

Economic, Environmental, & Social Benefits of Recreational Trails

IN WASHINGTON STATE



WASHINGTON STATE
Recreation and
Conservation Office

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The staff at ECONorthwest prepared this report based on their general knowledge of economics, and on information derived from government agencies, the reports of others, interviews of individuals, or other sources believed to be

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ECONorthwest has not independently verified the accuracy of all such information and makes no representation regarding its accuracy or completeness. Any statements nonfactual in nature constitute the authors' current opinions, which may change as more information becomes available.

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1 | EXECUTIVE SUMMARY

Washington State is home to unparalleled natural resources ranging from extensive coastlines, snow-peaked mountains, and arid river valleys. Through investments in well-maintained trail networks supported by the state, the federal government, tribes, local communities, non-profits, volunteers, and other organizations, these resources provide recreational opportunities to millions of residents and visitors. In total, residents and visitors spend approximately 292 million days per year on recreational trails to walk, run, hike, bike, or backpack.

Residents are avid trail users, spending an average of 38 to 42 days per person per year participating in non-motorized recreational trail use. These activities create economic benefits on multiple dimensions. Trail users contribute over \$8.2 billion to Washington's economy and support over 81,000 jobs every year. Physical activity associated with trail use results in over \$390 million of health savings per year. In addition to these market values, the trails themselves and the ecological they provide are highly valued, providing Washingtonians with over \$8.5 billion in recreational-use value and \$5.9 billion in ecosystem services each year.

EXHIBIT 1. Annual Impacts of Non-Motorized Trail Recreation

IMPACT TYPE	VALUE
Total Trail-User Spending	\$8.4 billion
Economic Contribution	\$8.2 billion
Jobs	81,000
Health Savings	\$390 million
Recreational-Use Value	\$8.5 billion
Ecosystem Services	\$5.9 billion

This report evaluates the economic, environmental, and social benefits of outdoor recreation activities associated with trails and their nexus with the economy of Washington. We define these trail-based activities to include walking, running, hiking, biking, and backpacking on paved and unpaved trails in Washington — motorized and equestrian recreational uses are not included in this analysis. This study is focused on three central questions:

1. How are the trails used by residents and non-residents?
2. What is the economic contribution of the spending associated with trail-based recreation?
3. What are the health, social, and environmental benefits derived from trail landscapes and their use?

To answer the first question and create the inputs needed to answer questions two and three, this report begins with a participation analysis using data collected as part of the Washington State Comprehensive Outdoor Recreation Plan (SCORP), the U.S. Census Bureau's American Community Survey (ACS), and 519 different on-site counts at trails, parks, and recreation areas throughout the state. Using this approach, we are able to estimate the number of non-motorized, non-equine trail user days that take place in every county and legislative district in Washington.

To answer the second question, an economic contributions analysis builds off the results of the participation analysis by calculating the spending associated with trail-based recreation activities mentioned above (i.e. walking, running, hiking, biking, and backpacking). Trail users support local economies by spending money on transportation, lodging, and equipment. Different spending patterns are associated with various activities, durations, and distances from home. These spending patterns are applied to the destination-based user day estimates and input into an economic model of local economies to produce estimates of the total economic contributions and jobs supported by recreational trail use. These results include both the direct impacts of spending, as well as the indirect and induced impacts of increased local economic activity. The third question is answered in three parts:

HEALTH BENEFITS: Recreational trail use is a form of exercise. The physical activity associated with trail-based recreation can reduce the probability of adverse health outcomes, in-turn reducing average health care costs. The monetary value of these health benefits is calculated using the estimates of trips taken to trails by residents of each county, local health statistics, and models of health risk reductions. Exposure to nature through trail use is also associated with mental health benefits. Although not monetized, mental health improvements, as well as the beneficial effects on physical health and productivity they support, are important benefits of trails recreation in Washington.

SOCIAL BENEFITS: Trail users spend money to participate in trail recreation, such as food, gas, equipment, and other expenditures. Because these people chose to engage in trail recreation, we know that they value the experience by at least the cost they pay, but the true value they have for the trail is likely even higher. To estimate this additional value of trails to users we use a measure known as the recreational-

use value. The recreational-use value is calculated using the estimates of trips taken by residents combined with peer-reviewed economic research that empirically measure this excess value for trail-based outdoor recreation. In addition to recreational-use value, other social benefits considered in this report include increases in property values and quality of life attributable to trails. Quality of life improvements also attract business activity to the state that then results in additional economic activity.

ENVIRONMENTAL BENEFITS: Trails do not directly produce substantial environmental benefits, but there are numerous instances throughout the state where their presence and the use and enjoyment they provide to users has prevented alternative, more ecologically impactful uses of the landscape. Although there is no formal process by which a trail directly protects surrounding land, the public processes associated with the State and National Environmental Protection Acts (SEPA and NEPA) on state and federal lands allows the public to voice their preferences and either directly or indirectly preserve land with high recreational values. The preservation of this natural landscape creates ecosystem service benefits. The potential scale of these ecosystem service benefits that accrue from land that may otherwise face development is calculated for all forested U.S. Forest Service land within 500 feet of a trail in Washington that is not otherwise protected (i.e. wilderness), yielding a conservative estimate of ecosystem service values.¹

The statewide estimates produced in this report are designed to inform local, state, and federal decision-makers so they are able to critically evaluate the variety of economic contributions of recreational trails. These estimates are also reported for each county and legislative district in the state in an accompanying web-based data visualization application.² To help understand the implications of trails at the local level, the analytical framework used to produce the state-wide estimates are applied to two case studies: The Spokane River Centennial Trail in eastern Washington, and the Lake Serene Trail in the central Cascades. This report concludes with a summary of policy recommendations developed during the preparation of this study.

¹ We excluded wilderness areas for the environmental benefits analysis because wilderness areas are already preserved from logging and other activities. Because NEPA only applies to federal actions, we included only U.S. Forest Land in this analysis, and not state lands or other federal land to ensure our estimate is conservative. The 500 foot buffer is simply a tool for this economic study

² The web-based results are available at: https://econw.shinyapps.io/econ_wa_rec_trails/

TERMINOLOGY



TRAIL-USER SPENDING is the total amount of money spent on trail-based recreation, including equipment, travel and lodging, entrance fees, and food and beverages, among others.



ECONOMIC CONTRIBUTION: is equivalent to economic output and represents the total value of all goods and services resulting from the spending by trail users. It is the broadest measure of economic activity because it does not consider intermediate supply costs.



JOBS: is a measure of employment which is expressed in terms of full-year-equivalents (FYE). One FYE job represents work over twelve months in an industry and can be either a part-time or full-time position.



LABOR INCOME: consists of employee compensation and proprietor income and is a subset of output. This includes workers' wages and salaries, as well as other benefits such as health, disability, and life insurance, retirement payments, and non-cash compensation.



RECREATIONAL-USE VALUE: is a monetary estimate of the amount a trail user would be willing to pay above and beyond the costs associated with that activity, including travel costs. Our definition of recreational-use value is equivalent to consumer surplus.



HEALTH SAVINGS: is a monetary estimate of reduced expenditures on health care and avoided productivity losses due to a reduction in the relative risk of disease as a result of increased physical activity.



ECOSYSTEM SERVICES: is a measure of the environmental benefits that flow to humans, including habitat provision, carbon sequestration, air filtration, and watershed protection.



RESIDENT USER DAYS: is the number of recreational user days taken by residents of a county or state legislative district at any location, as reported in the Washington Resident Outdoor Recreation Survey. The survey-based user day estimate is used to calculate health savings from recreation for residents.



DESTINATION-BASED USER DAYS: is the number of recreational user days taken to trails in a specific county or state legislative district by both residents and non-residents and is equal to the total number of trips in that location on all trails. The destination-based user day estimate is used to calculate the economic contributions from spending in the local economy.

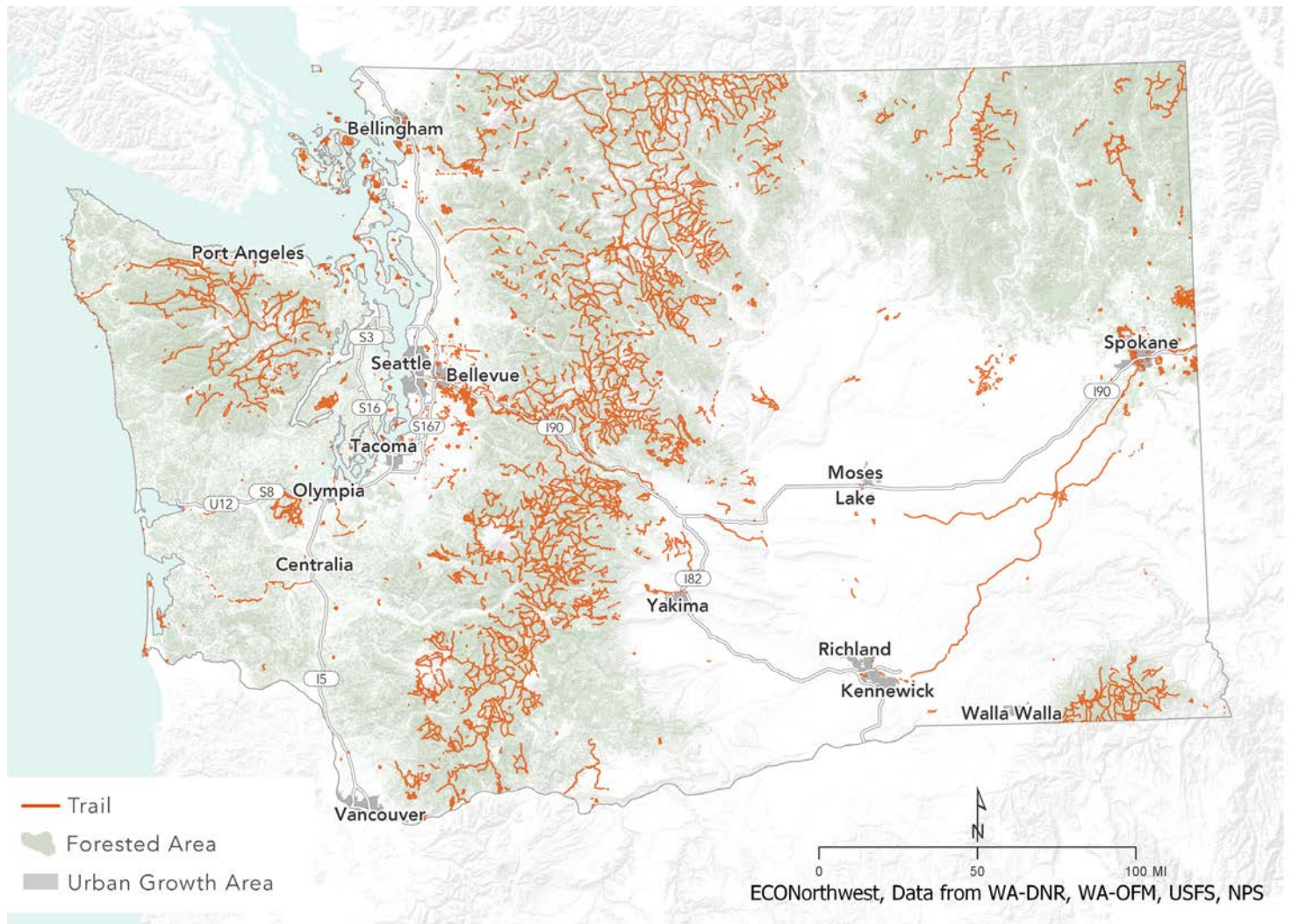
2 | BACKGROUND

Washington has a rich culture of outdoor recreation and the natural amenities to support activities in a variety of environments. Outdoor recreation creates value for Washington through both the economic activity created by the spending of recreationists, as well as the value to users who are able to participate in the activities. The vast majority of Washington residents (84 percent) participate in some form of non-motorized outdoor recreation.³

To partially supply this strong demand for outdoor recreation, Washington State's outdoor recreation resources include over 12,000 miles of trails (all trail types).⁴ Exhibit 2 shows



EXHIBIT 2. Map of Trails in Washington



Source: Washington State Recreation and Conservation Office. | Note: The trails reflected on this map include both motorized and non-motorized trails

³ Jostad, J., Schultz, J., Chase, M. (2017). "State of Washington 2017 Assessment of Outdoor Recreation Demand Report"

⁴ Washington State Recreation and Conservation Office. (No Date). Washington State Trails Map. Retrieved from <https://www.rco.wa.gov/recreation/WashingtonStateTrailsMap.shtml>

the location of trails throughout the state. Many of these trails are located on federally-managed lands throughout the Cascade Range and the Olympic Peninsula, while other trails are located in cities and towns throughout the state.

These trails support an array of outdoor recreation opportunities, from rigorous backpacking trips, leisurely park strolls, snowshoeing routes, downhill biking, and more, all providing physical, mental, social, cultural, and environmental benefits. However, not all trails provide for all types of outdoor recreation. For example, some National Park trails do not allow mountain biking or backpacking. The permitted use of a trail was considered for this analysis in order to exclude motorized trails and equestrian trails.

The popularity of trail use in Washington continues to increase at a rate above and beyond the recent population increases in the state. The *Seattle Times* reports that the increase in Seattle-area hikers has grown by seven times the rate of population growth in the city from 2008 to 2017.⁵ The Pacific Crest Trail Association similarly shows a jump in the number of through-hikers of the Pacific Crest Trail (PCT), which spans from Washington to California. In 2013 there were 1,879 permits issued for the PCT but by 2018 there were 7,313 issued permits, an increase of nearly 300 percent.⁶ Sales of Washington State Discover Pass, a recreational parking permit that provides access to state recreation lands, has increased from 417,000 passes sold in 2012 to 648,800 passes sold in 2018 — a 55 percent increase in only five years.⁷



Portion of the Pacific Crest Trail in Washington. (Photo by Ryan Stone on Unsplash)

2015 STUDY ON VALUE OF OUTDOOR RECREATION IN WASHINGTON

In 2015, Earth Economics prepared a study for Washington Recreation and Conservation Office estimating the value of outdoor recreation in Washington, “Economic Analysis of Outdoor Recreation in Washington State”. This 2015 report considered all forms of outdoor recreation in the state. Using a variety of data sources to estimate participation in outdoor recreation, the 2015 study estimated there were 446 million annual outdoor recreation participant days, approximately 56 per Washingtonian. The 2015 study found that outdoor recreation contributes \$21.6 billion per year to Washington’s economy, supports over 200,000 jobs in the state, and funds over \$2 billion in state and local tax revenue (all values are in 2014 dollars). There are three main ways the 2015 study is different from this report 1) it estimated the value for all outdoor recreation (not only non-motorized trail-based recreation), 2) it obtained visitation estimates from different data sources, and 3) it used different expenditure values based on land type. Because of these differences the results from the 2015 study are not directly comparable with this 2019 report on the value of trail-based recreation in Washington.



