CONSERVE BY BICYCLE PROGRAM STUDY

PHASE I REPORT APPENDIX Q

June 2007

Sprinkle Consulting

Kittelson & Associates, Inc.
Transportation Engineering/Planning

CUTR

rails-to-trails conservancy

APPENDIX Q - LITERATURE SEARCH AND CASE STUDY TECHNICAL MEMORANDUM

BACKGROUND

In 2005, the Florida Legislature created FS 335.07, Conserve by Bicycle Program, within the Florida Department of Transportation (FDOT).

The purposes of the Conserve by Bicycle Program are to:

- Save energy by increasing the number of miles ridden on bicycles, thereby reducing the usage of petroleum-based fuels.
- Increase efficiency of cycling as a transportation mode by improving interconnectivity of roadways, transit and bicycle facilities.
- Reduce traffic congestion on existing roads.
- Provide recreational opportunities for Florida's residents and visitors.
- Provide healthy transportation and recreation alternatives to help reduce the trend toward obesity and reduce long-term health costs.
- Provide safe ways for children to travel from their homes to their schools by supporting the Safe Paths to Schools Program.

As part of this program, FDOT authorized the Conserve by Bicycle Program Study. The goals of the Conserve by Bicycle Program Study are to determine:

- Where energy conservation and savings can be realized when more and safer bicycle facilities, such as bicycle paths, bicycle lanes, and other safe locations for bicycle use, are created which reduce the use of motor vehicles in a given area.
- Where the use of education and marketing programs can help convert motor vehicle trips into bicycle trips.
- How, and under what circumstances, the construction of bicycling facilities can provide more opportunities for recreation and how exercise can lead to a reduction of health risks associated with a sedentary lifestyle.
- How the Safe Paths to Schools Program and other similar programs can reduce school-related commuter traffic, which will result in energy and roadway savings as well as improve the health of children throughout the state.

- How partnerships can be created among interested parties in the fields of transportation, law enforcement, education, public health, environmental restoration and conservation, parks and recreation, and energy conservation to achieve a better possibility of success for the program. The above stakeholder groups for instance, may be brought into new or existing groups such as the Bicycle and Pedestrian Advisory Committee operated by Florida Department of Transportation.

FDOT awarded a contract to a consultant team, led by Sprinkle Consulting, Inc., to carry out the Program Study. The other members of the consultant team are Kittelson and Associates, Inc., Rails-to-Trails Conservancy, and the Center for Urban Transportation Research at the University of South Florida.

Task 2 of the Scope of Services states that, "The Consultant will complete a literature search which will highlight case studies of successful programs which have achieved some or all of the goals listed above. Research will include an evaluation of existing Florida-based programs that relate to the study goals, out-of-state statewide research, and national studies/programs. These case studies will be evaluated to determine which components would be most applicable in Florida."

This Technical Memorandum presents the findings of the literature search. Through a search of *Transportation Research Record* and the National Transportation Library, the research team uncovered case studies of specific facilities and programs and additional information about facilities and programs. Members of the Conserve by Bicycle Steering Committee and the researchers' contacts in the Association of Pedestrian and Bicycle Professionals identified additional references and sources for research and review. The researchers assigned each study and program to one or more study tracks – facilities, Safe Routes to School, education and marketing, or partnerships – corresponding to the goals in the Scope of Services. Each study and program was reviewed with respect to four criteria: mode shift, replaced activity, energy conservation, and recreation and exercise. The researchers determined whether these criteria were addressed and if so, whether they were measurable and/or applicable (or transferable) to Florida environments. For the review, each study and program was categorized as follows:

A-List	Contains measurable criteria and conducted in Florida
B-List	Contains measurable criteria but conducted outside Florida
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The studies appear in alphabetical order according to the author's last name. The program descriptions appear alphabetically according to the program name. For the reader's review convenience, the following pages provide two separate indices of the studies or programs by study track and by criteria.

STUDIES AND PROGRAMS REVIEWED

STUDY TRACK INDEX

Facilities

Safe Routes to School

Education and Marketing

Partnerships

CRITERIA INDEX

Mode Shift

Replaced Activity

Energy Conservation/Savings

Recreation/Exercise

Citation:

Abdel-Aty, Mohamed and Hassan Abdelwahab. *Calibration of Nested-Logit Mode-Choice Models for Florida*. University of Central Florida, Orlando, November 2001.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
	Yes	No	Yes	No
Mode shift		✓		
Replaced activity		✓		
Energy conservation/savings		✓		
Recreation/exercise		✓		

Applicability to Florida

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- If "B," outline how the research can be "translated" for application in FL within the context of this study's objectives.

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Summary:

The authors calibrated mode-choice models for Miami-Dade, Broward, and Palm Beach Counties, Florida. They modeled drive alone, carpool, and transit. The bicycle mode was not modeled in this research.

Citation:

Abraham, J.E. and J.D. Hunt. Specification and Estimation of Nested Logit Model of Home, Workplaces, and Commuter Mode Choices by Multiple-Worker Households. *Transportation Research Record 1606*, 1997, pp. 17-24.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
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Summary:

The authors calibrated developed a nested logit model in Calgary, Canada. They modeled walking, transit, and driving. The bicycle mode was not modeled in this research.

Citation:

Aljarad, Saad and William Black. Modeling Saudi Arabia-Bahrain Corridor Mode Choice. *Journal of Transport Geography*, Vol. 3, 1995, pp. 257-268.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

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Summary:

The authors analyzed two corridors connecting Saudi Arabia and Bahrain to evaluate factors affecting mode choice between the two locations. They modeled the car, air, and bus modes. The bicycle mode was not evaluated in this research.

Citation:

Appleyard, Bruce S. Planning Safe Routes to School. *Planning Magazine.* May 2003, pp. 34-37.

Program Study Track:

__ Facilities ✓ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

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Summary:

The report cites an early pilot program in England where bicycle use tripled within two years, reportedly as a result of investment in engineering solutions. Safety statistics from one of the earliest Safe Routes to School programs in Denmark are also provided.

Citation:

Arasan, V. Thamizh, V.R. Rengaraju, and K.V. Krishna Rao. Trip Characteristics of Travelers without Vehicles. *Journal of Transportation Engineering*. Vol. 122, No. 1, January/February 1996, pp. 76-81.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

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Summary:

The authors modeled mode choice (walking and bus) for work trips taken by travelers who do not own cars. The bicycle mode was not modeled in this research.

Citation:

Barnes, Gary, Kristin Thompson, and Kevin Krizek. A Longitudinal Analysis of the Effect of Bicycle Facilities on the Commute Mode Share. Paper presented at the 78th Annual Meeting of the Transportation Research Board, January 22-26, 2006.

Program Study Track:

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Summary:

This paper describes an effort to compare 1990 and 2000 Census data on bicycle commute mode shares in areas adjacent to facilities built between those two dates. Changes in mode share were compared with the changes for the metropolitan region overall. The authors found that the areas located within 1.5 miles of the endpoints of a facility and one mile of the facility's core had higher than average bicycle commute mode shares to begin with, but that these increased from 1.7% to 2.0%, and every one of the buffer areas showed significant increases in bicycle mode share. Over the same period the bicycle commute mode share for the remainder of the region stayed at 0.2%. Trips crossing the Mississippi River showed a larger increase than trips that did not, which the authors attribute to numerous bicycle improvements to bridges crossing the river during this decade. Most of the facilities were located around downtown Minneapolis and the University of Minnesota and these areas showed the largest increases in bicycle mode share. Downtown St. Paul had lower mode shares to begin with, fewer improvements, and its mode share as a destination for bicycle commuting went down, but bicycle commuting by residents of St. Paul did increase.

The authors found that major bicycle facilities constructed in the Twin Cities during the 1990s did significantly impact the level of bicycle commuting. The suburban parts of the region showed a decline in bicycle commuting, contrasted with a sharp increase in both Minneapolis and St. Paul. Within those cities, areas near bicycle facilities tended to show more of an increase in bicycle mode share than areas farther away.

Applicability to Florida

While this report does not quantify the benefit from a specific single improvement, it provides both an example of one way to evaluate the relationship between facility improvements and bicycle ridership without an extensive data collection process. This process could be applied to work in Florida.

Citation:

Barnes, Gary and Kevin Krizek. Estimating Bicycling Demand. In *Transportation Research Record: Journal of the Transportation Research Board, No. 1939.* TRB, National Research Council, Washington, DC, 2005, pp. 45-51.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

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Summary:

This paper discusses the total amount of bicycling in the U.S., identifies problems encountered during model development, and presents a model for estimating the percentage of adults who ride a bicycle on a given day.

Citation:

Bernstein, Scott, Carrie Makarewicz, Kevin McCarty, Albert Benedict, Kara Heffernan and Anne Canby. *Driven to Spend: Pumping Dollars out of Our Households and Communities.* Surface Transportation Policy Project, Center for Neighborhood Technology, June 2005.

Program Study Track:

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Summary:

One important goal of the Conserve by Bicycle Program Study is to encourage mode shift from the automobile to the bicycle. This study helps to explain the true cost associated with owning and operating an automobile. It makes a strong economic argument for consideration of shifting to other modes. It also provides insights into how these costs take away from other family items such as health care and healthy diets.

Citation:

Betz, Carter J., John C. Bergstrom, and J.M. Bowker. A Contingent Trip Model for Estimating Rail-trail Demand. *Journal of Environmental Planning and Management,* Vol 46, No. 1, 2003, pp. 79-96. http://www.americantrails.org/resources/economics/docs/rtdemandbetz03.pdf. Accessed on August 4, 2006.

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Summary:

"Previous research by Moore *et al.* (1994) indicated that only about 25% of visitors [to two rail-trails] lived 20 or more miles from two rail-trails they studied with similar characteristics as the ART."

Citation:

Bicycle Victoria. *Ride to Work and Beyond! Report on Follow-up Survey of Ride to Work Day 2005 Registered Participants, 27 February – 3 March 2006.*

Program Study Track:

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Summary:

A Ride to Work Day event was held in October 2005 in Melbourne, Victoria, Australia. There were 6,811 registered participants. The authors conducted a week-long follow-up e-mail survey in February-March 2006. Forty-nine percent of participants with valid e-mail addresses responded. About 14 percent of the respondents had never ridden to work prior to the event, that is, they were first-timers on Ride to Work Day. The follow-up survey found that about 27 percent of the first-timers (that is, about 4 percent of all survey respondents) were still riding to work at least once a week.

