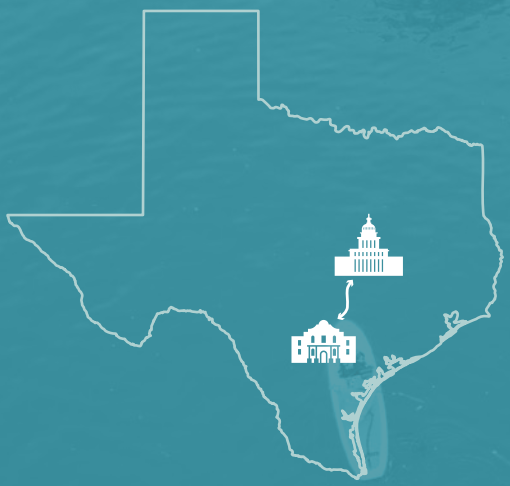
The ECONOMIC BENEFITS *of the* GREAT SPRINGS TRAIL

from the Alamo to the Capitol

great springs PROJECT

alta

THE HEART *of* TEXAS



Great Springs Project envisions a national park-scale corridor of protected lands between the densely urban areas of Austin and San Antonio over the Edwards Aquifer recharge and contributing zones.

Great Springs Project (GSP) envisions a national park-scale corridor of protected lands between the densely urban areas of Austin and San Antonio over the Edwards Aquifer recharge and contributing zones. This green corridor will be connected by a network of trails, linking four of Texas' Great Springs: Barton Springs, San Marcos Springs, Comal Springs, and San Antonio Springs. To realize this vision, GSP is unifying existing local efforts to address the most critical water, land, wildlife, and public health challenges facing the Central Texas region.

GSP's mission to protect and connect Texas' beautiful natural surroundings is underpinned by the requirement of equity and inclusion in access to this beauty. An important aspect of this work is an Equity Framework, developed by GSP's Equity Task Force early in the trail visioning and planning process, to advance an equitable approach and outcomes for the trail, including equal access to the many benefits of the trail.

The GSP Economic Benefits Report identifies the key benefits of such efforts, organized by the topic areas outlined below.

To learn more about the Equity Framework and GSP's work overall, please visit GreatSpringsProject.org.

The proposed location of the GSP trail will be determined in coordination with local communities, and is the focus of the GSP Trails Plan, concluding in late 2021.

This report uses a best estimate of the location based on connecting the four main springs, existing trails, and local trail plans, extending about 100 miles from Austin to San Antonio. When including potential spur trails, that number grows to over 170 miles, which are taken into account in this report.

In total, it is estimated that communities from Austin to San Antonio will experience the following benefits per year with the completed Great Springs Trail.

$55,920,000

TOTAL ANNUAL BENEFITS

ECONOMIC	$23,370,000
LAND & WATER	$19,240,000
TRANSPORTATION	$11,440,000
HEALTH	$1,870,000

ESTIMATED ANNUAL BENEFITS

$23,370,000
ECONOMIC BENEFITS

$1,870,000
HEALTH BENEFITS

$11,440,000
TRANSPORTATION BENEFITS

$19,240,000
LAND & WATER BENEFITS

Factors such as flood damage and loss of open space are outlined later in this report in terms of their costs and challenges to the region, rather than in terms of annual benefits.

Estimated daily use:

5,500
WALKERS & RUNNERS

4,800
BICYCLISTS

Introduction

This report contains an economic and health impact analysis of the proposed Great Springs Trail in Travis, Hays, Comal, and Bexar counties of Texas. The analysis estimated the number of bicycle and pedestrian trips that might take place on the proposed trail system; approximated the corresponding reduction in vehicle trips and vehicle miles traveled (VMT); assessed the potential benefits that might accrue if the entire proposed trail system was constructed; and assessed the potential ecosystem services benefits associated with land conservation adjacent to the trail corridor.

For the purpose of this report, the proposed trail system would connect Barton Springs, San Marcos Springs, Comal Springs, and San Antonio Springs (totaling 177 miles with parallel routing alternatives in Hays and Comal counties). In total, it was estimated that the completed trail system and association land conservation could generate **$55,920,000 in benefits.**

DEMAND

To understand the potential demand for the proposed trail system, count data from Austin and San Antonio was supplemented with data from similar trails in Alabama, Arkansas, North Carolina, South Carolina, Tennessee, Virginia, and other parts of Texas. If the proposed trail system experienced the same number of bicyclists per mile as the average of the comparable trails (by land use), there would be an estimated 4,800 bicyclists per day. If the proposed trail system experienced the same number of pedestrians per mile as the average of the comparable trails, there would be an estimated 5,500 pedestrians per day.