(Photo from www.discoverpass.wa.gov, updated by Racfa Design)

⁵ Balk, G. (2018). “Instagram effect? Number of Seattle-area hikers has doubled in less than 10 years, data show”. *The Seattle Times*. April 2. <https://www.seattletimes.com/seattle-news/data/instagram-effect-number-of-seattle-area-hikers-has-doubled-in-less-than-10-years-data-show/>

⁶ Pacific Crest Trail Association. (No Date). *PCT visitor use statistics*. Retrieved from <https://www.pcta.org/our-work/trail-and-land-management/pct-visitor-use-statistics/>

⁷ Balk, G. (2018). “Instagram effect? Number of Seattle-area hikers has doubled in less than 10 years, data show”. *The Seattle Times*. April 2. <https://www.seattletimes.com/seattle-news/data/instagram-effect-number-of-seattle-area-hikers-has-doubled-in-less-than-10-years-data-show/>

3 | PARTICIPATION

292 MILLION ANNUAL USER DAYS OF NON-MOTORIZED TRAIL USE BY WASHINGTONIANS



(Photo provided by Washington Recreation and Conservation Office)

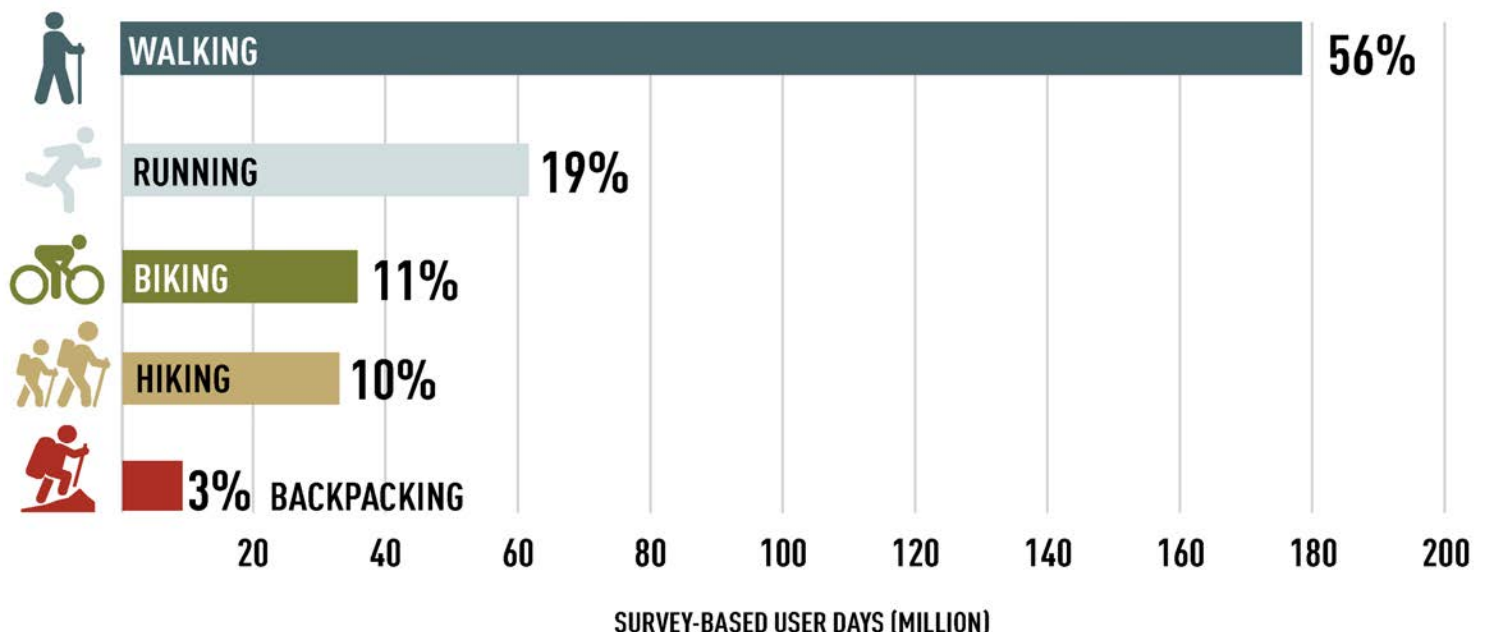
To understand how Washington residents and visitors use trails in the state, we estimate trail-based recreation participation using a combination of survey data and onsite counts. The “resident estimate” produces the number of recreational user days taken by residents of a county or state legislative district. These measures are influenced by the number of people living in that county or state legislative district, their avidity for trail-based recreation, and the availability of trails. This participation estimate serves as the basis for measuring the health and social benefits of trails received by those residents and is used to adjust for limited site coverage in the onsite counts.

A series of onsite counts collected throughout the state are used, along with a coverage adjustment, to estimate the number of recreational user days taken to trails in a specific county

or state legislative district (“destination-based estimate”), which is influenced by the availability and quality of trails and the number of people within a reasonable driving distance. This destination-based participation estimate serves as the basis for measuring the economic contributions of trail-based activities and includes both in-state residents and out-of-state visitors.

These estimates are dependent on the availability, quality, and coverage of recreation use data.⁸ We use a combination of a general-population recreational-use survey, the US Census’ American Community Survey, and on-site counts collected at 519 unique sites by a variety of federal, state, and local agencies to generate both the resident and destination-based user days for participation.⁹

EXHIBIT 3. Resident Estimate of User Days, by Activity



Source: ECONorthwest analysis of the 2017 Washington State Resident Outdoor Recreation Survey.

⁸ Recommendations to improve data collection are included at the end of this report.

⁹ A detailed documentation of the participation estimation approach is available in Technical Appendix A.

3.1 | RESIDENT USER DAY ESTIMATE

The resident user day estimate of participation is the number of recreational user days taken by residents of a county or state legislative district at any location, as reported in the Washington Resident Outdoor Recreation Survey. Survey respondents across the state reported the number of trips taken by activity and location type. In 2017, based on the resident user day estimate, Washington residents reported an average of 42 days per year walking, running, hiking, biking, or backpacking on recreational trails.¹⁰

The majority of these days (56 percent) were spent walking on trails, another 19 percent were spent running on trails, and 11, 10, and 3 percent were spent biking, hiking, and backpacking, respectively (Exhibit 3).

Resident trail user days vary across the individuals and the state and are dependent on both demographic characteristics as well as the availability of trail infrastructure. Even after controlling for individual demographics such as income, education, and age, the number of trailheads in a county influences the number of days residents spend on trails. Each additional trailhead in a county associated with an increase in trail use by 0.6 percent.¹¹

3.2 | DESTINATION-BASED USER DAY ESTIMATE

While the Resident Outdoor Recreation Survey asked residents how many times they engaged in trail-based activities in the last year, it did not explicitly ask the location where those

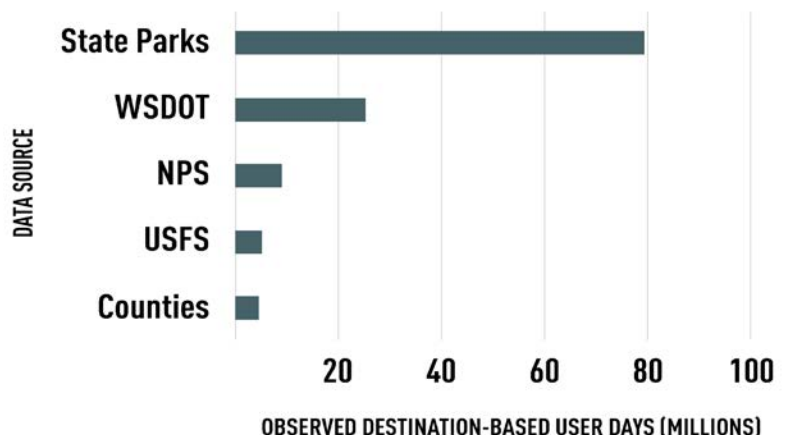
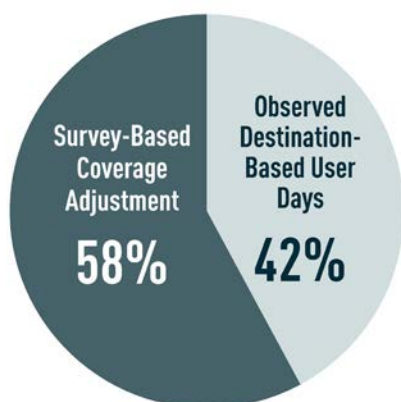
activities took place. Individuals recreate on trails within their own county or legislative district, but they also may travel on day or overnight trips to trails further from home.

To estimate the number of trail-based user days by the county or district in which they occurred, we use an alternative approach that includes all trips taken by Washington residents but also captures out-of-state visitors. This approach uses a set of 519 counts at trails, parks, and recreational facilities and adjusts those data to only include trail-based recreation. Although these data reflect actual recreation user days, they do not fully capture all recreation on all trails since visitation is not available for every trail in Washington. To account for this limited coverage, we supplement those counts with information from the Resident Outdoor Recreation survey.

Using this approach, we estimate 292 million total annual destination user days taking place on trails within Washington State. On-site counts comprise 42 percent of the ultimate estimate of destination-based participation, while the remaining 58 percent of user days reflect the survey-based coverage adjustment. The relative share of these trips is illustrated in Exhibit 4. The distribution of these trips across the state by county are illustrated in Exhibit 5.

Exhibit 6 demonstrates the number of destination use-day trips by state legislative district geography. The physical size of the district, the number of trails, and proximity to population centers affect the destination user-day trip estimates.

EXHIBIT 4. Sources of Destination-Based Participation Estimate



Source: ECONorthwest analysis of visitor use statistics

¹⁰ Since the Resident Outdoor Recreation Survey does not collect information on the destination of these trips, some of them may occur outside of the state.

¹¹ Detailed results are available in Technical Appendix A.

3 | PARTICIPATION

EXHIBIT 5. Number of Annual Destination User-Day Trips to a County

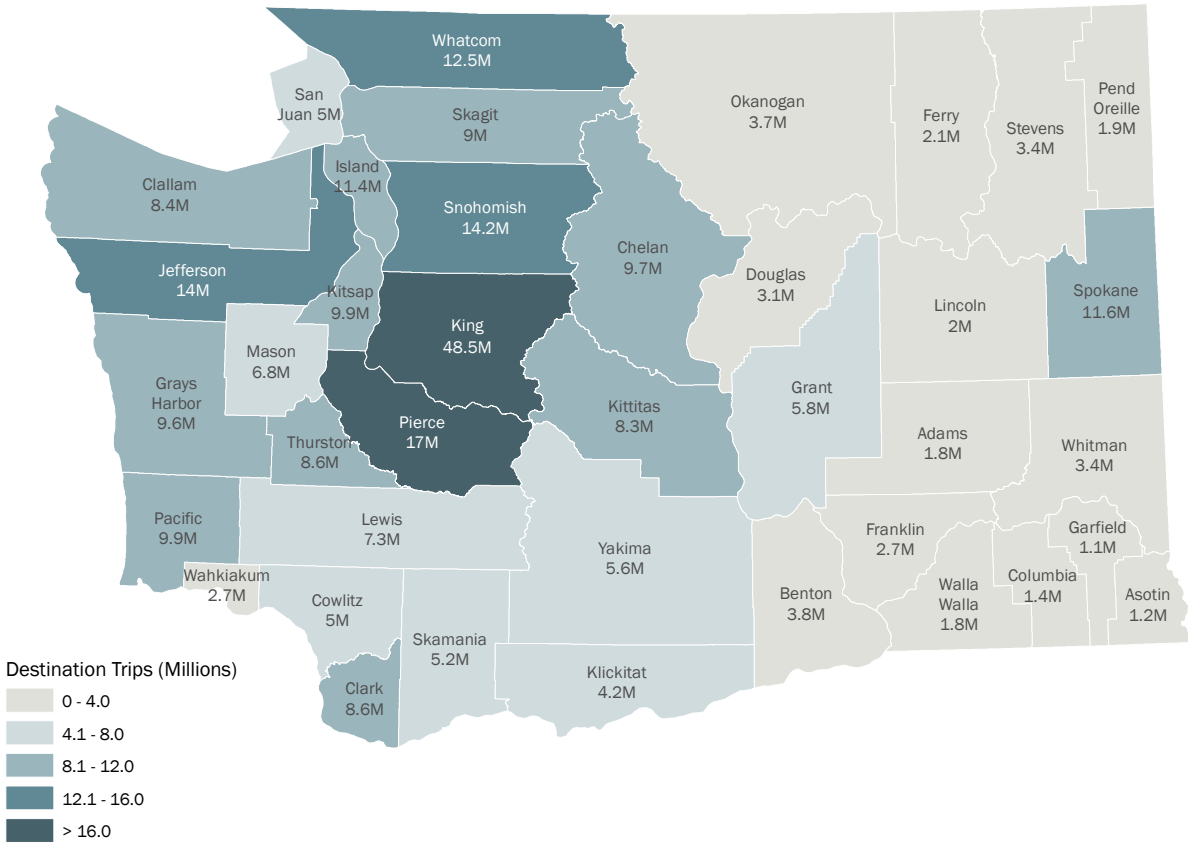
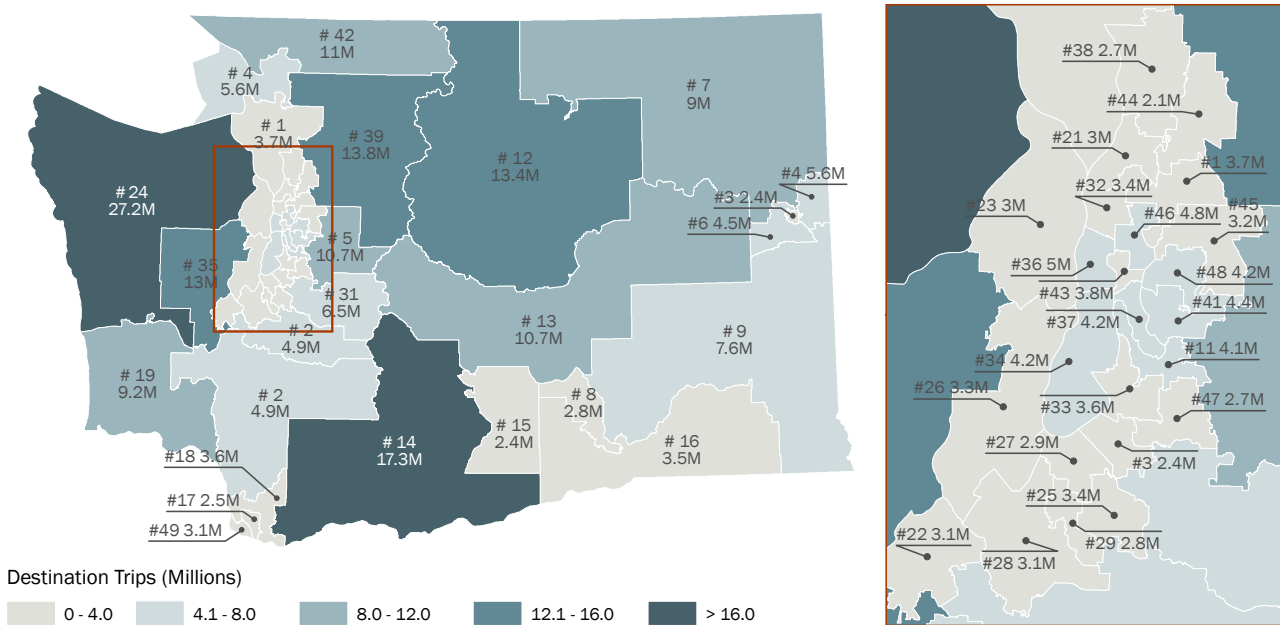


