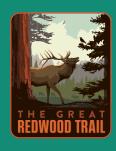


# THE GREAT REDWOOD TRAIL

**ECONOMIC BENEFITS ASSESSMENT** 2023





# RAIL to TRAIL

The Great Redwood Trail is envisioned as a 316-mile rail-trail project connecting California's San Francisco and Humboldt Bays. Once completed, it will be the longest rail-trail in the United States and will traverse scenic landscapes including old-growth redwood forests, oak woodlands and vineyards, and the dramatic Eel River Canyon. The Great Redwood Trail will connect the many vibrant communities of Marin, Sonoma, Mendocino, Trinity, and Humboldt Counties, creating a transformational economic engine and boosting healthy recreation for all in the North Coast region.

This Economic Benefits Assessment report and the Great Redwood Trail Master Plan address the 231 miles of trail within Mendocino, Trinity, and Humboldt Counties. The Great Redwood Trail in Sonoma and Marin Counties will be planned and constructed by Sonoma-Marin Area Rail Transit (SMART) and is outside the scope of this assessment.

# THE TRAIL EXTENT OF THIS MASTER PLAN CONNECTS:



231 miles



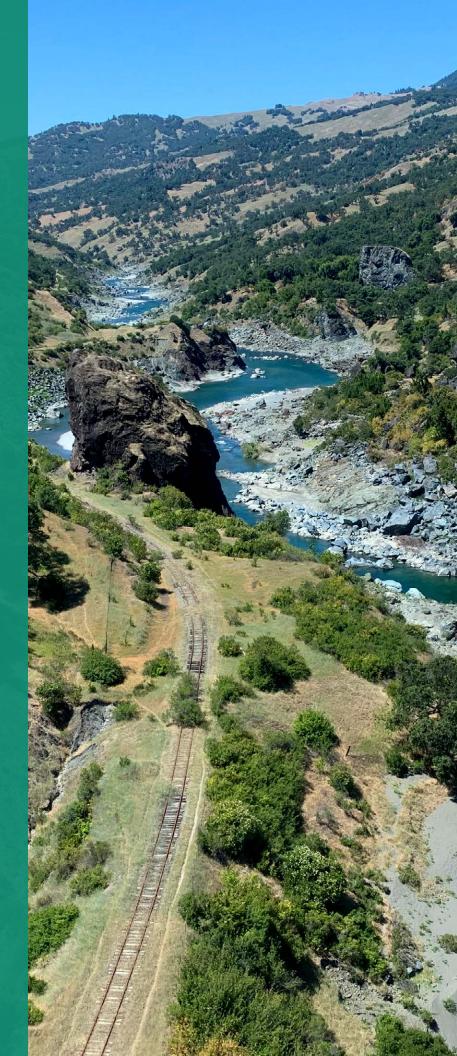
3 counties



29 cities, towns, and census-designated communities



180,000 people living within three miles of the trail





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To learn more about the project and Great Redwood Trail Agency (GRTA), please visit <a href="mailto:TheGreatRedwoodTrail.org">TheGreatRedwoodTrail.org</a>.

# BENEFITS SUMMARY

#### **Total Annual Benefits:**

\$102,568,000

The Great Redwood Trail will be a transformational economic engine in Northern California. The immense scale and scenic beauty of the completed trail will create new recreational experiences that will become destinations for the entire state and beyond. The benefits of the trail will expand into "trail towns"-cities, towns, and communities along the corridor that support trail users with services, promote the trail to their citizens and regions, and embrace the trail as a resource to be protected and celebrated. The mutual relationship between the Great Redwood Trail and the trail towns along the way can create sustained economic benefits for generations.

This report contains an economic benefits assessment of the proposed Great Redwood Trail in Mendocino, Trinity, and Humboldt Counties. The potential economic benefits of the Great Redwood Trail include both money spent on goods and services and money saved on transportation and health-care costs. The economic benefits assessment estimates the number of trips anticipated to take place on the proposed trail, and assesses the potential recreation, tourism, retail, transportation, and health benefits that may accrue once the proposed 231 miles of trail in Mendocino, Trinity, and Humboldt Counties are constructed.

For the purpose of this report, the proposed Great Redwood Trail connects 231 miles from the Sonoma-Mendocino County border to Humboldt Bay. In total, the completed trail and associated impacts are estimated to generate \$102,568,000 in annual benefits.

All monetary benefits associated with the Great Redwood Trail in this assessment are order-of-magnitude estimates that are rounded to the nearest thousand. All economic benefits identified in this report are estimates reported as 2023 dollars.



\$61,693,000

RECREATION, TOURISM, AND RETAIL BENEFITS



\$38,455,000

**HEALTH BENEFITS** 



\$2,420,000

**TRANSPORTATION BENEFITS** 

The Great Redwood Trail follows the former North Coast Railroad Authority (NCRA) right-of-way. The transformation of this route into a multiuse trail will provide economic benefits to the entire region and the individual trail towns that are along the route.



Trinidad 96 SISKIYOU BLUE LAKE (3) **ARCATA** Humboldt **EUREKA** 299 (211) **FORTUNA** Ferndale National Forest **RIO DELL** 283 (36) 101 TRINITY 254 **ALDERPOINT** HUMBOLDT COUNTY TEH Garberville Great Redwood eggett 271 Trail [101] Covelo (162) Pacific Laytonville Ocean MENDOCINO COUNTY Fort Bragg WILLITS **REDWOOD VALLEY** 101 253 **(53)** HOPLAND Point Clearlake Arena Healdsburg Calistoga SONOMA Santa (116) Rosa Sebastopol Rohnert Park 0 10 20 40 mi Cotati Sono Petaluma \*NOTE: The 4 mile section from Cloverdale to the Mendocino County border was analyzed as part of this assessment but not included in the overall results. A detailed breakdown of this section is included in the Subregion Analysis. MARIN Novato BENEFITS SUMMARY

# DEMAND

#### Total Estimated Annual Walking and Biking Trips

# 6.2 to 9.2 million trips



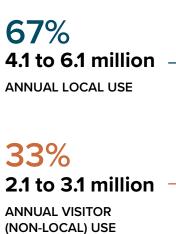
5.3 to 7.9 million

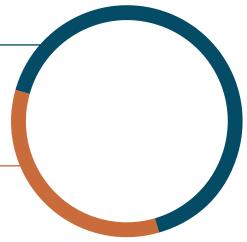
ANNUAL PEDESTRIAN **TRIPS** 



0.9 to 1.3 million

ANNUAL BIKE TRIPS





#### METHODOLOGY1

The economic benefits assessment is driven by the quantity of trail trips each year-more people using the trail equates to more benefit . This is calculated as demand, which estimates the daily and annual number of trips that will be taken on the Great Redwood Trail. The demand calculation takes into account local population, mode of travel, data from comparable trails, land-use context, and potential destinations. For clarity, demand calculates unique trips, not unique users. To calculate the potential demand for the proposed trail system, analysis of existing walking and biking activity in the project area was supplemented with data from comparable trails across the United States. Similar to the Great Redwood Trail, these comparable trails are regional multiuse trails that connect cities and towns with rural areas and recreational destinations.

Counts data from the following comparable trails was used in this analysis:

Given the broad geographic reach of the Great

Redwood Trail, the demand analysis is context-

conditions along the trail. Each mile of the Great Redwood Trail and each of the comparable trails

were categorized into rural, suburban, or urban

based on the predominant land use surrounding

the trail. This data was then cross-referenced to

inform the demand for mile-long segments of the

sensitive to account for the variety of unique

- Great Allegheny Passage, MD and PA
- Connecticut Trail Census, CT
- Erie Canalway Trail, NY

Great Redwood Trail.

Demand model is proprietary to Alta Planning + Design. For a complete breakdown of the demand and economic benefits assessment methodology, reference Appendix A: Methodology.

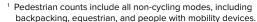
#### **RESULTS**

For the total 231 miles of Great Redwood Trail in Mendocino, Trinity, and Humboldt Counties, 6.2 to 9.2 million annual trips are estimated, including trips taken by pedestrians, cyclists, equestrians, backpackers, kayakers, and others. This includes an estimated 2.500 to 3.600 bicyclists per day and an estimated 14,500 to 22,000 pedestrians per day.

These daily estimates are averages over an entire year, and it is expected that trip demand would have peaks and valleys based on seasonality and day of the week. One-third of the trips are anticipated to be from visitors,<sup>2</sup> which presents significant economic opportunity for the region.

#### LIMITATIONS AND ASSUMPTIONS

The primary purpose of this analysis is to facilitate a more informed discussion on the economic benefits of the proposed Great Redwood Trail. Even with extensive primary and secondary research incorporated into the demand and economic benefits assessment models, it is challenging to accurately predict the exact impacts of various factors. For this reason, all estimated benefits are rounded and should be interpreted as order of magnitude estimates as opposed to exact numbers. Monetary estimates are reported as 2023 dollars. All estimates in this report assume that the 231 miles of the Great Redwood Trail in Mendocino, Trinity, and Humboldt Counties have been constructed and have had multiple years to establish.



<sup>&</sup>lt;sup>2</sup> For the purposes of this assessment, a visitor (non-local) trip is taken by a person who does not live within a zip code along the Great Redwood Trail alignment.







# RECREATION, **TOURISM, AND RETAIL BENEFITS**<sup>1</sup>



Each trip taken by groups of non-local trail users on the **Great Redwood** Trail is expected to generate the following revenue:2

\$64

FOR FOOD/MEALS

\$60

FOR RETAIL **ESTABLISHMENTS** 

\$31

FOR ENTERTAINMENT

\$52

FOR BICYCLE RENTALS

\$93

FOR LODGING<sup>3</sup>

The primary economic benefit for the Great Redwood Trail is money spent on goods and services related to recreation, tourism, and retail, which accounts for 60% of the total economic benefits. The increase in money spent within the region is primarily due to new non-local visitors who will bring money from outside the region and spend it locally. While a majority of Great Redwood Trail trips will be by local residents, one-third or an estimated 2.1 to 3.1 million of trips each year will be non-local. For the purposes of this assessment, a person who is non-local is somebody who does not live within a zip code along the Great Redwood Trail alignment.