Applicability to Florida

The results of this study suggest that Ride to Work Day is a stimulus for some commuters to discover bicycling to work for the first time, and once they have tried it, some continue to bicycle to work.

Citation:

Bike Arlington. *What is Bike Arlington?* http://www.bikearlington.com/about.cfm. Accessed August 28 2006.

Program Study Track:

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Summary: (from http://www.bikearlington.com/about.cfm)
Bike Arlington is an initiative of Arlington County, Virginia - where people have many options for moving about their community.

Ultimately, Bike Arlington is an effort to build on an existing partnership between Arlington citizens, businesses and County staff to *encourage more people to bike more often.*

Citation:

Bike Texas – Texas Bicycle Coalition. *Annual Report: October 2004-September 2005.* http://www.biketexas.org/TBC2005AnnualReport.pdf. Accessed August 24, 2006.

Program Study Track:

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Summary:

The Texas SuperCyclist Project is a statewide program, started in 1998, to certify elementary health and physical education teachers to teach 4th and 5th grade students the basics of traffic safety, with emphasis on bicycle riders as vehicle operators. This program receives about $300,000 annually from the Texas DOT and matching funds from community partners.

Citation:

Birk, Mia and Roger Geller. Bridging the Gaps: How the Quality and Quantity of a Connected Bikeway Network Correlates with Increasing Bicycle Use. Paper presented at the 78th Annual Meeting of the Transportation Research Board, January 22-26, 2006.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

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Summary:

Between 1991 and 2004, the number of miles of overall bikeways in Portland increased 215%, from 65 miles in 1991 to over 230 miles in 2004. Based on extrapolations from peak-hour counts on the four key Willamette River bridges, Portland's bicycle ridership increased 210% during this time, compared to a 14% population increase over the same time and 8% growth in motor vehicle traffic over the bridges. A comparison of 1990 and 2000 census data showed bicycle mode share rising from approximately 1% to 3%, with greater increases in specific areas (mostly the dense, flat inner City neighborhoods. Improvements focused on improving access to and on three bridges crossing the Willamette River and the report contains a table comparing the number of riders crossing the bridge to the percent completion of the network feeding that bridge.

Applicability to Florida

While this report does not quantify the benefit from a specific single improvement, it provides both an example of one way to evaluate network improvements and a comparison of ridership to improvements, both of which could be applied to work in Florida.

Citation:

Boarnet, Marlon G. et al. *Safe Routes to School Final Report Summary.* July 2004. http://www.uctc.net/papers/final%20reports/year15/51%20-%20Boarnet-Day%20final%20report%20year%2015.pdf. Accessed July 21, 2006.

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Summary:

This report documents the preliminary impacts of the State of California Safe Routes to School legislation. Its intent is to specifically examine changes in crash *rates*, but limited data led the researchers to focus instead on characteristics that are associated with crashes.

Full before and after data were collected at nine elementary schools spread throughout Southern California. Collected data included vehicle counts, bicycle and pedestrian counts, and yielding behaviors. The program projects were limited to construction projects such as new sidewalks and crossing improvements.

The research indicates that the projects had varying amounts of success. Most schools' bicycle/pedestrian mode splits remained relatively unchanged. The report indicates that the most effective construction projects have been sidewalk gap closures. The only bicycle facility project studied was the addition of on-street bicycle paths near Murietta Elementary, which showed no evidence of success. The authors suggest that education campaigns should be added to construction projects at schools with pre-existing low levels of bicycling and walking.

A before and after survey of parents was also conducted, with the results confined to "strong parental approval" of the program.

<u>Applicability to Florida</u>

For Florida programs focusing on construction/facility improvements, the varying success rates by improvement type could be useful.

Citation:

Caldwell, E. and D. Parker. *Modal Shift in Boulder Valley: 1990 to 2000.* City of Boulder. www.ci.boulder.co.us/files/Transportation_Master_Plan/diary2000.pdf. Accessed on September 26, 2006.

Program Study Track:

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Summary:

The Travel Diary Study is a biennial survey of Boulder Valley (Colorado) residents' travel patterns and mode selection. The baseline study was conducted in 1990 and has been re-implemented every two years since then. The study is designed to provide feedback to City staff and Council members on the effectiveness of City programs aimed at reducing single-occupancy vehicle (SOV) travel, and to provide information on travel patterns useful for future transportation planning.

The report does not correlate any specific investments in bicycle facilities with the mode shifts. The report is focus on the correlation between programs, such as GO Boulder (commuter assistance), and the Boulder ECO-Pass, and mode shift as it relates to their Transportation Master Plan's goal of reducing SOV travel. However, the report does provide measurable data on bicycle mode share changes, trip distance, trip purpose, and frequency over a 10 year period.

According to the City's Transportation Master Plan 2003, there is approximately $50 million currently funded in the 2025 plan for bicycle projects. This includes approximately 92 miles of bike lanes. The TMP reports that approximately 20% of the bicycle related projects in the original 1996 Bicycle Systems Plan had been completed by 2003 as well as 11 bicycle and pedestrian underpasses. More information is available at: http://www.bouldercolorado.gov/files/Transportation_Master_Plan/TMP_111303_72dpi.pdf

<u>Applicability to Florida</u>

As a longitudinal data collection methodology, the travel diary data collection method could be used in Florida to collect data on travel behavior changes following the addition of new bicycle facilities in Florida.

Citation:

Cervero, R. and M. Duncan. Walking, Bicycling, and Urban Landscapes: Evidence from the San Francisco Bay Area. *American Journal of Public Health*, Vol. 93, 2003, pp. 1478-1483.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

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Summary:

The authors determined the likelihood of bicycling for a variety of trip types. They found that built environment factors had a stronger relationship with bicycling trips than with walking trips and that block size, a street grid, and a mix of uses were more important at the origin than destination but significant at both. However, the built environment factors studied did not include bike lanes or other facilities and contained no predictive value.

Citation:

City of Portland. *TravelSmart.*

http://www.portlandonline.com/transportation/index.cfm?c=36370

Accessed August 24, 2006.

Program Study Track:

__ Facilities __ Safe Routes to School ✓ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
	Yes	No	Yes	No
Mode shift	✓		✓	
Replaced activity		✓		
Energy conservation/savings		✓		
Recreation/exercise	✓		✓	

Applicability to Florida

List Assignment (highlight one)

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Summary:

TravelSmart, used in more than 300 projects around the world, identifies individuals who want to change the way they travel. It provides individualized information and training to help these people take transit, bike, walk, or carpool.

The first large-scale TravelSmart project in the U.S. was conducted in Portland, Oregon. This project reached over 14,000 people in north and northeast Portland following the opening of the Interstate MAX light rail line. The project consisted of four steps:

1. "Before" survey – In April and May 2004, a random survey of 1,460 persons in the target area was conducted to determine how they travel.
2. Individualized marketing – A period of personalized contact focused on those who expressed an interest in receiving information about traveling using environmentally friendly modes. Information was delivered (by bicycle) to 2,624 households. One hundred eight households requested further services and received home visits; thirty-four of these were primarily interested in bicycling.
3. "After" survey – One year after the initial survey, a random survey of 1,708 persons was conducted to measure changes in travel behavior.
4. In-depth study – A one-hour-long home interview was conducted with selected persons to determine the potential for travel behavior change.

As a result of the individualized marketing campaign, car travel decreased from 81 percent to 73 percent of trips. Bicycling increased from 3 percent to 5 percent.

The combination of light rail and TravelSmart increased physical activity 25 hours per person per year. The increased activity reflects a combination of increased bicycling, walking, and access to/from transit.

Applicability to Florida

A marketing campaign targeted at interested persons can potentially increase levels of bicycling (and hence physical activity) beyond what may be realized with an investment in bicycling infrastructure alone.

Citation:

Da Penha Sanches, Suely and Fabiana Serra de Arruda. Incorporating Nonmotorized Modes in a Mode Choice Model. *Transportation Research Record: Journal of the Transportation Research Board, No. 1818*, TRB, National Research Council, Washington, DC, 2000, pp. 89-93.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

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Summary:

The authors developed a binary logit mode choice model (walking and auto/transit) for the Federal University of São Carlos, Brazil. The model explained 54 percent of the choice process. The bicycle mode was not modeled in this research.

Citation:

Davis, Gary A. and Trina Wicklatz. *Sample Based Estimation of Bicycle Miles of Travel.* University of Minnesota, Minneapolis, 2001.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

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Summary:

The paper describes a process for selecting representative roadway segments and off-road paths within a region, collecting data on bicycling on those segments and then applying that information to the entire roadway and off-road network to estimate total bicycle miles traveled in the region. Specifically the project sampled four types of bicycle facilities (off-road facilities, on-road facilities, roads with ADT of less than 5,000 and no bicycle facilities, and roads with ADT greater than 5,000 and no bicycle facilities) within local streets, arterial streets, and freeways. Each of these is classified as urban, suburban, rural, or on a university campus. The study collected video from sample sites representing each of the categories described above and collected a total of 160 12-hour counts.

The report focuses on the data collection process and the challenges involved rather than the number of cyclists identified on different segment types and locations and whether these may be representative or the extent to which facilities may have influenced the level of ridership.

Applicability to Florida

While this report does not quantify the benefit from a specific single improvement, it provides a potential format for a massive, regional process to estimate bicycle exposure for the region. This could be applied in Florida to help develop baseline regional bicycling volumes to determine crash and injury rates. Additionally the article describes in detail the data collection process utilized.

Citation:

Dill, Jennifer and Theresa Carr. Bicycle Commuting and Facilities in Major U.S. Cities. In *Transportation Research Record: Journal of the Transportation Research Board, No. 1828*, TRB, National Research Council, 2003, pp. 116-123.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

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Summary:

The authors use data from forty-three U.S. cities to model the percentage of workers commuting by bicycle as a function of bicycle lanes per square mile, state spending per capita on bicycles and pedestrians, and other variables. They found that each additional mile of bicycle lane per square mile increases the percentage of bicycle commuting by 0.76, holding other variables constant. The authors concluded that "Higher levels of bicycle infrastructure are positively and significantly correlated with higher rates of bicycle commuting."

Applicability to Florida

The study results suggest that investments in additional bicycle lanes will increase the mode share of bicycles for commuting purposes.

