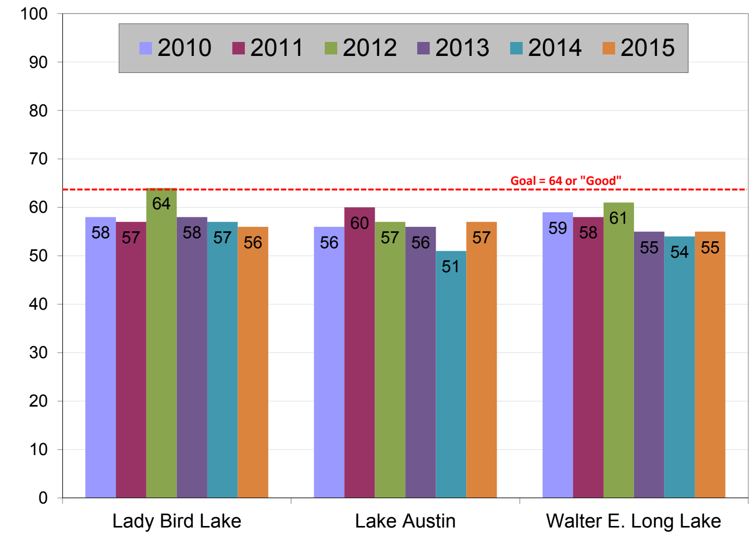


Figure 3. *Overall lake index scores from 2010 to 2015. 100 is the best score and 0 is the worst. The ALI goal is to score 64 or better*

Annual Focus

In summer 2015, WPD conducted an experiment to understand growth differences in the aquatic plants native cabomba and hydrilla. The experiment sought to answer two research questions: why is hydrilla, an exotic invader, absent in Lady Bird Lake but dominant in Lake Austin; and, can cabomba, a desirable native, prosper in Lake Austin to the extent that it has in Lady Bird Lake. In order to test the plants' growth potential in the lakes, the City planted each species in replicate buckets containing water and sediment from the different lakes and monitored the growth of the plants for three months.

Contrary to our expectations, hydrilla was able to grow amazingly well in the Lady Bird Lake treatments – even more so than in the Lake Austin treatments! It is therefore clear that sediment and water chemistry have not limited the growth potential of hydrilla in Lady Bird Lake. Instead, we hypothesize that grazing pressure, possibly from birds, fish, and reptiles, has been important to controlling the establishment of hydrilla in Lady Bird Lake. Results also indicated that cabomba would grow slower in Lake Austin than in Lady Bird Lake and may not be an effective competitor with hydrilla. This will be very useful information in the management of these lakes from both an ecological and a recreational perspective.

Example of a hydrilla clump at the end of the experiment from one treatment replicate bucket

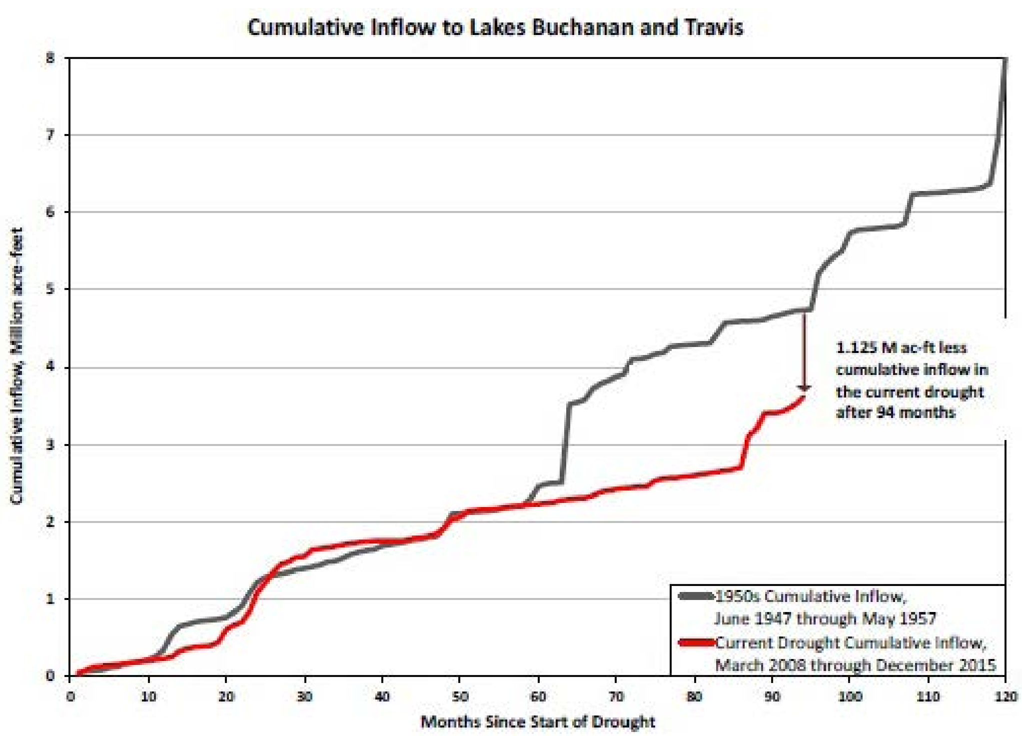


Figure 4. *Cumulative inflow into lakes Travis and Buchanan during the 1950s drought of record and the current drought*

Aquifers

A void in the Northern Edwards Aquifer Recharge Zone encountered during a construction project

Importance

The Barton Springs Segment of the Edwards Aquifer is the sole source of drinking water for more than 60,000 Central Texans. It also provides flow at Barton Springs, which is critical habitat for the endangered Barton Springs and Austin Blind salamanders. Barton Springs is also a historic and iconic recreational resource for Austin, drawing nearly a million visitors annually and providing more than $1.5 million in revenue for the City of Austin. In northern Austin, small springs discharging from the Northern Edwards Aquifer provide critical habitat for the Jollyville Plateau salamander, designated by the U.S. Fish and Wildlife Service (USFWS) as a threatened species.

Barton Springs salamander at a new spring habitat location outside of Zilker Park

Goals

The City of Austin's principal goal for the Edwards Aquifer is to preserve the integrity of the contributing and recharge zones to protect the quality and quantity of aquifer recharge. Additional goals include:

- Maintain or enhance critical environmental features, including salamander habitat
- Expand and strengthen water quality regulations to achieve the non-degradation goals of city regulations
- Comply with state and federal endangered species and stormwater discharge permit requirements

Imagine Austin Policies

CE P2. Conserve Austin's natural resources systems by limiting development in sensitive environmental areas, including the Edwards Aquifer, its contributing and recharge zones, and endangered species habitat.

CE P7. Protect and improve the water quality of the city's creeks, lakes, and aquifers for use and the support of aquatic life.

CFS P12. Maintain or enhance the existing rate of recharge in the Edwards Aquifer.

Ongoing Challenges & Responses

Aquatic salamanders require adequate levels of dissolved oxygen to survive and thrive. Pumping groundwater from the aquifer reduces flow and dissolved oxygen in Barton Springs, especially during drought. Decreased flow and dissolved oxygen in Barton Springs directly affect the habitat and populations of the Barton Springs salamander and the Austin Blind salamander. Development and wastewater disposal over the aquifer's recharge and contributing zones also threaten the quality and quantity of water recharging the aquifer, which may in turn negatively affect the salamanders.

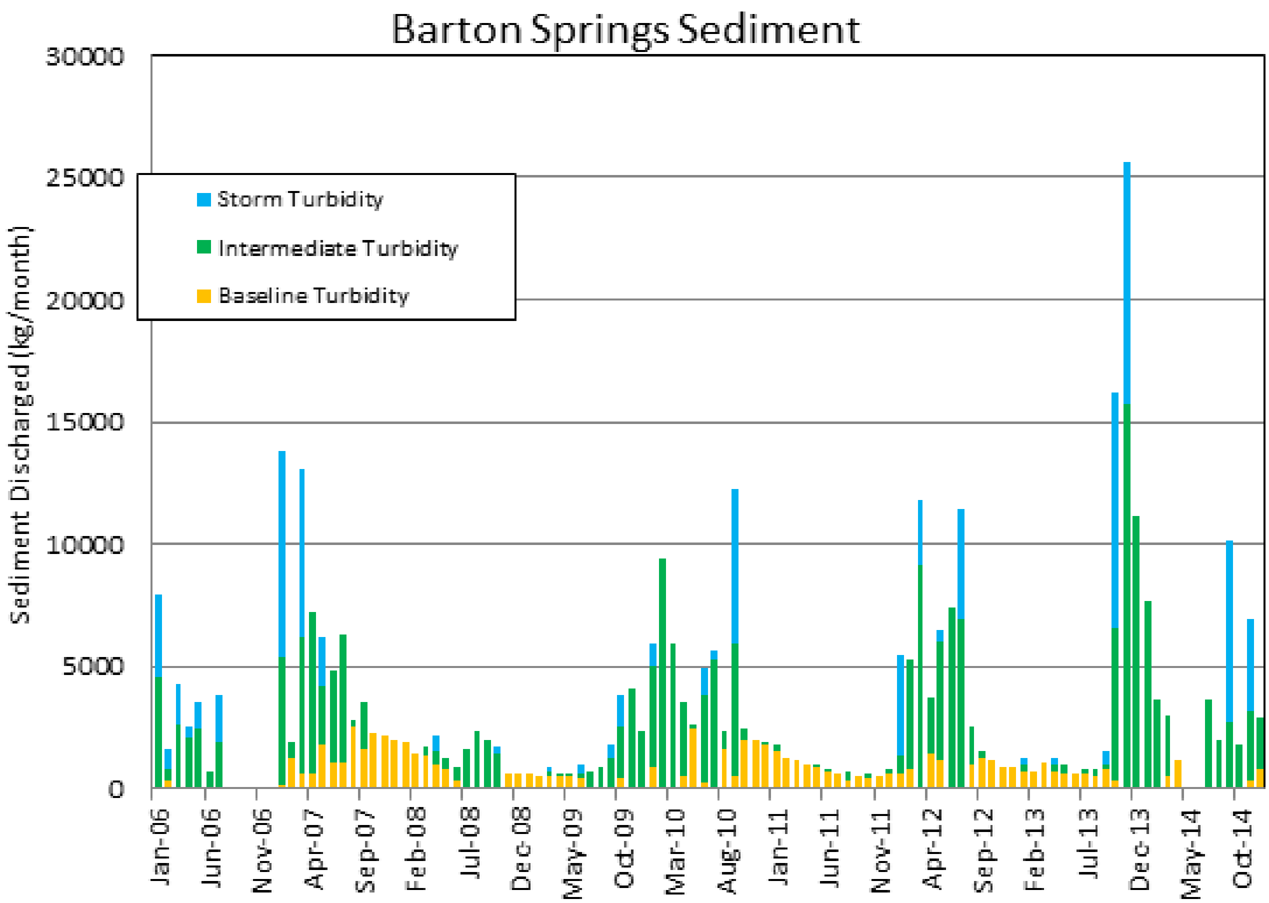


Figure 1. *Barton Springs flow and dissolved oxygen over time*

This Year's Challenges & Responses

The amount of sediment entering Barton Springs from the aquifer is an indicator of groundwater quality, affects salamander habitat, and influences operation of the pool. The Watershed Protection Department (WPD) estimated the average total mass of sediment discharging from Barton Springs to be approximately 44 tons per year, which is an unexpectedly large amount (see figure 1).

