THE GREAT REDWOOD TRAIL

ECONOMIC BENEFITS ASSESSMENT

2023

Coastal Conservancy

From 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**

Photo Credit: The Wildlands Conservancy

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To learn more about the project and Great Redwood Trail Agency (GRTA), please visit TheGreatRedwoodTrail.org.

BENEFITS SUMMARY

Total Annual Benefits:

$102,568,000[1]

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 and **$5,490,000** in annual tax revenue increase.

[1] 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

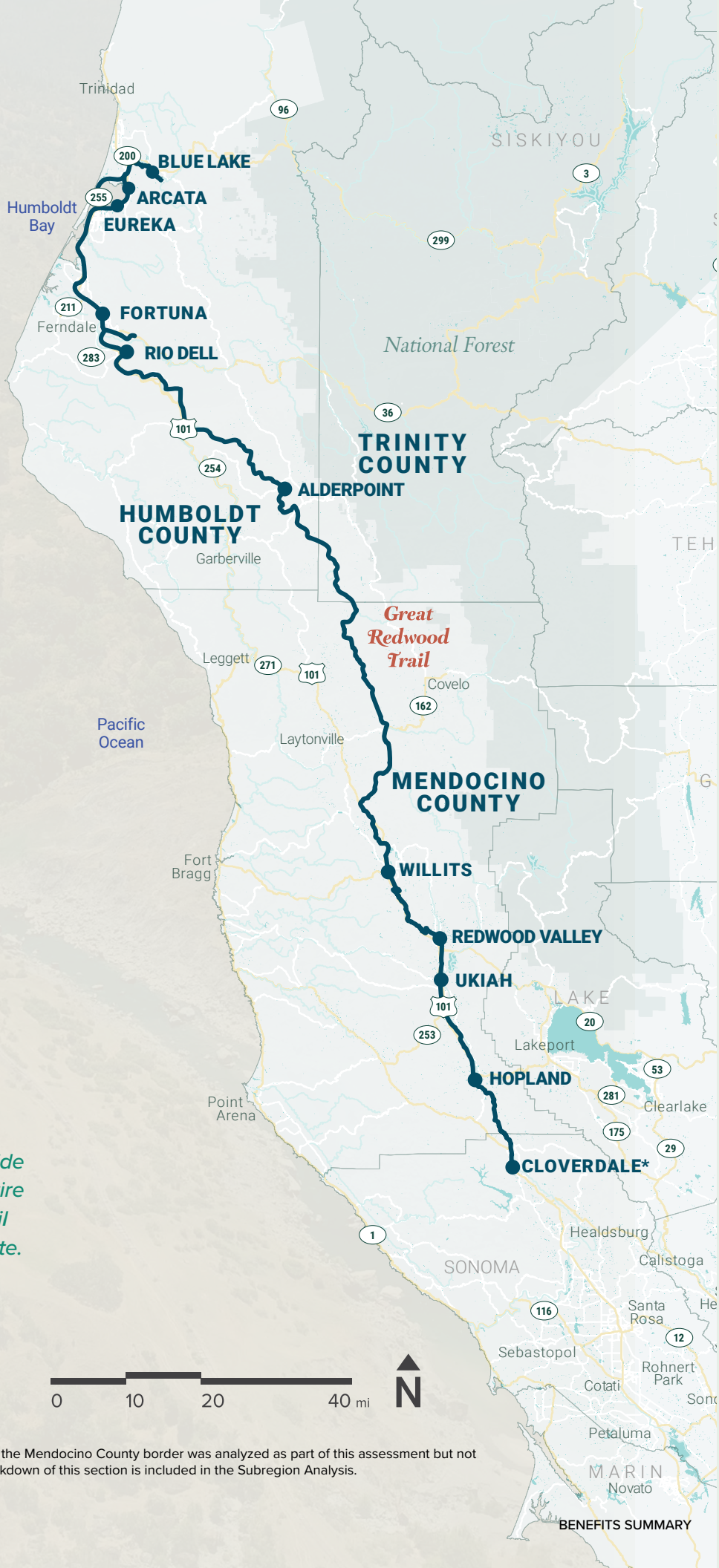
$2,420,000

TRANSPORTATION BENEFITS

$5,490,000

TAX REVENUE INCREASE

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.



Great Redwood Trail project corridor

0 10 20 40 mi

N

***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.

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

67%

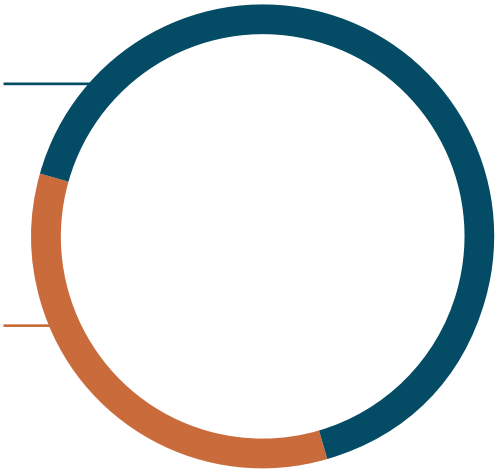
4.1 to 6.1 million

ANNUAL LOCAL USE

33%

2.1 to 3.1 million

ANNUAL VISITOR (NON-LOCAL) USE



METHODOLOGY[1]

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.

Given the broad geographic reach of the Great Redwood Trail, the demand analysis is context-sensitive to account for the variety of unique 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 Great Redwood Trail.