Non-local trips are estimated to generate \$61,693,000 per year for the region. The majority of this revenue (87%) will come from money spent on lodging such as hotels and campgrounds and on food and beverages. The remaining revenue (13%) will come from retail establishments, entertainment, and equipment rentals. While the emphasis of the money spent will be on goods and services that cater to recreation and tourism, non-local trips will increase money spent at most local businesses including grocery stores, farmers markets, and gas stations, among others. With this influx of economic demand, trail towns will be able to support increased economic development near and along the trail, such as expanded or new lodging, restaurants, rentals, and retail.

For a complete breakdown of the recreation, tourism, and retail assessment methodology, reference Appendix A: Methodology.

Averages based on typical group size of four people.

Typical lodging expenditure is an average per group of non-local users based on the assumption that 42% of nonlocal trail users stay overnight in lodging of some kind.

The estimates for these benefits assume the availability of such goods and services. For the full benefit to be realized, the supply of goods and services needs to support the demand. There are also indirect economic benefits that were not included as part of this assessment, as trail-related spending from non-local users is expected to circulate through the economy and provide a multiplier effect.

#### Case Study: Hipcamp

Hipcamp is a California-based company that partners with landowners to create new places for outdoor recreation.

- During an average visit, campers who book through Hipcamp spend \$300 at local businesses.<sup>1</sup>
- ▶ In Mendocino County alone, over 11,000 visitors use Hipcamp annually. These visitors spend a total of \$1.6 million within the county.² This supports 15.25 jobs with a salary of \$29,800. Additionally, the average camp host earned \$7,500 in supplemental income.

<sup>&</sup>lt;sup>2</sup> Earth Economics (2021). Economic and environmental benefits of Hipcamp Properties, Mendocino County [Fact Sheet]. https://www. eartheconomics.org/all-publications/2022/hipcamp



Completing the Great Redwood Trail will result in direct annual benefits from money spent by non-local trail users, particularly benefiting those in the tourism and service industries.

Annual Recreation, Tourism, and Retail Benefits:

\$61,693,000



\$23,519,000

FOOD/MEALS



\$5,972,000

**RETAIL ESTABLISHMENTS** 



\$1,899,000

**ENTERTAINMENT** 



\$398,000

BICYCLE RENTALS



\$29,905,000

LODGING

Communities can support economic development by encouraging rentals, retail, and restaurants along the trail.

<sup>&</sup>lt;sup>1</sup> Hipcamp's missionis simple: Get more people outside (2022).



# HEALTH BENEFITS<sup>1</sup>

Health benefits and reduced burden on the regional health-care system through:



\$7.08

HEALTH-CARE COST SAVINGS FOR EACH NEW WALKING TRIP CREATED BY THE GREAT REDWOOD TRAIL



\$6.31

HEALTH-CARE COST SAVINGS FOR EACH NEW BIKING TRIP CREATED BY THE GREAT REDWOOD TRAIL

<sup>1</sup> For a complete breakdown of the Health Analysis methodology, reference <u>Appendix A:</u> <u>Methodology.</u> Health benefits are the primary form of cost savings for the Great Redwood Trail, and account for 37% of the total economic benefits. The economic benefits related to health are **reduced health-care costs** as a result of increased physical activity. The Great Redwood Trail will create **new opportunities for physical activity and exercise** for local residents and visitors across the 231-mile portion of the Great Redwood Trail corridor. Building a desirable and accessible trail will expand opportunities for trail recreation, increase access to park facilities, and encourage people to walk and bike more as a means of transportation.

Rural communities in Northern California experience significantly higher rates of stroke, heart disease, vehicular collisions, and death than the rest of the state.<sup>2</sup> In Mendocino County, top community health priorities include addressing childhood obesity, family wellness, and mental health.<sup>3</sup> More people walking and biking as a result of the Great Redwood Trail will have a region-wide impact on community health, including increased physical activity levels, increased cardiovascular health, fewer vehicular collisions, and improved mental health and well-being. These benefits will reduce health-care costs for individuals and reduce the existing burden on the regional health-care system.

Health benefits are calculated as reduced mortality benefits, which include health-care cost savings from people experiencing fewer chronic illnesses and living longer. Based on national research and local demographics, the associated average cost savings for each new walking trip will be \$7.08, and each new biking trip will be \$6.31. The analysis estimates that the 6.2 to 9.2 million total annual walking and biking trips on the trail system will provide \$38,455,000 in health, or reduced mortality, benefits.

<sup>&</sup>lt;sup>2</sup> 2018 Humboldt County Community Health Assessment (2018), <a href="https://humboldtgov.org/">https://humboldtgov.org/</a> DocumentCenter/View/71701/2018-Community-Health-Assessment-PDF>

<sup>&</sup>lt;sup>3</sup> 2019 Mendocino County Community Health Needs Assessment (2019), <a href="https://www.healthymendocino.org/content/sites/mendocino/chna\_images/1\_2019\_CHNA\_Key-Findings\_Summary\_Report.pdf">https://www.healthymendocino/chna\_images/1\_2019\_CHNA\_Key-Findings\_Summary\_Report.pdf</a>



Completing the Great Redwood Trail will result in more people walking and biking, reducing health-care costs for the region.



\$33,991,000

MORTALITY REDUCTION BENEFITS FROM WALKING

SE CONTRACTOR

\$4,464,000

MORTALITY REDUCTION BENEFITS FROM CYCLING ANNUAL HEALTH BENEFITS: \$38,455,000

**Annual Health Benefits:** 

\$38,455,000





# TRANSPORTATION BENEFITS<sup>1</sup>

Transportation benefits and reduction of carbon footprint through:



#### 7.9 million

ANNUAL WALKING TRIPS



#### 1.3 million

ANNUAL BIKING TRIPS



#### 3 million

REDUCTION IN ANNUAL MOTOR VEHICLE MILES



# 1,230 metric tons

REDUCTION IN ANNUAL CO2 EMISSIONS The Great Redwood Trail will create new opportunities for local residents and visitors to walk and bike more frequently as a means of transportation throughout the 231-mile portion of the Great Redwood Trail corridor. Particularly in cities and towns, the trail will provide a high-quality and direct route to and from destinations, allowing people to replace short trips (under 4 miles) previously taken by car with walking or biking. These short trips may include everyday activities such as going to the park, running errands, or getting to and from work and school, among others.

The economic benefits related to transportation are cost savings as a result of fewer trips taken by car. Compared to trips taken by cars, walking and biking cost significantly less for each individual user and reduce costly byproducts of driving such as congestion, crashes, emissions, and roadway maintenance. The analysis estimates that the 6.2 to 9.2 million total annual walking and biking trips on the trail system would reduce vehicle-miles traveled by 3 million miles each year, which would provide \$2,420,000 in annual transportation benefits.

In addition to cost savings, reduced emissions<sup>3</sup> as a result of fewer vehicle-miles traveled will have lasting impacts on the health and well-being of residents in the region. These impacts may include increased air quality, mitigation of climate change impacts through reduced fossil fuels, and improved respiratory health for residents.

For reference, 3 million motor vehicle-miles is the same as driving from Cloverdale to Arcata 15,500 times.

1,230 metric tons are equivalent to the CO<sub>2</sub> removed from the atmosphere by 1,456 acres of U.S. forests in one year.<sup>4</sup>

<sup>&</sup>lt;sup>1</sup> For a complete breakdown of the transportation assessment methodology, reference Appendix A: Methodology.

<sup>&</sup>lt;sup>2</sup> Trip replacement refers to the percentage of car trips that are estimated to be replaced by biking or walking, based on industry research.

<sup>&</sup>lt;sup>3</sup> Includes carbon dioxide, nitrous oxides, sulfur oxides, particulate matter, and volatile organic compounds.

<sup>&</sup>lt;sup>4</sup> EPA (2022). <a href="https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator">https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator</a>

Completing the Great Redwood Trail will reduce motor vehicle trips and greenhouse gas emissions by replacing vehicle trips with lower cost and lower impact walking and biking trips.



REDUCED TOTAL VEHICLE EMISSION COSTS

#### \$188,000

REDUCED ROAD
MAINTENANCE COSTS

\$206,000

REDUCED TRAFFIC CONGESTION COSTS

\$669,000

REDUCED VEHICLE CRASH COSTS

\$1,258,000

HOUSEHOLD VEHICLE
OPERATION COST SAVINGS



#### **Annual Transportation Benefits:**

\$2,420,000

Real savings can be estimated from the reduction of vehicle miles traveled. These benefits include direct savings for households as well as reduced costs from maintenance and emissions.



# **BENEFITS BY COUNTY**

This section displays the estimated annual economic benefits of the Great Redwood Trail by county. The benefits were allocated to each county based on the proportion of estimated trips within each county.