EXHIBIT 6. Number of Annual Destination User-Day Trips to a State Legislative District



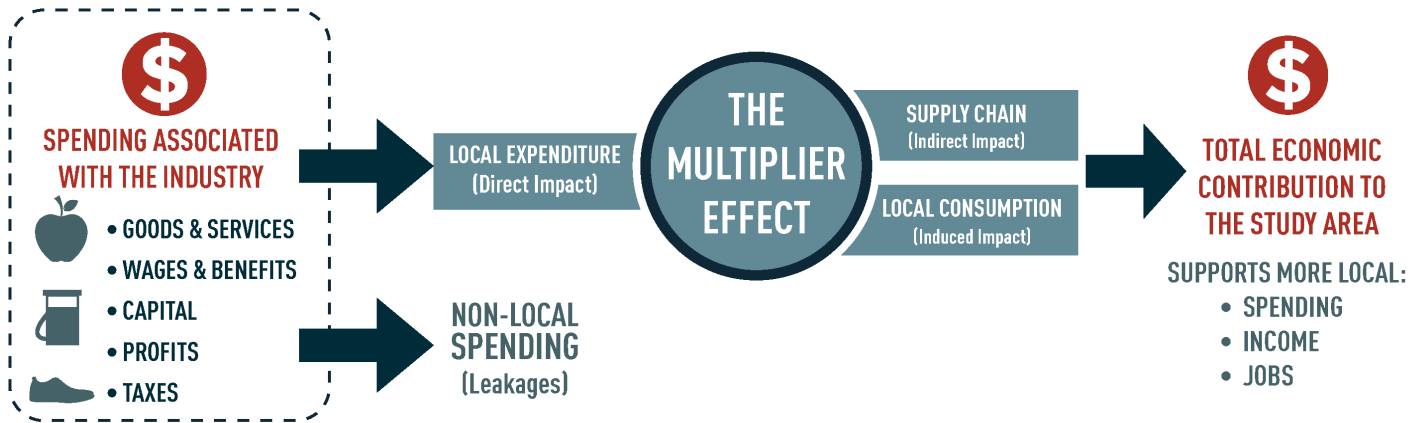
Source: ECONorthwest analysis of visitor use statistics.

ECONOMIC CONTRIBUTIONS | 4

Trails contribute to the economic activity of local communities by attracting people who spend money on goods and services like restaurants, lodging, and equipment. To calculate the economic contribution that trails have in Washington, we used the 2016 version of IMPLAN, an economic input-output model.¹² Spending from trail-based recreation that remains in the local

economy has downstream supply-chain and consumption effects that is then spent in other sectors of the economy. This circulation of spending throughout an economy is known as a “multiplier effect”. Exhibit 7 provides a visual representation of how the multiplier effect is used to calculate the economic contributions resulting from an increase in spending.

EXHIBIT 7. Components of an Economic Contribution Analysis



Source : Created by ECONorthwest.



Economic contributions analysis estimates three categories of effects:

- **DIRECT EFFECTS** are the output, jobs, and employee compensation supported by the increase in spending directly attributable to trail-based recreation. These can be considered the “inputs” to the model.
- **INDIRECT EFFECTS** are the economic effects supported by trail-based recreation spending in the local economy due increases in supply chain purchases. Increased purchases increase the demand for goods and services, which then leads to businesses purchasing more goods and hiring additional staff to meet this increased demand. These indirect effects are sometimes also referred to as “supply chain effects”.
- **INDUCED EFFECTS** are the changes in regional household spending patterns caused by changes in household income. Employees and owners of the industries which experience increased economic activity from spending from trail-based recreation may increase their household spending, leading to further economic activity. These are typically referred to as “consumption effects.”

¹² The term “economic contribution” is used throughout this memo to indicate that the analysis is quantifying the gross effects on the economy resulting from spending on trail-based recreation and not net effects (“economic impact”). An economic impact analysis would compare the economic activity resulting from spending on trail-based recreation with the alternative uses of the funds.

4 | ECONOMIC CONTRIBUTIONS

Taken together, these combined economic effects (direct, indirect, and induced) describe the total effect of the contribution to the economy in the region resulting from trail-based recreation. These effects are measured in terms of economic contribution, labor income, and jobs.

4.1 | SPENDING PATTERNS

The destination-based user day estimates are used to calculate the spending and economic contributions from participants in non-motorized trail recreation. To model the goods and services that participants purchase we relied on information from survey data collected by the U.S. Forest Service. The U.S. Forest Service conducts a National Visitor Use Monitoring (NVUM) program which includes an economics survey that is used to construct spending profiles for outdoor recreationists.¹³ More information about how the spending estimates were applied can be found in Technical Appendix B. An estimated \$8.4 billion per year is spent by non-motorized trail users in Washington for the 292 million annual destination-based user trips.

Summary of Annual Spending by Trip Type:

- \$230 million: Local day trips
- \$4.3 billion: Nonlocal day trips
- \$3.9 billion: Nonlocal overnight trips
- \$8.4 billion: Total trail user spending



4.2 | ECONOMIC CONTRIBUTION RESULTS

Of the approximately \$8.4 billion in annual consumer spending attributable to trail-based recreation that occurs in Washington, approximately \$3.8 billion leaves the state and goes to retail suppliers outside of the local economy,¹⁴ resulting in just over \$4.5 billion remaining as the direct effect to the state's economy.

Once supply chain (indirect) and consumption (induced) impacts are considered, the total contribution that trail-based recreation makes to Washington is \$8.2 billion. This value represents approximately 1.45 percent of Washington State's 2018 gross domestic product of \$563.15 billion.¹⁵ The spending by non-motorized trail users in Washington contributes \$3.14 billion in labor income and supports 81,000 jobs. Exhibit 8 summarizes these economic contributions state-wide, Exhibit 9 shows their distribution across the state by county.

EXHIBIT 8. Statewide Economic Contributions from Trail-Based Recreation

IMPACT TYPE	ECONOMIC CONTRIBUTION (Millions)	LABOR INCOME (Millions)	JOBS
Total	\$8,193	\$3,144	81,000

Source: Created by ECONorthwest using data from IMPLAN.

Exhibit 10 estimates the annual economic contributions for each state legislative district in Washington. The economic contributions are functions of the number of destination user-day trips and is therefore similar to Exhibit 6. In general, larger state legislative districts have more destination user-day trips, thus also higher economic contribution estimates. Note that the county and state legislative district totals will not sum to the state totals because some spending may leave the local economy but stays within the state.¹⁶

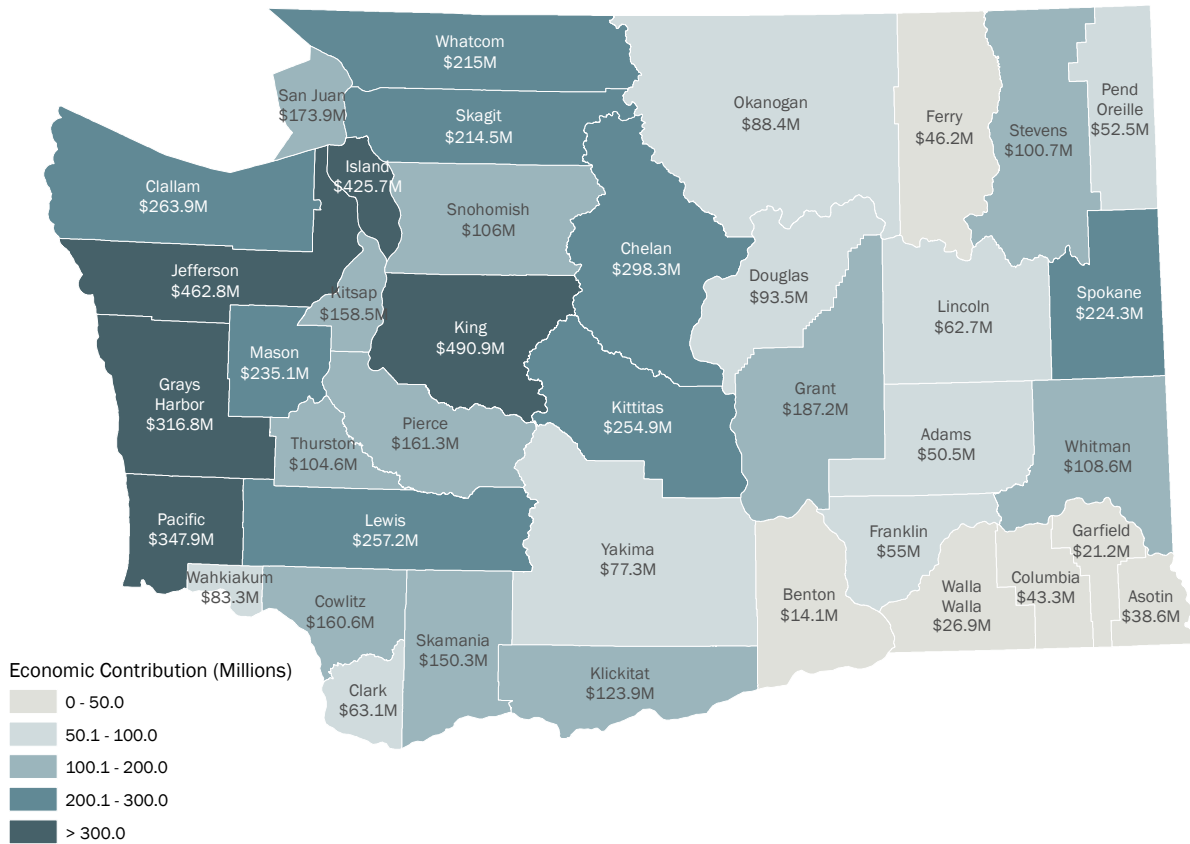
¹³ White, E.M. (2017). Spending patterns of outdoor recreation visitors to national forests. Gen. Tech. Rep. PNW-GTR-961. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 70 p.

¹⁴ For example, if someone spends \$1.00 on a bottle of water, the retailer who sold that water may net only \$0.15 that will then stay in the local economy. The other \$0.85 will leave and go to suppliers outside the local economy. The retail margin is calculated as sales receipts less the cost of goods sold.

¹⁵ Federal Reserve Bank of St. Louis. (2019). Total Gross Domestic Product for Washington (WANGSP). May 31. Retrieved from <https://fred.stlouisfed.org/series/WANGSP>.