The City of Austin continued to review planning documents from the Texas Department of Transportation relating to the proposed State Highway 45 Southwest over the Edwards Aquifer. Learn more about the environmental and legal issues associated with SH 45 SW: www.austintexas.gov/watershed_protection/publications/document.cfm?id=223710.

Right: *City hydrogeologists studying a location where the proposed SH 45 SW will be located*

City staff measuring creek flows in Onion Creek

Cave with flowing stream as seen from the trench wall

In cooperation with the Barton Springs Edwards Aquifer Conservation District, City of Austin hydrogeologists measured flows in upper Onion Creek to better understand recharge to the Trinity and Edwards aquifers. In November 2015, during high flow conditions from increased rainfall, recharge to the aquifer from Onion Creek was estimated to be 86.4 ft3/s, or more than 55 million gallons per day, with more than 50 percent of that recharge occurring on City of Austin Water Quality Protection Lands (WQPL).

WPD created 245 acres of new protective buffers around critical environmental features identified in 2015, bringing the cumulative total area of CEF buffers to more than 6,315 acres.

Voids are frequently encountered during utility line construction over the Edwards Aquifer (see image below). Mitigation is required by the State of Texas and the City to isolate utility lines from the aquifer to preserve the quantity and quality of groundwater. More than 200 voids have been intercepted by trenching in the Pearson Ranch area in northwest Travis County over the last 5 years, including a cave with a flowing underground stream that may discharge into Davis Spring Branch and Brushy Creek.

The WPD offers multiple youth education programs, which provide opportunities for more than 2,000 students and teachers in Austin to tour specially prepared caves and learn more about Austin's underground natural resources (see figure 2). Because of the sensitivity of cave environments, the number and size of educational tours is limited to prevent degradation of the subterranean features and fauna. In 2015, City staff and volunteers opened several new caves and installed protective gates to prevent unauthorized access. These caves were available for public education efforts.

	Grade Level	Number Reached
Earth Camp	5th	1,410
Watershed Detectives	Middle school	467
Hydrofiles	High school	153 participated in caving, 583 articipants overall
Clean Creek Camp	Families: Adults and children 9-13 years old	60
Groundwater to the Gulf	Teachers	34
Total Reached		**2,124**

Figure 2. (left) Watershed Protection Department Programs that include cave field trips during the 2014-2015 school year

In some parts of the state, local groundwater conservation districts regulate pumping in order to conserve and protect groundwater. In 2015, new legislation expanded the jurisdiction of the Barton Springs Edwards Aquifer Conservation District (BSEACD) in order to protect a large area of the Trinity Aquifer. This new protection for the Trinity Aquifer was put in place in response to plans to pump a large amount of groundwater. Learn more: www.bseacd.org/education/trinity-wells/.

Not all groundwater resources are protected by a groundwater conservation district. Groundwater may be pumped without limits in areas outside of groundwater conservation districts, and new wells in Austin are increasingly being drilled even in areas where Austin Water provides drinking water service (see figure 3). From 2004 to 2014, more than 3.9 times more wells per unit area were added in parts of Austin with city drinking water than were added in the area regulated by the BSEACD.

Above: *WPD educators preparing to enter a cave through the new cave gate*

Below: *WPD staff inside the same cave that is being prepared for additional educational tours*

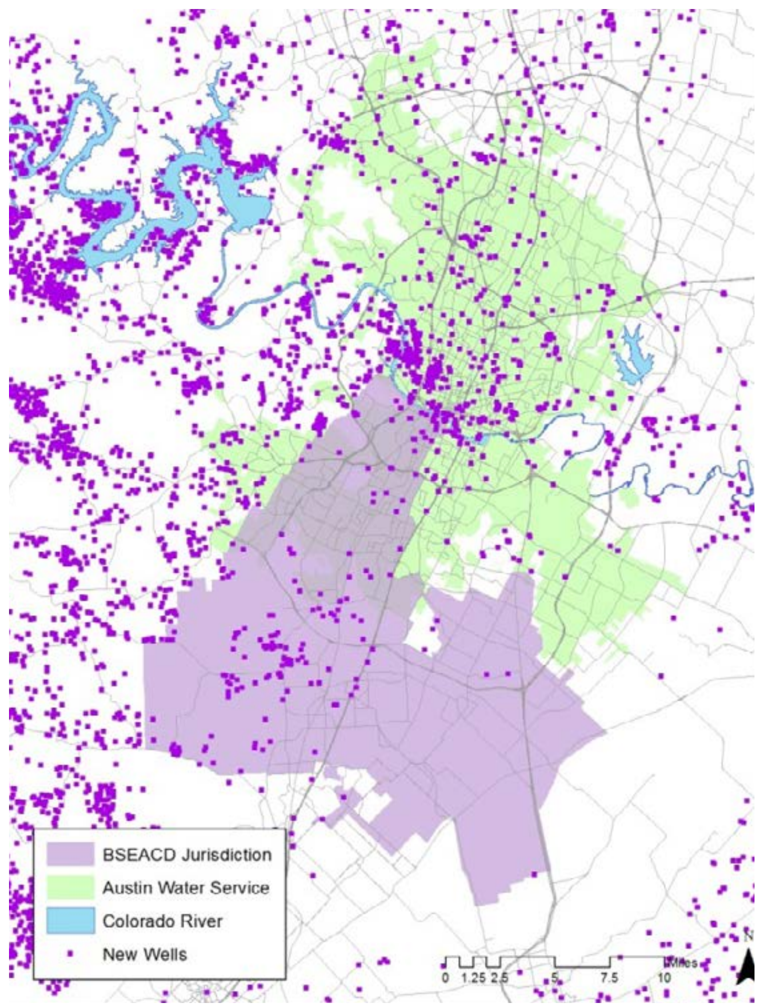


Figure 3. *New wells added between 2004 and 2014 from Texas Submitted Driller's Reports Database, shown with the boundaries of the BSEACD and the service area of Austin Water*

Status and Trends

The City of Austin, in cooperation with the United States Geological Survey, monitors the flow and dissolved oxygen of Barton Springs using automated instruments that take measurements every 15 minutes (see figure 4). Dissolved oxygen fluctuates over time with spring flow, and spring flow was high in 2015 due to increased rainfall. However, analysis by WPD staff documents continued long-term decline in Barton Springs dissolved oxygen over time.

The City of Austin regularly monitors the health of the endangered salamanders at Barton Springs (see below). Utilizing photographs of the head patterns of salamanders, City biologists can now track individual salamanders over time and use ecological modeling to estimate the size of the populations (see figure 5). Despite increasing Barton Springs flow during 2015, salamander counts remain lower than peak values observed in 2008.

City biologists surveying for salamanders at Eliza Spring in Zilker Park.