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

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

[1] 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[1] 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,[2] 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.

[1] Pedestrian counts include all non-cycling modes, including backpacking, equestrian, and people with mobility devices.
[2] 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.

Daily Estimated Walk and Bike Trips per Mile

1 - 75 | 75 - 150 | 150+

***NOTE:** The 4 mile section in Sonoma County to Cloverdale 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.

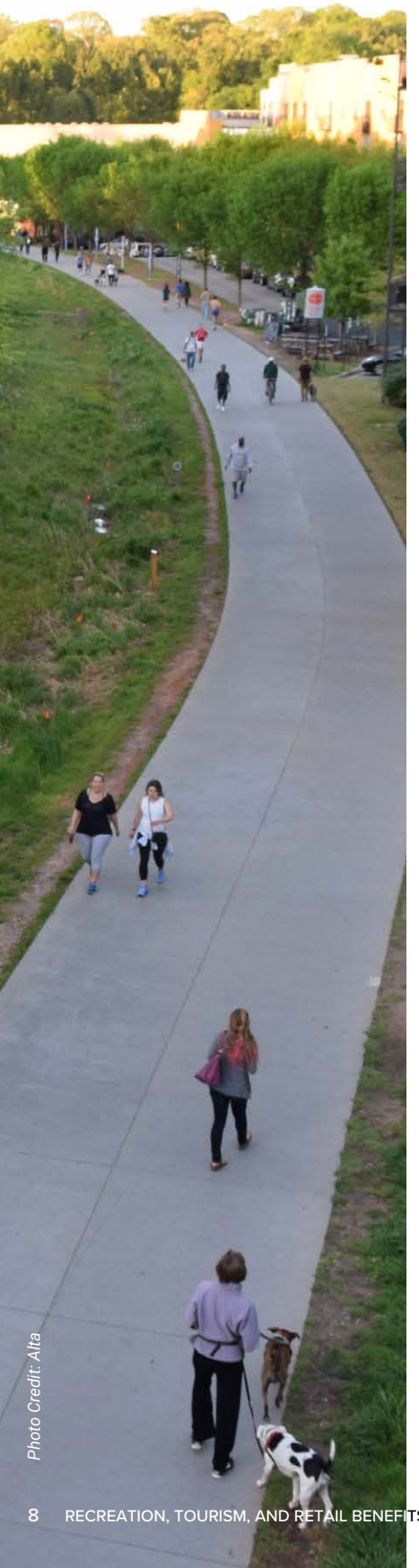


Photo Credit: Alta

RECREATION, TOURISM, AND RETAIL BENEFITS[1]

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[3]

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. These benefits will result in an increase of **$5,490,000** in annual tax revenue for local, regional, and state jurisdictions from sales and transient occupancy tax.

[1] For a complete breakdown of the recreation, tourism, and retail assessment methodology, reference Appendix A: Methodology.
[2] Averages based on typical group size of four people.
[3] Typical lodging expenditure is an average per group of non-local users based on the assumption that 42% of non-local 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.[1]
- 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.

[1] Hipcamp's missionis simple: Get more people outside (2022).
[2] 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

$5,490,000
TAX REVENUE INCREASE

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

HEALTH BENEFITS[1]

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

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.[2] In Mendocino County, top community health priorities include addressing childhood obesity, family wellness, and mental health.[3] 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.

[1] For a complete breakdown of the Health Analysis methodology, reference Appendix A: Methodology.

[2] 2018 Humboldt County Community Health Assessment (2018), <https://humboldtgov.org/DocumentCenter/View/71701/2018-Community-Health-Assessment-PDF>

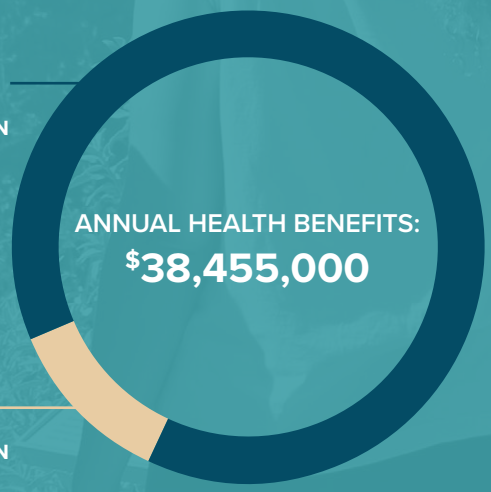
[3] 2019 Mendocino County Community Health Needs Assessment (2019), <https://www.healthymendocino.org/content/sites/mendocino/chna_images/1_2019_CHNA_Key_Findings_Summary__Report.pdf>

Photo Credit: Alta

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

$4,464,000
MORTALITY REDUCTION BENEFITS FROM CYCLING



Annual Health Benefits:

$38,455,000

TRANSPORTATION BENEFITS[1]

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.

