

Nonmotorized Transportation Pilot Program

Continued Progress in Developing Walking and Bicycling
Networks



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13. ABSTRACT In 2005, the United States Congress directed the Federal Highway Administration (FHWA) to develop the Nonmotorized Transportation Pilot Program (NTPP). The program provided over \$25 million in contract authority to four pilot communities (Columbia, Missouri; Marin County, California; Minneapolis area, Minnesota; and Sheboygan County, Wisconsin) for pedestrian and bicycle infrastructure and nonmotorized programs. This report summarizes the progress and results of the NTPP from August 2005 through December 2013, updating and expanding upon the analysis from the <i>Report to the U.S. Congress on the Outcomes of the Nonmotorized Transportation Pilot Program</i> , submitted by the Federal Highway Administration in April 2012. This report analyzes the results through December 2013 of the NTPP in terms of program implementation, transportation mode shift toward walking and bicycling and associated improvements pertaining to access and mobility, safety and public health, and the environment and energy. From 2007 to 2013, the pilot communities observed an estimated 22.8 percent increase in the number of walking trips and an estimated 48.3 percent increase in the number of bicycling trips. This report examines how the NTPP pilot communities provide examples to other communities interested in implementing and evaluating nonmotorized investments.				
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List of Acronyms

Abbreviation	Term
CDC	Centers for Disease Control and Prevention
FHWA	Federal Highway Administration
GIS	Geographic Information System
GHG	Greenhouse Gas
HEAT	Health Economic Assessment Tool
ITHIM	Integrated Transport and Health Impact Modeling Tool
NHTSA	National Highway Traffic Safety Administration
NTPP	Nonmotorized Transportation Pilot Program
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
STARS	Statewide Traffic Accident Records System (Missouri)
SWITRS	Statewide Integrated Traffic Records System (California)
TLC	Transit for Livable Communities
TOPS	Traffic Operations and Safety (Wisconsin)
VMT	Vehicle Miles Traveled
WHO	World Health Organization
WG	Working Group

Executive Summary

This report summarizes the progress and results of the Federal Highway Administration's (FHWA) Nonmotorized Transportation Pilot Program (NTPP) from August 2005 through December 2013. Section 1807 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) provided approximately \$25 million in contract authority to four pilot communities (Columbia, Missouri; Marin County, California; Minneapolis area, Minnesota; and Sheboygan County, Wisconsin) for pedestrian and bicycle infrastructure and nonmotorized programs.

In response to evaluation and reporting requirements in the legislation, the FHWA submitted two reports to Congress: an interim report in 2007 and a final report in 2012. The Interim Report to Congress outlined an evaluation plan for NTPP and initial program progress. The Final Report to Congress reported the results of four years of data collection on program implementation, transportation mode shift towards walking and bicycling, and related health and environmental benefits. This report represents an update to the findings in the Final Report to Congress with evaluation of three additional years of data, reflecting additional projects that have been completed since the 2012 report. This report also expands the scope of analysis to further consider priority themes of access, environment, safety, and public health.

Key outcomes from NTPP described in this report include:

- **Spending:** As of late 2013, the four NTPP pilot communities reported investing **\$88.5 million of NTPP funds in nonmotorized transportation projects or programs** (\$79.8 million in on- and off-street infrastructure, \$7.5 million in outreach, education, and marketing programs, and \$1.3 million in bicycle parking). The pilot communities also **leveraged \$59 million in other Federal, State, local, and private funds**.
- **Mode Share Shift:** An estimated **85.1 million vehicle miles traveled (VMT) were averted** from increased nonmotorized trips between 2009 and 2013 relative to the 2007 baseline. The **walking mode share increased 15.8 percent** from 2007 to 2013, while the **bicycling mode share increased 44 percent** over the same period. This translates to **22.8 percent and 48.3 percent increase in the number of pedestrian and bicycle trips** across the four communities.
- **Project-Level Outcomes:** **Trip counts increased up to 56 percent and 115 percent at individual pedestrian and bicycle project sites**, respectively. Infrastructure projects also enhanced nonmotorized transportation routes to community amenities and transit hubs. Community outreach programs increased knowledge of nonmotorized transportation options and safety, and some projects expanded access to bicycling for underserved populations.
- **Access and Mobility:** NTPP **expanded 1/4-mile bicycle network access to approximately 240,000 people, 106,000 housing units, and 102,000 jobs**. More than 70 percent of all NTPP infrastructure projects connect to employment centers, schools, parks, and recreation areas.
- **Environment and Energy:** NTPP saved an estimated **25 pounds of CO₂ pollution in 2013 per capita in the pilot communities, or a total of 9,065 tons**. This is equivalent to saving over 1.25 gallons of gas per capita in 2013 or nearly 3.6 million gallons between 2009 and 2013. NTPP **saved an estimated 3.6 million gallons of gasoline between 2009 and 2013**. This translates to an estimated **34,629 tons**

of CO₂ emissions averted over that time period. In 2013, the pilot communities **reduced emissions of hydrocarbons (33.4 tons), particulate matter (255 pounds PM₁₀ and 241 pounds PM_{2.5}), nitrogen oxides (23.3 tons), and carbon monoxide (304.6 tons)** that contribute to local air pollution.

- **Safety:** Despite large increases in nonmotorized transportation, the pilot communities collectively observed a **20 percent decline in the number of pedestrian fatalities and a 28.6 percent decline in the number of bicycle fatalities** from 2002 to 2012. Similarly, over the same time period, three of the communities experienced declines in the number of pedestrian injuries and **pedestrian injury rates declined between 17.9 percent and 55.1 percent** in each of the four communities. Bicycle injuries increased in three of the four communities, but **bicycling injury rates (incidents per number of trips) declined between 8.6 and 38.2 percent** in each of the four communities.
- **Public Health:** Based on the added bicycling trips observed just in 2013, the U.S. Centers for Disease Control and Prevention (CDC) estimates **reduced economic cost of mortality of \$46.3 million from bicycling** in 2013. This does not include reduced economic cost of mortality from walking or benefits from reduced economic costs of morbidity, which are likely higher than mortality.
- **Build-Out: The benefits of the NTPP investments will continue into the future.** Depending on future walking and bicycling trends in the pilot communities, the pilot communities' nonmotorized transportation investments could avert 266 million VMT over the next ten years, and other benefits, such as health, safety, and environmental benefits, would increase under similar potential scenarios.

Since authorization of the NTPP in 2005, interest and investment in nonmotorized transportation has grown dramatically around the country. Walking and bicycling as transportation, once the purview of a few U.S. cities and a peripheral issue for transportation practitioners, is increasingly a focus for policymakers, planners, and engineers throughout the U.S. With increasing emphasis on creating more livable communities, the public has grown to expect walking and bicycling options within the transportation system that are safe, equitable, environmentally sustainable, and economically efficient. Looking forward, the NTPP leaves a legacy of:

- Local nonmotorized infrastructure and organizational capacity, with community-wide benefits
- Improved evaluation tools, methods, and reporting techniques replicable in other communities
- Lessons for other communities
- Noteworthy practices for the design and implementation of future pilot programs

The NTPP demonstrated what communities can achieve with large investments in nonmotorized transportation planning, infrastructure, and programs. Columbia, Marin County, the Minneapolis area, and Sheboygan County serve as examples for peer communities nationwide as they consider how to improve nonmotorized transportation to produce a broad range of benefits in their communities.

Program Introduction

The Nonmotorized Transportation Pilot Program (NTPP), established in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) provided approximately \$25 million¹ each to four pilot communities (Columbia, Missouri; Marin County, California; Minneapolis area, Minnesota; and Sheboygan County, Wisconsin) for pedestrian and bicycle infrastructure and nonmotorized programs. This investment provided the Federal Highway Administration (FHWA) with an opportunity to work with the four pilot communities to implement a suite of focused nonmotorized projects within relatively limited geographic areas and to evaluate their impacts to provide insights for peer communities nationwide. SAFETEA-LU Section 1807 sought to “demonstrate the extent to which bicycling and walking can carry a significant part of the transportation load, and represent a major portion of the transportation solution, within selected communities.”

SAFETEA-LU Section 1807 enabled each pilot community to determine how best to program funds given their experience with nonmotorized transportation, unique geographic and demographic contexts, and community priorities. As a result, each community developed its own set of program priorities and approach to implementation. The purpose of the summary in this section is to:

- Provide a profile of the investments the pilot communities made as a whole, individually, and through leveraging other funding sources;
- Summarize the strategies the four communities used to identify their needs and allocate pilot program funds;
- Understand which strategies were effective; and
- Provide examples for other communities as they consider how to prioritize investments in nonmotorized transportation.

To respond to evaluation requirements in the legislation, FHWA and the pilot communities created a Working Group (WG) to coordinate implementation of the program and develop a common methodology for data collection and analysis across the four pilots (see Appendix A for a list of WG members). With funding from the FHWA and program budgets of individual communities, the WG developed a collaborative approach to data collection and evaluation relying on directly collected data and supplementary national, State, and local data sources. The WG developed and implemented evaluation approaches to assess the travel behavior impacts of nonmotorized investments, grounded in a community-wide count approach following the National Pedestrian and Bicycle Demonstration Project methodology.

Pursuant to the legislation, the FHWA submitted two reports to Congress: an interim report in 2007 and

¹ After the initial expiration of SAFETEA-LU in September 2009, the NTPP received one additional year of funds during authorization extensions.

a final report in 2012.^{2,3} The Interim Report to Congress outlines an evaluation plan for NTPP and initial program progress. The WG then implemented the evaluation plan and reported the results of four years of data collection in the Final Report to Congress through 2010. The evaluation focused on program implementation, transportation mode shift towards walking and bicycling, and related health and environmental benefits. The WG decided to continue the evaluation as NTPP projects approached completion. This report represents an update to the findings in the Final Report to Congress with evaluation of three additional years of data. This report also expands the scope of analysis to further consider priority themes of access, environment, health, and safety.

Using community bookend counts collected over the course of seven years (2007-2013), the WG modeled annual changes in nonmotorized trips and vehicle miles averted. These estimates contributed to a community-wide and program-level evaluation of NTPP investments, pointing to positive environmental, economic, health, and safety benefits of the pilot. Each community also selected a small subset of projects and programs to receive more in-depth evaluation. The WG's analysis reveals improved local accessibility and safety and increased use of active transportation over the measurement period. Non-infrastructure projects resulted in training and outreach for thousands of participants, improving the awareness of nonmotorized transportation issues and directly benefiting a diverse array of community members.

² FHWA. 2007. *Interim Report to the U.S. Congress on the Nonmotorized Transportation Pilot Program SAFETEA-LU Section 1807*. Submitted by FHWA with the assistance of the U.S. Department of Transportation's Volpe National Transportation Systems Center: http://www.fhwa.dot.gov/environment/bicycle_pedestrian/ntpp/2007_report/.

³ FHWA. 2012. *Report to the U.S. Congress on the Outcomes of the Nonmotorized Transportation Pilot Program SAFETEA-LU Section 1807*. Submitted by FHWA with the assistance of the U.S. Department of Transportation's Volpe National Transportation Systems Center: https://www.fhwa.dot.gov/environment/bicycle_pedestrian/ntpp/2012_report/.

Background – Communities and Approaches

This section summarizes the investments made in nonmotorized transportation over the course of the NTPP and how the pilot communities set funding priorities and selected projects. The communities developed similar processes for stakeholder consultation and community outreach, but tailored their project selection processes to their unique situations and program goals. One conclusion of this summary is that the long-term value of the NTPP is not just in the projects implemented over the course of the program, but in the community support, practitioner knowledge, and institutional relationships built through the communities' planning processes that have the potential to support local nonmotorized transportation planning well into the future.

The different approaches to project planning and development described in this section provide four useful models for peer communities around the country that are interested in increasing investments in active transportation to accomplish a broad range of goals.

The NTPP included a diverse set of communities in terms of demographics, local industries, topography, climate, and previous bicycle and pedestrian activities (see Table 1). In light of different challenges and given differing levels of experience with nonmotorized transportation planning and infrastructure, each community had to develop project planning, prioritization, and selection processes to effectively allocate their NTPP funds.⁴

Key Highlights

- The four NTPP communities collectively committed \$88.5 million of NTPP funds to infrastructure projects and outreach programs and leveraged NTPP funds to invest an additional \$59 million in other Federal, State, local, or private funds in nonmotorized transportation.
- In general, the communities implemented outreach programs and on-street infrastructure projects relatively quickly. Off-street infrastructure projects took longer to implement due to complexities.
- Each pilot community allocated its NTPP funds differently based on its unique context and program goals.
- The long-term value of NTPP is not just in the projects implemented, but in the community support, practitioner knowledge, and institutional relationships built, which have the potential to support local nonmotorized transportation planning into the future.

⁴ See individual case studies of each community in the *2012 Final Report to Congress* (FHWA, 2012).

Table 1: Profiles of the NTPP Communities

	Columbia, MO	Marin County, CA	Minneapolis Area, MN⁵	Sheboygan County, WI
Population (2010)	108,500	252,409	382,578	115,507
Housing Units (2010)	46,739	111,214	178,287	46,390
Jobs (2010)	72,070	101,475	290,990	52,736
Geographic Area	53 square miles	520 square miles	58.4 square miles	500 square miles
Population Density	2,047 persons per square mile	485 persons per square mile	6,551 persons per square mile	213 persons per square mile
Sidewalks (2005)	350 miles	Not available	1,715 miles	414 miles
Bicycle Lanes (2005)	28 miles	35.8 miles	38 miles	1.75 miles
Shared-Use Paths (2005)	25 miles	33.7 miles	57 miles	35.5 miles
Previous Bicycle / Pedestrian Planning and Project Experience	Moderate	Extensive	Extensive	Limited
Key Community Characteristics	College town; large institutional employers	Steep topography; limited connections between communities	Large, diverse population; densely developed; flat; extreme winter weather	Large land area; 16 communities

Profile of Investments

As of late 2013, the four NTPP pilot communities collectively committed \$88.5 million of NTPP funds to nonmotorized transportation projects or programs in the following five categories:

- Bicycle parking investments;
- On-street infrastructure projects;

⁵ Statistics are for the city of Minneapolis only, though the grant area also includes portions of 13 adjacent municipalities.

- Off-street infrastructure projects;
- Projects with both on-street and off-street components, including those with sidewalk improvements and on-street bicycle lanes; and
- Outreach, education, and marketing to promote walking and bicycling.

In addition to these investments, the pilot communities also spent NTPP funds on planning, program administration, and evaluation. This section focuses on the five investment categories listed above.

The pilot communities allocated over 90 percent of their project funds (\$79.8 million) to on- and off-street infrastructure projects (see Figure 1). Those funds were nearly evenly split between on-street and off-street improvements. The communities also invested 8.4 percent (\$7.5 million) of their funds in outreach, education, and marketing programs. Another 1.4 percent (\$1.3 million) was invested in bicycle parking.⁶

Figure 1: NTPP Pilot Community Investment Percentages by Type

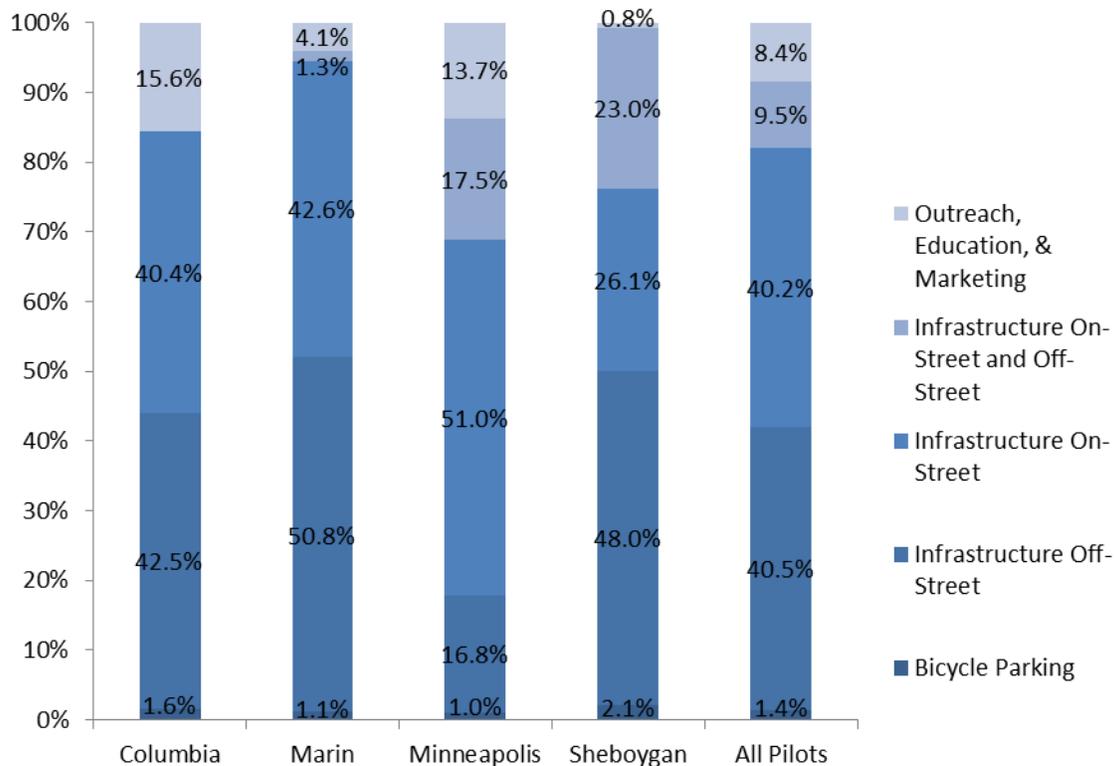


Table 2 outlines the extent of investments made in each community and across the pilots. In terms of facility length, the pilot communities built 12 times more on-street bicycle-specific facilities than

⁶ These figures are based on project investments reported by the NTPP pilot communities and do not include NTPP funds spent on planning, program administration, or evaluation.

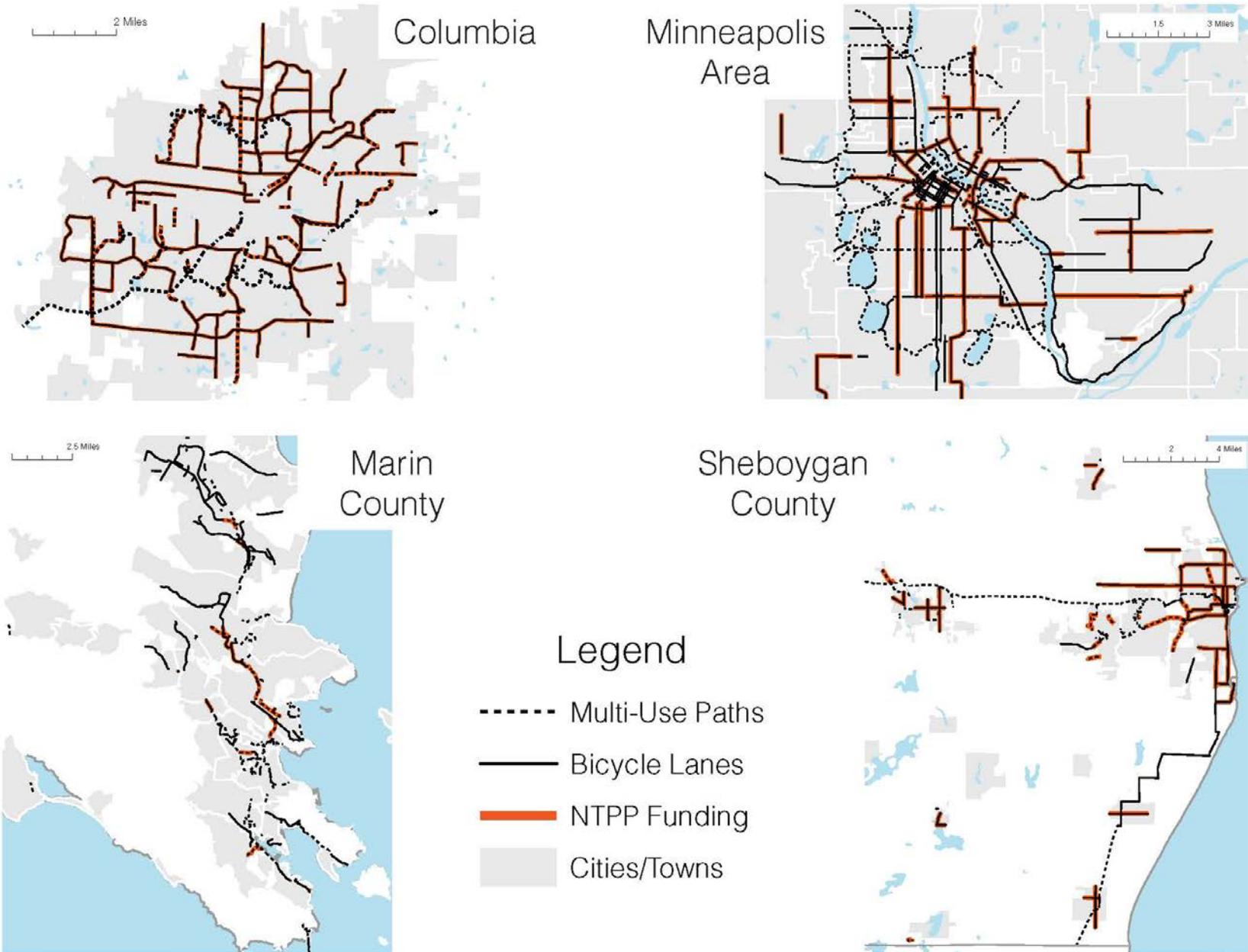
sidewalks. Of the 325 miles of on-street bicycle facilities funded by NTPP, 58 percent were bicycle lanes (187 miles), 32 percent were shared lane markings (104 miles), and 10 percent were bicycle boulevards (34 miles). The pilots developed approximately 37 miles of shared-use paths, which are used by pedestrians and bicyclists.