HUMBOLDT COUNTY 9 118 miles

TRANSPORTATION BENEFITS \$1,294,000

**HEALTH BENEFITS** 

\$17,968,000

RECREATION, TOURISM, & RETAIL BENEFITS

\$28,837,000

TOTAL BENEFITS:

\$48,099,000

MENDOCINO COUNTY 101 miles

TRANSPORTATION BENEFITS \$1,034,000

**HEALTH BENEFITS** 

\$18,485,000

RECREATION, TOURISM, & RETAIL BENEFITS \$29,662,000

**TOTAL BENEFITS:** 

\$49,181,000

TRINITY COUNTY 12 miles



TRANSPORTATION BENEFITS

\$3,800

**HEALTH BENEFITS** 

\$38.000

**RECREATION, TOURISM, & RETAIL BENEFITS** 

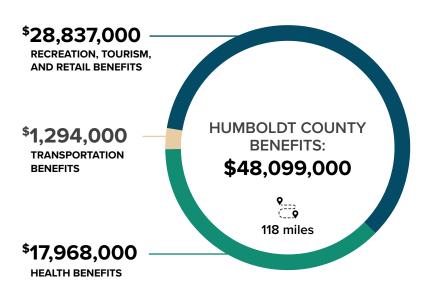
\$61,400

TOTAL BENEFITS:

\$103,000

## **HUMBOLDT COUNTY**

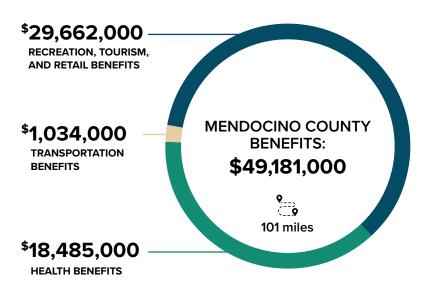
Includes incorporated and unincorporated Humboldt County.



RECREATION, TOURISM, AND RETAIL BENEFITS	\$28,837,000
Food/Meals	\$10,994,000
Retail	\$2,791,000
Entertainment	\$887,000
Bicycle Rental	\$186,000
Lodging	\$13,979,000
TRANSPORTATION BENEFITS	\$1,294,000
Reduced Traffic Congestion Costs	\$110,000
Reduced Vehicle Crash Costs	\$358,000
Reduced Road Maintenance Costs	\$101,000
Household Vehicle Operation Cost Savings	\$672,000
Total Vehicle Emission Costs Reduced	\$53,000
HEALTH BENEFITS	\$17,968,000
Mortality Reduction Benefits from Walking	\$15,854,000
Mortality Reduction Benefits from Cycling	\$2,114,000
TOTAL BENEFITS	\$48,099,000

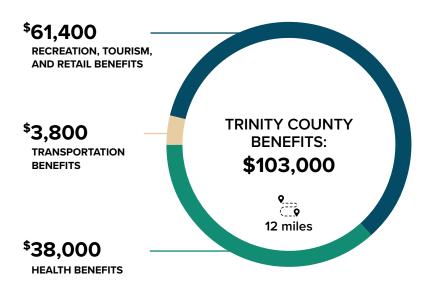
## **MENDOCINO COUNTY**

Includes incorporated and unincorporated Mendocino County.



RECREATION, TOURISM, AND RETAIL BENEFITS	\$29,662,000
Food/Meals	\$11,308,000
Retail	\$2,872,000
Entertainment	\$913,000
Bicycle Rental	\$191,000
Lodging	\$14,378,000
TRANSPORTATION BENEFITS	\$1,034,000
Reduced Traffic Congestion Costs	\$88,000
Reduced Vehicle Crash Costs	\$286,000
Reduced Road Maintenance Costs	\$80,000
Household Vehicle Operation Cost Savings	\$538,000
Total Vehicle Emission Costs Reduced	\$42,000
HEALTH BENEFITS	\$18,485,000
Mortality Reduction Benefits from Walking	\$16,319,000
Mortality Reduction Benefits from Cycling	\$2,166,000
TOTAL BENEFITS	\$49,181,000

# **TRINITY COUNTY**



RECREATION, TOURISM, AND RETAIL BENEFITS	\$61,400
Food/Meals	\$23,000
Retail	\$6,000
Entertainment	\$2,000
Bicycle Rental	\$400
Lodging	\$30,000
TRANSPORTATION BENEFITS	\$3,800
Reduced Traffic Congestion Costs	\$300
Reduced Vehicle Crash Costs	\$1,000
Reduced Road Maintenance Costs	\$300
Household Vehicle Operation Cost Savings	\$2,000
Total Vehicle Emission Costs Reduced	\$200
HEALTH BENEFITS	\$38,000
Mortality Reduction Benefits from Walking	\$33,000
Mortality Reduction Benefits from Cycling	\$5,000
TOTAL BENEFITS	\$103,000

# BENEFITS BY SUBREGION

This section displays the estimated annual economic benefits of the Great Redwood Trail by subregion, as shown in the map. The benefits were allocated based on the proportion of estimated trips within each jurisdiction.





#### CITY OF BLUE LAKE 1 mile

TRANSPORTATION BENEFITS \$41,000

HEALTH BENEFITS \$466,000

RECREATION, TOURISM, & RETAIL BENEFITS \$749,000

TOTAL BENEFITS: \$1.256.000

CITY OF ARCATA 7 miles

TRANSPORTATION BENEFITS \$412,000

HEALTH BENEFITS \$3,363,000

RECREATION, TOURISM, & RETAIL BENEFITS \$5,361,000

TOTAL BENEFITS: \$9,136,000

CITY OF EUREKA 11 miles

TRANSPORTATION BENEFITS \$286,000

HEALTH BENEFITS \$2,377,000

RECREATION, TOURISM, & RETAIL BENEFITS \$3,825,000

TOTAL BENEFITS: \$6,488,000

CITY OF FORTUNA 3 miles

TRANSPORTATION BENEFITS \$64,000

HEALTH BENEFITS \$637,000

RECREATION, TOURISM, & RETAIL BENEFITS \$1,030,000

TOTAL BENEFITS: \$1,731,000

CITY OF RIO DELL 4 miles

TRANSPORTATION BENEFITS \$58,000

HEALTH BENEFITS \$910,000

RECREATION, TOURISM, & RETAIL BENEFITS \$1,461,000

TOTAL BENEFITS: \$2,429,000

CITY OF WILLITS 2 miles

TRANSPORTATION BENEFITS \$78,000

HEALTH BENEFITS \$997,000

RECREATION, TOURISM, & RETAIL BENEFITS \$1,600,000

TOTAL BENEFITS: \$2,675,000

CITY OF UKIAH 4 miles

TRANSPORTATION BENEFITS \$170,000

HEALTH BENEFITS \$1,686,000

RECREATION, TOURISM, & RETAIL BENEFITS \$2,726,000

TOTAL BENEFITS: \$4,582,000

CITY OF CLOVERDALE 4 miles

TRANSPORTATION BENEFITS \$128,000

HEALTH BENEFITS \$2,207,000

RECREATION, TOURISM, & RETAIL BENEFITS \$3,540,000

TOTAL BENEFITS: \$5,875,000

UNINCORPORATED ,
HUMBOLDT COUNTY 86 miles

TRANSPORTATION BENEFITS \$802,000

**HEALTH BENEFITS** \$10,579,000

RECREATION, TOURISM, & RETAIL BENEFITS \$16,974,000

TOTAL BENEFITS: \$28,355,000

UNINCORPORATED

MENDOCINO COUNTY

71 miles

TRANSPORTATION BENEFITS \$819,000

HEALTH BENEFITS \$15,521,000

RECREATION, TOURISM, & RETAIL BENEFITS \$24,887,000

TOTAL BENEFITS: \$41,222,000

EEL RIVER CANYON 42 miles

TRANSPORTATION BENEFITS \$12,000

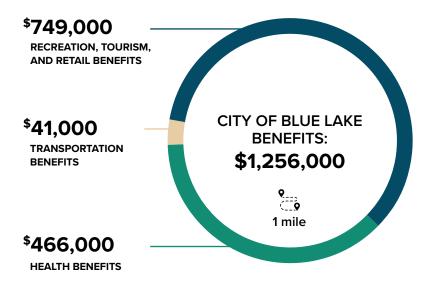
HEALTH BENEFITS \$217,000

RECREATION, TOURISM, & RETAIL BENEFITS \$348,000

TOTAL BENEFITS: \$577,000

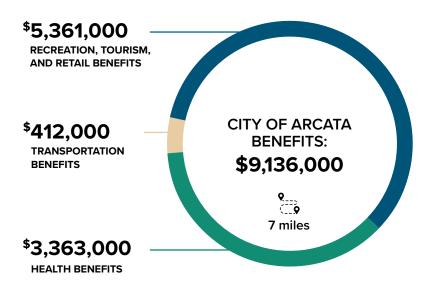
<sup>&</sup>lt;sup>1</sup> 4 miles from Cloverdale to the Mendocino County border

# **CITY OF BLUE LAKE**



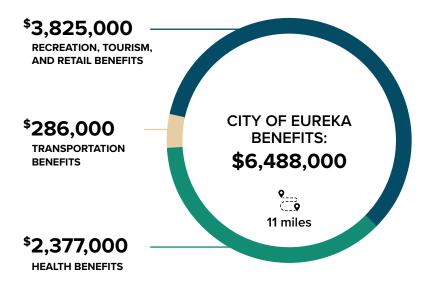
RECREATION, TOURISM, AND RETAIL BENEFITS	\$749,000
Food/Meals	\$285,000
Retail	\$72,000
Entertainment	\$23,000
Bicycle Rental	\$5,000
Lodging	\$363,000
TRANSPORTATION BENEFITS	\$41,000
Reduced Traffic Congestion Costs	\$4,000
Reduced Vehicle Crash Costs	\$11,00
Reduced Road Maintenance Costs	\$3,000
Household Vehicle Operation Cost Savings	\$21,000
Total Vehicle Emission Costs Reduced	\$2,000
HEALTH BENEFITS	\$466,000
Mortality Reduction Benefits from Walking	\$411,000
Mortality Reduction Benefits from Cycling	\$55,000
TOTAL BENEFITS	\$1,256,000