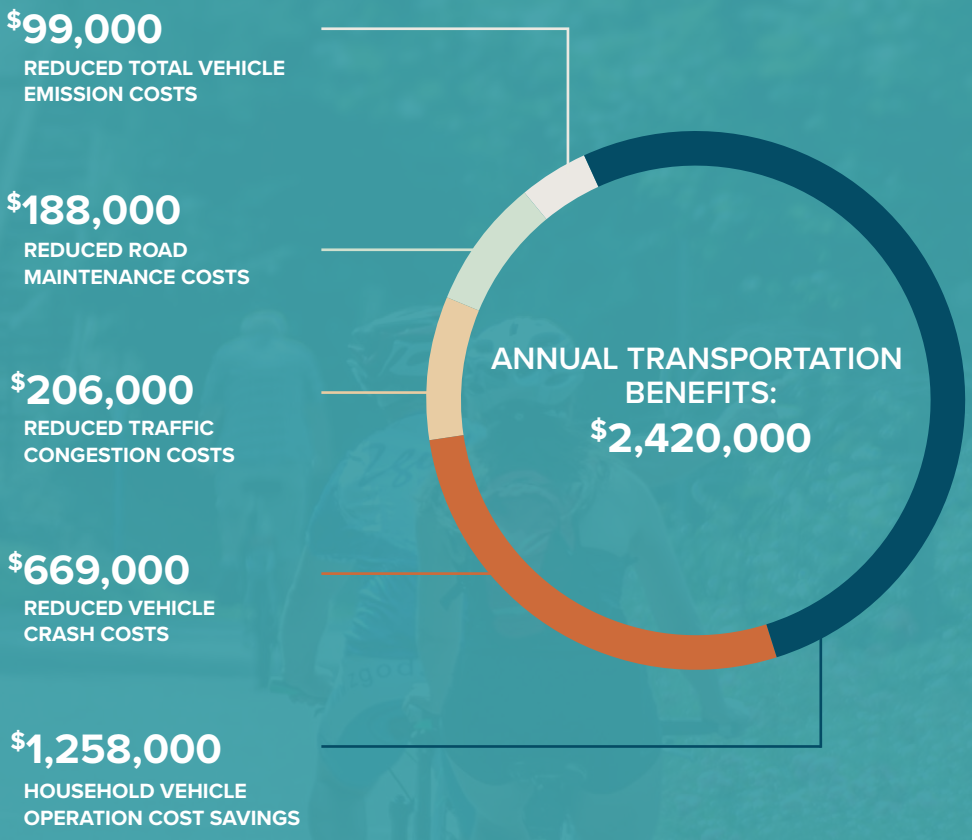
In addition to cost savings, reduced emissions[3] as a result of fewer vehicle-miles traveled will have lasting impacts on the health and well-being of residents in the region. These impacts may include increased air quality, mitigation of climate change impacts through reduced fossil fuels, and improved 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_2 removed from the atmosphere by 1,456 acres of U.S. forests in one year.[4]

[1] For a complete breakdown of the transportation assessment methodology, reference Appendix A: Methodology.
[2] Trip replacement refers to the percentage of car trips that are estimated to be replaced by biking or walking, based on industry research.
[3] Includes carbon dioxide, nitrous oxides, sulfur oxides, particulate matter, and volatile organic compounds.
[4] EPA (2022). https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

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.



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.

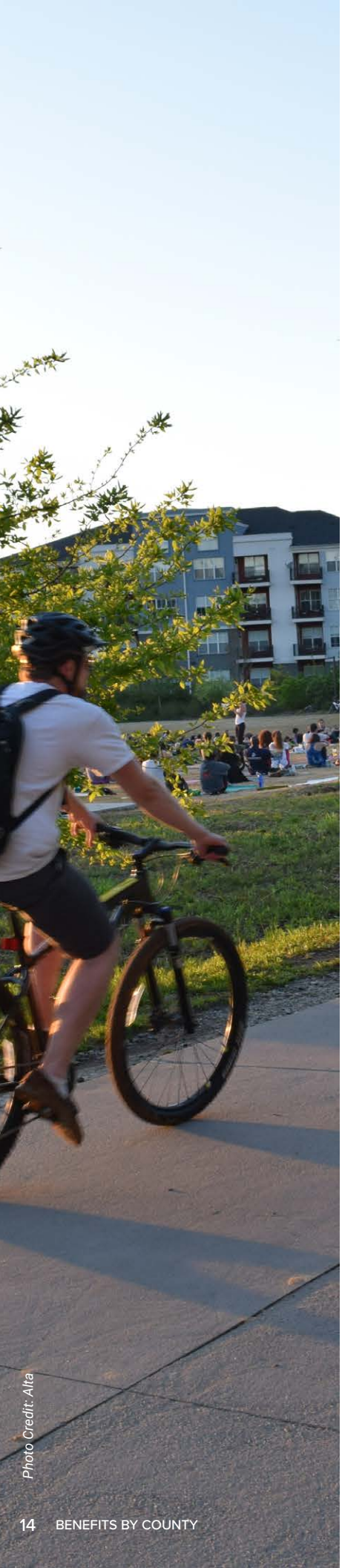


Photo Credit: Alta

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. Tax revenue is included for reference on the County benefits tables on the following pages.

