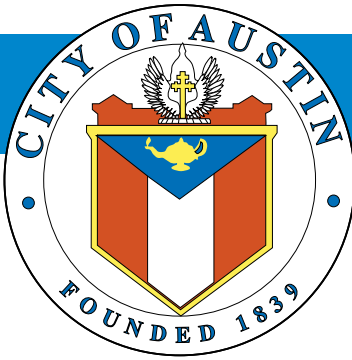


# The City of Austin State of Our Environment Report



2010



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## Resources

### Environmental Portal

[www.austintexas.gov/environmental](http://www.austintexas.gov/environmental)

- Programs
- Speakers Bureau
- Services
  - Homeowners
  - Businesses
  - Rebates/Loans/  
Giveaways
- How to Help
  - Report
  - Volunteer
  - Be a Steward
- Accomplishments
- Outdoors/Education
  - Education/Recreation
  - Gardening
  - Natural Area  
Conservation Lands
  - Wildlife/Endangered  
Species

### Sustainability Portal

[www.austintexas.gov/sustainability](http://www.austintexas.gov/sustainability)

*What is Sustainability?*

Sustainability means **finding a balance** among three sets of goals:

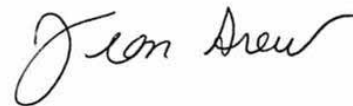
1. Prosperity and jobs
2. Conservation and the environment
3. Community health, equity, and cultural vitality.

It means taking positive, proactive steps to protect quality of life now, and for future generations.

**The Watershed Protection Department** is proud to introduce the 2010 State of Our Environment Report, which has a new format highlighting the question “How are we doing?” on key environmental indicators representing air, land and water. Past editions of the State of the Environment Report included a broader range of information, including recycling, water conservation, green building and other topics. The City of Austin continues its work on these important issues, and the “Resources” page of this report provides links for more information on these subjects. The new, more focused edition of this report was prepared to provide an indication of environmental health of our City, specifically with regard to:

- Creeks
- Lakes and Rivers
- Aquifers
- Urban Forest
- Open Space and Habitat
- Air Quality

The City of Austin has long been a national leader in its strong commitment to environmental protection, as the Imagine Austin Comprehensive Plan vision states “Austin is a green city.” The production of this report has been a team effort, led by the Watershed Protection Department, but also including Austin Energy, Austin Water, Parks and Recreation, Planning and Development Review, Office of Sustainability, and Transportation. I’d like to thank all who have participated in this effort, and hope that the readers will enjoy the revised format and take away an understanding of the “State of Our Environment.”



**The Office of Sustainability** encourages everyone to help advance the “triple bottom line” of the Economy, Environment, and Social Equity. As one leg of this balanced approach, environmental protection is an essential foundation for Austin’s sustainable future.

Environmental stewardship protects the critical “natural infrastructure” that our regional economy needs to remain strong. “Our economy and our environment are inextricably linked,” states Lisa P. Jackson, Chief Administrator of the Environmental Protection Agency. “Sustainability and planetary stewardship must be part of the economic growth that is reaching more and more people around the world every day.” As a green city, Austin has attracted environmental and clean-energy companies and professionals, innovative new technologies, and home-grown green jobs. The Austin Climate Protection Program similarly helps to protect our vital assets by addressing risk management for Central Texas from potential increased flooding, heat and drought, ecosystem disruptions, and their collective costs.

Equally important, environmental stewardship helps to protect public health. Preventing the pollution of our air, water and land advances social equity by protecting all our citizen’s assets and helping our most vulnerable community members – the poor, children, and the elderly. As Jackson notes, environmental protection “reduces exposure to pollution that causes cancer, heart disease and respiratory illness – three of the top four deadliest conditions in our country.”



# Creeks



## Importance

Creeks flow into our drinking water reservoirs, provide critical habitat for aquatic life and provide recreational opportunities for people. The health of Austin’s creeks is a direct measure of our success in managing land resources.

## Goals

One goal of the City is to protect and improve the quality of water in our creeks. A specific goal of the Watershed Protection Department is to maintain Environmental Integrity Index scores of “good” or better in all monitored creeks.

## Challenges and Responses

### Ongoing

Encroachment by development, loss of bank vegetation, increased impervious cover (with associated increases in storm runoff), leaking wastewater infrastructure, uncollected pet waste, and improper fertilizer use all result in degradation of water quality. These threats can convert healthy creeks into ones that are not safe for human water contact, are choked with nuisance aquatic plants, have destabilized stream banks, and have dissolved oxygen levels so low that fish perish.

The Watershed Protection Department addresses these problems through a combination of solutions, including public education, regulations, programs, and capital improvement projects.

More information: [www.austintexas.gov/watershed/](http://www.austintexas.gov/watershed/)

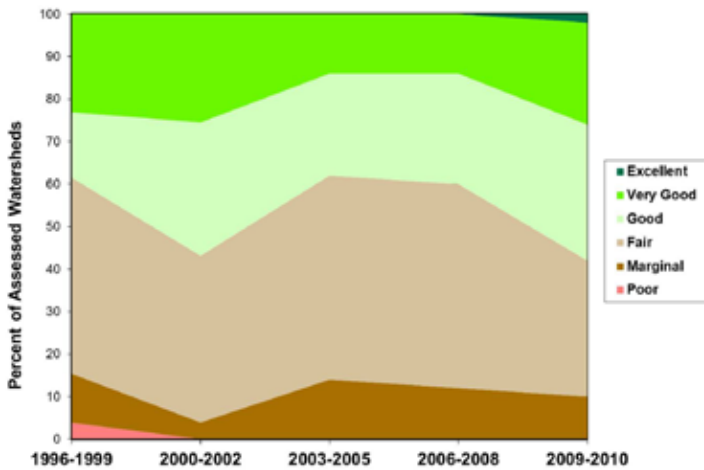


Figure 1. (Left) Change in Environmental Integrity Index scores citywide over time.

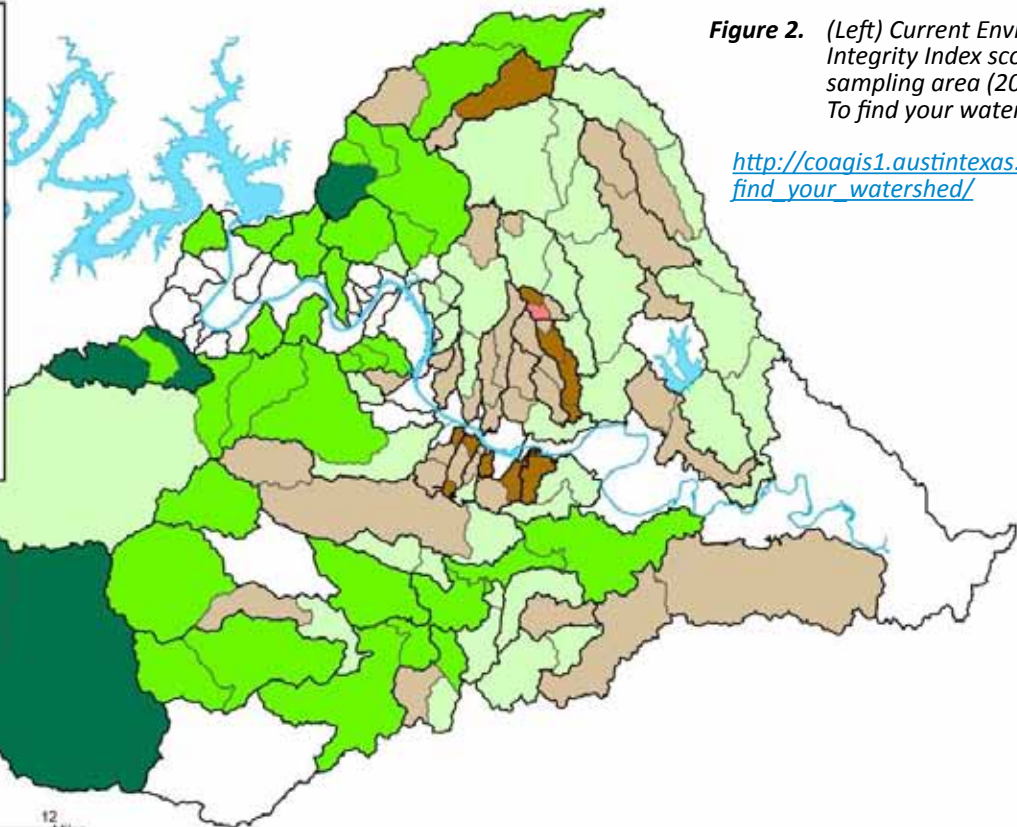


Figure 2. (Left) Current Environmental Integrity Index score by sampling area (2009-2010). To find your watershed, go to

[http://coagis1.austintexas.gov/website/find\\_your\\_watershed/](http://coagis1.austintexas.gov/website/find_your_watershed/)



## *This Year*

Specific challenges to creek health and City actions in 2010 included:

- The Environmental Board worked with staff to identify potential improvements to existing regulations to protect creeks. Highlights included improved stream buffers for small, “headwaters” streams and better protection against modifications of floodplains, riparian areas, and creek channels. The Environmental Board passed the following resolution, calling for action (which the Council took up in January 2011): [www.austintexas.gov/edims/document.cfm?id=145775](http://www.austintexas.gov/edims/document.cfm?id=145775) [pp. 7-9]
- Bacteria levels in Bull Creek District Park frequently exceeded contact recreation standards, and may have been related to uncollected dog feces. Watershed Protection successfully completed a creekside restoration project in the park and monitored bacteria levels during a six-month evaluation period when dogs had to be on-leash. For more information: [www.austintexas.gov/watershed/bullcreek\\_update.htm](http://www.austintexas.gov/watershed/bullcreek_update.htm)
- City Council approved an ordinance in December 2010 to require a portion of stormwater runoff on commercial sites to be directed to landscaped areas. The new requirements will use rainwater more wisely on-site to conserve potable water, enhance water quality, and sustain the health of urban landscapes. To read the ordinance: [www.austintexas.gov/edims/document.cfm?id=146917](http://www.austintexas.gov/edims/document.cfm?id=146917)  
To learn about how the City of Austin is using these techniques on City projects: [www.austintexas.gov/publicworks/sustainability](http://www.austintexas.gov/publicworks/sustainability)
- Rain gardens capture stormwater and provide natural infiltration into the soil. For more information: [www.austintexas.gov/watershed/swtreat\\_raingarden.htm](http://www.austintexas.gov/watershed/swtreat_raingarden.htm)  
To learn how to create a rain garden for yourself: [www.austintexas.gov/growgreen/downloads/raingarden\\_factsheet.pdf](http://www.austintexas.gov/growgreen/downloads/raingarden_factsheet.pdf)
- Trash is the most visible and widespread urban creek pollutant. Watershed Protection launched the “Let’s Can It, Austin!” campaign this year to help prevent littering. For more information: [www.austintexas.gov/watershed/canit.htm](http://www.austintexas.gov/watershed/canit.htm)