Table 2: Complete or Funded Projects by Project Category

Element	Columbia	Marin County	Minneapolis Area	Sheboygan County	All Pilots
Shared-Use Paths (Miles)	13.2	11.2	2.9	9.6	36.8
On-Street Bicycle Lanes (Miles)	70.8	7.8	65.5	43.0	187.1
Bicycle Boulevards (Miles)	6.1	-	27.8	-	33.9
On-Street Shared Lane Markings (Miles)	44.4	1.7	10.9	47.2	104.2
Sidewalks and Crosswalks (Miles)	2.1	3.9	3.9	16.1	26
Bicycle Parking (Number)	1,371	127	1,504	905	3,907
Intersection Improvements (Number)	6	60	19	-	88
Bike Sharing Bicycles (Number)	-	-	1,554	-	1,554
Bicycle Racks for Transit	-	-	-	25	25

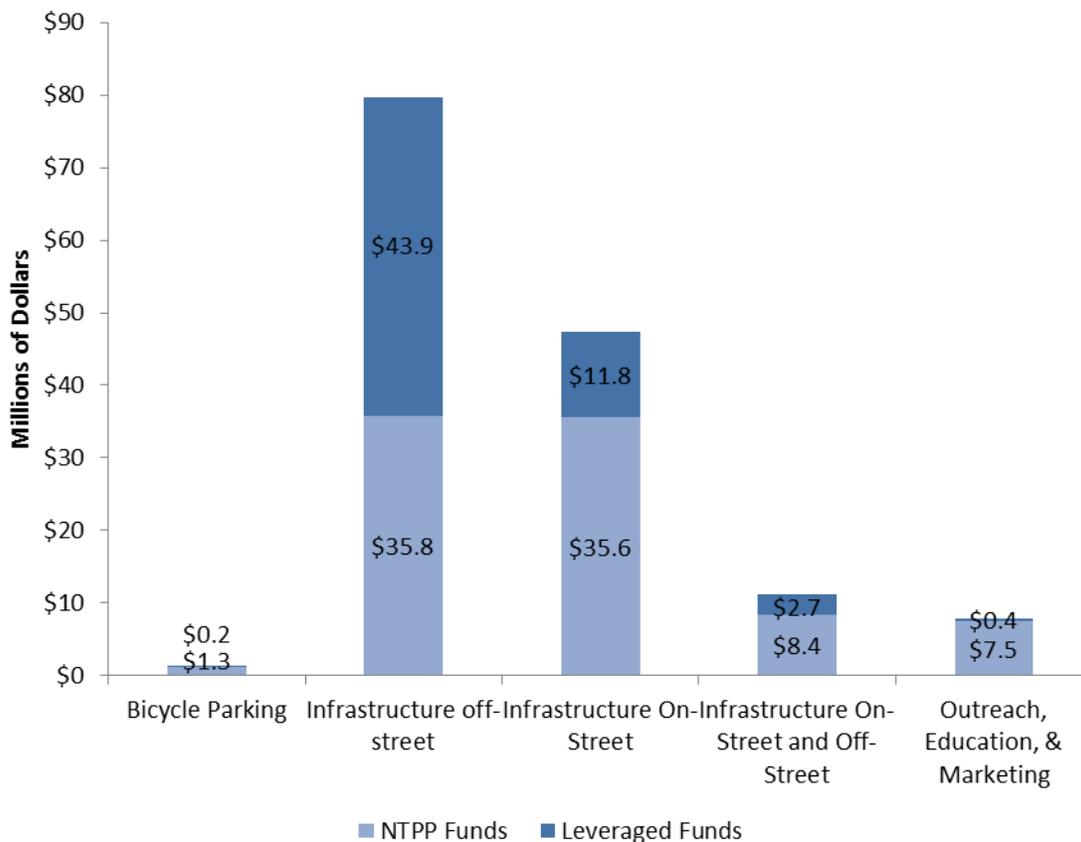
Figure 2 shows high-level conceptual maps for each pilot community’s bicycle network with and without NTPP investments (see Appendix B for more detailed maps).

Figure 2: Pilot Community Bicycle Network Maps With and Without NTPP Investments



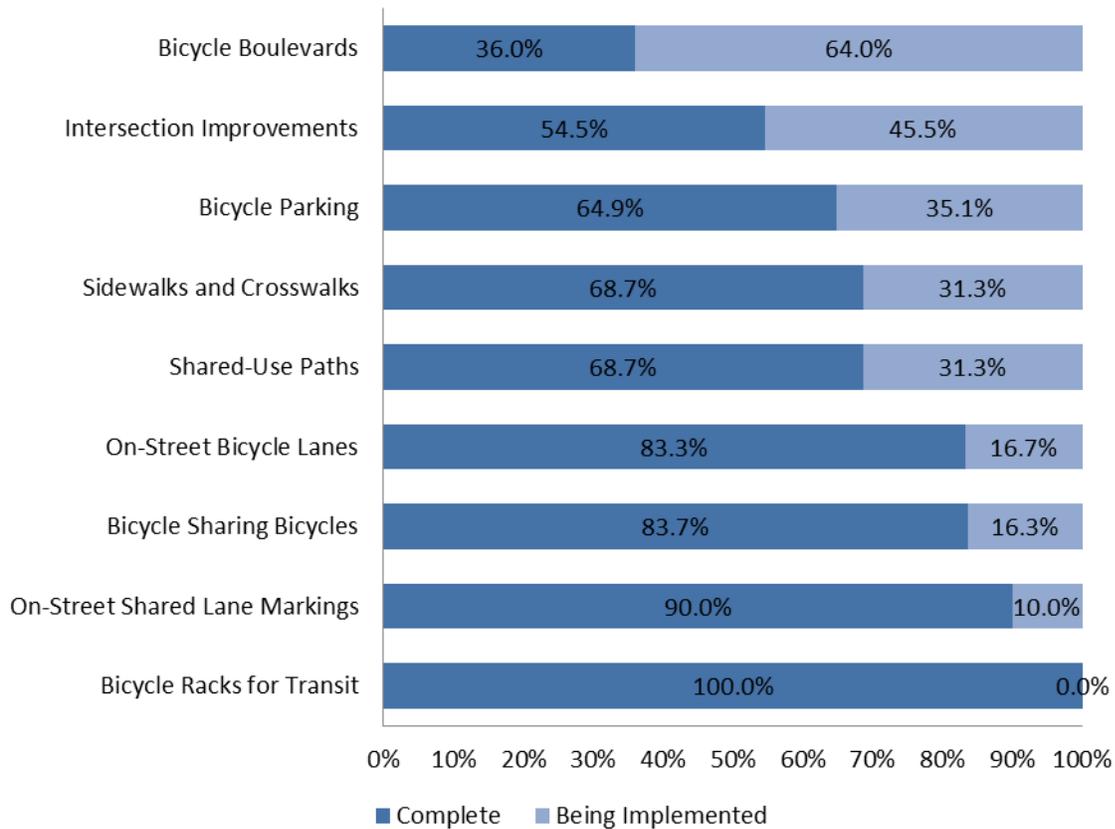
In addition to investing NTPP funds in these projects and programs, the pilot communities leveraged other Federal, State, local, and private sources to increase the program’s impact (see Figure 3). In all, the pilot communities leveraged outside funding in each investment category for an estimated total of \$59 million in leveraged funds. A large portion of those outside funds (\$44 million) were leveraged for off-street nonmotorized infrastructure, which is more than the nearly \$36 million the pilot communities spent of their own NTPP funds for these projects. Approximately \$10 million in leveraged funds went to three large projects.

Figure 3: NTPP Funds and Leveraged Funds by Project Category



The pilot communities have made substantial progress in implementing their slate of investments (see Figure 4). All of the infrastructure projects are either complete or are being implemented. Projects are listed as “being implemented” if the community is actively spending the NTPP funds allocated to the project, either for design, engineering, or construction. All project types except one (bicycle boulevards) are at least 50 percent complete.

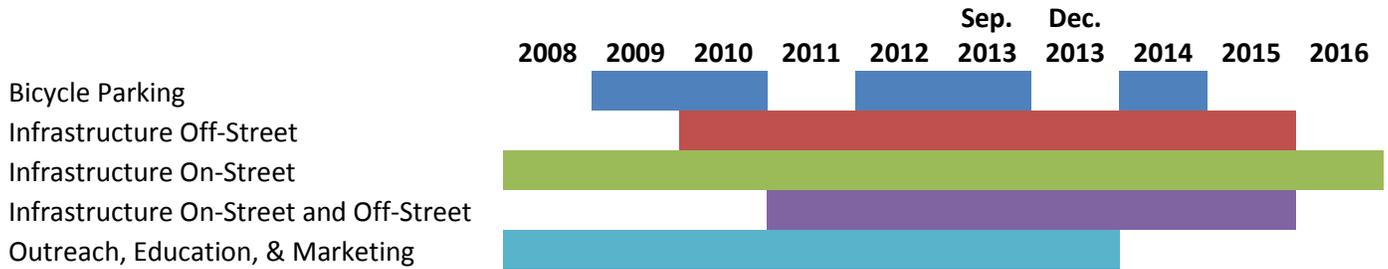
Figure 4: Status of All NTPP Infrastructure Projects by Type (Percent of Facilities Completed as of September 2013)



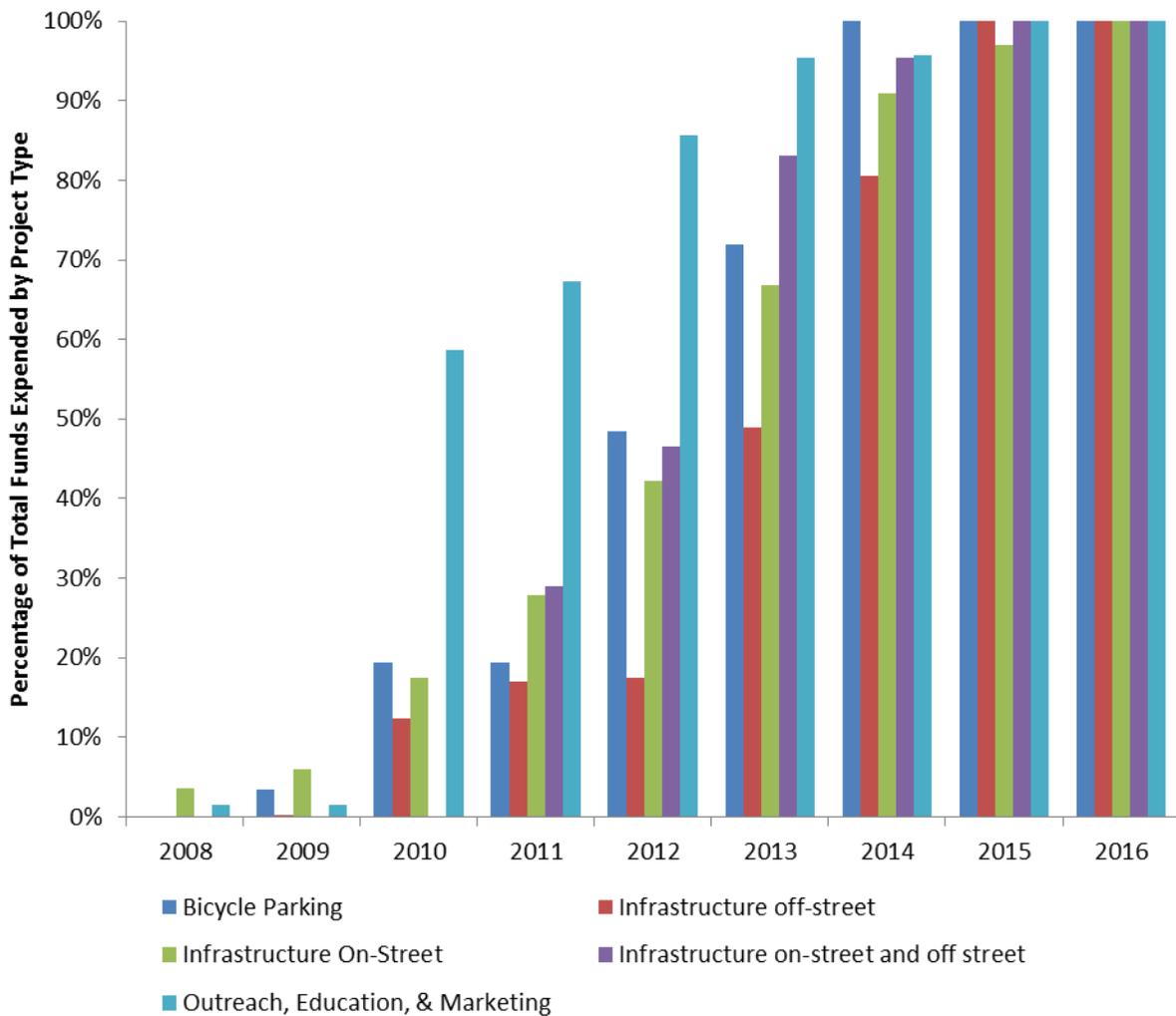
The pilot communities began prioritizing NTPP funds and implementing projects in 2006. As with all transportation infrastructure projects, project planning and construction can take several years. Figure 5 shows the timing of infrastructure and non-infrastructure projects over the course of the program. The chart shows that the communities completed their initial on-street infrastructure projects in 2008 and plan to continue making these improvements through 2016.

Figure 5: NTPP Investments over Time

Timing of Project Implementation by Project Type



Annual Project Implementation by Project Type (Percentage of Total Dollars Spent by Project Type as Reported by the Pilot Communities)



Infrastructure investments, especially those that include off-street improvements, took longer to

implement due to a variety of factors: Federal funding requirements, necessary coordination, the need to secure authorizations from various agencies, and jurisdictional and right-of-way challenges. Outreach, education, and marketing programs began early, but were largely completed by the end of 2013.

Goals and Planning Approach

Each pilot community planned within their unique contexts given distinct sets of challenges, goals, and opportunities. In Columbia and Marin County, the local public works departments administered NTPP funds, while in Sheboygan County, the planning department administered the funds. Congress designated a Twin Cities non-profit organization, Transit for Livable Communities (TLC), to administer the Minneapolis program. Each community developed different approaches to planning and project selection (see Table 3). While they faced some common challenges, each community had to determine how to allocate the NTPP funds in an efficient manner to most effectively meet their nonmotorized transportation objectives.

Table 3: NTPP Communities' Planning Approaches

	Columbia	Marin County	Minneapolis Area	Sheboygan County
Program Name	GetAbout Columbia	WalkBikeMarin	Bike Walk Twin Cities	Sheboygan County NOMO
Administering Entity	City Department of Public Works	County Department of Public Works	Local Non-Profit	County Planning and Conservation Department
Project Focus / Approach	Innovative design, education, and promotion programs	Closing local and regional network gaps, leveraging partnerships, connections to transit, and strategic community outreach	Capacity building, strategic expansion, community-wide and corridor scale planning studies, outreach to underserved communities	Develop pedestrian and bicycle plan, nonmotorized corridors in the heart of cities and towns, broad education campaigns
Advisory Committee	30-member citizens' advisory board with three subcommittees. Worked with city staff to develop program plan	19-member technical advisory committee provided project funding recommendations to the County Board of Supervisors	Bike/Walk Advisory Committee advised TLC Board about project selection and funding strategy	30-person advisory committee advised Board of Supervisors

To involve stakeholders throughout NTPP implementation, the communities worked with citizens' advisory committees to guide program implementation. These committees typically included representatives from local transportation and planning departments, pedestrian and bicycle advocacy groups, public health officials, law enforcement, and the business community. They met in public settings, which provided a transparent forum for decision-making and a means to include community input in project selection. This arrangement helped strengthen the relationships between different agencies and stakeholders, building a common understanding among participants and capacity for future collaboration. For example, participants in WalkBikeMarin's Technical Advisory Committee reported learning from the process and expressed a desire for a similar project selection process in the future.⁷

Through this engagement, each community's administering entity developed goals that reflect its nonmotorized transportation needs. Columbia's pilot program, GetAbout Columbia, chose to focus on experimental infrastructure design and made an effort to "get the word out" about nonmotorized travel options, spending a proportionally greater percentage of its funds on education and promotion than the other pilot communities. Marin County benefited from the substantial bicycle and pedestrian network already in place, but important gaps existed in regional connectivity. Therefore, WalkBikeMarin focused its efforts on closing key gaps in its nonmotorized transportation network and enhancing connections to transit for longer-distance commutes. In the Minneapolis area, Bike Walk Twin Cities used outreach techniques to build community capacity and support a longer-term culture shift towards nonmotorized transportation. The Minneapolis area program also focused on social equity and increasing access to nonmotorized transportation across neighborhoods and communities. Sheboygan County had the least experience with planning for walking and bicycling as a form of utilitarian transportation. Its primary goals were to develop a comprehensive nonmotorized transportation plan, with broad community participation, as well as to develop nonmotorized corridors in the hearts of its cities and towns.

Project Selection and Programming

Each pilot community allocated NTPP funds differently to meet their distinct goals (see Figure 1). For example, Columbia and the Minneapolis area spent comparatively more of their funds on outreach, education, and marketing, since creating a culture of nonmotorized transportation and building community capacity were important goals for the respective communities. Marin and Sheboygan Counties focused a proportionally greater share of funding on off-street nonmotorized transportation infrastructure, helping achieve their respective goals of closing regional network gaps and developing nonmotorized corridors through city and town centers.

⁷ Marin County Nonmotorized Transportation Pilot Technical Advisory Committee. 2007. Process Evaluation, Summary of Committee Member Comments.

The pilot programs in Marin County, the Minneapolis area, and Sheboygan County all worked with their advisory committees to develop selection criteria to guide the project selection process according to their wider community goals. In Columbia, the advisory committee used selection criteria detailed in its previously adopted plans for nonmotorized transportation, including its Sidewalk Master Plan, Trails Plan, and Bikeways Plan. Marin County, whose overall priority was to fill gaps in its local and regional network, chose projects based on performance measures including the impact on mode share, contribution to transportation networks, safety improvements, and implementation-readiness. The Minneapolis area chose its projects based on maximizing mode shift and network connectivity, with criteria that included cost effectiveness, addressing cultural and economic equity, innovation, and demonstrated support of the local community and jurisdiction. In Sheboygan County, which focused on increasing residents' access to destinations, the advisory committee ranked project applications using several criteria, including population density, network connectivity, and safety.

One challenge each pilot community had to address was how to establish a process to allocate Federal funds efficiently within their community. This was especially important given the time and resources required to select projects, update regional Transportation Improvement Programs, transfer Federal funds to the agencies implementing selected projects, and meet required project reviews. Columbia and Marin County, which both benefited from previously developed bicycle and pedestrian transportation plans and previously identified projects, chose to allocate all of their available funds in one grant application process. Columbia, which only had to plan for one jurisdiction, decided to program \$30 million of projects. This was more than the \$22 million they expected to receive from the NTPP, so that they would have projects ready to fill in if some of their other projects were delayed. Marin County also benefited from experience in managing similar grant programs, which allowed them to develop their application process more quickly. By contrast, the Minneapolis area and Sheboygan County held multiple calls to identify projects to fund. Although this may have required more time to select and fund the projects, it also created greater opportunities for community outreach. The Minneapolis area, which prioritized network expansion within the city as well as connections with surrounding communities, awarded its funds through three requests for proposals, increasing its outreach across 14 jurisdictions. Sheboygan County first developed a Pedestrian and Bicycle Comprehensive Plan to guide their project selection and issued multiple project calls to build community awareness.

Each of these communities' planning processes increased professional knowledge and community familiarity with nonmotorized transportation programming. This could support future pedestrian and bicycle improvements in these communities as they move forward, increasing the impact of the NTPP far beyond the seven years studied in this report.

The lessons learned by the four communities can also be helpful for other counties, cities, and towns that want to improve their pedestrian and bicycle infrastructure and programming. These lessons include:

1. **Comprehensive pedestrian and bicycle plans and street design policies help communities to program funds effectively.** Communities with preexisting plans and policies were able to select projects for implementation more quickly because of the previous research, outreach, and

community support these planning efforts had achieved. Some communities that did not have plans or policies in place for nonmotorized transportation chose to develop them before moving forward with project selection.