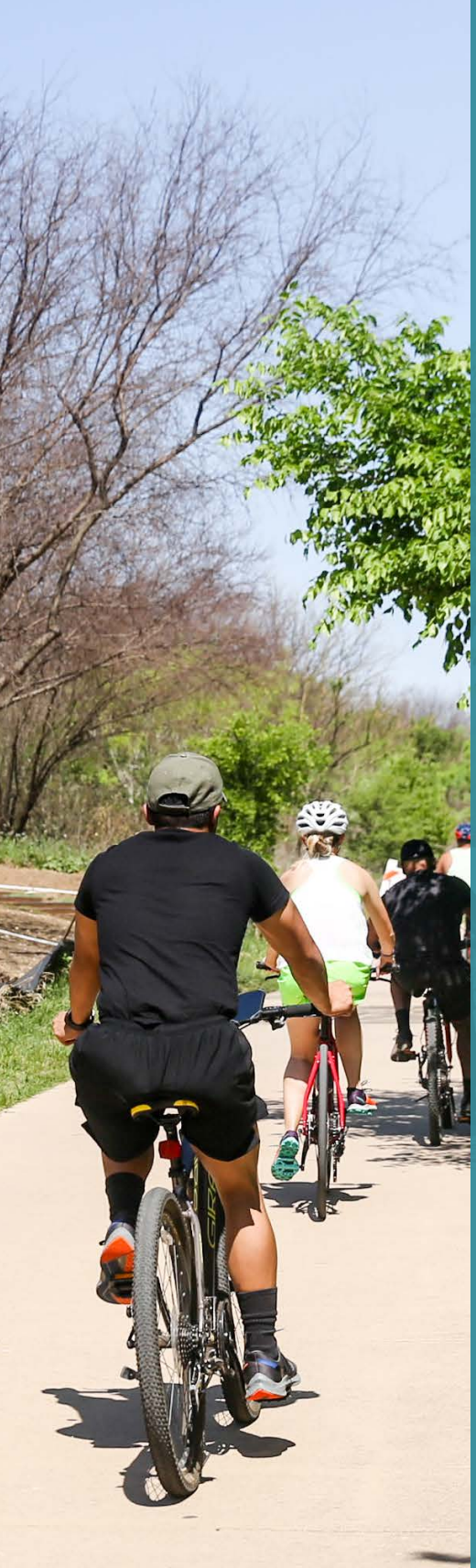


Photo: Jennifer M. Ramos

Methods

This impact analysis utilizes a standard methodology for calculating economic, environmental, transportation, and health benefits. All projections are based on trail usage estimates and survey results from similar trail systems in Texas and throughout the southeastern United States. These estimates are then extrapolated through the use of various multipliers derived from national studies and quantified in terms of monetary value where appropriate.

LIMITS OF THE ANALYSIS

The primary purpose of the analysis is to enable a more informed policy discussion on the benefits of investing in the proposed Great Springs Project. Even with extensive primary and secondary research incorporated into the impact analysis model, it is impossible to accurately predict the exact impacts of various factors. Accordingly, all estimated benefit values are rounded and should be considered order of magnitude estimates, rather than exact amounts.

Additionally, carbon estimates are not intended to be interpreted as an emissions audit that can be used in emission trading programs; they are based on the region's overall land cover, and carbon values will vary depending on the land cover of the actual locations to be conserved.

$

ECONOMIC BENEFITS

The average expenditures of groups of trail users on comparable trails:

$64
for FOOD/MEALS

$60
at RETAIL ESTABLISHMENTS

$31
for ENTERTAINMENT

$52
for BICYCLE RENTAL

$93
for LODGING

Once the majority of the trail system is complete and regionally connected, people using it are likely to spend money on food, retail, entertainment, and sometimes lodging.

The average percent of trail users that were not from the surrounding area was 33 percent among comparable trails. If the proposed trail experienced the same percent of non-local users as the comparables, then an estimated 1.1 million non-local users would use the proposed trail each year.

The average expenditures of groups of trail users on comparable trails are listed at left. If the estimated 1.1 million non-local trail users purchased goods at the same rate as comparable trails and there is an average of four people per group, then the proposed trail system would contribute to an estimated $8,910,000 in annual food/meal spending, $2,260,000 in annual retail spending, $720,000 in annual entertainment spending, $150,000 in annual bicycle rental spending, and $11,330,000 in annual lodging spending (assumes only 42 percent of the non-local trail users stay overnight in a hotel), for a total of $23,370,000 in estimated annual trail-related spending from non-local trail users (excludes transportation spending).