## **Status and Trends**

Despite constantly increasing pressure from Austin’s growing population, the water quality of Austin’s creeks is not declining over time. The City of Austin monitors creek health using the Environmental Integrity Index (EII). The EII assesses water quality, contact recreation, aquatic life, physical integrity and aesthetics by direct field sampling. Using the EII, the City monitors 50 watersheds across Austin on a rotating two-year cycle. EII information is used to track the long-term health of creeks over time and prioritize areas for specific projects. More information on EII scores is available:

[www.austintexas.gov/watershed/surface\\_eii.htm](http://www.austintexas.gov/watershed/surface_eii.htm)

The overall EII score is a comprehensive reflection of the health of Austin’s creeks. It can be used to identify where problems occur in Austin (Figure 2) and may be used to track the success of Austin’s water quality protection efforts over time (Figure 1). Approximately half of the stream reaches assessed during 2010 maintained “good” or better EII scores and the percentage of reaches maintaining “good” or better scores was higher in the most recent round of sampling than in the initial round of sampling from 1996 thru 1999.

## **Annual Focus**

The Watershed Protection Department (WPD) has initiated a new creek riparian zone restoration program, known as RZR. Riparian zones are the areas adjacent to creeks where land interfaces with water. Degradation of riparian zones from excessive mowing, invasion of non-native species, and a lack of diversity of plants can result in less infiltration of runoff, less uptake of water pollutants and excessive loss of land by erosion. (Curbing this degradation was a focus of the Environmental Board resolution cited above.) Biologists collaborating with field crews have shifted more than 6.75 acres of riparian zones to less intensive maintenance thereby reducing maintenance costs for WPD operations and improving stream conditions. In addition to the passive approach of changing management strategies, during 2010 WPD actively restored 560 linear feet in the Willowbrook reach of Boggy Creek and is planning two new restoration projects for implementation during 2012. Active restoration projects are prioritized based on EII riparian health scores on City-owned properties. Education is a key component to convince the public that creekside areas do not need intensive mowing.





**Figure 3.** Before (top) and after (bottom) photos of restoration work involving native and adapted plantings, trail re-design, use of cedar logs to redirect water flow, and installation of irrigation systems.



# Lakes and Rivers



## Importance

Austin has three lakes – Lake Austin, Lady Bird Lake, and Lake Walter E. Long. Lake Austin is currently the sole source of drinking water for the City of Austin, and all three of the lakes in Austin are regionally important recreation resources. Lake Long also provides cooling water for an Austin Energy power plant. The lakes are the primary receiving water for stormwater runoff, and pollutants can collect in lake sediment over long periods of time.

## Goals

The Watershed Protection Department’s three main goals for lakes are to manage invasive plants, maintain water quality, and control the amount of trash. Specifically, invasive plants should not impair recreation, Lake Index scores should be “good” (64 or higher), and Visual Index of Pollution scores should be 2 or less. The lower score indicates less trash.

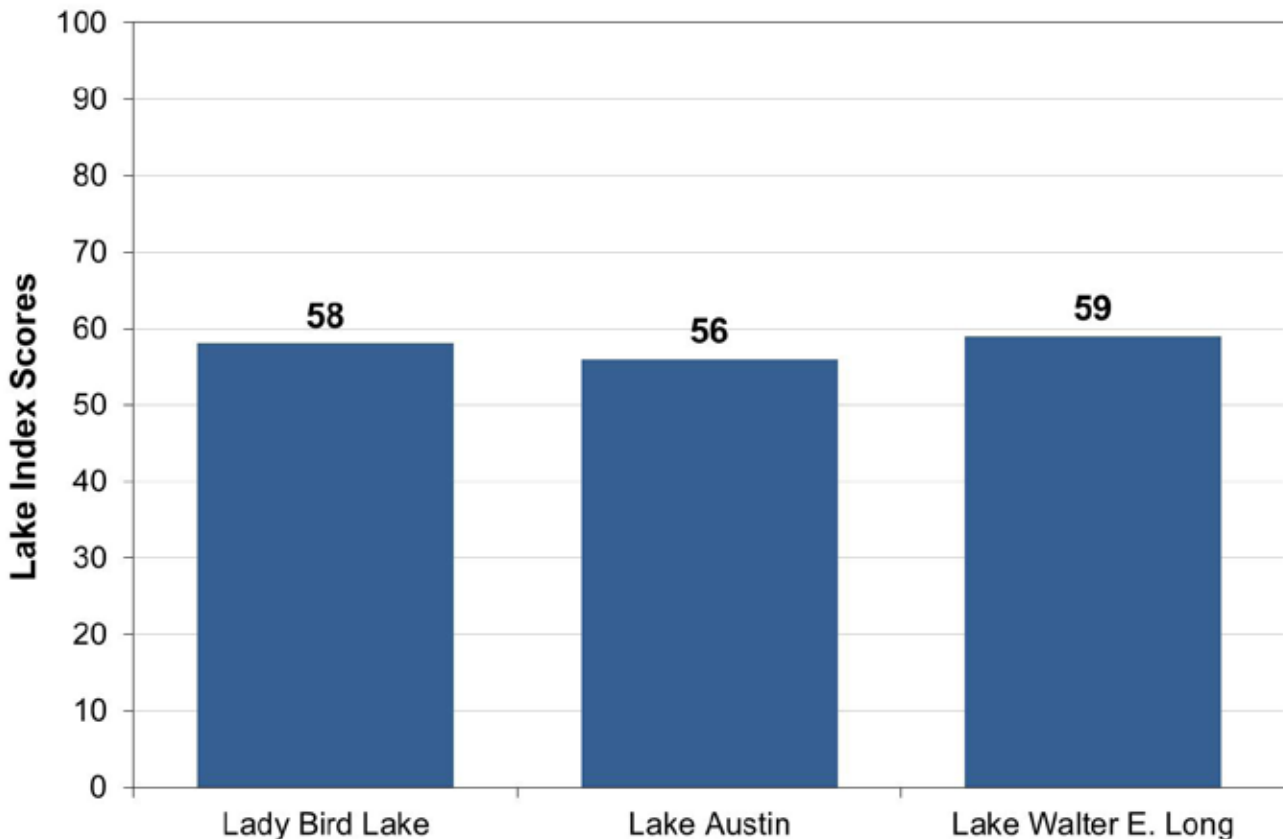
**Figure 1.** Overall Lake Index scores for 2009. 100 is the best score and 0 is the worst. All lakes currently score in the “Fair” range.

## Challenges and Responses

### Ongoing

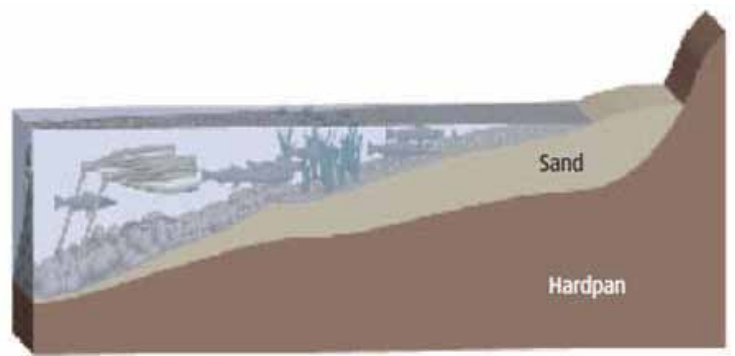
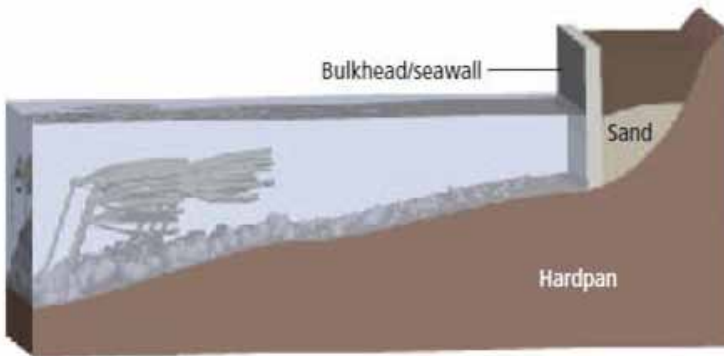
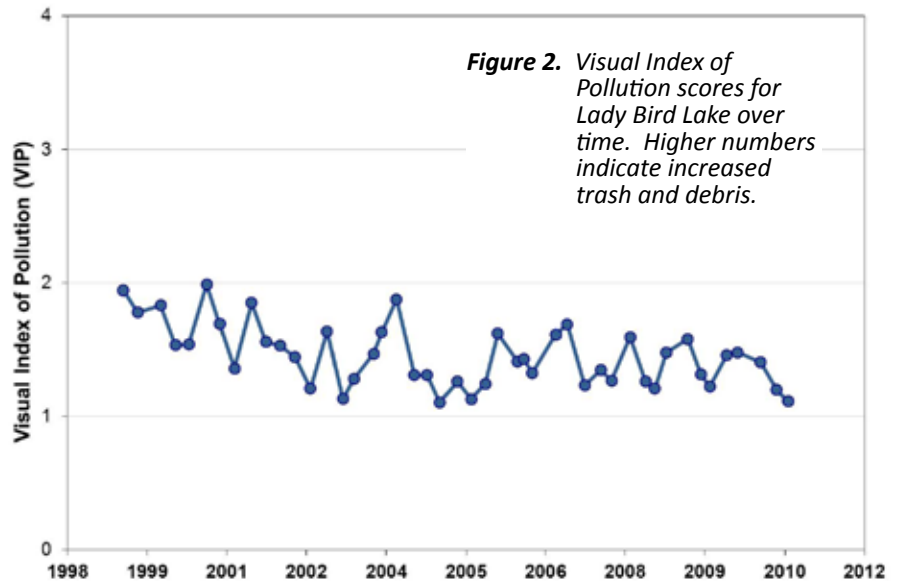
Increasing nutrient concentrations change the composition and quantity of nuisance algae. As algae increase, lakes become less clear and dissolved oxygen can be reduced. This places stress on aquatic life and can increase water treatment costs. Increasing water usage can reduce flows through the lake, exacerbating these problems. In Lake Long, treated wastewater effluent from the Austin Water Utility may also increase algae because the intake to fill the lake from the Colorado River is 2.5 miles downstream of the wastewater treatment plant outfall.