HUMBOLDT COUNTY 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

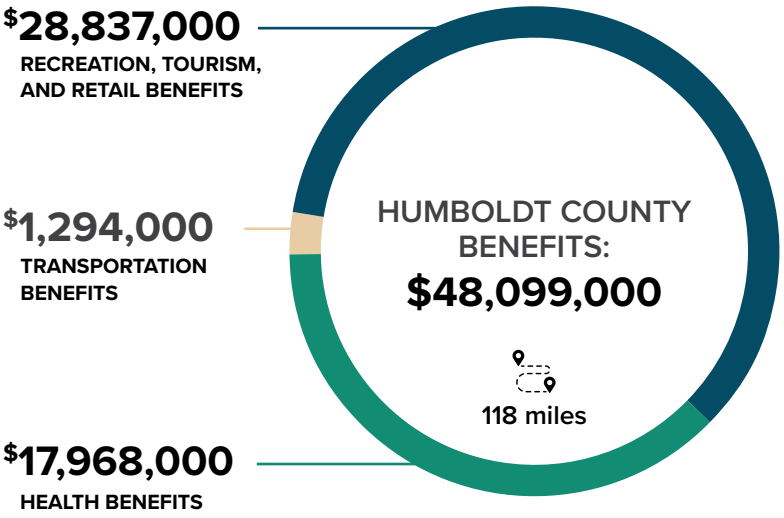
TRANSPORTATION BENEFITS	$1,034,000
HEALTH BENEFITS	$18,485,000
RECREATION, TOURISM, & RETAIL BENEFITS	$29,662,000
TOTAL BENEFITS:	**$49,181,000**

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.

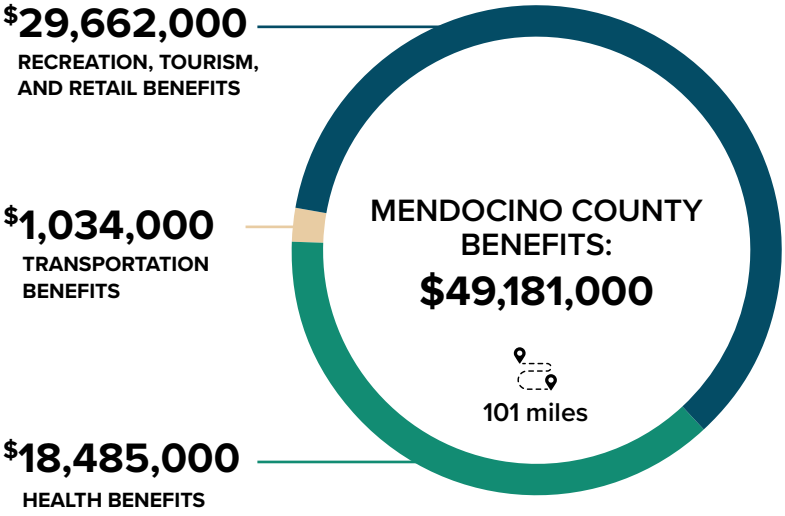


TOTAL TAX REVENUE INCREASE	$2,835,000
Sales Tax	$1,242,000
Transient Occupancy (Lodging) Tax	$1,593,000

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.



TOTAL TAX REVENUE INCREASE	$2,646,000
Sales Tax	$1,215,000
Transient Occupancy (Lodging) Tax	$1,431,000

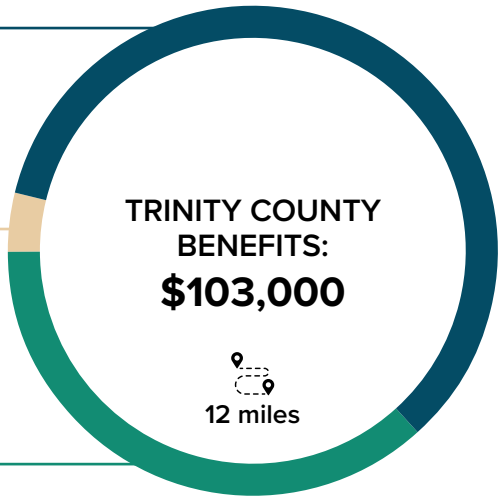
RECREATION, TOURISM, AND RETAIL BENEFITS	$29,662,000
Food/Meals	$11,308,000
Retail	$2,872,000
Entertainment	$913,000
Bicycle Rental	$191,000
Lodging	$14,378,000
TRANSPORTATION BENEFITS	**$1,034,000**
Reduced Traffic Congestion Costs	$88,000
Reduced Vehicle Crash Costs	$286,000
Reduced Road Maintenance 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

$61,400
RECREATION, TOURISM, AND RETAIL BENEFITS

$3,800
TRANSPORTATION BENEFITS

$38,000
HEALTH BENEFITS



TOTAL TAX REVENUE INCREASE	$9,000
Sales Tax	$3,000
Transient Occupancy (Lodging) Tax	$6,000

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. Tax revenue is included for reference on the subregion benefits tables on the following pages.

Photo Credit: Alta

***NOTE:** Extents of the Great Redwood Trail are color coded by Subregion.

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[1]

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**

[1] 4 miles from Cloverdale to the Mendocino County border

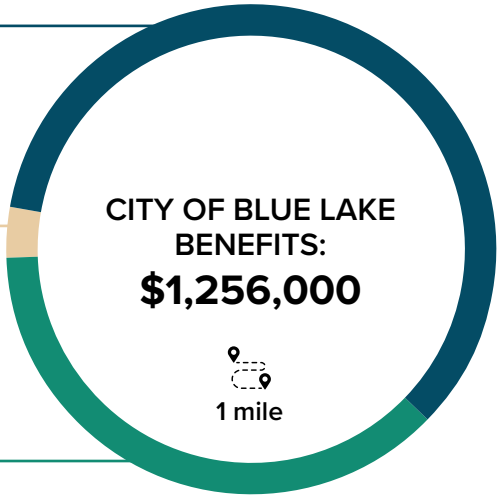
CITY OF BLUE LAKE

HUMBOLDT COUNTY

$749,000
RECREATION, TOURISM, AND RETAIL BENEFITS

$41,000
TRANSPORTATION BENEFITS

$466,000
HEALTH BENEFITS



TOTAL TAX REVENUE INCREASE	$70,000
Sales Tax	$30,000
Transient Occupancy (Lodging) Tax	$40,000