This section only includes direct economic benefits of the trail system. There are also indirect economic benefits, as trail-related spending from non-local users is expected to circulate through the economy, providing a multiplier effect. Additional related economic benefits could include those related to trail construction and maintenance jobs, and jobs related to recreation, food service, retail, entertainment, and lodging.

The completed Great Springs Trail will result in direct annual economic benefits from non-local trail users, particularly benefiting those in the tourism and service industries.

FOOD/MEALS
$8,910,000

RETAIL
$2,260,000

ENTERTAINMENT
$720,000

BICYCLE RENTAL
$150,000

LODGING
$11,330,000
(assumes 42% of non-local trail users stay overnight in a hotel)

$23,370,000 TOTAL ECONOMIC BENEFITS

LAND & WATER BENEFITS

Conservation Goal:

50,000

ACRES BY 2036, PROVIDING BENEFITS FOR LAND, WATER, & FLOOD PROTECTION

Water may be Texas' most vital resource and land conservation over the aquifer is critical to its protection. GSP aims to conserve 50,000 acres of land by the Texas Bicentennial in 2036, protecting the life sustaining waters in the Edwards Aquifer Recharge Zone. This will not only help protect the springs along the trail, but will also provide ecosystem benefits to people throughout the region for:

- Water Quality
- Water Supply
- Flood Mitigation
- Stormwater Management
- Pollination and Wildlife Habitat
- Agritourism and Agricultural Commodities
- Preservation of Farms, Ranches, and Forestlands
- Carbon Sequestration

The potential ecosystem services benefits can be measured by first assessing the various types of land in the Recharge Zone, all of which provide different ranges of benefits. According to USGS Land Cover Classifications data, the study area is predominantly evergreen forest and pasture/hay, followed by deciduous forest, grasses, and urban lands. Assuming the conserved land would have a similar composition to the study area as a whole, we applied land values per acre and land cover type, based on land cover values from studies developed in Texas[1] and the southeastern US.[2] Our final estimate of annual ecosystem service benefits based on this approach is $18.1 million.

Additional benefits from GSP's land and water conservation goals may include other ecosystem services, such as photosynthesis, genetic diversity, heat mitigation, soil formation, medicinal plants, biofuels, nutrient cycling, aesthetic values, and spiritual enrichment.

1 Texas A&M Natural Resource Institute, Texas Land Trust Council, and the Texas Water Resources Institute (2020). Texas Farm and Ranch Lands Conservation Program: 2020 Evaluation Report.

2 Paul, A. (2011). The Economic Benefits of Natural Goods and Services: A Report for the Piedmont Environmental Council.

GSP's conservation efforts will protect water quality, water supply, wildlife habitat, and preservation of working lands, while protecting people and property from flood damage.

WATER QUALITY & WATER SUPPLY

WILDLIFE HABITAT & POLLINATION

FARMS, RANCHES, & MANAGED FORESTLANDS

$18.1 MILLION

IN ESTIMATED LAND AND WATER CONSERVATION BENEFITS

$1.1 MILLION

IN ESTIMATED ANNUAL CARBON SEQUESTRATION BENEFITS

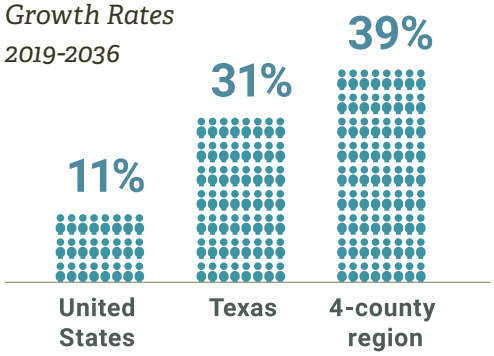
(SEE PAGES 14-15)

Protecting the Edwards Aquifer Recharge Zone

The GSP study area lies between Austin and San Antonio, along the Edwards Aquifer Recharge Zone. This is one of the most productive aquifers in the United States, characterized by the presence of sinkholes, sinking streams, caves, large springs and highly productive water wells.[1]

The GSP goal to protect the aquifer in this region faces many challenges, particularly the fast pace of population growth and development. For example, between now and 2036, the population of **Texas will grow at three times the rate of the U.S. and the four-county region is expected to grow nearly four times as fast** (below).[2, 3, 4] Furthermore, past development patterns suggest that finding balance between conservation and development will continue to be a challenge, adding urgency to the GSP mission (right).