In addition to algae, invasive 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. Hundreds of tons of trash and debris are routinely collected by the City from Lady Bird Lake.



*This Year*

- Watershed Protection Department field crews removed more than 270 tons of debris from Lady Bird Lake in 2010, including an additional 194 tons after Tropical Storm Hermine. Learn more about litter here: [www.austintexas.gov/watershed/canit.htm](http://www.austintexas.gov/watershed/canit.htm)
- Hydrilla is a rapidly growing invasive plant. More than 330 acres of hydrilla were found in Lake Austin by the Texas Parks and Wildlife Department in 2010. Hydrilla in Lake Austin is managed with lake drawdowns and by stocking sterile Asian grass carp. To date, 1,800 of those fish have been introduced to the lake to eat the aquatic weed. In 2011, the City is starting a capital improvement project to remove invasive vegetation from Lady Bird Lake. For more information: [www.austintexas.gov/watershed/hydrilla.htm](http://www.austintexas.gov/watershed/hydrilla.htm)
- The City of Austin successfully protested a petition by two cities to allow wastewater discharges to the Highland Lakes in 2010. Wastewater discharges contain elevated concentrations of nutrients that can spur the growth of nuisance algae. Wastewater discharges to the Highland Lakes are prohibited by the Texas Commission on Environmental Quality. With overwhelming support for the existing prohibition, the Texas Commission on Environmental Quality denied the petition and the discharge ban remains in effect.



**Figure 3.** Real and schematic examples of shoreline. The left example shows a vertical bulkhead. The right example shows a desired, natural shoreline with stable natural materials, low profile slopes and native and adapted vegetation.

## Status and Trends

Since 2009, all three area lakes have been monitored as part of Austin's Lake Index, which includes annual monitoring and assessment of aquatic habitat, insects, water quality, sediment quality, invasive vegetation and floating algae. Higher Lake Index scores indicate improved water quality. As shown in Figure 1 (previous page), all three lakes yielded "fair" scores, less than the goal of "good" or better.

More on the Lake Index will be available next year: [www.austintexas.gov/watershed/surface.htm](http://www.austintexas.gov/watershed/surface.htm)

Additionally, trash and aesthetic impacts to Lady Bird Lake are assessed using the Visual Index of Pollution. This assessment has been on-going with consistent methods since 1999. Higher scores indicate more trash and debris. Scores have continued to improve (or lower) over time (Figure 2).

## Annual Focus

During 2009, City staff conducted a GIS-based survey of Lake Austin and determined that approximately 42% of the shoreline is armored with vertical bulkheads made

of concrete, metal, and stone (Figure 4). A review of available literature on the topic indicated that vertical bulkheads are known to reflect wave energy, cause erosion of the lake bottom, and disrupt the natural physical and biological processes of the shoreline. Additionally, the First National Lakes Assessment, released by the U.S. EPA in February 2010, stresses the importance of protecting shoreline habitats and documents the correlation of lakeshore integrity and lake biological health. Following 19 public presentations by City staff, the City Council adopted new requirements in December 2010 for shoreline protection. The ordinance clarifies the prohibition of vertical bulkheads and thereby minimizes wave return and wave action by regulating the design and materials (Figure 3). A new section of the Environmental Criteria Manual is currently under development that will establish technical criteria for shoreline stabilization that support stable and environmentally functional shorelines. The development of these new code and criteria will serve the community by protecting the integrity of our lakes. Learn more about Austin's shoreline protection initiatives:

[www.austintexas.gov/watershed/bulkhead\\_shoreline.htm](http://www.austintexas.gov/watershed/bulkhead_shoreline.htm)

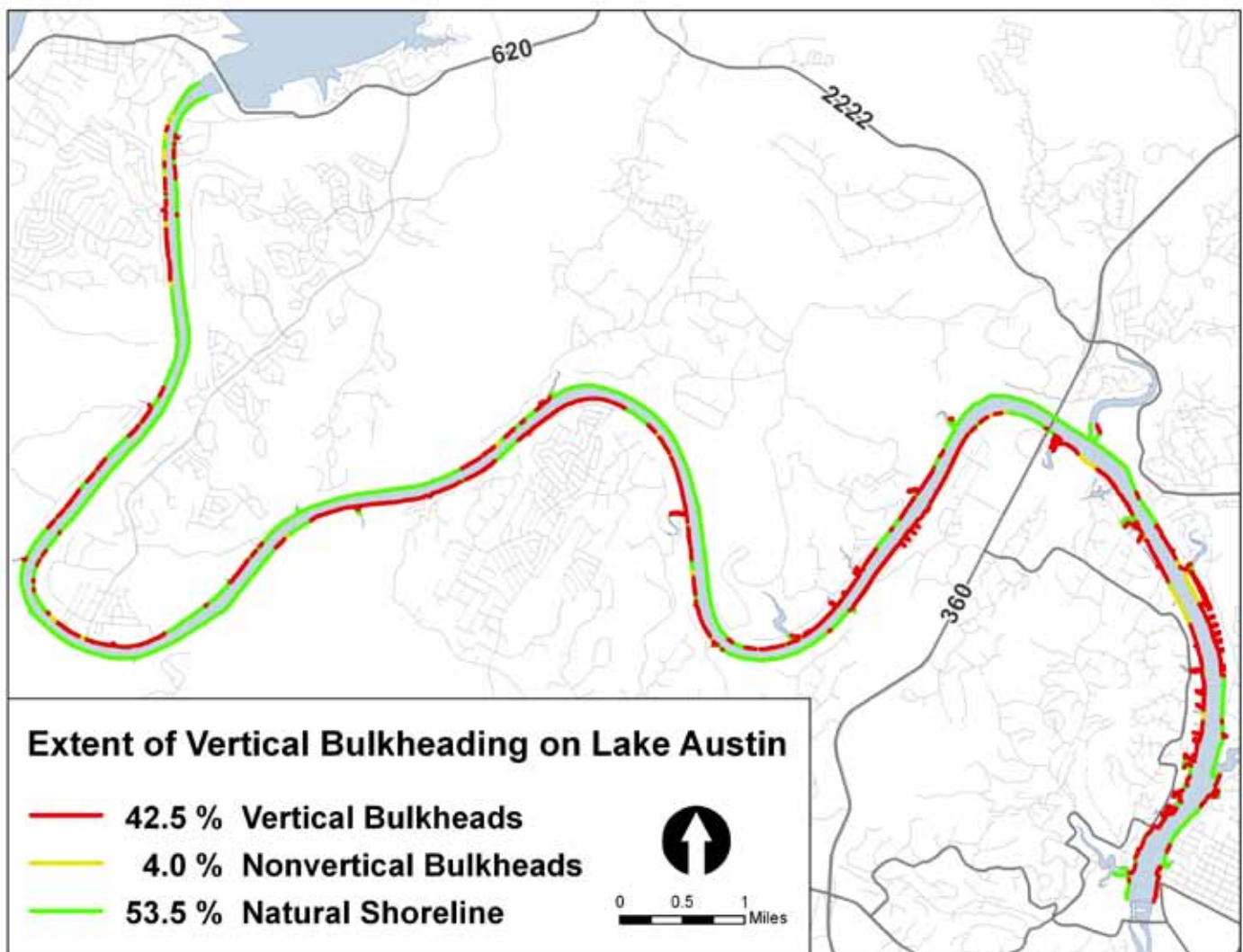


Figure 4. Map showing the extent of bulkheading on Lake Austin, 2009.



# Aquifers



## Importance

The Barton Springs Segment of the Edwards Aquifer is the sole source of drinking water for thousands of Central Texans. It also supports the habitat of the endangered Barton Springs Salamander and the Austin Blind Salamander, which may soon be listed as endangered. In addition, Barton Springs is an important recreational resource for Austin, drawing hundreds of thousands of visitors annually. In north Austin, small Edwards Aquifer springs provide critical habitat for the threatened Jollyville Plateau Salamander.

## Goals

The goal of the Watershed Protection Department for the Edwards Aquifer is to maintain sufficient flow, dissolved oxygen, and water quality at spring outlets to protect salamander populations.

## Challenges and Responses

### Ongoing

Aquatic salamanders require sufficient dissolved oxygen to survive and thrive. Pumping from the aquifer reduces flow and dissolved oxygen in Barton Springs, especially during drought. Furthermore, development over the recharge and contributing zones of the aquifer threatens the quality of water recharging the aquifer, which may in turn affect salamander habitats.

Barton Springs flow and dissolved oxygen directly affect the habitat and populations of the Barton Springs Salamander. Dissolved oxygen concentrations less than 5 mg/L are of particular concern. When Barton Springs flow is less than 40 cubic feet per second, significant water quality changes become evident. When flow is below 30 cubic feet per second, Barton Springs salamanders are negatively affected by the decrease in dissolved oxygen (Figure 1).

### This Year

- Austin is building a new water treatment plant to withdraw drinking water from Lake Travis. The transmission main to carry the water underground to residents crosses the Bull Creek watershed and has the potential to disrupt spring flows important to the Jollyville Plateau Salamander. The City is making substantial efforts to ensure that the project will not adversely affect the quality or quantity of water in Bull Creek. Steps are being taken during construction to prevent impacts. Environmental monitoring of Bull Creek surface water and groundwater in area springs and wells is being conducted to verify that no negative changes occur.