2. **Leveraging funds expands program impact.** The four pilot communities increased the impact of the NTPP grant funds by leveraging them in combination with available funds from other Federal, State, local, or private sources.
3. **Developing selection criteria that reflect community goals helps guide project selection.** The pilot communities developed tailored selection criteria, based in part on performance measures, which helped to select projects that would enable them to effectively fulfill their community goals and meet the legislative intent of the program. This approach may be helpful to many communities as they consider how to allocate funds for nonmotorized transportation infrastructure and programming. Tailored selection criteria are also useful, because they can help communities inspire innovation and demonstrate the value of these investments to decision-makers and community members.
4. **Outreach and collaboration across agencies and stakeholders builds capacity for future nonmotorized transportation planning and projects.** Each pilot community emphasized outreach and collaboration among planners, engineers, transportation and public health advocates, and other professionals through their project selection processes and use of collaborative advisory committees. In addition to selecting projects for implementation, the committees brought professionals together from different jurisdictions and focus areas. This process strengthened relationships between these stakeholders, and provided them with a shared base of knowledge about nonmotorized transportation planning in their communities.
5. **NTPP funds nurture and seed long-term programming.** The achievements of each pilot community have longer-term effects by building staff knowledge and capacity, collaborative relationships between professionals from different jurisdictions or focus areas, public support for nonmotorized transportation programs, planning capacity, and policies that will support future nonmotorized transportation projects. For example, Marin County adopted a Complete Streets Policy to guide future roadway projects and the Minneapolis area and Sheboygan County developed plans to guide future efforts.

Evaluation and Results

While the 2012 Final Report to Congress presented evaluation of results through 2010, this section updates (for 2011-2013) and expands upon earlier findings.⁸ Given that many NTPP investments were not completed until after 2010, these data represent the most comprehensive evaluation of the NTPP to date. As described earlier, many NTPP projects are still being implemented (see Figure 4). The pilot communities will continue to develop new nonmotorized transportation improvements with NTPP funds over the next three years.

When the WG initiated NTPP analysis and reporting discussions in late 2005, it assessed reporting options based on the legislative goals of the NTPP, data availability, and a limited evaluation budget. Given these constraints, the WG developed a collaborative approach to data collection and evaluation, relying on directly collected data, where feasible, and supplementary existing national, State, and local data sources, where available. Evaluation areas fall under the following themes:

- **Mode Share Shift**
- **Access and Mobility**
- **Environment and Energy**
- **Safety and Public Health**

The WG developed and implemented evaluation approaches to assess the travel behavior impacts of nonmotorized investments, grounded in a community-wide count approach and following the National Pedestrian and Bicycle Demonstration Project methodology. Using community-wide counts collected over the course of seven years (2007-2013) as “bookends” to measure progress, the WG modeled annual changes in nonmotorized trips and vehicle miles averted. These estimates form the basis of averted emissions and gasoline usage calculations under the Environment and Energy theme and the exposure and economic cost of mortality estimates under the Safety and Public Health theme.

The counts and estimates, in addition to locally administered surveys and outside data sources, contributed to the evaluation, which the WG decided to report at three different scales:

- **Project-Level Evaluation:** Identifies the specific impact of individual investments. Each community selected a sample of infrastructure and non-infrastructure projects to both highlight and report localized results.
- **Community-Wide Evaluation:** Identifies the community-wide and synergistic impacts of investments across each individual pilot.
- **Program-Level Evaluation:** Identifies the overall impact of investments across the four pilots.

The WG recognizes that the evaluation results are not completely attributable to NTPP investments because:

- **The results are based on estimates:** The changes estimated in each community, particularly the mode share shift results, are based on a snapshot of time (i.e., one or two count days a year); the counts and their conversions provide an estimate and representation of overall

⁸ Specifically, this section builds off and complements Section 4 of the *2012 Final Report to Congress* (FHWA, 2012). https://www.fhwa.dot.gov/environment/bicycle_pedestrian/ntpp/2012_report/page03.cfm#Toc308001036

nonmotorized travel in each community.

- **The NTPP's impact differs depending on preexisting infrastructure and other concurrent investments in each community:** Investments differ as both a share of total nonmotorized investments over the evaluation period and in contribution to the overall network in each pilot. The relative impact of NTPP is considered in the health section of the report.
- **External factors that influence results:** Changing economic conditions, gas prices, demographics, and preferences all impact travel decisions.

Recommendations for addressing and better understanding the impact of community-wide investments are provided in the Future Research and NTPP Legacy sections. Despite these uncertainties, the WG's analysis reveals that, over the seven-year measurement period, concurrent increases in active transportation and accessibility improvements helped reduce emissions and energy usage and improve health and safety outcomes.

Mode Share Shift

To gauge an on-the-ground increase or decrease in nonmotorized activity, each pilot community conducted counts of bicyclists and pedestrians on days in the fall at predetermined locations every year between 2007 and 2013. The methodology for these counts followed the National Pedestrian and Bicycle Documentation Project, developed by Alta Planning and Design and the Institute of Transportation Engineers.⁹

According to Alta Planning and Design, “Studies have shown that activity levels of bicyclists and pedestrians may vary as much as 30 percent or more on a daily basis at the same location (even on sequential days).”¹⁰ To address this variability, the results in this section present activity as a three-year moving average, with each annual count calculated as the average of the current and previous two years. For example, the 2010 count is the average of the 2008, 2009, and 2010 counts. This method, which is used by the American Community Survey for many of its data tables and reports, mitigates year-to-year variability, instead showing a smoother trend over time. For reference, actual count volumes recorded in each year are provided in Appendix C.

Key Highlights

- Walking mode share increased 15.8 percent from 2007 to 2013.
- Bicycling mode share increased 44 percent from 2007 to 2013.
- 85.1 million VMT were averted by nonmotorized trips between 2009 and 2013 relative to the 2007 baseline.

Program-Level

Using three-year moving averages, Figure 6 shows the results of the pilot communities’ annual pedestrian and bicycle counts. Based on these results, the WG estimates that the number of pedestrian and bicycle trips in the pilot communities increased by 19 percent and 62 percent, respectively compared to the baseline year (2007).¹¹ From 2007 to 2013, these increases equate to 3.7 and 10.5 percent average annual growth rates for walking and bicycling, respectively.

⁹ Alta Planning and Design. 2014. National Bicycle and Pedestrian Documentation Project. Accessed 30 January 2014: <http://bikepeddocumentation.org/>

¹⁰ Alta Planning and Design. 2013. “Draft Summary of 2007-13 Bicycle and Pedestrian Counts and Surveys, November 2013.” Prepared for GetAbout Columbia.

¹¹ The WG did not have enough years of pre-program data to apply a moving average for the baseline year.

Figure 6: Program-Level Annual Nonmotorized Count Percent Change from Baseline (2007) (3-Year Moving Averages)

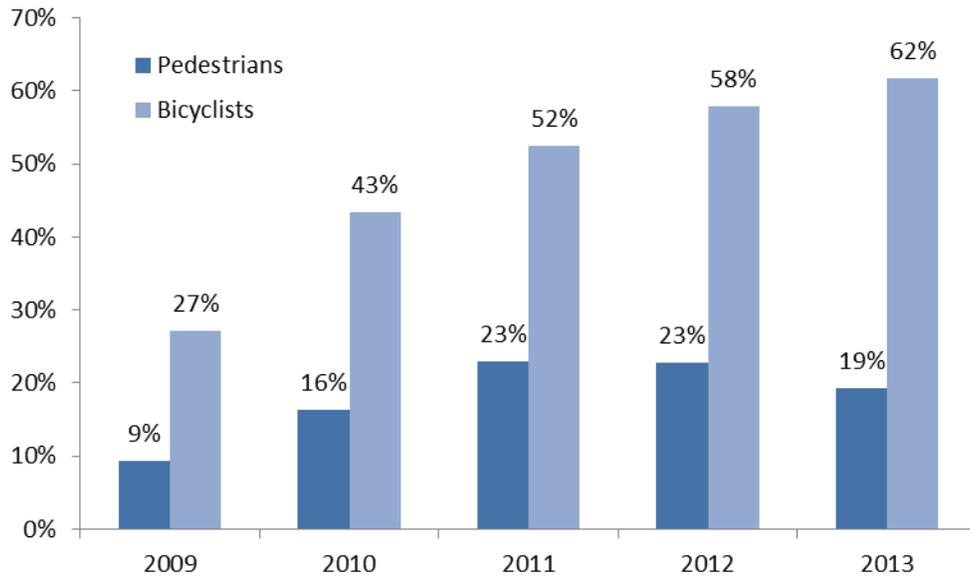


Table 4 and Table 5 show the annual pedestrian and bicyclist counts by community.

Table 4: Annual Pedestrian Counts (3-Year Moving Averages, Except for 2007 Baseline Year)

Year	Columbia	Marin County	Minneapolis Area	Sheboygan County	All Pilots
2007	900	9,203	2,522	80	12,705
2009	1,047	10,173	2,590	83	13,893
2010	1,089	10,879	2,733	86	14,787
2011	1,196	11,485	2,836	102	15,619
2012	1,169	11,385	2,919	125	15,597
2013	1,100	11,031	2,877	148	15,155

Table 5: Annual Bicyclist Counts (3-Year Moving Averages, Except for 2007 Baseline Year)

Year	Columbia	Marin County	Minneapolis Area	Sheboygan County	All Pilots
2007	202	3,820	4,102	66	8,190
2009	239	4,934	5,175	71	10,419
2010	257	5,785	5,630	76	11,748
2011	285	6,331	5,800	74	12,489
2012	285	6,501	6,077	70	12,933
2013	291	6,323	6,563	65	13,243

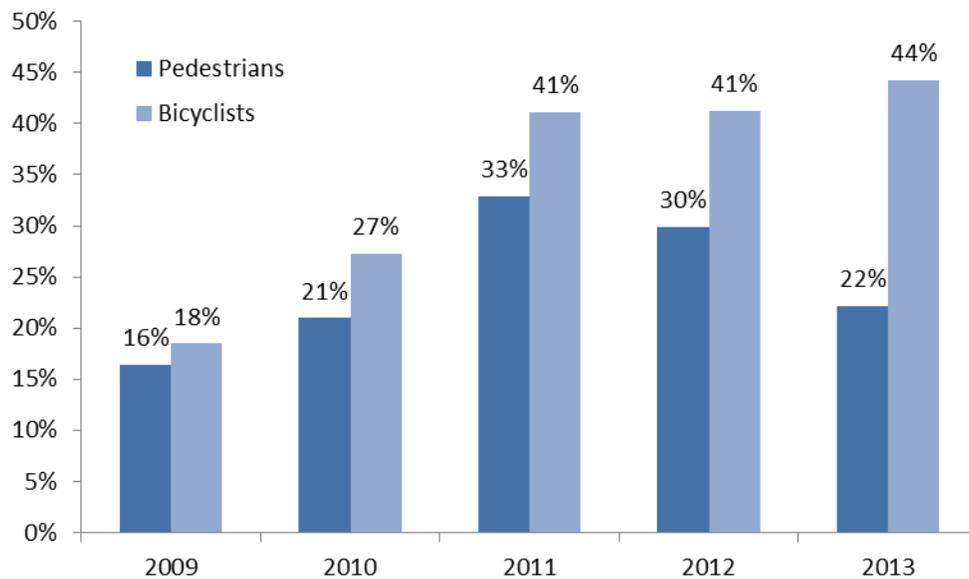
Community-Wide

Figure 7 to Figure 10 show pedestrian and bicyclist count changes in each community.

Columbia

In Columbia (Figure 7), walking increased an estimated 22 percent and bicycling increased an estimated 44 percent between 2007 and 2013. These increases equate to an estimated average annual growth rate of 7.7 and 4.4 percent for bicycling and walking, respectively.

Figure 7: Annual Columbia Count Percent Change from Baseline (2007) (3-Year Moving Averages)

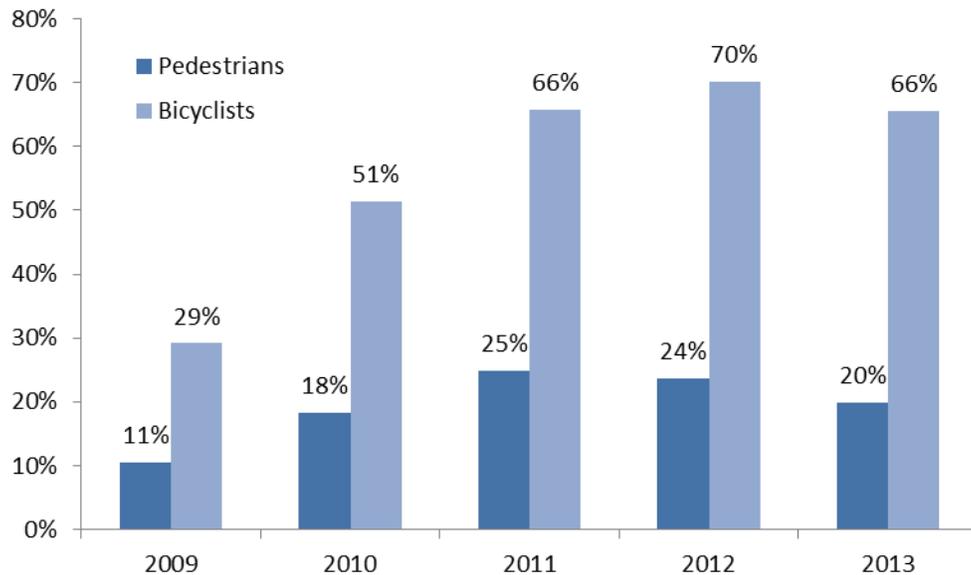


According to Columbia, early implementation of several intersection improvements at Stewart and Providence Roads in particular (one of the data collection locations) may explain the early increase in measured pedestrian traffic. Bicycle facilities are still being implemented, which could explain the consistent increase in bicycle traffic. Additionally, Columbia made an early large investment in promotion and education. This investment may not have had a significant effect on the results. A longer, but less intense promotion and education effort may be more effective.

Marin County

Figure 8 shows that walking increased an estimated 20 percent and bicycling increased an estimated 66 percent in Marin County between 2007 and 2013. These increases equate to an estimated 3.8 and 12 percent average annual growth rate for walking and bicycling, respectively.

Figure 8: Annual Marin County Count Percent Change from Baseline (2007) (3-Year Moving Averages)

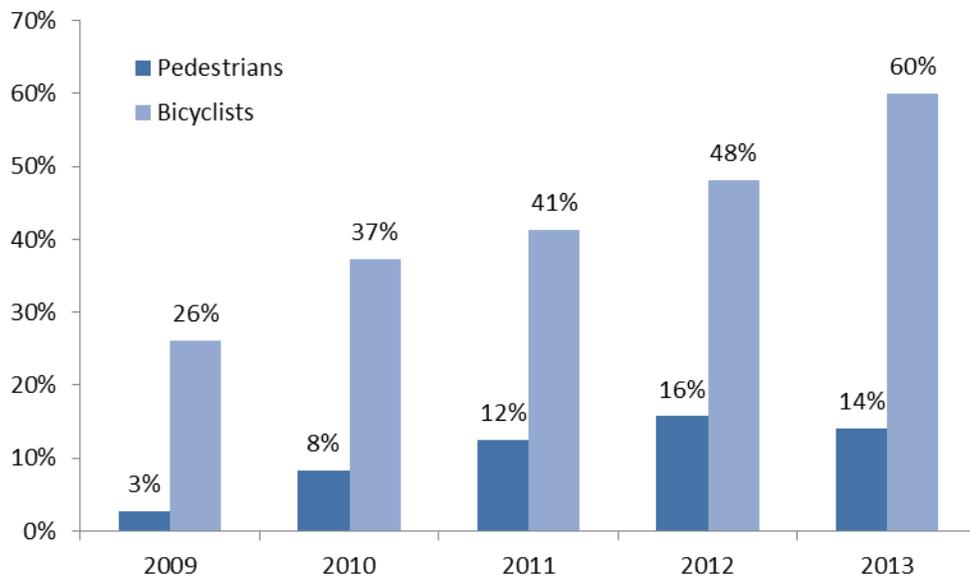


According to Marin County, nearly all of its 24 individual infrastructure projects, 13 stairway connection projects, and 23 signal improvement projects were completed between 2009 and early 2012. This suggests that the increases in pedestrian and bicycling activity resulted from various projects incrementally coming on line over that period. Marin County designed an intensive outreach campaign between 2008 and 2011 in order to increase awareness of the new facilities and encourage bicycling and walking countywide as a means to get around. The lack of any major expansion of the countywide pedestrian or bicycle network in 2013 is likely the reason that usage increases leveled off for 2013.

Minneapolis Area

In the Minneapolis area (Figure 9), walking increased an estimated 14 percent and bicycling increased an estimated 60 percent between 2007 and 2013. These increases equate to an estimated 2.8 and 9.5 percent average annual growth rates for walking and bicycling, respectively.

Figure 9: Annual Minneapolis Area Count Percent Change from Baseline (2007) (3-Year Moving Averages)



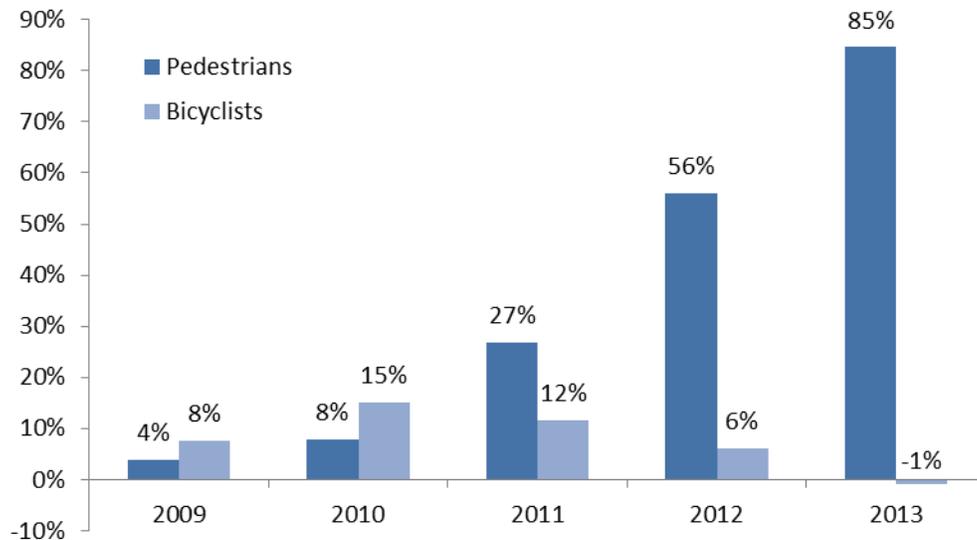
According to TLC, the steady increase of bicycling in the Minneapolis area may be understood, in part, by a strategic and comprehensive approach that began in 2006. The focus for the first two years was building momentum and laying a foundation for future work by completing planning studies, building technical capacity, and garnering political support. Activities of the Bike Walk Ambassadors, Smart Trips social marketing, TLC's Bike Walk Move campaign, and numerous workshops and trainings helped create the support for the innovative facilities that soon followed, including the first bicycle boulevards in the Midwest, the Nice Ride Minnesota Bike Sharing program, and buffered bike lanes as part of road diets. By 2012, TLC demonstrated a greatly expanded network, doubling the on-street bikeways in the Minneapolis area, and held numerous ribbon-cutting ceremonies and other events to increase awareness about the new options for nonmotorized travel. Walking has also increased over the years, but not as dramatically as bicycling. TLC surmises that as conditions for bicycling have improved, some walkers may have switched to using bicycles for transportation purposes.

It is clear that better facilities encourage more bicycling and walking, as TLC noted when comparing pedestrian and bicycling volumes at the different locations where counts were conducted over the years. Locations where significant improvements were made consistently show the greatest increases in walking and bicycling.

Sheboygan County

Walking increased an estimated 85 percent and bicycling decreased an estimated one percent between 2007 and 2013 in Sheboygan County (Figure 10). This increase equates to an estimated 14 percent average annual growth rate for walking. The estimated annual growth rate for bicycling is zero percent comparing 2013 to 2007; however increases were observed in the intermediate years.

Figure 10: Annual Sheboygan County Count Percent Change from Baseline (2007) (3-Year Moving Averages)



According to Sheboygan County staff, prior to the implementation of the NTPP, the county lacked a structured nonmotorized network. Coupled with a lack of awareness and no existing plan for pedestrians and bicyclists, nonmotorized usage was relatively low in the early years of the program. The geographic nature of the county also contributed to a higher mode share of motorized transportation than the other communities, considering it remains the least dense with greater distances between its cities, villages, and towns, and with a much higher proportion of rural land area.

After early implementation of smaller scale NTPP projects, however, Sheboygan County has measured a substantial increase in walking between 2009 and 2013. Since sidewalks are inherently less costly and easier to construct than large-scale projects like multiuse pathways, these were some of the first accommodations to reach completion. Walking counts nearly doubled each of the first three years and have continued to show considerable growth at the count locations.