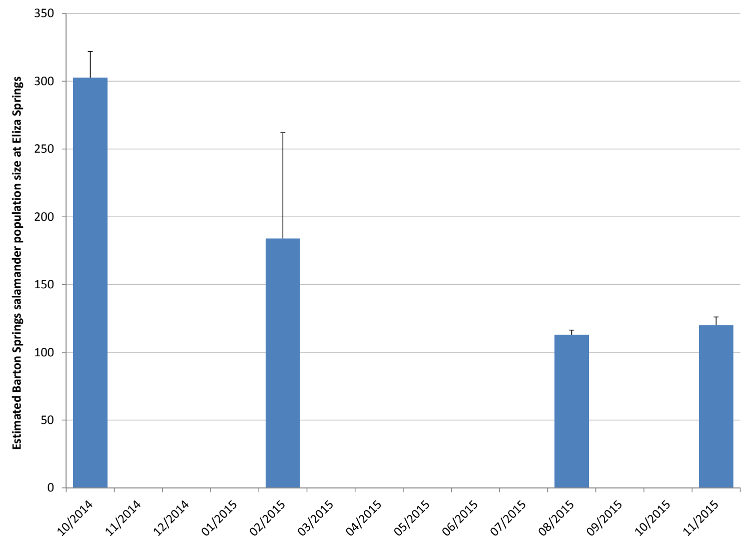
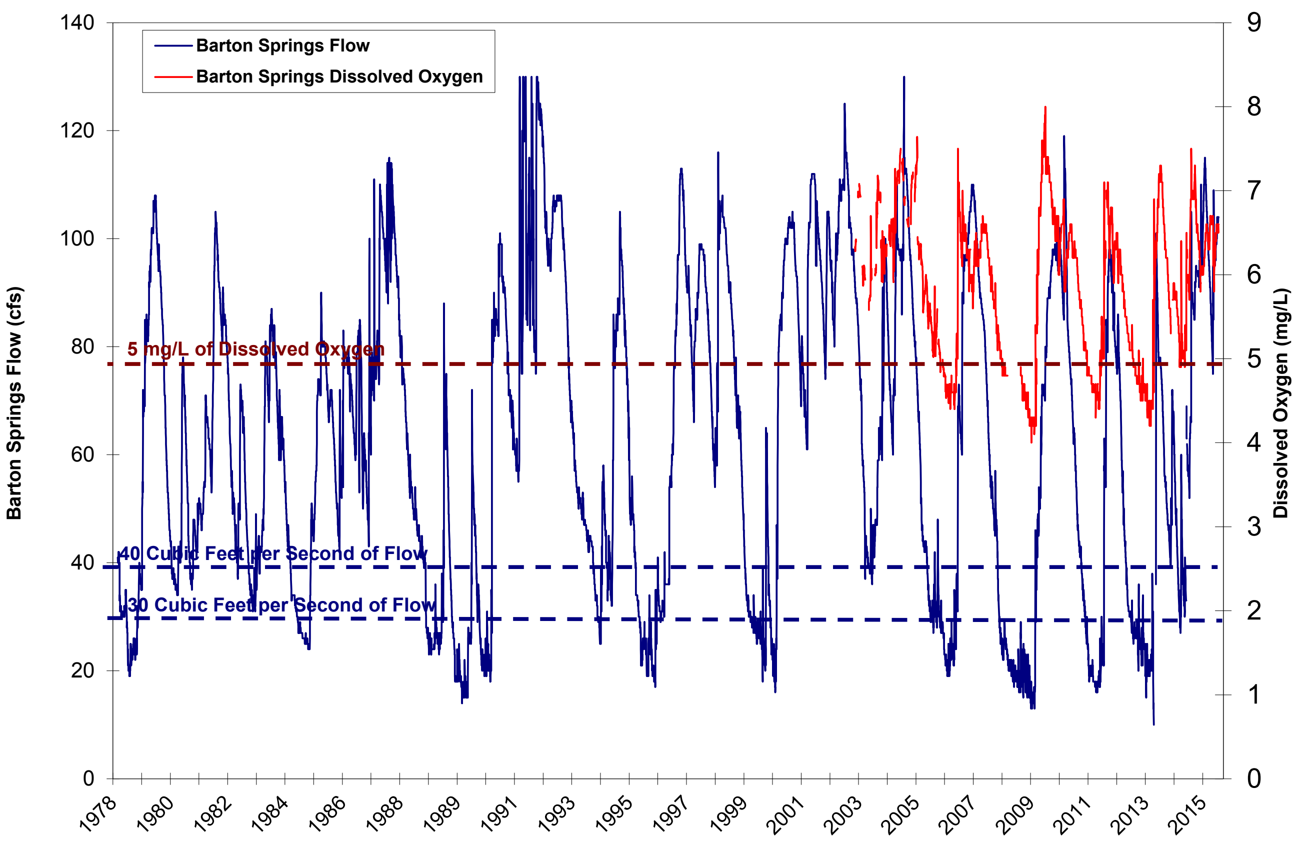
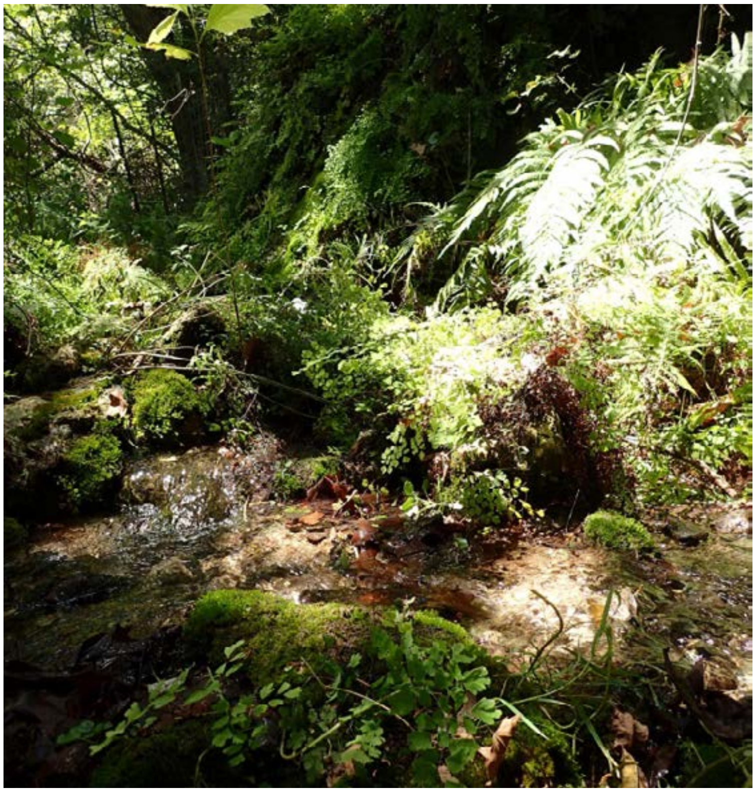


Figure 5. Barton Springs salamander population size and standard error estimates from Eliza Springs, the location with the highest abundance of salamanders, based on photographic identification of individual salamanders. Bars represent the months when WPD staff surveyed for salamanders

Figure 4. *Barton Springs flow and dissolved oxygen over time. Oxygen concentrations less than 5 mg/L are of particular concern to salamanders. Water quality changes in Barton Springs become evident at flows less than 40 ft3/s, and salamanders are negatively impacted by reduced oxygen at spring flows less than 30 ft3/s.*





A spring in Northwest Austin inhabited by Jollyville Plateau salamanders.

Jollyville Plateau salamander population counts at the surface springs in northern Austin are a direct representation of the health of the species, and are strongly affected by the flow of the springs in which they live. When springs go dry, some salamanders retreat into the aquifer. The number of salamanders observed on the surface when springs are flowing varies with the amount of springflow discharging from those locations.

Annual Focus

The Barton Springs salamander (Eurycea sosorum, see image 11) was officially described by scientists as a separate taxonomic species in 1993 and listed as an endangered species by the U.S. Fish and Wildlife Service in 1997. Prior to 2015, the only known surface habitat for the Barton Springs salamander was at four springs in and around Barton Springs in Zilker Park. However, salamanders of the same genus (Eurycea) were found at other locations in Central Texas, although their exact taxonomic status, or species classification, had not yet been officially determined.

In 2015, researchers with the University of Texas and a City biologist extensively studied the DNA of Eurycea salamanders in Central Texas to better understand their taxonomic status. The results of their genetic analysis found that five additional populations of Barton Springs salamander (Eurycea sosorum) exist in locations outside of Zilker Park (see figure 7). Counts of individual salamanders at all locations are very low, and the species is still on the verge of extinction. Although the full legal and scientific ramifications of this discovery are unknown, this new information can improve management and protection of the aquifer for humans and salamanders. Learn more at www.austintexas.gov/salamanders.

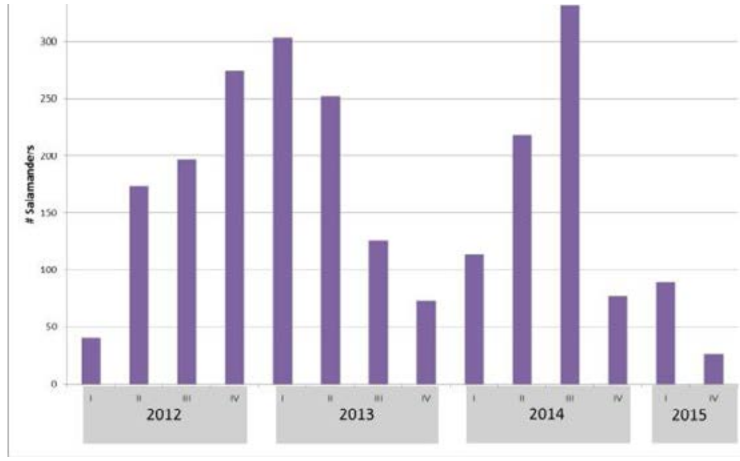


Figure 6. *Jollyville Plateau salamander population counts by quarter and year at one representative Bull Creek monitoring site.*

Barton Springs salamander (Eurycea sosorum), photo by Tom Devitt, PhD..

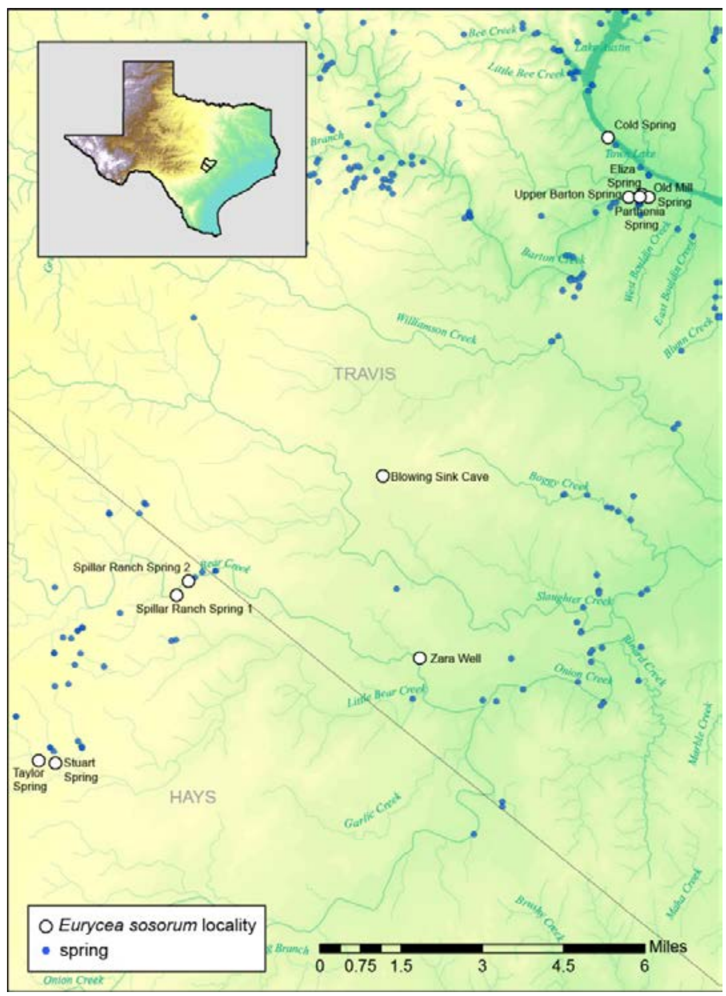


Figure 7. Locations of Barton Springs salamander populations. All previously known Barton Springs salamander locations were in Zilker Park in Austin.

Urban Forest

Importance

Austin's urban forest provides social, ecological, and economic benefits to the community and enhances the quality of life for Austin residents. Recognizing the urban forest as a community asset and an important part of Austin's green infrastructure network, City policy and practices aim to preserve, maintain, and replace individual trees with the goal of a sustainable urban forest. A thriving, healthy urban forest is a reflection of the City's ability to preserve individual trees and vegetation communities; restore or repair degraded lands; protect lands for their environmental services; manage and educate about tree diseases; encourage the removal of non-native, invasive species; and replant trees and vegetation. Management of Austin's urban forest is coordinated through the combined efforts of multiple City departments that engage in regulation, operations, and planning.