Learn more: [www.austintexas.gov/water/wtp4/](http://www.austintexas.gov/water/wtp4/)

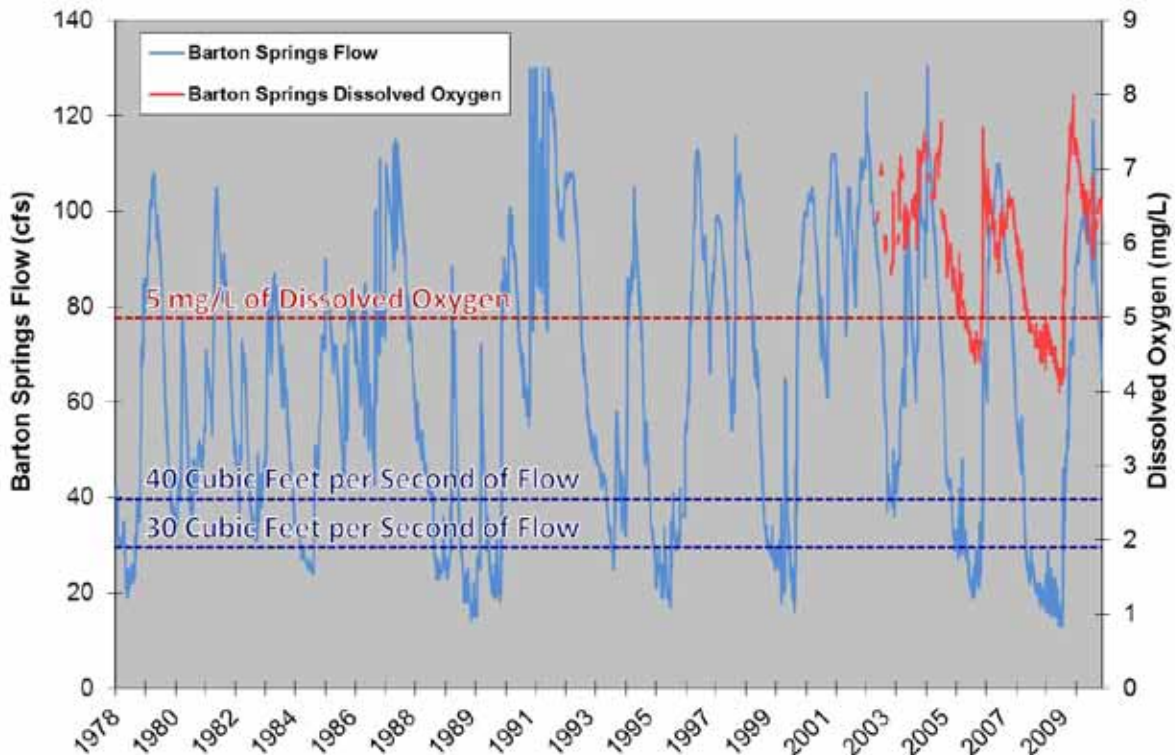


Figure 1. Barton Springs flow and dissolved oxygen over time.

## Quarterly Count Summary, 2008-2010: Bull Creek Main Stem (Franklin), Site 349

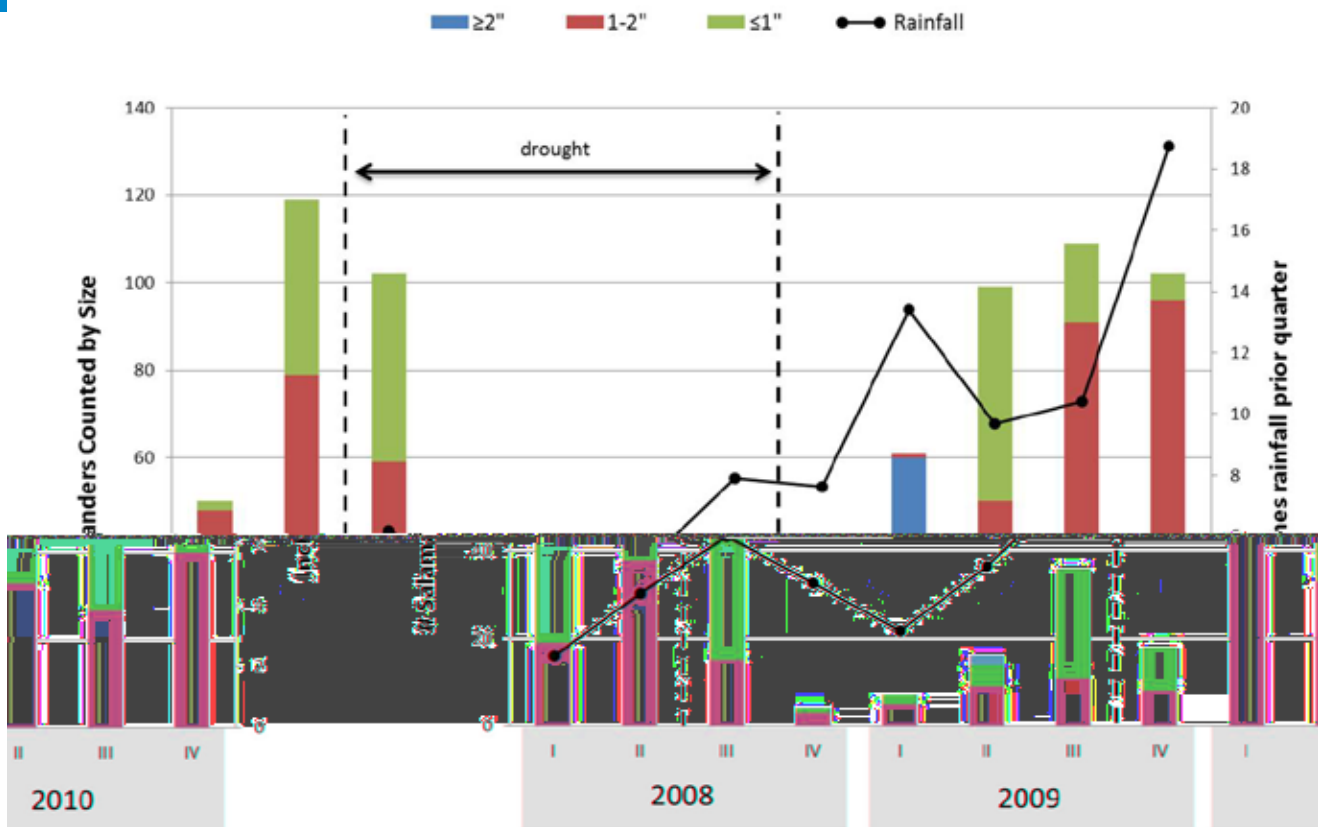


Figure 2. Jollyville Plateau Salamander population counts at one representative Bull Creek monitoring site.

- Normal Barton Creek flow does not enter Barton Springs Pool, but bypasses it through a culvert adjacent to the pool. The bypass structure is in need of major repairs. Learn more: [www.austintexas.gov/parks/bartonspringsmp.htm](http://www.austintexas.gov/parks/bartonspringsmp.htm)
- Hydrogeologists performed dye tracing of the aquifer during the most recent drought and discovered a new connection between Barton Springs and the Blanco River (see the Annual Focus below).

After a prolonged period of severe drought, spring flow and dissolved oxygen levels were above average during 2010. Jollyville Plateau Salamander population counts at the surface are a direct representation of the health of the species, and are strongly impacted by the flow of the springs. In 2010, there was an apparent recovery of salamander populations at representative sites (Figure 2).

Learn more about salamander protection efforts: [www.austintexas.gov/watershed/salamander.htm](http://www.austintexas.gov/watershed/salamander.htm)

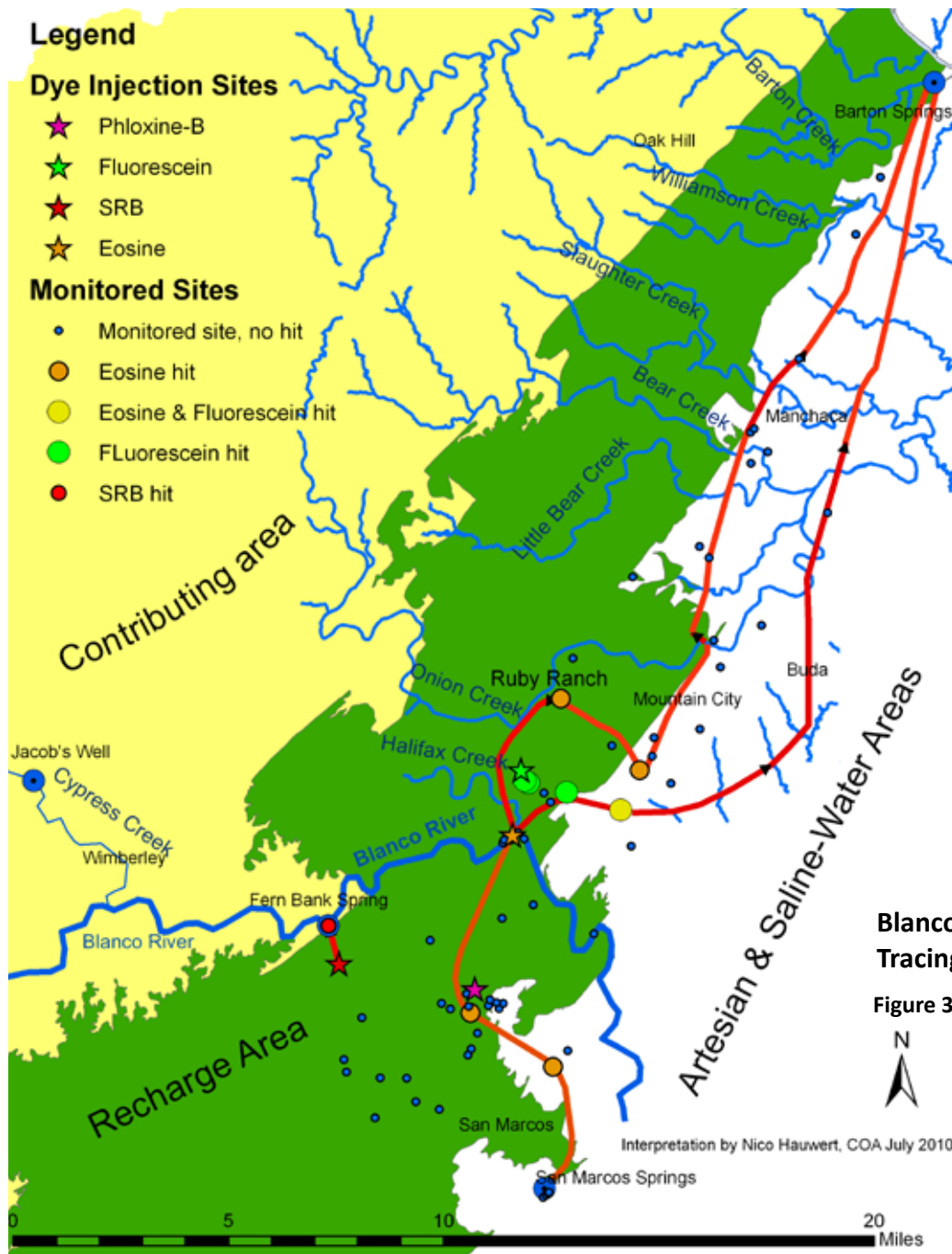
### Status and Trends

The City in cooperation with the United States Geologic Survey monitors the flow of Barton Springs using automated instruments that take measurements every 15 minutes. Withdrawal of water from the aquifer by pumping continues to increase over time. Flows at Barton Springs are still driven primarily by rainfall. Access the data from the USGS server: [http://waterdata.usgs.gov/tx/nwis/inventory/?site\\_no=08155500&agency\\_cd=USGS&](http://waterdata.usgs.gov/tx/nwis/inventory/?site_no=08155500&agency_cd=USGS&)

The City also closely monitors the water quality of Barton Springs, as well as the habitat conditions and populations of the Barton Springs Salamander and the threatened Austin Blind Salamander. Due to City of Austin efforts to protect and improve habitat, the population of the Barton Springs Salamander has significantly improved since it was listed as an endangered species in 1997.