Projected Population Growth Rates
2019-2036



1 Edwards Aquifer Authority. 2021. About the Edwards Aquifer. https://www.edwardsaquifer.org/science-maps/about-the-edwards-aquifer/

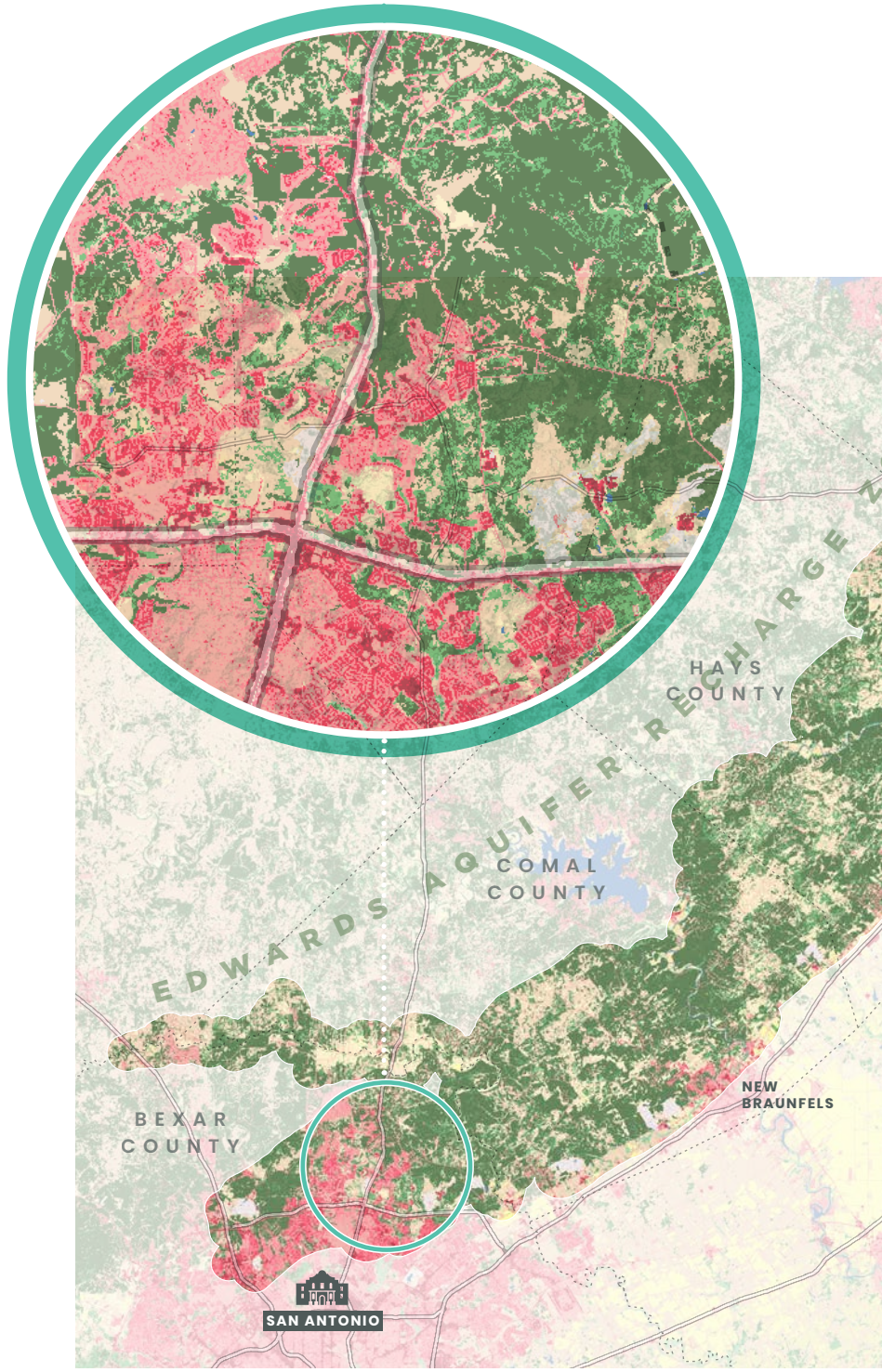
2 U.S. Census Bureau, Population Division; https://www.census.gov/data/tables/time-series/demo/popest/intercensal-2000-2010-counties.html

3 Texas Demographic Center https://demographics.texas.gov/data/tpepp/projections/

4 US Census, Projected Population Size and Births, Deaths, and Migration; Projections for the United States: 2017-2060

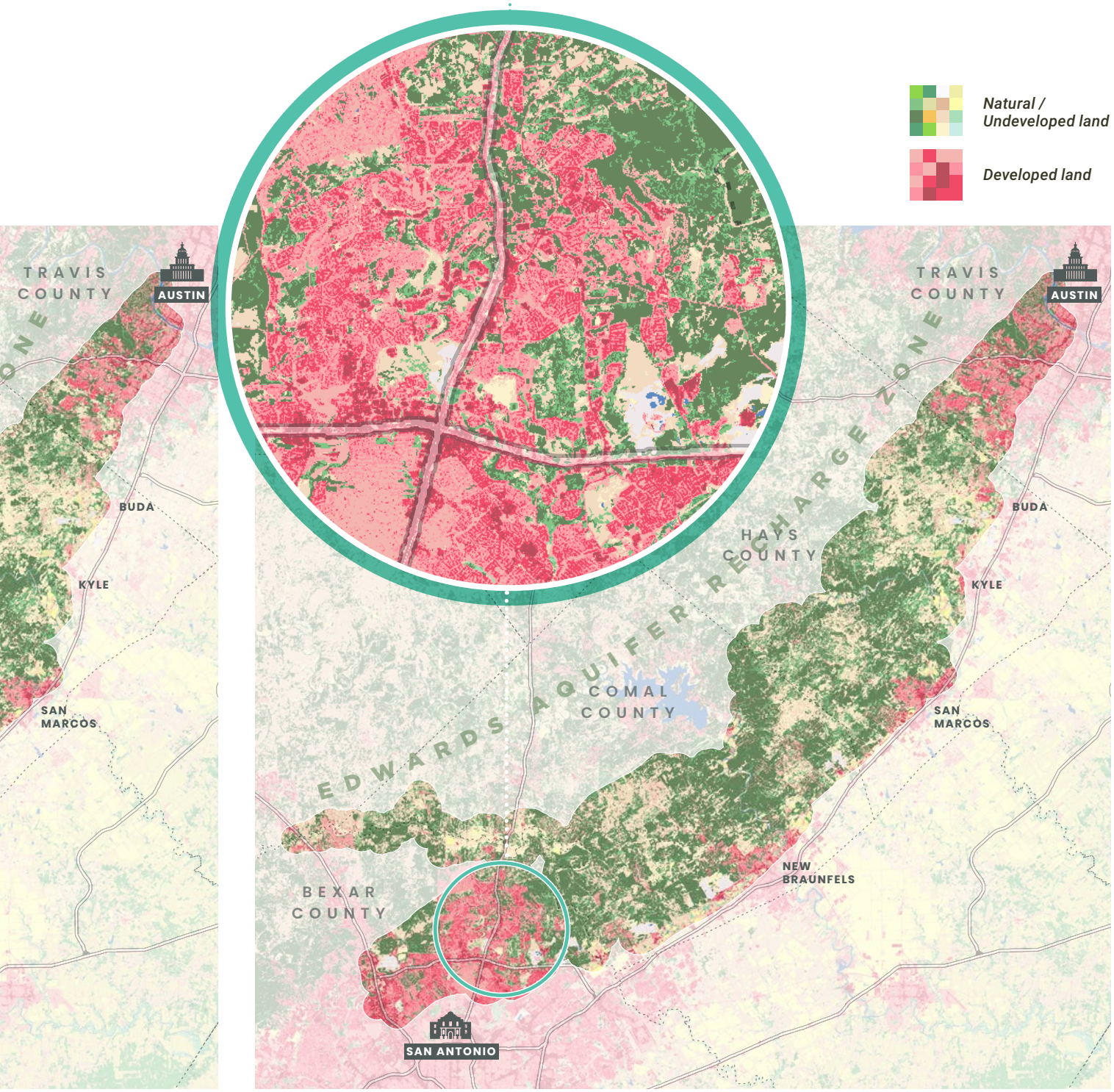
5 The U.S. Geological Survey; Date range selected based on the earliest comprehensive landcover data available (2001), and the most recent (2016).

From 2001 to 2016, one of the biggest changes from natural to developed land in the region was north of Loop 1604 in San Antonio, shown here.[5]



2001 *Developed Land over the Edwards Aquifer Recharge Zone between Austin and San Antonio, with a 1-mile buffer.*

During this 15-year period, the GSP study area lost 23,500 acres of natural land. For context, that's about 18,000 football fields of development added between Austin and San Antonio.



2016 *Developed Land over the Edwards Aquifer Recharge Zone between Austin and San Antonio, with a 1-mile buffer.*

Estimated carbon sequestration associated with 50,000 acres of land conservation in the GSP study area:

823,000
METRIC TONS
OF STORED CARBON

20,000
METRIC TONS OF
CARBON SEQUESTERED
ANNUALLY (FLUX)

Carbon Sequestration Benefits

Carbon is naturally stored in the Earth's atmosphere, oceans, soils, and vegetation (sometimes referred to as different "stores" of carbon). The imbalance of increased carbon in the atmosphere contributes to climate change, with related social costs that are experienced globally, either directly through changing weather patterns, or indirectly through changes in water, air, food, ecosystems, livelihoods, and infrastructure.

Carbon moving from one store (like the atmosphere) into another store (like trees, via photosynthesis) is referred to as carbon flux. Measuring carbon sequestration as a benefit of land conservation takes into account both the annual flux of carbon into the landscape, as well as the overall benefit provided by storing carbon in the natural landscape over long periods of time. Because natural areas absorb and store more carbon than developed areas (shopping centers, highways, and homes), the growth of our cities results in a net release of carbon into the atmosphere.

The carbon sequestration benefits within the GSP study area were estimated by first examining what the region offers in terms of forests, grasslands, and other natural areas, all of which absorb and store carbon at different rates. Assuming the land cover composition of the 50,000 acres to be conserved is roughly proportional to the study area as a whole, we applied per-acre estimates of carbon storage and fluxes by land type, derived from U.S. Geological Survey Professional Paper 1787.[1] The key finding is that approximately 823,000 metric tons of CO2 would be released if 50,000 acres within the study area were developed. Additionally, if we account for carbon flux changes if the land was developed, we find that there would be a reduction in CO2 sequestration in the range of 20,000 metrics tons per year.

The social cost of these metric tons of CO2 was quantified using the EPA's social cost of carbon[2] for 2020, which finds that each metric ton of carbon costs $55, resulting in carbon storage benefits of **$45 million,** and flux benefits of **$1.1 million annually**.

Reduced Travel Emissions Benefits

The more commonly known release of carbon into the atmosphere is from automobiles. We estimate a reduction of 5,400 metric tons of CO2 emissions, plus 23 metric tons of other emissions, based on the increased number of walking and bicycling trips associated with the trail (as outlined in other sections of this report). This translates to a total vehicle emission cost savings of **$420,000.**

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1 Zhu, Zhiliang, ed., Bouchard, Michelle, Butman, David, Hawbaker, Todd, Li, Zhengpeng, Liu, Jinxun, Liu, Shuguang, McDonald, Cory, Reker, Ryan, Sayler, Kristi, Sleeter, Benjamin, Sohl, Terry, Stackpoole, Sarah, Wein, Anne, and Zhu, Zhiliang, 2011, Baseline and projected future carbon storage and greenhouse-gas fluxes in the Great Plains region of the United States: U.S. Geological Survey Professional Paper 1787, 28 p. (Also available at http://pubs.usgs.gov/pp/1787.)

2 EPA. Social Cost of Carbon Fact Sheet. 2016. (Also available at https://www.epa.gov/sites/production/files/2016-12/documents/social_cost_of_carbon_fact_sheet.pdf)

$45 MILLION

ESTIMATED ONE-TIME CARBON STORAGE BENEFIT RELATIVE TO DEVELOPED LAND

$1.1 MILLION

ESTIMATED ANNUAL CARBON SEQUESTRATION BENEFITS RELATIVE TO DEVELOPED LAND
(CALCULATED IN LAND AND WATER BENEFITS, PAGE 11)

5,400

METRIC TONS OF CO2 VEHICLE EMISSIONS REDUCED [3]

$420,000

TOTAL VEHICLE EMISSION COSTS REDUCED [4]
(CALCULATED IN TRANSPORTATION BENEFITS , PAGE 19)

3 Average Annual Emissions and Fuel Consumption for Gasoline-Fueled Passenger Cars and Light Trucks (EPA)

4 GHG Equivalencies Calculator (EPA)

Photo: Jennifer M. Ramos

FLOOD PROTECTION BENEFITS

1 in 10

TEXANS IS EXPOSED TO MODERATE OR HIGH RISK RIVERINE FLOODING EACH YEAR[2]