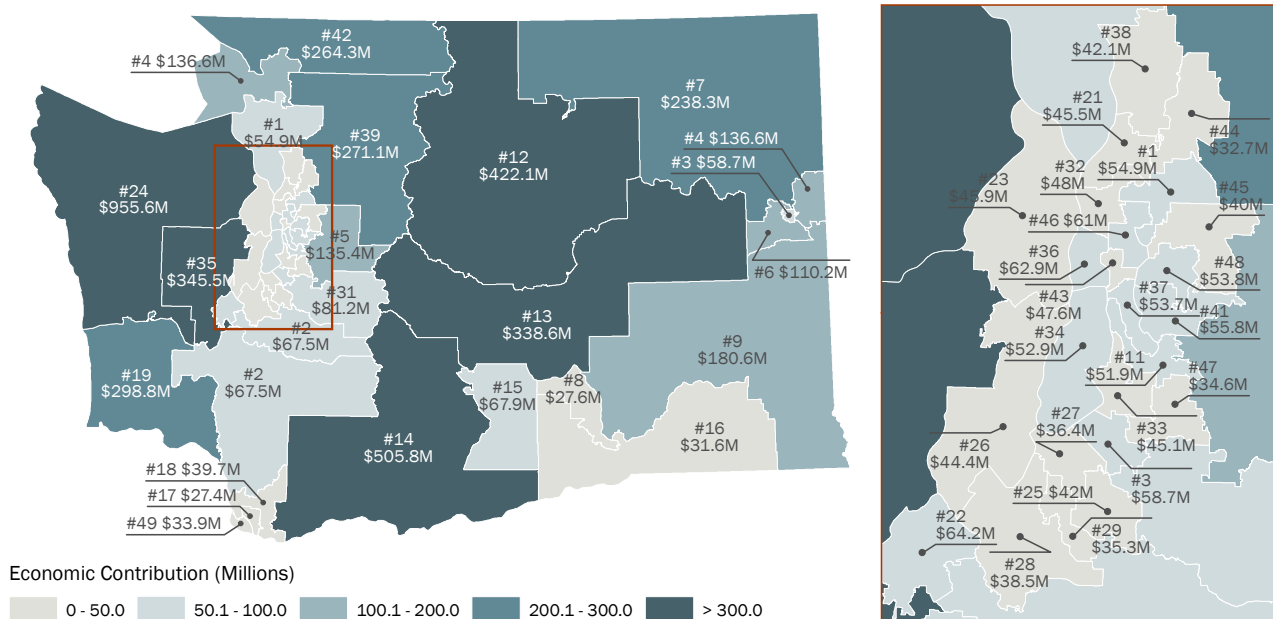
¹⁶ For example, a trail-user may purchase food in Clark County, but the supplier for that food is in Grant County. In this situation the retail margin stays in the state of Washington, but leaves Clark County, thus making the statewide economic contribution higher compared with the sum total of the counties.

EXHIBIT 9. Annual Economic Contribution Attributable to Trail-Based Recreation by County



Source: Created by ECONorthwest using data from IMPLAN. | Note: Economic contribution estimates are based upon the destination-based user day estimates.

EXHIBIT 10. Annual Economic Contribution Attributable to Trail-Based Recreation by State Legislative District



Source: Created by ECONorthwest using data from IMPLAN. | Note: Economic contribution estimates are based upon the destination-based user day estimates.

5 | HEALTH BENEFITS AS AN ECONOMIC VALUE

When individuals engage in trail-based recreation, there are pathways that create physical and mental health benefits for the participant. These health benefits manifest from engaging in physical activity, exposure to the natural environment, and strengthened social ties. Based on the level of physical activity, these physical health benefits generate economic value based on the associated cost of illness savings resulting from the reduction in the risk of diseases.

Previous research has identified and quantified significant physical health benefits from trails. A study on the health benefits from bike/pedestrian trails found that every \$1 invested in trails resulted in \$2.94 of savings on health care costs,¹⁷ showing that trails can serve as a cost-effective health intervention tool. Mental health benefits are more difficult to directly monetize, but nonetheless represent important health benefits for trail-based recreation participants. An accompanying study on health benefits conducted by the University of Washington (2019) will provide more insight into the connections between trail-based recreation and health.

5.1 PHYSICAL HEALTH BENEFITS

Increases in physical activity have been linked to decreases in incidences of cardiovascular disease, stroke, some cancers, diabetes, obesity, and depression, as well as decreases in the risk of premature death.^{18, 19} Different types of physical activity require different amounts of energy, so the relative risk of these diseases is a function of the intensity and frequency of

the activity. These reductions in risk of diseases then results in lower health costs for the lifetime of the participant, including both direct health care costs as well as lost productivity during an illness (also known as absenteeism). Physically-active adults have approximately 30 percent lower health care costs than physically inactive adults.²⁰

To calculate the health savings associated with trail-based recreation we use the resident user day estimate by activity to estimate the health savings. More information about the methods used to calculate the physical health savings can be found in Technical Appendix C.

The number of participants who engage in non-motorized trail-based recreation activity in Washington are presented in Exhibit 11. Some participants may participate in multiple trail-based activities over the year.

Using the estimates of the number of participants per activity, the health savings by activity are calculated as the reduction in risk for the eight diseases included in the model and monetized using average health costs for individuals in Washington. The total annual cost of illness savings to Washington residents from participation in trail-based recreation is over \$390 million. This value is approximately 0.64 percent of the over \$55.8 billion that was spent in 2014 on healthcare in Washington.^{21, 22} These cost savings accrue to health insurers, providers, and participants. The health savings by activity, which are

EXHIBIT 11. Estimated Number of Participants by Activity

				
WALKING	HIKING	BACKPACKING	JOGGING/RUNNING	BICYCLING
3,811,000	1,326,000	780,000	1,442,000	1,496,000

Source: ECONorthwest analysis.

¹⁷ Wang, G., Macera, C. A., Scudder-Soucie, B., Schmid, T., Pratt, M., Buchner, D. (2005). A cost-benefit analysis of physical activity using bike/pedestrian trails. *Health Promotion Practice* 6, 2, 174-79.

¹⁸ Warburton, D. E., Nicol, C. W., & Bredin, S. S. (2006). Health benefits of physical activity: the evidence. *Canadian Medical Association Journal*, 174(6), 801-809.

¹⁹ Twohig-Bennett, C., & Jones, A. (2018). The health benefits of the great outdoors: A systematic review and meta-analysis of greenspace exposure and health outcomes. *Environmental research*, 166, 628-637.

²⁰ Pratt, M., Macera, C. A., & Wang, G. (2000). Higher direct medical costs associated with physical inactivity. *Physician and Sports Medicine*, 28(10), 63-70.

²¹ Kaiser Family Foundation. (2014). *Health Care Expenditures by State of Residence (in millions)*. Retrieved from <https://www.kff.org/other/state-indicator/health-care-expenditures-by-state-of-residence-in-millions/>

²² Values have been inflated to 2019 dollars using the BLS CPI Inflation Calculator.

HEALTH BENEFITS AS AN ECONOMIC VALUE | 5

EXHIBIT 12. Estimated Value of Health Savings by Activity (Millions)

WALKING	HIKING	BACKPACKING	JOGGING/RUNNING	BICYCLING	TOTAL
\$149.6	\$26.1	\$55.1	\$115.7	\$44.3	\$390.7

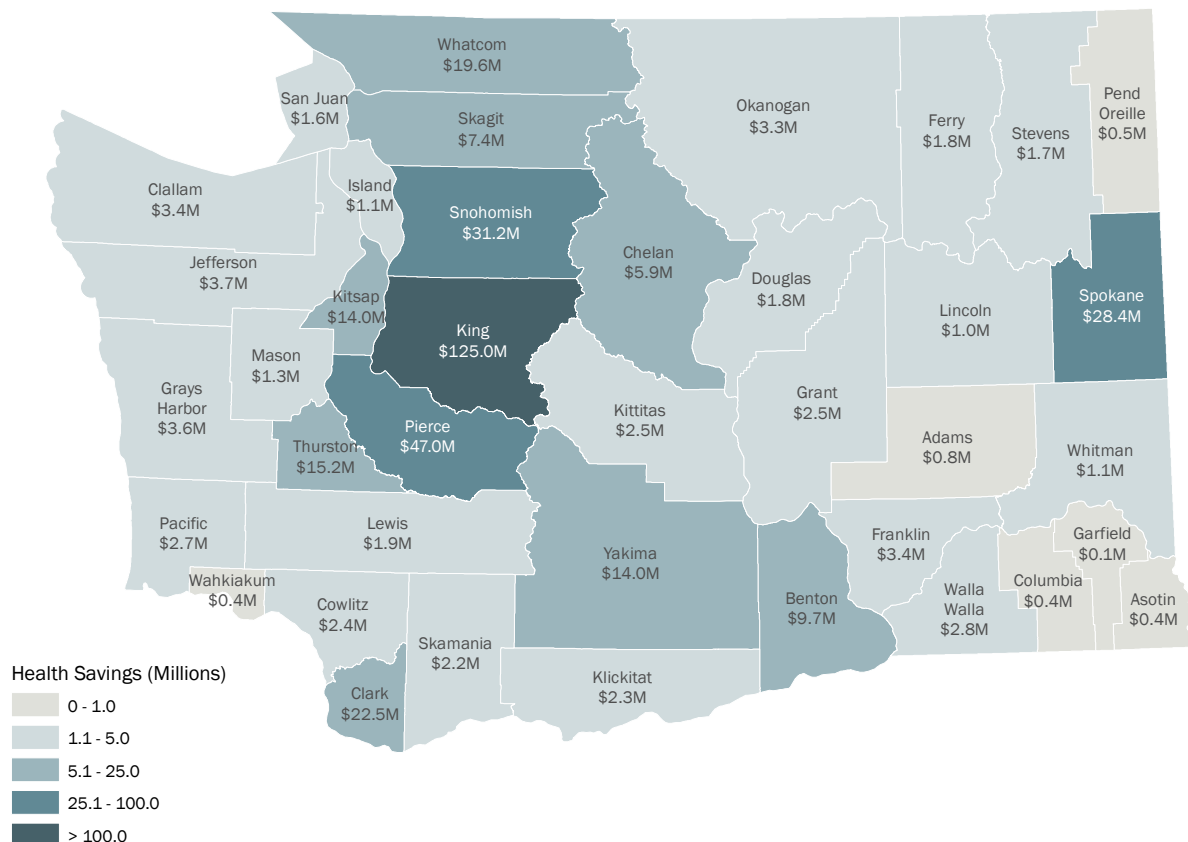
Source: ECONorthwest analysis.

calculated based on the number of participants and the level of physical activity exertion, are presented in Exhibit 12. The distribution of these benefits throughout the state by county are displayed in Exhibit 13.

Exhibit 14 displays the health savings by state legislative district in Washington, which is determined by the population

of the state legislative district. Because these districts are created based on population sizes, there is less variation in the districts compared with the county health savings estimates. To better show the variation that there is, the state legislative district uses a different color scale than the county map in Exhibit 13.

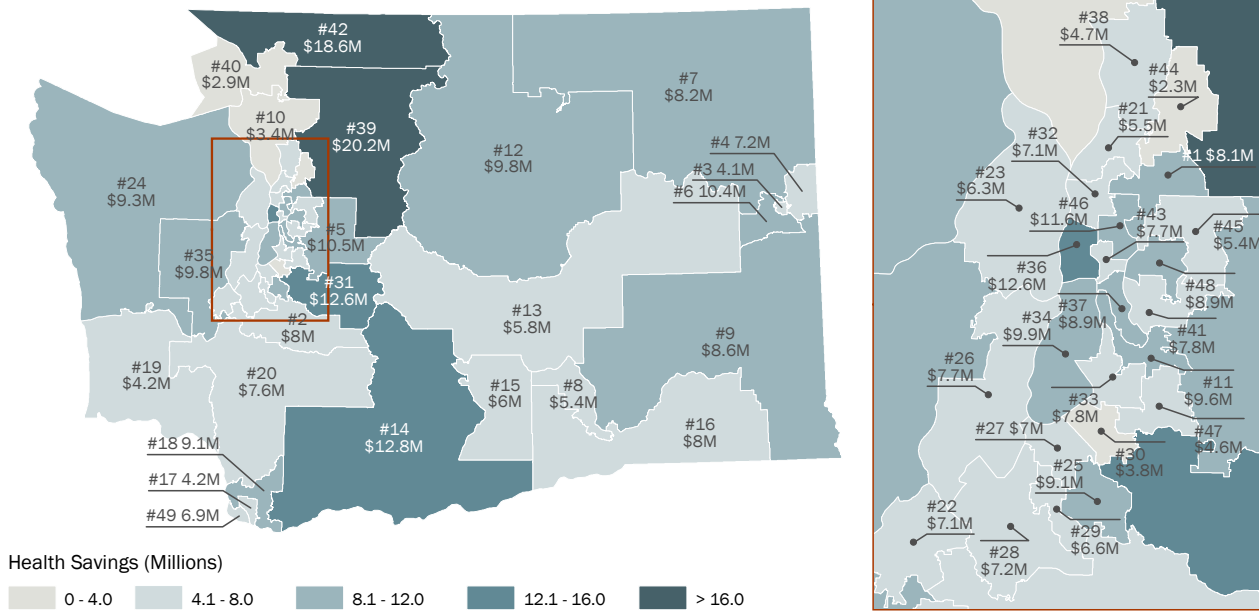
EXHIBIT 13. Annual Health Savings Results by County



Source: ECONorthwest analysis | Note: Health savings estimates are based upon the resident user day estimates.

5 | HEALTH BENEFITS AS AN ECONOMIC VALUE

EXHIBIT 14. Annual Health Savings Results by State Legislative District



Source: ECONorthwest analysis.

Note: Health savings estimates are based upon the resident user day estimates. Map uses different color ramp shading than Exhibit 13 to better illustrate how health savings differ by legislative district.

5.2 | MENTAL HEALTH BENEFITS

Psychological benefits can arise for trail users from exposure to natural environments. Although the level of exposure can

vary between an urban greenway and a wilderness area, most trails in Washington allow for some level of exposure to nature. Researchers have found that contact with nature supports benefits of reduced stress, better sleep, reduced depression, reduced anxiety, greater happiness, reduced aggression, reduced ADHD symptoms, and increased prosocial behavior.²³



Multiple other studies have shown that exposure to nature reduces stress levels, which in turn has physiological health benefits.^{24,25,26} In addition to improvements in personal mood, the mental health benefits of trails results in reduced absenteeism, higher productivity, and lower health costs for Washingtonians. Although we do not have sufficient data to monetize these benefits, as mentioned above, researchers from the University of Washington are conducting a parallel study on the physiological health benefits of trails.

²³ Frumkin, H., Bratman, G. N., Breslow, S. J., Cochran, B., Kahn Jr, P. H., Lawler, J. J., ... & Wood, S. A. (2017). Nature contact and human health: A research agenda. *Environmental health perspectives*, 125(7), 075001.

²⁴ Ward Thompson, C., Aspinall, P., Roe, J., Robertson, L., & Miller, D. (2016). Mitigating stress and supporting health in deprived urban communities: The importance of green space and the social environment. *International journal of environmental research and public health*, 13(4), 440.

²⁵ Nielsen, T. S., & Hansen, K. B. (2007). Do green areas affect health? Results from a Danish survey on the use of green areas and health indicators. *Health & place*, 13(4), 839-850.