## **CITY OF ARCATA**



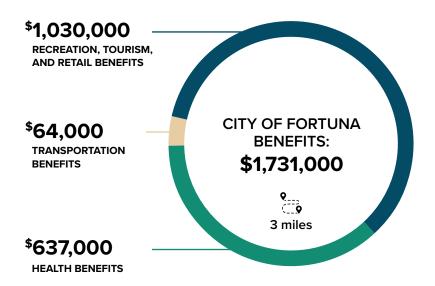
RECREATION, TOURISM, AND RETAIL BENEFITS	\$5,361,000
Food/Meals	\$2,044,000
Retail	\$518,000
Entertainment	\$165,000
Bicycle Rental	\$35,000
Lodging	\$2,599,000
TRANSPORTATION BENEFITS	\$412,000
Reduced Traffic Congestion Costs	\$35,000
Reduced Vehicle Crash Costs	\$114,000
Reduced Road Maintenance Costs	\$32,000
Household Vehicle Operation Cost Savings	\$214,000
Total Vehicle Emission Costs Reduced	\$17,000
HEALTH BENEFITS	\$3,363,000
Mortality Reduction Benefits from Walking	\$3,048,000
Mortality Reduction Benefits from Cycling	\$315,000
TOTAL BENEFITS	\$9,136,000

# **CITY OF EUREKA**



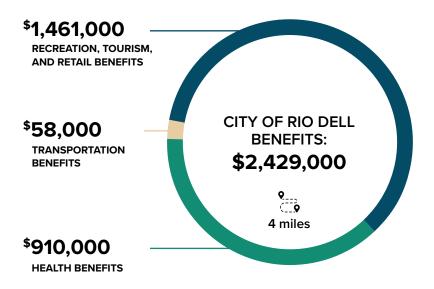
RECREATION, TOURISM, AND RETAIL BENEFITS	\$3,825,000
Food/Meals	\$1,458,000
Retail	\$370,000
Entertainment	\$118,000
Bicycle Rental	\$25,000
Lodging	\$1,854,000
TRANSPORTATION BENEFITS	\$286,000
Reduced Traffic Congestion Costs	\$24,000
Reduced Vehicle Crash Costs	\$79,000
Reduced Road Maintenance Costs	\$22,000
Household Vehicle Operation Cost Savings	\$149,000
Total Vehicle Emission Costs Reduced	\$12,000
HEALTH BENEFITS	\$2,377,000
Mortality Reduction Benefits from Walking	\$2,075,000
Mortality Reduction Benefits from Cycling	\$302,000
TOTAL BENEFITS	\$6,488,000

# **CITY OF FORTUNA**



RECREATION, TOURISM, AND RETAIL BENEFITS	\$1,030,000
Food/Meals	\$392,000
Retail	\$100,000
Entertainment	\$32,000
Bicycle Rental	\$7,00
Lodging	\$499,000
TRANSPORTATION BENEFITS	\$64,000
Reduced Traffic Congestion Costs	\$5,000
Reduced Vehicle Crash Costs	\$18,000
Reduced Road Maintenance Costs	\$5,000
Household Vehicle Operation Cost Savings	\$34,000
Total Vehicle Emission Costs Reduced	\$2,000
HEALTH BENEFITS	\$637,000
Mortality Reduction Benefits from Walking	\$548,000
Mortality Reduction Benefits from Cycling	\$89,000
TOTAL BENEFITS	\$1,731,000

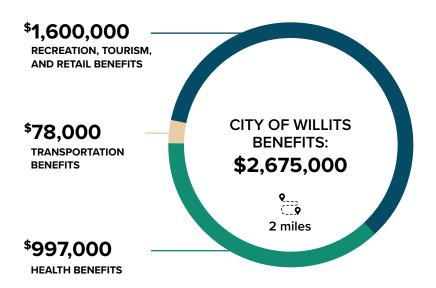
# **CITY OF RIO DELL**



RECREATION, TOURISM, AND RETAIL BENEFITS	\$1,461,000
Food/Meals	\$557,000
Retail	\$142,000
Entertainment	\$45,000
Bicycle Rental	\$9,000
Lodging	\$708,000
TRANSPORTATION BENEFITS	\$58,000
Reduced Traffic Congestion Costs	\$5,000
Reduced Vehicle Crash Costs	\$16,000
Reduced Road Maintenance Costs	\$5,000
Household Vehicle Operation Cost Savings	\$30,000
Total Vehicle Emission Costs Reduced	\$2,000
HEALTH BENEFITS	\$910,000
Mortality Reduction Benefits from Walking	\$802,000
Mortality Reduction Benefits from Cycling	\$108,000
TOTAL BENEFITS	\$2,429,000

## **CITY OF WILLITS**

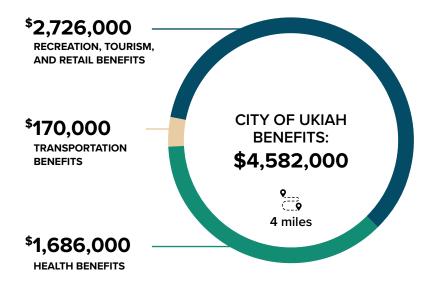
**MENDOCINO COUNTY** 



RECREATION, TOURISM, AND RETAIL BENEFITS	\$1,600,000
Food/Meals	\$610,000
Retail	\$155,000
Entertainment	\$49,000
Bicycle Rental	\$10,000
Lodging	\$776,000
TRANSPORTATION BENEFITS	\$78,000
Reduced Traffic Congestion Costs	\$7,000
Reduced Vehicle Crash Costs	\$21,000
Reduced Road Maintenance Costs	\$6,000
Household Vehicle Operation Cost Savings	\$41,000
Total Vehicle Emission Costs Reduced	\$3,000
HEALTH BENEFITS	\$997,000
Mortality Reduction Benefits from Walking	\$870,000
Mortality Reduction Benefits from Cycling	\$127,000
TOTAL BENEFITS	\$2,675,000

## **CITY OF UKIAH**

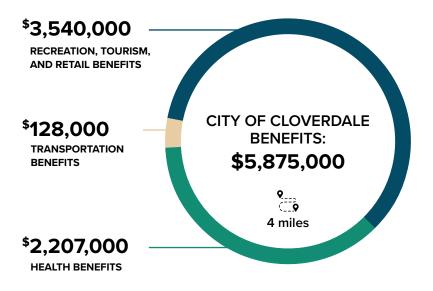
#### **MENDOCINO COUNTY**



RECREATION, TOURISM, AND RETAIL BENEFITS	\$2,726,000
Food/Meals	\$1,039,000
Retail	\$264,000
Entertainment	\$84,000
Bicycle Rental	\$18,000
Lodging	\$1,321,000
TRANSPORTATION BENEFITS	\$170,000
Reduced Traffic Congestion Costs	\$14,000
Reduced Vehicle Crash Costs	\$47,000
Reduced Road Maintenance Costs	\$13,000
Household Vehicle Operation Cost Savings	\$89,000
Total Vehicle Emission Costs Reduced	\$7,000
HEALTH BENEFITS	\$1,686,000
Mortality Reduction Benefits from Walking	\$1,442,000
Mortality Reduction Benefits from Cycling	\$244,000
TOTAL BENEFITS	\$4,582,000

# **CITY OF CLOVERDALE**

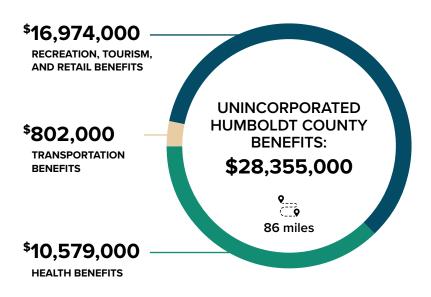
**SONOMA COUNTY** 



RECREATION, TOURISM, AND RETAIL BENEFITS	\$3,540,000
Food/Meals	\$1,349,000
Retail	\$343,000
Entertainment	\$109,000
Bicycle Rental	\$23,000
Lodging	\$1,716,000
TRANSPORTATION BENEFITS	\$128,000
Reduced Traffic Congestion Costs	\$11,000
Reduced Vehicle Crash Costs	\$35,000
Reduced Road Maintenance Costs	\$10,000
Household Vehicle Operation Cost Savings	\$67,000
Total Vehicle Emission Costs Reduced	\$5,000
HEALTH BENEFITS	\$2,207,000
Mortality Reduction Benefits from Walking	\$1,952,000
Mortality Reduction Benefits from Cycling	\$255,000
TOTAL BENEFITS	\$5,875,000

## UNINCORPORATED **HUMBOLDT COUNTY**

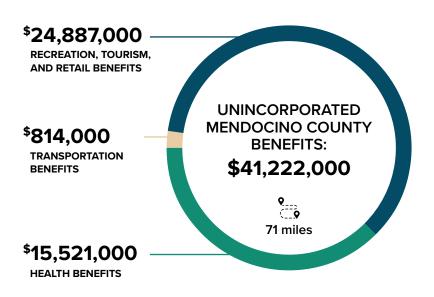
Includes unincorporated Humboldt County north of Alderpoint.



RECREATION, TOURISM, AND RETAIL BENEFITS	\$16,974,000
Food/Meals	\$6,472,000
Retail	\$1,643,000
Entertainment	\$522,000
Bicycle Rental	\$109,000
Lodging	\$8,228,000
TRANSPORTATION BENEFITS	\$802,000
Reduced Traffic Congestion Costs	\$68,000
Reduced Vehicle Crash Costs	\$222,000
Reduced Road Maintenance Costs	\$62,000
Household Vehicle Operation Cost Savings	\$417,000
Total Vehicle Emission Costs Reduced	\$33,000
HEALTH BENEFITS	\$10,579,000
Mortality Reduction Benefits from Walking	\$9,342,000
Mortality Reduction Benefits from Cycling	\$1,237,000
TOTAL BENEFITS	\$28,355,000

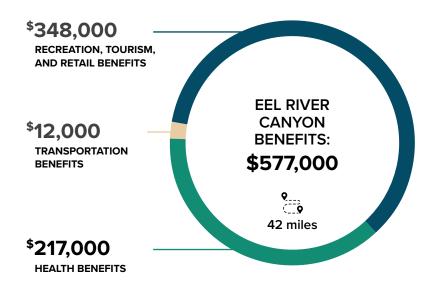
# UNINCORPORATED MENDOCINO COUNTY

Includes
unincorporated
Mendocino
County south of
the Middle Fork
of the Eel River.