Bicycle use, however, has fluctuated but remained relatively steady overall since the base year. A decline for the first time in 2013 can be attributed to construction of NTPP-funded facilities at a quarter of the count locations at the time counts were recorded; this construction was so extensive that bicycling or walking was difficult. Sheboygan County, however, completed over \$10 million of NTPP- and municipal-funded bicycle and pedestrian projects in 2013, which now provide better accessibility, safety, and visibility for bicycle users. The most highly anticipated and expensive project, a three mile multiuse path, is expected to show promising results once construction is completed in 2015.

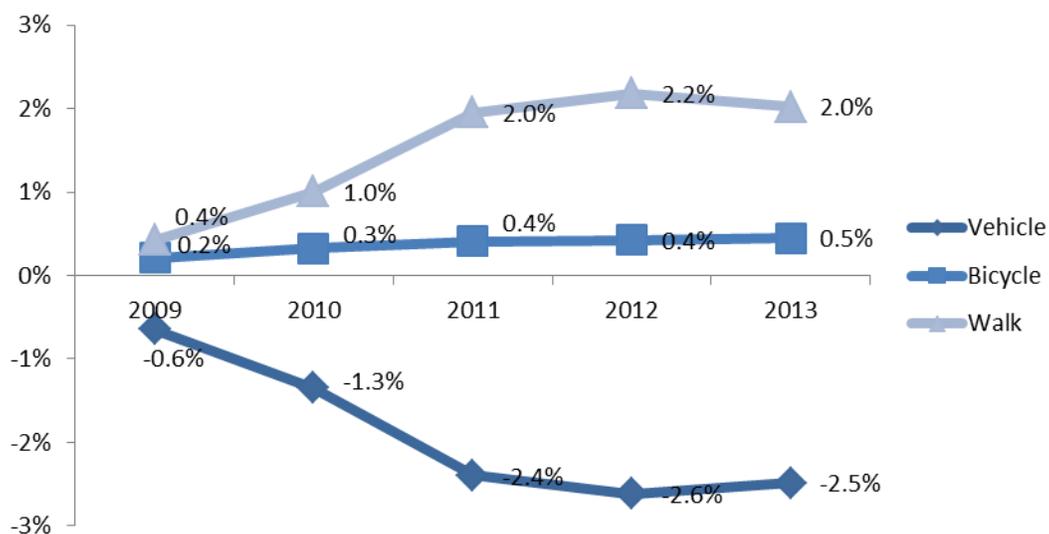
Sheboygan County chose to wait until many of its infrastructure projects had been built before rolling out an extensive marketing campaign. Beginning in 2014, the county is partnering with the Chamber of Commerce to invest more directly and heavily in touting the benefits of nonmotorized transportation to both its residents and visitors.

Mode Shift Calculations

Because no model was available to meet the reporting needs of the NTPP, the WG developed a model to calculate nonmotorized mode share changes for all trip purposes and VMT averted at the community level. WG members developed the model, with reviews by several academic peers. The Volpe Center submitted a paper and presentation describing the model at the Transportation Research Board’s 2013 Annual Meeting.¹² The Final Report to Congress includes a description of how the overall NTPP methodology and model work.

According to estimates from the model, bicycling as a mode share increased every year; walking increased each year with a peak in 2012 and slight decline in 2013; and driving decreased each year in the pilot communities with a slight increase in 2013 (Figure 11). Specifically, walking increased from an estimated 12.8 percent of mode share in 2007 to 14.8 percent in 2013 (an increase of 15.8 percent). Bicycling in the pilot communities increased from an estimated 1.0 percent of mode share in 2007 to 1.5 percent of mode share in 2013 (an increase of 44 percent).

Figure 11: Mode Share Changes Compared to Baseline (2007) (3-Year Moving Averages)



For context, no national-level data source annually estimates mode share for all trip purposes across all modes. However, it is possible to compare the NTPP results to the findings of the American Community Survey (ACS), which estimates commuter mode share across all modes at a national level. From 2007 to 2012, commuter mode share for walking decreased from 2.9 to 2.8 percent (a decrease of

¹² Rasmussen, B., G. Rousseau, and W. Lyons. 2013. “Estimating the Impacts of the Nonmotorized Transportation Pilot Program: Developing a New Community-Wide Assessment Method.” TRB Paper 13-4916.

approximately 3 percent) and bicycling increased from 0.5 percent to 0.6 percent (an increase of approximately 20 percent).¹³ One reason the estimated nonmotorized mode shares in the NTPP communities are substantially higher before and after program implementation is because the NTPP communities are, on average, more urban and densely developed than the country as a whole. However, this study does show that the percentage increase in walking and bicycling mode share in the pilot communities was greater than the national average mode share change over the same time period.

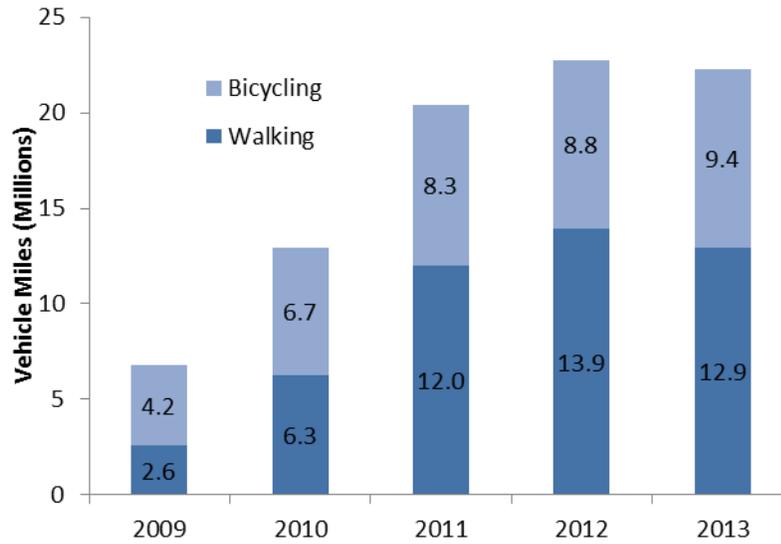
The estimated number of vehicle trips replaced by nonmotorized trips followed the same patterns as mode share (Table 6), as did the number of vehicle miles replaced by nonmotorized miles (Figure 12). An estimated 25.5 miles were walked per capita (over the age of 16) that would have otherwise been driven in 2013. An estimated 5.7 miles were bicycled per capita (over the age of 16) that would have otherwise been driven in 2013.

Table 6: Averted Vehicle Trips and Trips per Capita (16 Years or Older) per Year Compared to Baseline (2007) (3-Year Moving Averages)

	2009	2010	2011	2012	2013
Averted Vehicle Trips by Walking	3,719,366	8,928,836	17,181,961	19,886,546	18,455,357
Averted Vehicle Trips by Bicycling	1,859,882	2,958,954	3,693,277	3,898,411	4,145,049
Total Averted Vehicle Trips	5,579,248	11,887,790	20,875,238	23,784,957	22,600,405
Averted Trips per Capita by Walking	5.4	12.8	24.4	27.9	25.5
Averted Trips per Capita by Bicycling	2.7	4.2	5.2	5.5	5.7
Total Averted Trips per Capita	8.0	17.0	29.7	33.3	31.2

¹³ U.S. Census Bureau. American Community Survey, Table S0801 - Commuting Characteristics by Sex, 3-Year Estimates for 2007 and 2012.

Figure 12: Annual Averted Vehicle Miles Compared to Baseline (2007) (Using 3-Year Moving Averages)



In sum, an estimated 85.1 million VMT were averted by nonmotorized trips between 2009 and 2013 (Figure 12). Though usually shorter than bicycle trips, an estimated 80.5 percent of those miles were attributed to walking trips since walking trips are made more frequently than bicycling trips. Between 2009 and 2013, however, bicycling trips and miles increased every year in the pilot communities while walking trips and miles decreased slightly in 2013.

Project-Level Evaluation

Table 7 provides brief descriptions and results from a sample of these individual projects chosen by the four NTPP pilot communities. The WG evaluated preliminary data for many of these projects in the Project-Level Evaluation and Results section of the 2012 Final Report to Congress.¹⁴ This evaluation provides updated pedestrian and bicycle count data when available and profiles some NTPP projects that have been implemented more recently. For infrastructure projects, the table includes annual pedestrian and bicycling count data.¹⁵ For non-infrastructure projects, the WG reported other metrics, such as number of participants or number of users of a bicycle-sharing system.

¹⁴ FHWA, 2012. Section IV: Evaluation and Results:

http://www.fhwa.dot.gov/environment/bicycle_pedestrian/ntp/2012_report/page03.cfm#Toc308001036

¹⁵ Because of the year-to-year variability in pedestrian and bicycle counts (due to weather and other factors), the WG used averages of the total two-hour weekday afternoon and weekend counts where available for up to three years prior to the project implementation for pre-project data. The WG used the average of the most recent three years after project completion to provide the most recent post-project data available. For example, a project constructed in 2009 would be evaluated based on an average of the 2007-2008 data for pre-project counts and an average of 2011-2013 data for post-project counts. A project constructed in 2011 would have a pre-project count averaged from 2008-2010 and post-project data averaged from 2012-2013.

Table 7: NTPP Project-Level Analyses

Pilot Community	Date Complete	Project Name	Description	Evaluation ¹⁶
Columbia	2009	Providence Road/Stewart Road Intersection Improvement	This project implemented several improvements to an important commuter intersection for all modes, connecting the MKT Trail, a residential neighborhood, the University, student housing, and the downtown area. Improvements included reconfiguring intersection geometries, constructing pedestrian crosswalks, improving striping for pedestrians and bicyclists, and reconstructing sidewalks.	<p>Pedestrian counts at this location increased from a pre-project average (2007-2008) to a post-project three-year average in 2011-2013 by 51 percent.</p> <p>Over the same time period, bicycle counts at this location increased by 98 percent.</p>
	2010	Windsor/Ash Bicycle Boulevard	<p>This project created a bicycle boulevard, or a low-vehicle-volume street designed for bicyclists and pedestrians as the priority mode. The Windsor/Ash Bicycle Boulevard included new lane striping, shared lane markings, nonmotorized crossing improvements, and reconfigured intersections to restrict vehicles turning onto and off of the street.</p> <p>Columbia developed Windsor/Ash Bicycle Boulevard as an experimental pilot in 2010. Based on the successful results (shown right),</p>	<p>Counts from before project implementation (2009) and after completion (2011) show a 16.8 percent increase in bicycle traffic and a 7.3 percent decrease in motor vehicle traffic after the installation of the bicycle boulevard. Average vehicle speeds decreased from 28 mph to 26 mph (7 percent decrease).</p> <p>In a May 2011 survey of residents along the route, 74 percent of respondents thought the bicycle boulevard was a good idea and 65</p>

¹⁶ As with other evaluations of NTPP results, it is important to note that many projects were supported with other funds in addition to NTPP. Therefore, the results here may not be attributable solely to NTPP funds. However, they do demonstrate the outcomes of the NTPP communities' signature projects.

			the City plans to construct a permanent bicycle boulevard at this location in 2014.	percent felt it improved the neighborhood image.
Marin County	2010	Alameda del Prado Bicycle Lanes and Sidewalks	This project added new Class II bicycle lanes and sidewalks to Alameda del Prado in the city of Novato, closing a gap in Marin County's Bicycle Route 5.	<p>Pedestrian counts increased from a pre-project average (2007-2009) to a post-project average (2011-2013) by 56 percent.</p> <p>Bicyclist counts increased from a pre-project average to a post-project average by 115 percent.</p>
	2010	Cal Park Tunnel	This project involved reconstruction of a 1,100-foot railroad tunnel and construction of a 1.1-mile nonmotorized path linking the cities of San Rafael and Larkspur, providing direct access to commuter ferry service to downtown San Francisco. ¹⁷	<p>This project closed a regional network gap and reduced bicycling time between San Rafael and Larkspur by 15 minutes, providing expanded access to a regional transit hub.</p> <p>Bicycle counts along a road leading to the tunnel before the project (2007-2009) and post-project bicycle counts in the tunnel (2011-2013) show a 95 percent increase, and do not reflect a second phase to be constructed in 2014 to extend the path over a heavily trafficked arterial.</p>
	2008	San Rafael Medway Road Improvements	This project implemented pedestrian and bicycle improvements on Medway Road, which connected the Canal neighborhood and downtown San Rafael. Improvements	This project improved pedestrian and bicyclist safety and access between the Canal neighborhood and downtown San Rafael.

¹⁷ WalkBikeMarin contributed \$2.5 million in NTPP funds to the overall project budget of \$27.7 million.

			included striped bicycle lanes, widened sidewalks, and new transit shelters and street furniture.	
Minneapolis Area	2011	Bryant Avenue Bicycle Boulevard	This 3.3-mile project connects major South Minneapolis locations and offers an alternative to a parallel busy arterial. Design elements include curb and pavement changes, including a landscaped median at a busy crossing, an experimental intermittent colored green background for sharrows, and installation of bicycle parking throughout.	Bryant Ave is one of the first bicycle boulevards to open, a design introduced to the Twin Cities with the pilot. Other bicycle boulevards since opened or yet to open include new elements of traffic circles, bicycle signals, diverters of motorized traffic, pedestrian refuges, and special signage. City of Minneapolis Estimated Daily Traffic for a location along the Bryant Ave Bicycle Boulevard increased 57.5% from 2008 to 2013.
	2010 - 2011	Franklin Avenue Road Diet	This project converted 0.5 miles of a key travel corridor from a four-lane road to a three-lane road with a center turn lane and bicycle lanes on both sides.	Dedicated on-street space for bicyclists led to a 43 percent decrease in bicycle traffic on sidewalks in 2011. From the pre-project average (2007-2009) to post-project average (2012-2013), pedestrian counts increased 19 percent. During that same period, bicyclist counts increased 23 percent.
	2010-2013	Sibley Community Partners Bike Library	The Sibley Community Partners Bike Library provides six-month bicycle loans, classes, and support for low-income residents to gain access to bicycle transportation. The program is structured annually through social service partner organizations.	The program has had hundreds of participants to date. Demand exceeds supply of bicycles annually. According to a survey of participants, 96 percent of patrons experienced health benefits; 77 percent saved money by using their Bike Library bicycles; 35 percent of patrons used their bicycles to get to work; 24

				percent used their bicycles to look for work; 26 percent rode their bicycles to school; and 28 percent used their bicycles to get to English Language Learning/English as a Second Language classes.
	Opened 2010	NiceRide Minnesota Bicycle Share	The NiceRide bicycle-sharing system started in 2010 with 700 bicycles at 65 kiosks, mostly around the downtown, uptown, and university areas of Minneapolis.	In the first season, NiceRide had 65 stations and 700 bicycles. The system had 100,818 trips in 2010, 20 percent of which would otherwise have been made by car. In 2013, the system expanded to 170 stations and 1,556 bicycles. In 2013, the system is projected to have 305,000 trips, a roughly 200 percent increase in rides from 2010-2013.
	2013	University of Minnesota Trail Connection	This project provided an exclusive, direct route for bicyclists and pedestrians from Bridge #9 (allowing access to downtown Minneapolis) to Dinkytown and the University of Minnesota (East Bank) following a railroad corridor that ties directly to the transitway that leads to St. Paul.	Bicycle trip counts increased from a pre-project average (2010-2012) to 2013 post-project count data by 58 percent.
Sheboygan County	2011-2013	ReBike Program	Sheboygan County's ReBike program provides donated bicycles to area residents in need. The initiative is made possible by a partnership with a local business, Paradigm Coffee & Music, as well as several volunteers that hold the sessions every Wednesday evening. Sheboygan County residents in need of a bicycle can attend a ReBike session, where they are paired with a volunteer to spend a few hours working on a bicycle that	The ReBike program has distributed bicycles to over 700 area residents in need.

			has been donated. Once any necessary adjustments are made, the recipient is free to take the bicycle home at no charge.	
	2013	Union Pacific Rail-Trail	This 1.7-mile multiuse path follows portions of an abandoned rail corridor through the heart of the city of Sheboygan.	The area within 1 mile of this corridor includes 31 percent of the county population, 20 schools, 34 churches, more than 90 manufacturers with over 5,300 employees, and many commercial businesses. Because this project was completed after the 2013 nonmotorized trip counts were collected, there is no available data on the project's impacts.

Access and Mobility

Accessibility refers to people’s ability to reach goods, services, and activities and is derived from the need to get between home and work, school, shopping, recreation, and health care destinations, among other destinations. Many factors contribute to accessibility, including mobility (physical movement), the quality and affordability of transportation options, multimodal connectivity options, and land use patterns.¹⁸ According to the 2009 National Household Transportation Survey, 40 percent of all trips are two miles or less and 27 percent are one mile or less; distances which are considered reasonable for walking and bicycling.

The access and mobility analysis indicates:

- A large majority of NTPP investments connect to community activity centers; and
- Dramatic increases in access, in terms of the number of people, housing units, and jobs newly accessible to the bicycle network.

Given the NTPP’s focus on mode shift, each pilot prioritized and pursued projects that fill local and regional gaps in the pedestrian and bicycling network, helping people access destinations more directly and without driving. Both Marin County and the Minneapolis area prioritized multimodal connections, including ferry and transit connections, respectively. Given that the Minneapolis area has the largest population of the four pilots, the pilot prioritized connections to transit and access for underserved communities.

The pilots considered nonmotorized network connections as a vital component of a complete

Key Highlights

- More than 70 percent of NTPP projects connect to employment centers, schools, parks, and recreation areas.
- Across the pilot communities, NTPP expanded access to approximately 240,000 people, 106,000 housing units, and 102,000 jobs within 1/4-mile of the bicycle network.
- Starting from a limited bicycle network, Columbia and Sheboygan County increased bicycling access by 5-6.5 times and 1.5-2.5 times, respectively.
- Starting from an extensive bicycle network, the Minneapolis area and Marin County increased bicycling access for approximately 140,000 people, 62,000 housing units, and 55,000 jobs.

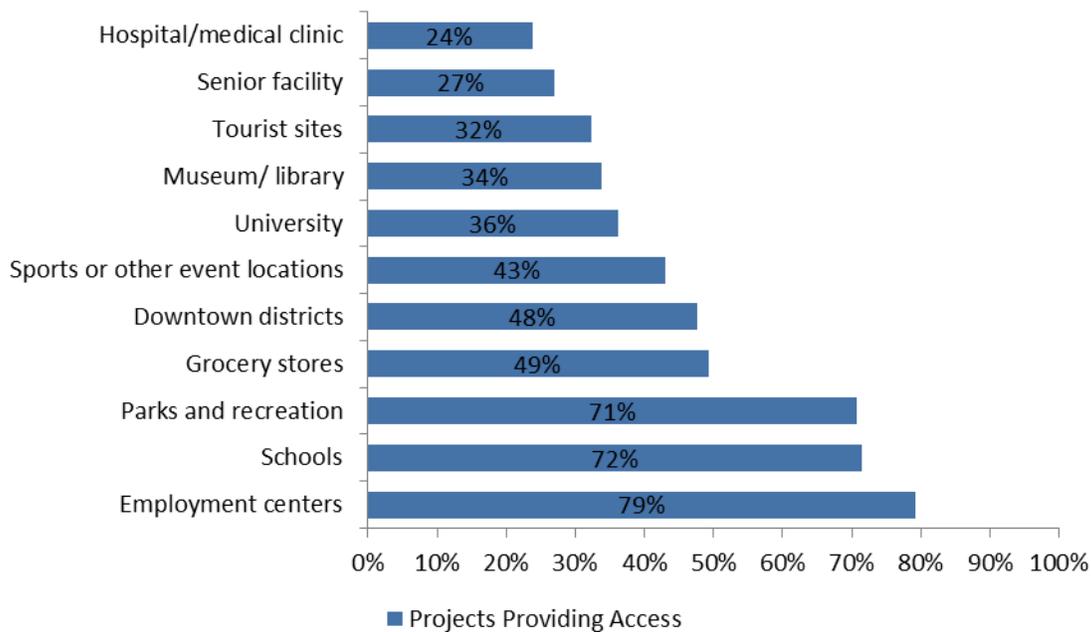
¹⁸ Litman, Todd. 2012. “Evaluating Accessibility for Transportation Planning: Measuring People’s Ability to Reach Desired Goods and Activities.” Victoria Transport Policy Institute. <http://www.vtpi.org/access.pdf>.

transportation system, enhancing community livability and accessibility and promoting walking and bicycling as a viable option for everyday transportation.

Connections to Activity Centers

As a way to gauge expanded access, the pilot communities estimated the number of connections that each project makes to various key community destinations. Figure 13 shows the percentage of projects that include at least one connection to one of a variety of activity centers. In many cases, the same project connects to multiple destinations. More than 70 percent of projects connect to activity nodes, including employment centers, schools, and park and recreation areas.

Figure 13: Connections to Community Activity Centers (As a Percent of Program Funds Spent)



Access to People, Housing, and Jobs via Bicycle Facilities

Each NTPP infrastructure investment helped improve the viability of walking and bicycling across the pilot communities. Investment in on-street bicycling infrastructure was much greater under NTPP than walking infrastructure. This was due to individual community priorities and the relative expense of off-street infrastructure compared to off-street. Pursuant to this investment emphasis and given already extensive sidewalk networks in each community, the WG decided to focus its evaluation of improved community-level access to the bicycling network as a result of NTPP investments.