Goals

The primary goals for the City's urban forest management are to:

- Ensure public well-being and safety
- Enhance the benefits of the urban forest through preservation, care, maintenance, and replenishment

Imagine Austin Policies

CE P4. Maintain and increase Austin's urban forest as a key component of the green infrastructure network.
CE P11. Integrate development with the natural environment through green building and site planning practices such as tree preservation and reduced impervious coverage and regulations. Ensure new development provides necessary and adequate infrastructure improvements.

Ongoing Challenges & Responses

Austin's urban forest is increasingly challenged by a changing climate, development pressure and changing land use patterns, as well as urban stressors such as soil compaction, invasive species, and competition for space. The City of Austin uses multiple strategies to address these challenges, including comprehensive planning, tree preservation regulations, interdepartmental coordination, and community education and engagement.

Bald Cypress at the Town Lake running trail

A Gap Analysis of the public urban forest was completed per City Council Resolution 20130627-070 2014 and updated in 2015. This year's level of service analysis is based on accepted forestry standards and benchmarks with other communities. The gap for public tree maintenance and planting was identified to be $33 million annually.

This Year's Challenges & Responses

To increase efficiency and effectiveness of urban forest efforts in the City of Austin, the Urban Forester and City Arborist functions were brought together into one new division -- the Urban Forest Division. The Urban Forest Division is housed in the Development Services Department and manages the regulatory aspects of tree protection, urban forest planning and implementation, interdepartmental coordination, and community engagement.

Coordination and collaboration between departments continues to grow through the existing Interdepartmental Tree Working Group (iTWG), the Imagine Austin Green Infrastructure Priority Program, and the newly created Forestry Leadership Team.

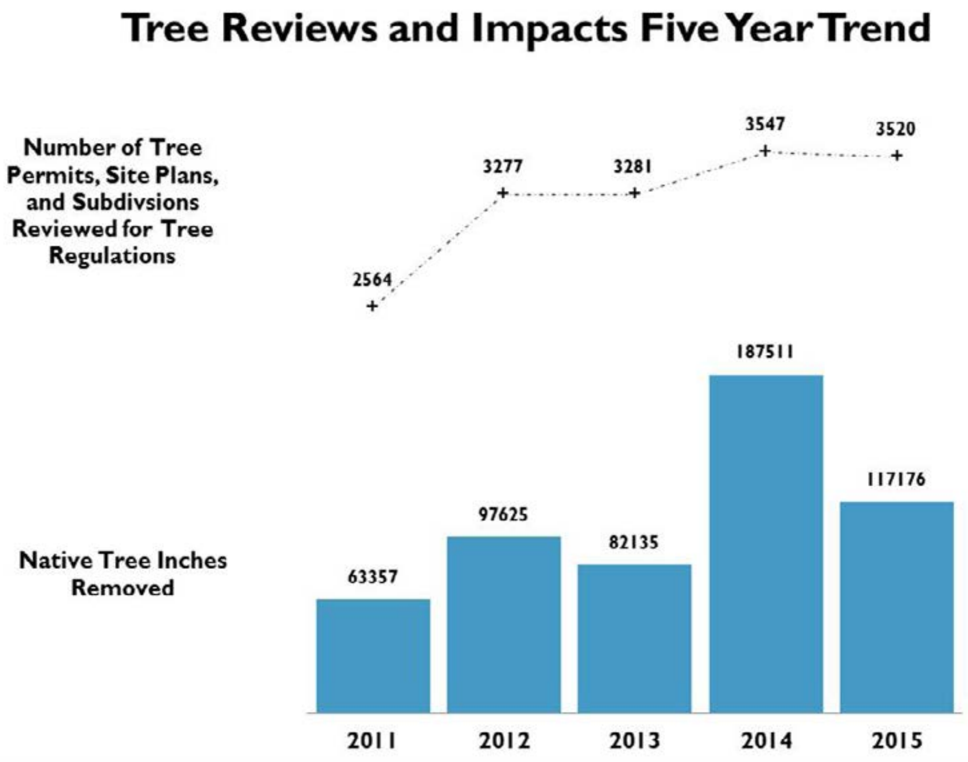
Status & Trends

Continuing growth and development throughout the City, along with strenuous environmental conditions, create a need for greater protection and oversight of Austin's urban forest. Although Austin has seen a significant increase in development activities in recent years, there was a slight decrease in the number of tree-related reviews from 2014 to 2015. A decrease was also observed in the number of tree diameter inches removed in 2015 compared to the remarkable record high observed in 2014, in part due to residual drought stress. Despite these decreases from the previous year, 2015 continues a growth trend observed in tree-related impacts.

In an effort to regulate the impacts of development, the City Arborist and Land Use Review staff reviewed 390 commercial site plans, 251 subdivisions, 2,879 tree permits, and averaged approximately 667 tree inspections per month. Additionally, 164 commercial and parkland site plans were reviewed for impacts to public trees.

Tree preservation efforts also extend to heritage trees, which are trees that have a diameter of 24 inches or more, measured four and one-half feet above natural grade. The tree under consideration must be one of the 10 species listed in the heritage tree ordinance. In 2015, staff reviewed 816 tree permits for heritage trees and more than 151 site plans and 59 subdivision plans for compliance with the heritage tree ordinance. More than 95 percent of all healthy heritage trees were preserved in the development review process.

A primary concern of the City's Urban Forest division is not only the protection of trees but also the well-being of the public. In 2015, 510 trees were removed and 2,000 trees were pruned for safety on park property. Since the City Council prioritized tree care in 2013, 43 parks have received proactive tree care. This type of preventative tree care reduces the number of dead or high-risk trees that pose a public safety risk on parkland. The Parks Forestry Program trained 198 Parks and Recreation staff on tree protection and 10,188 new trees were planted on park property, including 782 container trees and 9,406 seedlings.



In partnership with Austin Energy (AE), City staff oversaw the protection and management of trees and vegetation by completing maintenance work on 292 miles of overhead distribution power lines, which required varying degrees of work on 10,453 properties. AE distributed 1,156 mitigation trees to customers and was recognized as a Tree Line USA utility for the 14th straight year. The NeighborWoods program contracted through TreeFolks distributed 3,600 containerized trees to private property owners.

To further express the importance of tree protection, the Urban Forestry staff committed to several community engagement opportunities to educate the public on the care and dedication that goes into the maintenance of Austin's urban forest. Staff provided over 156 hours of educational training to community members and landscape professionals and featured popular events such as the Trees of Govalle performance in partnership with Tree Folks, Urban Forest Stewards, Certified Arborist Training, Arbor Day, and participation in the Grow Green Homeowners and Landscape Professionals training. The division also provides online tools and resources, such as the Nature in the City blog, monthly newsletter called The Treebune, and Facebook, Twitter, and Instagram accounts. Additionally, the City's partnership with TreeFolks' NeighborWoods program has yielded 43,000 trees distributed across Austin over the past 14 years. As a result, areas with the most trees planted experienced cooler temperatures and a total reduction of 27 million pounds of carbon dioxide from the atmosphere.

Through the Urban Forest Replenishment Fund, the Community Tree Division granted $125,327 for work related to tree planting and maintenance, promoting tree care and preservation, and forest conservation. The Fund supports the Urban Forest Grant Program, which mitigates tree removal impacts and enhances the urban forest through outreach and education.

Tree planting at Austin Arbor Day Celebration

The Trees of Govalle performance. Photo Credit: Tree Folks.

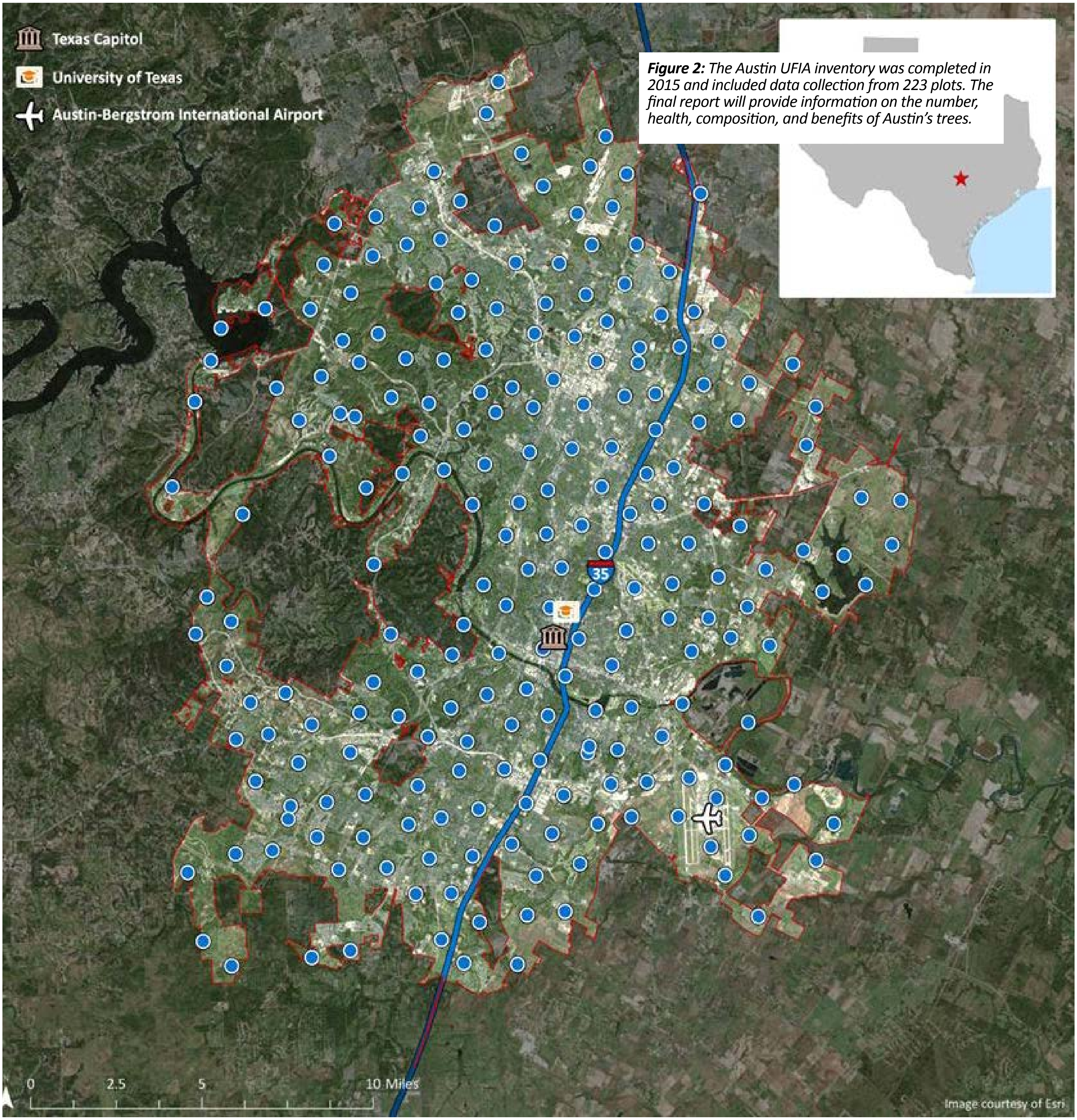


***Figure 2:** The Austin UFIA inventory was completed in 2015 and included data collection from 223 plots. The final report will provide information on the number, health, composition, and benefits of Austin's trees.*