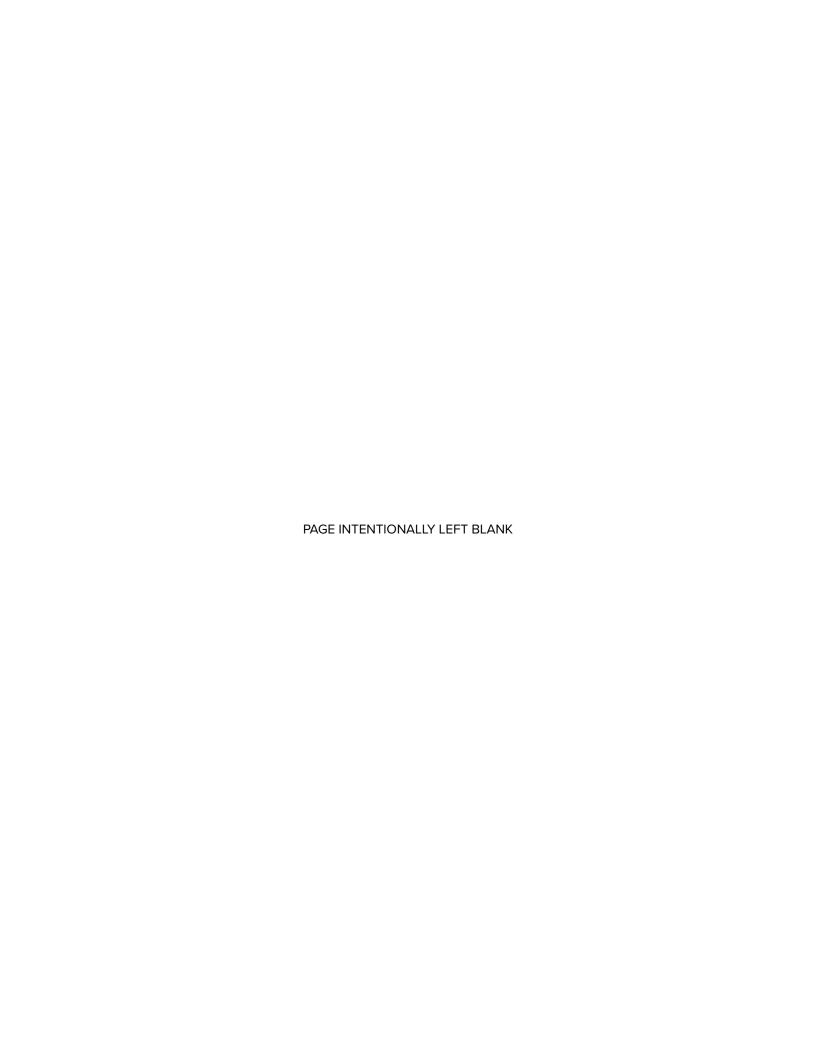
RECREATION, TOURISM, AND RETAIL BENEFITS	\$24,887,000
Food/Meals	\$9,488,000
Retail	\$2,408,000
Entertainment	\$766,000
Bicycle Rental	\$161,000
Lodging	\$12,064,000
TRANSPORTATION BENEFITS	\$814,000
Reduced Traffic Congestion Costs	\$69,000
Reduced Vehicle Crash Costs	\$225,000
Reduced Road Maintenance Costs	\$63,000
Household Vehicle Operation Cost Savings	\$424,000
Total Vehicle Emission Costs Reduced	\$33,000
HEALTH BENEFITS	\$15,521,000
Mortality Reduction Benefits from Walking	\$13,745,000
Mortality Reduction Benefits from Cycling	\$1,776,000
TOTAL BENEFITS	\$41,222,000

## **EEL RIVER CANYON**



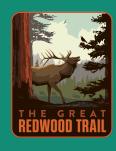
Includes portions of unincorporated Mendocino, Trinity, and Humboldt County from the Middle Fork of the Eel River to Alderpoint.

RECREATION, TOURISM, AND RETAIL BENEFITS	\$348,000
Food/Meals	\$133,000
Retail	\$34,000
Entertainment	\$11,000
Bicycle Rental	\$2,000
Lodging	\$168,000
TRANSPORTATION BENEFITS	\$12,000
Reduced Traffic Congestion Costs	\$1,000
Reduced Vehicle Crash Costs	\$3,000
Reduced Road Maintenance Costs	\$1,000
Household Vehicle Operation Cost Savings	\$6,500
Total Vehicle Emission Costs Reduced	\$500
HEALTH BENEFITS	\$217,000
Mortality Reduction Benefits from Walking	\$191,000
Mortality Reduction Benefits from Cycling	\$26,000
TOTAL BENEFITS	\$577,000



# ECONOMIC BENEFITS ASSESSMENT

**APPENDIX** 









# APPENDIX A: METHODOLOGY

#### **Executive Summary**

This technical memorandum details the methodology used for the economic benefits assessment of a 231-mile segment of the proposed Great Redwood Trail (GRT), an envisioned 316-mile rail-trail project connecting California's Humboldt and San Francisco Bays. The segment that this analysis covers runs through the counties of Mendocino, Trinity, and Humboldt. For the purposes of this memo, the "proposed GRT alignment" or "proposed trail system" refers to the current best estimate of a conceptual GRT trail alignment, based on existing segments of trail, existing plans, and several potential spur trails.

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); and assessed the potential benefits that might accrue if the entire proposed trail system was constructed. In total, it is estimated that the proposed trail system could generate \$102,568,000 in annual benefits, organized around the following categories:



#### Recreation, Tourism, and Retail Benefits:

Includes estimated spending from non-local visitors to the trail on goods, services, and lodging.



Health Benefits: Includes increased physical activity levels, increased cardiovascular health, and other positive outcomes for users, leading to reductions in health care costs.



**Transportation Benefits:** Includes reduction in vehicle miles traveled and the associated reduction in congestion, collisions, roadway maintenance costs, emissions (CO<sub>2</sub>, NO<sub>X</sub>, SO<sub>X</sub>, and PM<sub>2.5</sub>), and climate change impacts.

Table 1 displays the annual estimated benefits for each category. Subtotals for each category are shown in bold. The following sections provide an explanation of how each benefit was calculated.

Table 1. Total Annual Benefits

CATEGORY	VALUE OF BENEFIT <sup>1</sup>
RECREATION, TOURISM, AND RETAIL BENEFITS	\$61,693,000
Food/Meals	\$23,519,000
Retail	\$5,972,000
Entertainment	\$1,899,000
Bicycle Rental	\$398,000
Lodging	\$29,905,000
HEALTH BENEFITS	\$38,455,000
Mortality Reduction Benefits from Walking	\$33,991,000
Mortality Reduction Benefits from Cycling	\$4,464,000
TRANSPORTATION BENEFITS	\$2,420,000
Reduced Traffic Congestion Costs	\$206,000
Reduced Vehicle Crash Costs	\$669,000
Reduced Road Maintenance Costs	\$188,000
Household Vehicle Operation Cost Savings	\$1,258,000
CO2 Emissions Reduced (metric tons)	1,230
Other Vehicle Emissions Reduced (metric tons) <sup>2</sup>	5.78
Total Vehicle Emission Costs Reduced	\$99,000
TOTAL BENEFITS	\$102,568,000

<sup>\*</sup>Numbers are rounded to three digits in the table.

#### **Demand**

The economic benefits assessment is driven by the quantity of trail trips each year—more people using the trail equates to more benefits. This is calculated as demand, which estimates the daily and annual number of trips that will be taken on the GRT. This methodology is proprietary to Alta Planning + Design.

#### **EXISTING WALKING AND BIKING ACTIVITY**

This analysis first examined the current levels of walking and biking within the project area. **Table 2** displays the existing commute-to-work mode share for people within walking and biking distance of the proposed trail.

Table 2. Means of Transportation to Work of People Living Near the Proposed Trail Network (2019 American Community Survey)

GRT CORRIDOR	POPULATION	DROVE ALONE	CARPOOL	PUBLIC TRANSIT	BICYCLED	WALKED	OTHER
Walkshed (within half-mile)	135,654	71.2%	11.2%	1.4%	1.3%	7.0%	0.7%
Bikeshed (within 3 miles)	183,904	72.2%	11.1%	1.3%	1.2%	6.1%	0.7%

#### COMPARABLE TRAILS, COUNTS, AND URBAN/RURAL SPLITS

Next, the analysis estimated the expected number of biking and walking trips that are expected to occur on the proposed trail system. To understand the potential demand for the proposed trail system, count data at similar trail counter locations in Connecticut, New York, Pennsylvania, and Maryland were analyzed (**Table 3**).

Table 3. Trail Counts at Similar Facilities

TRAIL (LOCATION)	URBAN COUNTERS	RURAL COUNTERS	AVERAGE ESTIMATED DAILY COUNTS URBAN	AVERAGE ESTIMATED DAILY COUNTS RURAL	SOURCE
Great Allegheny Passage (Cumberland, MD, Pittsburgh, PA)	0	7	N/A	131	Herr, Dr. Andrew R. Analysis of 2021 Trail Usage Patterns along the Great Allegheny Passage (2022).
Connecticut Trail Census (CT)	1 (New Britain, CT)	5	119	125	University of Connecticut, Connecticut Trail Census. https://cttrailcensus.uconn.edu/(2019).
Erie Canalway Trail (NY)	1 (Brockport, NY)	4	159	89	Parks & Trails New York. Who's on the Trail, Erie Canalway Trail, 2021 Trail User Count. New York State Canal Corporation (2022).