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**

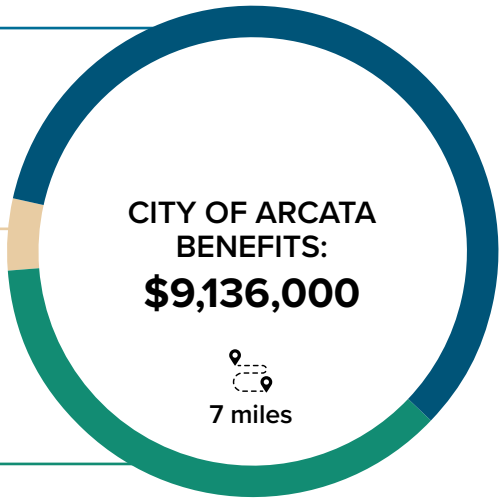
CITY OF ARCATA

HUMBOLDT COUNTY

$5,361,000
RECREATION, TOURISM, AND RETAIL BENEFITS

$412,000
TRANSPORTATION BENEFITS

$3,363,000
HEALTH BENEFITS



TOTAL TAX REVENUE INCREASE	$490,000
Sales Tax	$230,000
Transient Occupancy (Lodging) Tax	$260,000

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**

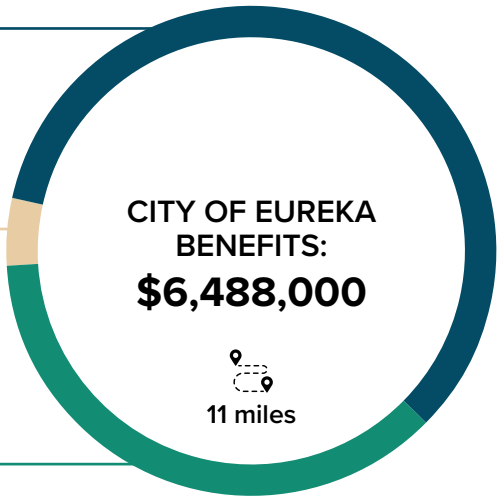
CITY OF EUREKA

HUMBOLDT COUNTY

$3,825,000
RECREATION, TOURISM, AND RETAIL BENEFITS

$286,000
TRANSPORTATION BENEFITS

$2,377,000
HEALTH BENEFITS



TOTAL TAX REVENUE INCREASE	$370,000
Sales Tax	$180,000
Transient Occupancy (Lodging) Tax	$190,000

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**

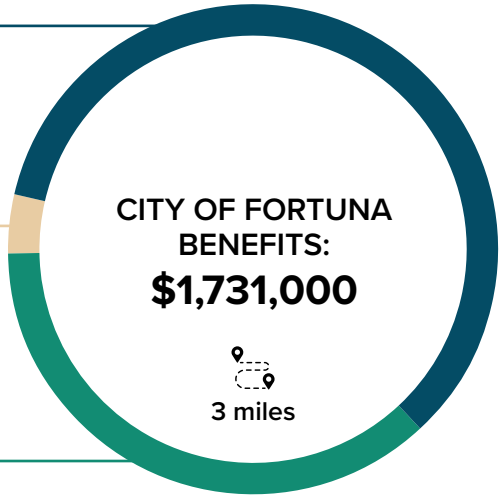
CITY OF FORTUNA

HUMBOLDT COUNTY

$1,030,000
RECREATION, TOURISM, AND RETAIL BENEFITS

$64,000
TRANSPORTATION BENEFITS

$637,000
HEALTH BENEFITS



TOTAL TAX REVENUE INCREASE	$100,000
Sales Tax	$50,000
Transient Occupancy (Lodging) Tax	$50,000

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**

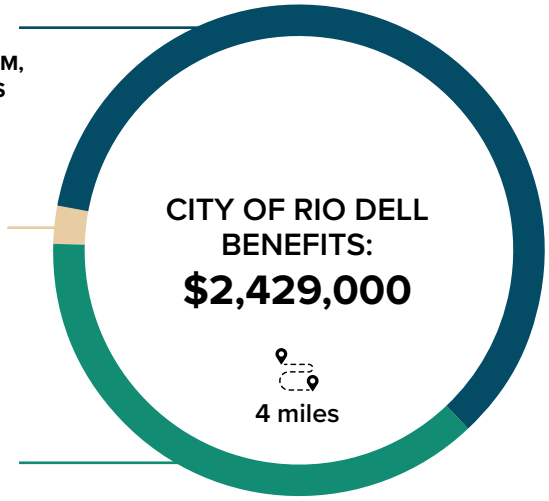
CITY OF RIO DELL

HUMBOLDT COUNTY

$1,461,000
RECREATION, TOURISM, AND RETAIL BENEFITS

$58,000
TRANSPORTATION BENEFITS

$910,000
HEALTH BENEFITS



TOTAL TAX REVENUE INCREASE	$130,000
Sales Tax	$70,000
Transient Occupancy (Lodging) Tax	$60,000