Annual Focus

The City of Austin partnered with the Texas A&M Forest Service and United States Forest Service (USFS) to become a "first" city in the Urban Forest Inventory Analysis (Urban FIA). The Urban FIA program has inventoried the nation's forests since 1930, but the focus has always been on rural forests. With changing demographics and an increasing percentage of Americans living in urban areas, the program has expanded to include urban trees in order to complement current efforts while providing a more holistic picture of conditions. Urban trees and natural spaces are critical to human health and well-being due to the many environmental, social, and economic benefits that urban trees provide. In the summer of 2015, the Texas A&M Forest Service collected Urban FIA data, including growth, composition, mortality, and land use from 223 plots in the City of Austin on both private and public lands. Collectively, this data will provide reliable extrapolations on the number, health, composition, and benefits of Austin's trees. Preliminary reports suggest there are 33 million trees in the City of Austin and the green infrastructure value of the urban forest is $16 billion. The final report will be released in 2016 and will tell more about the number, health, composition and benefit of Austin trees.

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 Austin Water's Wildland Conservation Division (referred to as Wildland) manages natural areas to improve our water quantity and quality, endangered species habitat, and quality of life. Continued growth is in Austin's future, and the City is carefully planning to help preserve clean air, clean water, and natural areas through Wildland.

Goals

The Wildland Division encompasses two programs: Balcones Canyonlands Preserve (BCP) and Water Quality Protection Lands (WQPL). Focus of the programs:

- BCP - to protect and enhance the habitat of endangered and rare species as mitigation for development in western Travis County.
- WQPL - to produce the optimal level of high quality water to recharge the Barton Springs segment of the Edwards Aquifer by protecting land and restoring prairie-savanna ecosystems and healthy riparian corridors.

Imagine Austin Policies

CE P1. Permanently preserve areas of the greatest environmental and agricultural value.

CE P2. Conserve Austin's natural resources systems by limiting development in sensitive environmental areas, including the Edwards Aquifer, its contributing and recharge zones, and endangered species habitat.

CE P3. Expand the city's green infrastructure network to include such elements as preserves and parks, trails, stream corridors, green streets, greenways, and agricultural lands.

CE P5. Expand regional programs and plan for the purchase of conservation easements and open space for aquifer protection, stream and water quality protection, and wildlife habitat conservation, as well as sustainable agriculture.

Wildland Conservation Division Status*
41,971 total acres
28,361 WQPL acres
13, 610 BCP acres

** including voluntary conservation partnerships and dual managed tracts*

The City of Austin passed a resolution to incorporate native milkweed into the city's landscape portfolio at Austin City Hall, city-owned buildings and properties, as well as the city's vast preserve lands, parks, and open space.

Ongoing Challenges & Responses

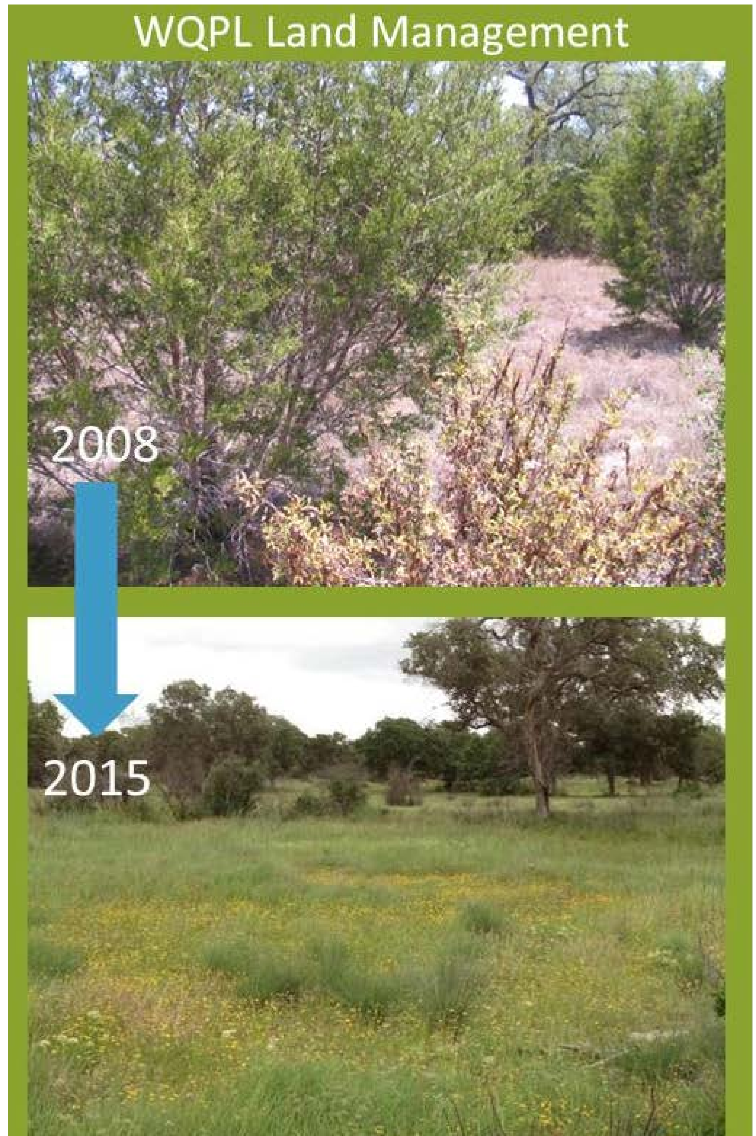
As one of the fastest growing regions in the U.S., a major challenge facing Austin and Central Texas is protection of the region's environmental resources. Implementing land management goals of the WQPL and BCP programs over large-scale acreage is the first priority of Wildlands each year. Management of Wildland toward a thriving ecosystem that meets BCP or WQPL goals contributes to a more sustainable future for all of Austin.

Habitat loss for the endangered species that inhabit the Austin area, including the golden-cheeked warbler, black-caped vireo, and six karst invertebrates, is a challenge for the entire community. The BCP program is in the final stages of completing a landmark scientific study to better understand the health of the golden-cheeked warbler population and determine how the BCP can best meet the needs of these endangered species.

This year marked the close of an intensive five year scientific study of Austin's endangered golden-cheeked warbler. Preliminary findings suggest that large blocks of mature, closed-canopy Ashe juniper and oak woodlands support higher densities of warblers and that these warblers are more productive than adults in more fragmented woodlands. Results and analysis are anticipated in 2016.

Five prescribed burns were conducted across 968.5 acres by Wildland staff and partners in FY 2015. A particular milestone is that each of these bruins was a repeat treatment implemented as part of a continual process of ecological restoration.

The WQPL program completed the thinning of Ashe juniper trees on 191.5 acres in 2015. By removing targeted trees with an approach that minimizes negative impacts to soil, water, wildlife, and desirable vegetation, the program initiated the process of restoring this land to prairie or oak savanna. All brush-thinning operations are conducted in concert with prescribed burn plans, which helps to ensure the preparation for both prescribed burns and potential wildfires.



This area of Little Bear Creek management unit was mechanically thinned in 2009, then treated with prescribed fire in 2010 and again in 2014. It was seeded with native grasses in 2011 and 2012. From this point, the restoration process can be continued with less intensive management consistently primarily of prescribed burning every four to seven years.

Status & Trends

Wildland continued to grow in size in 2015 when both the WQPL and BCP programs purchased tracts of land.

In addition to purchasing land, Wildland continued its trend of reaching a larger audience through education and outreach programing and volunteer efforts.

BCP acquired 10 acres of land in the Four Points area. This tract was one of the last remaining undeveloped and unprotected private pieces of land on the main tributary of Bull Creek. The tract includes habitat for the endangered golden-cheeked warbler and threatened Jollyville Plateau salamander.

WQPL acquired two tracts totaling 51.8 acres in 2015.

Annual Focus

It has been 20 years since the City of Austin and Travis County worked with the U.S. Fish and Wildlife Service (USFWS) to create the BCP. In the early 1990s there was a stalemate involving economic development, private property rights, and federal regulations protecting endangered species. The creation of the BCP, a 30,610-acre system of endangered species habitat, was the first time that a local partnership created a solution that balanced complying with federal regulations and economic growth. Over the past 20 years the BCP has been a major economic engine in our community by providing private property owners an easy and cost-effective way to mitigate for the removal of endangered species habitat while protecting the most ideal habitat within the preserve. While the past 20 years have been a success in acquiring the minimum acreage requirements for the USFWS-issued permit, there is still work to be done to complete the permit requirements, including additional cave protection, land acquisition and continued land management in the Bull Creek and Lake Austin watersheds.

In 2015 volunteers donated over 4000 hours to Wildlands, a cost savings value of $88,000. Volunteers led guided hikes, helped with scientific research, collected native seeds and helped with a variety of other projects. Learn more about regular opportunities to attend a guided hike or volunteer by visiting www.austintexas.gov/wildlandevents.