²⁶ Berto, R. (2014). The role of nature in coping with psycho-physiological stress: a literature review on restorativeness. *Behavioral sciences*, 4(4), 394-409.

OTHER ECONOMIC BENEFITS | 6

In addition to the economic contributions and health benefits, trail-based recreation provides other economic benefits to users and local economies. These other benefits include the benefits that users receive from trail-based recreation (i.e. recreational-use values), increased local property values for homes located near trails, and a general increased quality of life.

6.1 | RECREATIONAL-USE VALUE

The recreational-use value associated with trail-based recreation, also known as consumer surplus, is a monetary estimate of the amount a user would be willing to pay above and beyond the costs associated with that activity, including parking and travel costs. For trail-based recreation, recreational-use value is the difference between what a recreational user pays in terms of transportation costs, equipment, access fees, and their opportunity cost of time, and the maximum amount that a user would be willing to pay to use a trail. For example, if a hiker spends \$50 for a day of hiking that includes gas, food, gear, etc., but that same individual is willing to pay \$90 for the same experience, the hiker has a surplus value of \$40 for that user day. For an elected official, this measure can be used to estimate the value of trails to his or her local constituency.

We use estimates from the U.S. Forest Service²⁷ to estimate the recreational-use value for biking, hiking, and backpacking, assuming these activities are occurring in locations similar to National Forest lands. For walking and running, we apply lower estimates from a study on rail-trail recreational-use value from Siderelis and Moore (1995),²⁸ assuming that these types







of activities are occurring close to home and therefore have lower associated recreational-use values. Exhibit 15 displays the estimated recreational-use values by activity. The total recreational-use value from trail-based use in Washington is approximately \$8.5 billion per year.

6.2 | PROPERTY VALUE GAINS

Proximity to trails is a valuable amenity for residential properties, similar to a home having a neighborhood pool, a view, or extra bedrooms. Homes with these amenities are generally in high demand and thus sell for higher prices than similar homes without these amenities. The marginal value of these amenities can be estimated using an economic approach known as a hedonic property value model. These models use large datasets on property transactions and identify the difference between similar homes with and without certain amenities, like a trail.

Existing studies have found that the distance from a property to a trail is the most important factor for determining the gain in property value. Other important factors for determining property value gains include the setting of the home (e.g. urban or rural), the type of trail, and the condition of the trail. In some cases, living near a very popular trailhead might actually reduce property values if there are nuisance issues. While some economic studies have observed property value increases as far as 10,000 feet (1.9 miles) from a trailhead,²⁹ others suggest that benefits accrue only within 1,000 feet (0.19 miles).³⁰

EXHIBIT 15. Recreational-Use Value by Activity

					
WALKING	HIKING	BACKPACKING	JOGGING/RUNNING	BICYCLING	TOTAL
\$1,459,000	\$2,979,000	\$318,000	\$502,000	\$3,283,000	\$8,541,000

Note: All values are in 2019 dollars.

²⁷ Rosenberger, R. S., White, E. M., Kline, J. D., & Cvitanovich, C. (2017). *Recreation economic values for estimating outdoor recreation economic benefits from the National Forest System*. U.S. Department of Agriculture, Forest Service. Gen. Tech. Rep. PNW-GTR-957. 33 p., 957.

²⁸ Siderelis, C., & Moore, R. (1995). Outdoor recreation net benefits of rail-trails. *Journal of Leisure Research*, 27(4), 344-359.

²⁹ Parent, O., & Vom Hofe, R. (2013). Understanding the impact of trails on residential property values in the presence of spatial dependence. *The Annals of Regional Science*, 51(2), 355-375.

³⁰ Campbell Jr, H. S., & Munroe, D. K. (2007). Greenways and greenbacks: the impact of the Catawba Regional Trail on property values in Charlotte, North Carolina. *Southeastern Geographer*, 47(1), 118-137.

6 | OTHER ECONOMIC BENEFITS

Property value impact from trails also depends on the location and site conditions. In San Antonio, Texas, a study found that being near a trail led to a 2 percent increase in property value.³¹ Another study in Charlotte, North Carolina found that for every 1 percent increase in the distance from a trail, the sales price of the home declines by approximately 0.03 percent.³² Even larger property value impacts have been found in the literature, including up to 14 percent for homes within one-half mile of a rail-trail in Indianapolis, Indiana.³³

We do not estimate property value impacts statewide. However, we do apply this methodology to our case study evaluation of the Spokane River Centennial Trail.

6.3 | QUALITY OF LIFE BENEFITS

The improved quality of life that trails provide for Washington residents is an economic benefit that is difficult to monetize but still has important implications. Trails are a community



Trail shoreline Lions Park in Bremerton, Washington.
(Photo provided by Washington Recreation and Conservation Office)



Blanca Lake in Washington (Photo by Adam Domanski)

amenity that improve the quality of life for residents. Businesses and workers both benefit from the “second paycheck,” the increase in quality of life based on their location, obtained from living and working in a location with amenities such as trails. With a “second paycheck” workers enjoy the benefits of the amenity, but businesses do not need to pay for those benefits, so overall welfare of the workforce and perceived compensation increases at no impact to a firm’s expenses.

Research suggests that quality of life is an important factor in businesses and workers location-choice decisions.³⁴ Labor-dependent industries that are knowledge-focused, such as technology companies, research and development facilities, corporate headquarters, finance, and professional services, have been found to prioritize quality of life when choosing where to locate and expand.³⁵ Smaller companies that want their location to reflect their corporate culture also place a higher value on quality of life in their selected location. Trails are one way in which Washington State and local communities can distinguish themselves from other areas, attract job-creating businesses and skilled workers, and expand the tax base.

³¹ Asabere, P. K., & Huffman, F. E. (2009). The relative impacts of trails and greenbelts on home price. *The Journal of Real Estate Finance and Economics*, 38(4), 408-419.

³² Campbell Jr, H. S., & Munroe, D. K. (2007). Greenways and greenbacks: the impact of the Catawba Regional Trail on property values in Charlotte, North Carolina. *Southeastern Geographer*, 47(1), 118-137.

³³ Lindsey, G., Man, J., Payton, S., & Dickson, K. (2004). Property Values, Recreation Values, and Urban Greenways. *Journal of Park & Recreation Administration*, 22(3).

³⁴ George Mason University Center for Regional Analysis. (2018). “Promoting Parks and Recreation’s Role in Economic Development.” *National Recreation and Park Association*.

³⁵ Reilly, C.J. and Renski, H. (2008). “Place and Prosperity: Quality of Place as an Economic Driver.” *Maine Policy Review*, 17(1), 12-25.

ENVIRONMENTAL BENEFITS | 7

Although trails themselves do not provide significant environmental benefits, they do engage individuals with the natural environment, which can then affect land use policy decisions and people's perceptions about nature. In urban areas, natural corridors associated with trails combat warm urban temperatures known as the "urban heat island effect."³⁶ In forested areas, trails could result in decisions to forgo alternative uses, such as private development, because of how those activities would impact the quality of recreation along the trail.

When land managers consider alternative uses of forested land in the state, the presence of a high-value recreational trail could lead certain areas to be protected from development or other actions that diminish its ecological function and aesthetic quality. For example, federal land management actions are subject to National Environmental Policy Act (NEPA) reviews. NEPA is inherently a public process that may include provisions that lead to preserving land for recreational trails. In addition to NEPA, the U.S. Forest Service (USFS) has designated large blocks of land for the preservation and future expansion of trails and non-motorized recreational use through its Recreational Opportunity Spectrum (ROS) identification process. These lands, protected primarily because of their recreational value, may also be important from an ecological perspective. The value of the ecosystem services provided by federal forested land reserved for trail-based recreational use is the basis for the environmental benefits calculation.

The environmental benefits from forested land that flow to humans (also referred to as ecosystem services) include habitat provision, carbon sequestration, air filtration, and watershed protection.³⁷ Multiple studies have estimated the economic value of these environmental benefits.³⁸ For this analysis, we apply the value of benefits of protected trail corridors from a study conducted by The Nature Conservancy of Canada and TD Bank Group for forests in British Columbia³⁹ due to the similarity of forest types in Washington and British Columbia.

The ecosystem service value of forested land is estimated in that study as \$17,867 per acre, of which 95 percent of the value is attributable to carbon sequestration (i.e. the prevention of stored carbon being released into the atmosphere).⁴⁰

To measure the potential magnitude of the environmental benefits of trails, we limit our analysis to the 332,000 acres of USFS land that is forested, not in a wilderness area, and within 500 feet of a recreational trail in Washington. Although a hypothetical 500-foot "no harvest buffer" is not a mandated policy of the USFS, we use it to estimate the potential scale of the environmental benefits. This area is about 1.5 percent of the 22 million acres of forested land in Washington. Exhibit 16 displays a map of the trails and U.S. Forest Service land used for this analysis.

The 332,000 acres from this analysis is a conservatively low estimate because it considers only forested, non-wilderness federal land within 500 feet of a trail. This area also does



Shedroof Divide Trail (Photo by Taylor McDowell)

³⁶ U.S. Environmental Protection Agency. (No Date). *Heat Island Cooling Strategies*. Retrieved from <https://www.epa.gov/heat-islands/heat-island-cooling-strategies>

³⁷ Millennium Ecosystem Assessment. (2005). *Ecosystems and Human Well-being: Synthesis*. Island Press, Washington, DC.

³⁸ De Groot, R., Brander, L., Van Der Ploeg, S., Costanza, R., Bernard, F., Braat, L., ... & Hussain, S. (2012). Global estimates of the value of ecosystems and their services in monetary units. *Ecosystem services*, 1(1), 50-61.

³⁹ DePratto, B., and Kraus, D. (2014). *The Natural Capital Value of Forest Habitat Conservation*. Nature Conservancy Canada. Retrieved from http://www.natureconservancy.ca/assets/documents/nat/NaturalCapitalTD_NCC.pdf

⁴⁰ This value has been inflated to 2019 dollars using the BLS CPI Inflation Calculator and converted from Canadian dollars to US dollars using a 1.15 exchange rate to reflect the rate as of 2014.

⁴¹ <https://www.fs.fed.us/pnw/rma/fia-topics/state-stats/Washington/index.php>.

7 | ENVIRONMENTAL BENEFITS

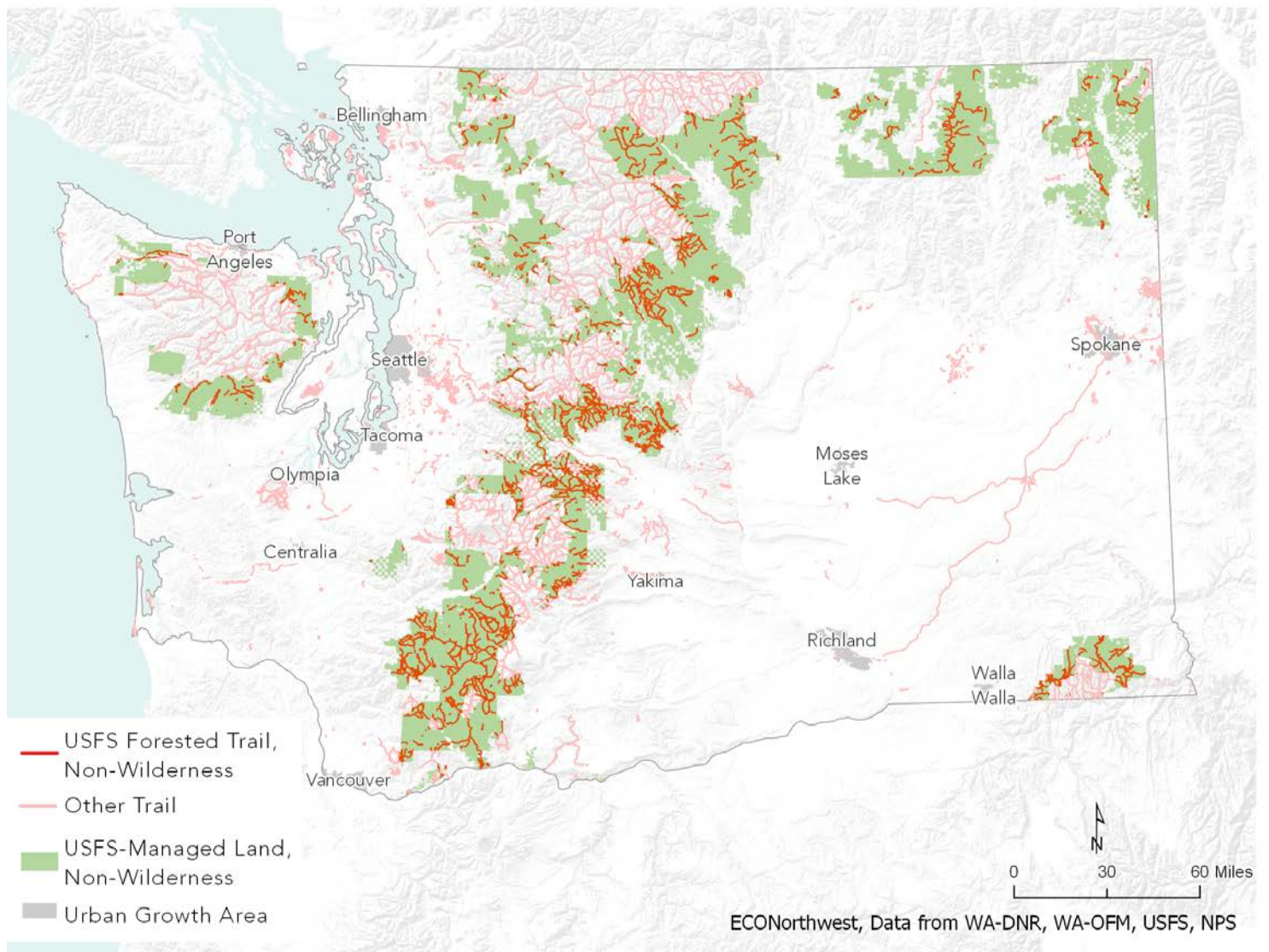
not include the large blocks of U.S. Forest Service lands designated for the future expansion of trails and non-motorized recreational use. In the Mt. Baker-Snoqualmie National Forest alone approximately 340,000 acres fall into these categories (i.e. semi-primitive non-motorized and primitive non-motorized) and represent potential additional environmental benefits of land preserved for trail use.

Applying the \$17,867 per acre environmental benefit value to the 332,000 acres of USFS land, we obtain a value of \$5.9 billion in environmental benefits potentially attributable to trails in Washington.



(Photo by David Marcu on Unsplash)

EXHIBIT 16. Trails in Washington and National Forest Land (Forested, Non-Wilderness)



CASE STUDY: Centennial Trail | 8

Trails provide benefits throughout Washington, from highly urban environments in downtown Seattle to remote wilderness trails. To demonstrate how the benefits of trails described thus far in the report actually manifest in different communities, we have selected two case studies that illustrate the benefits to different types of trails in different areas of the state. The first case study is the Centennial Trail located in Spokane County, and the second is Lake Serene Trail located in the Mt. Baker-Snoqualmie National Forest.

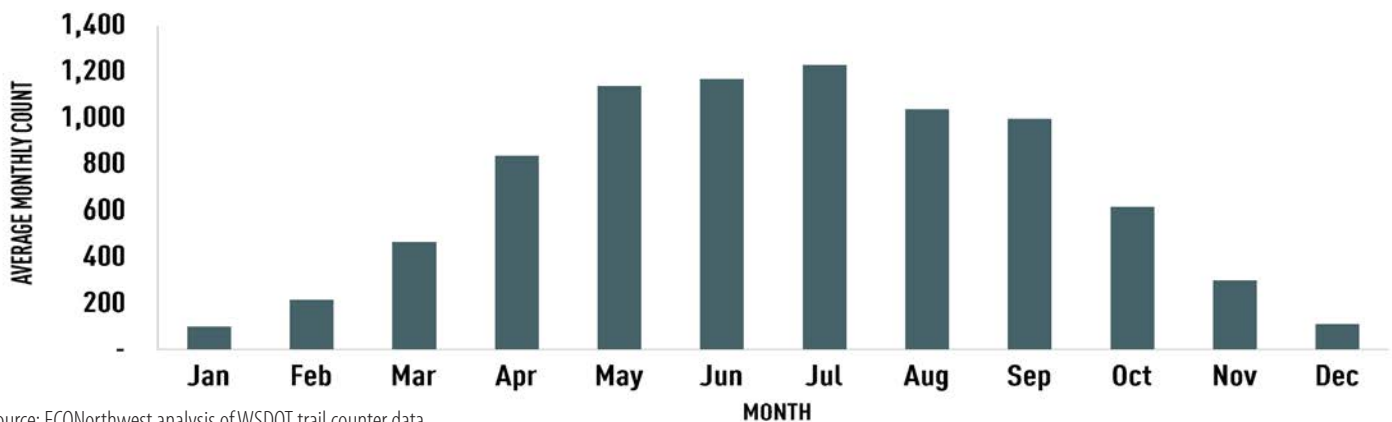
8.1 | SPOKANE RIVER CENTENNIAL STATE PARK TRAIL

The Centennial Trail is a nearly 40-mile paved trail located in Spokane County in eastern Washington. It follows the Spokane River and extends from the Washington/Idaho border, through Liberty Lake, City of Spokane Valley, Spokane County, Riverside State Park, and Nine Mile Falls. After reaching Idaho, the trail continues for 24 additional miles through Post Falls and Coeur d'Alene as the North Idaho Centennial Trail.

The trail gets its name because it was built beginning in 1989 to celebrate Washington's State Centennial. The trail is located on the site of a former rail line, which is known as a rail-trail or rails-to-trails project. The long length of the trail and connection in Idaho is attributable to that historical use as a rail corridor.

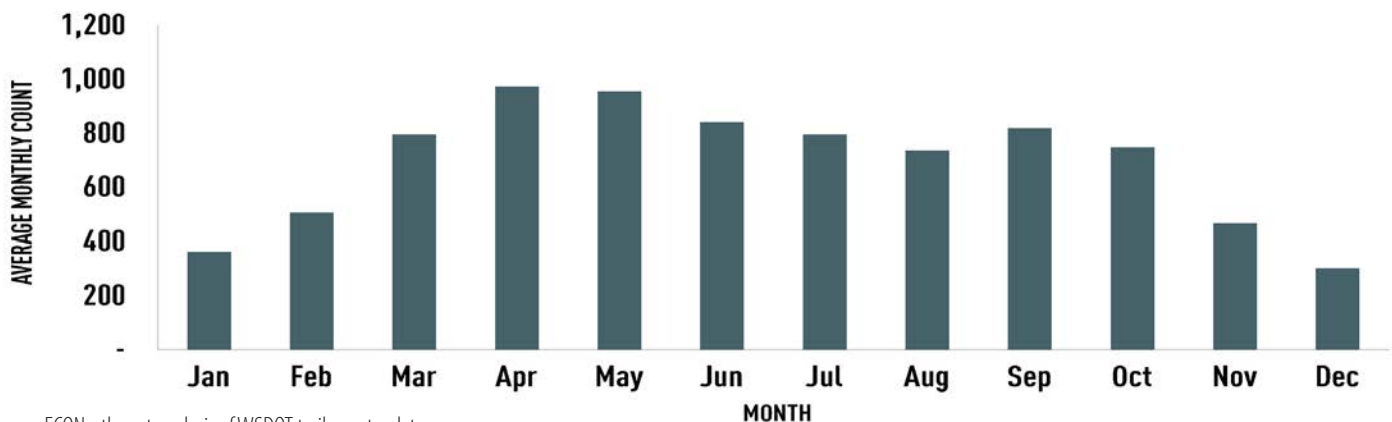
Washington State Park visitor statistics estimate that approximately 1.5 million pedestrian and biking trips occur on the Centennial Trail every year, many of which are likely repeat users, such as commuters or neighborhood residents. Approximately 30 percent of trail users are bicyclists, while most of the remainder are pedestrians, in addition to a small portion of users traveling by other modes such as skateboards, scooters, or rollerblades. Because the trail is completely paved it also provides a wheelchair accessible outdoor recreation opportunity.

EXHIBIT 17. Monthly WSDOT Pedestrian Counts at Spokane River Centennial Trail



Source: ECONorthwest analysis of WSDOT trail counter data.

EXHIBIT 18. Monthly WSDOT Bicycling Counts at Spokane River Centennial Trail



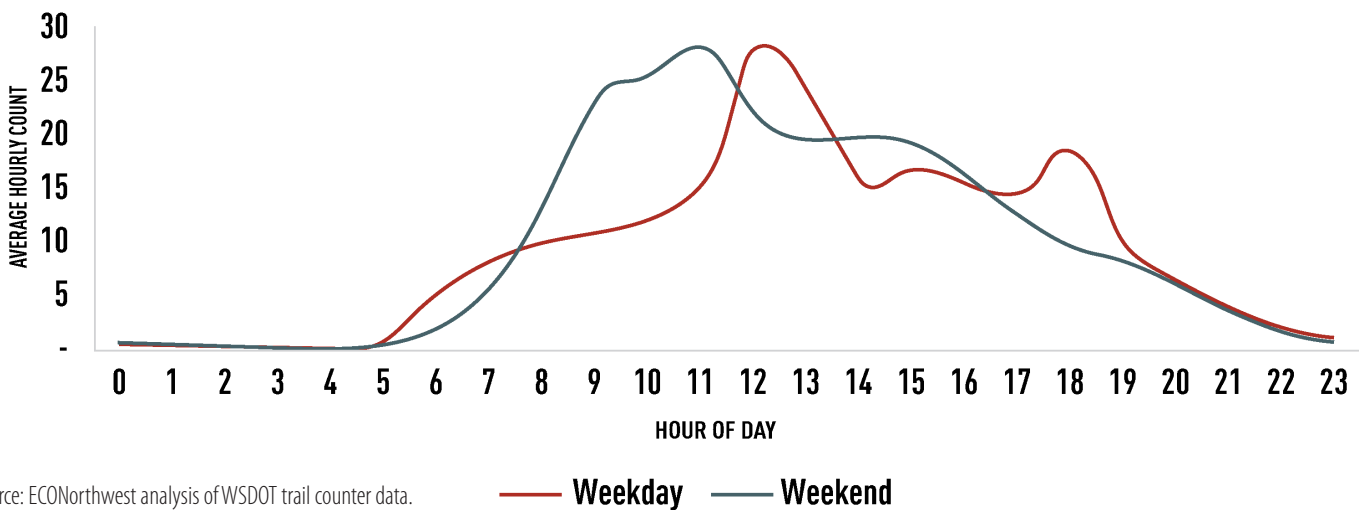
Source: ECONorthwest analysis of WSDOT trail counter data.

8 | CASE STUDY: Centennial Trail

To obtain estimates of the seasonal and daily use patterns of the Centennial Trail, we relied on a WSDOT permanent counter (see Appendix D for how trail counts were calculated). Although this counter only captures a small share of the total trail users, it provides useful information to help understand how different individuals use the trail throughout the day, week, and year. As indicated in Exhibit 17, the highest pedestrian use occurs in the spring months of April and May. A slight reduction occurs during the hottest summer months of July and August before increasing again in the fall. The lowest use occurs in January and December. Exhibit 18 shows that bicycling use follows a more consistent pattern throughout the year, with higher use in the summer months and lower use in the winter.

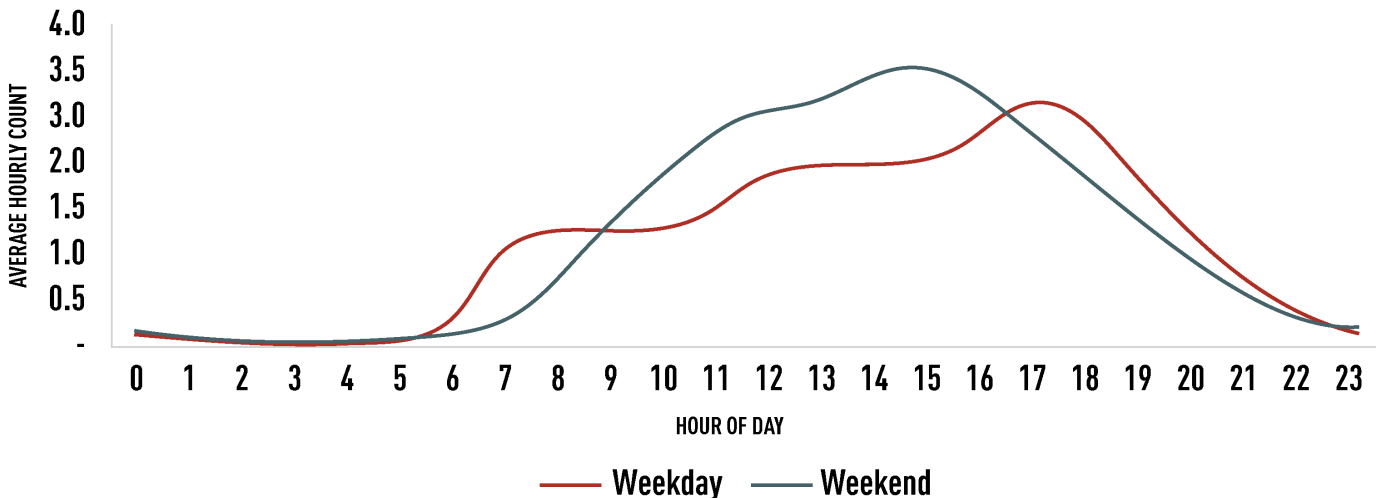
Daily use patterns for pedestrians and bicyclists for weekdays and weekends are displayed in Exhibit 19 and Exhibit 20 below. Weekday pedestrian peak use occurs at 12-1 p.m., with a secondary peak at 6-7 p.m., indicating a lunch-time and after-work use pattern. Weekend pedestrian use is highest in the morning and then tapers out slowly throughout the rest of the day. Weekday bicycling use is highest at 6-7 p.m., indicating an after-work use pattern, however the early use at 7 a.m. may represent daily bicycle commuters. Weekend bicycle use is highest in the middle of the day and early afternoon.

EXHIBIT 19. Hourly WSDOT Pedestrian Counts at Spokane River Centennial Trail



Source: ECONorthwest analysis of WSDOT trail counter data.

EXHIBIT 20. Hourly WSDOT Bicycling Counts at Spokane River Centennial Trail



CASE STUDY: Centennial Trail | 8

8.1.1 | ECONOMIC CONTRIBUTIONS

Because of its location in a metro area, we assume that the majority of the 1.5 million annual user day visits to the Centennial Trail are by local residents who likely only spend a small amount on gas, food, and other items to use the trail. The methodology for calculating economic contributions is described in Technical Appendix B. The estimated annual spending attributable to the Centennial Trail is \$2.6 million for the 1.5 million annual user day trips.

After accounting for funds that flow to non-local retail suppliers, approximately \$954,000 remains in Spokane County's economy. That spending then ripples through the economy with a local-area multiplier of 1.8 to generate a total of \$1.7 million in economic contribution. The spending associated with the Centennial Trail supports an estimated 22 jobs and \$594,000 in wages and compensation in the local economy. The annual economic contributions from the Centennial Trail are summarized in Exhibit 21.

EXHIBIT 21.

Annual Economic Contributions to Spokane County from the Centennial Trail

	ECONOMIC CONTRIBUTION	LABOR INCOME	JOBS
Total Effect	\$1,688,000	\$594,000	22

Source: ECONorthwest using IMPLAN (2016). | Note: All values are in 2019 dollars.



8.1.2 | HEALTH SAVINGS

Dividing the number of user occasions by the total health savings for biking and walking in Spokane County yields an average health savings per user occasion of \$0.83 for walking and \$1.22 for biking. Applying the 1,084,000 user occasions of walking and 479,000 user occasions of biking to these estimates yields a total annual health savings of approximately \$1.6 million per year. We are assuming that all pedestrian user occasions are walking, although some are jogging and running, so this value likely underestimates the total health savings attributable to the Centennial Trail.



8.1.3 | RECREATIONAL-USE VALUE

Recreational-use value, also known as consumer surplus, is the difference between what a recreational user would pay to use a trail, and what they actually pay. Siderelis & Moore (1995) calculate the recreational-use value associated with rail-trails in a suburban setting as \$8.18 per user occasion.^{42,43} Given the similarity of this study to the Centennial Trail, we also use this value by applying it to the 1.5 million annual user days. The annual recreational-use value of the Centennial Trail is estimated as \$12 million. This finding suggests that users of the Centennial Trail would be willing to pay a total of \$12 million dollars per year in excess of the travel costs and taxes they are currently incurring to use the trail.

⁴² Siderelis, C., & Moore, R. (1995). Outdoor recreation net benefits of rail-trails. *Journal of Leisure Research*, 27(4), 344-359.

⁴³ The value has been converted to 2019 dollars using the BLS CPI Inflation Calculator.

8 | CASE STUDY: Centennial Trail

8.1.4 | PROPERTY VALUES

The presence of trails is associated with increased property values for nearby homes. To estimate how the Centennial Trail may affect property values, we identified all residential homes within a quarter-mile (Euclidean distance) using Spokane County assessor information.⁴⁴ There are 6,025 homes within a quarter-mile of the Centennial Trail that combined have a total assessed value of \$1.18 billion. To estimate the value of the premium associated with the trail, we applied the two percent property value premium found by Asabere and Huffman (2009) to the property value estimate.⁴⁵ We then find that approximately \$23.7 million in property value in Spokane County is attributable to the Centennial Trail. This estimated property value increase is for only residential homes. The value the trail creates for commercial properties, such as restaurant and retail business that may rely on foot traffic, is not considered, but likely also experiences a property

value premium. Exhibit 22 shows the length of the trail and the associated land parcels for all property types within 0.25 mile, 0.5 mile, and 1 mile of the Centennial trail.

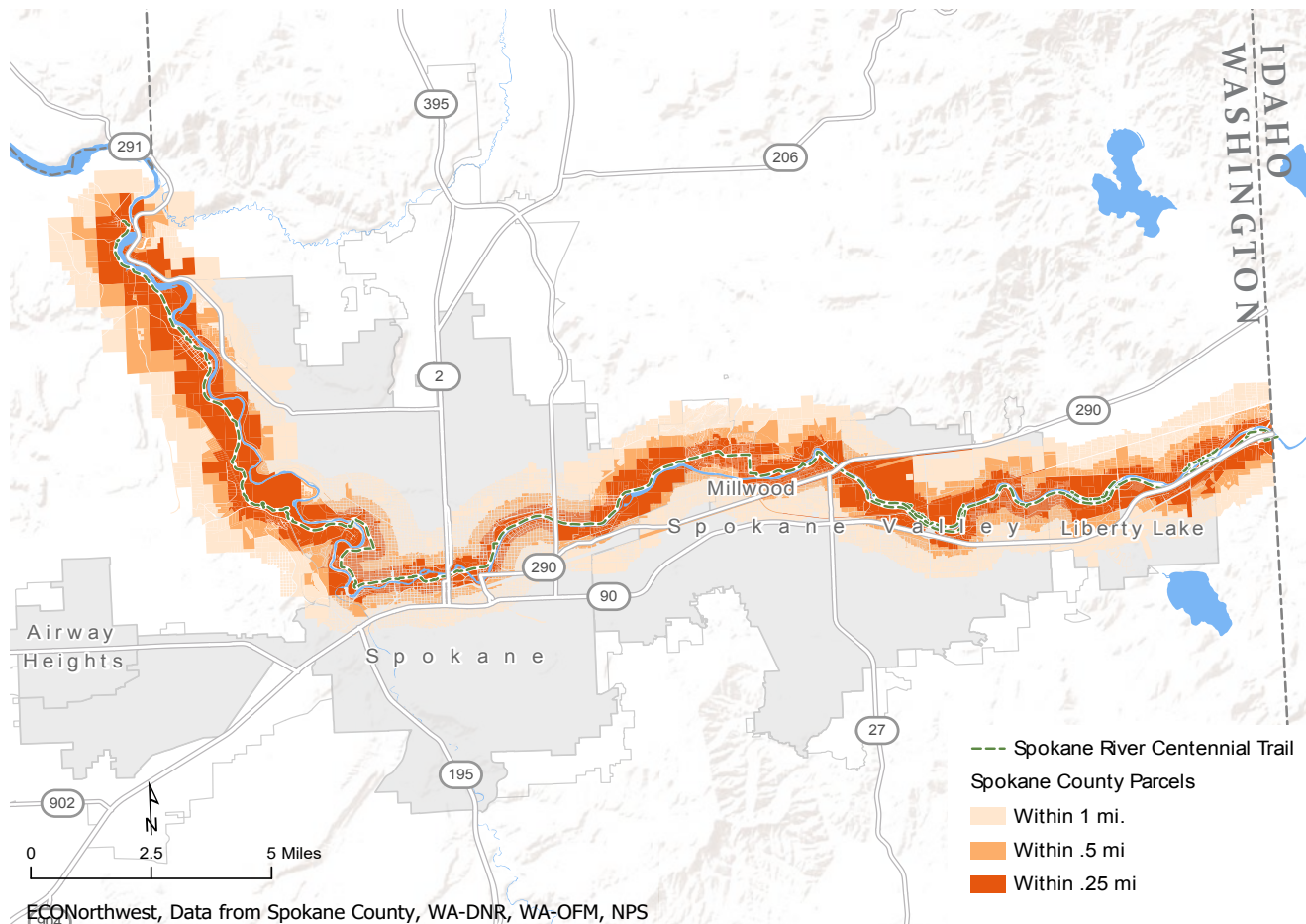
EXHIBIT 23.

Summary of Annual Economic Impacts Supported by the Spokane Centennial Trail

IMPACT TYPE	VALUE
Economic Contribution	\$1.7 million
Total Labor Income	\$594,000
Total Jobs	22
Health Savings	\$1.6 million
Recreational-Use Value	\$12 million
Property Values	\$23.7 million

Source: ECONorthwest

EXHIBIT 22. Land Parcels Near the Centennial Trail



⁴⁴ Spokane County GIS Data Catalog. Available at <https://gisdatacatalog-spokanecounty.opendata.arcgis.com/pages/parcel-data-file-downloads>

⁴⁵ Asabere, P. K., & Huffman, F. E. (2009). The relative impacts of trails and greenbelts on home price. *The Journal of Real Estate Finance and Economics*, 38(4), 408-419.

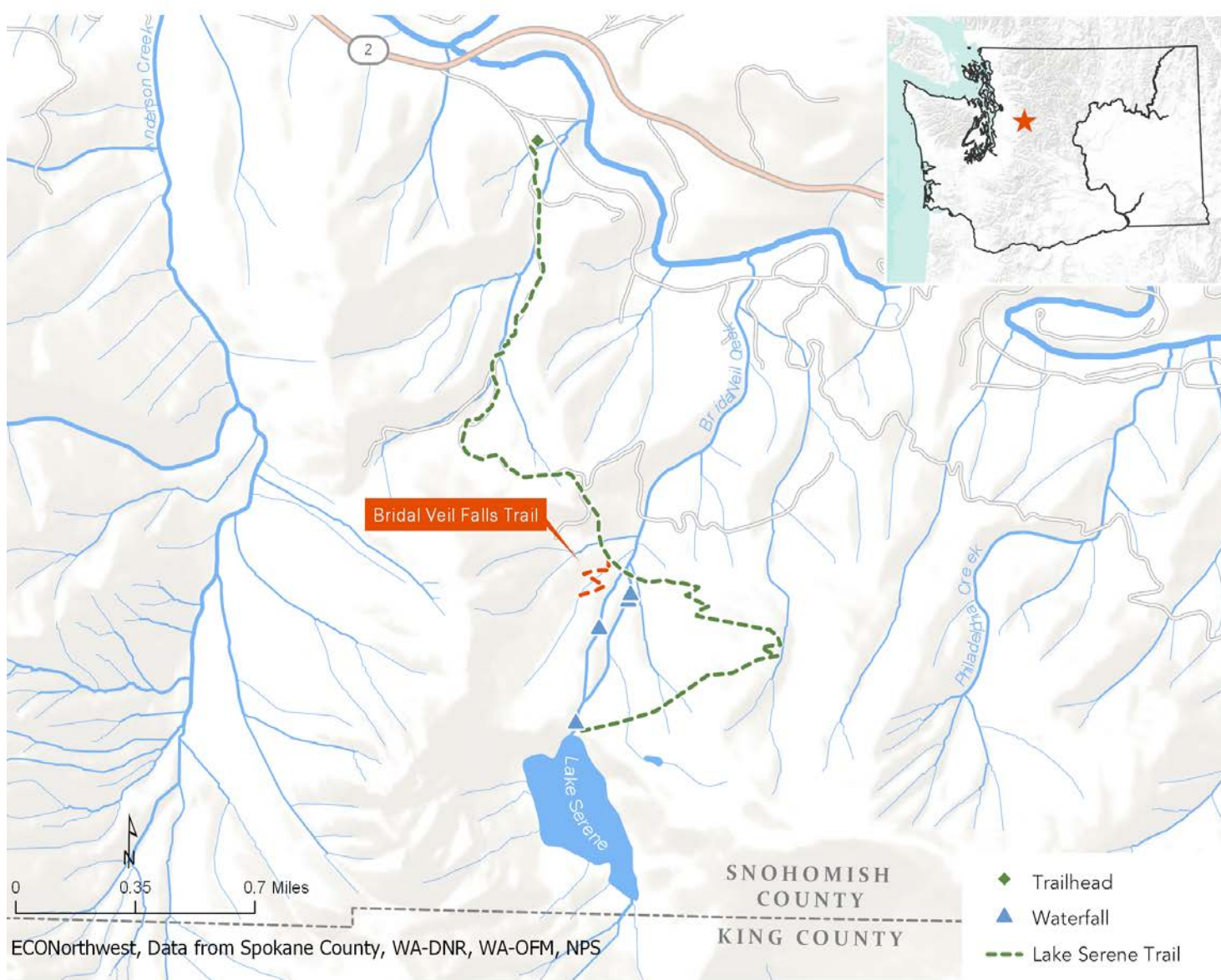
CASE STUDY: Lake Serene Trail | 8

8.2 | LAKE SERENE

Lake Serene Trail (#1068) is a hiking trail to Lake Serene (7.2 miles roundtrip) and Bridal Veil Falls (0.5 mile out and back side trail) in the Mt. Baker-Snoqualmie National Forest. Boasting a clear-blue alpine lake, waterfall, forest coverage, and valley views, all located less than 60 miles from downtown Seattle, the trail offers many features that make it a popular recreation destination. Over 1,500 visits per week occur at the Lake Serene Trail during the peak season.⁴⁶

From August 2017 to September 2018, Lake Serene Trail was closed for forest management activities adjacent to a portion of the trail. Based on a trailhead use model developed at the University of Washington, over 39,000 potential recreational users had to go somewhere else during the closure. The number of “forgone user days” varies throughout the year, with the highest impact occurring during the warmer summer months, as highlighted in Exhibit 25 on the following page.

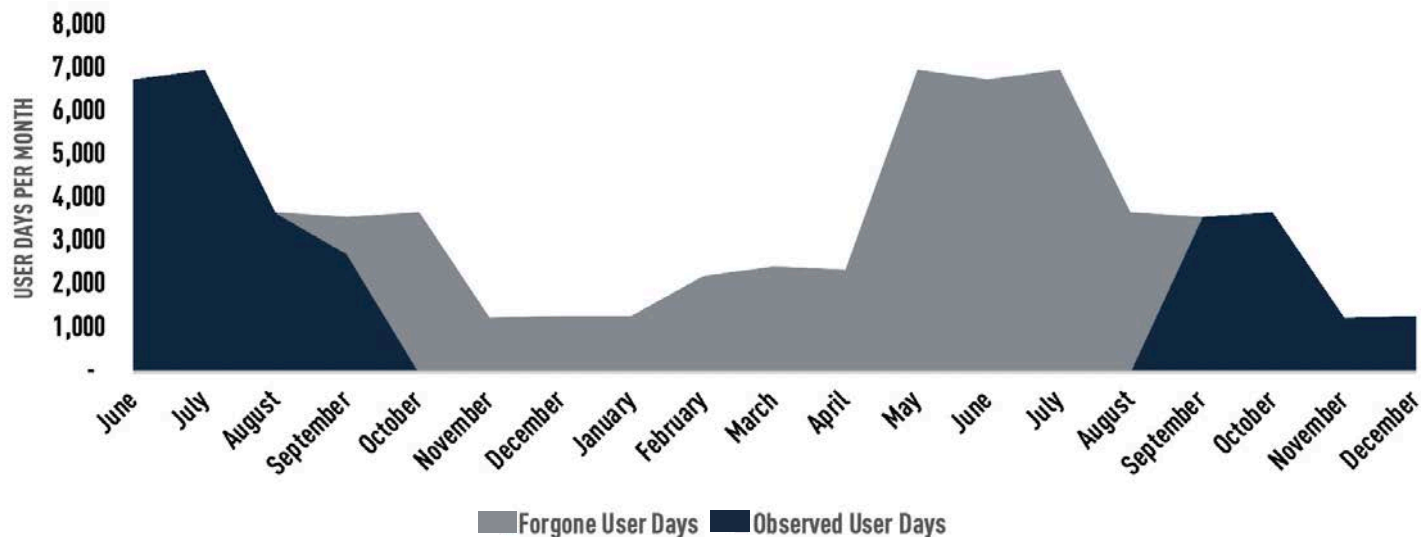
EXHIBIT 24. Lake Serene Trail and Bridal Veil Falls Trail Locations



⁴⁶ On-site counts at Lake Serene were provided courtesy of Spencer Wood and Sama Wildner of the University of Washington. They are engaged in extensive research that uses a combination of data sources including on-site intercepts and social media engagements to estimate trail-use at all trails in the state.

8 | CASE STUDY: Lake Serene Trail

EXHIBIT 25. Observed and Forgone User Days at Lake Serene Trail, June 2017-December 2018



Source: Spencer Wood and Sama Winder at the University of Washington.

When Lake Serene Trail was closed, recreationists who would have otherwise visited that site chose one of three scenarios:

1. Visit an alternative site near Lake Serene Trail (local substitution),
2. Visit an alternative site further from Lake Serene Trail (non-local substitution), or
3. Not participate in outdoor recreation (stay at home).

For all scenarios, recreational economic value would be reduced because the alternative sites would not be users' first choice and users may incur additional personal costs through additional travel time, or additional financial costs such as increased fuel and food spending.

Selecting these alternative sites can shift where the economic contribution occurs within the state. If recreationists select the non-local alternative and substitute to sites further away, such as in the Snoqualmie valley along I-90, the local economic contributions would no longer accrue to the towns of Monroe, Index, or Gold Bar near the Lake Serene Trail, but would rather accrue to the towns of Snoqualmie and North Bend near the substitute sites. Health benefits for trail users would still accrue for both the local and non-local alternatives.

For the third scenario, where potential recreationists choose to stay home and engage in a non-trail-based activity, there are no economic contributions, health benefits, or recreational user values accruing as a result of trail use.

The selection between the three scenarios will vary by user and depends on individual demand for recreation and the availability of suitable substitutes. While we do not have sufficient data to estimate the substitution pattern that resulted from the Lake Serene Trail closure, these types of effects are regularly measured when evaluating impacts from site closures or benefits from the construction of new sites. From those studies, we can say with confidence that closing trails reduces local economic value attributable to trails. These effects are summarized in Exhibit 26.



Lake Serene (Photo by Lukasz Grabarski)

EXHIBIT 26.

Changes in Economic Value When Trails Are Closed

	LOCAL SUBSTITUTION	NON-LOCAL SUBSTITUTION	STAY AT HOME
Local Economic Contributions	Unchanged	▼	▼
Health Benefits	Unchanged	Unchanged	▼
Recreational Use Value	▼	▼	▼

Source: ECONorthwest.

To calculate the baseline benefits from Lake Serene Trail, we calculate the economic contributions, health benefits, and recreational value from trips to Lake Serene Trail during normal operation. These represent the maximum potential loss from the closure.

8.2.1 | ECONOMIC CONTRIBUTIONS

Camping is not allowed at Lake Serene and the trail is not near a major population center, so we assume all baseline trips are non-local day trips and apply the non-local day trip spending estimate of \$72.66 per party from the USFS National Visitor Use Monitoring program. We then convert the 45,318 user visits to party size to apply this per party spending estimate. As a result, baseline spending by visitors to Lake Serene Trail is estimated as \$1.4 million per year.

After accounting for the money that leaves the local economy to pay non-local retail suppliers, approximately \$475,000 remains in the local economy. That spending then ripples through Snohomish County's economy to generate a total of \$834,000 in economic activity. The spending associated with visitors to Lake Serene Trail supports an estimated 12 jobs and \$314,000 in wages and compensation in the local economy. Exhibit 27 summarizes the annual economic contributions of Lake Serene Trail when it is open and experiencing regular visitation.



Lake Serene Trail (Photo provided by Washington Trails Association)

When Lake Serene Trail was closed the full economic contribution of the trail was not being realized. If local substitution is chosen by all users, then the economic contributions remain in the local economy. However, not all trail users will choose to substitute to local sites. If all trail users substitute to non-local sites then the economic contributions could completely leave the local economy. Lastly, if all trail users stayed at home and did not participate in trail recreation the economic contributions would leave the local economy and not occur in any other location.

EXHIBIT 27. Annual Economic Contributions to Snohomish County from Lake Serene Trail

	ECONOMIC CONTRIBUTIONS	LABOR INCOME	JOBS
Total Effect	\$834,000	\$314,000	12

Source: Created by ECONorthwest using data from IMPLAN.

8 | CASE STUDY: Lake Serene Trail

8.2.2 | HEALTH BENEFITS

To calculate the health benefits associated with recreation at Lake Serene Trail we use the average health savings per user occasion for hiking in Snohomish County of \$0.85. When the 45,318 Lake Serene Trail user days are applied to this estimate it yields an annual health savings of \$38,000 per year. A caveat for interpreting these values is that visitors likely do not visit Lake Serene Trail every week, so not all the health benefits would be attributable to the trail. A hike at Lake Serene Trail is also much longer than the average weekly hiking for residents of Snohomish County of 25 minutes per week, which may increase the value of the health benefits from the trail.

8.2.3 | RECREATIONAL-USE VALUE

Recreational-use value, also known as consumer surplus, is the difference between what a recreational user would pay to use a trail and what they actually pay. Because Lake Serene Trail is in a National Forest, we use the hiking consumer surplus value from White (2017) of \$91.10 per person per day to estimate the recreational-use value. For the 45,318 annual trips to Lake Serene Trail, the estimated recreational-use value of Lake Serene Trail is \$4.1 million per year.

The actual lost economic value from the trail closure is dependent on the substitution patterns of the recreational users that would have otherwise visited it. The potential losses for all three substitution pattern scenarios are summarized in Exhibit 28, assuming all users substitute the same way. The true value is likely somewhere in between these estimates, since each of the alternatives will have some people that select it.

These results highlight the implications of any trail closures considered in the future. When evaluating land management decisions that will affect recreation trail use, policymakers should take the following into consideration:

1. Recognize that any trail closure will result in a loss of recreational use value.
2. Closing trails without suitable local substitute trails may lead to reduced local economic contributions.
3. Closing trails that do not have any suitable substitutes may result in reduced health savings benefits.

EXHIBIT 28. Summary of Potential Lost Economic Value from Lake Serene Trail Closure, by Scenario

IMPACT TYPE	BASELINE (TRAIL NOT CLOSED)	LOCAL SUBSTITUTION (ALL USERS)	NON-LOCAL SUBSTITUTION (ALL USERS)	STAY AT HOME (ALL USERS)
Economic Contribution	\$834,000	No Change	-\$834,000	-\$834,000
Total Labor Income	\$314,000	No Change	-\$314,000	-\$314,000
Total Jobs	12	No Change	-12	-12
Health Savings	\$38,000	No Change	No Change	-\$38,000
Recreational-Use Value	\$4.1 million	Reduced, Magnitude Unknown	Reduced, Magnitude Unknown	-\$4.1 million

Source: ECONorthwest.



(Shutterstock)

This report has outlined the economic benefits of trails in the State of Washington, including the economic contributions associated with recreation spending, health benefits of physical activity and exposure to nature, recreational-use value for trail users, environmental benefits, property value benefits, and quality of life improvements. Many of these benefits depend on the number of trails in the state, but the quality and accessibility of trails is also important because those factors help determine the number of visitors to a trail. In general, the more a trail is used, the higher the benefits. This report presents the following policy recommendations, some of which align with the State Trails Plan,⁴⁷ that policymakers can implement to help maximize the benefits from non-motorized trail-based recreation in Washington.

1. ENCOURAGE DEVELOPMENT OF NEW TRAILS. Building new trailheads and creating more trail miles in areas with trail scarcity is a way to promote additional trail use, which will maximize the user-based benefits from trails. The Centennial Trail and Lake Serene Trail case studies demonstrate the impact that even a single trail can have in local economies. This project did not conduct an analysis of trail scarcity by location and/or use, but such an exercise could be conducted using data from the Washington State Trails Map⁴⁸ intersected with geospatial population distributions. New trails should also be targeted in areas with current capacity constraints by identifying high-use trails in the state.

Regulations also influence the potential for new trails. Recreation partners report that permitting rules for new trails vary by county, with some local jurisdictions applying vague or undefined permitting requirements. Developing statewide policies for new trail permitting could ease this regulatory burden for trail builders. There is also inconsistent trail infrastructure definitions and terminology, which creates challenges for new regulations. Common trail terminology currently exist in other areas⁴⁹ and criteria for regional trails in Washington is currently being developed through a coalition for regional trails in King, Kitsap, Snohomish, and Pierce counties. Leveraging these examples and working

with regional stakeholders is the recommended strategy to implement a set of common terminology.

2. CONDUCT COMPREHENSIVE PLANNING FOR TRAILS.

Drafting a state vision for trails could serve as a guide for future trail policy. The state vision would include drafting a concept for trails in Washington that addresses where people want to go and the types of experiences available to trail-users. A statewide vision for trails could also inform long-range planning efforts, including planning for increased populations and expanded use of trails. Long-term planning for trail infrastructure, similar to what is done for roads and highways, could be used as a strategy to prevent future congestion and damage from overuse at popular trails. Proactive planning could help ensure trails have the resources and amenities needed to handle increased users. Specific strategies that could ease adverse effects of trail congestion include trail expansions, additional parking, additional bathrooms, increased trash receptacles, separating bike and pedestrian usage, and creating transit-to-trail transportation options.

3. ENCOURAGE DEVELOPMENT OF TRAILS THAT PROMOTE MULTI-DAY TRIPS.

Overnight spending is significantly higher than day trip spending, meaning that the economic contributions to local economies are higher with longer trips. Increasing the number of multi-day trips can be accomplished through connecting existing trails, allowing for camping, and creating new camping opportunities. Statewide trails in other locations of the U.S., such as the Allegheny Passage in Maryland and Pennsylvania and the Chesapeake & Ohio Canal Trail along the Potomac River, are examples of statewide trail systems that support multiple day excursions and draw users from across the country. Additionally, the Rails-to-Trails Conservancy is planning the Great American Rail-Trail that would span from La Push to Washington D.C., representing another effort policymakers in Washington can support to maximize the benefits of trails in the state.⁵⁰ The Spokane Centennial Trail case study example demonstrates how connected trail networks close to where people live can yield large economic benefits.

⁴⁷ The State Trail Plan is available at: <https://www.rco.wa.gov/StateRecPlans/specific-recreation-plans/state-trails-plan/>

⁴⁸ The Washington State Trails Map is available at <https://wa-geoservices.maps.arcgis.com/apps/View/index.html?appid=127767fbc3ee40d6b06477c29658eda4>

⁴⁹ Examples of definitions can be found at: <https://www.capitaltrailscoalition.org/network-inclusion/>

⁵⁰ More information about the great American Rail-Trail can be found at: <https://www.railstotrails.org/greatamericanrailtrail/>

9 | POLICY RECOMMENDATIONS

4. ENCOURAGE VISITATION BY ADDING NEW AND IMPROVING EXISTING AMENITIES.

Trails represent neighborhood amenities, and the quality of the amenity depends on the characteristic of the trail, including accessibility and cleanliness, as well as the existence of features like maps, ample parking, bathrooms, water fountains, shade, views, water features, etc. All else equal, a higher quality trail will have more visitation than a lower quality trail and be a source of higher benefits. To understand where amenities need improvement, amenities could be documented with the trail inventory and then a supply analysis could determine where there is a scarcity of amenities relative to people and the feasibility of improving or implementing new features.

5. USE TRAILS AS A HEALTH INTERVENTION.

The physical and mental health benefits associated with trails makes them potential pathways to improve health outcomes. Exposure to nature is even being prescribed by doctors because of the physical, mental, and social benefits.⁵¹ Increased access to trails can be accomplished by marketing campaigns creating awareness about local trails, building new trails, or lowering barriers to entry to access trails. Some of the ways barriers to entry can be lowered includes public transportation access to trails, such as King County's innovative Trailhead Direct transit to trails bus service, integrated trail networks that connect to where people live, and subsidized programs to cover trail fees.

6. IMPROVE DATA COLLECTION OF TRAIL USAGE AND CREATE CONSISTENCY.

For this project we attempted to determine only how many people were using trails in Washington. Our participant analysis was limited by missing data. Additionally, there are many other questions which would inform trail policy that the data does not currently allow for because there is a lack of surveys and data issues where surveys do exist. Other questions that would inform trail policy include determining how people are using the trails in terms of who is a repeat visitor versus a one-time visitor, how many minutes on average per week a visitor uses the trail, whether the visit is for commuting or recreation, how far the person

travels for a trail, and other questions. Without proper data, understanding demand for trails will be limited. Intercept surveys, where feedback is collected at the site at representative times, are common ways to obtain specific information about visitor patterns and attitudes. Intercept surveys can complement trail counters to better inform the actual patterns of use. Although important tools, trail counters can double count people and miss people who use different parts of the trail.

The Statewide Comprehensive Recreation Participation (SCORP) survey for Washington is conducted every five years and is one of the most important data sources for estimating trail-based recreation because it surveys users on patterns of activity that distinguish by activity and location (e.g. paved vs. unpaved trails). The existing survey can be improved to better inform participation and preferences throughout the state. The Society of Outdoor Recreation Professionals offers resources based on SCORP reports from all U.S. states.⁵² Recommendations we have for improving future SCORP survey efforts include:

- Increase the survey sample rate.
- Reduce the cognitive burden in the survey by limiting the number of questions and skip-patterns.
- Remove the opportunity for users to input open-ended responses for bi-modal (e.g. yes/no) or numerical (e.g. How many times? What is your age? etc.) questions.
- Ask questions about the specific destinations for recent trips.
- Extend the survey period to cover an entire year for the period when survey responses are collected and reduce the respondent recall period to no more than two months.

⁵¹ For more information visit ParkRx at: <https://www.parkrx.org/health-benefits>.

⁵² For more information visit: <https://www.recro.org/scorp-library>

This report evaluates the economic benefits of recreational non-motorized trails in Washington in terms of economic contributions, health benefits, recreational value, and environmental benefits. Statewide, Washington residents spent over 292 million days walking, running, hiking, biking, and backpacking on trails in the state in 2016. These recreational users contribute over \$8.2 billion to Washington's economy each year. Trail-based activities also improve health outcomes and reduce health care expenditures by over \$390 million per year. Trails themselves are a valuable asset to the state, conveying over \$8.5 billion in recreational-use value benefits and potentially as much as \$5.9 billion in environmental benefits per year.

State, local, and federal decision makers have the opportunity to expand these important resources by protecting and expanding trail networks and improving data collection capabilities to better estimate their use. Washington has a treasure-trove of natural resources, and recreational trails allow residents and visitors to access, engage, appreciate, and protect them.



Kennedy Creek Salmon Trail.
(Photo provided by Washington Recreation and Conservation Office)

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