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**

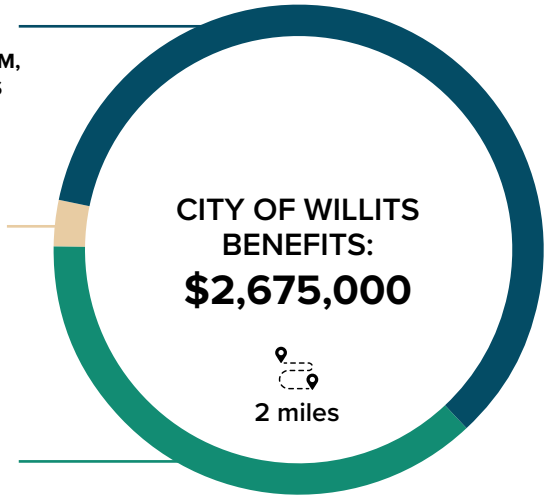
CITY OF WILLITS

MENDOCINO COUNTY

$1,600,000
RECREATION, TOURISM, AND RETAIL BENEFITS

$78,000
TRANSPORTATION BENEFITS

$997,000
HEALTH BENEFITS

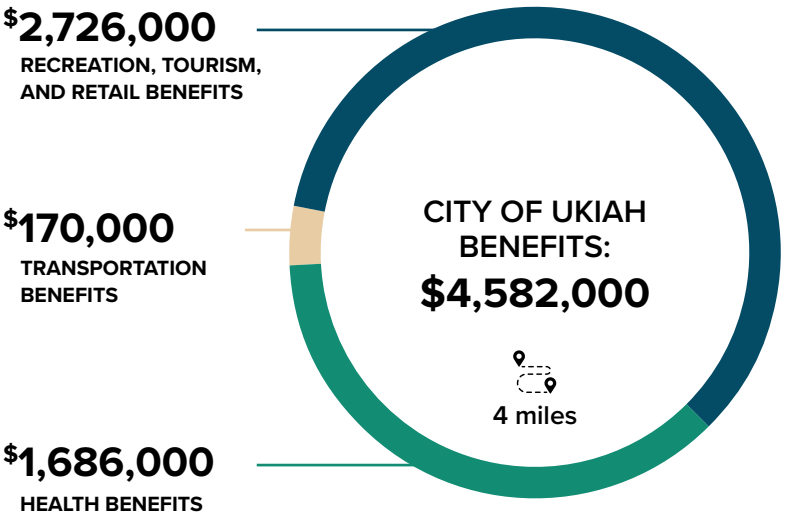


TOTAL TAX REVENUE INCREASE	$160,000
Sales Tax	$80,000
Transient Occupancy (Lodging) Tax	$80,000

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



TOTAL TAX REVENUE INCREASE	$250,000
Sales Tax	$120,000
Transient Occupancy (Lodging) Tax	$130,000

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**

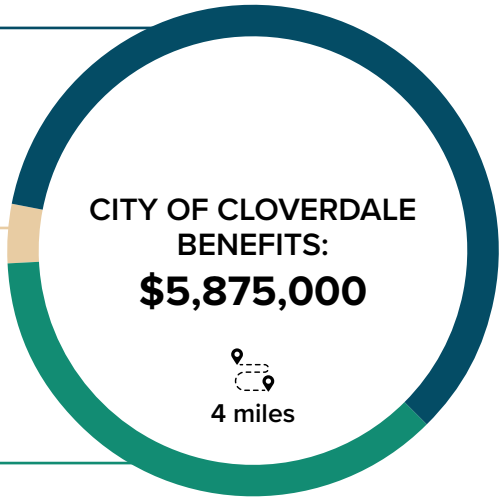
CITY OF CLOVERDALE

SONOMA COUNTY

$3,540,000
RECREATION, TOURISM, AND RETAIL BENEFITS

$128,000
TRANSPORTATION BENEFITS

$2,207,000
HEALTH BENEFITS

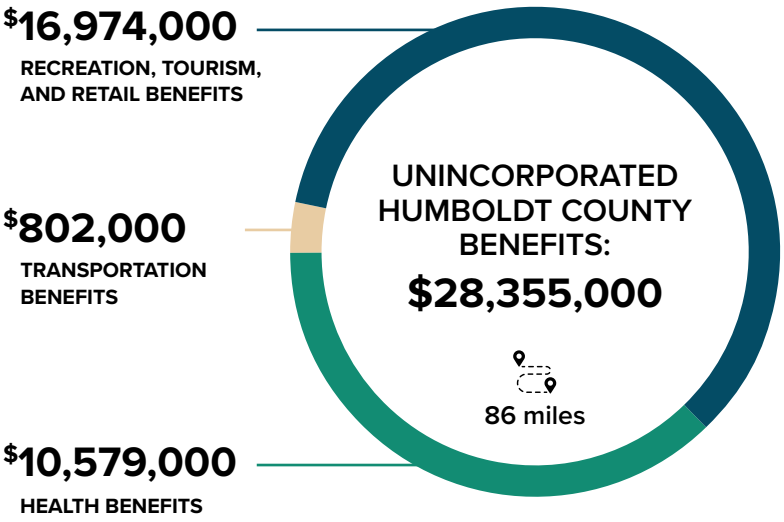


TOTAL TAX REVENUE INCREASE	$330,000
Sales Tax	$160,000
Transient Occupancy (Lodging) Tax	$170,000

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.