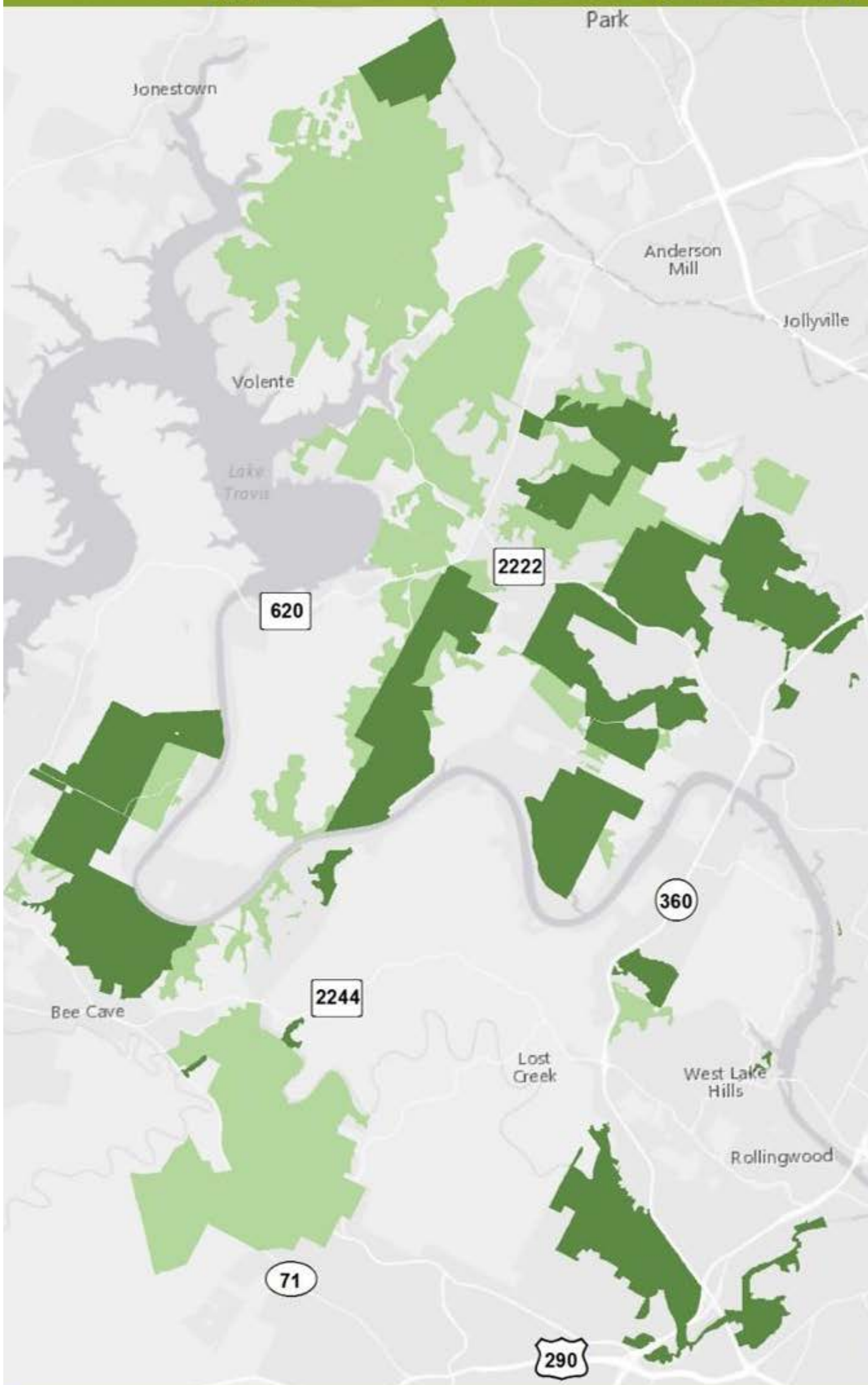
Balcones Canyonlands Preserve

Celebrating 20 years as a leading example of balancing conservation with economic development





YEAR ANNIVERSARY



These lands :

- Sequester carbon
- Filter the air
- Absorb rainfall & reduce flooding
- Filter pollution
- Protect habitat for wildlife
- Conserve native plants
- Preserve our cultural history
- Mitigate for the take of endangered species habitat
- Provide for recreation and education
- Serve as research locations
- Preserve our scenic views

Air Quality

***Image # 1:** What are the Effects of Ground-Level Ozone. Figure provided by Ozone Action Heroes (http://ozoneactionheroes.com/), a part of the Capital Area Metropolitan Planning Organization (CAMPO).*

Importance

The primary air quality concern in Austin is ground-level ozone. Elevated ozone levels can have a significant impact on human health (see image 1). Ground-level ozone causes many individuals to experience increased respiratory ailments. Vulnerable populations, including children, older adults, and those with lung diseases like asthma, are especially susceptible.

Ozone forms when nitrogen oxides (NOx) and volatile organic compounds (VOCs) combine and "cook" in the sunlight. Vehicle engines, electric generation units, industrial facilities, and many everyday activities create man-made sources of NOx and VOCs. High ozone levels most frequently occur from May to June and from August to October. Visit http://ozoneactionheroes.com/ to learn more about air quality basics.

On-road vehicles account for nearly 50% of ozone-forming emissions released within Central Texas.

Goals

The goal of the City of Austin's Air Quality Program is to promote healthy outdoor air quality for all residents. The City's Air Quality Program addresses the impact of City operations on air quality, takes part in projects to reduce traffic congestion, and participates in regional efforts to improve air quality throughout Central Texas.

Imagine Austin Policies

CE P10. Improve the air quality and reduce greenhouse gas emissions resulting from motor vehicle use, traffic and congestion, industrial sources, and waste.

LUT P19. Reduce traffic congestion, increase transit use, and encourage alternative transportation modes through such practices as Transportation Demand Management, which includes carpooling, flex time work schedules, and subsidizing transit costs for employees.

Ongoing Challenges & Responses

The City of Austin has a history of participation in proactive air quality initiatives with regional partners. Austin has been an active member of the Central Texas Clean Air Coalition since 2002, and currently participates in the Coalition's Ozone Advance Program (OAP) Action Plan, a voluntary initiative that 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.

This Year's Challenges & Responses

On October 1, 2015, the United States Environmental Protection Agency (U.S. EPA) tightened the National Ambient Air Quality Standard (NAAQS) for ozone from 75 parts per billion (ppb) to 70 ppb. Central Texas' design value was low enough in 2015 for the region to remain in compliance with both the 2008 and 2015 ozone standards. The design value is a statistic that reflects the region's average ozone level. In 2017, U.S. EPA will re-evaluate the region's ozone designation using data from the 2014, 2015, and 2016 ozone seasons to make a final attainment designation under the new, more stringent 2015 federal ground-level ozone standard. Therefore, 2016 will be a critical year in maintaining ozone levels below the standard. For more details on the EPA's new standard, go to: https://www.epa.gov/ozone-pollution

The U.S. EPA also revised the Air Quality Index (AQI) to align with the new standard. 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. The table below shows each air quality level of health concern and the matching color indicator. More information about the Air Quality Index can be found by visiting the Air Now website at: www.airnow.gov/

Levels of Health Concern

Good
Moderate
Unhealthy for Sensitive Groups
Unhealthy
Very Unhealthy
Hazardous

Figure 1: *Based on the new 2015 Ozone Standard, in 2015 no days were designated unhealthy for all groups. There were 12 days that were unhealthy for sensitive groups and 58 days with moderate ozone readings.*

High Ozone Days Based on New Air Quality Index

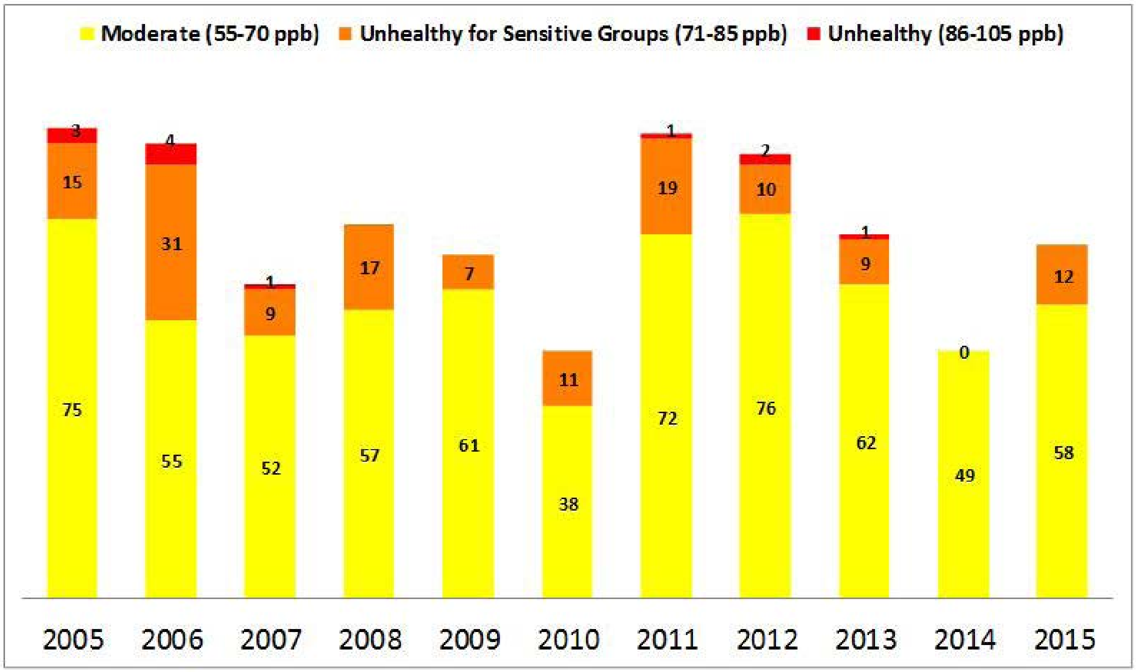


Figure 2: *"High Ozone Days" Based on New Air Quality Index" provided by the Capital Area Council of Governments.*

While the region's design value may remain in attainment of the Ozone Standard, it is expected that there will be more days with unhealthy ozone levels due to the stricter federal standard. All citizens should consider what they will do to reduce air pollution levels. Some suggested actions include:

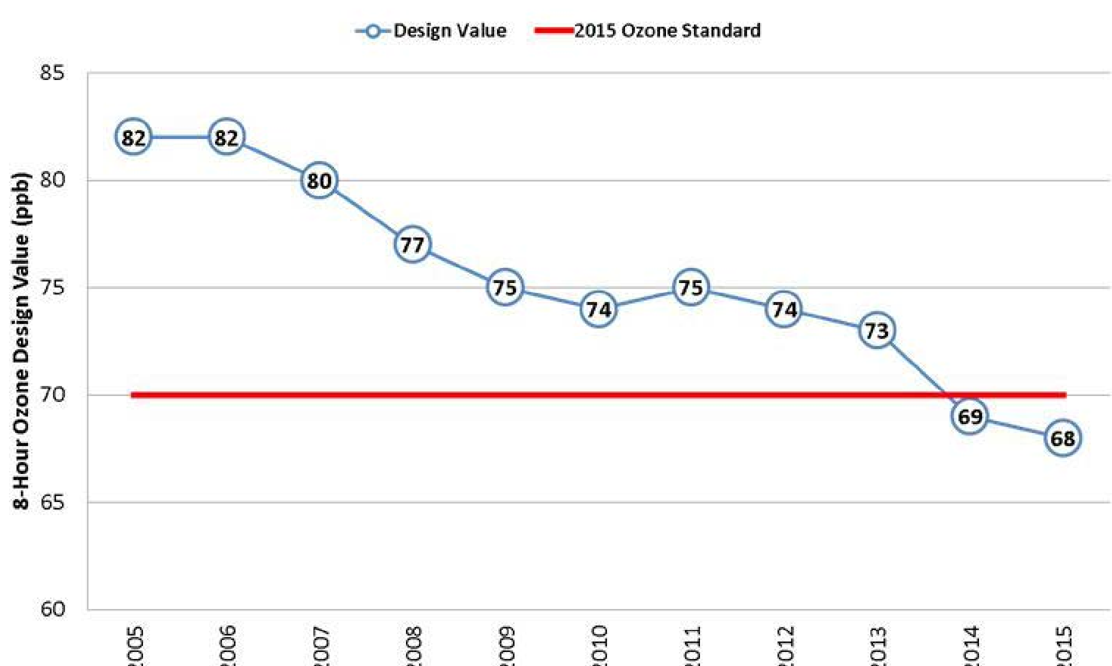
- Consider commuting by walking, biking, or taking the bus
- Avoid unnecessary side-trips or mowing your lawn during the middle of the day
- Avoid idling your vehicle

Status & Trends

Average ozone levels in the Austin area have been decreasing for more than a decade. The Austin region ended the 2015 ozone season in compliance with the 2008 and 2015 ozone standards, with an ozone design value of 68 ppb.

Central Texas Ozone Design Value Trend

Figure 3: *Ozone Design Value Trend 2005-2015, provided by the Capital Area Council of Governments*



The downward trend 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 upwind areas. The region-wide inspection and maintenance program has also contributed to the reduction of ozone by ensuring that local vehicles are maintained. For more information about the region's air quality visit AirCentralTexas.org.

Annual Focus

Since the U.S. EPA intends to use 2014 through 2016 ozone levels for determining whether a region is in compliance with air quality standards, Austin's 2016 ozone season will be critical to determining the area's attainment status. Under the new ozone standard it is expected that Central Texas will have more Ozone Action Days. Efforts to improve Austin's air quality must continue.

In 2015, the City took an active role in supporting several regional air quality initiatives, such as the CLEAN AIR Force of Central Texas. Austin Council Member Don Zimmerman (D-6) was appointed to the CLEAN AIR Force of Central Texas Board of Directors, and City air quality staff continued to serve on the CLEAN AIR Force technical advisory committee. Additionally, the CLEAN AIR Force and the City hosted a lunch and learn for Central Texas media and meteorologists. The goal of the event was to raise awareness for the media about the importance of air quality in Central Texas and how to educate readers, listeners and viewers of the various local media outlets.

The City also continued to support the regional Commute Solutions Program, which provides outreach to commuters who use alternative transportation options to improve air quality and reduce traffic congestion. City staff partnered with Capital Area Council of Governments (CAPCOG) staff to create the new myCommuteSolutions.com subsites for each Clean Air Coalition member jurisdiction.

Finally, the City remained an active member on the Movability Austin board and played an active role in development and implementation of Mobility Week 2015, a week-long event that brought together various stakeholders to discuss mobility solutions in order to help reduce traffic in Austin.

Sustainability

Importance

Climate in Central Texas is very dynamic. Average temperatures are increasing, the risks of extreme temperatures are changing, and precipitation patterns are shifting, with heavy precipitation becoming more frequent in many locations. Summer temperatures are expected to increase, and days where the maximum temperature exceeds 100°F and 110°F will become more common. Heavy precipitation, measured in days per year with more than 2 inches of rain and the amount of rainfall during the 5 consecutive wettest days of the year, is expected to increase.

Extreme weather events have already had severe adverse impacts on the community, displacing hundreds of citizens and requiring tens of millions of dollars for recovery efforts. For example:

- During the summer of 2011, Austin had 90 days with temperatures of at least 100°F; on average, this number has historically been less than 12 days per year
- In 2011 and 2015, dry conditions from extreme heat led to the destruction of more than 1,500 homes and 32,000 acres of forest surrounding Bastrop due to wildfires
- The Halloween Flood of 2013 and additional flooding in May and October of 2015 resulted in loss of life, extensive damage to homes and businesses, hundreds of road closures, and loss of power for thousands of Austin residents

Goals

Goals within Imagine Austin also support reducing greenhouse gas emissions through interconnected development patterns that reduce sprawl and support a variety of transportation choices, such as:

- A more compact and connected city that provides housing, retail and businesses within activity centers
- An integrated, expanded, and affordable transportation system that reduces traffic congestion and travel times
- Safe bicycle and pedestrian facilities with well-designed routes that provide connectivity throughout Austin

Imagine Austin Policies

CE P9. Reduce the carbon footprint of the city and its residents by implementing Austin's Climate Protection Plan and develop strategies to adapt to the projected impacts of climate change.

CE P10. Improve the air quality and reduce greenhouse gas emissions resulting from motor vehicle use, traffic and congestion, industrial sources, and waste.

May 2015 flooding at House Park Field

	Historical Observed	Near-term (2011-2040)	Mid-century (2041-2070)		End-of-century (2071-2100)	
			Lower	Higher	Lower	Higher
Temperature						
Summer average high temperature (°F)	93.8	96.9	97.9	100.2	98.6	103.8
Cold nights (minimum temperature < 32°F)	16.6	10.8	7.8	6.4	7.0	3.9
Warm nights (minimum temperature > 80°F)	0.5	5.4	10.5	39.5	17.0	86.7
Hot days (maximum temperature > 100°F)	11.7	31.4	40.1	63.2	46.5	92.3
Very hot days (maximum temperature > 110 °F)	0.0	1.3	0.4	11.6	0.9	19.5
Precipitation						
Annual precipitation (inches)	33.7	31.8	33.6	33.3	33.0	31.4
Dry days (PR <0.01 inches in 24h)	277.3	280.3	280.6	282.7	281.4	288.1
Longest dry spell (days)	53.1	53.3	54.4	54.7	54.0	60.4
Wet days (PR>2 inches in 24h)	2.2	2.5	2.8	2.7	2.8	2.8
Wettest 5 days (inches of precipitation)	5.8	7.2	7.6	7.7	7.8	7.8

Figure 1

CE P12. Adopt innovative programs, practices, and technologies to increase environmental quality and sustainability and reduce Austin's carbon footprint through the conservation of natural resources.

LUT P19. Reduce traffic congestion, increase transit use, and encourage alternative transportation modes through such practices as Transportation Demand Management, which includes carpooling, flex time work schedules, and subsidizing transit costs for employees.

CFS P42. Increase connectivity between neighborhoods and from neighborhoods to parks and greenways through the use of sidewalks, bicycle lanes, multi-use paths, and trails.

This Year's Challenges & Responses

One of the significant challenges the City faces is how to adapt to a changing climate. To begin to address this challenge, the City hired ATMOS Research & Consulting to conduct geographically-specific climate modeling for Austin through 2100 using the Camp Mabry weather station. The model's projections indicate higher average temperatures and increasing drought conditions in the future. These conditions will drive up energy and water use, which in turn can increase greenhouse gas emissions. (See figure 1)

The Office of Sustainability is working closely with the Austin Water to incorporate these climate change projections into the In¬tegrated Water Resource Planning process and prioritize water con¬servation and efficiency efforts. The process will explore supply augmentation and demand management strategies for the City of Austin and include planning for prolonged drought. Additionally, strategies identified in the Austin Community Climate Plan for energy efficiency and distrib¬uted solar energy will decrease emissions and reduce stress on the energy grid, while also increasing Austin's preparedness for higher temperatures.

Austin also faces the significant challenge of population growth. Austin is one of the fastest growing cities in America, with approximately 100 people moving here daily. This increase in population leads to more demand for electricity, natural gas, and water; increased traffic congestion, and the production of more waste. The City's goal for net-zero community-wide emissions becomes more challenging as the population grows. The City's plan for addressing this growth and the associated increase in greenhouse gas emissions is the Imagine Austin Comprehensive Plan. Imagine Austin guides land use strategies that support emissions reduction and greater resilience.

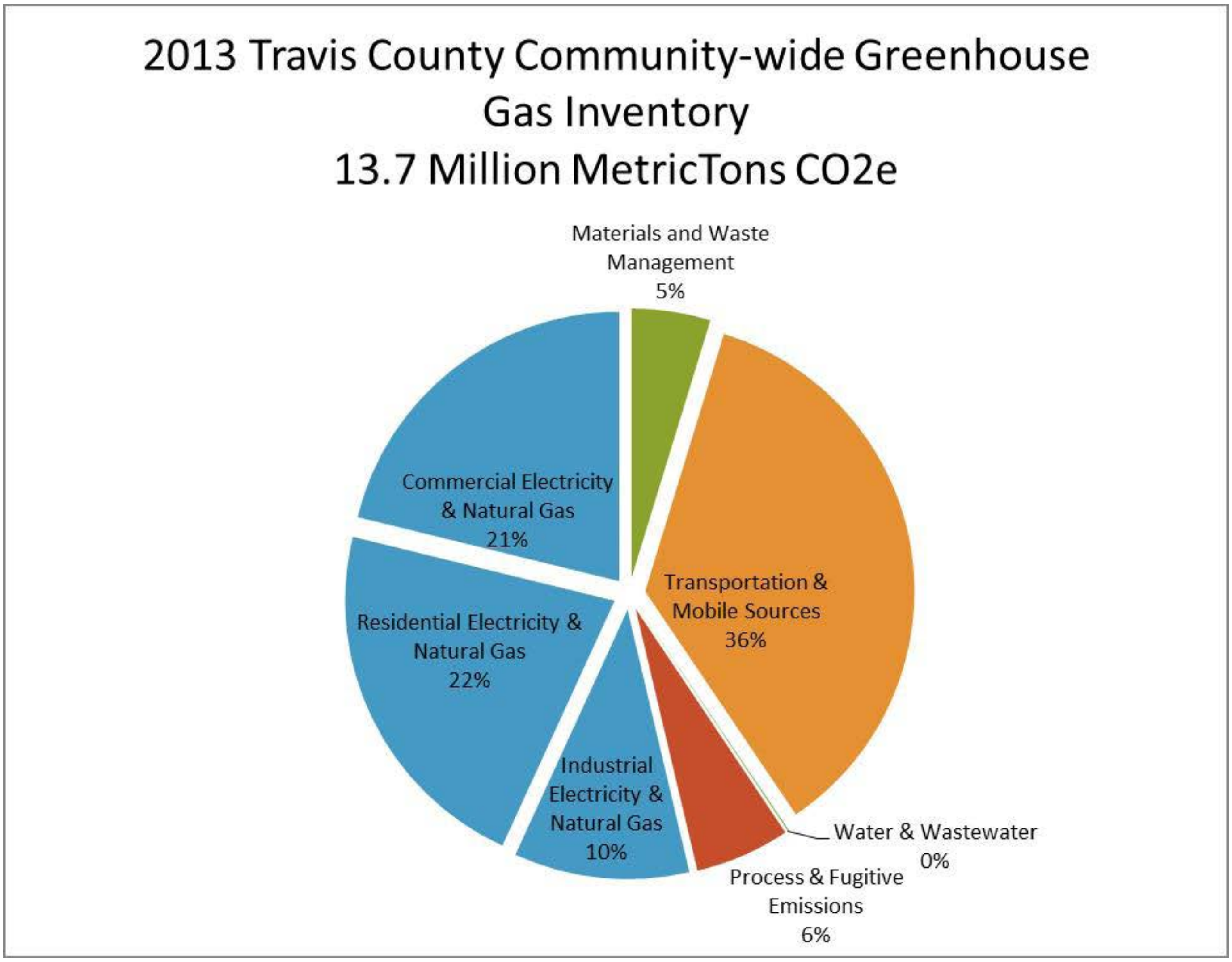


Figure 2

Status & Trends

Community-wide greenhouse gas emissions are estimated by the City of Austin every three years and follow the U.S. Community Greenhouse Gas Protocol developed by the International Council for Local Environmental Initiatives (ICLEI). The most recent greenhouse gas inventory completed for Travis County is for calendar year 2013. Total greenhouse gas emissions are estimated to be 13.7 million metric tons of carbon dioxide equivalents (see figure 2). The major sources of greenhouse gas emissions in Travis County are: the use of electricity and natural gas (53%); transportation and mobile sources (36%); emissions from industrial facilities (6%); and materials and waste management (5%).Total greenhouse gas emissions for Travis County decreased by approximately 2% between 2010 and 2013, even as the population increased from 1.03 million to 1.21 million. (see figure 3)

Emissions in several categories decreased, including commercial and residential electricity and natural gas use; materials and waste management; and emissions from factories. However, other categories had increased emissions, including industrial electricity and natural gas use; transportation and mobile sources; and methane from landfills. The 2020 target for community-wide greenhouse gas emissions is 11.3 million metric tons of carbon dioxide equivalents.

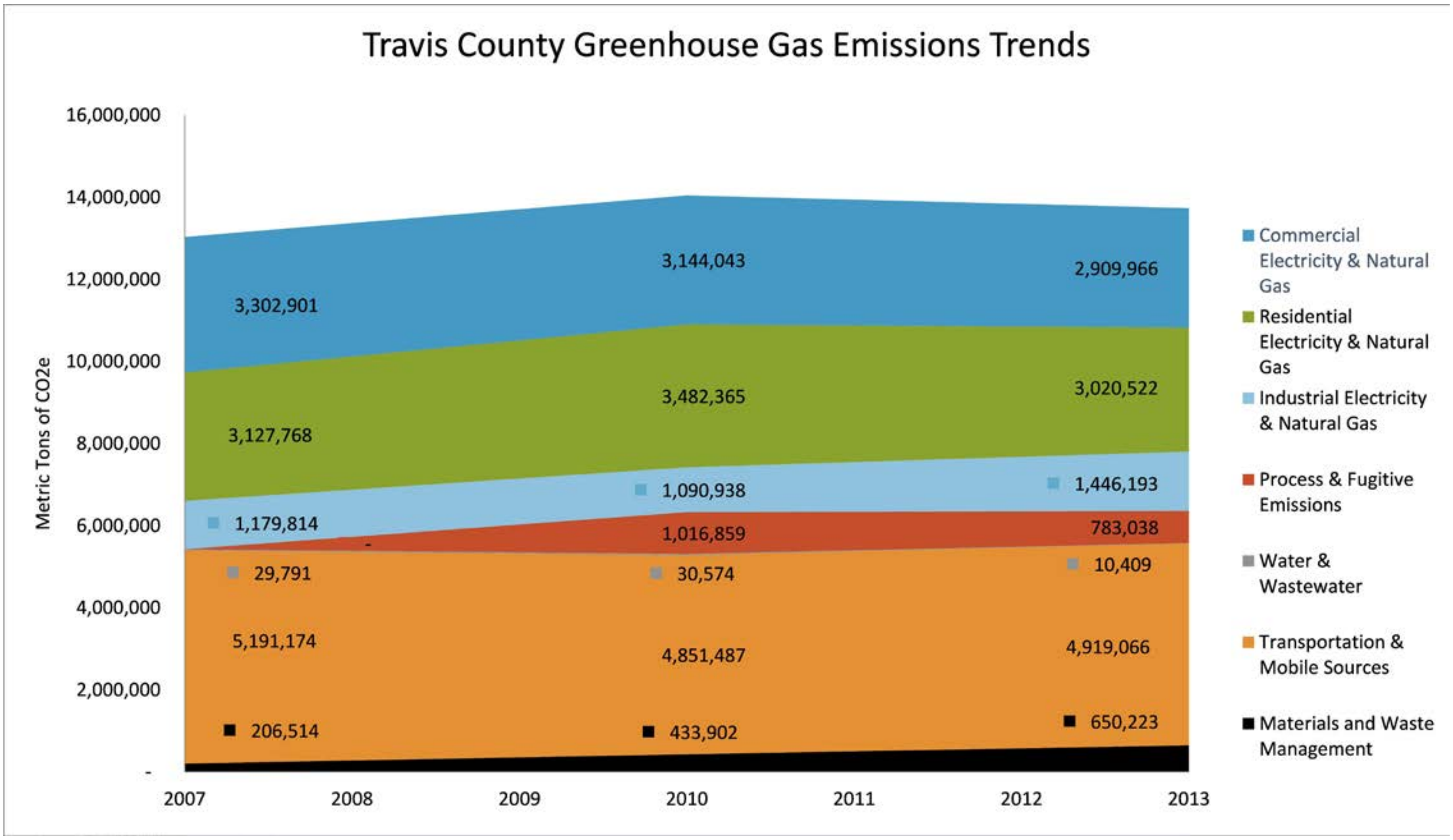


Figure 3

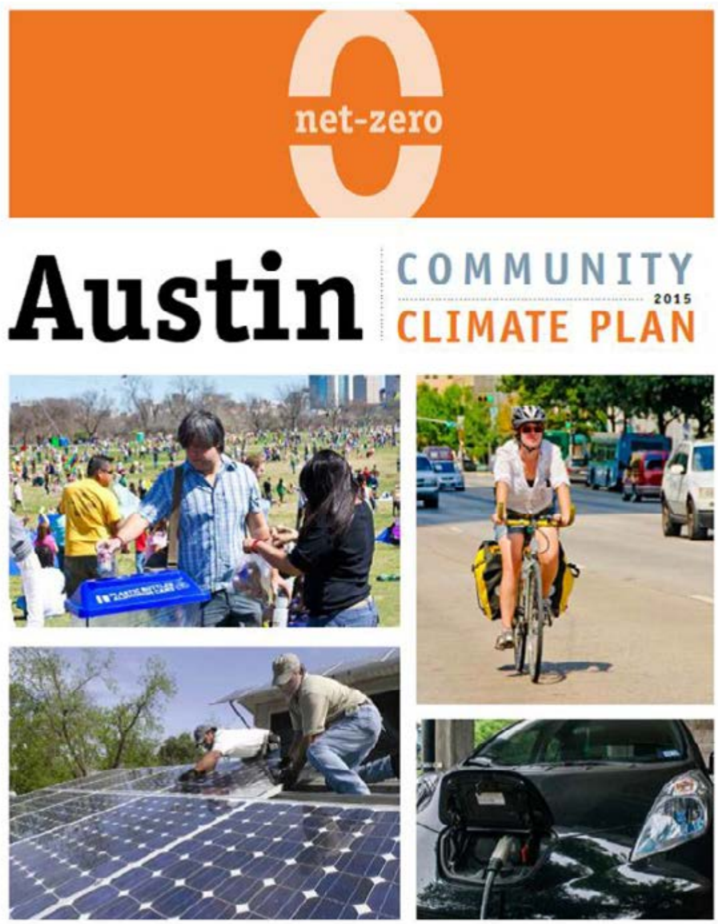
Annual Focus

On December 12, 2015, the world reached an important milestone in planning for climate change with the signing of the Paris Agreement. The agreement confirmed a target of keeping the global average rise in temperature below 2°C and committed all 196 signatory countries to update and report back on their climate action plans every five years. Austin is well positioned to support U.S. efforts with our ongoing climate planning actions, including goals that are more aggressive than those set in the Paris Agreement.

In June 2015, the City Council adopted the Austin Community Climate Plan to achieve community-wide net-zero greenhouse gas emissions by 2050. In particular, 58 actions from the plan were prioritized as Phase 1 actions. Execution of these actions is necessary to achieve the first interim reduction target of 11.3 million metric tons of greenhouse gas emissions community-wide by 2020.

The Office of Sustainability is working with staff from Austin Energy, Austin Transportation, Planning and Zoning, and Austin Resource Recovery to finalize a Phase 1 Implementation Plan for the Austin Community Climate Plan. It will focus on achieving the 2020 interim emissions reduction target from electricity and natural gas, transportation, and materials and waste management sources. This effort includes developing implementation timelines, establishing performance metrics based on avoided or reduced emissions, and categorizing costs, savings, and community co-benefits.

Link to the ACCP: http://austintexas.gov/sites/default/files/files/Sustainability/FINAL_-_OOS_AustinClimatePlan_061015.pdf



100% Recycled

2015