Blanco River



## Annual Focus

The Edwards Aquifer was subjected to extremely low water levels during the drought of 2009. Dye studies during the drought revealed a previously unknown connection between the Blanco River and Barton Springs. During normal conditions, Onion Creek acts as the southern groundwater divide separating the Barton Springs and San Marcos Springs contributing zones. During drought, as much as 50 percent of the flow of Barton Springs may originate from the Blanco River. This scientific discovery has implications for regional groundwater supply management across current groundwater conservation district boundaries.



# Urban Forest

## Importance

Trees enhance our community with both biological and societal values. The urban forest has social, ecological, cultural, economic, historical, and aesthetic benefits. A healthy urban forest enhances the health and welfare of the citizens of Austin and is an asset and important part of the City's infrastructure that City policy seeks to protect.

## Goals

The principal goals of the City Arborist Program are to preserve and replant the regulated forest of Austin and police, plan, and promote the urban forest. These goals are pursued by preserving trees and vegetation communities impacted by development activities, encouraging the removal of non-native invasive trees, controlling oak wilt, and managing a grant program to promote conservation and improvement projects that benefit Austin's urban forest.

## Challenges and Responses

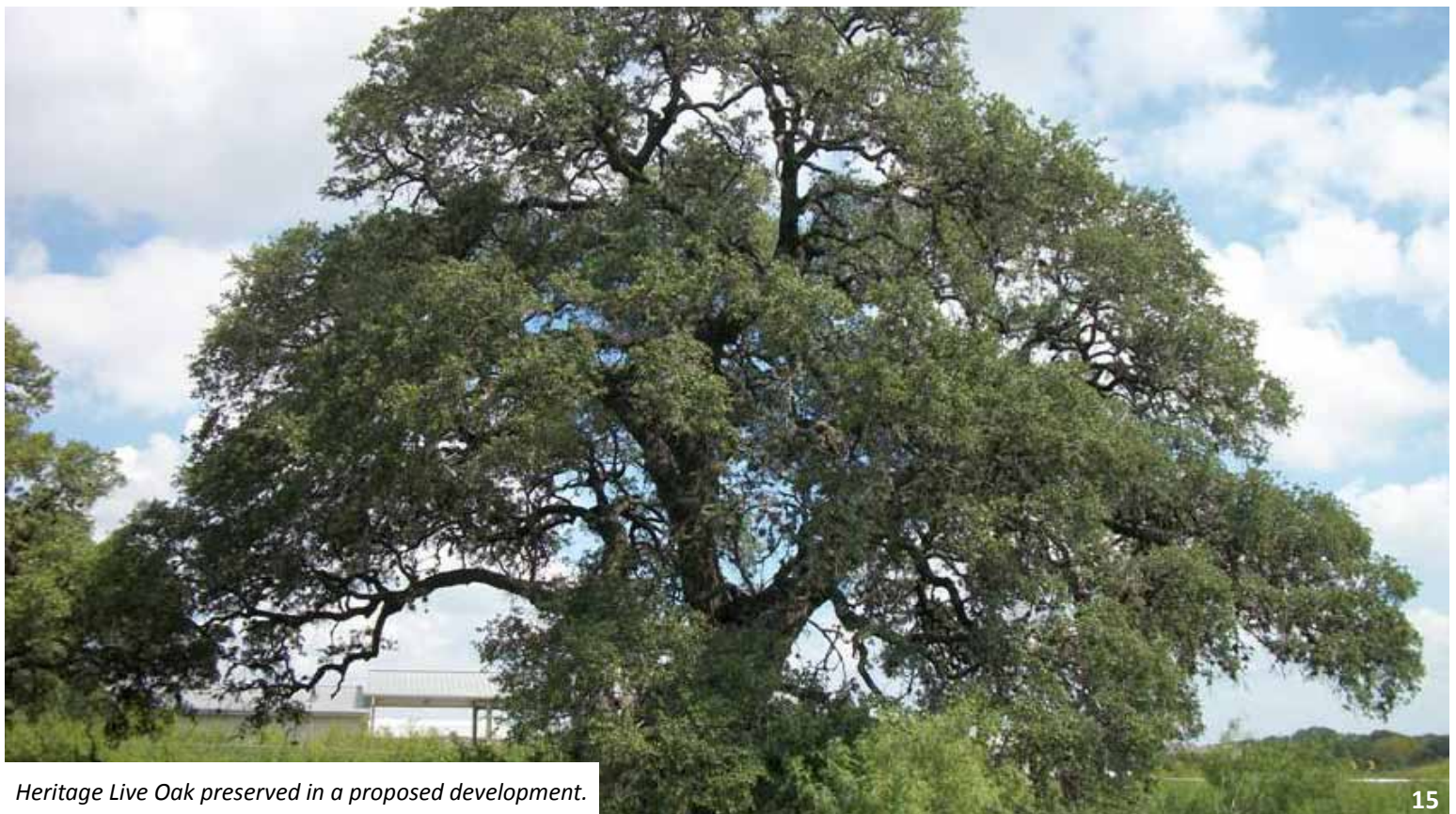
### Ongoing

Austin's urban forest represents a diverse landscape of two unique ecological regions—the Edwards Plateau and the Texas Blackland Prairie—and is challenged by a range of historic and existing land uses and other environmental stressors such as drought and disease. A wide variety of

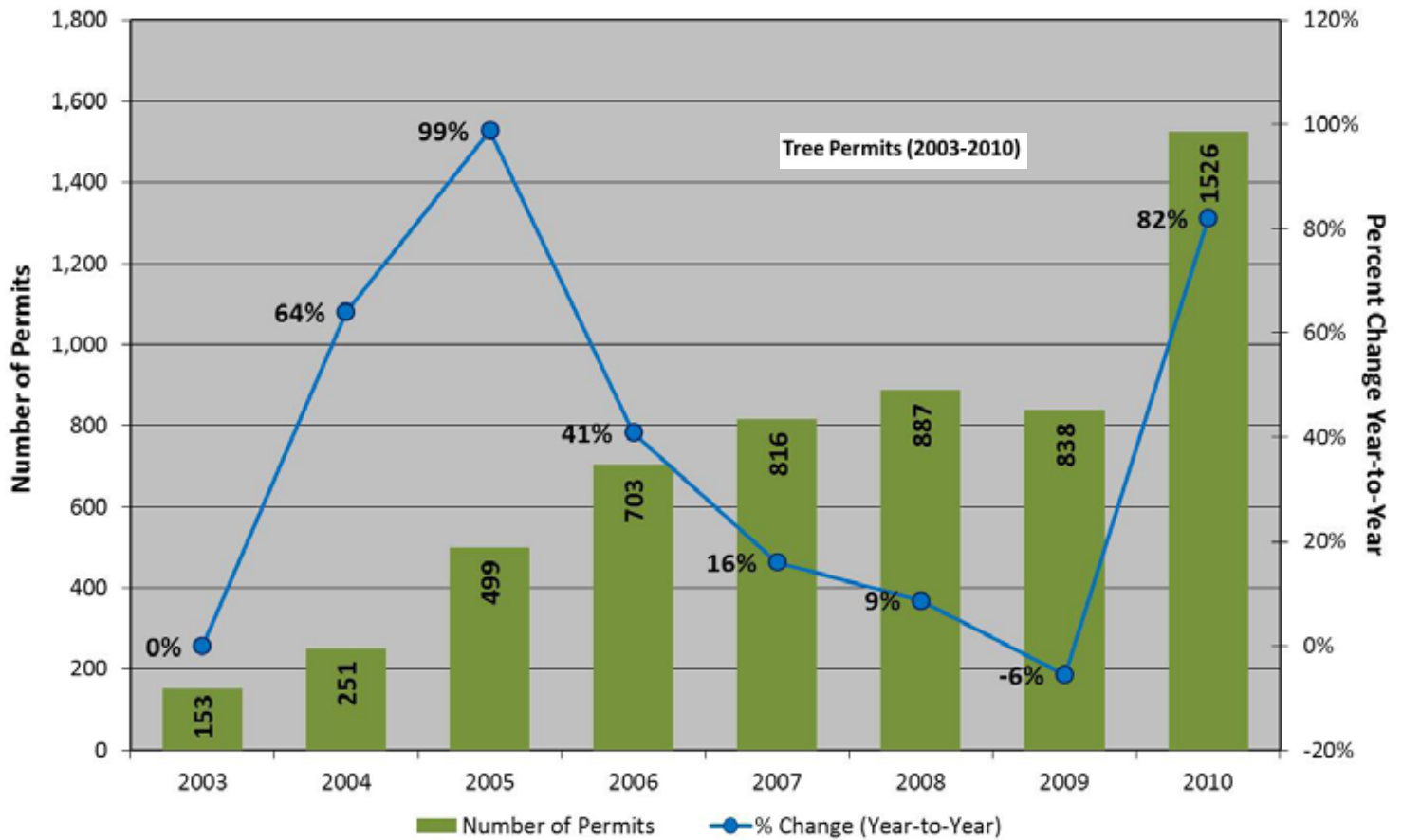


management strategies are needed to address these complex conditions. The health of Austin's forest is in large part a reflection of our ability to preserve individual trees and vegetation communities, restore or repair degraded lands, protect lands for their environmental services, encourage the removal of non-native, invasive species, and replant trees. Development activities provide both challenges and opportunities as trees are removed for construction and planted to fulfill landscape requirements and tree removal mitigation.

