I N D I A N A

IDENTIFYING CHOICES AND SUPPORTING ACTION TO IMPROVE COMMUNITIES

CENTER FOR URBAN POLICY AND THE ENVIRONMENT

MAY 2008

Many Marion County Residents Use Indianapolis Greenways

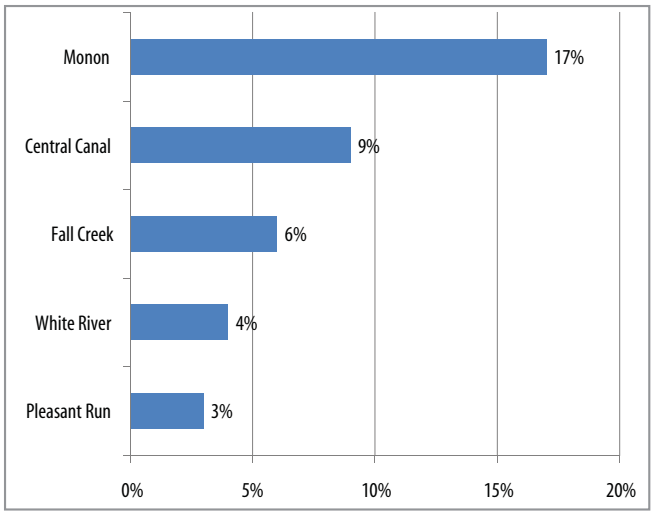
During the last decade, policymakers have focused increasing attention on the creation of healthy, clean, and ecologically safe living environments for citizens. This focus has included innovative approaches to the design of urban spaces, such as building easy to use, yet economical, recreation areas and commuting corridors. Urban trails and greenways are linear open spaces along natural or infrastructure corridors such as rivers, ridgelines, historic railroads, or canals. Multiuse urban trails and greenways provide excellent opportunities for physical recreation and (to a lesser degree) commuting. Trails are open to everyone, and provide attractive green space for nearby property owners.

Indianapolis has a fairly well developed network of trails that offer opportunities for recreational activities, such as walking, running, biking, or skating, and connect various areas and land uses to one another. The types of trails are varied. Some pass by rivers, creeks, and canals; some are paved (good for bikers and skaters); and some are not. Some trails pass by other community amenities, such as the Indianapolis Art Center, Broad Ripple retail area, and downtown Indianapolis. The Monon Trail connects Indianapolis and Carmel. A trail network can be a significant alternative for a safe and healthy commute to work, school, or other everyday activities.

In this report, we analyze the use of urban greenways in Indianapolis to inform questions about management and investment in trails. Trail usage is an important factor to consider. There is broad agreement among experts that the use of trails (by walkers, runners, cyclists, skaters, etc.) contributes to the well-being of individuals and communities. But questions about where to build new trails and how to develop them to maximize usage must be answered. In addition to using taxpayer money effectively in light of limited resources, decision-makers must prioritize items such as trail maintenance and development (crosswalks, pedestrian bridges, underpasses), safe pedestrian connections between trail segments and streets (traffic lights, stop signs), and trail cleaning and winter snow removal.

In this report, we extend the work in a previous report from the Center for Urban Policy and Environment (Lindsey and Nguyen, 2002) by providing more evidence of the heavy usage of urban trails in Indianapolis and by explaining how trail use varies by time (daily, weekly, and seasonal variations) and by trail location. The data were gathered from two primary sources: automated monitoring of trail network usage in Indianapolis and the Adult Obesity Needs Assessment Telephone Survey.

Figure 1. Percentage of respondents who used major Indianapolis trails during the month preceding the 2005 survey



Note: Some respondents reported using more than one trail in the past year

Marion County Survey indicates many residents use Indianapolis greenways and trails

The Adult Obesity Needs Assessment Telephone Survey (Gibson et al., 2006) was conducted by the Marion County Health Department between February and June 2005. During the survey, 4,784 residents were interviewed. The survey was conducted to establish information about body mass index (BMI), physical activity behaviors, food intake, eating patterns, and other related factors. The result is a very rich data set, sufficient to assess for many population subgroups, as well as for the county as a whole: physical activity, nutritional status, and obesity (Gibson et al., 2006).[1]

Over one-quarter of survey respondents used a trail in the last year

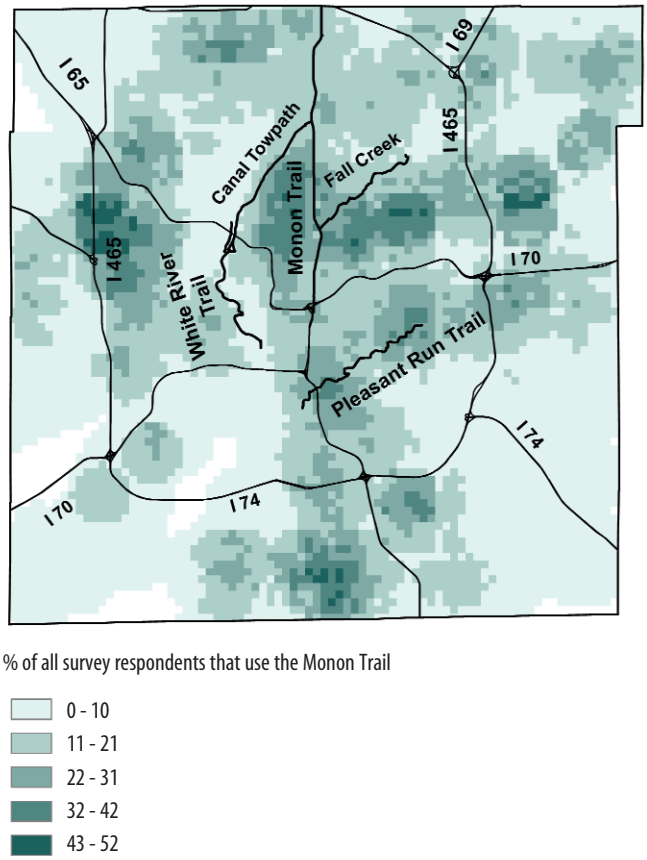
The Obesity Needs Survey also included questions on the use of trails and greenways. Over one-quarter of respondents (26 percent) stated that they used an Indianapolis trail in the past year. The detailed breakout of the usage data by trails is shown in Figure 1.

The trail used most heavily by survey respondents is the Monon Trail (17 percent of respondents), which is the longest trail in Indianapolis, spanning more than ten miles from downtown Indianapolis to the northern Marion County boundary, and extending another five miles into Hamilton County. Nearly half of all respondents who reported trail use visited the Monon Trail (49 percent); the Central Canal Towpath was used second most often (by over 25 percent of the reported trail users). These two most popular trails among Marion County residents are well developed trails surrounded by both residential and retail land uses, and also green areas.

Not all trail users reside in the immediate area of a trail

The survey also provides important data on where the trail users live, and confirm hypotheses that proximity to trails is correlated with likelihood of use. We define proximity as living within walking distance or a short (less than 5 minute) drive, which would be roughly equivalent to a radius of a couple of miles.

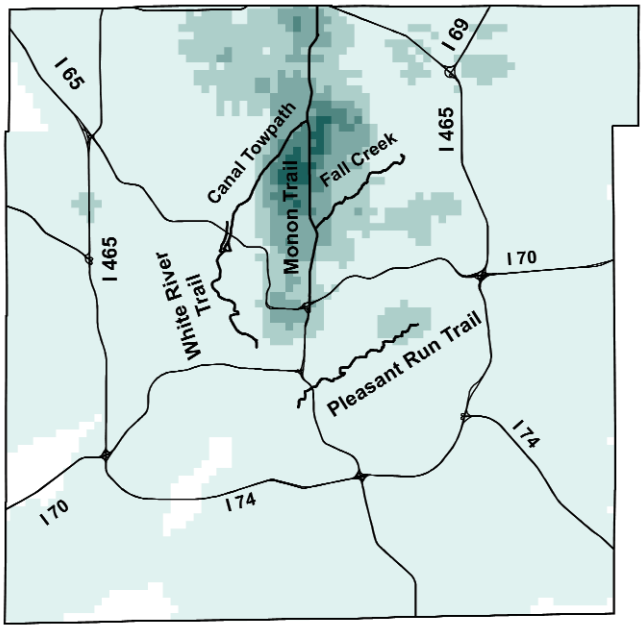
Figure 2. Density map of all survey respondents by neighborhood, Marion County



[1]For more information about the survey's methods and results see www.mchd.com/obesitysurvey.htm

Figure 2 is a map that shows the percentage of survey respondents who report using trails by neighborhood. The information in this map helps provide better understanding about where trail users live. For example, if there are 100 survey respondents in a neighborhood (within a one-mile radius around a respondent) and 60 of these respondents say they use the trail, then this *neighborhood* is shown in darker shading.

Figure 3. Density map, by neighborhood of survey respondents who use the Monon Trail



% of neighborhood respondents that use the Monon Trail

- 0 - 10
- 11 - 21
- 22 - 31
- 32 - 42
- 43 - 52

Note: Though four other trails are shown on the map, the data illustrated by the shading represent only reported Monon Trail users.

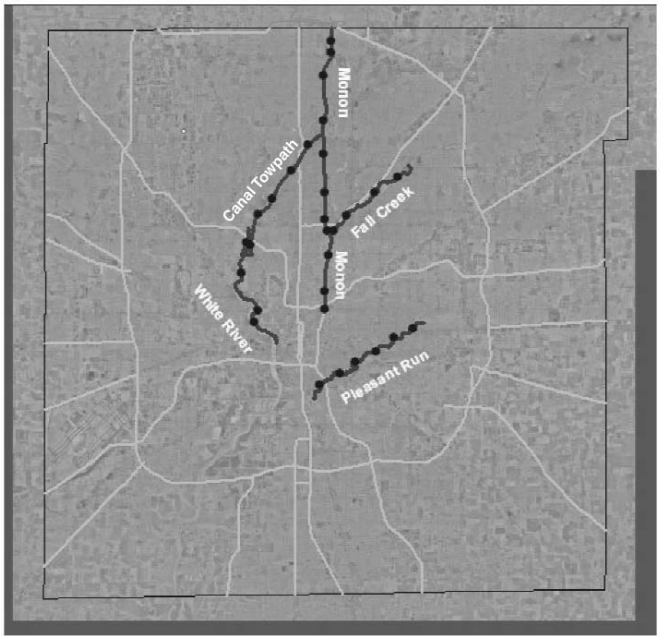
Figure 3 is similar to Figure 2 but illustrates only the location of the households of the respondents who reported using the Monon Trail (i.e., the percentages in this map represent the proportion of the respondents within a neighborhood who use the Monon Trail).

One can see that the proportion of residents in the neighborhoods within a couple of miles of Monon Trail who use the trail is generally higher than the proportion in outlying areas. In the section of Monon Trail between the Fall Creek and Central Canal trails, the percentage of neighborhood residents who use the trails varies between 22 and 52 percent. Moreover, the trail users are not confined to this fairly wide vicinity of the trail. Up to 20 percent of residents in some neighborhoods that are farther away report using the Monon Trail. Some residents come to the well-developed and very popular Monon Trail even though other trails may be closer to their home.

Data on trail traffic are gathered at several locations in Indianapolis

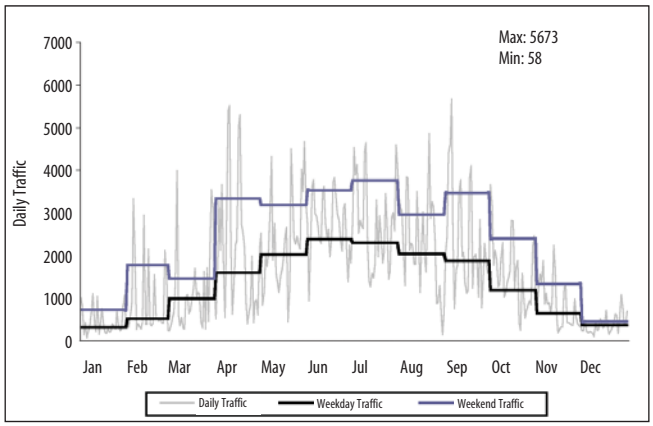
Over the past several years our researchers have maintained the most comprehensive, continuous trail traffic monitoring system in the United States. We collect data from five multi-use trails (Monon Trail, 11 monitors; Fall Creek Trail, 4 monitors; Central Canal Towpath, 5 monitors; White River Wapahani Trail, 4 monitors; Pleasant Run, 6 monitors) using a total of 30 infrared monitors, representing 33 miles of trail network in Indianapolis (see Figure 4). Traffic is monitored 24 hours per day, 7 day per week. Counts from the monitors reflect total traffic or users past

Figure 4. Map of Indianapolis trails covered by traffic monitors



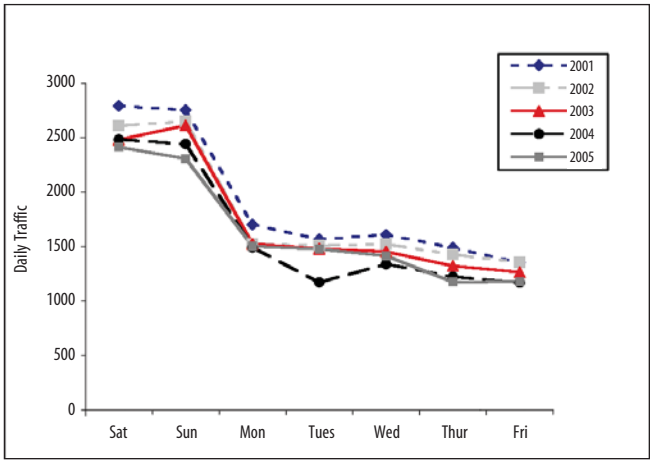
- counters
- segments

Figure 5. 2005 daily traffic, mean weekday traffic and mean weekend traffic, on Monon Trail at 67th Street



Note: Mean weekday and mean weekend traffic volumes are averages for each month.

Figure 6. Average daily traffic for different days of the week, Monon Trail at 67th Street



a point on a trail. The actual number of separate users on a trail segment, as opposed to the counts of traffic at a certain point, may be estimated as approximately one-half the traffic count.

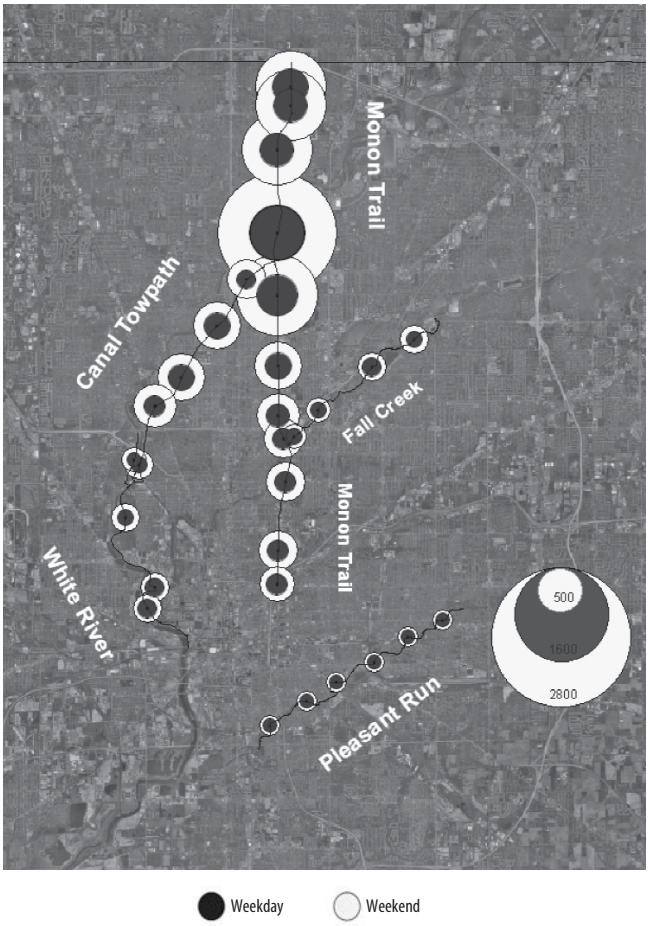
Seasonal, weekly, and daily use varies substantially, but predictably

Our observations of trail traffic show that traffic varies in complex, albeit systematic, ways. Trail use varies seasonally; it is highest in summer, then spring and fall, and lowest in winter. The variation of daily trail traffic for one year (2005, other years present a similar picture) for the most heavily visited segment in the Indianapolis trail network (Monon Trail at 67th Street, very close to the popular Broad Ripple area) is shown in Figure 5.

The daily traffic counts exhibit strong fluctuations. Each sharp peak corresponds to weekends, when trail usage is heaviest, and in some cases also is influenced by daily weather conditions. However, the peaks are less extreme and the "baseline" is lower in winter. To illustrate this point, we averaged the traffic throughout a month on weekdays and weekends (shown in Figure 5). This provides clear evidence that the mean weekend traffic exceeds the mean weekday traffic every month of the year. The averaging also readily illustrates seasonal variations in trail traffic.

Because the trails are used primarily for recreational activities, the observed variation for traffic throughout a typical week is not surprising. Figure 6 presents an example of an

Figure 7. Average weekend and weekday traffic for 30 locations on Indianapolis urban trails network



average week for the Monon Trail at the 67th Street location over five years. One can see that this pattern of weekend versus weekday traffic does not change from year to year. Figure 6 also shows that there has been no significant change—increase or decrease—in trail traffic over the past five years.

In Figure 7, each circle represents a monitoring location. The radii of circles are proportional to the level of traffic (number of users who pass the monitors). Light circles represent average weekend traffic and dark circles represent average weekday traffic during a one-year period. The dark circles (weekday locations) are smaller than the light circles (weekend traffic) for all locations monitored. Across all locations, weekend traffic is about 1.6 times higher than weekday traffic. Saturday and Sunday traffic account for about 40 percent of the total traffic for a week, with Saturday typically the highest.

On average, weekday traffic declines slightly from Monday through Friday. This weekend/weekday pattern is common for most of the trails. An analysis of the traffic across 30 locations, however, shows that there is less variation in weekday versus weekend traffic for Pleasant Run Trail and some other locations along the southern trails.

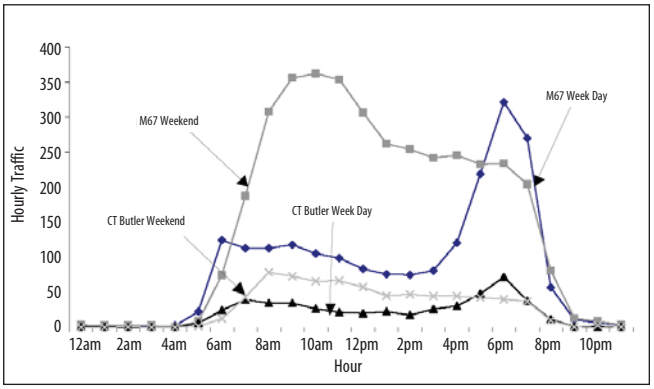
Hourly trail use follows distinct patterns on weekdays and weekends

Traffic is not equal at different parts of the day. As was noted in the earlier trail report (Lindsey & Nguyen, 2002), there are very few nighttime visits to trails, if any. Less trivial are the differences in variations of hourly traffic during weekdays and weekends. Figure 8 presents examples of these variations at two locations: Monon Trail at 67th Street (M67) and Canal Towpath near Butler University (CT Butler).

The peak hour traffic on weekdays typically occurs between 5:00 p.m. and 7:00 p.m. (this depends on the month of the year, and is associated with longer and later hours of daylight). This late time of peak traffic probably corresponds to the recreational activities that people are engaged in after work hours. The weekend traffic presents a very different pattern of traffic variation. Peak hour traffic on weekends occurs in mid to late morning and may extend to early afternoon.

Even though the patterns of hourly traffic throughout a day may be quantitatively different for different locations (see Figure 8), the important qualitative features are universal. The timing of the peak hour is more or less the same for most locations in

Figure 8. Variation of traffic throughout a day at two different locations, July 2005

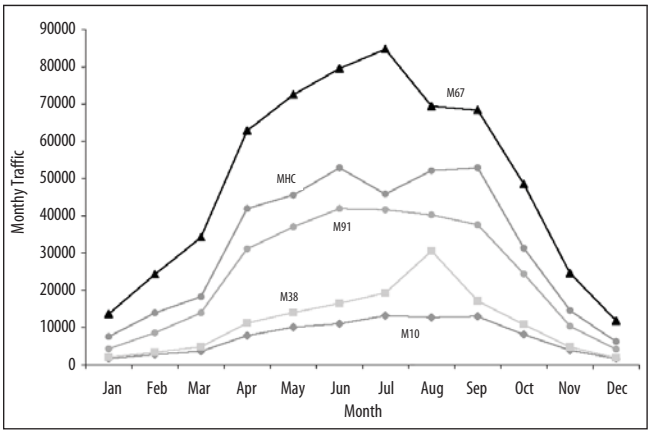


the system. Moreover, as our statistical analysis of all trail locations showed (see Lindsey et al., 2007), the mean peak hour traffic is approximately 14 percent of total daily traffic, regardless of specific location and season.

Traffic ratios make a useful tool to analyze variations of trail traffic

Trail use varies monthly as temperatures fluctuate, with maximum monthly traffic being, on average, five times larger than minimum monthly traffic. Monthly traffic counts at five Monon Trail locations range from a few thousand to more than 80,000 users, depending on location (see Figure 9). Two locations shown in the figure are at the southern part of Monon Trail and have relatively low traffic—Monon Trail at 10th Street (M10) and Monon Trail at 38th Street (M38); three locations are

Figure 9. Monthly traffic for five locations on the Monon Trail

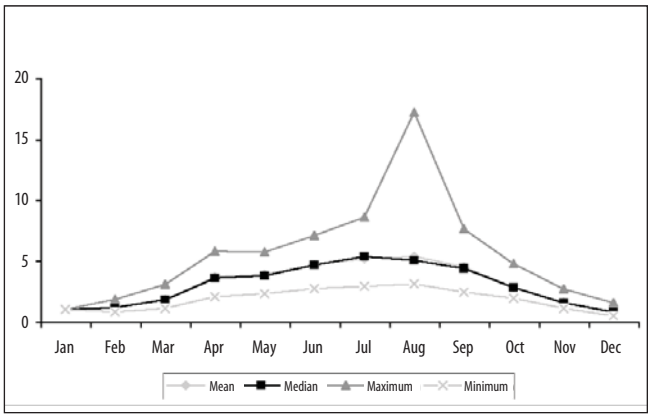


at the northern part of Monon Trail and have relatively high traffic—Monon Trail at 67th Street (M67), Monon Trail at Honey Creek (MHC), and Monon Trail at 91st Street (M91). In all cases the highest traffic on the trail occurs from May through September, with peaks usually in July or August.

Even though the absolute values of monthly traffic are different for each location, the patterns of traffic variation throughout a year are similar for all locations. We found the use of monthly "traffic ratios" to be a convenient quantitative tool to capture the similarity in the seasonal patterns of traffic variation. Monthly traffic ratios illustrate how much higher traffic volumes are in months other than January. To calculate traffic ratios, we divided traffic volume in any given month by January traffic volume. If we know the traffic ratios for all months and actual traffic for any single month (not necessarily January), we can estimate the traffic for all other months. In Indianapolis, as shown in Figure 10, January traffic typically is the lowest in the year, which makes it suitable for the baseline level. For all other months we expect monthly traffic ratios to be larger than one. The use of traffic ratios makes the comparison of highly used and lightly used locations possible.

Figure 10 illustrates the distribution of monthly traffic ratios for the Monon Trail. Average characteristics (mean and median), as well as maximum and minimum monthly traffic ratios, are shown. One can see that mean and median are essentially the same for all months, and that the annual patterns of traffic ratios are the same for the averages, minimum, and maximum ratios. Thus, the pattern of seasonal variability does not depend on the location on the Monon Trail. For example, across locations, the traffic in July is, on average, about five times larger than the average January traffic.

Figure 10. Average (mean and median), minimum, and maximum monthly traffic ratios for 11 locations on the Monon Trail



A notable exception to the general pattern is the maximum monthly traffic ratio in August. This peak is associated with the Indiana State Fair, which occurs in August (the Monon Trail crosses 38th Street next to the Indiana State Fair property). So, even though seasonal variations have similar patterns in all locations, social events can significantly alter local traffic patterns (and thus should be considered for trail use analysis on a special basis).

Conclusions

This study is based on two sources of data—results of a Marion County residents' survey and the results of automated trail traffic counts. The data show that the trails and greenways in Indianapolis are heavily used by Marion County residents (over one-quarter of respondents used trails in the last year), and that trails are used not only by those who live near the trails, but also by county residents who live farther away.

To illustrate how trail traffic varies in time and by location, this study presents illustrative data primarily for several selected locations on the Monon Trail in Indianapolis. Similar data are available for all 30 locations in the Indianapolis trail system. Even though the traffic volumes depend on location, the average patterns of variations of trail use are relatively uniform across different locations on the trail. Thus, one can quickly obtain rough estimates of daily traffic from very limited observations.

Will the same results be true for trail networks in other cities? This remains an open question. However, we expect that the answer is positive for large and medium-size metropolitan areas with climates, landscapes, and socio-demographic structure similar to those of Indianapolis (many other Midwestern cities may fall within this category). With some exceptions (when there is a significant high-attendance social event situated near a trail, or a trail is used for commutes), the patterns of daily, weekly, and seasonal variations are expected to be similar across different locations on trails. Surveys and field observations in other localities are needed to fully confirm these assumptions.

Analysts can use these observations to make inferences about trail use from very limited observations of traffic during short time intervals in particular locations. Planners can use these data to better plan and manage trails to promote effective trail use. The ability to predict the volumes of human traffic on existing trails will permit better management of limited resources for trail maintenance and facilitate decision-making regarding trail safety and development expenditures.

Sources

Lindsey, G. & Nguyen, D. (2002). *Urban trails heavily used in Indiana.* Indianapolis: Indiana University, School of Public and Environmental Affairs, Center for Urban Policy and the Environment. Available on line at http://www.urbancenter.iupui.edu/PubResources/pdf/59_02-C13_trails.pdf.pdf

Gibson, P., Zollinger, T., Moriarty, S., Lahsaee, H., Saywell, Jr., R., Muegge, C., & Caine, V. (2006, November 30). 2005 Marion County, Indiana adult obesity needs assessment results, 2nd Edition. Available at http://www.mchd.com/obesity/Obesity%20Report%202nd%20edition%20for%20web.htm

Lindsey, G., Wilson, J., Rubchinskaya, E., Yang, J., Han, Y. (2007) Estimating urban trail traffic: Methods for existing and proposed trails. Landscape and Urban Planning 81: 299–315.

CENTER FOR URBAN POLICY AND THE ENVIRONMENT

Indiana's Future:

Identifying Choices and Supporting Action to Improve Communities

State of Indiana

This project, funded by an award of general support from Lilly Endowment, Inc., builds on the Center's research to increase understanding of Indiana. The Center's goal is to understand the people, economics, problems, and opportunities in Indiana, and to help decision-makers understand the impact of policy decisions. The Center also works to mobilize energy to accomplish these goals.

One of the ongoing research efforts in the Center is focused on the use of Indianapolis greenways. Center researchers are monitoring trail traffic, collecting data related to trail use, and developing models to identify characteristics of urban neighborhoods that affect trail use. Decision-makers can use data and models developed by the Center to improve planning and management of urban trail systems. The trail monitoring and analysis has been supported with a grant from the Active Living Research Program of the Robert Wood Johnson Foundation and undertaken in cooperation with several state and local agencies, including the Greenways Division of the Indianapolis Department of Parks and Recreation, the Marion County Health Department, and the Indiana Department of Natural Resources.

The Center for Urban Policy and the Environment is part of the School of Public and Environmental Affairs at Indiana University–Purdue University Indianapolis. An electronic copy of this document and other information about community issues can be accessed via the Center Web site (www.urbancenter.iupui.edu). For more information, visit the Center Web site or contact the Center at 317-261-3000.

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