Citation:

Doherty, Susan. *Rail-Trails and Community Sentiment.* Rails-to-Trails Conservancy, Washington, DC. http://www.americantrails.org/pdf/RRstrategies.pdf. Accessed on July 21, 2006.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

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Summary:

This paper is a combination of a study of opposition to and strategies for success of rail-trails. The results of the study indicate that 85% of the 125 rail-trails addressed were created and opened without opposition. A lack of communication is the main cause of opposition to rail-trails. Thirteen helpful strategies for succeeding in building a rail-trail are listed on page 7 of the document.

Citation:

Eash, Ronald. Destination and Mode Choice Models for Non-motorized Travel. *Transportation Research Record: Journal of the Transportation Research Board, No. 1674*, TRB, National Research Council, Washington, DC, 1999, pp. 1-8.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

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Summary:

The author calibrated and applied models for vehicle vs. non-motorized mode choice. The models predicted a higher number of non-motorized trips than was found in the 1990 Census or 1990 Household Travel Survey (61 percent and 21 percent higher, respectively), but given differences in definitions and survey populations, the author concluded that there was reasonable agreement.

Citation:

Feeney, S. J. *The Mohawk-Hudson Bike-Hike Trail: Analysis of Trail Use, Regional Benefits and Economic Impact.* Schenectady County Department of Planning. November 1998, www.cdtcmpo.org/bike/usersurvey.pdf. Accessed on September 27, 2006.

Program Study Track:

✓ Facilities __ Safe Routes to School ✓ Education/marketing __ Partnerships

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Summary:

This report documents the results of a trail user survey conducted along the Mohawk-Hudson Bike-Hike Trail on seven different days between September 1996 and July 1997. The report documents the extent and type of use, identifies user attitudes toward the trail, and develops user profiles. This report also attempts to ascertain the trail's existing and potential economic and quality of life benefits to Schenectady County and the region.

Applicability to Florida:

This report places a heavy emphasis on the impact of bicycle trails to tourism which is particularly pertinent to the case of Florida. It also provides insight into the impact of trails on adjacent property, which is always a matter of debate when new bike trails are proposed.

Citation:

Get Active Orlando. E-mail from Mighk Wilson (Bicycle & Pedestrian Coordinator, Metroplan Orlando) to Theo Petritsch, August 31, 2006.

Program Study Track:

__ Facilities __ Safe Routes to School __ Education/marketing ✓ Partnerships

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Summary:

Orlando's Active Living by Design program (called "Get Active Orlando" now) is going to try to start a program with the Orange County Health Department to get county clinic doctors to "write prescriptions for bicycling" for some of their clients/patients, to give them free bikes (from the police and Lynx impound lots) and provide some training and mentoring. Mr. Mighk Wilson is going to try to get some local bike shops to donate some useful accessories (lights, locks, pumps, racks, etc.).

Citation:

Gonzalez, Liliana, R. Choudary Hanumara and Carol Overdeep. *2002 Bicycle Transportation User Survey*. URITC Project Number 536182. University of Rhode Island Transportation Center, Rhode Island DOT, 2004. http://ntl.bts.gov/lib/24000/24600/24632/536182.pdf Accessed on September 27, 2006.

Program Study Track:

✓ Facilities __ Safe Routes to School ✓ Education/marketing __ Partnerships

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Summary:

This report provides user data for four different bike paths in Rhode Island. Data were collected on mode to access path, mode used on path, trip purpose (including recreation, health/exercise, and commuting), demographics (age and gender), distance traveled on path, time spent on path, frequency of path use, and time and day of path use. The report also collected data specific to bicycle commuting in terms of distance, frequency, reasons for choosing bicycling, and barriers to bicycle commuting on path.

Applicability to Florida

This report provides valuable information shared-use path users, in terms of demographics, trip purpose, trip length, mode to access path, and use of path for commuting purpose. Survey instrument and raw data are provided in appendices. Data were collected on customer satisfaction levels with directional policies, water stations, roads crossing path, litter, crime and safety. One limitation is that bicycling is lumped together with walking on the commuting questions.

For example, approximately 72 percent of path users use the path for health and exercise, and 42 percent report using it for recreation, and 4 percent use it for commuting. Of all path users, 72 percent are bicyclists. Approximately 24 percent of trail users bicycle to the paths. Bicyclists typically spend about 1-2 hours on the path.

Of bicycling and walking commuters, approximately 38 percent do it once per week on average, and 24 percent bicycle commute using the trail four or more day per week. Approximately 48 percent use the path for just a portion of their commute, and 52 percent can use the path for virtually all of their total commute.

Of the 583 total survey respondents, 17 percent commuted by walking or bicycling on one of the four paths in the past year. Of the bicycle or walking commuters, 24 percent commuted by bicycle or foot almost always, 19 percent regularly, 18 percent sometimes and 38 percent rarely.

Bicycle and pedestrian commuters were asked to identify the reason(s) why they commute via bicycle or foot. Health/Exercise was by far the most favored reason with 81 percent of commuters citing this as their motivation. Other responses, which were noted, include not owning a car (35 percent), saves time (29 percent), avoids traffic (26 percent), and saves money (17 percent). Five commuters indicated that environmental concerns prompted them to commute via bicycle or foot. "Traffic" was the leading reason why people chose not to commute via bicycle or foot in the 1996 survey with 58 percent, followed by "Distance" at 51 percent and "Time" at 39 percent. In this survey, the order of the top three is "Distance" (40 percent), "Time" (22 percent), and "Traffic" (20 percent).

Approximately 14 percent also reported having school-aged children using one of the four paths to get to school.

Citation:

Goodwin, R. E. and Carol A. Lewis. *An Assessment of Potential Energy Savings and Other Benefits from Alternative Fuel Utilization and Employer Trip Reduction Programs.* Research Report SWUTC 466070-1. Southwest Regional University Transportation Center, 2000. http://swutc.tamu.edu/Reports/466070-1.pdf Accessed on September 27, 2006.

Program Study Track:

__ Facilities __ Safe Routes to School ✓ Education/marketing ✓ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
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Mode shift	✓			✓
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Summary:

While this report does not provide measurable criteria, it does provide insight into the role of employer partnerships through commute trip reduction programs at the employer-level as a means to reduce energy use. The report addresses the reasons why employers may want to provide amenities to encourage bicycle commuting.

Citation:

Greer, Donald L. *Nebraska Rural Trails: Three Studies of Trail Impact.* Program in Recreation and Leisure Studies, School of Health, Physical Education and Recreation University of Nebraska at Omaha. http://www.unomaha.edu/recadmin/trails/nebtrails.pdf. Accessed on July 31, 2006.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

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Summary:

For this effort, three separate mail-in surveys were used to gather opinions of residents, property owners, and business owners, respectively, near or adjacent to four trails in Nebraska and Iowa. Among the residential respondents, all of whom lived within three blocks of one of the trails, 73.6% reported having a household member use the trail for recreational purposes. For individual trails, the percentage ranged from 88.9 to 62.9. Moreover, 60.6% of respondents self-reported an increase in health and fitness as a direct result of the trail's existence. Nearly 31% of the respondents indicated at least weekly trail use. When given an open-ended question regarding the most important reasons for trail use, exercise was the most common response. The same questions were asked of business and land owners, and the respective percentages were predictably lower, presumably because they do not live in close proximity to the trail.

Applicability to Florida

While characteristics of the individual trails and their surrounding communities are not provided in the report, such data may provide some insight into usage rates for people living in close proximity to trails and therefore provide guidance as to likely benefits with respect to improved recreational opportunities and individuals' health.

Citation:

Hagelin, Christopher. *A Return on Investment Analysis on Bikes-on-Bus Programs.* Publication 576-06. National Center for Transit Research at the Center for Urban Transportation Research, 2005. http://www.nctr.usf.edu/pdf/576-05.pdf Accessed on September 27, 2006.

Program Study Track:

__ Facilities __ Safe Routes to School ✓ Education/marketing ✓ Partnerships

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Summary:

The purpose of this project was to conduct a return on investment analysis of bikes-on-bus (BOB) programs, and to develop recommendations on how transit agencies can overcome rack capacity limitations. Fifteen transit agencies and over 200 BOB users were surveyed. Missing data, specifically the number of BOB boardings, made a rigorous analysis of return on investment impracticable. However, the findings showed that transit agencies generally view the initial investment and operational costs of BOB programs to be minimal compared to the return on the investment. The BOB user survey results showed that BOB programs attract new patrons, encourage increased use of transit, and expand the transit service area. When faced with rack capacity limitations, the transit agencies have added three-bike capacity racks or have experimented with allowing bicycles in the bus. While added rack capacity and an effective bikes-in-bus (BIB) policy can improve the integration of bicycles and transit, it is recommended that transit agencies invest in a bike-to-transit strategy. The survey results showed that BOB users tend to bicycle a greater distance from their residence to the bus stop than between the bus stop and the work site. Therefore, this strategy is centered on the provision of bicycle parking at bus stops and transfer centers to accommodate BOB users that need their bicycle on only one side of their transit trip. Bicycle parking at bus stops, specifically in residential areas, can ease the impact of rack capacity limitations and maximize the potential of the bicycle as a means to access transit.

Three Florida transit agencies, Metro-Dade Transit, Pinellas Suncoast Transit Authority, and Hillsborough Area Regional Transit, provided BOB permit holder databases that were used to draw a random sample of BOB users to receive a survey. A total of 220 completed surveys were received. The survey collected data on the use of BOB, travel behavior, and demographics.

BOB Travel Behavior

Approximately 70 percent of BOB users surveyed have been combining bicycling and transit for over a year, and almost 33 percent have been doing so for over three years. It is estimated that 65 percent of patrons surveyed use BOB services more than four days per week on average. Over 40 percent of BOB users reported 11 or more boardings per week. One in four BOB users is new to transit, and of those new transit riders, over 80 percent reported that the ability to access transit by bicycle was the reason for the switch. The three-quarters of BOB patrons that were not new to transit reported increased transit use after they started using BOB services.

BOB and Work Trips

Approximately 72 percent of BOB patrons use the service to commute to work. Of those that use BOB to access jobs over 83 percent use BOB four or more days per week. Approximately 61 percent of BOB work commuters bicycle more than one mile to access transit but 80 percent travel less than one mile after getting off the bus and bicycling to their place of work. Of those that commute to work using BOB, 60 percent reported also using BOB for non-work trips as well.

BOB Demographics

The demographic data suggest that BOB users are usually males who earn under $30,000 or even under $20,000 a year. Hispanics and African-Americans exist in higher proportions in the BOB user population than compared to the general public. BOB users are also more likely to have limited access to a car with over 45 percent coming from households without cars. In addition, 35 percent of BOB users do not hold a valid driver's license. This type of demographic information can be very useful in the design of social marketing campaigns desired to target special segments. For example, transit agencies could market the BOB program at traffic court, in which any person that has their driver's license taken away or suspended is provided with information on the BOB program, bus schedules, a free one-month bus pass, and perhaps even a bicycle and

helmet to provide them with a viable transportation option. Bicycles that are abandoned on racks and unclaimed could provide a good source of bicycles for such a program.

Citation:

Hagelin, Christopher. *Statewide Survey on Bicycle and Pedestrian Facilities.* Publication PS-05-08-07. Center for Urban Transportation Research, Florida Department of Transportation Safety Office, 2005. http://www.cutr.usf.edu/tdm/pdf/71089-00.pdf Accessed on September 27, 2006.

Program Study Track:

✓ Facilities ✓ Safe Routes to School ✓ Education/marketing __ Partnerships

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Summary:

This survey and report were designed to provide statewide measurements on Florida residents' satisfaction with bicycle and pedestrian facilities and collect data on bicycling behavior. A total of 1750 telephone surveys were conducted, or 250 from each of the seven FDOT districts. Given the sample size in relation to the number of households in Florida, the sampling error for statewide results is +/- 2.2 percent at the 95 percent confidence interval. Due to the relatively smaller sample size at the district level, the sampling error is much larger at the district level, averaging +/- 6.8 percent. Of the total, 555 reported bicycling once per month or more and for the purpose of this report are classified as "bicyclists." Based on the sample size of the subpopulations, the sampling error for bicyclists is +/- 4.8 percent and +/-2.8 percent for non-bicyclists at the 95 percent confidence interval.

Key Bicycle Findings

- The vast majority of bicyclists (95 percent) and non-bicyclists (85 percent) agreed that good bicycle facilities add value to their community.
- Approximately 74 percent of bicyclists and 55 percent of non-bicyclists agreed that the government needs to spend more money on bicycle facilities.
- Approximately 40 percent of non-bicyclists agreed or strongly agreed that a greater network of bike lanes would encourage them to bicycle more, and 44 percent in regard to multi-use paths.
- Both bicyclists (85 percent) and non-bicyclists (75 percent) agreed that bike lanes should be standard features on Florida roads and over 90 percent of both groups agreed that all bike lanes should be signed and marked.

Bicycle Behavior Findings

- Floridians bicycle for a wide variety of purposes, but most commonly for exercise or recreation.
- Over half of bicyclists biked between 6 and 20 days per month.
- For bicyclists, the mean miles bicycled per month was 73.
- Approximately 43 percent of the "average" Floridian's bicycle-miles traveled occur on roads without bike lanes, 22 percent on multi-use paths, 20 percent on sidewalks, and 15 percent on roads with bike lanes.
- Approximately 41 bicyclists had been involved in a total of 76 bicycle-motor vehicle crashes in the last five years; 38 percent occurred on roadways without bike lanes, 31 percent involved sidewalk bicycling, and 20 percent occurred on roads with bike lanes.
- Bicyclists that averaged over 100 miles per month were less likely to be in crashes with motor vehicles, despite their increased exposure.

Bicycling and Walking by Children

- Approximately 82 percent of children of respondents neither bicycle nor walk to school.
- The most common reasons given by parents as to why their children do not bicycle or walk to school were distance (35 percent), safety issues (23 percent), and age of children (14 percent).
- To make a child's bicycling or walking trip to school safer, parents called for more/better sidewalks (26 percent), safer crossing facilities (21 percent), and greater law enforcement (13 percent).

Applicability to Florida

The information about Florida residents' bicycling behavior, attitudes towards existing bicycling facilities, and desires for new bicycling facilities can be used to guide decisions on investments in new bicycling facilities.

Citation:

Hubsmith, Deborah A. Safe Routes to School in the United States. *Children, Youth, and Environments,* Vol. 16, No. 1, 2006, pp. 168-190.

Program Study Track:

__ Facilities ✓ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
	Yes	No	Yes	No
Mode shift	✓			
Replaced activity		✓		
Energy conservation/savings		✓		
Recreation/exercise		✓		

Applicability to Florida

List Assignment (highlight one)

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Summary:

The report cites an early pilot program in England where bicycle use tripled within two years. Qualitative findings suggest that early programs have been generally successful and that opportunities exist to greatly expand Safe Routes to School programs in the United States.

References, Citations, and Case Studies: (these are included in this Technical Memorandum)

Nelson/Nygaard Consulting Associates. Marin County Safe Routes to Schools Program Evaluation: 2004-2005. August 2005. http://www.tam.ca.gov/Uploads//pdfs/SR2S_Program%20Evaluation.pdf.

Pucher, John and Lewis Dijkstra. Promoting Safe Walking and Cycling to Improve Public Health: Lessons from the Netherlands and Germany. *Ameican Journal of Public Health*, Vol. 93, No. 9, September 2003. http://www.policy.rutgers.edu/papers/15.pdf

Staunton, Catherine E. et al. Promoting Safe Walking and Biking to School: The Marin County Success Story. *American Journal of Public Health,* Vol. 93, No. 9, September 2003, pp. 1431-1434.

Steiner, Ruth L. et al. Safe Ways to School – The Role in Multimodal Planning. Prepared for the Florida Department of Transportation Systems Planning Office (Project Work Order #32), May 2006.

Citation:

Jackson, Michel E. and Erik O. Ruehr. Let the People Be Heard: San Diego County Bicycle Use and Attitude Survey. *Transportation Research Record: Journal of the Transportation Research Board, No. 1636.* TRB, National Research Council, Washington, DC, 2002. http://www.enhancements.org/trb%5C1636-002.pdf. Accessed on August 8, 2006.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
	Yes	No	Yes	No
Mode shift		✓		
Replaced activity		✓		
Energy conservation/savings		✓		
Recreation/exercise	✓			✓

Applicability to Florida

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Summary:

Based on the survey findings, cyclists prefer a bikeway with a separately paved path that excludes car travel. An interesting finding was that a majority of cyclist survey respondents made complaints about sharing roadways with motorists but almost all reported never actually experiencing a conflict.

Citation:

Johnson, Rebecca. *Education is the Best Advocacy: Focus on the Texas SuperCyclist Project.* http://www.bicyclinginfo.org/insight/features/texas.htm. Accessed July 11, 2006.

Program Study Track:

__ Facilities __ Safe Routes to School ✓ Education/marketing ✓ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
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Mode shift		✓		
Replaced activity		✓		
Energy conservation/savings		✓		
Recreation/exercise		✓		

Applicability to Florida

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Summary:

The Texas SuperCyclist Project is a statewide program, started in 1998, to certify elementary health and physical education teachers to teach 4th and 5th grade students the basics of traffic safety, with emphasis on bicycle riders as vehicle operators. This program receives about $300,000 annually from the Texas DOT and matching funds from community partners.

Citation:

Krizek, Kevin J. Estimating the Economic Benefits of Bicycling and Bicycle Facilities: An Interpretive Review and Proposed Methods. In *Essays on Transportation Economics*, ed. by Vicente Inglada. Springer Publishing, New York, 2006.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
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Mode shift		✓		
Replaced activity		✓		
Energy conservation/savings		✓		
Recreation/exercise	✓			✓

Applicability to Florida

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Summary:

This paper reviews literature on the economic benefits of bicycling and bicycling facilities in terms of increased mobility, more physical activity and better health, and other outcomes.

References, Citations, and Case Studies: (see references from Krizek, Kevin J., et al., *Guidelines for Analysis of Investments in Bicycle Facilities.*)

Citation:

Krizek, Kevin J., Gavin Poindexter, Gary Barnes and Paul Mogush. Guidelines for Analyzing the Benefits and Costs of Bicycle Facilities. Submitted to the Transportation Research Board, August 2005. http://www.bicyclinginfo.org/bikecost/docs/Guidelines.pdf. Accessed on October 5, 2006.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
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Mode shift	✓		✓	
Replaced activity		✓		✓
Energy conservation/savings		✓		
Recreation/exercise	✓		✓	

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Summary:

The authors describe an interactive website-based tool (http://www.bicyclinginfo.org/bikecost/methodology.cfm) that communities can use to measure the costs and benefits of bicycle facilities. The website estimates existing and new bicycling demand by using 400-, 800-, and 1,600-meter buffers around a new facility. The health benefit of increased physical activity is valued at $128 per new bicyclist on a facility. Energy savings is not addressed by this tool.

Applicability to Florida (from http://www.bicyclinginfo.org/bikecost/howto.cfm)
"If your community is considering building a new bicycle facility you can use this tool to estimate costs, the demand in terms of new cyclists, and measured economic benefits (e.g., time savings, decreased health costs, a more enjoyable ride, decreased pollution)."

Citation:

Krizek, Kevin J., et al. *Guidelines for Analysis of Investments in Bicycle Facilities.* NCHRP Report 552. TRB, National Research Council, Washington, DC, 2006.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

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Mode shift		✓		
Replaced activity		✓		
Energy conservation/savings		✓		
Recreation/exercise	✓			✓

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Summary:

Chapter 2 reviews past efforts to measure, model, and predict bicycle demand, and also proposes a sketch planning method to estimate the number of bicyclists in an area. Additional information is given in Appendices A and B. In Chapter 3 (and Appendix C), the authors review literature on the economic benefits of bicycling and bicycling facilities in terms of increased mobility, more physical activity and better health, and other outcomes.

References, Citations, and Case Studies: (summaries from report)

Davis, G.A. and T. Wicklatz. *Sample Based Estimation of Bicycle Miles of Travel.* University of Minnesota, Minneapolis, 2001.
Counted the number of bikes on a fairly large sample of roads and bike facilities in the Twin Cities and calculated the total amount of biking in the region.

Goldsmith, S. *Estimating the Effect of Bicycle Facilities on VMT and Emissions.* Seattle Engineering Department, Seattle, no date.
Used Census data combined with local information to predict likely changes in bicycle commuting due to facility improvements.

Lindsey, G. and N.L.B. Doan. *Use of Greenway Trails in Indiana.* Indiana University Purdue University Indianapolis, Indianapolis, 2002.
Informational report on trail use in Indiana.

Merom, D., A. Bauman, P. Vita, and G. Close. An environmental intervention to promote walking and cycling – the impact of a newly constructed Rail Trail in Western Sydney. *Preventive Medicine,* Vol. 36, 2003, pp. 235-242.

Moore, R.L., A.R. Graefe, and R.J. Gitelson. The Economic Impact of Rail-Trails. *Journal of Park and Recreation Administration*, Vol. 12, No. 2, 1994, pp. 63-72.
Examined economic impact generated by three diverse rail-trails in Iowa, Florida and California. Impacts were broken down into users' expenditures related to trail visits.

Moore, R. and K. Barthlow. *The Economic Impacts and Uses of Long-Distance Trails*, National Park Service, Washington, DC, 1998.
Investigates use patterns and economic impacts of long distance trails. Case study of Overmountain Victory National Historical Trail.

PKF Consulting. *Analysis of Economic Impacts of the North Central Rail Trail*. Maryland Greenways Commission, Maryland Department of Natural Resources, Annapolis, MD, 1986.
Investigated seven categories including tourism, property values, local resident expenditures and public sector expenditures to determine an economic value.

Przybylski, M. and G. Lindsey. *Economic Evaluation of Major Urban Greenway Projects*. Report No. 98-C13. Center for Urban Policy and the Environment, Indianapolis, 1998.
Describes procedures used in economic evaluations of two major greenway projects in Indiana. Includes benefit-cost analyses and regional economic impact analyses.

Schutt, A.M. Trails for Economic Development: A Case Study. *Journal of Applied Recreation Research*, Vol. 23, No. 2, 1998, pp. 127-145.
Summarizes a user and economic impact study of the Bruce Trail in Ontario.

Sharples, R. A Framework for the Evaluation of Facilities for Cyclists – Part 1. *Traffic Engineering and Control*, Vol. 36, No. 3, 1995, pp. 142-149.
Suggests framework for how to determine who will be affected by new cycling infrastructure and how.

Sharples, R. A Framework for the Evaluation of Facilities for Cyclists – Part 2. *Traffic Engineering and Control,* Vol. 36, No. 4, 1995, pp. 221-223.
Applies the above framework to Wilmslow Road Corridor in Manchester, England.

Siderlis, C. and R.L. Moore. Outdoor Recreation Net Benefits of Rail-Trails. *Journal of Leisure Research*, Vol. 27, No. 4, 1995, pp. 344-359.
Estimates net economic values with the individual travel cost method for three rail trails in different U.S. regions.

Sumathi, N.R. and D.A. Berard. *Mountain Biking in the Chequamegon Area of Northern Wisconsin and Implications for Regional Development.* University of Wisconsin-Extension. 1997
Profiles mountain biking user characteristics from the Chequamegon Area Mountain Biking Association trail system.

Vogt, C. and C. Nelson. *A Case Study Measuring Economic and Community Benefits of Michigan's Pere Marquette Rail-Trail*, Michigan State University, East Lansing, MI, 2002.
Compiles executive summaries from research reports that have been completed as part of this case study. Includes economic benefit generated by trails used for organized rides, property owners' opinions.

Wang, G.J., C.A. Macera, B. Scudder-Soucie, T. Schmid, M. Pratt and D. Buchner. Cost Effectiveness of a Bicycle/Pedestrian Trail Development in Health Promotion. *Preventive Medicine*, Vol. 38, No. 2, 2004, pp. 237-242.
Derives cost-effectiveness measures of bicycle/pedestrian trails by dividing the costs of trail development and maintenance by selected physical activity-related outcomes of the trails (e.g., number of trail users).

Citation:

Lawrie, J., Guenther, J., T. Cook, M. Meletiou, and Sarah Worth O'Brien. *The Economic Impact of Investments in Bicycle Facilities: A Case Study of the Northern Outer Banks.* Institute for Transportation Research and Education, North Carolina State University, Raleigh, 2004. http://www.ncdot.org/transit/bicycle/safety/Economic_Impact_Study_PDFs/OBX%20EIS%20Tech%20Rprt%20Full.pdf. Accessed on September 27, 2006.

Program Study Track:

✓ Facilities __ Safe Routes to School ✓ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
	Yes	No	Yes	No
Mode shift		✓		
Replaced activity		✓		
Energy conservation/savings		✓		
Recreation/exercise	✓		✓	

Applicability to Florida

List Assignment (highlight one)

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Summary:

This is a technical report from a study commissioned by the North Carolina DOT Division of Bicycle and Pedestrian Transportation that aimed at examining the value of public investment in bicycle facilities and determining the economic benefits accrued in the northern Outer Banks. The study found that the economic impact of bicycling visitors is significant. A conservative estimate of the annual economic impact is $60 million, with 1,400 jobs created/supported per year. This compares favorably to the estimated $6.7 million of federal, state and local funds used to construct the special bicycle facilities in the area. The technical report contains a variety of data collected on bicycle trip length and trip purpose, as well as demographic data on users.

Applicability to Florida

The study results suggest that investments in additional bicycle facilities, both bike lanes, and shared-use paths, focused on tourism and recreation can potentially accrue significant economic benefits while at the same time providing a quality bicycle network for residents for commuting and recreation.

Citation:

Litman, Todd. *Quantifying the Benefits of Non-Motorized Travel for Achieving TDM Goals*. Victoria Transport Policy Institute, Victoria, B.C., 1999.

Program Study Track:

✓ Facilities ✓ Safe Routes to School ✓ Education/marketing ✓ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
	Yes	No	Yes	No
Mode shift	✓		✓	
Replaced activity	✓		✓	
Energy conservation/savings	✓		✓	
Recreation/exercise	✓		✓	

Applicability to Florida

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Summary:

This publication contains the methodology and calculations of the environmental, infrastructure, and health benefits of bicycling and walking compared to driving by mile for urban and rural areas, with the benefits described in dollars per mile. The study estimates the benefits for an urban, peak hour bicycling trip with an average distance of two miles to be $5.60. The estimated benefits are $2.84 for an urban, off-peak bicycling trip, and $1.52 for a rural trip. It then describes how these can be combined and multiplied by the number of trips expected to be diverted over the course of a facility's lifespan in order to estimate the total financial savings created by that project. The paper also suggests that each mile of non-motorized travel replaces not a single mile of motorized travel but seven miles because non-motorized trips tend to be shorter and that the benefits could be multiplied by seven to incorporate that calculation.

Applicability to Florida

The monetary value of the benefits was designed to be applicable throughout the United States and Canada, but Florida could revisit the specific calculations to adjust for changes or regional differences and then incorporate this as part of its own assessment of the benefits of cycling facilities or programs that encourage bicycling. While some may question the dollar value of the benefits, the article makes it clear what assumptions are used so that they can be modified to be more conservative. The article also includes an extensive list of references that may also prove useful.

Citation:

Litman, T. *Quantifying the Benefits of Nonmotorized Transportation for Achieving Mobility Management Objectives.* Victoria Transport Policy Institute, Victoria, BC, November 2004. www.vtpi.org/nmt-tdm.pdf. Accessed on September 27, 2006.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

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Mode shift	✓			✓
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Energy conservation/savings	✓		✓	
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Applicability to Florida

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Summary:

Although this document does not contain measurable data from specific facilities or user surveys, it does provide conversion factors for energy reduced from modal shifts from motorized to non-motorized trips, including bicycling. For example, page 12 of the document states that:

> "Consumption of natural resources, such as petroleum, can impose various external costs, include macroeconomic impacts and national security risks from dependence on imported petroleum, environmental damages, climate change impacts, and the loss of resources available for future generations. Put another way, resource conservation can provide various benefits to society. The external costs of petroleum consumption are estimated to be 1-4¢ per vehicle-mile for an average automobile (NRC, 2001). These impacts tend to be higher for short trips, due to cold starts, and under congested, urban travel conditions.
>
> Estimated Benefits: Energy conservation benefits of a shift from driving to walking or cycling are estimated to average 5¢ per urban peak mile, 4¢ per urban off-peak mile, and 3¢ per rural mile."

Applicability to Florida

This document provides a source for estimating the cost savings of mode shifts from motorized to non-motorized modes.

Citation:

Morris, H. Commute Rates on Urban Trails: Indicators from the 2000 Census. In *Transportation Research Record: Journal of the Transportation Research Board, No. 1878*, TRB, National Research Council, 2004, pp. 116-121.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

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Mode shift	✓		✓	
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Recreation/exercise		✓		

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Summary:

The author explores the extent to which the trail facilities are being used for transportation trips. Bicycle trips on these trails were studied. A GIS-based analysis of 2000 Census journey-to-work data at the block group level was used. The hypothesis that households closer to the trail would present a greater bike-to-work rate is supported by the data for nine of the thirteen trails.

Applicability to Florida

A trail will likely attract more bicycle commuters from residents closer to the trail than from residents farther away.

Citation:

Moudon, Anne Vernez and Chanam Lee. Walking and Bicycling: An Evaluation of Environmental Audit Instruments. *American Journal of Health Promotion,* Vol. 18, No. 1, September/October 2003, pp. 21-37.

Program Study Track:

✓ Facilities ✓ Safe Routes to School ✓ Education/marketing ✓ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
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Mode shift	✓			✓
Replaced activity		✓		
Energy conservation/savings		✓		
Recreation/exercise		✓		

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Summary:

The authors of this article reviewed an extensive number of studies to compare the ways in which they all considered the built environment and policy factors influencing the decision to walk or bicycle. While the article does not contain any measurable results for these factors, it describes the factors that can be considered and has a 70-article reference list that could prove useful for more detailed review, although the list is too extensive to be shown here.

Citation:

National Coalition for Promoting Physical Activity, *Policy Resource Guide*. http://www.ncppa.org/tableofcontents.asp#http://www.ncppa.org/tableofcontents.asp# Accessed on September 27, 2006.

Program Study Track:

✓ Facilities ✓ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

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Summary:

This Policy Resource Guide accompanies the Physical Activity for Youth Initiative led by the National Coalition for Promoting Physical Activity (NCPPA). It contains links to various examples of governmental policy that promotes youth physical activity.

Citation:

Nelson, Arthur C. and David Allen. If You Build Them, Commuters Will Use Them: Association between Bicycle Facilities and Bicycle Commuting. *Transportation Research Record: Journal of the Transportation Research Board, No. 1578.* TRB, National Research Council, Washington, DC, 1997, pp. 79-83.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

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Summary:

The authors use data from eighteen U.S. cities to model the percentage of workers commuting by bicycle as a function of bicycle pathway miles per 100,000 residents, terrain, the number of rainy days per year, the mean high temperature, and the percentage of college students. The final model results indicate that each mile of bicycle pathway per 100,000 residents is associated with a 0.069 percent increase in bicycle commuters. Each rainy day is associated with a 0.008 percent decrease. Each additional percent of college students is associated with a 0.071 percent increase. The other variables were not statistically significant and were dropped from the final model.

Applicability to Florida

The study results suggest that investments in additional bikeways will increase the number of bicycle commuters.

Citation:

Nelson/Nygaard Consulting Associates. *Marin County Safe Routes to Schools Program Evaluation: 2004-2005.* August 2005. http://www.tam.ca.gov/Uploads//pdfs/SR2S_Program%20Evaluation.pdf. Accessed July 21, 2006.

Program Study Track:

__ Facilities ✓ Safe Routes to School __ Education/marketing __ Partnerships

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Summary:

The Marin County, CA Safe Routes to Schools program is one of the oldest and most well-documented programs in the United States. This report highlights the program elements and the specific results achieved during the 2004-2005 school year.

The Marin program's effectiveness is measured based on commute habit changes among students at participating schools. The evaluation report states that a key element of the program is "quantitative measurement of the shift from single student drive alone trips to school…to other modes, including biking and walking, carpooling and transit. To measure the effectiveness of the Safe Routes to Schools program in achieving this goal, a SR2S staff member works with individual classroom teachers to administer 'before' and 'after' surveys at participating schools to determine how students travel to school." During the 2004-2005 school year, 37 schools with a combined enrollment of 16,261 participated in the program. The Marin program concluded that only schools that participate in the program for the whole school year, collect data for both semesters, and achieve at least a 20 percent response rate during both periods are eligible to be used in the mode shift calculations.

Data from twenty-six schools were used to determine mode shift among participating students during the study year. During this time, single student car trips' share of school travel decreased from 55 percent to 42 percent while bicycling and walking increased from 7 percent and 14 percent to 9 percent and 20 percent, respectively. Including shifts to carpooling and transit as well, 4250 one-way automobile trips were estimated to be reduced. Similar shifts, though not outlined in this report, have occurred in other years since the program's inception in 2000.

The Marin program has also taken the step of converting the motor vehicle trips saved into reductions in vehicle miles traveled (VMT) and corresponding reductions in

emissions. For the 2004-2005 school year, these reductions were nearly 2.6 million VMT and over 11.6 tons of emissions related to air pollution, based on a 180-day school year. The report also includes an appendix showing the methods used to translate mode shift data into energy consumption data. It does not appear that data relating to improved health have been collected, though providing health benefits is a stated goal of the program.

Recognizing the uncommon length of the program (five years), a discussion of the relationship between data collection and program duration is provided. Specifically, during the evaluation process, the phenomenon of reduced mode shift as the intended effect becomes the norm must be taken into account. Also, the desire for additional survey data, including demographics and trip lengths, is mentioned as a reason for the potential development of a "long form" survey to be given to a smaller sample of students.

This report is also useful in its detailed description of many of the education, encouragement, and enforcement activities used at a variety of Marin County schools, though no direct link between specific activities and mode shift is provided.

Applicability to Florida

The data collection plan and general activities discussed in this paper provide valuable guidance for similar programs in Florida.

Citation:

Noland, R.B. Relationships between Highway Capacity and Induced Vehicle Travel. *Transportation Research Part A*. Vol. 35, 2001, pp. 47-72.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
	Yes	No	Yes	No
Mode shift		✓		
Replaced activity		✓		
Energy conservation/savings		✓		
Recreation/exercise		✓		

Applicability to Florida

List Assignment (highlight one)

A-List	Contains measurable criteria and conducted in Florida
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Summary:

The author developed various models to estimate the relationship between various socio-economic variables and lane miles (as independent variables) and vehicle miles traveled. He concluded that about one-fourth of the growth in vehicle miles traveled is induced by increased lane miles. The bicycle mode was not modeled in this research.

Citation:

North Carolina Department of Transportation. *The Economic Impact of Investments in Bicycle Facilities.* Division of Bicycle and Pedestrian Transportation, North Carolina Department of Transportation, Raleigh, NC. http://www.ncdot.org/transit/bicycle/safety/Economic_Impact_Study_PDFs/VI_CONCLUSION.PDF. Accessed on August 8, 2006.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
	Yes	No	Yes	No
Mode shift		✓		
Replaced activity		✓		
Energy conservation/savings		✓		
Recreation/exercise		✓		

Applicability to Florida

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Summary:

The recommendations section of this report stated that there is an economic benefit for a city in building bike paths. Many tourists visit well-designed bike facilities and in turn visit the surrounding shops and businesses. The study reported determined that the most desirable attributes in a bicycle facility are the following: more/wider bike paths and shoulders, addition amenities, and route signs/maps.

Citation:

Nozzi, Dom. *MS Excel Template for Individuals to Use to Calculate CO2 and Fuel Savings by Commuting by Bicycle.* City of Gainesville, FL, 2006.

Program Study Track:

__ Facilities __ Safe Routes to School ✓ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
	Yes	No	Yes	No
Mode shift		✓		
Replaced activity		✓		
Energy conservation/savings	✓		✓	
Recreation/exercise		✓		

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Summary:

This tool is a simple to use MS Excel Spreadsheet that allows the user to fill in simple blanks to calculate the fuel saving in terms of gallons as well as calculate the reduction of carbon dioxide (CO_2) gas.

Citation:

Pinellas County Metropolitan Planning Organization. *Pinellas Trail User Survey Report.* Pinellas County, FL, 2000.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
	Yes	No	Yes	No
Mode shift	✓		✓	
Replaced activity	✓		✓	
Energy conservation/savings		✓		
Recreation/exercise	✓		✓	

Applicability to Florida

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Summary:

This user survey of the Pinellas Trail was completed in May 2000 with a total of 1518 responses. Pinellas County used an intercept survey methodology on a Friday and Saturday in November of 1999 at six different locations along the Trail. Some of the data is compromised due to the combining of bicycling with other modes such as walking or skating.

Two different methodologies were used to examine mode shift. One method focused on trips, which numbered more than the actual number of survey respondents, and the other method focused on the user. In terms of trips analyzed by the survey, 55 percent of trips taken on the trail represented a shift from the use of a vehicle, meaning that prior to the Trail, those trips would have been done with an automobile. Approximately 45 percent of users reported using the Trail to complete trips that were done with an automobile in the past. The report also suggested that those using the Trail to replace automobile trips tend to travel longer distances than those that use the Trail for health or recreation purposes, but does not provide the data to support that claim.

Other key findings include that 46 percent bike or skate to the Trail, and 53 percent bicycle on the Trail. Approximately 5 percent use the Trail to commute to work, 4 percent to go to school, 17 percent for shopping, 12 percent to a park or the beach, 30 percent for socializing or recreation, and 25 percent for exercise. Approximately 29 percent use the Trail five to seven days per week and 46 percent live less than a mile from the Trail. Once on the Trail, 22 percent usually travel 10 miles or more.

The survey also asked users what they did before the Trail was built, but the answers were not connected to mode. Approximately 42 percent answered that they previously used roads or streets, but the survey did not specify whether this was in an automobile or not. Only four percent of respondents specified that they did use an automobile or a bus to make their trips. What may be more interesting is that 22 percent

stated that before the Trail they did "nothing" which may suggest that the Trail has prompted people to get out and be more active.

In all, while this survey does contain measurable data, additional contact with Pinellas MPO may be necessary to make the data more useful to the project.

Citation:

Polydoropoulou, Amalia and Moshe Ben-Akiva. Combined Revealed and Stated Preference Nested Logit Access and Mode Choice Model for Multiple Mass Transit Technologies. *Transportation Research Record 1771*, 2001, pp. 38-45.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
	Yes	No	Yes	No
Mode shift		✓		
Replaced activity		✓		
Energy conservation/savings		✓		
Recreation/exercise		✓		

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Summary:

The authors used stated preferences and revealed preferences to develop a nested logit model of main mode choice (bus, mass transit, car driver, and car passenger) and access mode choice (walk, park and ride, kiss and ride, and bus) in Tel Aviv, Israel. The models are being used in feasibility and planning studies for a new mass transit system. The bicycle mode was not modeled in this research.

Citation:

Pucher, John and Ralph Buehler. Why Canadians Cycle More Than Americans: A Comparative Analysis of Bicycling Trends and Policies. *Transport Policy*, Vol. 13, May 2006.

Program Study Track:

✓ Facilities __ Safe Routes to School ✓ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
	Yes	No	Yes	No
Mode shift	✓			✓
Replaced activity		✓		
Energy conservation/savings		✓		
Recreation/exercise		✓		

Applicability to Florida

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Summary:

This article indicates that, despite a colder climate, Canadians cycle about three times more than Americans. Reasons for this difference include Canada's higher urban densities and mixed-use development, shorter trip distances, lower incomes, higher costs of owning, driving and parking a car, safer cycling conditions, and more extensive cycling infrastructure and training programs. Most of these factors result from differences between Canada and the United States in their transport and land-use policies, and not from intrinsic differences in history, culture or resource availability. That suggests that it is possible to significantly increase cycling levels in the United States by adopting Canadian policies that have promoted cycling and enhanced its safety.

References, Citations, and Case Studies:

Dill, Jennifer and Theresa Carr. Bicycle Commuting and Facilities in Major U.S. Cities. In *Transportation Research Record: Journal of the Transportation Research Board, No. 1828*, TRB, National Research Council, 2003, pp. 116-123.

Thunderhead Alliance and Chicagoland Bicycle Federation. *Bicycle Benchmarking Project*. Thunderhead Alliance and Chicagoland Bicycle Federation, Chicago, 2004.

Citation:

Pucher, John and Lewis Dijkstra. Promoting Safe Walking and Cycling to Improve Public Health: Lessons from the Netherlands and Germany. *Ameican Journal of Public Health*, Vol. 93, No. 9, September 2003. http://www.policy.rutgers.edu/papers/15.pdf. Accessed on August 3, 2006.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
	Yes	No	Yes	No
Mode shift	✓			✓
Replaced activity		✓		
Energy conservation/savings		✓		
Recreation/exercise	✓			✓

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Summary:

In Germany and the Netherlands, a higher percentage of people walk or bike to their destinations, compared to the U.S. The authors give examples that are used in Germany and the Netherlands to make roadways safer, asserting that "Improved safety would also encourage more people to walk and cycle on a regular basis, providing them with valuable exercise, mobility options, independence, and even fun." (p. 19)

Citation:

Rose, Geoff, Heidi Marfurt, and Phil Harbutt. Using a "Ride to Work" Day Event as a Travel Behaviour Change Initiative. Presented at 83rd Annual Meeting of the Transportation Research Board, Washington, DC, 2004.

Program Study Track:

__ Facilities __ Safe Routes to School ✓ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
	Yes	No	Yes	No
Mode shift	✓		✓	
Replaced activity		✓		
Energy conservation/savings		✓		
Recreation/exercise		✓		

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Summary:

A Ride to Work Day event was held in October 2002 in Melbourne, Victoria, Australia. There were 1,409 registered participants. The authors conducted one-day follow up surveys in December, February, March, and April. About 51 percent of the participants responded to at least one survey. To minimize the possibility that receiving a survey would influence participants' travel behavior, surveys were sent on the day of the survey, without advance notice.

About 12 percent of the survey respondents had never ridden to work prior to the event, that is, they were first-timers on Ride to Work Day. The follow-up surveys found that about 10 percent of the first-timers were still riding to work, at least on the survey day.

Applicability to Florida

The results of this study suggest that Ride to Work Day is a stimulus for some commuters to discover bicycling to work for the first time, and once they have tried it, some continue to bicycle to work.

Citation:

Sallis, James F., Lawrence D. Frank, Brian E. Saelens, and M. Katherine Kraft. Active Transportation and Physical Activity: Opportunities for Collaboration on Transportation and Public Health Research. *Transportation Research, Part A: Policy and Practice*, Vol. 38, No. 4, 2004, pp. 249-268.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
	Yes	No	Yes	No
Mode shift	✓			✓
Replaced activity		✓		
Energy conservation/savings		✓		
Recreation/exercise	✓			✓

Applicability to Florida

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Summary:

This publication summarizes studies within the planning and public health field that evaluate the links between the physical environment and the likelihood to participate in cycling or other physical activity. While the article does not contain any measurable results for these factors, it describes the factors that can be considered and has a 82 article reference list that could prove useful for more detailed review, although the list is too extensive to be shown here. It did mention that "(l)imited evidence suggested that better walking and cycling infrastructure (e.g., sidewalks and bicycle paths) was related to more walking/cycling trips (McNally and Kulkarni, 1997; Anon, 1993; Hess et al., 1999)." The study also suggests that additional research would be valuable and is being funded by several sources.

Citation:

Sallis, James F. and Karen Glanz. The Role of Built Environments in Physical Activity, Eating, and Obesity in Childhood. *The Future of Children*, Vol. 16, No. 1, Spring 2006, pp. 89-108.

Program Study Track:

✓ Facilities ✓ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
	Yes	No	Yes	No
Mode shift		✓		
Replaced activity		✓		
Energy conservation/savings		✓		
Recreation/exercise	✓			✓

Applicability to Florida

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Summary: (from report)

"Research into the link between the built environment and childhood obesity is still in its infancy. Analysts do not know whether changes in the built environment have increased rates of obesity or whether improvements to the built environment will decrease them. Nevertheless...the policy implications are clear. People who have access to safe places to be active, neighborhoods that are walkable, and local markets that offer healthful food are likely to be more active and to eat more healthful food—two types of behavior that can lead to good health and may help avoid obesity."

References, Citations, and Case Studies:

Boarnet, Marlon G. et al. Evaluation of the California Safe Routes to School Legislation: Urban Form Changes and Children's Active Transportation to School. *American Journal of Preventive Medicine*, Vol. 28, 2005, pp. 134-40.

Pucher, John and Lewis Dijkstra. Promoting Safe Walking and Cycling to Improve Public Health: Lessons from the Netherlands and Germany. *Ameican Journal of Public Health*, Vol. 93, No. 9, September 2003. http://www.policy.rutgers.edu/papers/15.pdf.

Staunton, Catherine E. et al. Promoting Safe Walking and Biking to School: The Marin County Success Story. *American Journal of Public Health,* Vol. 93, No. 9, September 2003, pp. 1431-1434.

Timperio, Anna et al. Perceptions about the Local Neighborhood and Walking and Cycling among Children. *Preventive Medicine*, Vol. 38, 2004, pp. 39-47.

Tudor-Locke, Catrine, Barbara E. Ainsworth, and Barry M. Popkin. Active Commuting to School: An Overlooked Source of Children's Physical Activity? *Sports Medicine*, Vol. 31, 2001, pp. 309-13.

Citation:

Schneider, Robert, Robert Patton, Jennifer Toole, and Craig Raborn. *Pedestrian and Bicycle Data Collection in United States Communities: Quantifying Use, Surveying Users, and Documenting Facility Extent.* Pedestrian and Bicycle Information Center, Chapel Hill, 2005. http://www.pedbikeinfo.org/pdf/casestudies/PBIC_Data_Collection_Case_Studies.pdf Accessed on September 27, 2006.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
	Yes	No	Yes	No
Mode shift	✓			✓*
Replaced activity	✓			✓*
Energy conservation/savings		✓		
Recreation/exercise	✓			✓*

*Addressed in various case studies discussed in document, but case studies do not provide sufficient data for analysis, and when possible the original reports on which the case studies were based were reviewed.

Applicability to Florida

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Summary:

This document is a valuable resource as it provides an analysis of different methods used to collect bicycle (and pedestrian) data, through counts, user surveys, and facility inventories. The document discusses various technologies that are used to count bicycle (and pedestrian) trips, including time-lapse video, passive infrared sensors, in-pavement loop detectors, pneumatic tube bicycle counts, and plezo film. The document also analyzes a variety of manual count methods. Another section of the document contains four different case studies of user surveys conducted in Pinellas County, Florida, Rhode Island, Boulder, CO, and California. The Florida, Rhode Island, and Colorado studies are the most pertinent. The reports used to develop these case studies are discussed individually in this Technical Memorandum.

Citation:

Shafer, C.S., B. Lee, S. Turner, and M. Hughart. *Evaluation of Bicycle and Pedestrian Facilities: User Satisfaction and Perceptions on Three Shared Use Trails in Texas.* SWUTC/99/472840-00021-1. Texas Transportation Institute, US Department of Transporation, 1999. http://ntl.bts.gov/lib/11000/11700/11730/472840-00021-1.pdf Accessed on September 27, 2006.

Program Study Track:

✓ Facilities __ Safe Routes to School ✓ Education/marketing __ Partnerships

Criteria Addressed and Measured

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	Yes	No	Yes	No
Mode shift	✓		✓	
Replaced activity		✓		
Energy conservation/savings	✓			✓
Recreation/exercise	✓		✓	

Applicability to Florida

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Summary:

This user and customer satisfaction survey of three shared-use trails in Texas provides a variety of data on trip purpose, specifically on commuting, and recreational use of trail, demographics, trip distances, frequency of use, and satisfaction with trail attributes.

Applicability to Florida

The report provides examples of survey instruments used to collect data and provides an analysis related to improvements to quality of life as an impact of the trails. The survey instrument was also designed to determine trail attributes that encourage and discourage trail use which may be important to consider when estimating demand on future trails.

Citation:

Siderelis, Christos and Moore, Roger. Outdoor Recreation Net Benefits of Rail-Trails. *Journal of Leisure Research,* Vol. 27, No. 4, 1995, pp. 344-59. http://vnweb.hwwilsonweb.com.ezproxy.lib.usf.edu/hww/results/results_single_ftPES.jhtml. Accessed on July 21, 2006.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
	Yes	No	Yes	No
Mode shift		✓		
Replaced activity		✓		
Energy conservation/savings		✓		
Recreation/exercise	✓		✓	

Applicability to Florida

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Summary:

The purpose of this research is to estimate rail-trail recreation demand equations. Survey results from three such trails, including the Tallahassee-St. Marks Trail in Florida, were used as the basis of the modeling effort. Model types include ordinary least squares models, Tobit models, and negative binomial models.

The focus of the research is largely on the economic aspects/benefits of rail trails; as the authors put it, "The term net benefit in recreation economics expresses a gain (consumer surplus) in annual income or well being and is interpreted as user willingness-to-pay, over and above the actual travel expenditures, for access to a particular site." In this process, certain preferences of recreational trail users were uncovered. Among these is the general valuing of rail-trails in rural areas over suburban areas.

Citation:

Staunton, Catherine E. et al. Promoting Safe Walking and Biking to School: The Marin County Success Story. *American Journal of Public Health,* Vol. 93, No. 9, September 2003, pp. 1431-1434.

Program Study Track:

__ Facilities ✓ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
	Yes	No	Yes	No
Mode shift	✓		✓	
Replaced activity		✓		
Energy conservation/savings		✓		
Recreation/exercise	✓			✓

Applicability to Florida

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Summary:

This journal article describes the Marin County Safe Routes to Schools program, but it was written when the program was only two years old. At that time, the mode shift achieved had included a 64% increase in walking, a 114% increase in bicycling, a 91% increase in the number of students carpooling, and a 39% decrease in arriving by private car carrying only one student among children at participating schools. The paper also describes the survey method used at that time, which involved volunteers asking for a show of hands for each mode, with the results from three days of surveys averaged.

Applicability to Florida

This survey method can be combined with Florida's Safe Ways to School Tool Kit, which has sample surveys, to formulate an appropriate mode shift data collection technique.

Citation:

Steiner, Ruth L., Linda B. Crider, and Matthew Betancourt. *Safe Ways to School – The Role in Multimodal Planning*. Prepared for the Florida Department of Transportation Systems Planning Office (Project Work Order #32), May 2006.

Program Study Track:

__ Facilities ✓ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
	Yes	No	Yes	No
Mode shift		✓		
Replaced activity		✓		
Energy conservation/savings		✓		
Recreation/exercise		✓		

Applicability to Florida

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Summary:

This report is valuable because of its unique focus on the State of Florida, including local trends, agency involvement, and funding. Florida's Safe Ways to School pilot program, which began in 1997, is discussed, though the authors concede that the relative youth of these programs makes measuring their effectiveness difficult. A reference to The Florida Traffic and Bicycle Safety Education Program's Safe Ways to School Tool Kit, which contains sample student and parent surveys that include mode choice questions, is provided.