Tree preservation and removal is an ever-present challenge for City Arborist staff. The City Arborist Program continues to improve and expand data collection to have a better understanding of the regulated urban forest that, in turn, provides better data and better decision making. Increasing knowledge of permit requirements for the regulated community continues to be addressed. Numerous informational posters, a City of Austin Arborist Program website, and a recently produced tree permit video provide outreach to the regulated community. Active management and public education about oak wilt is an ongoing effort as well. Information about tree regulations, City Arborist programs, and the tree permit educational video can be found at: [www.austintexas.gov/trees/](http://www.austintexas.gov/trees/)



*Heritage Live Oak preserved in a proposed development.*



**Figure 1.** Number of tree permits received since 2003 and percent change from year-to-year.

### This Year

- In 2010 substantial tree-related changes were made to the City’s Environmental Criteria Manual (ECM). These changes were needed to revise outdated material and bring tree preservation requirements up-to-date. The new regulations provide a no impact zone in the ¼ critical root zone, reduce the allowable crown impacts from 30% to 25% of the live canopy, and significantly revise the preservation and mitigation species list (ECM Appendix F). All known trees native to the two ecoregions that occur in Austin are on the new list. This is a significant change because: (1) all native trees are mitigated equally; (2) 15 non-native, invasive species have been removed from the list; and (3) if a native tree is removed, then mitigation requirements must also be met with native species.
- City Council passed a resolution on invasive species management in April 2010. An interdepartmental task force was formed to implement the resolution and a comprehensive invasive species management plan is currently in development. To address invasive species issues, the City Arborist Program implemented rule changes that identify woody non-native, invasive species on development plans or tree permits and no longer require mitigation for removal of these trees.
- To help protect native species, the Urban Forestry Program in the Parks and Recreation Department created a rare tree nursery that includes nearly 300 Post Oak seedlings.

- An oak wilt trench was constructed in the Travis Heights community in 2010. The intent of this trench is to suppress the spread of oak wilt and preserve numerous heritage Live Oaks.
- The 2011 State of Austin’s Urban Forest Summit was an interdepartmental effort, working in conjunction with the Urban Forestry Board, Keep Austin Beautiful, and community partners. On January 21, eighty-five stakeholders participated in the 2011 Summit held at the Lady Bird Johnson Wildflower Center. The goal of the summit was to develop material that could be integrated into the forthcoming Imagine Austin Plan—the City of Austin’s new comprehensive plan. More information: [www.austintexas.gov/parks/forestrysummit.htm](http://www.austintexas.gov/parks/forestrysummit.htm).

### Status and Trends

Tree canopy coverage is a recognized measure of forest conditions. A tree canopy cover analysis completed by the Watershed Protection Department identified the distribution of tree canopy for the entire city. Notable findings included differences between canopy coverage in the city limits (34 percent) versus the extra-territorial jurisdiction (28 percent) as well as geographical differences across the city. For example, some northwest Austin neighborhoods had over 50 percent canopy coverage, while some far east Austin neighborhoods had around only 20 percent canopy coverage.



Urban forest canopy can also be analyzed by quality and diversity. Individual tree and forest community health seems to be degrading overall due to pressure from a number of impacts including increased impervious cover, soil degradation and compaction, introduction of exotic, invasive plants, lack of care, and drought. A similar trend exists with species diversity. Development activities, for example, remove trees that are unlikely to reach a protected diameter, such as Texas Persimmon and White Shin Oak, thereby reducing diversity in the urban forest. Diversity is further threatened as some native species less tolerant to impacts such as Post Oak are gradually replaced by competitors such as exotic, invasive Chinaberry.

There was an 82% increase in the number of tree permits received in 2010 over permits received in 2009. Overall, the number of permits received has risen significantly since 2003 (Figure 1). This is likely a response to multiple factors, including public knowledge of tree permits, enforcement, increased staff, and most recently the passage of the Heritage Tree Ordinance.

The greatest number of dead and diseased trees removed was between May and October (Figure 2). In addition to the physical stressors on trees in an urban environment, this elevation in diseased or dead trees is likely a result of drought conditions, though empirical data is not available to support this assertion. In 2010, 4,923.5 inches of trees were removed that required mitigation and 2,739 inches of mitigation were provided resulting in approximately a 56% mitigation rate of removed inches. Factors such as tree species and condition determine the mitigation rates. Through the urban forest replenishment fund as well as regulations, the City Arborist Program was responsible for purchasing 7,205 trees for other City departments' tree planting programs and requiring 21,270 caliper inches of trees to be planted as part of development.

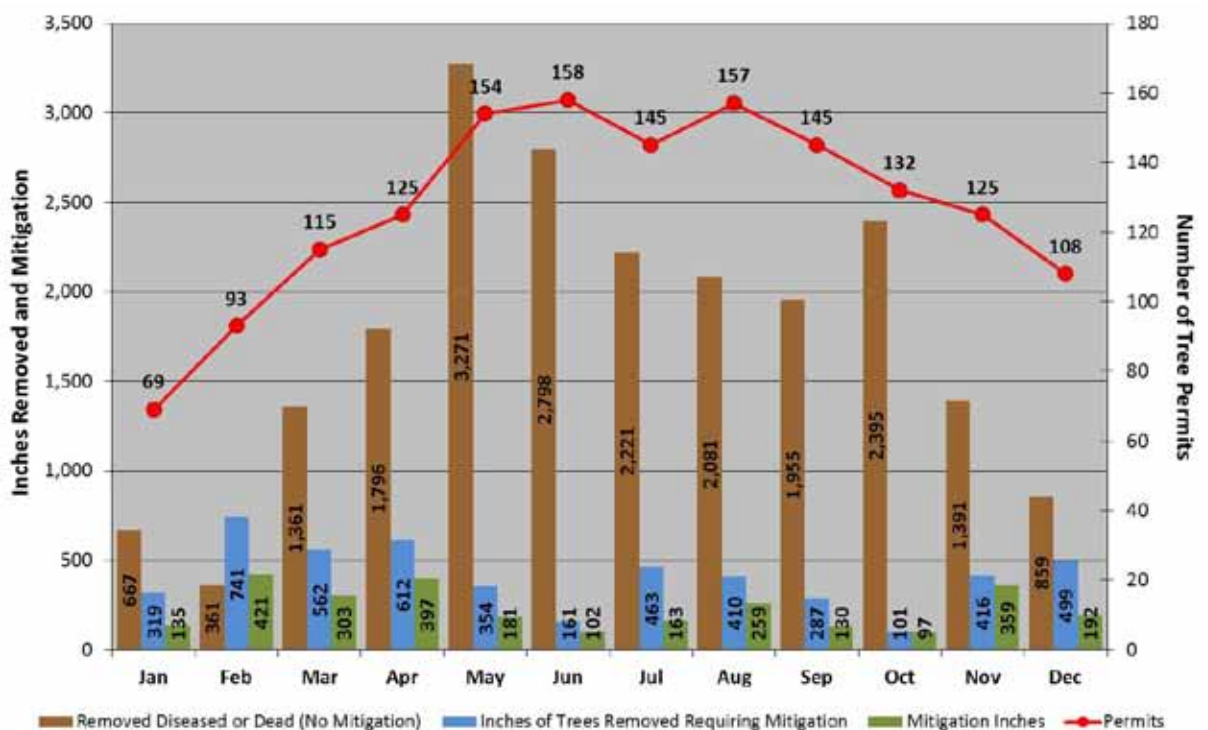
## Annual Focus

Age diversity of the urban forest is a topic that came to the forefront of public discussion with the passage of the Heritage Tree Ordinance by City Council in February 2010. This was the first significant change to the tree ordinance since its adoption in 1983. The Heritage Tree Ordinance provides additional code protection for certain species of trees greater than 24 inches in diameter. For heritage trees between 24 and 29 inches in diameter, specific administrative criteria are set forth for conditions in which removal is permitted. A City board and commission variance must be requested to remove a heritage tree that does not meet administrative criteria for approval. With the exception of dead or diseased trees, removal of a heritage tree with one stem greater than 30 inches necessitates a board and commission hearing and approval.

An undisturbed Live Oak-Ashe Juniper forest community is typically characterized by an age distribution skewed towards a large number of younger, smaller trees and a small number of older, larger trees that have survived the rigors of time, environmental stressors, and competition. As development replaces forest communities, the built environment stresses both individual trees and the remnants of the forest community. Observations suggest that the population of the largest and oldest trees (or Heritage Trees) may be lower than ideal, therefore protection and care efforts are a priority. Another example of putting this priority into practice is the Zilker Tree Rescue which provided comprehensive treatment for 92 of the most significant trees in the Polo Field area of Zilker Park and mulch and water to an additional 500 trees.

2010 Tree Permit Data

**Figure 2.** 2010 Tree Permit data including number of permits received, inches of diseased or dead trees removed, caliper inches of trees removed requiring mitigation, and mitigation inches provided.





# Open Space and Habitat



## Importance

Austin's population historically doubles every 20 years. This substantial growth is quickly reducing open space and habitat. The City of Austin's wildlands permanently protect open space and provide numerous benefits to the community including preserving endangered species habitat, conserving a native plant seedbank, protecting air quality, reducing radiant heat effects, preserving the natural and cultural heritage of the area, protecting water quality and quantity, sequestering carbon, and absorbing stormwater which reduces runoff and flooding.

## Goals

The Balcones Canyonlands Preserve (BCP) and Water Quality Protection Lands (WQPL) fall under Austin Water's Wildland Conservation Division. The BCP conserves habitat for eight endangered species and 27 species of concern. The WQPL manages lands to optimize the quantity and quality of water recharging the Barton Springs segment of the Edwards Aquifer.

## Challenges and Responses

### Ongoing

- Feral hogs damage riparian vegetation by trampling and rolling in moist soils, shallow creeks, and springs. A combination of trapping and lethal means is used to remove feral hogs on some of the Wildland properties. Over 150 feral hogs were removed by in-house and contract staff in 2010.
- Trespassing on the Wildlands is difficult to prevent. Fences are often used to deter trespassing and associated criminal activities. Fences also help prevent people

from accidentally straying onto a property during land management activities. Staff regularly patrols boundaries to monitor fence condition and encroachment activities.