Each of the comparable trails was categorized into rural or urban, based on the predominant land use surrounding the trail (**Table 3**). The proposed GRT alignment was divided into the same land use classifications using Bureau of Transportation Statistics Local Area Transportation Characteristics for Households Data (LATCH) land use classifications.<sup>3</sup> **Table 4** displays the average number of bicycles and pedestrians per mile by land use, as well as the breakdown of the proposed GRT alignment.

Creating context-sensitive estimates of demand based on existing counts often requires extrapolating based on other datasets to understand how demand changes throughout a corridor. Powerful proxy metrics for demand and mode-shift potential include looking at the rates of Active Trip Potential (ATP) trips, or vehicle trips shorter than three miles. Using the average daily volumes from the comparable trails in Table 3, bicycle and pedestrian trip counts were scaled and applied to mile-long segments of the proposed trail by leveraging ATP trips to create adjustment factors. Replica Places<sup>11</sup> activity-based model outputs for a typical Thursday in 2019 were used to collect information on ATP trips. Details of Replica's modeling approach are articulated in Appendix A. ATP trips evaluated included those that terminate within a one-mile buffer of the proposed trail segment relative to the baseline number of ATP trips occurring within a similar one-mile buffer area around the existing trail segment. These estimated counts were then split into bicycle and pedestrian trips, by multiplying the estimated count by the percentage of trips attributable to each mode and land designation. For both urban and rural trips, **Figure 1** shows how this percentage was calculated, and Table 4 shows the results:

Figure 1: Count Split Percentage Equation

Walk Trips = (Walk Trips)/(Walk Trips + Bike Trips)

Bike Trips = (Bike Trips)/(Walk Trips + Bike Trips)

Table 4. Bicycle and Pedestrian Percentage Breakdown per American Community Survey Mode Split

LAND USE	AVERAGE DAILY BICYCLE TRIPS (%)	AVERAGE DAILY PEDESTRIAN TRIPS (%)	GRT ALIGNMENT (MILES)
Urban	17.5	82.5	93
Rural	14.7	85.3	138

<sup>&</sup>lt;sup>1</sup> Replica Places (2022). https://replicahq.com/places/



### RECREATIONAL DEMAND DECAY

As the GRT will traverse through old-growth redwood forests and other geographic attractions, the analysis sought to take rural recreational demand into consideration regarding the final estimated count numbers. As a result, the analysis included a recreational rural demand decay process to properly account for the influence of outdoor and rural attractions users would be inclined to visit. At its core, the demand decay functions on the logic that the farther away a trail user is from an attraction, the less pull it has on bringing trail users to that specific area.

The demand decay process was accomplished by creating bands of decay impacted by the number of attractions within a one-mile buffer of trail within one mile of an access point. Each additional attraction creates additional demand, at a decreasing rate per attraction. **Table 5** displays the relative bands of decay that were calculated from 2009 National Household Travel Survey data surrounding trip purpose and trip length, while **Table 6** displays the attraction subgroup influences on the demand decay rates. The specific list of attractions can be found in **Table 7**.

Table 5. Demand Decay Bands

BANDS OF DECAY ADJUSTED				
DISTANCE	PEDESTRIAN DEMAND	BICYCLE DEMAND		
1 Mile	1	1		
1-2 Miles	0.183	0.427		
2-3 Miles	0.067	0.031		
3-4 Miles	0.021	0.158		
4-10 Miles	0.083	0.151		
10-20 Miles	0.001	0.004		

Table 6. Attraction Subgroup Table and Rates

ATTRACTION SUBGROUPS				
ATTRACTION NUMBER (PER ONE MILE BUFFER OF TRAIL WITHIN ONE MILE OF A COUNTER) <sup>4</sup>	RELATIVE IMPACT ON DEMAND DECAY RATE			
1 Attraction	100%			
3 Attractions	75%			
5 Attractions	50%			
5+ Attractions	25%			

Table 7. Attractions for Demand Decay Methodology

SOURCE	ATTRACTION	SOURCE	ATTRACTION
OpenStreetMap (OSM)	Restaurant	OpenStreetMap (OSM)	Community Centre
OpenStreetMap (OSM)	Café	OpenStreetMap (OSM)	АТМ
OpenStreetMap (OSM)	Library	OpenStreetMap (OSM)	Arts Centre
OpenStreetMap (OSM)	Bar	OpenStreetMap (OSM)	Bicycle Rental
OpenStreetMap (OSM)	Graveyard	OpenStreetMap (OSM)	Fountain
OpenStreetMap (OSM)	School	OpenStreetMap (OSM)	Camp Site
OpenStreetMap (OSM)	Boat Storage	OpenStreetMap (OSM)	Hotel
OpenStreetMap (OSM)	University	OpenStreetMap (OSM)	Motel
OpenStreetMap (OSM)	Bench	OpenStreetMap (OSM)	Museum
OpenStreetMap (OSM)	Marketplace	OpenStreetMap (OSM)	Attraction
OpenStreetMap (OSM)	Pub	OpenStreetMap (OSM)	Camp Pitch
OpenStreetMap (OSM)	Theatre	OpenStreetMap (OSM)	Picnic Site
OpenStreetMap (OSM)	College	OpenStreetMap (OSM)	Viewpoint
OpenStreetMap (OSM)	Barbecue	OpenStreetMap (OSM)	Caravan Site
OpenStreetMap (OSM)	Shelter	Internal Data	Bridges
OpenStreetMap (OSM)	Bicycle Parking	Internal Data	Tunnels

This demand decay rate was then applied to a segment in question through the process outlined in Figure 2:

Figure 2: Count Split Percentage Equation

Decayed Walk Trips = Walk Trips - (Walk Trip × Combined Demand Decay Rate)

The estimated counts from the demand decay process were then added to the pre-existing estimated counts. The result of this operation was then summed up for all segments along the proposed trail and divided by the average bicycle and pedestrian trip length from the 2017 National Household Travel Survey to account for unique trips (2.38 miles and 0.86 miles, respectively). In a sentence, the analysis computes the personmiles traveled based on the estimated counts on these "synthetic counters," add in recreational demand that has undergone a demand decay process, and then divides these person-miles traveled by the average trip distances to get an estimate of unique user trips.

## **TRIP TYPE**

The daily estimates (4,000 bicycle users and 24,000 pedestrian users) were extrapolated to annual trip volumes and broken into different trip types (i.e., commute, recreation, school, college, and utilitarian) using the existing travel patterns (**Table 2**) and data from the National Household Transportation Survey (**Table 8**). The annual extrapolations account for the expected number of trips per week by trip type (i.e., commute, school, and college trips are expected to be five out of seven days a week, and other trip types are expected to occur seven days a week).

Table 8. Trip Purpose Multiplier<sup>5</sup>

	BIKE	WALK
Utilitarian Trip Multiplier	5.33	8.77
Social/Recreational Trip Multiplier	1.68	2.18

#### **DEMAND RESULTS**

This impact analysis includes the total 231 miles of the proposed trail. **Table 9** displays the average daily estimated number of bicycles and pedestrians per mile, along each segment of the proposed GRT alignment. The list of comparable facilities include data collected multiple years post-construction, and as such, it is expected that it may take multiple years for the proposed trail to reach these per day estimates. On an annual basis, it is expected there will be an estimated 6.2 to 9.2 million bicycle and pedestrian trips. The range is due to different statistical methods for aggregating the demand decay results along the full corridor (proportional allocation versus arithmetic means). **This report uses the latter method and demand results (9.2 million trips per year) for calculating benefits** 

Table 9. Trail Use by Primary Land Use

LAND USE	AVERAGE DAILY BICYCLE TRIPS (TOTAL)	AVERAGE DAILY PEDESTRIAN TRIPS (TOTAL)	GRT ALIGNMENT (MILES)
Urban	1,515	8,747	93
Rural	2,470	14,922	138

### TRIP REPLACEMENT AND VEHICLE-MILE REDUCTION

Many of the estimated 9.2 million annual bicycle and pedestrian trips are expected to replace motor vehicle trips. Calibrated to modal shift factors reported in literature<sup>6</sup>, a univariate regression model estimates the motor vehicle trip replacement factor based on the percentage of trips that terminate in census block groups within 1/4-mile of the proposed facility that are less than 4 miles. Trip distance data is provided by Replica for a typical travel Thursday in Fall 2019.<sup>7</sup> The motor vehicle trip replacement factor for all active mode trips is 22.2%.

To estimate the number of vehicle-miles that might be replaced by bicycling and walking trips, Table 10 shows the average trip distance of bicycling and walking trips by trip purpose. The number of vehicle-miles reduced due to bicycle and pedestrian trips was calculated by multiplying the number of biking or walking trips by the trip replacement and trip distance factors. The analysis estimates that the 9.2 million walking and biking trips on the proposed trail system will reduce VMT by 3 million miles.

Table 10. Trip Distance (miles)

	ВІКЕ	WALK
Commute Trips <sup>8</sup>	2.47	0.72
College Trips <sup>9</sup>	1.31	0.43
K–12 School Trips <sup>10</sup>	1.36	0.69
Utilitarian Trips <sup>11</sup>	2.28	0.83
Social/Recreational Trips <sup>12</sup>	2.73	1.12

# Recreation, Tourism, and Retail Benefits

After implementation, visitors to the GRT are likely to spend money on food, retail, entertainment, and lodging.