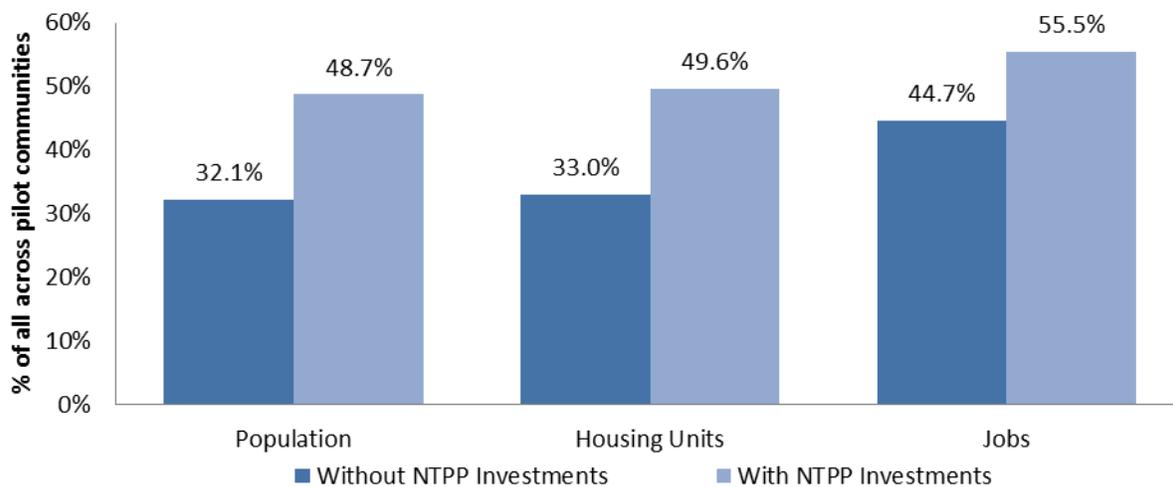
Because individuals living near bicycle facilities are more likely to use those facilities than people living further away, the WG decided to measure improvements in access within 1/4-mile of multi-use paths and lanes using a geographic information system (GIS).¹⁹ Barnes and Krizek (2005) found that the likelihood of bicycle use for survey participants in Minneapolis significantly increased if they lived within at least 1/4-mile of an on-street bicycle facility. The WG analyzed access to each pilot communities' bicycle network based on 2010 population, housing units, and jobs (see Table 1), with and without NTPP investments (See Appendix D for absolute numbers).

Program-Level

The analysis indicates that, at a program-level, NTPP investments increase 1/4-mile access to the bicycle network to approximately 240,000 people, 106,000 housing units, and 102,000 jobs.²⁰

Figure 14 presents before and after program-level access as a percent of all people, housing units, and jobs located within a 1/4-mile distance in the four communities.

Figure 14: Program-Level Bicycle Access With and Without NTPP Investments (within 1/4-Mile from the Bicycle Network)



¹⁹ Barnes and Krizek. 2005. "Tools for Predicting Usage and Benefits of Urban Bicycle Network Improvements." Humphrey Institute of Public Affairs, University of Minnesota: <http://www.lrrb.org/media/reports/200550.pdf>.

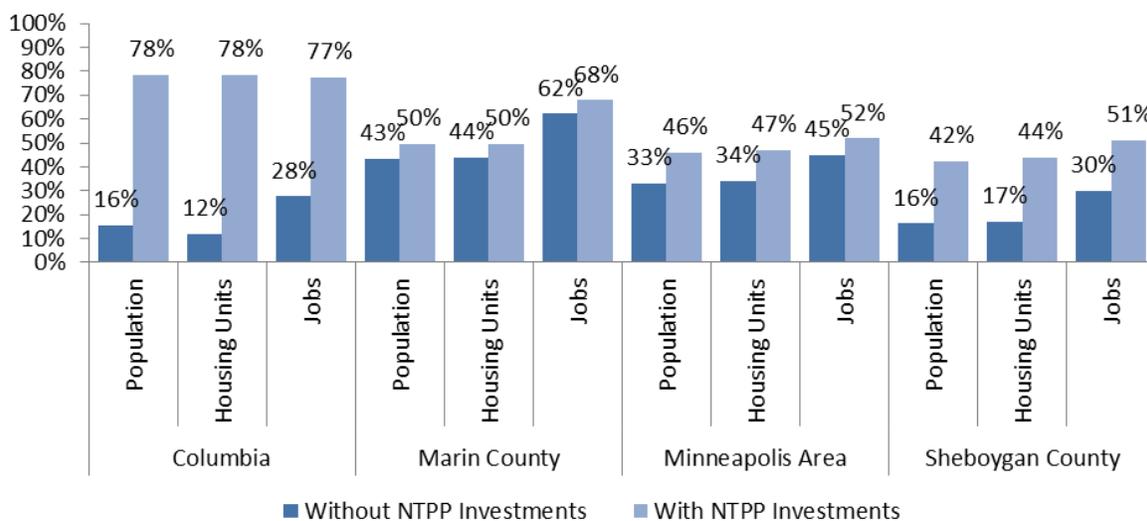
²⁰ The overall population and number of housing units and jobs for each community are reported in Table 1; however, these numbers do not include 13 adjacent municipalities that are part of the grant area. According to the U.S. Census Bureau, the overall Minneapolis area had 956,660 people, 431,412 housing units, and 52,736 jobs in 2010.

Community-Wide

The analysis indicates that, at a community level, NTPP investments had a disproportionate impact in terms of improved access in Columbia and Sheboygan County relative to the other two communities. This is expected given that the bicycle network was relatively limited in these two communities prior to NTPP. While the Minneapolis area pilot developed nearly as many bicycle lanes as Columbia, the existing or baseline bicycle network within the city of Minneapolis was extensive before NTPP.

The Minneapolis area investments helped create regional connections, particularly to neighboring St. Paul, but also helped solidify the core bicycle network in and around downtown Minneapolis and the University of Minnesota where extensive on- and off-street infrastructure already existed. For Marin County, given the pilot's focus on completing relatively shorter, high dollar, network gaps, projects translated to smaller access improvements. Still, together the Minneapolis area and Marin County accounted for more than half of the expanded access to people, housing units, and jobs described above. In addition, closing network gaps increased the connectivity of these communities' networks. For example, Marin County's CalPark Tunnel project created a new bicycle connection between San Rafael and Larkspur and the ferry connection to San Francisco, which expands the potential destinations that can be reached from bicycle facilities in both communities. Figure 15 shows community-level access as a percent of all people, housing units, and jobs located in each of the four communities according to the 2010 U.S. Census, both with and without NTPP bicycle infrastructure investments.

Figure 15: Community-Wide Bicycle Access With and Without NTPP Investments (within 1/4-Mile from the Bicycle Network)

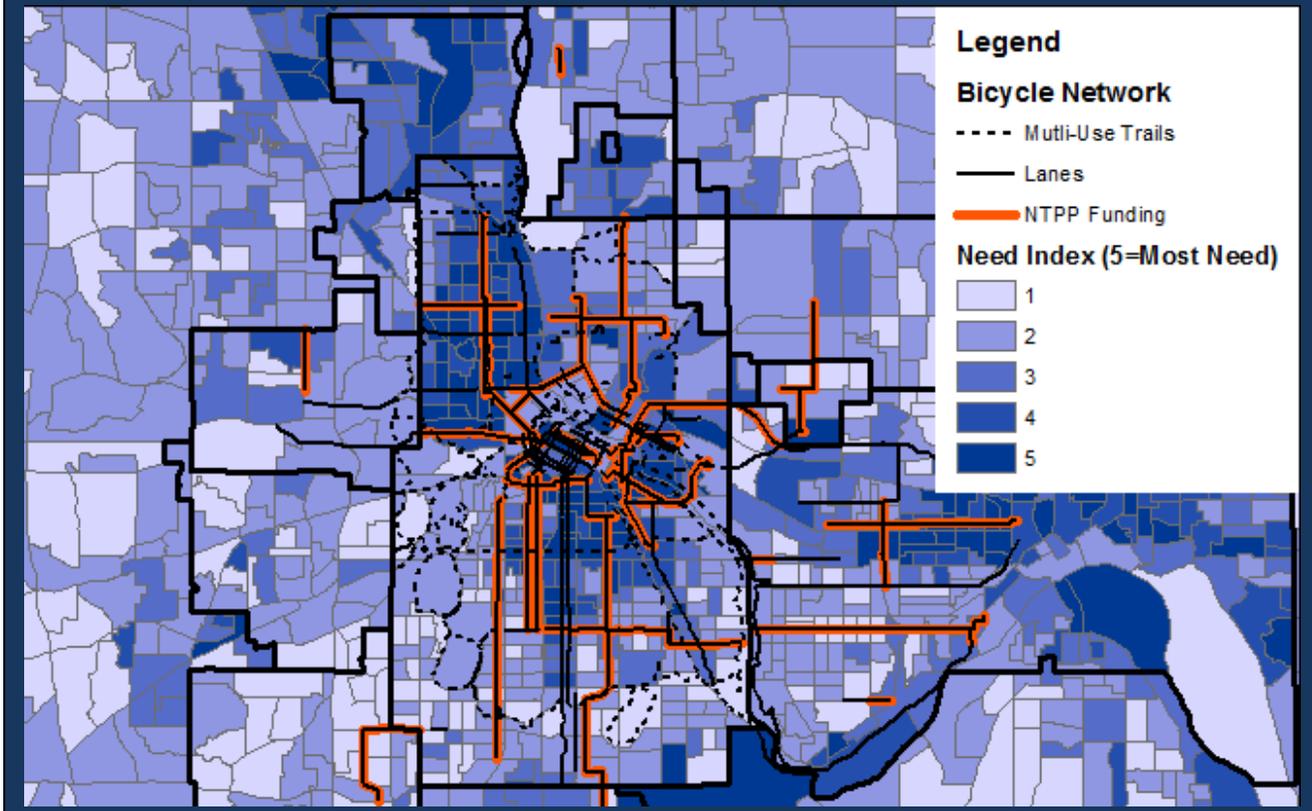


Minneapolis – Bicycle Access for Underserved Populations

In programming NTPP funds, Bike Walk Twin Cities included access and equity among its strategic priorities, aiming to address cultural and economic gaps. According to a GIS analysis, within ¼-mile of the bicycle network, NTPP infrastructure investments increased access to approximately 28,300 residents of color, 2,800 people living under the poverty line, and 922 households without a vehicle. While NTPP infrastructure investments significantly increased access for all people in the Minneapolis area (from 32 percent to 48 percent), on a percentage basis, underserved groups benefited most from the pilot investments. This analysis does not account for other key Minneapolis area program investments that address cultural and economic gaps, such as the Community Partners Bike Library, the Nice Ride Minnesota bicycle sharing program, the launch of the SPOKES Bike Walk Connect Center, and various outreach and education projects (see Table 7).

The map below highlights which parts of the area’s bicycle network the Minneapolis area funded using NTPP funds, superimposed on Census block groups. Each block group is indexed and weighted equally based on the percentage of the population that falls under the poverty line, the percentage of the population that belongs to a minority group, and the percentage of households without access to a vehicle.

Bicycle Network Before and After the NTPP Relative to Underserved Populations



Environment and Energy

Increases in nonmotorized transportation trips and the subsequent shift in mode share from driving to walking and bicycling (analyzed in the Mode Share Shift section) have associated environmental and energy benefits. The environment and energy analysis indicates fewer VMT, resulting in:

- Reduced air pollutants and greenhouse gas (GHG) emissions, helping improve local air quality, and mitigate global climate change; and
- Reduced energy consumption.

To evaluate the environmental benefits from the NTPP investments, the WG focused on emissions of criteria pollutants identified under the Federal Clean Air Act Amendments²¹ and carbon dioxide (CO₂), the major transportation-related GHG and a significant contributor to global climate change. To consider the impacts of program investments on energy use, the WG focused on energy savings from shifts from driving to walking and bicycling.

According to FHWA's National Household Travel Survey, many trips are short: 28 percent are one mile or less, yet 60 percent of those trips are driven, and while 50 percent of all trips are three miles or less, 72 percent of those trips are driven.²² Most air pollutants, including volatile organic compounds (VOCs), hydrocarbons, and carbon monoxide (CO), which are regulated under the Federal Clean Air Act Amendments, are emitted within a few minutes of starting a vehicle because of engine characteristics, making these short trips more polluting per mile from the perspective of respiratory health. Additionally, each gallon of gas burned produces 19.64 pounds of CO₂, nearly a pound per mile driven on average.²³ Automobiles are responsible for about 20 percent of CO₂ emissions in the U.S.²⁴

Key Highlights

- The pilot communities saved nearly 3.6 million gallons of gasoline between 2009 and 2013. This translates to an estimated 34,629 tons of CO₂ emissions averted over that time period.
- In 2013 alone, the pilot communities reduced emissions that contribute to local air pollution, such as hydrocarbons (33.4 tons), particulate matter (255 pounds PM₁₀ and 241 pounds PM_{2.5}), nitrogen oxides (23.3 tons), and carbon monoxide (304.6 tons).

²¹ U.S. Environmental Protection Agency (EPA). 2013. "Air Pollution and the Clean Air Act." Accessed 30 January 30, 2014: <http://www.epa.gov/air/caa/>

²² League of American Bicyclists. 2013. "National Household Travel Survey – Short Trips Analysis." Accessed 6 December 2013: <http://www.bikeleague.org/content/national-household-travel-survey-short-trips-analysis>.

²³ U.S. Energy Information Administration. 2013. "How much carbon dioxide is produced by burning gasoline and diesel fuel?" Accessed 6 December 2013: <http://www.eia.gov/tools/faqs/faq.cfm?id=307&t=11>.

²⁴ EPA. 2004. "Program Overview: EPA's Fuel Economy and Emissions Programs." Accessed 7 February 2014: <http://www.eia.gov/tools/faqs/faq.cfm?id=307&t=11>.

The WG estimated air quality benefits over the period of the program using a table of conversions (Appendix E).

Table 8 shows estimated reductions in these pollutants in 2013 and from 2009 to 2013 based on averted VMT figures presented in the Mode Share Shift section. With a combined estimated population of 723,618 people over the age of 16 in the pilot communities in 2013, the WG estimates that over 25 pounds of CO₂ were saved in 2013 per capita (over the age of 16) or 9,065 tons collectively between the pilot communities.

Table 8: Air Quality and Climate Change Mitigation Benefits of the NTPP

Pollutant	Reduction/Savings in Pounds		
	Per Day	Total in 2013	Total from 2009-2013
Hydrocarbons	183	66,821	255,262
Particulate Matter (PM) ₁₀	0.70	255	976
PM _{2.5}	0.66	241	920
Nitrogen Oxides (NO _x)	128	46,677	178,308
Carbon Monoxide (CO)	1,669	609,255	2,327,391
Carbon Dioxide (CO ₂)	49,672	18,130,244	69,258,658

Averted VMT can also be converted into energy savings, measured in gallons of gasoline or British Thermal Units (BTUs, the standard measure of energy) saved. For gasoline savings, the estimated VMT averted would translate into a savings of more than 1.25 gallons of gasoline per capita (over the age of 16) in the pilot communities in 2013.²⁵ For BTUs, it is assumed that the average gallon of conventional gasoline contains 113,500 BTUs (see Table 9).

Table 9: Energy Savings of the NTPP

Energy Resource/Unit	Reduction/Savings		
	Per Capita in 2013	Total in 2013	Total from 2009-2013
Gallons of Gasoline	1.29	936,410	3,577,145
British Thermal Units (BTUs)	146,877	106 billion	406 billion

²⁵ Calculations are based on the average passenger car fuel efficiency in 2005, at the beginning of the NTPP, of 22.6 miles per gallon. Bureau of Transportation Statistics. 2012. Table 4-23: Average Fuel Efficiency of U.S. Light Duty Vehicles. Accessed 7 December 2011:

http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_statistics/html/table_04_23.html.

Safety and Public Health

The WG chose to focus on both fatality and injury trends and rates and the public health impacts of increased levels of physical activity. Virtually all NTPP infrastructure and programming investments improved pedestrian and bicycle safety and contributed to increased physical activity. While the health benefits of nonmotorized transportation are apparent, there is much concern around the country about nonmotorized safety, particularly as a result of more bicyclists and greater exposure to vehicles on roadways. The health and safety analysis indicates:

- Declining pedestrian and bicycling roadway fatalities;
- Declining or stable pedestrian roadway injuries;
- Increasing bicycle roadway injuries, but declining bicycle injury rates in light of large increases in the number of bicycle trips; and
- Large health benefits from increased physical activity in the pilot communities in the form of economic cost of mortality (death) averted.

Safety

The pilot communities designed infrastructure interventions and education and outreach activities to improve safety for pedestrians and bicyclists. To evaluate the success of these projects and programs, the WG conducted an analysis of motorist-involved²⁶ pedestrian and bicycle crash fatalities and reported injuries between 2002 and 2012.

²⁶ While non-roadway and non-vehicle bicycle crashes can make up a significant portion of all bicycling injuries, such crashes are generally not reported to the police. For example, an injury that results from a bicyclist hitting a curb and falling or a pedestrian tripping in a parking lot are not logged in police reports. Given this data limitation and NTPP's focus on reducing conflicts with motor vehicles through roadway safety countermeasures, the WG decided to focus on motor vehicle-involved crashes.

Key Highlights

Safety:

Despite increases in pedestrian and bicycle trips observed over the course of NTPP, between 2002 and 2012, the communities observed:

- A 20 percent and 28.6 percent respective decline in pedestrian and bicycle fatalities on roadways
- Declining pedestrian roadway injuries in three communities and declines injury rates (incidents per number of trips) between 17.9 percent and 55.1 percent in each of the four communities
- Increasing bicycle roadway injuries in three of the four communities, but declines in injury rates between 8.6 percent and 38.2 percent in each of the four communities

Health:

- The added bicycling trips observed in 2013 alone reduced the economic cost of mortality in the pilot communities by an average of \$46.3 million
- Benefits from reduced economic costs of morbidity are likely higher than

While fatality and injury trends provide a good overall picture of the human toll of vehicular crashes involving nonmotorized users, they do not account for changes in nonmotorized travel and accompanying exposure or risk of crashes. Given large increases in nonmotorized travel in the pilot communities over the course of the NTPP, the WG decided to apply annual community-wide count estimates from the NTPP model to measure fatality and injury rates over time. These analyses indicated a steady or declining number of pedestrian and bicycle fatalities and injuries and declining rates (incidents per number of trips) of fatal or reported injury-inducing collisions.

There are a number of potential reasons for the observed safety improvements:

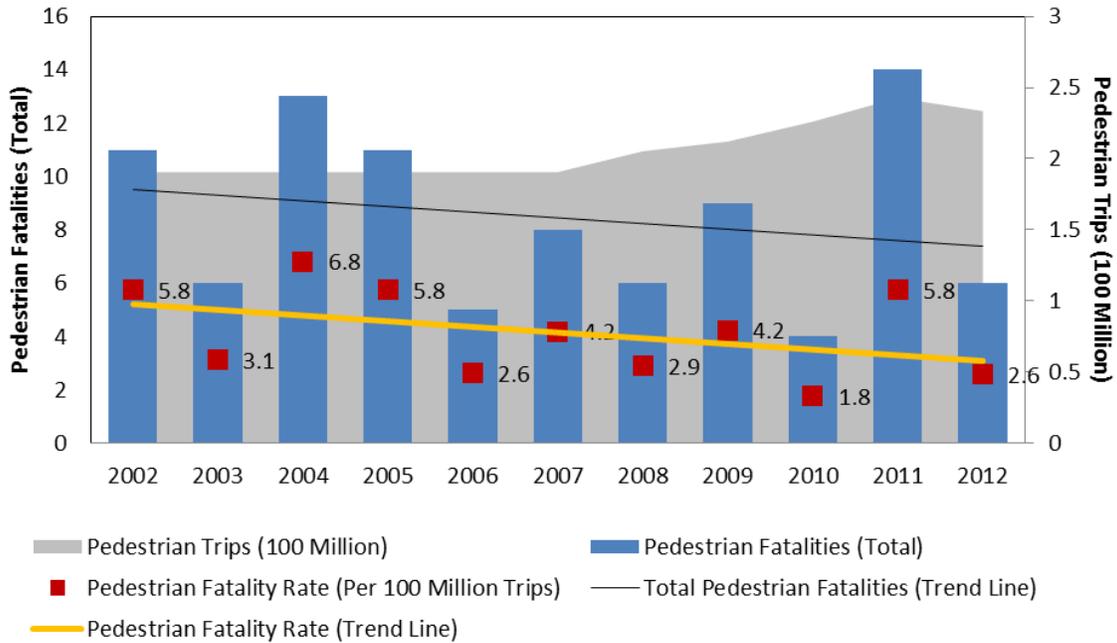
- Many of the NTPP projects, including safety improvements, reduced traffic hazards for pedestrians and bicyclists;
- NTPP outreach programs focused on education and marketing to nonmotorized users and motorists to promote safe behavior; and
- Greater numbers of pedestrians and bicyclists may have created “safety in numbers,” generating greater driver awareness of nonmotorized road users.