- Invasive plants were shown to negatively impact 49% of endangered species in a 1998 study. Invasive plants also out-compete native plant species. Wildland staff and volunteers regularly map and remove invasive plants.
- Oak wilt is regularly monitored for on BCP properties. Where it is warranted and equipment access is possible, staff implement trenching. This strategy, though not 100% effective, is intended to disrupt root connections between diseased and healthy trees. More than 2,000 meters of oak wilt trenching was completed in 2010. More information: [www.austintexas.gov/water/wildland/downloads/annualbccpreportfy10.pdf](http://www.austintexas.gov/water/wildland/downloads/annualbccpreportfy10.pdf)
- Red imported fire ants displace native ants, attack ground-nesting birds, and have been documented consuming young Golden-cheeked warblers. They will also venture into caves where protected species live, potentially consuming those animals or consuming the food those cave species need to survive. Mounds found around cave entrances known to contain protected species are treated with boiling water.



**Spring 2009:** Native vegetation slowly returning after a prescribed burn.



**Spring 2010:** The successful results of a prescribed burn and reseeding efforts. Native grasses are abundant.

- White-tailed deer populations have grown beyond the habitat's carrying capacity on many Wildland properties. Lethal means are used to reduce the density of white-tailed deer. The WQPL Program successfully reduced the white-tailed deer population to levels within carrying capacity and as a result no deer culling occurred in 2010 on WQPL properties. A recent study conducted on Wildlands analyzes the effects of deer overabundance on avian species. More information: [www.austintexas.gov/water/wildland/downloads/appendix09-researchreport\\_sperry.pdf](http://www.austintexas.gov/water/wildland/downloads/appendix09-researchreport_sperry.pdf)
- The Brown-headed Cowbird is a year-round native bird species in Texas that is a brood parasite. Trapping of brown-headed cowbirds is conducted each spring by Wildland staff and volunteers on BCP properties.

*This Year*

- Access to the Wildlands is managed through guided educational activities, volunteer projects, and some public trails. The loss of both education and outreach staff resulted in a dramatic decline in public participation and access. 2010 saw a 54% decrease in volunteer hours and a 64% decline in the number of people reached by outreach and education activities. Volunteers play a key role by extending the abilities of staff to accomplish tasks.
- Five new karst features were located in a stretch of Onion Creek that is highly connected to Barton Springs. These karst features are being fitted with grates to protect continued recharge.
- A new undescribed species of Leptonetid spider was discovered as part of Wildlands karst monitoring.
- A project with Baylor University is underway to estimate stand ages, composition changes, and fire histories within the BCP's woodlands. The results of these analyses will be used to identify priority woodlands for the Golden-cheeked warbler and potential management areas for the Black-capped vireo.

**Status and Trends**

The Water Quality Protection Lands (WQPL) Program manages 25,907 acres. In 2010, the City partnered with Hays County, the Natural Resources Conservation Service, the Hill Country Conservancy, and the Dahlstrom family to purchase a conservation easement on the 2,254-acre Dahlstrom Ranch. The Dahlstrom Ranch, located along Onion Creek, encompasses more than 4% of the entire Barton Springs recharge zone. With that acquisition, the WQPL Program now protects more than 24% of the recharge zone and 6% of the contributing zone for the Barton Springs segment of the Edwards Aquifer. With additional open space provided by the BCP and City parkland, over 30% of the Barton Springs recharge zone is permanently protected.

The status of ongoing land management strategies on the WQPL are as follows:

- The WQPL Program completed Ashe juniper thinning on more than 340 acres within the recharge zone, plus an additional 105 acres of mixed brush clearing.
- Prescribed burning was conducted on a total of 1,560 acres. Approximately 120 acres were over-seeded with native seed to help restore native grasses on areas treated with prescribed fire.

The Balcones Canyonlands Preserve (BCP) Program manages 11,726 acres. The BCP Program also jointly manages several properties with the Parks and Recreation Department, which increases the City's BCP-managed acreage to more than 13,500 acres. In 2010, the City worked with the Nature Conservancy to add 14 key acres to the Barton Creek Wilderness Park, purchasing a gap within the park that was slated for extensive commercial development in close proximity to Twin Falls and Sculpture Falls.

Trends in species found on the BCP include the following:

- Cave cricket populations in several caves appear to be in decline. Cave cricket counts at Lakeline Cave declined from 2,600 in 1993 to 0 in 2007. City of Austin

Site Name	Full Territories	Full Territories Producing > 1 Young	Breeding Success	Fledglings Observed
Barton Creek	2	2	1	8
Emma Long	10	5	0.5	8
Forest Ridge	10	7	0.7	13
Ivanhoe	11	9	0.82	20
3M/St. Edwards	13	13	1	33

**Table 1.** 2009 Golden-cheeked warbler reproductive success.



and Travis County staff are continuing to conduct cave cricket surveys and analyzing landscape changes to better understand the underlying cause(s) and identify possible measures to reverse the negative trend. More information: [www.austintexas.gov/water/wildland/downloads/appendixg-balconescanyonlandspre-servekarstmonitoring.pdf](http://www.austintexas.gov/water/wildland/downloads/appendixg-balconescanyonlandspre-servekarstmonitoring.pdf)

- Highlights from Black-capped vireo monitoring include continued occupation of the Cortaña/River Place and Forest Ridge tracts; implementation of habitat restoration and management on approximately 50 acres of the Vireo Research Area, including a pilot prescribed burn on seven acres; and preparation of 11 acres on Cortaña for a prescribed burn.

### Annual Focus

A shift in Golden-cheeked warbler monitoring occurred in 2009 to include the color banding of individual Golden-cheeked warblers. Previous surveys identified if Golden-cheeked warblers occupied an area but did not provide the specifics about the total number of birds, density, productivity, how survival varies with habitat features, and

how various management scenarios influence population viability. A total of 95 warblers were banded in 2010, including 91 males, three females, and one hatch year. In addition, volunteers searched for color-banded warblers. Over 45 percent of warbler males banded in 2009 returned in 2010. All three of the females banded in 2009 were observed in 2010. Golden-cheeked warblers exhibit high site fidelity, often returning to or near the same territory they occupied the previous year. The Bull Creek macrosite supported the highest territory densities and produced the greatest number of fledglings (Table 1, previous page), consistent with findings that the warbler requires large patches of mature, closed-canopy Ashe juniper-oak woodlands with minimal internal disturbance. Territory densities at the Emma Long Metropolitan Park in the North Lake Austin macrosite appear to have declined since a previous study conducted in 2002-2003, suggesting that habitat fragmentation and/or concentrated, intensive recreational uses from mountain biking and motorized dirt bikes may be negatively impacting the endangered Golden-cheeked warbler.

More information: [www.austintexas.gov/water/wildland/downloads/appendixfgoldencheekedwarbler.pdf](http://www.austintexas.gov/water/wildland/downloads/appendixfgoldencheekedwarbler.pdf)



*Golden-cheeked warbler*



*Color bands placed on a Golden-cheeked warbler*

# Air Quality



## Importance

The primary air quality concern in Austin is ground-level ozone, the main component of smog. Unhealthy levels of ozone can lead to increased incidence of respiratory ailments, especially in sensitive populations such as young children, the elderly, and asthma sufferers. This in turn leads to more lost school and work days in the region. Elevated levels of ozone can also damage vegetation.

## Goals

The City's goal is to promote healthy outdoor air for all citizens. The Air Quality programs address the City's impact on air quality and are active in regional efforts to improve air quality throughout Central Texas.

## Challenges and Responses

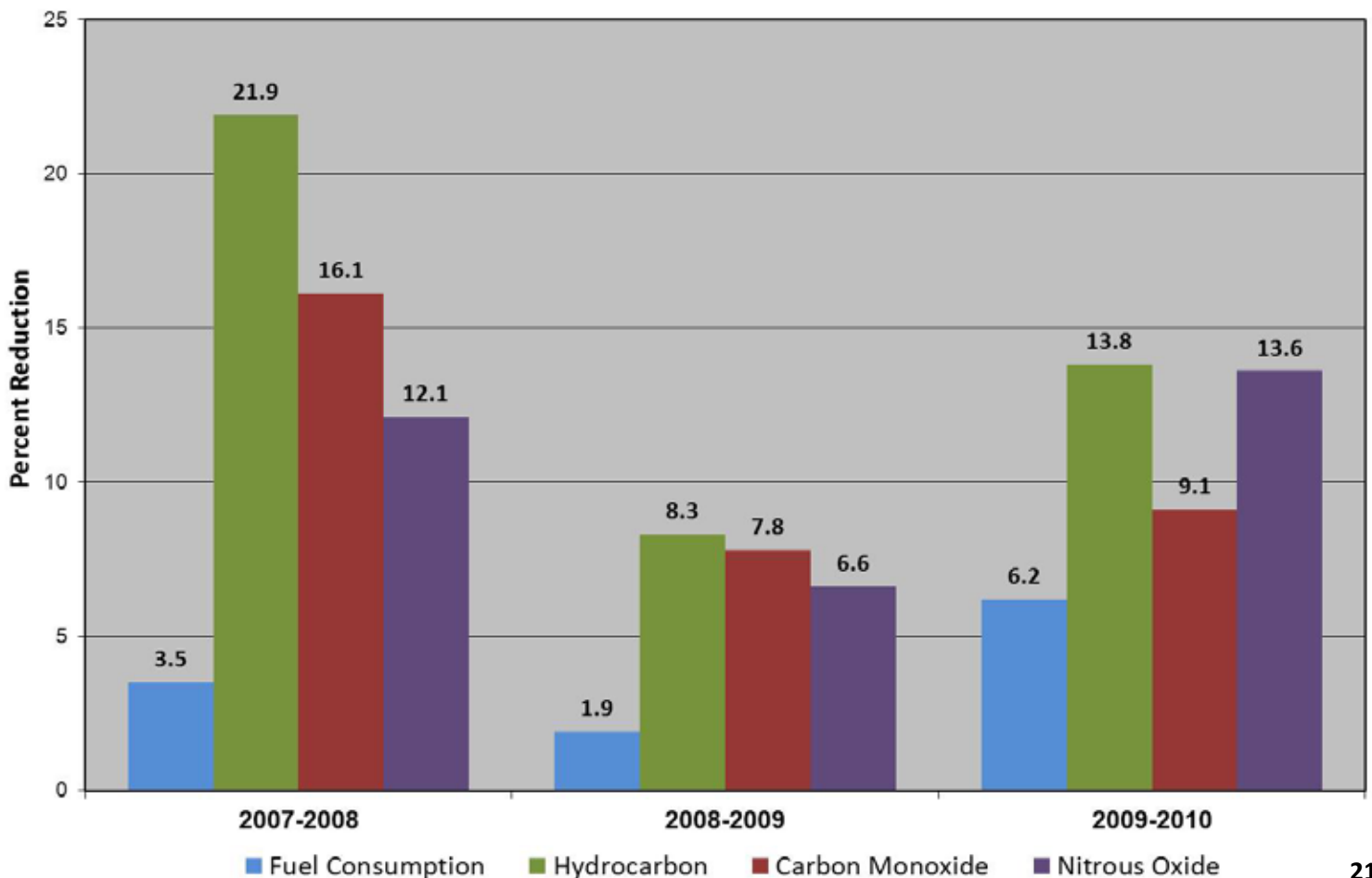
### Ongoing

The Austin region ended the 2010 ozone season in attainment of the existing Federal health-based ozone standard, with an ozone design value of 74 parts per billion (ppb). The design value is a statistic that reflects the region's average ozone level and is compared to the health-based

standard to determine attainment status. Research suggests that most high ozone is imported to Austin from upwind areas, meaning most of the sources that cause high ozone are beyond local control. In addition, the growing Austin-area population and associated sources of local emissions challenge the region's ability to reduce ozone-forming emissions (Figure 3, next page).