CONSERVATION AS NATURAL FLOOD INFRASTRUCTURE

Protecting people and property from catastrophic flooding is especially critical in this region of Texas. For example, the 2015 flood alone required the City of San Marcos to seek **$50 million** in federal funding for flood mitigation.[1] In fact, roughly **one in every 10 Texans is exposed to moderate or high risk of riverine flooding each year**, and anticipated statewide flood mitigation costs over the next 10 years are estimated to be **more than $31.5 billion.**[2]

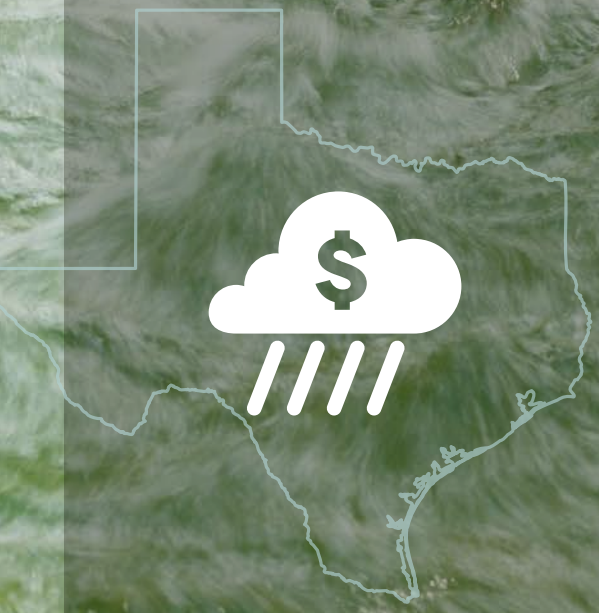
Using land conservation as a form of natural infrastructure can effectively reduce such impacts.[3] The primary benefits of this approach are rainfall interception, increased soil infiltration, water uptake, water storage and the delay of peak flows, all of which reduce the quantity of water requiring management. Surface attenuation is a key benefit of open spaces and it has been shown that trees and pastureland can decrease peak flows by up to 60%.

1 Hays County Parks & Open Space Advisory Commission. 2021. Flood Mitigation, Stormwater Management, Water Quality, & Aquifer Recharge Benefits From Open Space Conservation.

2 Texas Water Development Board. 2019. State Flood Assessment. 86th Legislative Session.

3 Glick, P., E. Powell, S. Schlesinger, J. Ritter, B.A. Stein, and A. Fuller. 2020. The Protective Value of Nature: A Review of the Effectiveness of Natural Infrastructure for Hazard Risk Reduction.

Given the high costs of flood damage in Texas, every tool possible should be employed to protect people and property. Strategic land conservation as a form of natural infrastructure should be a key tool in reducing catastrophic damage, saving Texans millions of dollars.



$50 MILLION

REQUESTED FEDERAL FLOOD MITIGATION FUNDING FOR THE 2015 FLOOD IN SAN MARCOS, TX

– *Hays County Parks & Open Space Advisory Commission.*

$31.5 BILLION

ANTICIPATED STATEWIDE FLOOD MITIGATION COSTS OVER THE NEXT 10 YEARS

– *2019. State Flood Assessment*

Photo: Jennifer M. Ramos

TRANSPORTATION BENEFITS

1,900,000
ANNUAL ESTIMATED PEDESTRIAN TRIPS

1,620,000
ANNUAL ESTIMATED BIKE TRIPS

3,520,000
TOTAL ANNUAL WALKING & BIKING TRIPS

The most readily-identifiable benefits of the proposed trail derive from its potential ability to connect residents and visitors to major activity centers and recreation opportunities across the four-county area of the Great Springs Project.

Ultimately, the proposed GSP trail system would serve as a major investment in bicycling and walking for the region and could provide long-term transportation benefits to residents and visitors. While no money may change hands, real savings can be estimated from the cost savings associated with congestion, vehicle crashes, road maintenance, and household vehicle operations.

TRANSPORTATION CALCULATIONS

The daily estimates noted in the demand section of this report (4,800 bicycle trips and 5,500 pedestrian trips) were extrapolated to annual volumes and broken into different trip types (i.e. commute, recreation, school, college, and utilitarian). The breakdown of trip types is based on the travel patterns of people living near the proposed trail (2019 American Community Survey) and trip-type data from the National Household Travel Survey (NHTS). The result is an estimated 1,620,000 annual bike trips and 1,900,000 annual pedestrian trips, for a total of 3,520,000 trips per year.

Some of the estimated 3.5 million annual bicycle and pedestrian trips will replace motor vehicle trips. The number of motor vehicle miles reduced due to bicycle and pedestrian trip replacement was estimated through a comparison of the data noted above, along with trip distance data from the NHTS. The analysis estimates that the 3.5 million walking and biking trips on the trail system would reduce annual vehicle miles traveled by 12.9 million miles.