TOTAL TAX REVENUE INCREASE	$1,670,000
Sales Tax	$680,000
Transient Occupancy (Lodging) Tax	$990,000

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**

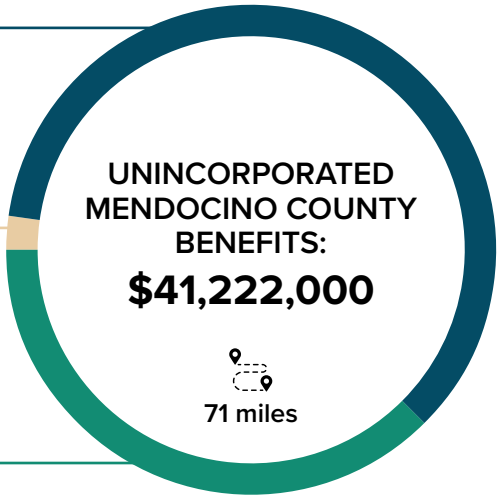
UNINCORPORATED MENDOCINO COUNTY

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

$24,887,000
RECREATION, TOURISM, AND RETAIL BENEFITS

$814,000
TRANSPORTATION BENEFITS

$15,521,000
HEALTH BENEFITS



TOTAL TAX REVENUE INCREASE	$2,220,000
Sales Tax	$1,010,000
Transient Occupancy (Lodging) Tax	$1,210,000

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**

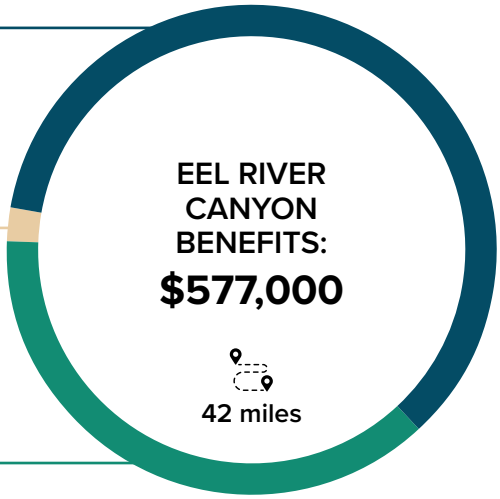
EEL RIVER CANYON

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

$348,000
RECREATION, TOURISM, AND RETAIL BENEFITS

$12,000
TRANSPORTATION BENEFITS

$217,000
HEALTH BENEFITS



TOTAL TAX REVENUE INCREASE	$30,000
Sales Tax	$10,000
Transient Occupancy (Lodging) Tax	$20,000

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**

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ECONOMIC BENEFITS ASSESSMENT

APPENDIX

THE GREAT REDWOOD TRAIL

Coastal Conservancy

Photo Credit: The Wildlands Conservancy

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_2, NO_X, SO_X, and $PM_{2.5}$), 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[1]
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)[2]	5.78
Total Vehicle Emission Costs Reduced	$99,000
TOTAL BENEFITS	**$102,568,000**

**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.[3] **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"[1] 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

[1] Replica Places (2022). https://replicahq.com/places/

Photo Credit: Alta

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)[4]	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)	ATM
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

$$\textit{Decayed Walk Trips} = \textit{Walk Trips} - (\textit{Walk Trip} \times \textit{Combined Demand Decay Rate})$$

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 person-miles 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*[5]

	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[6], a univariate regression model estimates the motor vehicle trip replacement factor based on the percentage of trips that terminate in census block groups within ¼-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.[7] 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)*

	BIKE	WALK
Commute Trips[8]	2.47	0.72
College Trips[9]	1.31	0.43
K–12 School Trips[10]	1.36	0.69
Utilitarian Trips[11]	2.28	0.83
Social/Recreational Trips[12]	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*

LOCATION	TRIP POINT OF ORIGIN (PERCENT OF SURVEYED USERS, NUMBER OF RESPONSES)		SURVEYED USERS	SOURCE
	LOCAL	NON-LOCAL		
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[13] (**Table 12**).

Table 12. *Average Expenditures*

LOCATION	AVERAGE EXPENDITURES (PERCENTAGE OF SURVEYED USERS, NUMBER OF RESPONSES, AVERAGE EXPENSES)					SOURCE
	FOOD/MEALS		RETAIL	ENTERTAINMENT	BICYCLE RENTAL	
	RESTAURANT	GROCERY				
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,[14] 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),[15] 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*[16]

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)[17] 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 Benefits*[18]

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)[19]	0.00000005	$0.019032
Nitrous Oxides (NO_X)[20]	0.00000069	$0.006051
Sulfur Oxides (SO_X)[21]	0.00000001	$0.000391
Volatile Organic Compounds (VOC)[22]	0.00000103	$0.002205
Carbon Dioxide[23]	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.[24] 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.[25]

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[26]	$206,000
Reduced Vehicle Crash Costs[27]	$669,000
Reduced Road Maintenance Costs[28]	$188,000
Household Vehicle Operation Cost Savings[29]	$1,258,000
CO_2 Emissions Reduced[30]	1,230 (metric tons)
Other Vehicle Emissions Reduced [31]	5.78 (metric tons)
Reduced Total Vehicle Emission Costs[32]	$99,000
TOTAL TRANSPORTATION BENEFITS	**$2,420,000**

Tax Revenue Benefits

The research team calculated the relative splits in combined sales tax (County and State, City when applicable) and transit occupancy (lodging) tax for the jurisdictions that fall under the Great Redwood Trail. These numbers were calculated from non-local spending rates from non-local users of the trail. The combined sales tax was applied to food, entertainment, retail and bicycle rental spending. The transient occupancy tax was applied to lodging spending.