These trends are interrelated, but all have the potential to contribute to the fatality and injury trends described below.

Fatalities

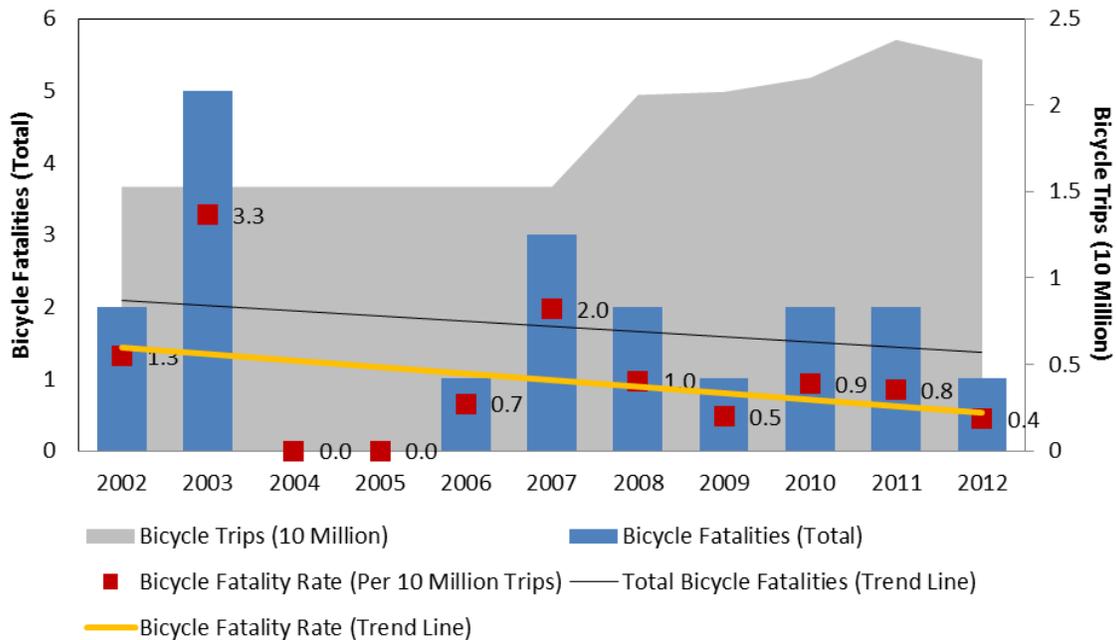
The relatively small number of fatalities in each community generally indicates there was no increase in annual pedestrian or bicyclist fatalities (see Table 10). In addition, the annual census of traffic fatalities compiled by the National Highway Traffic Safety Administration (NHTSA) indicates that, at a program level, pedestrian and bicycle fatalities declined 20 percent and 28.6 percent between 2002 and 2012 despite an estimated 22.8 percent and 48.3 percent respective increase in trips over the course of NTPP. Accounting for increased exposure, fatality rates declined 35.8 percent for pedestrians and 51.8 percent for bicyclists over that time period (see Figure 16 and Figure 17). Table 10 presents nonmotorized fatality numbers at the community level.

Figure 16: Program-Level Pedestrian Fatalities and Exposure Involving Motor Vehicles for All Pilot Communities, 2002-2012



Source: NHTSA Federal Accident Reporting System (FARS) <http://www-fars.nhtsa.dot.gov/Main/index.aspx>.

Figure 17: Program-Level Bicycle Fatalities and Exposure Involving Motor Vehicles for All Pilot Communities, 2002-2012



Source: NHTSA FARS <http://www-fars.nhtsa.dot.gov/Main/index.aspx>.

Table 10: Community-Level Pedestrian and Bicycle Fatalities Involving Motor Vehicles, 2002-2012

	Columbia		Marin County		Minneapolis (city)		Sheboygan County	
	Pedestrian	Bicycle	Pedestrian	Bicycle	Pedestrian	Bicycle	Pedestrian	Bicycle
2002	1	0	3	1	6	1	1	0
2003	1	1	0	1	4	2	1	1
2004	2	0	0	0	10	0	1	0
2005	1	0	3	0	6	0	1	0
2006	2	0	2	0	1	1	0	0
2007	0	1	3	0	4	2	1	0
2008	0	0	2	0	2	2	2	0
2009	1	0	1	0	6	1	1	0
2010	0	0	0	0	4	2	0	0
2011	3	0	2	0	7	2	2	0
2012	0	0	2	1	3	0	1	0

Source: NHTSA FARS

Injuries

Injury data pose challenges compared to fatality data.²⁷ While fatality data represent a census of all motor vehicle-involved pedestrian and bicycle deaths, many pedestrian and bicycle crashes are not recorded. While injury-inducing crashes of all types may go unreported to police, based on available research into public health records, motor vehicle crashes involving pedestrians and bicycles more often go unreported.²⁸ Given variable reporting practices and presumed underreporting in the pilot communities, the WG chose to collect police injury data compiled by State and local agencies and analyze that data at a community rather than program level.

Local data indicates that, despite a 22.8 percent and 48.3 percent increase in the number of pedestrian and bicycle trips across the four pilot communities over the course of NTPP, pedestrian injuries declined in three of the four communities between 8 and 28.3 percent between 2002 and 2012. Marin County observed a 5 percent increase in pedestrian injuries over the same time period; however, pedestrian injury rates (incidents per number of trips) declined more than 21 percent. Each of the other three communities experienced between 17.9 percent and 55.1 percent decline in pedestrian injury rates (see Figure 18).

Bicycle injuries increased in each community except Sheboygan County between 2002 and 2012. Accounting for exposure, injury rates (incidents per number of trips) declined between 8.6 and 38.2 percent in each of the four communities (see Figure 19).

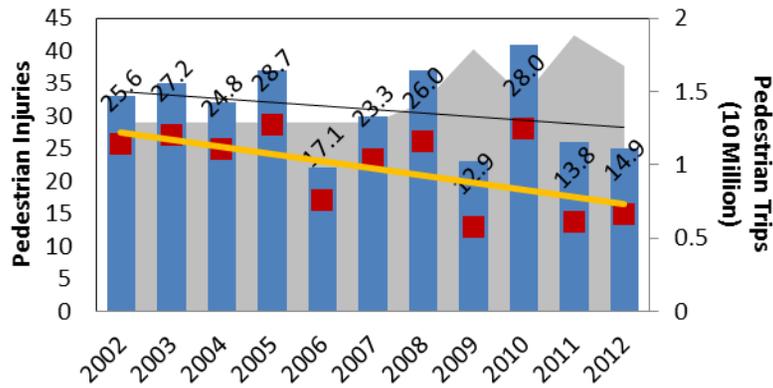
Table 11 presents nonmotorized injury numbers at the community level.

²⁷ While NHTSA samples police accident reports and estimates injuries at a State level, there is no consistent data set detailing pedestrian and bicycle injuries at a county or municipal level. Varying reporting practices preclude more complete, fine-grained data sets, particularly when it comes to reporting injury severity.

²⁸ Parties involved in such crashes may not report because there was no injury, property damage was marginal, they are unaware of reporting requirements, or someone fled the scene. For pedestrian and bicycle injuries leading to hospitalization, research into public health records indicates that police reports underestimate such crashes by 25-40 percent. (Federal Highway Administration. Injury to Pedestrians and Bicyclists: An Analysis Based on Hospital Emergency Department Data. FHWA-RD-99-078. 1999.)

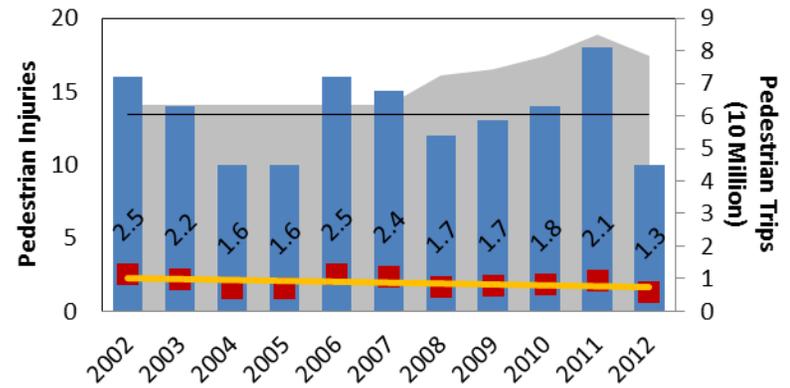
Figure 18: Reported Pedestrian Injuries (Involving Motor Vehicles) and Exposure, 2002-2012

Columbia, MO



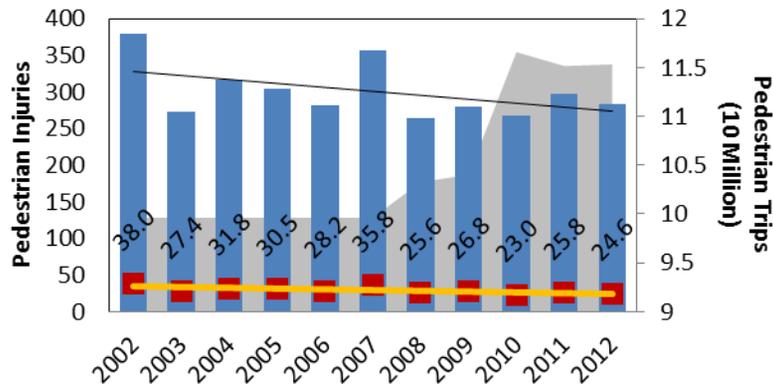
Source: Missouri Statewide Traffic Accident Records System (STARS)

Marin County, CA



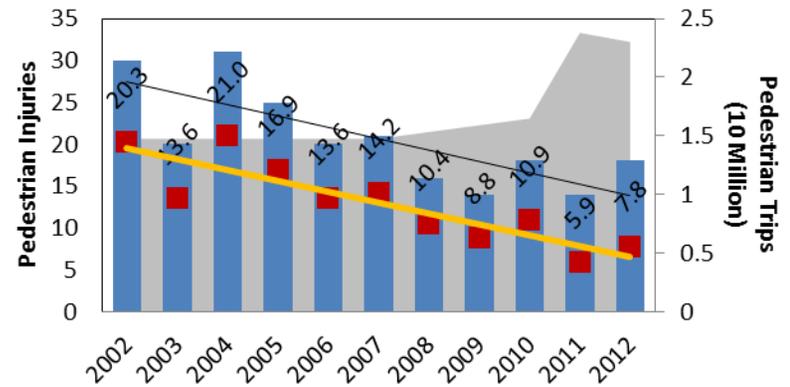
Source: California Statewide Integrated Traffic Records System (SWITRS)

Minneapolis (city), MN



Source: Minnesota Department of Public Safety - Office of Traffic Safety

Sheboygan County, WI

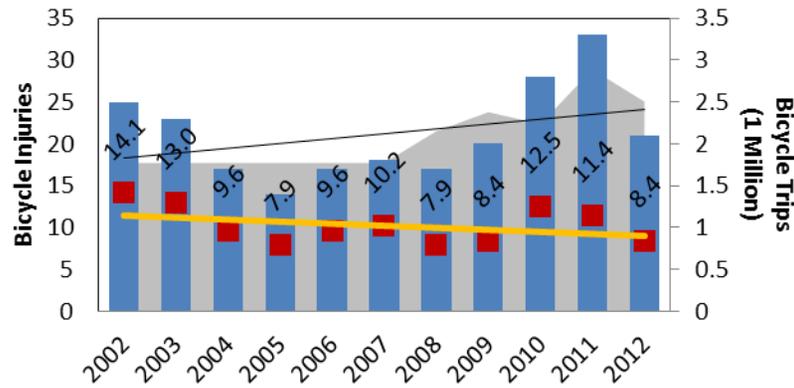


Source: Wisconsin Traffic Operations and Safety (TOPS) Laboratory

Pedestrian Trips
 Pedestrian Injury Rate (Per 10 million Trips)
 Pedestrian Injuries (Total)
 Total Pedestrian Injuries (Trend Line)
 Pedestrian Injury Rate (Trend Lane)

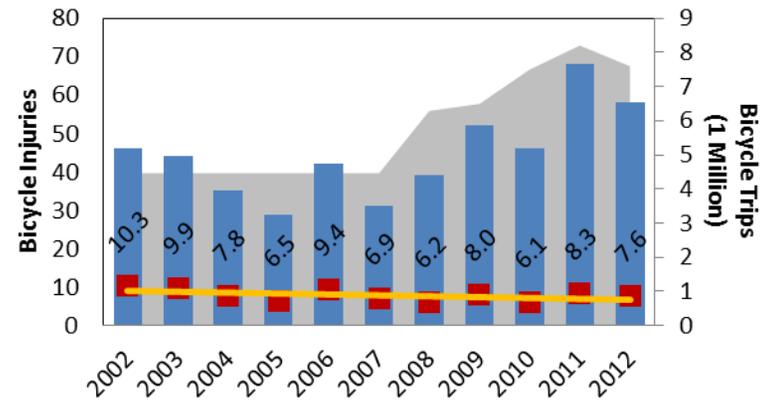
Figure 19: Reported Bicycle Injuries (Involving Motor Vehicles) and Exposure, 2002-2012

Columbia, MO



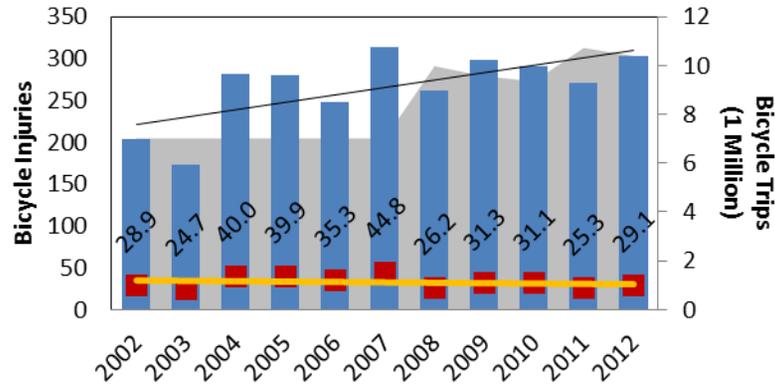
Source: Missouri STARS

Marin County, CA



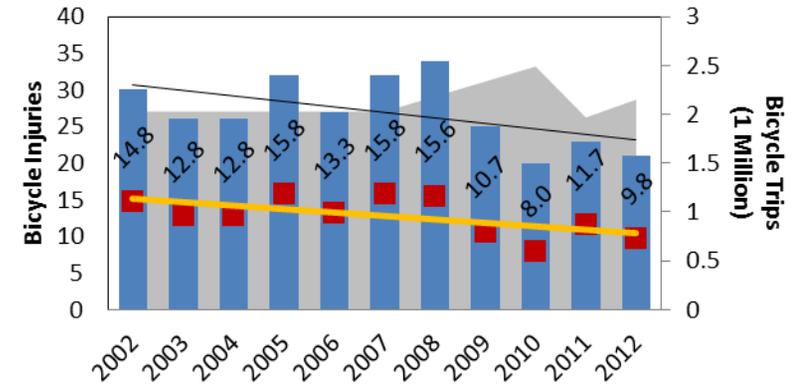
Source: California SWITRS

Minneapolis (city), MN



Source: Minnesota Department of Public Safety - Office of Traffic Safety

Sheboygan County, WI



Source: Wisconsin TOPS Laboratory

Bicycle Trips
 Bicycle Injuries (Total)
 Bicycle Injury Rate (Per 1 million Trips) — Total Bicycle Injuries (Trend Line)
 Bicycle Injury Rate (Trend Line)

Table 11: Community-Level Reported Pedestrian and Bicycle Injuries Involving Motor Vehicles, 2002-2012

	Columbia		Marin County		Minneapolis (city)		Sheboygan County	
	Pedestrian	Bicycle	Pedestrian	Bicycle	Pedestrian	Bicycle	Pedestrian	Bicycle
2002	33	25	16	46	379	203	30	30
2003	35	23	14	44	273	173	20	26
2004	32	17	10	35	317	281	31	26
2005	37	14	10	29	304	280	25	32
2006	22	17	16	42	281	248	20	27
2007	30	18	15	31	357	314	21	32
2008	37	17	12	39	264	261	16	34
2009	23	20	13	52	279	299	14	25
2010	41	28	14	46	268	291	18	20
2011	26	33	18	68	297	271	14	23
2012	25	21	10	58	284	303	18	21

Source: Missouri STARS; California SWITRS; Minnesota Department of Public Safety - Office of Traffic Safety; Wisconsin TOPS Laboratory

Public Health

Regular physical activity improves health, as documented in extensive medical research. The U.S. Department of Health and Human Services recommends adults achieve at least 150 minutes of moderate cardiovascular exercise per week, such as walking or bicycling, in addition to strength training. Periods of cardiovascular activity can be as short as 10 minutes to provide benefits. Regular physical activity is shown to help:

- Reduce the risk and impact of cardiovascular disease and diabetes;
- Reduce the risk of certain types of cancer;
- Control weight;
- Improve mood; and
- Reduce the risk of premature death.

The physical activity benefits of NTPP investments will continue long into the future, as more people take advantage of these assets and the growing network of nonmotorized facilities matures in the pilot communities.

Mortality

In coordination with the U.S. Centers for Disease Control and Prevention (CDC), the WG applied the World Health Organization's (WHO) Health Economic Assessment Tool (HEAT) for cycling to estimate the economic savings resulting from reduced mortality from increased bicycling in the pilot communities from 2007 to 2013.²⁹ To run this calculation, the CDC entered the total number of new bicycling trips that were made in 2013, relative to the 2007 baseline.³⁰

Acknowledging that not all of the changes in bicycling are attributable to NTPP investments, each community estimated an “attribution rate” to NTPP investments for use in this model.³¹ CDC then performed a sensitivity analysis of 10 percent (plus or minus) based on this rate. Applying this model, the additional bicycling trips taken in the pilot communities in 2013 reduced the economic cost of mortality by an average of \$46.3 million, plus or minus \$6.7 million. Note that this estimate is for just one year; three years of this benefit (approximately \$139 million) would eclipse the total amount of funding for the NTPP (\$125 million).

These estimates are likely conservative because they are based only on benefits of reduced mortality (death) and not of reduced morbidity (illness). Also, the estimates only calculate reduced mortality due to increased physical activity, do not consider safety or the health benefits of improved air quality, only include bicycling for utilitarian purposes, and do not consider the benefits of walking. The HEAT model is not yet adapted to estimate economic benefits of improved walking or bicycling morbidity, or calibrated to estimate economic benefits of improved walking mortality in the U.S. context. In the future, it will likely provide estimates of significant additional economic savings.

Morbidity

The estimated economic savings from reduced morbidity would likely greatly surpass the economic savings of reduced mortality.³² Given that the HEAT model uses conservative inputs, the actual health savings could be higher than the estimate above. This discussion and the estimates of health benefits are provided to demonstrate an important future area of analysis for the pilots as they complete their

²⁹ World Health Organization (WHO). 2012. Health Economic Assessment Tool for Cycling. <http://www.heatwalkingcycling.org/>. Adapted for use in the U.S. by Dr. Candace Rutt, Centers for Disease Control and Prevention.

³⁰ For methodology, see WHO, 2012.

³¹ Columbia's estimated attribution rate is 90 percent, Marin County's is 75 percent, Minneapolis area's is 60 percent, and Sheboygan County's is 90 percent.

³² WHO, 2012.

networks and for communities interested in estimating or measuring the impacts of nonmotorized investments. Such analysis will be increasingly possible as models and tools are further refined and as data collection for walking and bicycling trips becomes more common (see [Directions for Future Research](#)).

Build-Out Analysis

In this report, the WG analyzed the impacts of the NTPP from 2007 to 2013. However, the infrastructure and programs that the pilot communities implemented will have impacts into the future, including a more extensive pedestrian and bicycle transportation network, community knowledge of nonmotorized transportation, and professional capacity for future nonmotorized transportation planning. In addition, some NTPP-funded projects are still being implemented and are expected to be completed by 2016. The WG examined possible scenarios to determine future impacts of the NTPP when the projects are all complete, each community's nonmotorized networks are more established, and people are more familiar and comfortable with them.