The completed Great Springs Trail will result in more bicycle and pedestrian trips for commute and utilitarian purposes, which are likely to replace motor vehicle and transit trips.

ANNUAL ESTIMATED TRANSPORTATION OFFSETS:

12,900,000 MOTOR VEHICLE MILES

TOTAL VEHICLE EMISSION COSTS REDUCED [5]

$420,000

REDUCED TRAFFIC CONGESTION COSTS [1]

$890,000

REDUCED VEHICLE CRASH COSTS [2]

$2,880,000

REDUCED ROAD MAINTENANCE COSTS [3]

$1,900,000

HOUSEHOLD VEHICLE OPERATION COST SAVINGS [4]

$5,350,000

$11,440,000 **TOTAL TRANSPORTATION BENEFITS**

1 Average Annual Miles per Driver by Age Group. Last modified: September 26, 2014. FHWA; Using Figure ES.3 "Cost of Crashes and Congestion per Vehicle Mile Traveled" ratios.

2 Average Annual Miles per Driver by Age Group. Last modified: September 26, 2014. FHWA; Using Figure ES.3 "Cost of Crashes and Congestion per Vehicle Mile Traveled" ratios.

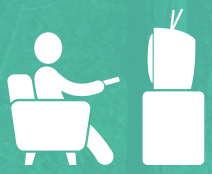
3 Kitamura, R., Zhao, H., and Gubby, A. R. Development of a Pavement Maintenance Cost Allocation Model. Institute of Transportation Studies, University of California, Davis.

4 American Automobile Association, Your Driving Costs. 2017.

5 GHG Equivalencies Calculator (EPA)

HEALTH BENEFITS

Why It Matters



27%

OF ADULTS *and*

17%

OF CHILDREN

REPORT LITTLE OR NO LEISURE-TIME PHYSICAL ACTIVITY IN TEXAS [1]

The implementation of a well-designed, regional trail from Austin to San Antonio will encourage a shift from energy-intensive modes of transportation such as cars and trucks to active modes of transportation such as bicycling and walking. More people bicycling and walking can help encourage an increase in physical activity levels, which may help reduce healthcare costs for residents in the region.

The completed Great Springs Trail will result in more people walking and bicycling, reducing healthcare costs for the region.

1,200

ESTIMATED NEWLY ACTIVE PEOPLE

$1,603

HEALTHCARE COST SAVINGS PER PERSON THAT BECOMES PHYSICALLY ACTIVE [2]

$1,870,000

TOTAL HEALTHCARE COST SAVINGS

1 State Indicators Report on Physical Activity (CDC)

2 Inadequate Physical Activity and Health Care Expenditures in the United States (CDC)

BENEFITS BY COUNTY

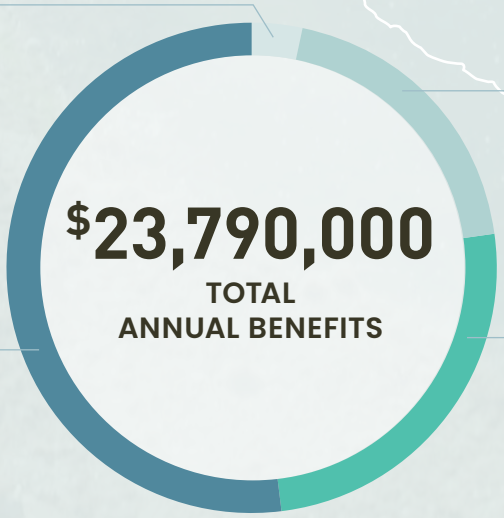
$210,000
HEALTH BENEFITS

$1,290,000
TRANSPORTATION BENEFITS

$2,650,000
ECONOMIC BENEFITS

$1,800,000
LAND & WATER BENEFITS

Travis County



$900,000
HEALTH BENEFITS

$5,500,000
TRANSPORTATION BENEFITS

$11,250,000
ECONOMIC BENEFITS

$6,140,000
LAND & WATER BENEFITS

Hays County

This section displays the estimated annual economic benefits of the Great Springs Project by county. Benefits based on land cover (ecosystem and carbon sequestration benefits) used the proportion of land within the study area for each county to apportion benefits. The remaining benefits were allocated to each county based on the proportion of estimated users within each county. Factors such as flood damage and loss of open space are outlined in other sections of this report in terms of their costs and challenges to the region, rather than in terms of annual benefits.