References, Citations, and Case Studies:

Florida Traffic and Bicycle Safety Education Program. *Safe Ways to School Tool Kit*. http://www.dcp.ufl.edu/centers/trafficsafetyed/documents/Safe%20Ways%20to%20School%20toolkit.pdf

Citation:

Stinson, Monique. *An Evaluation of the CATS CMAQ Division's Method for Analyzing Bicycle, Pedestrian and HOV Project Proposals*. Working Paper 05-03. Chicago Area Transportation Study, Chicago, April 2005.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
	Yes	No	Yes	No
Mode shift	✓		✓	
Replaced activity		✓		
Energy conservation/savings		✓		
Recreation/exercise		✓		

Applicability to Florida

List Assignment (highlight one)

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D-List	No measurable criteria

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Summary:

This report describes the method used by the Chicago Area Transportation Study (CATS) to estimate non-motorized trips that may result from non-motorized project investments (pages 6-12). First, GIS software is used to create a one-mile buffer area around each project. Second, the population, working population, number of university workers, and population density for each area are obtained from Census data. Third, diversion rates, trip lengths, and other factors are assumed using data from the 1995 CATS Trail Survey and the 1990 CATS Home Interview. Finally, the reduction in motor vehicle trips is estimated.

The report does not mention whether this method has been validated using before-and-after data.

Applicability to Florida

A similar method can be used to estimate non-motorized trips in Florida.

Citation:

Stinson, M. A., and C. R. Bhat. An Analysis of the Frequency of Bicycle Commuting Using an Internet-Based Survey. In *Transportation Research Record No. 1878, Pedestrians and Bicycles; Developing Countries,* TRB, National Research Council, Washington, D.C., 2004 pp. 122-130. http://www.enhancements.org/download/trb/trb2004/TRB2004-001493.pdf. Accessed on September 27, 2006.

Program Study Track:

✓ Facilities __ Safe Routes to School ✓ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
	Yes	No	Yes	No
Mode shift	✓			✓
Replaced activity	✓			✓
Energy conservation/savings		✓		
Recreation/exercise	✓			✓

Applicability to Florida

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Summary:

This paper provides several important insights. According to the authors, the dominant deterrents to bicycle commuting are unpleasant weather and inadequate daylight. Other barriers include the need to run errands during work. The paper also suggests that it appears that there are some misconceptions on the part of non-bicyclist commuters about the dangers of bicycling. This demonstrates the need for bicycling safety classes, increased enforcement of traffic laws, or more lighting in dark areas. The authors state that the primary reasons for commuting by bicycle among bicycle commuters are the health/fitness benefits, the pleasure/enjoyment accruing from bicycle use, and the perceived contribution toward alleviating environmental problems. Their analysis also finds that individuals residing and working in more dense areas (urban areas) have a higher likelihood of commuting to work by bicycle, presumably due to better bicycle-related infrastructure. Also, distance to work has a very strong influence on the propensity to commute by bicycle.

References, Citations, and Case Studies:

Forbes, G. The Hamilton-Wentworth Community Cycling Survey. *ITE Journal*, Vol. 68, No. 6, 1998, p. 16.

Niemeier, D., Rutherford, G., and J. Ishimaru. *An Analysis of Bicyclist Survey Responses from the Puget Sound Area and Spokane.* Report 95.4, Washington State Transportation Commission, Olympia, WA, 1995.

Ottawa-Carleton Cycling Advisory Group. *Commuter Cycling in Ottawa-Carleton: A Survey*. Department of Engineering and Works, City of Ottawa, Ontario, Canada, 1992.

Stinson, M.A., and C.R. Bhat. An Analysis of Commuter Bicyclist Route Choice Using a Stated Preference Survey In *Transportation Research Record 1828*, TRB, National Research Council, Washington, D.C., 2003, pp 107-115.

Citation:

Taylor, Dean and Hani Mahmassani. Analysis of Stated Preferences for Intermodal Bicycle-Transit Interfaces. *Transportation Research Record 1556*, 1996, pp. 86-95.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

Criterion	Addressed?		If addressed, measurable?	
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Mode shift		✓		
Replaced activity		✓		
Energy conservation/savings		✓		
Recreation/exercise		✓		

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Summary:

The authors conducted a stated-preference survey in which respondents ranked their preferences for making a work trip by automobile only, auto and transit, or bicycle and transit.

Citation:

Turner, Shawn, Gordon Shunk and Aaron Hottenstein. *Development of a Methodology to Estimate Bicycle and Pedestrian Travel Demand.* Report No. 1723-S. Texas Transportation Institute, College Station, 1998.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

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Summary:

This study set out to determine a method to estimate travel demand for bicycle and pedestrian facilities, in order to plan for and prioritize facility improvements and evaluate mode shift. The study's authors selected two sites each in four Texas cities (College Park, Austin, Dallas, and Houston) with high levels of bicycle and pedestrian usage. At these locations pedestrians and cyclists were given mail-in surveys asking questions about the trip purpose, frequency, destination, origin, and travel time. Pedestrian and bicycle volumes were also collected at these locations. Using this data and information about the surrounding land use the researchers evaluated trip length and trip generation by land use and density. The paper specifically avoided suggesting "warrants" for bicycle or pedestrian facilities. Instead it provided information that could be used to determine potential demand.

Applicability to Florida

While this report does not quantify the benefit from a specific single improvement, it may be useful to compare the trip generation rates from this study to similar work within Florida. The authors also conducted an extensive literature review which is documented in a separate paper.

Citation:

Ulrich, Karl T. *The Environmental Paradox of Bicycling.* The Wharton School, University of Pennsylvania, July 2006

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

Criteria Addressed and Measured

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Summary: (copied from abstract)

"Substituting bicycling for driving is frequently promoted as a means of reducing energy consumption and the associated degradation of the environment. This paper estimates the magnitude of this effect. The analysis takes account of the first-order effects due to the dramatically lower energy requirements of transportation by bicycle relative to automobiles. The environmental benefits of human power are, however, strongly coupled to the environmental costs of increased population, due to increased longevity of those who engage in physical activity. Paradoxically, increased use of human power for transportation is unlikely to reduce substantially the use of energy because of this second-order effect. Human-powered transportation is therefore less an environmental issue and more an issue of public health. The interplay between longevity and environmental impact is a central feature of the conflicting societal objectives of improving human health and increasing environmental sustainability."

According to the author, the average automobile in the U.S. consumes 3.8 MJ of energy for each kilometer traveled. This represents the fossil fuel energy savings for each kilometer that is traveled by bicycle instead of by automobile. The paper does not translate the energy savings into gallons of gasoline.

The author cites studies showing that an increase in calorie expenditure of 1,000 calories per week (which could be achieved by bicycling 50 km per week) is associated with a 20 to 35 percent reduction in the risk of mortality.

<u>Applicability to Florida</u>

This paper provides estimates of energy savings and health benefits that could be achieved for each kilometer of automobile travel that is replaced by bicycle travel.

Citation:

University of North Carolina Highway Safety Research Center. *A Compendium of Available Bicycle and Pedestrian Trip Generation Data in the United States.* Federal Highway Administration, Washington, DC, October 1994.

Program Study Track:

✓ Facilities __ Safe Routes to School ✓ Education/marketing __ Partnerships

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Summary:

Chapters 4 and 8 present bicycle trip counts for numerous bicycle facilities in cities throughout the U.S. These include Gainesville, Fort Myers/Lee County, Fort Lauderdale, Tallahassee, and Monroe County. For a designated Bike-to-Work Day in 1990 in Phoenix, a temporary bike lane was created; about 200 more bicycle trips were counted than on an average week day.

References, Citations, and Case Studies:

Cynecki, Michael J., Grace Perry, and George Frangos. A Study of Bicyclist Characteristics in Phoenix, Arizona. In *Transportation Research Record: Journal of the Transportation Research Board, No. 1405*, TRB, National Research Council, 1993, pp. 28-34.

Heffernan and Associates. *Evaluation Study: Bike-to-Work Day, February 28, 1990.* Prepared for the City of Phoenix, April 1990.

North Central Florida Regional Planning Council. *Bicycle Usage Trends Program.* Gainesville, FL, 1994.

Citation:

University of South Florida. *Florida Prevention Research Center.* http://hsc.usf.edu/nocms/publichealth/prc/. Accessed September 5, 2006

(E-mail from Audrey Warren (Regional Planning Commission, New Orleans) to Theo Petritsch, September 1, 2006)

Program Study Track:

__ Facilities __ Safe Routes to School ✓ Education/marketing __ Partnerships

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Summary:

The mission of the Florida Prevention Research Center is "to develop, implement and evaluate evidence-based approaches to strengthen community capacity for sustained disease prevention and health promotion."

Citation:

Vogt, Christine, Afke Van der Woud, Joel Lynch, and Charles Nelson. *Midland County Nearby Businesses and Adjacent Residential Landowners' Attitudes Towards and Use of the Marquette Rail-Trail in Michigan.* Department of Park, Recreation and Tourism Resources, Michigan State University, East Lansing, MI. http://www.prr.msu.edu/trails/Reports/MIDLANDCOREPORT2.pdf . Accessed on July 21, 2006.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

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Summary:

The researchers performed a survey of business owners and residents located adjacent to the Pere Marquette Rail-Trail in Michigan. As part of this survey, residents were asked to identify which positive and negative effects they believe the trail causes. Among the positive effects, 73.2% of the 157 residential respondents indicated an increase in recreational opportunities and 58.3% cited improved health and fitness.

Applicability to Florida

While there is no indication of how many of these respondents actually take advantage of the recreational opportunities, the results do provide an idea of how many people are likely to view a trail facility in that light, which is likely transferable to Florida.

Citation:

Welzenbach, Karl D. Analysis *of the 1995 Bicycle Survey of Suburban Bike Trails.* Working Paper #96-08. Chicago Area Transportation Study, Chicago, June 1996.

Program Study Track:

✓ Facilities __ Safe Routes to School __ Education/marketing __ Partnerships

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Summary:

This report presents the findings from a bicycle and pedestrian survey conducted by the Chicago Area Transportation Study in 1995. The bicycle survey was conducted on 54 segments of 18 suburban trails (totaling 196 miles). 3,230 bicyclists completed the survey. Overall, 25% of bicycle trips were diverted from automobiles. By trip purpose, 43% of work trips and 37% of non-work utilitarian trips were diverted.

Applicability to Florida

If 25% of bicycle trips on suburban trails in Florida are also diverted, then estimates of reductions in automobile trips can be made with bicycle count data, which are cheaper to obtain than survey data.