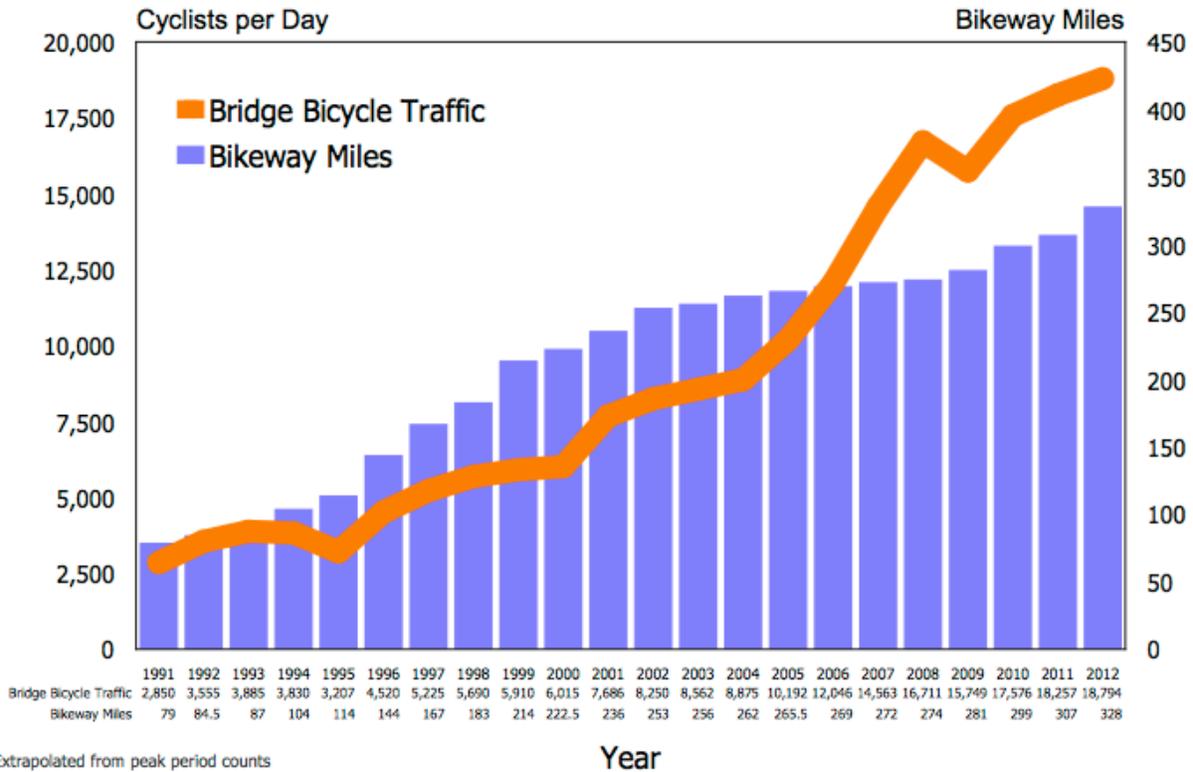
The WG chose to analyze a scenario for future nonmotorized transportation in the pilot communities that combines recent trends and a realistic outlook on what impacts could be expected in the pilot communities over the next 10 years. This scenario projects a 1 percent average annual increase in walking and a 5 percent average annual increase in bicycling over the next 10 years. The WG believes this scenario is plausible because each community still has more projects to complete and potentially more people will use their communities' networks as they become more established. Other communities observed similar growth, particularly for bicycling, even when the overall miles of the network did not continue to grow at a corresponding rate (see Figure 20 displaying trends in Portland, Oregon). A similar increase may be possible in some or all of the pilot communities as their networks mature.

A scenario of 1 percent growth in walking and 5 percent growth in bicycling over the next 10 years would be more moderate than the growth trend observed between 2007 and 2013. While that period saw an average of four million additional walking trips per year and 551,000 bicycle trips per year, the WG's scenario for future growth estimates an average of 202,000 additional walking trips per year and 267,000 bicycle trips per year.

Key Highlights

- The impacts of the NTPP investments will continue into the future.
- The pilot communities' nonmotorized transportation investments could avert nearly 266 million VMT between 2014 and 2023.
- Other NTPP benefits, such as health, safety, and environmental benefits, would increase under similar potential scenarios.

Figure 20: Bicycle Traffic Across Five Main Portland Bridges Juxtaposed with Bikeway Miles (Portland, Oregon)



Source: City of Portland, Oregon. <http://www.portlandoregon.gov/transportation/article/448401>.

Ultimately, future NTPP benefits will depend upon the decisions the communities make to promote, maintain, or expand their investments and overall network. Figure 21 and Figure 22 show vehicle trips replaced by walking and bicycling trips, respectively from 2009 to 2013, and each scenario described above from 2014 to 2023. While these figures show projections for averted vehicle trips, the projections for other figures for averted VMT, energy and air pollution savings, and health benefits would look the same. These projected nonmotorized trips would avert nearly 266 million VMT total between 2014 and 2023, which translates to a 33 percent annual increase over 2013 levels by the year 2023.

Figure 21: Projected Vehicle Trips Replaced by Walking Compared to Baseline (2007)

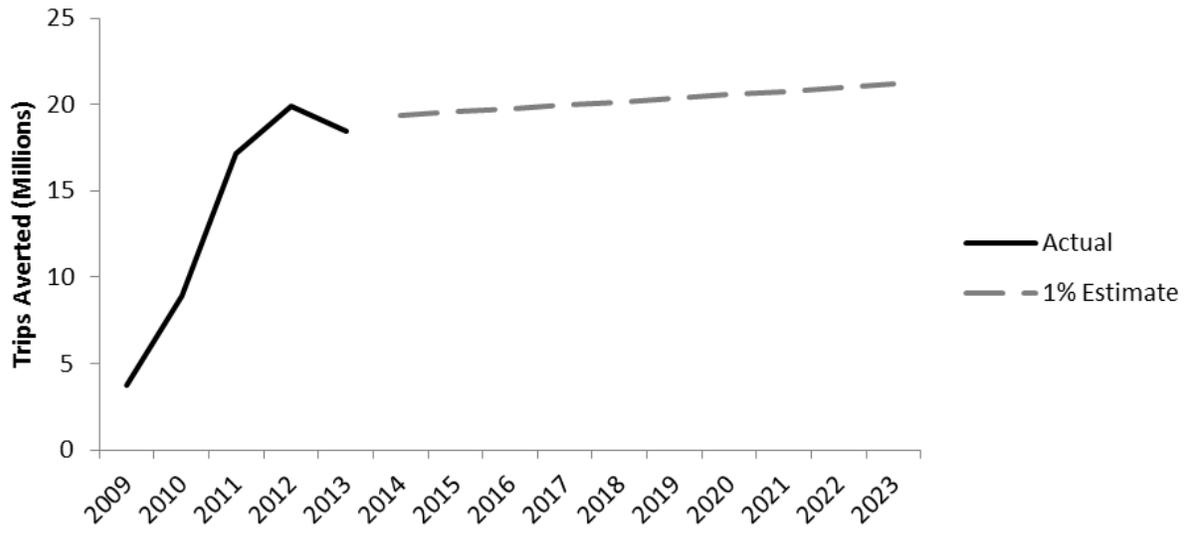
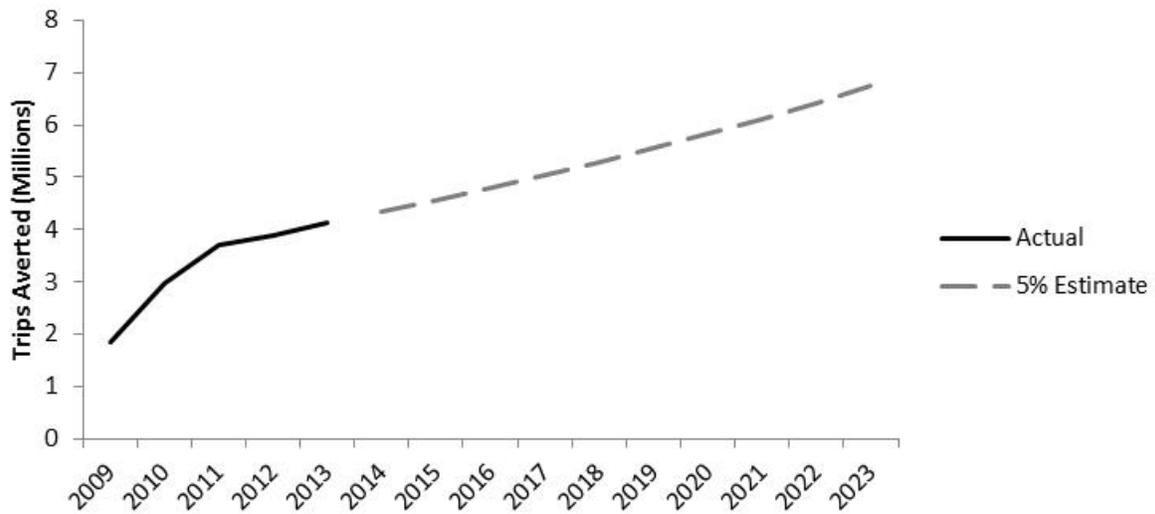


Figure 22: Projected Vehicle Trips Replaced by Bicycling Compared to Baseline (2007)



Directions for Future Research

The results presented in this report and the 2012 Report to Congress provide valuable data about use of new nonmotorized programs and infrastructure, mode shift, VMT averted, and resultant access, mobility, environmental, safety, and public health benefits. However, the WG recognizes there are other directions for research on the impacts from NTPP that were beyond the scope of this report. These research questions could provide valuable directions for future research and should be considered in future evaluations of the NTPP or similar nonmotorized transportation programs and investments:

Network Connectivity and Multi-Modality

- The WG analyzed the increased access that NTPP investments provided in terms of residents, businesses, and community amenities within a ¼-mile radius of each pilot community's bicycle network. However, the WG did not analyze the increased connectivity of the network, or how many locations residents can access seamlessly through the network. Small, gap-filling projects may not substantially expand the number of people near a pedestrian or bicycle facility, but they do expand their usefulness. Analysis of the NTPP's connectivity benefits would create a fuller understanding of the program's achievements.
- Several NTPP-funded infrastructure projects were designed to create safer, more convenient access for pedestrians and bicyclists to transit facilities, to facilitate longer, multimodal trips. Analysis of the NTPP projects' impact on transit ridership is a promising direction for future research.

Economic Impacts from Nonmotorized Transportation Investments

The variety of potential economic benefits of pedestrian and bicycle infrastructure and programming investments include commute cost savings for bicyclists and pedestrians, direct benefits to bicycle and tourism-related businesses, indirect economic benefits due to changing consumer behavior, and individual and societal cost savings associated with health and environmental benefits. The WG researched methods for evaluating different economic impacts from nonmotorized transportation investments at three different scales (project, neighborhood, and community-wide), which are summarized in a companion white paper "Evaluating the Economic Benefits of Nonmotorized Transportation."³³ Because of data and time limitations, conducting research into the economic impacts of NTPP investments was beyond the scope of this report. However, understanding the economic benefits from nonmotorized transportation projects will become increasingly important as communities decide how to allocate limited transportation resources.

³³ Volpe Center for FHWA. Forthcoming. "Evaluating the Economic Benefits of Nonmotorized Transportation." Pedestrian and Bicycle Information Center http://www.pedbikeinfo.org/data/factsheet_economic.cfm.

Further Research into Safety and Public Health Impacts

Safety

- In this report, the WG analyzed fatality and injury data for pedestrians and bicyclists in crashes with motor vehicles. However, the WG did not have sufficient crash and exposure data to evaluate whether safety improved around specific infrastructure projects. This analysis would help communities evaluate the effectiveness of individual projects and could inform future infrastructure designs or funding priorities.
- In addition to saving lives and reducing injuries, pedestrian and bicycling safety improvements have economic benefits. Quantifying the medical cost savings to communities and individuals and the economic cost savings from reduced mortality and injury is a key research direction.

Health

- The WG collaborated with the CDC to apply the WHO's HEAT model to estimate the economic cost of mortality (death) averted that result from the health benefits of bicycling in the pilot communities. However, HEAT is currently not able to estimate the economic cost of mortality averted due to increased walking in the United States or to estimate the savings from reduced disease (morbidity) from walking or bicycling.³⁴ In addition to mortality, future efforts could estimate cost savings from reduced morbidity.
- Future research could also analyze a more comprehensive set of health benefits from nonmotorized transportation due to changes in physical activity, air pollution, and reduced injury. The Integrated Transport and Health Impact Modeling Tool (ITHIM),^{35,36,37} and other evolving models, such as one under development by the Metropolitan Transportation Commission in the San Francisco Bay Area, have the potential to improve the ability of communities to estimate broadly based health benefits of nonmotorized transportation. Two recent reports provide more information on these models: the companion white paper developed for the FHWA and WG "Evaluating the Economic Benefits of Nonmotorized Transportation,"³⁸ and white papers on transportation planning for healthy communities.^{39,40}

³⁴ WHO, 2012.

³⁵ Woodcock J., P. Edwards, C. Tonne, B. G. Armstrong, O. Ashiru, D. Banister, et al. 2009. "Public health benefits of strategies to reduce greenhouse-gas emissions: urban land transport." *The Lancet* 374:1930-1943.

³⁶ California Department of Public Health, "Health Co-Benefits and Transportation-Related Reductions in Greenhouse Gas Emissions in the Bay Area." Accessed 30 January 2014:
http://www.cdph.ca.gov/programs/CCDPHP/Documents/ITHIM_Technical_Report11-21-11.pdf.

³⁷ Maizlish, Neil. "Public Health Benefits of Walking and Bicycling to Reduce Greenhouse Gas Emissions: The Woodcock Model of Active Transport." California Department of Public Health. Accessed 30 January 2014:
http://www.arb.ca.gov/cc/ab32publichealth/meetings/091310/woodcock_model_health_co-benefits.pdf.

³⁸ Volpe Center for FHWA. Forthcoming. "Evaluating the Economic Benefits of Nonmotorized Transportation."

NTPP Legacy

Throughout implementation of the NTPP, FHWA, the pilot communities, and the rest of the WG celebrated successes and learned and applied lessons locally. The program developed local infrastructure and organizational capacity while contributing to the rapidly growing national body of knowledge on nonmotorized transportation planning, implementation, and evaluation. The NTPP presented a unique opportunity for FHWA to collaborate with on-the-ground practitioners and WG members, including the Rails-to-Trails Conservancy, CDC, and the Volpe Center, and for all to learn collaboratively about developing successful nonmotorized investments in a variety of settings.

Since authorization of the NTPP in 2005, interest and investment in nonmotorized transportation has grown dramatically around the country. Walking and bicycling as transportation, once the purview of a few U.S. cities and a peripheral issue for transportation professionals, is increasingly a focus for policymakers, planners, and engineers throughout the U.S. With increasing emphasis on creating more livable communities, the public has grown to expect walking and bicycling options within the transportation system that are safe, equitable, environmentally sustainable, and economically efficient.

Looking forward, the NTPP leaves a legacy of:

Local Nonmotorized Infrastructure and Organizational Capacity, with Community-Wide Benefits

This report and the 2012 Final Report to Congress describe in detail significant benefits from NTPP investments that each pilot community will continue to accrue far into the future. These benefits come in the form of:

- First-time and enhanced pedestrian and bicycle planning and evaluation
- Major facility investments, including large additions to on-road networks and signature off-road projects, and with significant access and mobility benefits
- Shifts to nonmotorized modes and resultant benefits in energy savings, environmental quality, safety, and public health
- Lasting partnerships between transportation planners and engineers, educational institutions, public health agencies, community organizations, and businesses
- Increased understanding of the role of walking and bicycling, including education for local planners, engineers, decision-makers, law enforcement, and the public

Pedestrian and Bicycle Information Center. http://www.pedbikeinfo.org/data/factsheet_economic.cfm.

³⁹ Volpe Center for FHWA. 2012. "Metropolitan Area Transportation Planning for Healthy Communities." Accessed 30 January 30, 2014: http://www.planning.dot.gov/healthy_communities_desc.asp.

⁴⁰ Volpe Center for FHWA. April 2014. "Statewide Transportation Planning for Healthy Communities." http://www.planning.dot.gov/healthy_communities_desc.asp.

Improved Evaluation Tools, Methods, and Reporting Techniques Replicable in Other Communities

The NTPP helped expand the suite of practical analytical tools and the body of knowledge for nonmotorized transportation data collection and evaluation, especially at a community level. These tools, methods, and reporting techniques, which could be adopted by any community with a modest evaluation budget, include:

- **Community-wide count methodology and mode shift model** using the American Community Survey⁴¹
- **Project-level evaluation methods** using count data, surveys, safety data, and modeling to estimate results
- **Access and mobility** evaluation techniques that utilize widely available GIS tools and Census data
- **Environment and energy** conversions that build off of the community-wide count methodology, a mode shift model, and other available calculation tools
- **Safety and public health** evaluation techniques that use existing national and State-level data, exposure estimates from the mode shift model, and tools from the WHO and CDC

Lessons for Other Communities

In each pilot community, NTPP led to several key insights and lessons learned for program planning and implementation, capacity building, and stakeholder and partnership outreach (see Section 6 in the Final Report to Congress). Highlights include:

- **The importance of broad community engagement in planning investments:** Throughout the course of the NTPP, the pilot communities learned that outreach efforts must be broad and not limited to groups already known to support bicycling and walking. Each of the pilot communities actively engaged with diverse segments of their populations through community meetings, citizen’s advisory committees with representatives from diverse stakeholder groups, and education and outreach campaigns. Including elected officials, community organizations, and representatives from the business community in project selection and planning initiatives helped to create broader, more effective public support for project implementation.
- **The importance of consistent, system-level data collection:** The NTPP pilot communities and WG developed a count methodology and count locations at the beginning of the program and collected pedestrian and bicyclist usage data annually to assess community-wide impact at a system level. Strong baseline data and ongoing data collection was crucial for the communities and WG to evaluate program outcomes and report annual progress.

⁴¹ Rasmussen, B., G. Rousseau, and W. Lyons. “Estimating the Impacts of the Nonmotorized Transportation Pilot Program: Developing a New Community-Wide Assessment Method.” TRB Paper 13-4916.

- **Delegating funding to agencies and organizations most equipped to deliver projects and outreach programs:** The pilot communities found that delegating funding to implementation agencies and organizations in the jurisdiction of selected projects and programs was an effective approach to project and program delivery, since these agencies and organizations had greater knowledge, capacity, and experience with on-the-ground implementation in those jurisdictions.
- **The importance of project-readiness and compliance procedures in delivering projects on time:** Because of the rapid timeline for project selection, funding, and implementation under the NTPP, project-readiness was a crucial factor in project selection for the pilot communities. In some cases, projects might have been ideal for closing network gaps or addressing key commute corridors, but right-of-way issues or other project complexities made them infeasible for implementation under NTPP; other projects that were ready for construction helped communities achieve short-term progress while they continued to plan for other, longer-term network improvements.
- **Balancing timing of community outreach and education with infrastructure investments:** Some NTPP pilot communities deployed outreach and education projects throughout the NTPP timeframe, which they believed helped increase familiarity with new nonmotorized transportation facilities as they were added to communities' pedestrian and bicycle networks – matching growing interest and enthusiasm with improved facilities. Other communities that made more intensive investments in outreach at the beginning of the NTPP timeline, before infrastructure projects were completed, felt that more gradual and strategic outreach and education may have been more effective.
- **The importance of prominently emphasizing walking and not just bicycling:** Most people walk for at least part of their daily transportation. In contrast to bicycling, few people identify themselves primarily as pedestrians, or recognize the role of walking as a transportation option with links to other modes. Emphasizing the importance of walking and of improving communities' walkability resulted in expansion of safe, convenient, nonmotorized transportation access for a broader segment of the population than bicycle infrastructure improvements alone.
- **The importance of a holistic approach:** The pilot communities learned that it is important to focus on their entire system of nonmotorized transportation infrastructure and programming, rather than just a few signature projects. Overall network connectivity and smaller projects, like bicycle parking and crosswalk enhancements, were also important to overall community success.
- **Behavior change happens over the long run:** The NTPP projects were planned, funded, and constructed over a relatively short timeframe of seven years. The communities aimed to develop the infrastructure and programming to support long-term increases in walking and bicycling to reduce fuel consumption and improve air quality, safety, public health, and provide equitable, low-cost access to key destinations. Just as it takes time to develop an integrated network of nonmotorized transportation infrastructure, it takes time for residents to become familiar with the network and integrate it into their transportation routines and daily lives. NTPP

benefits are likely to compound as all projects are completed, future projects are undertaken, and community usage matures.

Noteworthy Practices for the Design and Implementation of Future Pilot Programs

Looking at the history of NTPP, the WG has reached the following conclusions about the program and developed advice for future pilot programs or communities interested in strategic nonmotorized transportation investments:

- 1. Community distinctiveness:** The NTPP's focus on unique communities with distinct infrastructure and programming needs was successful; one key value of the NTPP was that it allowed four very different communities to test and assess the role of nonmotorized transportation in their communities.
- 2. Collaborative evaluation:** The NTPP's WG model was effective, as it gave the pilot communities a larger network of support within which to discuss ideas and challenges, exchange experiences within the group as well as the national nonmotorized community, and develop a coordinated evaluation approach.
- 3. Project streamlining:** One suggestion for future Federal nonmotorized transportation funding programs is to make it easier to use Federal funds for small projects like bicycle parking or minor infrastructure improvements. Communities often found that substantial improvements can be made with small investments, but the processes required to transfer Federal funds were too complex for communities that wanted to invest in many small projects and show short-term results.
- 4. Long-term reporting:** It was important for the WG to recognize data collection and evaluation needs from the beginning and to collect data consistently over eight years. This allowed the WG to work together to produce an evaluation of the program across communities at multiple scales. Future pilots could further improve data collection and evaluation methodology by:
 - a. Establishing a modest annual budget for data collection and evaluation;
 - b. Identifying data collection needs from the outset based on research needs (including pedestrian and bicyclist count data, safety data, health data, and data on economic impacts); and
 - c. Collecting a longer history of baseline data to provide a better understanding of pre-program trends.