For specific owner operator splits, revenues were calculated using the jurisdiction's specific sales and transient occupancy tax rates. As the Wildlands Conservancy falls within the counties of Trinity, Mendocino and Humboldt, the research team took the average of these counties' tax rates when calculating tax revenues. For county splits, revenues were calculated using each respective county's tax rates.

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

[1] All monetary benefits in this assessment are order-of-magnitude estimates that are rounded to the nearest thousand.

[2] Includes particulate matter 2.5, nitrous oxides, sulfur oxides, and volatile organic compounds.

[3] Bureau of Transportation Statistics Local Area Transportation Characteristics for Households Data https://www.bts.gov/latch/latch-data.

[4] Buffers that did not have at least one attraction were omitted from the demand decay function.

[5] Travel Day Person Trips (in millions), NHTSA 2017 <https://nhts.ornl.gov/>.

[6] Volker et al (2019). Quantifying Reductions in Vehicle Miles Traveled from New Bike Paths, Lanes, and Cycle Tracks.

[7] Replica Places (2019). https://replicahq.com/.

[8] NHTS (2017). http://nhts.ornl.gov/tables09/fatcat/2009/aptl_TRPTRANS_WHYTRP1S.html.

[9] Ibid.

[10] Safe Routes National Center for Safe Routes to School, Trends in Walking and Bicycling to School from 2007 to 2012 (2013). https://www.pedbikeinfo.org/pdf/SRTSlocal_Trends2007-2012.pdf.

[11] NHTS (2017). http://nhts.ornl.gov/tables09/fatcat/2009/aptl_TRPTRANS_WHYTRP1S.html.

[12] Ibid.

[13] This assumes the average nightly hotel rate of $93 from Budget your Trip <https://www.budgetyourtrip.com/united-states-of-america/> and the proportion of visitors who stay overnight on recreational bicycle rides (42%) from The Economic Significance of Bicycle-Related Travel in Oregon.

[14] Spring Intercept Survey Results. Huntsville/Madison County Convention & Visitors Bureau (2017).

[15] Proportion of visitors who stay overnight on recreational bicycle rides from The Economic Significance of Bicycle-Related Travel in Oregon.

[16] These values are calculated from the average spending totals and rates of spending shown in Table 12.

[17] Benefit-Cost Analysis Guidance for Discretionary Grant Programs. U.S. Department of Transportation (2022). https://www.transportation.gov/sites/dot.gov/files/2022-03/Benefit%20Cost%20Analysis%20Guidance%202022%20%28Revised%29.pdf

[18] These values are calculated from the average spending totals and rates of spending shown in Table 12.

[19] 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) https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/ld_cafe_co2_nhtsa_2127-al76_epa_pria_181016.pdf.

[20] 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) https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/ld_cafe_co2_nhtsa_2127-al76_epa_pria_181016.pdf.

[21] 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) https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/ld_cafe_co2_nhtsa_2127-al76_epa_pria_181016.pdf.

[22] 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) https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/ld_cafe_co2_nhtsa_2127-al76_epa_pria_181016.pdf.

[23] Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866. <https://www.epa.gov/sites/default/files/2016-12/documents/sc_co2_tsd_august_2016.pdf>.

[24] Caltrans Highway Safety Improvement Program https://dot.ca.gov/hq/LocalPrograms/HSIP/apply_nowHSIP.htm.

[25] Kitamura, R., Zhao, H., and Gubby, A. R. Development of a Pavement Maintenance Cost Allocation Model. Institute of Transportation Studies, University of California, Davis. https://trid.trb.org/view.aspx?id=261768.

[26] Average Annual Miles per Driver by Age Group. Last modified: September 26, 2014. FHWA. https://www.fhwa.dot.gov/ohim/onh00/bar8.htm; Using Figure ES.3 "Cost of Crashes and Congestion per Vehicle Mile Traveled" ratios from 2008 report and adjusting to 2011 values. <http://exchange.aaa.com/wp-content/uploads/2012/07/AAA-Crashes-vs-Congestion-2011.pdf>.

[27] Average Annual Miles per Driver by Age Group. Last modified: September 26, 2014. FHWA. https://www.fhwa.dot.gov/ohim/onh00/bar8.htm; Using Figure ES.3 "Cost of Crashes and Congestion per Vehicle Mile Traveled" ratios from 2008 report and adjusting to 2011 values. http://www.camsys.com/pubs/AAA.pdf.

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

[29] American Automobile Association, Your Driving Costs - 2017 Edition (2017) <https://exchange.aaa.com/wp-content/uploads/2017/08/17-0013_Your-Driving-Costs-Brochure-2017-FNL-CX-1.pdf>.

[30] Average Annual Emissions and Fuel Consumption for Gasoline-Fueled Passenger Cars and Light Trucks, EPA (2008) <https://www3.epa.gov/otaq/consumer/420f08024.pdf>.

[31] Ibid. Includes particulate matter, nitrous oxides, sulfur oxides, and volatile organic compounds.

[32] GHG Equivalencies Calculator, EPA <https://www.epa.gov/energy/ghg-equivalencies-calculator-calculations-and-references>.

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