In January 2010, the Environmental Protection Agency proposed to revise the health-based standard to within a range of 60 to 70 ppb. Using 2011 monitoring data to date, Austin's current design value is above 70 ppb, meaning Austin would be monitoring non-attainment relative to the proposed revision.

**Figure 1.** Yearly reduction in consumption and emissions resulting from traffic signal re-timing.







## Design Value Trend for Austin-Round Rock MSA (1999-2010)



**Figure 2.** Austin area ozone trends 1999-2010.<sup>2</sup> The graph shows the annual design value since 1999 for the Austin-Round Rock Metropolitan Statistical Area (MSA). The downward trend is believed to be attributed to cleaner sources such as cars and trucks, both in Austin and in upwind areas. However, increases in the number of local sources associated with a growing population also lead to increases in emissions. The figure also shows the ozone standards finalized in 1997 and 2008 and the range in which the EPA is expected to set a revised standard. The MSA will probably violate a value in this range, meaning the Austin air will be considered unhealthy.

### This Year

The City of Austin has committed to implement several measures to reduce ozone-forming emissions:

- The 8-Hour O<sub>3</sub> Flex Plan, the latest in a series of regional initiatives supported by the City of Austin, is a voluntary agreement between the Texas Commission on Environmental Quality, the Environmental Protection Agency, and local governments within the Austin-Round Rock Metropolitan Statistical Area (MSA) that allows local governments to implement measures to reduce ozone emissions in order to maintain compliance with the 1997 ozone National Ambient Air Quality Standards. Voluntary initiatives such as those outlined in the 8-Hour O<sub>3</sub> Flex have allowed the region to address ozone problems proactively rather than wait to address them through the prescribed Federal nonattainment process. More information: [www.capcog.org/documents/airquality/reports/8o3flex/Austin-RoundRock8-HourOzoneFlex.pdf](http://www.capcog.org/documents/airquality/reports/8o3flex/Austin-RoundRock8-HourOzoneFlex.pdf)
- The City of Austin is committed to improving the quality of life for residents of Austin by reducing the negative environmental impacts associated with the Urban Heat Island effect. Public education and proactive City programs that address these impacts are key in the challenge to cool Austin. More information: [www.austintexas.gov/urbanheatisland](http://www.austintexas.gov/urbanheatisland)
- Recognizing the regional nature of air quality, the City of Austin takes an active role in area initiatives:
  - Clean Air Coalition [www.capcog.org/divisions/regional-services/clean-air-coalition](http://www.capcog.org/divisions/regional-services/clean-air-coalition)
  - Clean Air Force of Central Texas [www.cleanairforce.org](http://www.cleanairforce.org)
  - Commute Solutions Coalition [www.commutesolutions.com](http://www.commutesolutions.com)
- The City of Austin hosts Central Texas Clean Cities, a volunteer coalition convened by the U.S. Department of Energy. Its mission is to support local decisions to adopt practices that contribute to the reduction of petroleum consumption—often through the promotion of alternative fuel vehicles—and to encourage development of alternative fueling infrastructure to reduce consumption of foreign oil and to lower emissions. More information: [www.austintexas.gov/cleancities](http://www.austintexas.gov/cleancities)

<sup>1</sup> Conceptual Model for Ozone for the Austin Area, The University of Texas at Austin, July 2010.

<sup>2</sup> Capital Area Council of Governments (CAPCOG)

[www.capcog.org/documents/airquality/cac/2011\\_01/1999-2010%20Design%20Value%20Trend.pdf](http://www.capcog.org/documents/airquality/cac/2011_01/1999-2010%20Design%20Value%20Trend.pdf)

- Austin Energy monitored weather and ozone forecasts daily throughout the 2010 ozone season and looked for opportunities to reduce oxides of nitrogen (NOx) emissions from its local power plants on days when elevated ozone was expected.
- Vehicle emissions can increase when traffic encounters stops and delays along roadways. The City's Traffic Signal Office re-times at least a third of its signal system every year to reduce travel times and delays, and calculates the resulting estimated annual reductions in emissions (Figure 1, previous page).

### Status and Trends

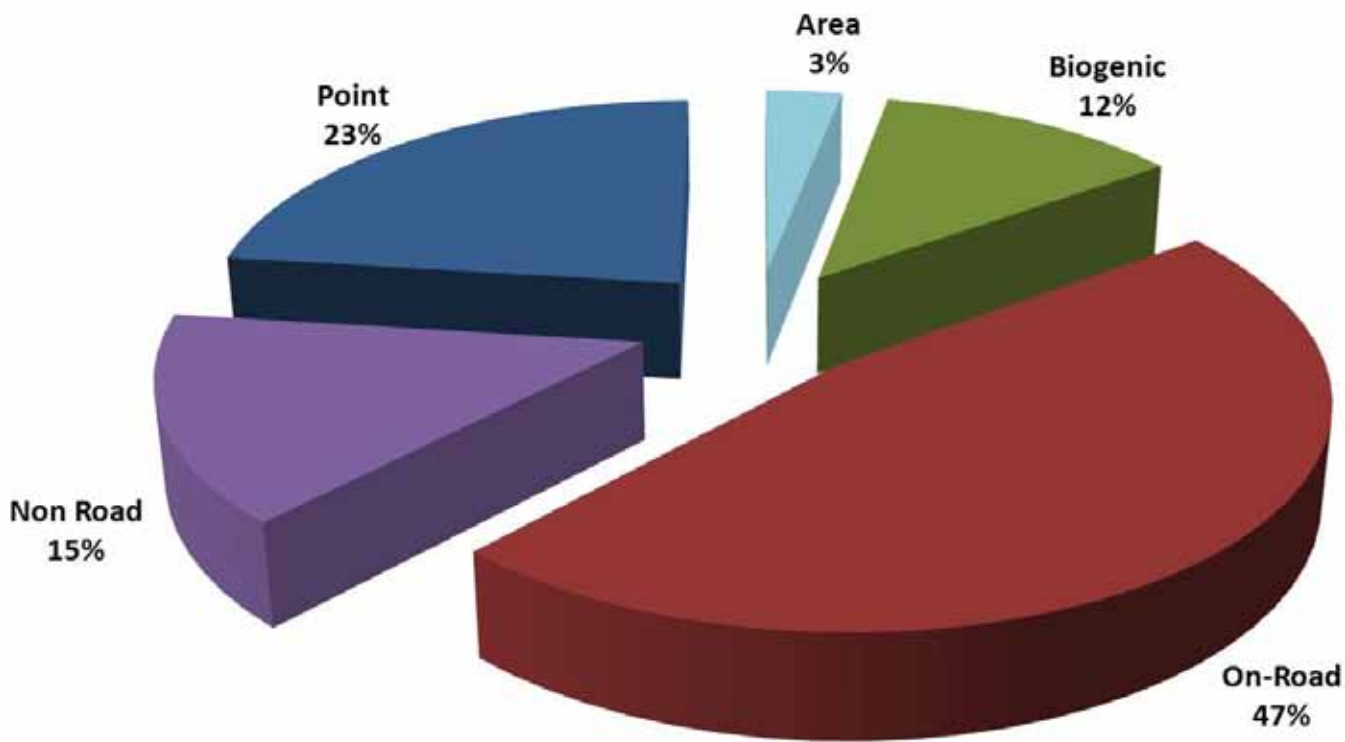
Austin-area average ozone levels have been decreasing for more than a decade (Figure 2). Austin's ozone season runs from April through October. High ozone levels historically occurred most frequently between August and September, with a secondary period of frequent high ozone days between May and June. In recent years the frequency of high ozone days in a given year has both decreased and become equally distributed between the May-June and August-September periods.<sup>1</sup>

Central Texas has a history of proactive air quality initiatives. The City of Austin will continue to: support regional partners in reducing ozone precursor emissions; review and comment on new EPA ozone standards; and evaluate existing and new measures.

### Annual Focus

Efforts undertaken by the City of Austin and local stakeholders to push for the region to maximize ozone-reducing activities last ozone season were successful in aiding the area to establish a design value in attainment of the 2008 standard. The City has again committed to undertake extra efforts during the next ozone season with an eye toward minimizing high ozone values sufficient to keep the area design value within the lowest non-attainment classification, labeled marginal. Outreach and education continue to play an important role in raising the level of awareness for air quality issues. To succeed, these efforts will need a strong response from citizens and regional partners as well as favorable weather conditions.

**Figure 3.** Austin-Round Rock MSA emissions inventory pie chart. Combined mobile source emissions account for nearly 50% of ozone precursors in Central Texas. The on-road mobile category comprises the vehicles (e.g., cars, trucks, buses) traveling the regional roads and highways. Non-road mobile sources account for the emissions of mobile equipment operated in areas other than public thoroughfares. The non-road category includes farm vehicles, lawn and garden equipment, construction, mining, and industrial equipment, railroad locomotives, aircrafts, and others. Data Sources: On-Road Mobile—TTI, Point Source—TCEQ 2006 EI, Non-Road Mobile—NMIM.







2010