## **NON-LOCAL TRIPS**

The average percentage of trail users that were not from the area surrounding the trail was 33% among trails comparable to the proposed GRT (**Table 11**). If there are 9.2 million annual trips on the proposed trail, and it experiences the same percentage of non-local trail users as the comparable trails, then an estimated 3.1 million non-local trail trips will occur on the proposed trail each year.

Table 11. Trip Point of Origin and Length of Stay

	TRIP POINT OF ORIGIN (PERCENT OF SURVEYED USERS, NUMBER OF RESPONSES)			
LOCATION	LOCAL	NON-LOCAL	SURVEYED USERS	SOURCE
Brevard Greenway, Average of Years 1 and 2 (Brevard, NC)	64%	36%,	500	Evaluating the Economic Impact of Shared Use Paths in North Carolina, Technical Memorandum: Brevard Greenway Year Two. North Carolina Department of Transportation (2016).
American Tobacco Trail, Average of Years 1 and 2 (Triangle Region, NC)	65%	35%	3,989	Evaluating the Economic Impact of Shared Use Paths in North Carolina, Technical Memorandum: American Tobacco Trail Year Two. North Carolina Department of Transportation (2016).
Washington & Old Dominion Railroad (Arlington, VA to Leesburg, VA)	95%	5%	1,462	The Washington & Old Dominion Trail: An Assessment of User Demographics, Preferences, and Economics; Virginia Dept. of Conservation, 2004.
Great Allegheny Passage (Pittsburgh, PA to Cumberland, MD)	69%	31%	1,272	Trail Town Economic Impact Study (Phase II: Trail User Survey), Progress Fund and Laurel Highlands Visitor Bureau; 2009.
Katy Trail (St. Louis Region, MO)	33%	67%	N/A	Katy Trail Economic Impact Report: Visitors and MGM2 Economic Impact Analysis (2012).
Erie Canalway Trail (Buffalo to Albany, NY)	77%	23%	562	The Economic Impact of the Erie Canalway Trail: AN ASSESSMENT AND USER PROFILE OF NEW YORK'S LONGEST MULTI-USE TRAIL (2014).
Average	67%	33%		

## **AVERAGE EXPENDITURES PER NON-LOCAL TRIP**

The average expenditures of groups of trail users on comparable trails was \$64 for food/meals, \$60 at retail establishments, \$31 for entertainment, \$52 for bicycle rental, and \$93 for lodging<sup>13</sup> (**Table 12**).

Table 12. Average Expenditures

	AVERAGE EXPENDITURES (PERCENTAGE OF SURVEYED USERS, NUMBER OF RESPONSES, AVERAGE EXPENSES)							
	FOOD/MEALS	FOOD/MEALS		MEALS				
LOCATION	RESTAURANT	GROCERY	RETAIL	ENTERTAINMENT	BICYCLE RENTAL	SOURCE		
Duck Trail, Year 2 (Duck, NC)	31%, 510, \$40	16%, 509, \$70	12%, 510, \$68	2%, 510, \$73	3%, 510, \$63	Evaluating the Economic Impact of Shared Use Paths in North Carolina, Technical Memorandum: Duck Trail Year Two. North Carolina Department of Transportation (2016).		
Brevard Greenway, Year 2 (Brevard, NC)	21%, 239, \$25	15%, 238, \$28	8%, 239, \$37	<1%, 239, \$6	2%, 239, N/A	Evaluating the Economic Impact of Shared Use Paths in North Carolina, Technical Memorandum: Brevard Greenway Year Two. North Carolina Department of Transportation (2016).		
Brevard Greenway, Year 1 (Brevard, NC)	37%, 217, \$20	19%, 216, \$32	7%, 216, \$47	<1%, 217, \$10	2%, 217, \$70	Evaluating the Economic Impact of Shared Use Paths in North Carolina, Technical Memorandum: Brevard Greenway Year One. North Carolina Department of Transportation (2016).		
American Tobacco Trail, Year 2 (Triangle Region, NC)	19%, 1,833, \$15	8%, 1,834, \$31	3%, 1,835, \$73	1%, 1,835, \$22	0%, 1,835, \$25	Evaluating the Economic Impact of Shared Use Paths in North Carolina, Technical Memorandum: American Tobacco Trail Year Two. North Carolina Department of Transportation (2016).		
American Tobacco Trail, Year 1 (Triangle Region, NC)	20%, 1,927, \$21	13%, 1,920, \$28	5%, 1,923, \$73	1%, 1,924, \$36	0%, 1,925, \$48	Evaluating the Economic Impact of Shared Use Paths in North Carolina, Technical Memorandum: American Tobacco Trail Year One. North Carolina Department of Transportation (2016).		
Huntsville/ Madison County	88%, 150, \$76		42%, 150, \$61	45%, 150, \$36	N/A	Spring Intercept Survey Results. Huntsville/Madison County Convention & Visitors Bureau (2017). Alabama Tourism Industry 2019 Economic Impact.		
Average	48%, \$64		13%, \$60	8%, \$31	1%, \$52			

### RECREATION, TOURISM, AND RETAIL RESULTS

While locals will benefit the trail, the vast majority of the money for recreation, tourism and retail will come from outside of the region. If the estimated non-local trail users purchase goods at the same rate as the comparable trails and there are an average of four people per group,<sup>14</sup> then the proposed trail system will contribute an estimated \$23,519,000 in annual food/meal spending, \$5,972,000 in annual retail spending, \$1,899,000 in annual entertainment spending, \$398,000 in annual bicycle rental spending, and \$29,905,000 in annual lodging spending (assumes 42% of non-local trail users stay overnight in a hotel),<sup>15</sup> for a total of \$61,693,000 in estimated annual trail-related spending from non-local trail users (**Table 13**). These estimates assume the availability of such goods and services. This section only includes direct economic benefits of the proposed trail system. There are also indirect economic benefits not included, as trail-related spending from non-local users is expected to circulate through the economy, providing a multiplier effect.

Table 13. Annual Recreation, Tourism, and Retail Benefits<sup>16</sup>

CATEGORY	WALK
Food/Meals	\$23,519,000
Retail	\$5,972,000
Entertainment	\$1,899,000
Bicycle Rental	\$398,000
Lodging	\$29,905,000
TOTAL RECREATION, TOURISM, AND RETAIL BENEFITS	\$61,693,000

# **Health Benefits**

More people bicycling and walking can help encourage an increase in physical activity levels, increased cardiovascular health, and other positive outcomes for users.

#### REDUCED MORTALITY

Health benefits are calculated as reduced mortality benefits, which include health-care cost savings from people experiencing fewer chronic illnesses and living longer. The benefits from reduced mortality were calculated using the recommended values provided in the 2022 US Department of Transportation Benefit-Cost Analysis Guidance (Table A-12)<sup>17</sup> and the national distribution of age ranges and travel patterns. Table 14 displays the multipliers that were used.

Table 14. Mortality Reduction Multipliers

MORTALITY REDUCTION BENEFITS OF INDUCED ACTIVE TRANSPORTATION	VALUE
Walking Value per Induced Trip	\$7.08
Cycling Value per Induced Trip	\$6.31
Walking Age Proportion (20–74 years old)	68%
Cycling Age Proportion (20–64 years old)	59%
Trips Induced from Non-Active Modes	89%

These benefits were applied to the estimated number of walking and biking trips along the proposed GRT alignment. For example, the number of expected new walking trips was multiplied by the walking value per induced trip, the walking age proportion multiplier, and the percentage of trips expected to be induced from non-active modes (i.e. personal vehicles).

## **HEALTH RESULTS**

The analysis estimates that the 6.2 to 9.2 million total annual walking and biking trips on the proposed trail system will provide \$38,455,000 in health, or reduced mortality, benefits (Table 15).

Table 15. Annual Health Benefits18

CATEGORY	MONETARY VALUE
Mortality Reduction Benefits from Walking	\$33,991,000
Mortality Reduction Benefits from Cycling	\$4,464,000
TOTAL HEALTH BENEFITS	\$38,455,000

# **Transportation Benefits**

The GRT will create new opportunities for local residents and visitors to walk and bike more frequently as a means of transportation across the 231-mile portion of the GRT corridor. The results of this analysis are informed by the reduction of 3 million vehicle-miles identified as part of the demand analysis.

#### **GREENHOUSE GAS AND POLLUTANTS**

For every vehicle-mile reduced, there is an assumed decrease in greenhouse gases and criteria pollutants. **Table 16** lists the reduction in greenhouse gases and criteria pollutants by VMT, along with the cost to mitigate or clean up those pollutants.

Table 16. Environmental Protection Multipliers

POLLUTANT	VALUE (METRIC TONS/VMT)	VALUE (\$USD/VMT)
Particulate Matter (PM) <sup>19</sup>	0.00000005	\$0.019032
Nitrous Oxides (NO <sub>X</sub> ) <sup>20</sup>	0.00000069	\$0.006051
Sulfur Oxides (SO <sub>x</sub> ) <sup>21</sup>	0.0000001	\$0.000391
Volatile Organic Compounds (VOC) <sup>22</sup>	0.00000103	\$0.002205
Carbon Dioxide <sup>23</sup>	0.00042047	\$0.005201

#### **COLLISIONS AND ROADWAY MAINTENANCE**

Safety benefits are a result of the expected reduction in collisions due to the decrease in VMT. The estimated collision cost reduction is \$0.22 per VMT.<sup>24</sup> The estimated roadway maintenance cost savings associated with a reduction in VMT is based on a state-of-good-repair multiplier of \$0.06 per VMT.<sup>25</sup>

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#### TRANSPORTATION RESULTS

Real savings can be estimated from the reduction of costs associated with congestion, vehicle crashes, road maintenance, and household vehicle operations. The impact analysis model also evaluates and quantifies annual savings from reduced vehicle emissions, using a number of readily available data inputs. Table 17 displays the monetary value and air quality improvements of these benefits due to the 3-million-mile reduction in vehicle-miles traveled.