Conclusion

From 2005 to 2013, the NTPP communities achieved a great deal to improve their nonmotorized transportation infrastructure and programs. The program ultimately shows that an influx of pedestrian and bicycling investments, along with proper planning and implementation, is associated with significant increases in nonmotorized transportation. The legacy of the NTPP will depend in part on the decisions the pilot communities make in the future. Future walking and bicycling trends in these communities will depend partly on whether they are able to maintain their nonmotorized infrastructure and programming, and whether the communities continue to expand their nonmotorized networks.

As detailed throughout this report and the 2012 Report to Congress, the NTPP demonstrated what communities can achieve with dedicated Federal funds for nonmotorized transportation planning, infrastructure, and programs. Columbia, Marin County, the Minneapolis area, and Sheboygan County can serve as examples for peer communities nationwide as they consider how to improve nonmotorized transportation to accomplish a broad range of goals. Together with the other WG members, the pilot communities are proud of their contribution to the growing national body of knowledge on nonmotorized transportation planning, implementation, and evaluation.

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Appendix A: Working Group Members

Pilot Communities

Columbia, Missouri – GetAbout Columbia

- Participants: Ted Curtis, Cliff Jarvis, and Tyler Wallace
- Organization: Columbia Department of Public Works
- Website: <http://www.gocolumbiamo.com/PublicWorks/GetAboutColumbia/>

Marin County, California – WalkBikeMarin

- Participants: Craig Tackabery and Dan Dawson
- Organization: Marin County Department of Public Works
- Website: <http://www.walkbikemarin.org/>

Minneapolis Area, Minnesota – Bike/Walk Twin Cities

- Participants: Joan Pasiuk, Steve Clark, Tony Hull, and Prescott Morrill
- Organization: Transit for Livable Communities
- Website: <http://www.bikewalktwincities.org/>

Sheboygan, Wisconsin – NOMO

- Participants: Aaron Brault, Emily Vetting, and Mary Ebeling
- Organization: Sheboygan County Planning and Conservation Department
- Website: <http://www.nomosheboygancounty.com/>

Federal Highway Administration

- Participants: Gabriel Rousseau and John Fegan
- Organization: Office of Safety
- Website: http://www.fhwa.dot.gov/environment/bicycle_pedestrian/

Rails-to-Trails Conservancy

- Participants: Marianne Fowler, Tracy Hadden Loh, Stephanie Manning, Franz Gimmler, David Levinger, Thomas Gotschi, Billy Fields
- Website: <http://www.railstotrails.org/>

Volpe National Transportation Systems Center

- Participants: William Lyons, Benjamin Rasmussen, David Daddio, Jared Fijalkowski, Erica Simmons, and Anna Biton
- Organization: Transportation Planning Division; Organizational Performance Division
- Website: <http://www.volpe.dot.gov>

Centers for Disease Control and Prevention

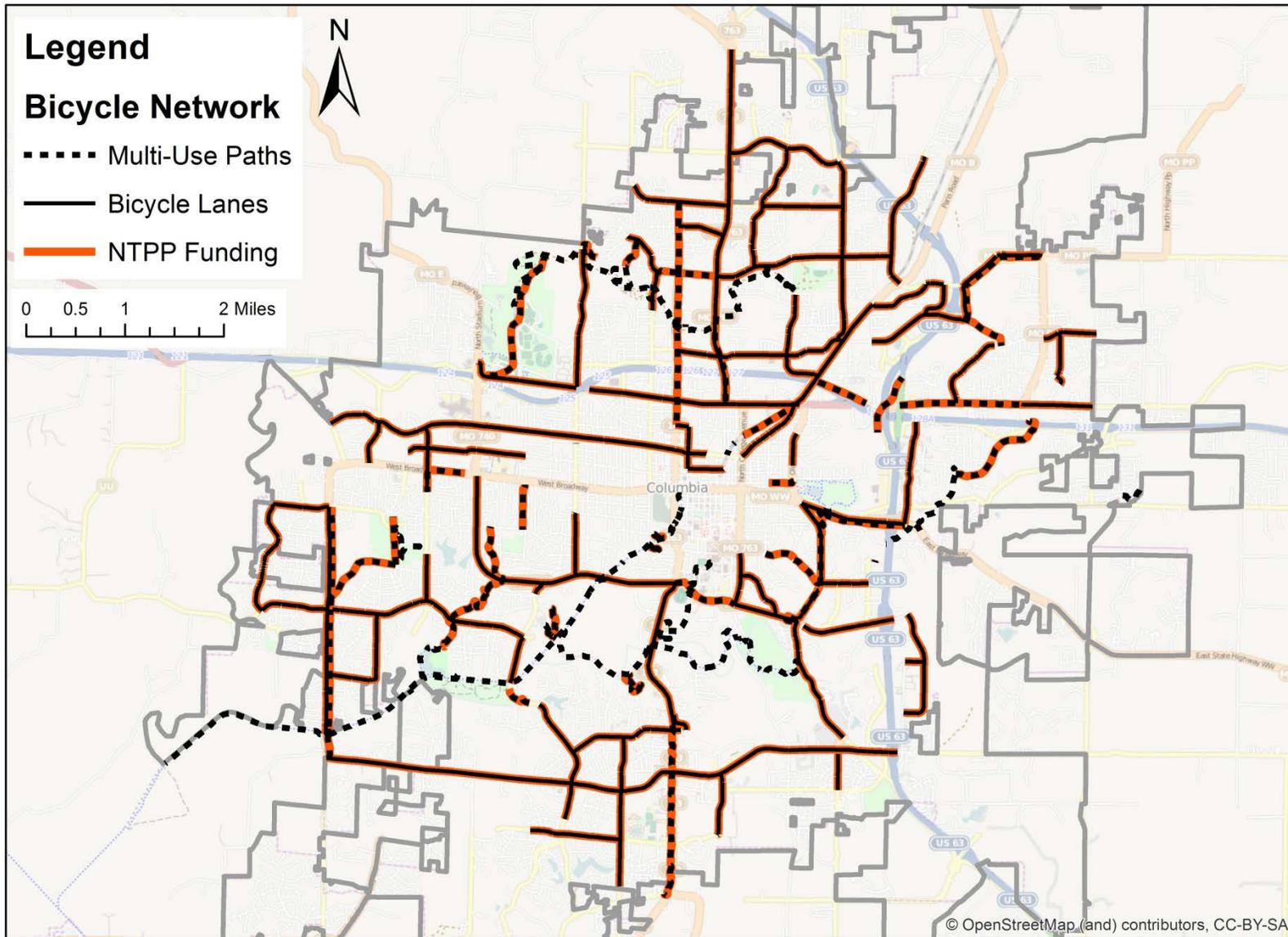
- Participants: Arthur Wendel, Geoffrey Whitfield, Candace Rutt, and Andrew Dannenberg
- Organizations: National Center for Environmental Health; National Center for Chronic Disease Prevention and Health Promotion
- Website: <http://www.cdc.gov/>

Marin County Bicycle Coalition

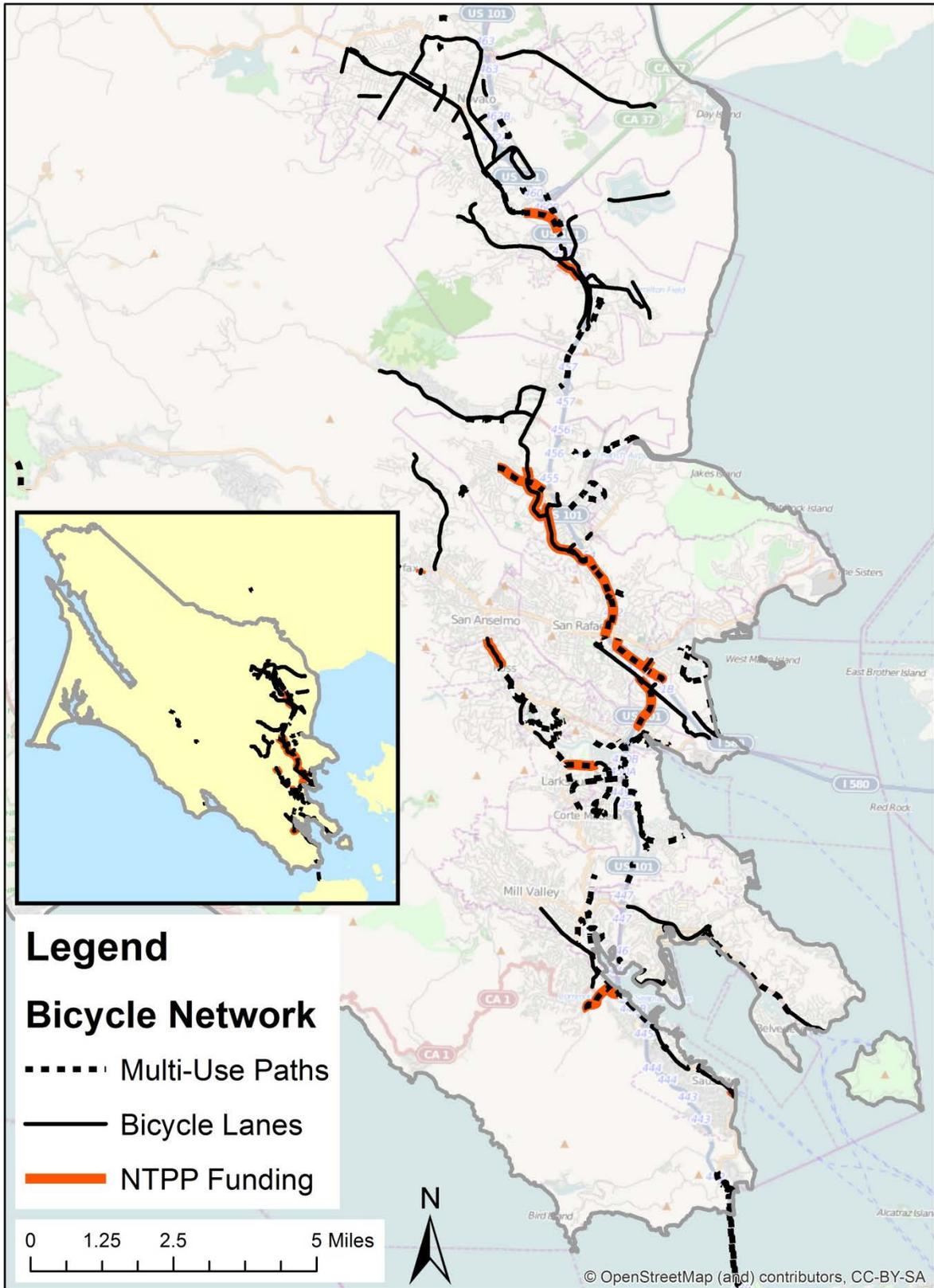
- Participant: Deb Hubsmith
- Website: <http://www.marinbike.org/Index.shtml>

Appendix B: Detailed Community Bicycle Maps

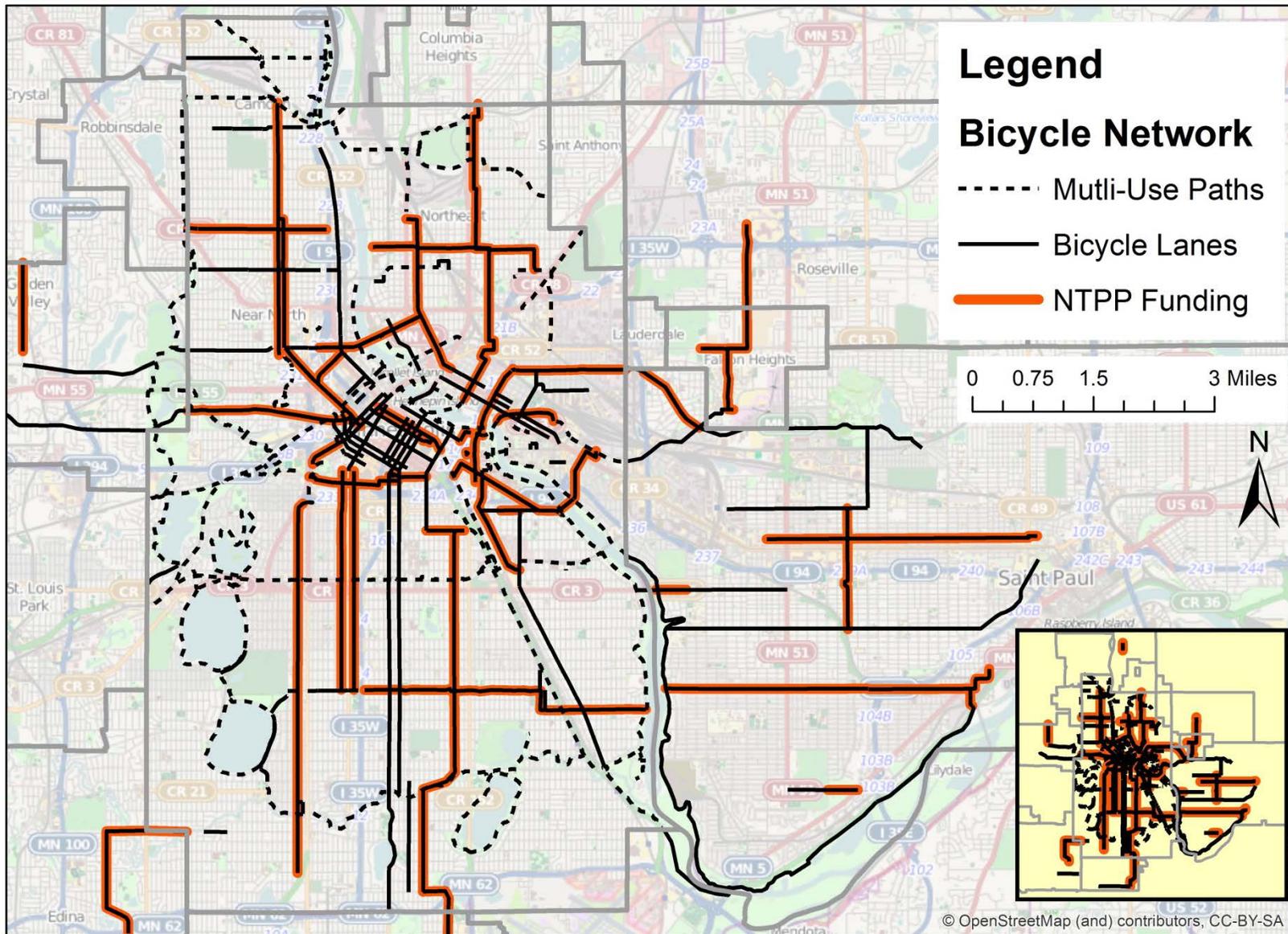
Columbia, MO



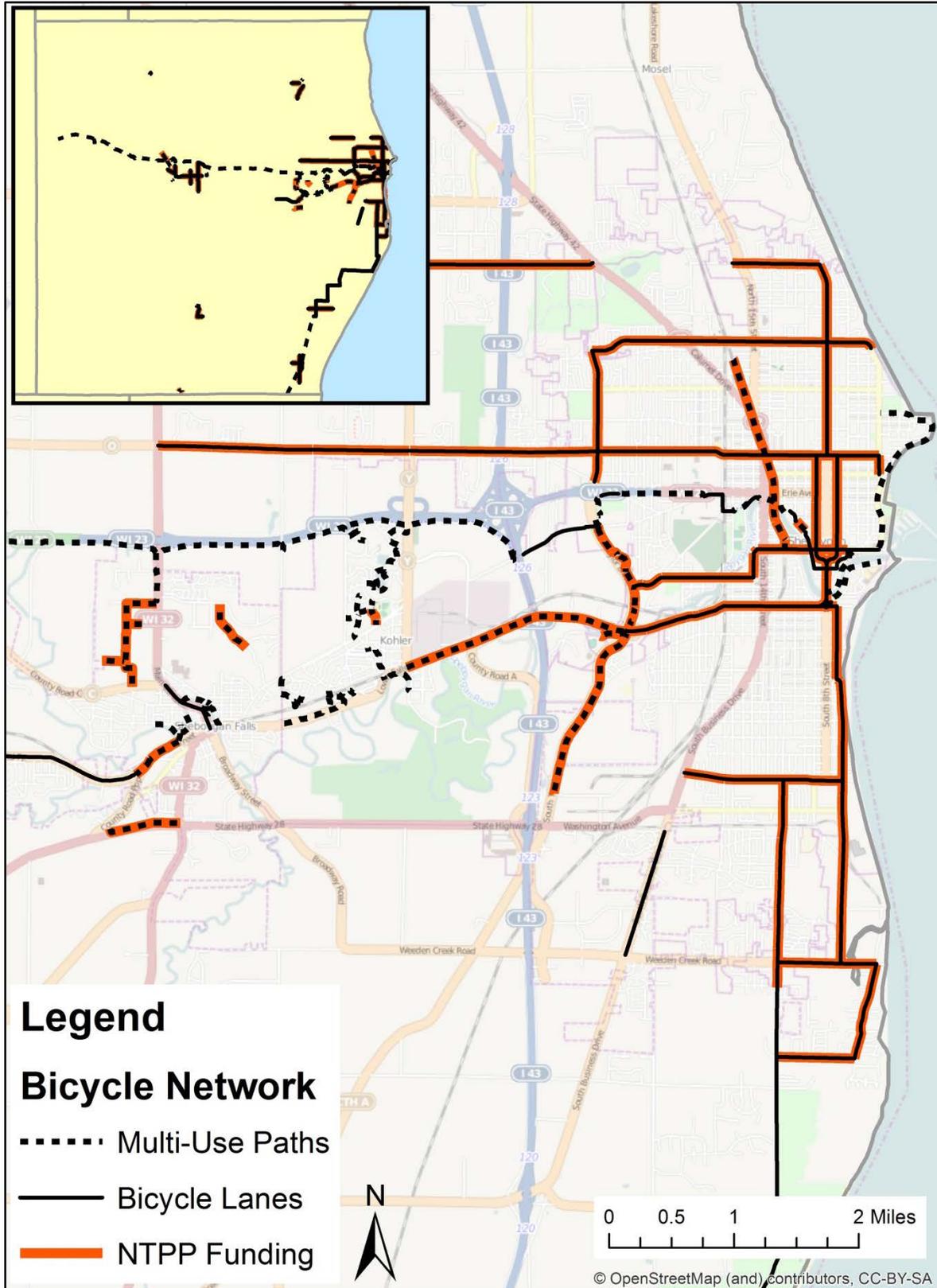
Marin County, CA



Minneapolis Area, MN



Sheboygan County, WI



Appendix C: Annual Count Data

Table 12: Annual Community Count Data

	Mode	Columbia	Marin County	Minneapolis	Sheboygan County	Total
2007	Bicycle	202	3,820	4,102	66	8,190
	Walk	900	9,203	2,522	80	12,705
2008	Bicycle	245	5,393	5,831	71*	11,540
	Walk	993	10,514	2,614	83*	14,204
2009	Bicycle	271	5,588	5,591	76*	11,526
	Walk	1,249	10,802	2,633	86*	14,770
2010	Bicycle	255	6,373	5,468	81	12,177
	Walk	1,024	11,321	2,951	89	15,385
2011	Bicycle	329	7,032	6,340	64	13,765
	Walk	1,315	12,331	2,925	129	16,700
2012	Bicycle	272	6,097	6,424	65	12,858
	Walk	1,168	10,502	2,881	156	14,707
2013	Bicycle	273	5,841	6,925	67	13,106
	Walk	816	10,260	2,825	158	14,059

* An average was used for these years since counts were not conducted.

Appendix D: Access and Mobility Calculations

Table 13: 1/4-Mile Bicycle Access to People, Housing Units, and Jobs (Community-Wide and Program-Level)

	People		Housing Units		Jobs	
	Before	After	Before	After	Before	After
Columbia	16,986	84,946	5,632	36,651	19,896	55,702
Marin County	109,725	125,210	48,787	55,121	63,140	68,927
Minneapolis Area	314,842	439,312	147,244	203,376	320,526	369,482
Sheboygan County	18,715	48,911	7,850	20,273	15,863	26,916
All Pilots	460,268	698,379	209,513	315,421	419,425	521,027

Appendix E: Air Quality Conversions

Table 14: Air Quality Conversions

Pollutant	Amount	Conversion	Equation
Hydrocarbons	x pounds/program	1.36	Yearly mileage reduction multiplied by 1.36 grams per reduced mile
PM10	x pounds/program	0.0052	Yearly mileage reduction multiplied by 0.0052 grams per reduced mile
PM2.5	x pounds/program	0.0049	Yearly mileage reduction multiplied by 0.0049 grams per reduced mile
NOX	x pounds/program	0.95	Yearly mileage reduction multiplied by 0.95 grams per reduced mile
CO	x pounds/program	12.4	Yearly mileage reduction multiplied by 12.4 grams per reduced mile
C02	x pounds/program	369	Yearly mileage reduction multiplied by 369 grams per reduced mile

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