Table 17. Annual Transportation and Emission Benefits

CATEGORY	VALUE OF BENEFIT
Reduced Traffic Congestion Costs <sup>26</sup>	\$206,000
Reduced Vehicle Crash Costs <sup>27</sup>	\$669,000
Reduced Road Maintenance Costs <sup>28</sup>	\$188,000
Household Vehicle Operation Cost Saving <sup>29</sup>	\$1,258,000
CO <sub>2</sub> Emissions Reduced <sup>30</sup>	1,230 (metric tons)
Other Vehicle Emissions Reduced <sup>31</sup>	5.78 (metric tons)
Reduced Total Vehicle Emission Costs <sup>32</sup>	\$99,000
TOTAL TRANSPORTATION BENEFITS	\$2,420,000

# Limitations

The primary purpose of the analysis is to enable a more informed policy discussion on the benefits of investing in the proposed GRT. 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 in order of magnitude estimates, rather than exact amounts.

It should also be taken into consideration that this analysis was done using cross-sectional comparable trails whose counts were at times averaged into a daily score. As a result, the analysis does not consider seasonality, the difference between weekday and weekend visitors, or other temporal factors. Furthermore, in the demand decay methodology, it is of note that all attractions were treated equally. In treating all attractions as the same, there could be areas that were awarded more rural recreation demand than they should have, and conversely less rural recreation demand than they should have. This is likely to balance out over the full alignment, but worth noting.

#### **APPENDIX A FOOTNOTES**

- All monetary benefits in this assessment are order-of-magnitude estimates that are rounded to the nearest thousand.
- Includes particulate matter 2.5, nitrous oxides, sulfur oxides, and volatile organic compounds.
- <sup>3</sup> Bureau of Transportation Statistics Local Area Transportation Characteristics for Households Data <a href="https://www.bts.gov/latch/latch-data">https://www.bts.gov/latch/latch-data</a>.
- Buffers that did not have at least one attraction were omitted from the demand decay function.
- Travel Day Person Trips (in millions), NHTSA 2017 <a href="https://nhts.ornl.gov/">https://nhts.ornl.gov/>.</a>
- Volker et al (2019). Quantifying Reductions in Vehicle Miles Traveled from New Bike Paths, Lanes, and Cycle Tracks.
- <sup>7</sup> Replica Places (2019). <a href="https://replicahq.com/">https://replicahq.com/</a>.
- 8 NHTS (2017). <a href="http://nhts.ornl.gov/tables09/fatcat/2009/aptl\_TRPTRANS\_WHYTRP1S.html">http://nhts.ornl.gov/tables09/fatcat/2009/aptl\_TRPTRANS\_WHYTRP1S.html</a>.
- 9 Ihid
- Safe Routes National Center for Safe Routes to School, Trends in Walking and Bicycling to School from 2007 to 2012 (2013). <a href="https://www.pedbikeinfo.org/pdf/SRTSlocal\_Trends2007-2012.pdf">https://www.pedbikeinfo.org/pdf/SRTSlocal\_Trends2007-2012.pdf</a>.
- NHTS (2017). http://nhts.ornl.gov/tables09/fatcat/2009/aptl\_ TRPTRANS\_WHYTRP1S.html.
- la Ibid.
- This assumes the average nightly hotel rate of \$93 from Budget your Trip <a href="https://www.budgetyourtrip.com/united-states-of-america/">https://www.budgetyourtrip.com/united-states-of-america/</a> and the proportion of visitors who stay overnight on recreational bicycle rides (42%) from The Economic Significance of Bicycle-Related Travel in Oregon.
- Spring Intercept Survey Results. Huntsville/Madison County Convention & Visitors Bureau (2017).
- Proportion of visitors who stay overnight on recreational bicycle rides from The Economic Significance of Bicycle-Related Travel in Oregon.
- These values are calculated from the average spending totals and rates of spending shown in Table 12.
- Benefit-Cost Analysis Guidance for Discretionary Grant Programs. U.S. Department of Transportation (2022). <a href="https://www.transportation.gov/sites/dot.gov/files/2022-03/Benefit%20Cost%20Analysis%20">https://www.transportation.gov/sites/dot.gov/files/2022-03/Benefit%20Cost%20Analysis%20</a> Guidance%202022%20%28Revised%29.pdf
- These values are calculated from the average spending totals and rates of spending shown in Table 12.
- The Safer Affordable Fuel-Efficient Vehicles Rule for MY2021-MY2026 Passenger Cars, BUILD Guidance 2020, Table A-7 and Light Trucks Preliminary Regulatory Impact Analysis (October 2018) <a href="https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/ld\_cafe\_co2\_nhtsa\_2127-al76\_epa\_pria\_181016.pdf">https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/ld\_cafe\_co2\_nhtsa\_2127-al76\_epa\_pria\_181016.pdf</a>.
- The Safer Affordable Fuel-Efficient Vehicles Rule for MY2021-MY2026 Passenger Cars, BUILD Guidance 2020, Table A-7 and Light Trucks Preliminary Regulatory Impact Analysis (October 2018) <a href="https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/ld\_cafe\_co2\_nhtsa\_2127-ai76\_epa\_pria\_181016.pdf">https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/ld\_cafe\_co2\_nhtsa\_2127-ai76\_epa\_pria\_181016.pdf</a>.
- The Safer Affordable Fuel-Efficient Vehicles Rule for MY2021-MY2026 Passenger Cars, BUILD Guidance 2020, Table A-7 and Light Trucks Preliminary Regulatory Impact Analysis (October 2018) <a href="https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/ld\_cafe\_co2\_nhtsa\_2127-al76\_epa\_pria\_181016.pdf">https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/ld\_cafe\_co2\_nhtsa\_2127-al76\_epa\_pria\_181016.pdf</a>.

- The Safer Affordable Fuel-Efficient Vehicles Rule for MY2021-MY2026 Passenger Cars, BUILD Guidance 2020, Table A-7 and Light Trucks Preliminary Regulatory Impact Analysis (October 2018) <a href="https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/ld\_cafe\_co2\_nhtsa\_2127-al76\_epa\_pria\_181016.pdf">https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/ld\_cafe\_co2\_nhtsa\_2127-al76\_epa\_pria\_181016.pdf</a>.
- Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866. <a href="https://www.epa.gov/sites/default/files/2016-12/documents/sc\_co2\_tsd\_august\_2016.pdf">https://www.epa.gov/sites/default/files/2016-12/documents/sc\_co2\_tsd\_august\_2016.pdf</a>.
- <sup>24</sup> Caltrans Highway Safety Improvement Program <a href="https://dot.ca.gov/hq/">https://dot.ca.gov/hq/</a> <a href="LocalPrograms/HSIP/apply\_nowHSIP.htm">LocalPrograms/HSIP/apply\_nowHSIP.htm</a>.
- Kitamura, R., Zhao, H., and Gubby, A. R. Development of a Pavement Maintenance Cost Allocation Model. Institute of Transportation Studies, University of California, Davis. <a href="https://trid.trb.org/view.aspx?id=261768">https://trid.trb.org/view.aspx?id=261768</a>.
- Average Annual Miles per Driver by Age Group. Last modified: September 26, 2014. FHWA. <a href="https://www.fhwa.dot.gov/ohim/onh00/bar8.htm">https://www.fhwa.dot.gov/ohim/onh00/bar8.htm</a>; Using Figure ES.3 "Cost of Crashes and Congestion per Vehicle Mile Traveled" ratios from 2008 report and adjusting to 2011 values. <a href="https://exchange.aaa.com/wp-content/uploads/2012/07/AAA-Crashes-vs-Congestion-2011.pdf">https://exchange.aaa.com/wp-content/uploads/2012/07/AAA-Crashes-vs-Congestion-2011.pdf</a>.
- Average Annual Miles per Driver by Age Group. Last modified: September 26, 2014. FHWA. <a href="https://www.fhwa.dot.gov/ohim/onh00/bar8.htm">https://www.fhwa.dot.gov/ohim/onh00/bar8.htm</a>; Using Figure ES.3 "Cost of Crashes and Congestion per Vehicle Mile Traveled" ratios from 2008 report and adjusting to 2011 values. <a href="http://www.camsys.com/pubs/AAA.pdf">http://www.camsys.com/pubs/AAA.pdf</a>.
- <sup>28</sup> Kitamura, R., Zhao, H., and Gubby, A. R. Development of a Pavement Maintenance Cost Allocation Model. Institute of Transportation Studies, University of California, Davis.
- American Automobile Association, Your Driving Costs -2017 Edition (2017) <a href="https://exchange.aaa.com/wp-content/uploads/2017/08/17-0013\_Your-Driving-Costs-Brochure-2017-FNL-CX-1.pdf">https://exchange.aaa.com/wp-content/uploads/2017/08/17-0013\_Your-Driving-Costs-Brochure-2017-FNL-CX-1.pdf</a>.
- <sup>30</sup> Average Annual Emissions and Fuel Consumption for Gasoline-Fueled Passenger Cars and Light Trucks, EPA (2008) <a href="https://www3.epa.gov/otaq/consumer/420f08024.pdf">https://www3.epa.gov/otaq/consumer/420f08024.pdf</a>>.
- 31 Ibid. Includes particulate matter, nitrous oxides, sulfur oxides, and volatile organic compounds.
- 32 GHG Equivalencies Calculator, EPA <a href="https://www.epa.gov/energy/ghg-equivalencies-calculator-calculations-and-references">https://www.epa.gov/energy/ghg-equivalencies-calculator-calculations-and-references</a>.



Prepared by: