

Trails: A Sustainable Transportation Solution

Shawn McLaughlin, AICP, CPRP
Union County Planning Director

Michelle Oswald, Ph.D., LEED AP
Assistant Professor at Bucknell University

APA PA Annual Conference
Harrisburg, PA



Bucknell
UNIVERSITY



Overview



- * I. Sustainable Transportation
- * II. Background on Rail Trails
 - * Definition
 - * History
 - * Benefits
- * III. Buffalo Valley Rail Trail
 - * Planning
 - * Development
 - * Future Goals
- * IV. Travel Demand Analysis
 - * Rail Trail Impact Assessment Method (RTIAM)
 - * Travel Demand Results





Part I

What is Sustainable Transportation?

What is Sustainability?...



- * How would you define the term sustainability?
- * **“Sustainability is development that meets the needs (and aspirations) of the present generation without compromising the ability of future generations to meet their own needs.”**

(World Commission on Environment and Development, United Nations, 1987)

- * How can this be applied to transportation?

How does sustainability relate to transportation?

Transportation has been defined as an...

UNSUSTAINABLE ACTIVITY



One definition...

* A sustainable transport system:

- Allows the **basic access** and development needs of individuals, companies and society to be met **safely** and in a manner consistent with **human and ecosystem health**, and **promotes equity** within and between successive generations
- Is **affordable**, operates fairly and efficiently, offers a **choice of transport mode** and supports a **competitive economy**, as well as balanced regional development
- **Limits emissions** and waste within the planet's ability to absorb them, uses **renewable resources** at or below their rates of generation, and uses non-renewable resources at or below the rates of development of renewable substitutes, while **minimizing the impact on the use of land** and the **generation of noise**.

(European Council of Ministers of Transport 2004)

Triple Bottom Line of Sustainability



- * Three Pillars of Sustainability
- * Three E's of Sustainability

Applying the Triple Bottom Line to Transportation and Urban Planning



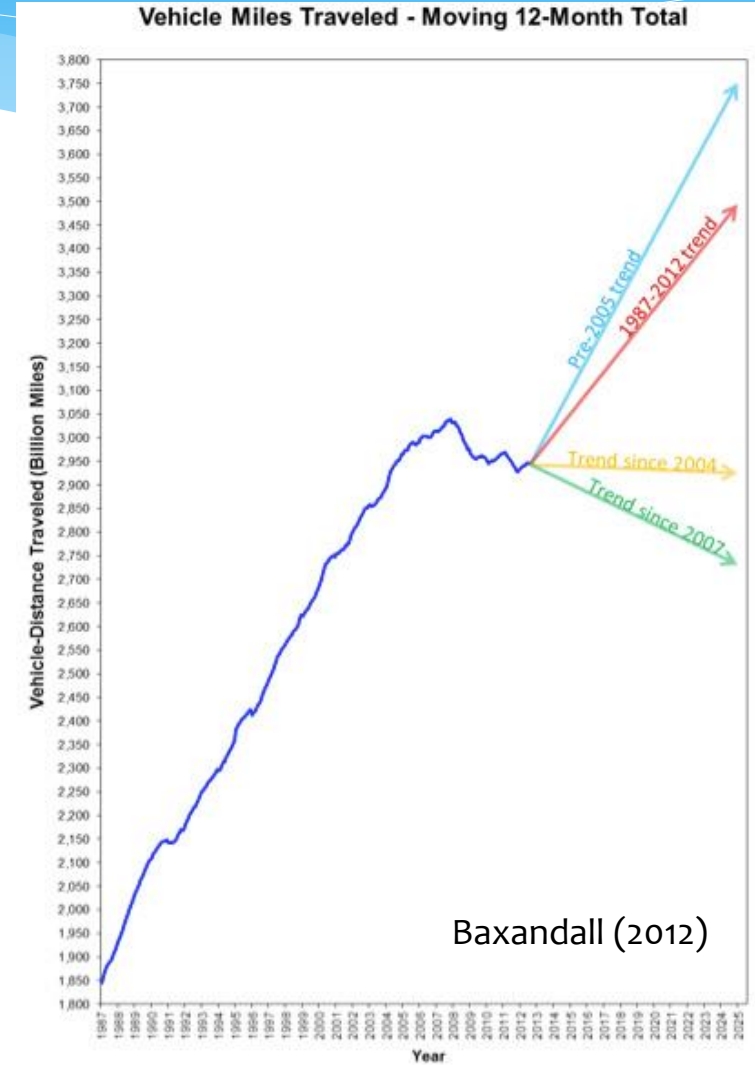
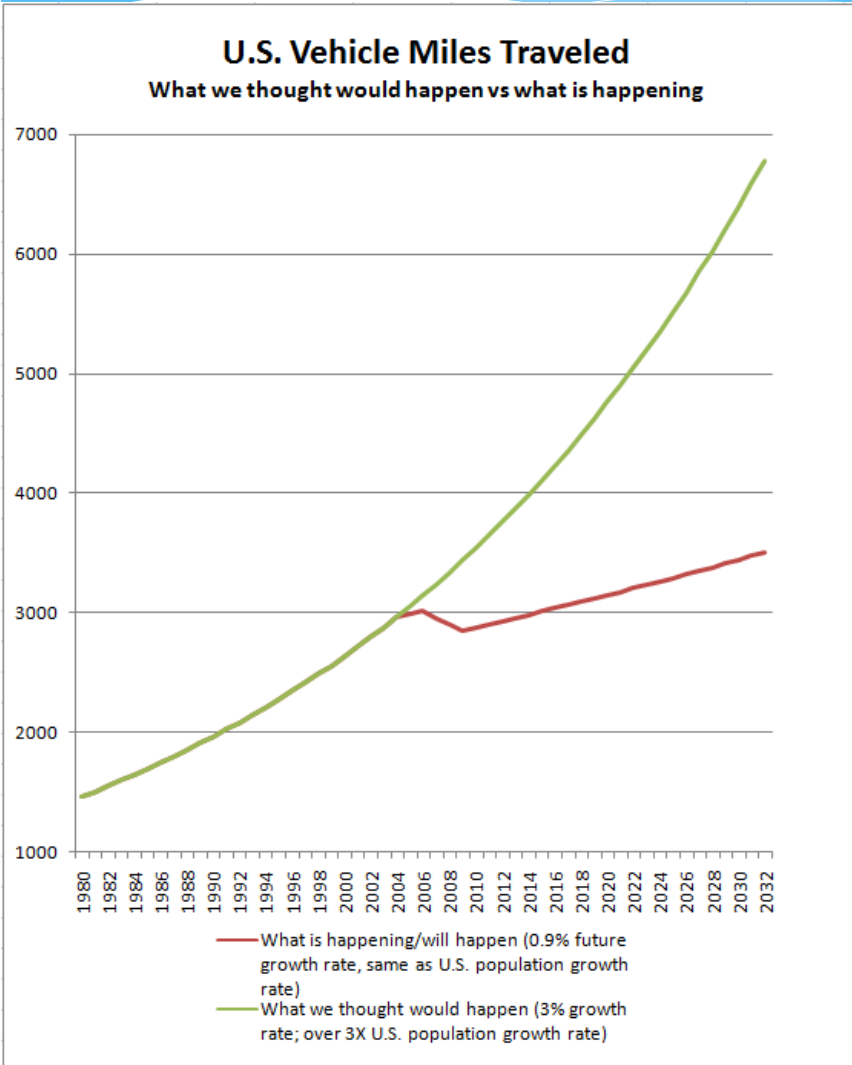
Motivation for Sustainability

- Recent national emphasis on sustainability and “going green”

WHY?



Consumer Demand



Sustainable Transportation Options



Mode Shift



Corridor Efficiency



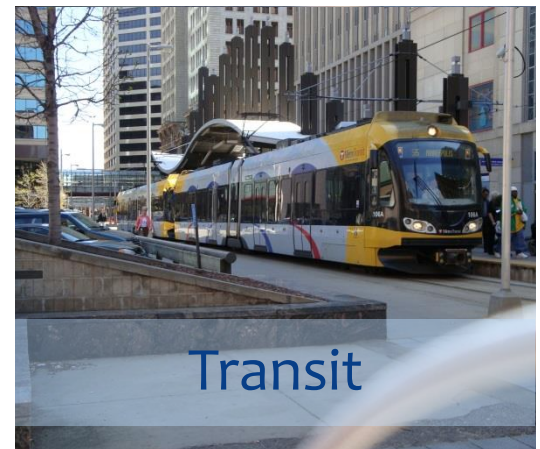
TOD



Rail Freight



Fuel Efficiency



Transit

One sustainable solution...





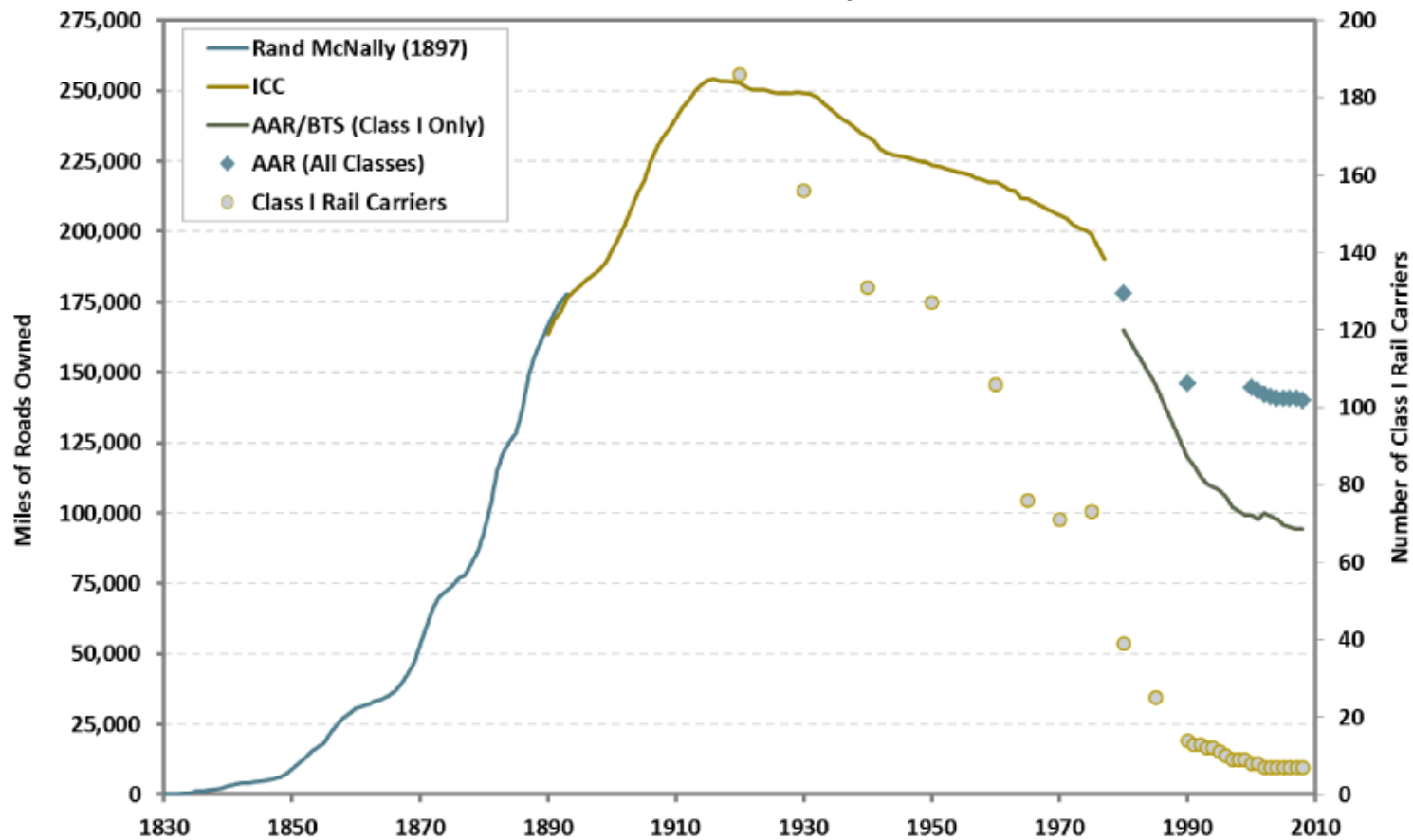
Part II

Background on Rail Trails



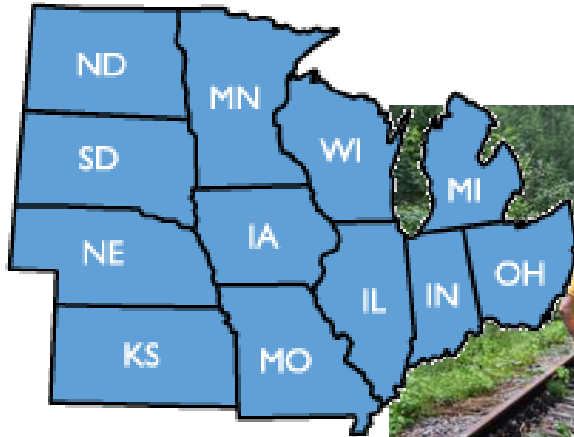
Railroad History

Rail Track Mileage & Number of Class I Rail Carriers, 1830-2008



Rail Trail Movement

Midwestern Region

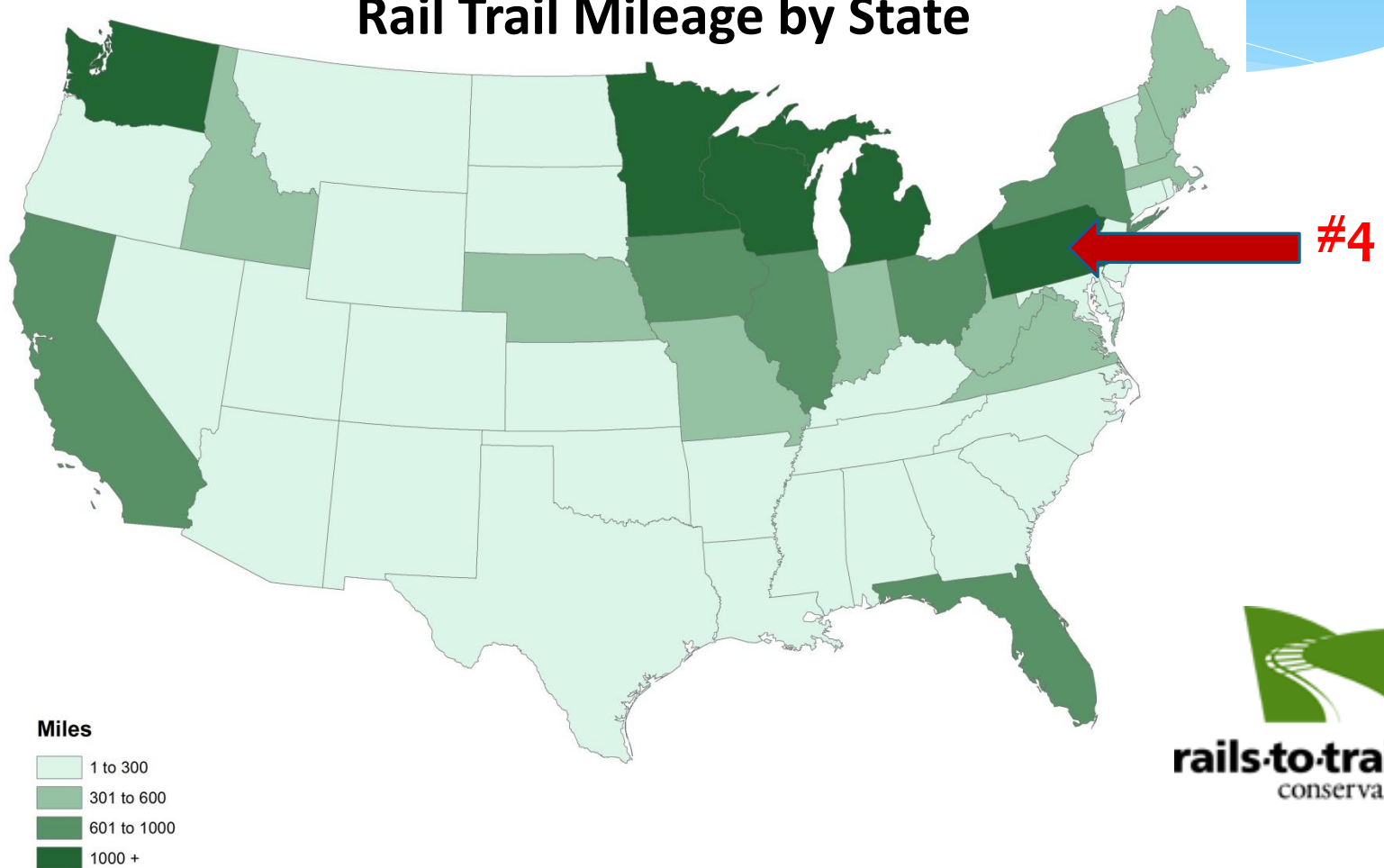


Railbanking Emerges

- * 1983 US Congress amended Section 8(d) of the National Trails System Act to preserve rail corridors through “rail banking” and allow for “interim” trail use.
- * Future abandonments need to go through federal review and state and local government notification.
- * Legal abandonment now more than ceasing rail service and removing infrastructure.
- * Upheld by Preseault v. ICC, 494 U.S. 1 (1990) Preseault v. Interstate Commerce Commission Et al.

Rail Trail Movement

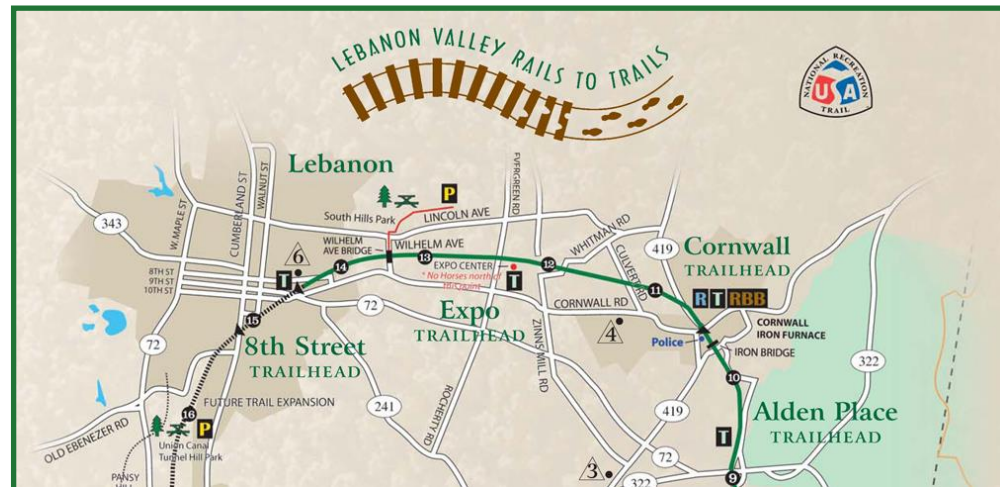
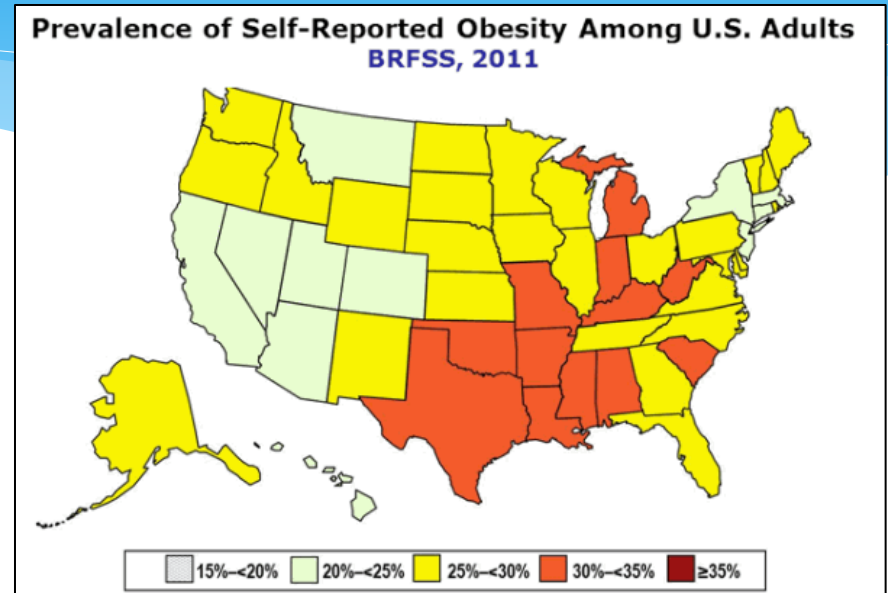
Rail Trail Mileage by State



rails-to-trails
conservancy

Rail Trail Benefits

- * Health & Wellness
- * Adaptive Reuse
- * Preserves Rail Corridor
- * Transportation/Connectivity



Rail Trail Benefits

- * Economic Revitalization
- * Community Identity
- * Livability
- * Social Interaction



A Resource for
Businesses along the
Great Allegheny Passage



Perkiomen Trail
2008 User Survey
and Economic Impact Analysis



Part III

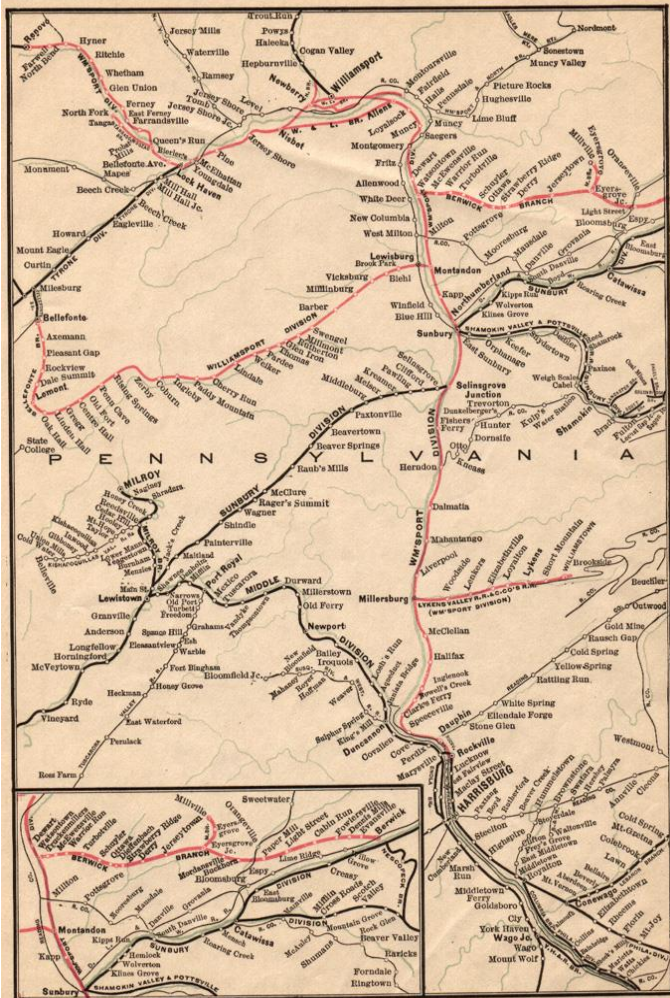
Buffalo Valley Rail Trail Case Study



BVRT Location



BVRT History



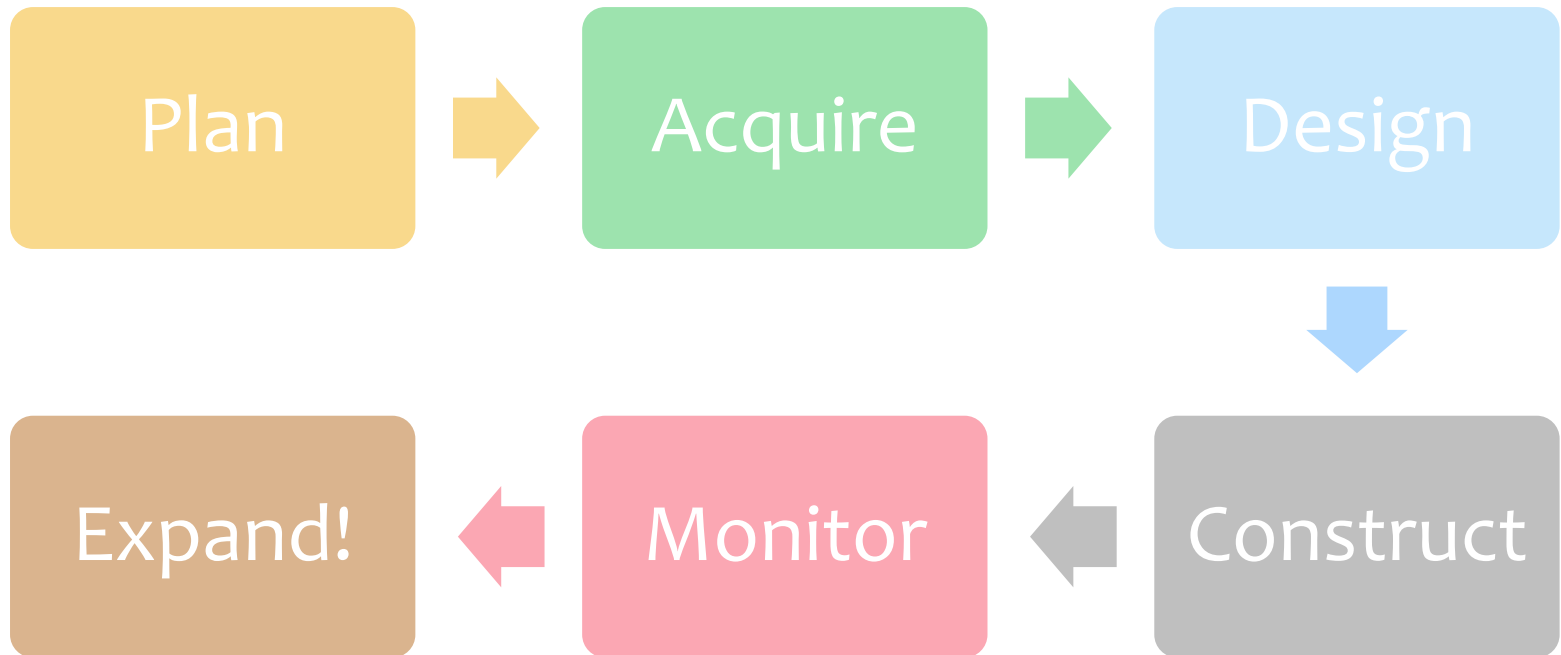
WILLIAMSPORT DIVISION

(12)

Williamsport Division
Other Penna. R. R. Lines

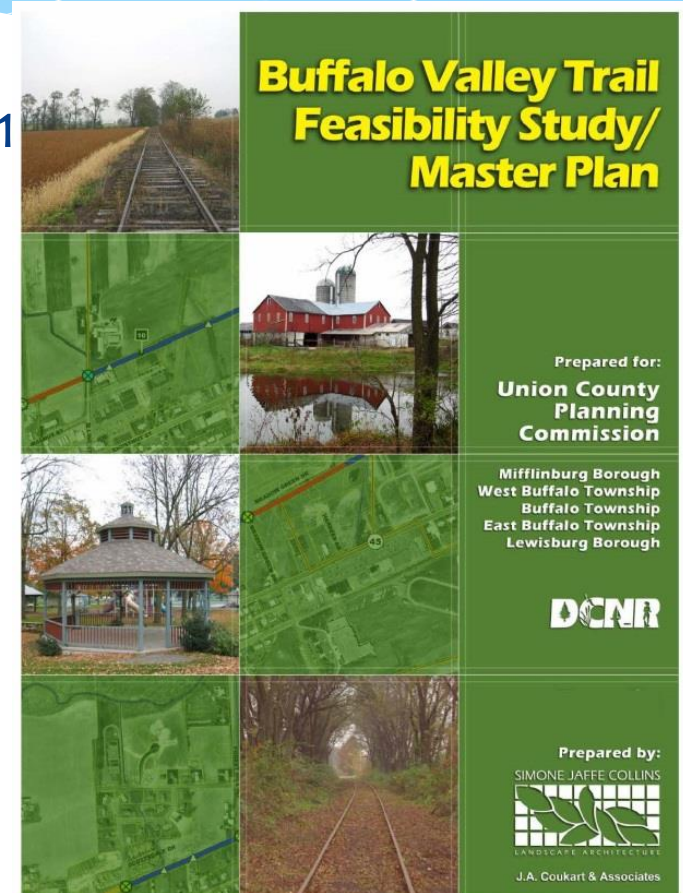


BVRT Major Phases

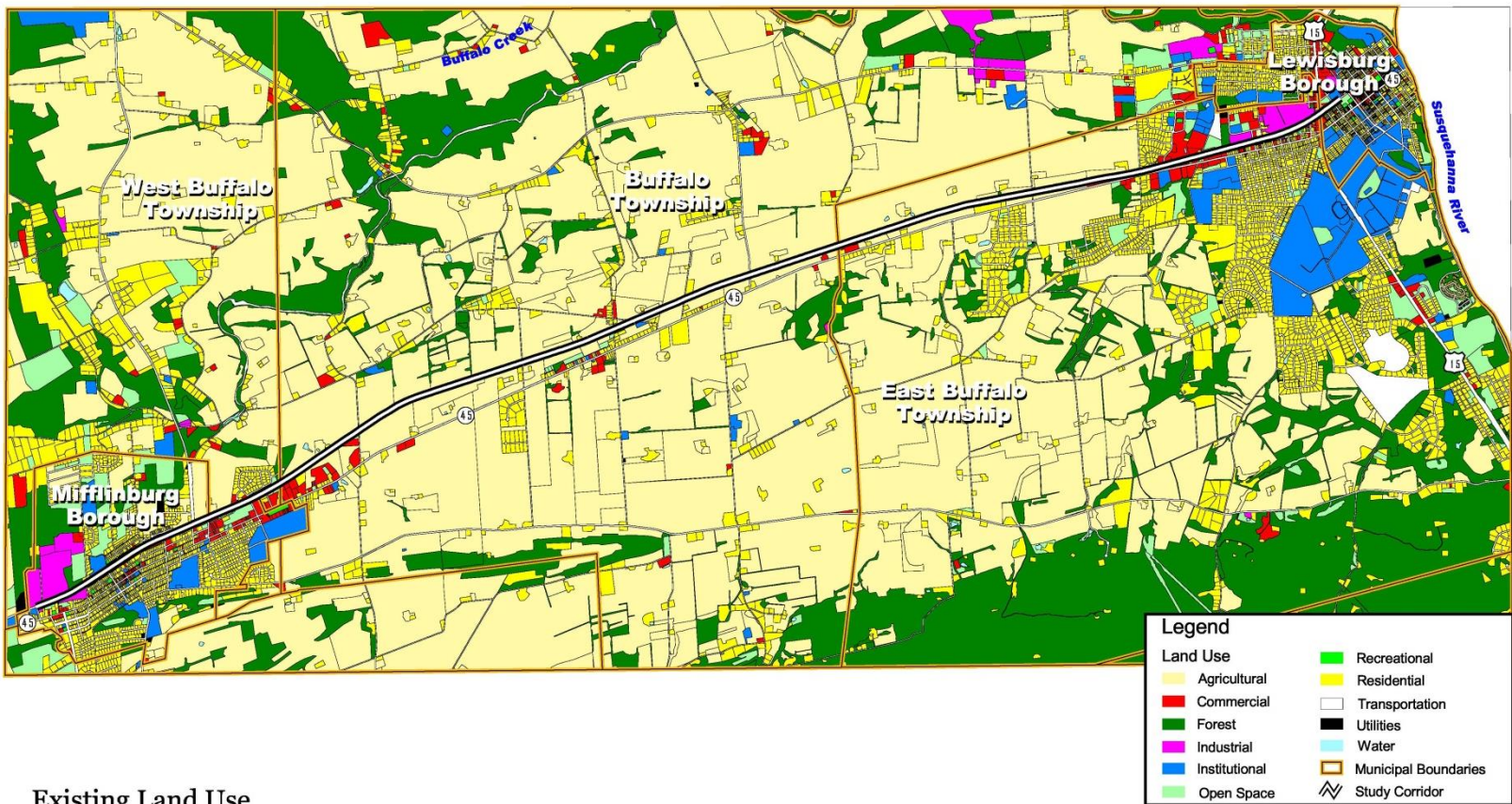


Planning Phase

- * Idea by Main Street organization in 2001
- * Feasibility Study initiated in 2003
 - * Review constraints
 - * Evaluate options
 - * Obtain public input
 - * Recommended option



Planning Phase



Existing Land Use

Buffalo Valley Trail Feasibility Study

Union County □ Mifflinburg Borough □ West Buffalo Township □ Buffalo Township □ East Buffalo Township □ Lewisburg Borough

0.5 0 0.5 1 Miles

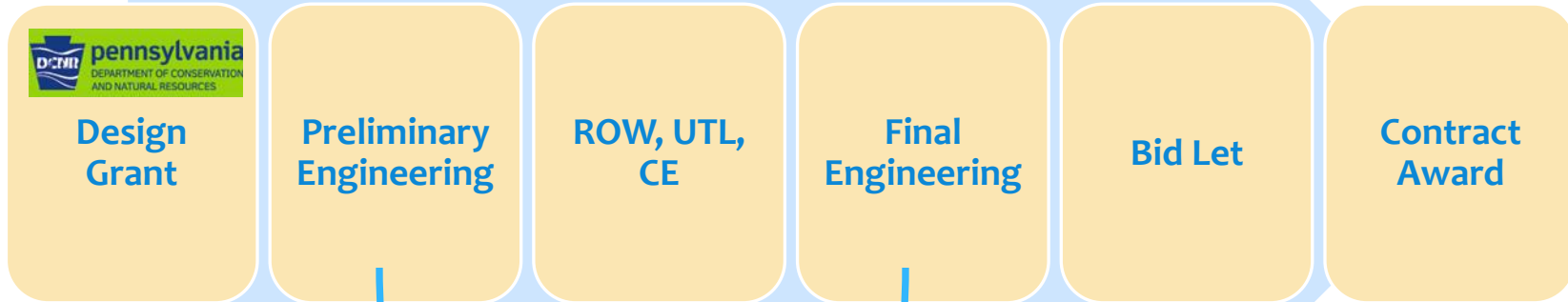


Acquisition Phase

- * 2008 sales agreement between Lewisburg Area Recreation Authority and West Shore Railroad Corp.
- * Federally railbanked by US Surface Transportation Board (STB) in 2008
- * Property Transaction Closed
- * Infrastructure removed



Design Phase



Public Involvement

Design (Opposition) Phase

Serving the Central Susquehanna Valley since 1937
THURSDAY LIFE DELIVERED
UNION COUNTY RAILS-TRAILS PROJECT

Farmers blast group



William Moore Sr. speaks about his concerns at the Lewisburg Area Recreation Authority meeting concerning its rails-to-trails project.

Organization dodging issue, landowners complain

FIRE WAS HATE CRIME, PASTOR SAYS/B1
Selingsgrove field hockey stays unbeaten C1 A fair night to meet the Mahoney E
The Daily Item
Serving the Central Susquehanna Valley since 1937
THURSDAY LIFE DELIVERED DAILY

NOW SHOWING
at
DAILYITEM.COM

UNION COUNTY RAILS-TO-TRAILS PROJECT LARA, farmers battle



Don Fogie, of East Buffalo Township, Union County, and other farmers are voicing concerns about the proposed rails-to-trail project that cuts through their properties. Fogie, owner and operator of Fogie Forest Products, says, "People make the assumption the right-of-way is farther out into our property, and I don't need people poking around my business or getting close to my equipment."

Land owners fear trespassers, vandalism, liability

Construction Phase

- * Awarded \$3.2 million PCTI Funding
- * 2 miles Superpave; 7 miles TSA
- * Construction completed in 8 ½ months



Technical Bulletin

Trail Surface Aggregate (TSA) 5/2012

Trail Surface Aggregate (TSA): A specific mixture of aggregate designed for surfacing trails that is designed to achieve very high densities to withstand traffic and erosion better than traditional aggregates.

Background:

Trail Surface Aggregate (TSA) is designed for use as a wearing surface for trails. It is different from traditional materials used to surface trails such as "number 10's". TSA is designed to have a uniform mixture of a range of rock sizes from 3/8-inch all the way down to fine material. This uniform mix allows excellent compaction to achieve a higher in-place aggregate density than commonly used aggregates to resist wear and erosion. The mix was designed by the PSU Center for Dirt and Gravel Road Studies, and is based on a "downsizing" of the successful and popular Driving Surface Aggregate (DSA) developed for use on roads.

Specification:

All TSA material is to be derived from natural stone formations. Stone is defined as rock that has been crushed; rock is defined as consolidated mineral matter. Both are restricted to that which has been mined or quarried from existing geologic bedrock formations.

All components of the aggregate mix, including fines passing the #200 sieve, are to be derived by crushing parent rock material that meets TSA purchasing specifications for abrasion resistance, pH, and freedom from contaminants. No clay or silt soil may be added or retained after processing operations. Determine the amount of particles less than #200 sieve size using the washing procedures specified in PTM No. 100.



Close-up of worker's gloved hand in TSA pile.

TSA can be made using a traditional sieve gradations, or using a "recipe" approach that mixes existing aggregate gradations. The "recipe approach" may be more cost effective for ordering small amounts of TSA for smaller jobs.

TSA RECIPE:

- Combine existing aggregates and water in the ratio:
- 4 parts unwashed AASHTO # 10 (or B3 sand)
 - 4 parts AASHTO # 8
 - 1 part minus #200 fines (collector fines)

TSA GRADATION:

Sieve Size	TSA Percent Passing
1/2"	100%
3/8"	90-100
#4	50-85
#8	35-60
#16	25-50
#200	12-18

Maintenance & Monitoring Phase

- * Maintenance cost \$1,800 per mile
- * Dog issues
- * Illegal parking
- * Vegetation Management
- * Monitoring of use and conditions



Buffalo Valley Rail Trail: Future Phases

DATE: May 29, 2013 SCALE: 1" = 250'
DRAWN BY: MKL

Pennsylvania North State Plane Mapping Coordinates,
NAD 1983

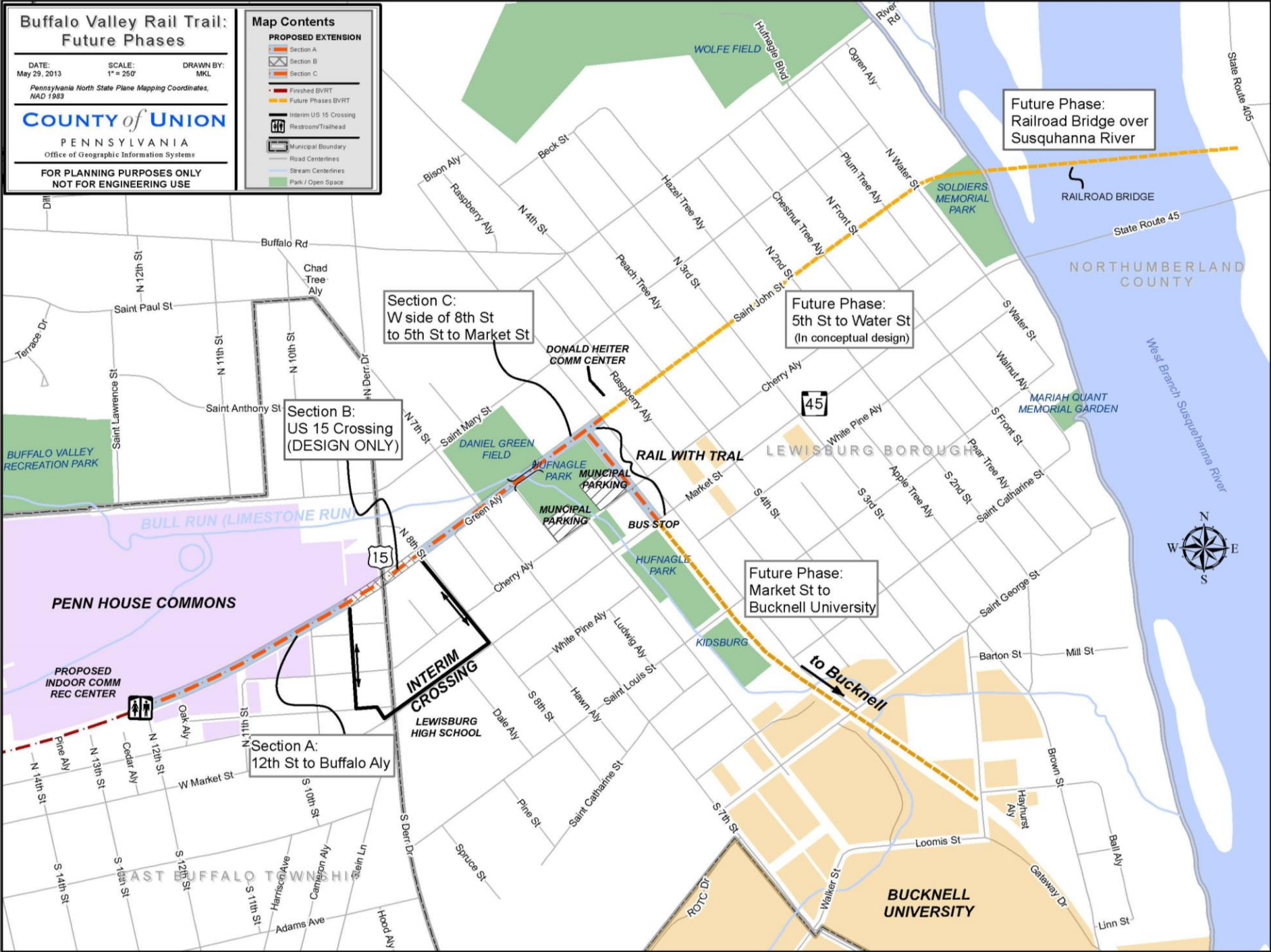
COUNTY of UNION
PENNSYLVANIA
Office of Geographic Information Systems

FOR PLANNING PURPOSES ONLY
NOT FOR ENGINEERING USE

Map Contents

PROPOSED EXTENSION

-  Section A
-  Section B
-  Section C
-  Finished BVRT
-  Future Phases BVRT
-  Interim US 15 Crossing
-  Restroom/Trailhead
-  Municipal Boundary
-  Road Centerlines
-  Stream Centerlines
-  Park / Open Space



Section C:
W side of 8th St
to 5th St to Market St

Section B:
US 15 Crossing
(DESIGN ONLY)

Section A:
12th St to Buffalo Aly

Future Phase:
5th St to Water St
(In conceptual design)

Future Phase:
Market St to
Bucknell University

Future Phase:
Railroad Bridge over
Susquehanna River

INTERIM
CROSSING

RAIL WITH TRAIL

to Bucknell

RAILROAD BRIDGE

45

15



Expansion Phase – Challenges?



US 15 Crossing



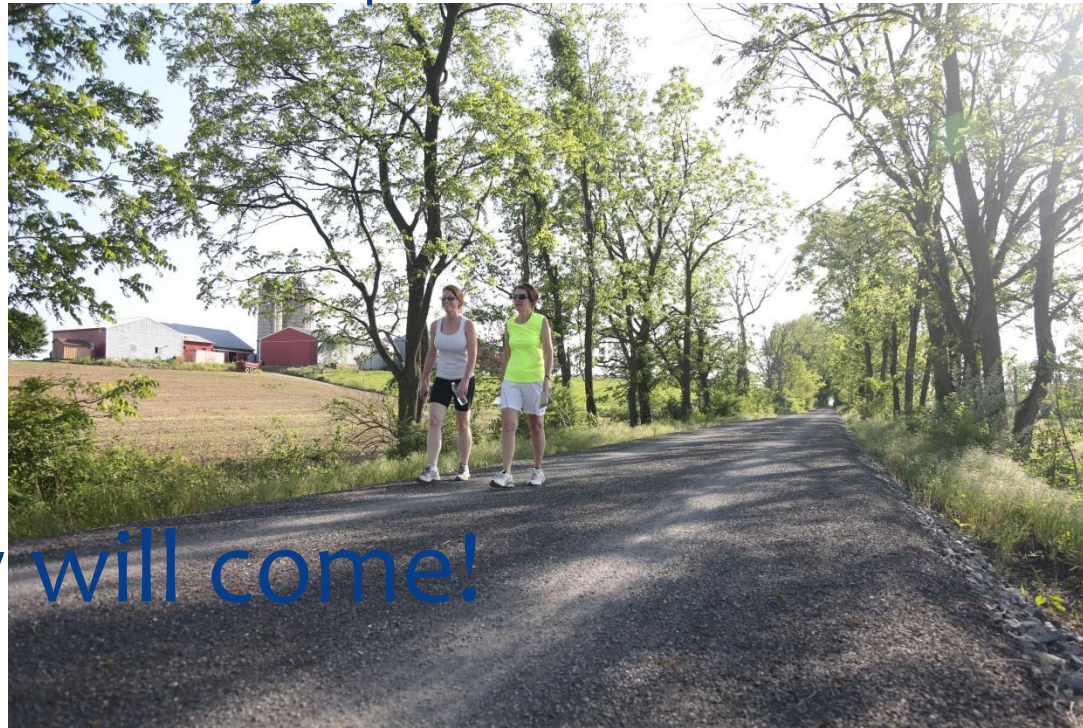
St. John Street in Trail ROW



Susquehanna River Bridge

Key Lessons Learned

- * Attorney specializing in railroad law very helpful
- * It's a marathon not a sprint
- * Funding always a challenge
- * Opposition Guaranteed
- * **Build it and they will come!**





Part IV

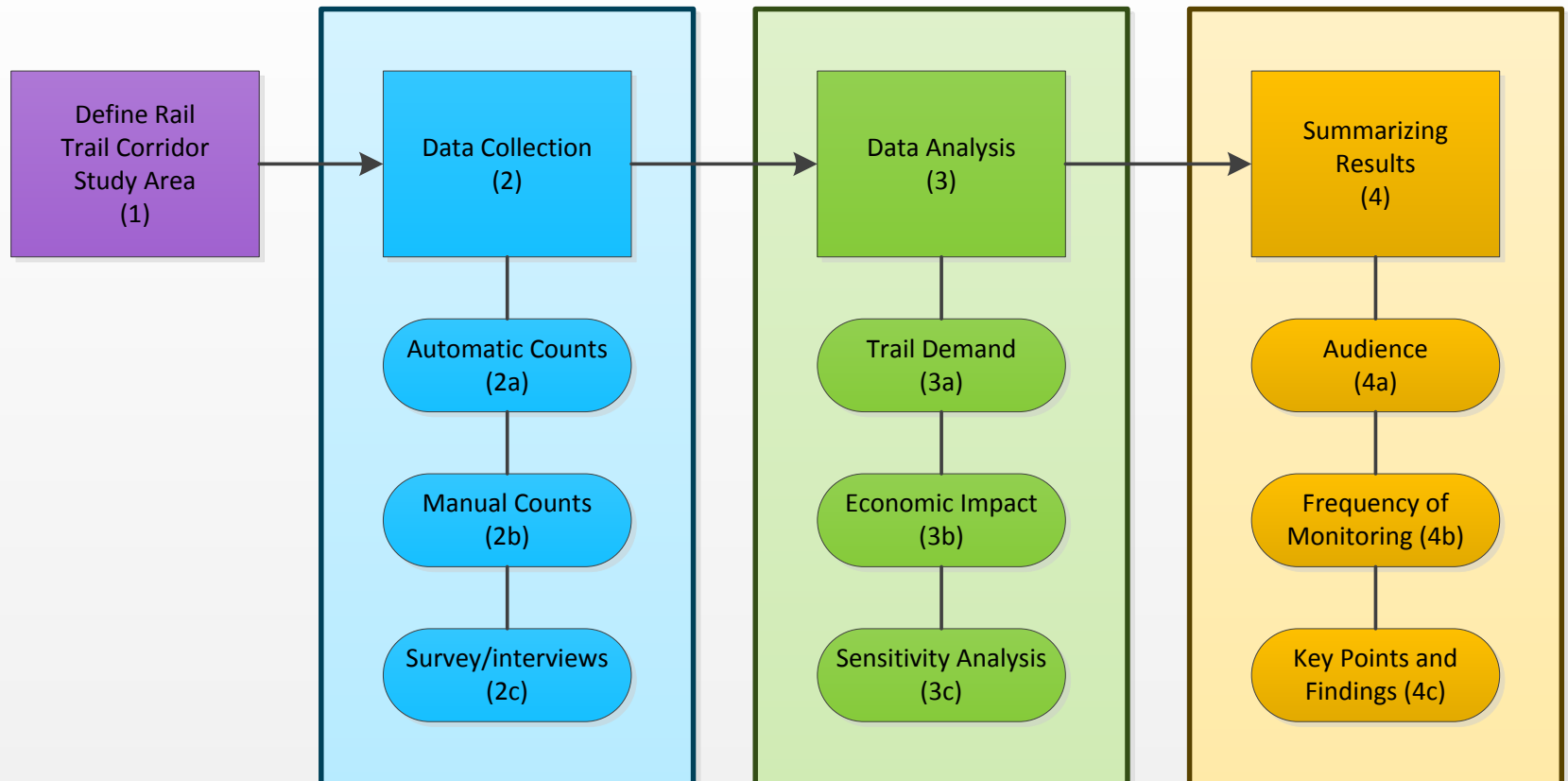
Travel Demand Analysis

Background on Trail Studies

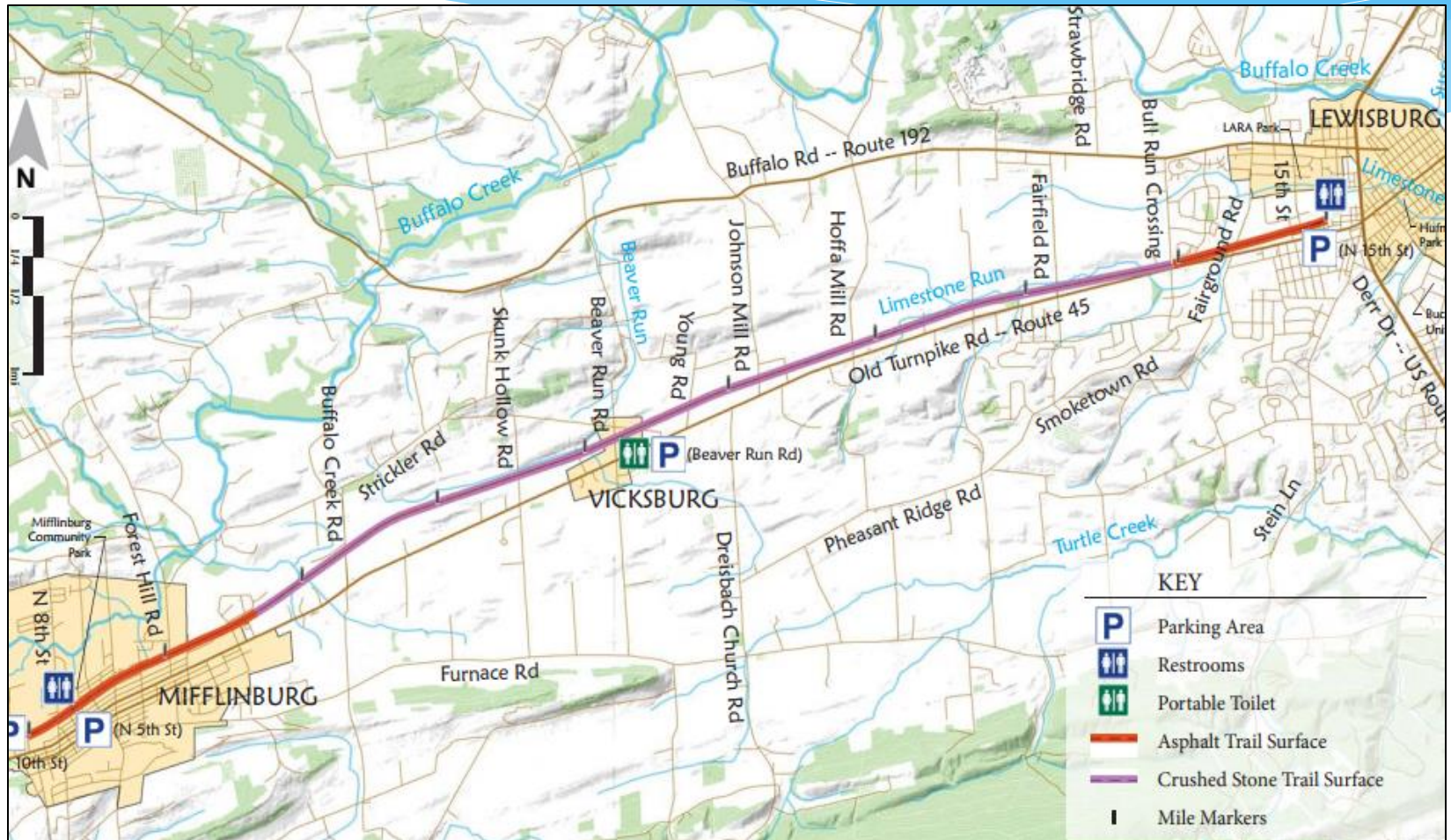
- * Rails to Trails Conservancy- Trail User Survey Workbook
- * Great Allegheny Trail Alliance
- * Perkiomen Trail User Survey and Economic Impact Analysis
- * Virginia Creeper Trail



RTIAM- Rail Trail Impact Assessment Methodology



Study Area



Data Collection Process

1. Automatic Counts

- * 4 locations using TRAFx infrared counters

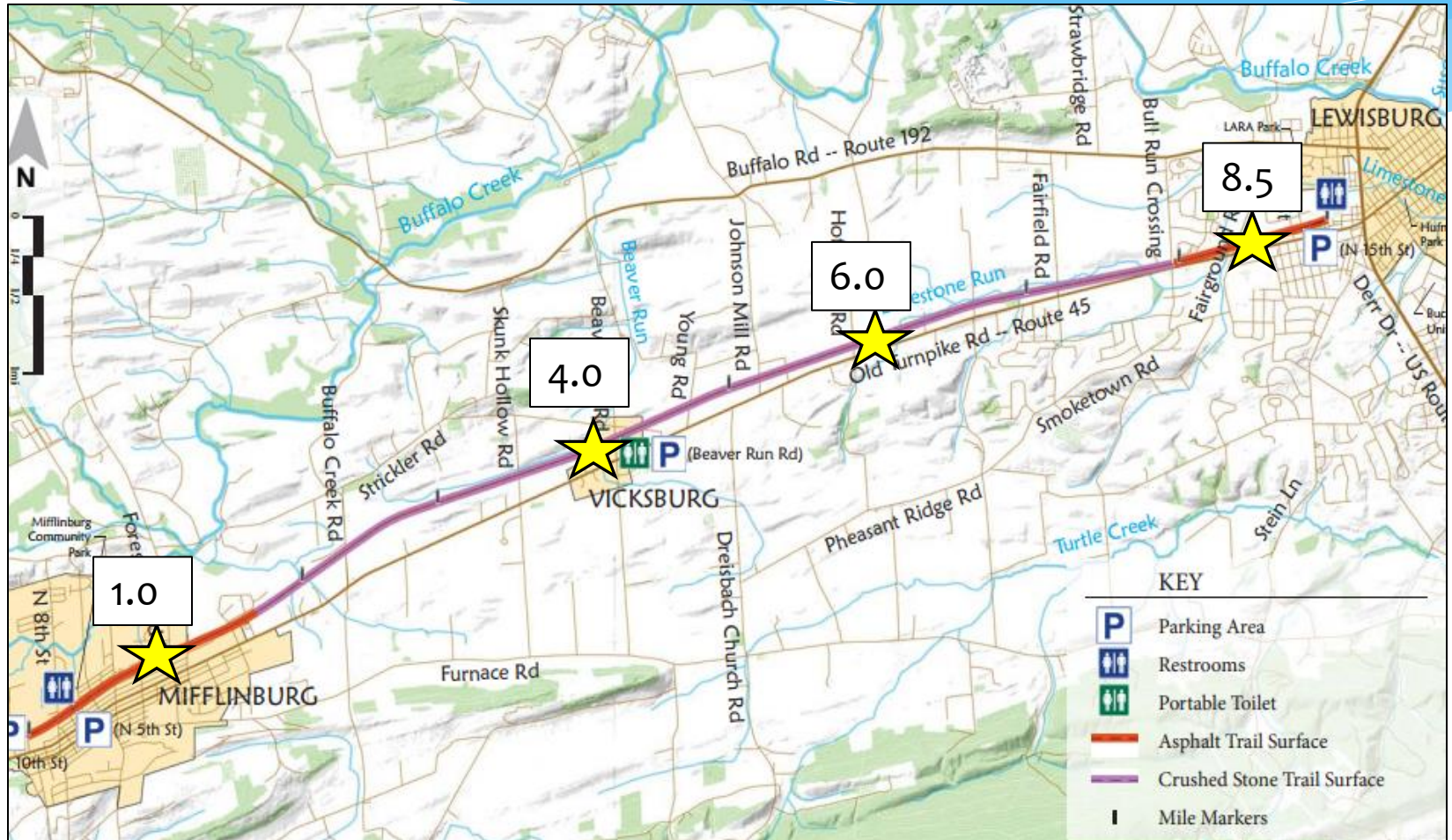
2. Manual Counts

- * Adjustment factor for automatic counts

3. Surveys/Interviews

- * 2 trailheads

1-Automatic Counts



1.0, 4.0, 6.0 and 8.5 mile markers

1-Automatic Counts



1-Automatic Counts

TRAFX

Logged in as: cregan1391@gmail.com
Organization: Bucknell University, Central PA
Subscription Expires: 2017-02-22

HOME ANALYZE UPLOAD MANAGE ADMIN HELP LOGOUT

Site Management

Below is a list of all your counter sites. Click the [Manage] links below to modify.

Site name	Lat.	Long.	Adjust factor	÷ 2	Filter	Photo	Image 2	Exclusions	Data sets	Start	End	
Rail Trail 2012-April MM 1	1.75599	Y	0	No Image Uploaded	No Image Uploaded	0	1	2012-06-01	2012-06-01	[Delete]
Rail Trail 2012-April MM 4	1.89903	Y	0	No Image Uploaded	No Image Uploaded	0	1	2012-04-03	2012-04-23	[Delete]
Rail Trail 2012-April MM 6	1.89903	Y	0	No Image Uploaded	No Image Uploaded	0	1	2012-04-03	2012-04-23	[Delete]
Rail Trail 2012-April MM 8.5	2.04207	Y	0	No Image Uploaded	No Image Uploaded	0	2	2012-04-03	2012-04-23	[Delete]
Rail Trail 2012-June MM 1.0	1.75599	Y	0	No Image Uploaded	No Image Uploaded	0	1	2012-06-01	2012-07-11	[Delete]
Rail Trail 2012-June MM 4.0	1.89903	Y	0	No Image Uploaded	No Image Uploaded	0	1	2012-06-01	2012-07-11	[Delete]
Rail Trail 2012-June MM 6.0	1.89903	Y	0	No Image Uploaded	No Image Uploaded	0	1	2012-06-01	2012-07-11	[Delete]
Rail Trail 2012-June MM 8.5	2.04207	Y	0	No Image Uploaded	No Image Uploaded	0	1	2012-06-01	2012-07-11	[Delete]

Create a site
Use the box below to create a new counter site.

New site name

Trafx Datanet Software Program

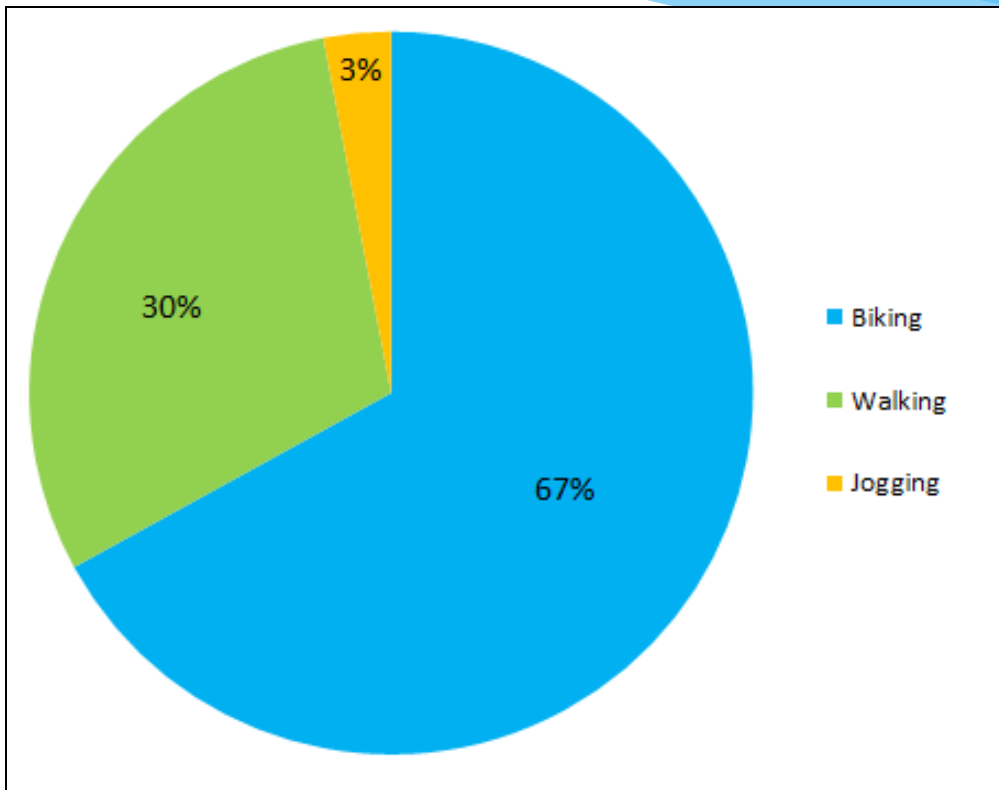
2-Manual Counts

- * Purpose:
 - * Directional split
 - * Modal split
 - * Error adjustment
 - * Two-way trip adjustment

2-Manual Counts

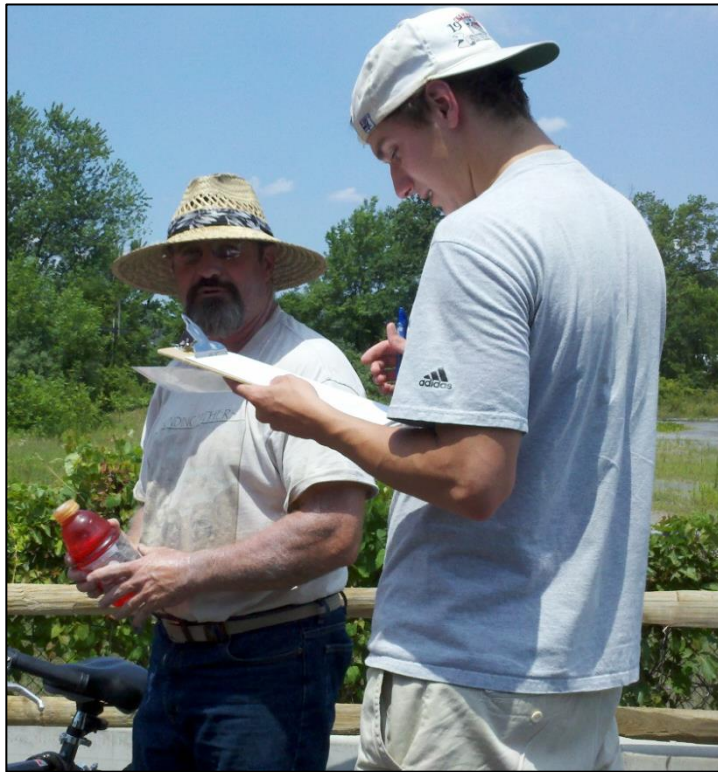
Manual Counts												
Date:				Weather:								
Location:				Number on counter at start:								
Start Time:				Number on counter at end:								
End Time:				Total count at end:								
	Gender		Activity			Approx. Age			Children			
1	M	F	Walk	Jog/Run	Bike	18-30	30-60	60+	1	2	3	4+
2	M	F	Walk	Jog/Run	Bike	18-30	30-60	60+	1	2	3	4+
3	M	F	Walk	Jog/Run	Bike	18-30	30-60	60+	1	2	3	4+
4	M	F	Walk	Jog/Run	Bike	18-30	30-60	60+	1	2	3	4+
5	M	F	Walk	Jog/Run	Bike	18-30	30-60	60+	1	2	3	4+

Mode Distribution



* Based on manual counts

3-Surveys



3-Survey Results

17. During your most recent use of the trail, or past use, did you make any stops to establishments near the trail?

No	45%
Yes	
Community pool/park	4%
Farmers Market	5%
Purple Cow	12%
Amy's Tasty Freeze	11%
Health Food Store	4%
Mifflinburg Sheetz	8%
Mifflinburg Weis	7%
Vargo	5%
Other	24%

- * 10.59 average # of trips per month
- * Average age: 48.8 years old
- * Average duration: 86.85 minutes

14. How did you find out about the trail?

Internet	2%
Friend/family	23%
Advertisement	2%
Road signs	1%
Newspaper	21%
Tourist/visitor information	2%
Saw it	7%
Local (don't remember)	37%
Other	5%

15. Has the use and/or existence of the trail influenced your spending on any recreational goods in the Susquehanna Valley Area?

No	58%
Yes	
Clothing	7%
Footwear	1%
Bike purchase/rental	24%
Bike accessories	11%
Car accessories (bike rack, etc.)	3%

Travel Demand Analysis

- * DataNet Software- download from infrared counters
- * Calculate Adjustment factor- from manual count
- * Apply 2-way trip factor
- * Analyze results
- * Explore seasonal adjustment



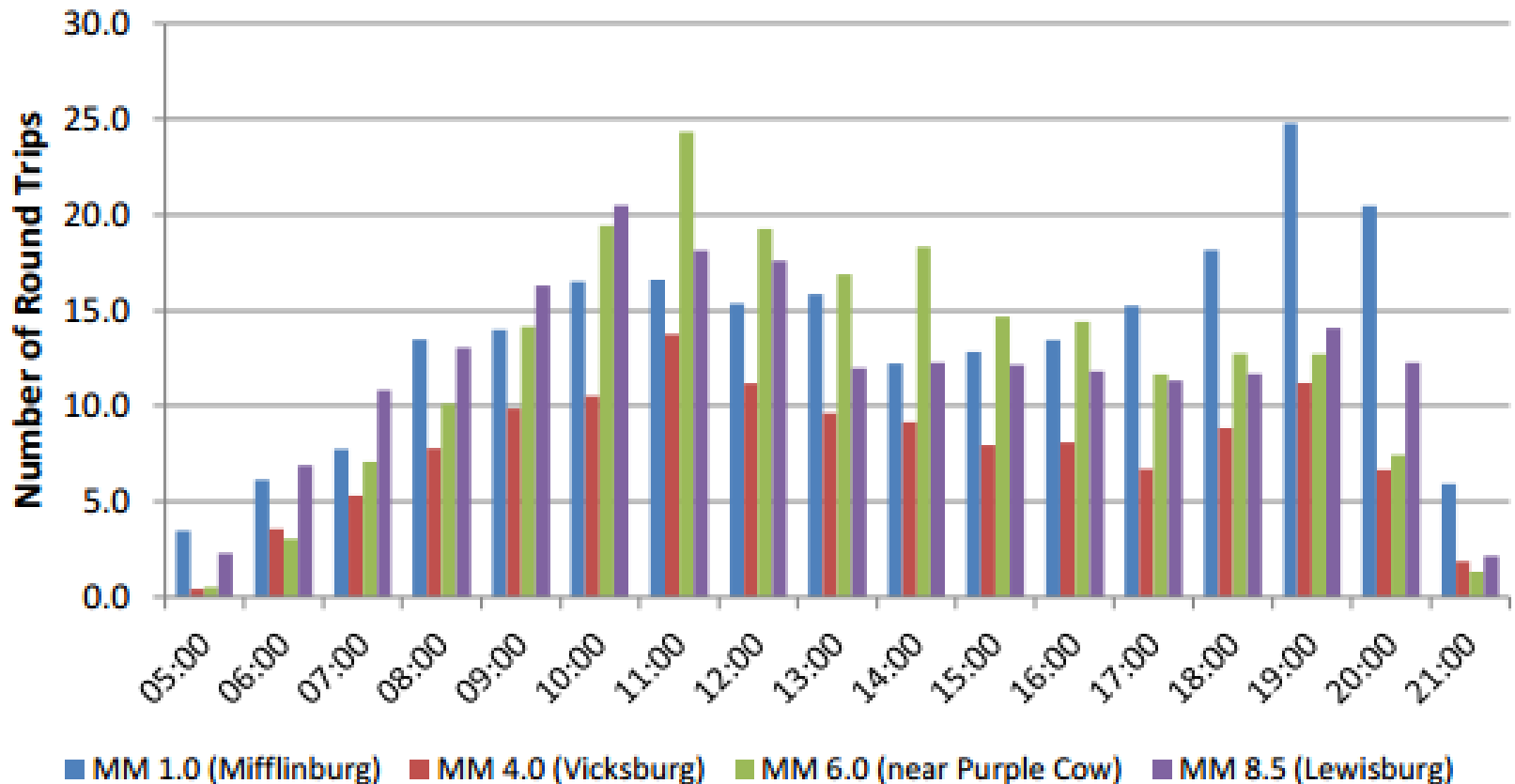
Rail Trail 2012-April MM 1	[Manage]	...	...	1.75599
Rail Trail 2012-April MM 4	[Manage]	...	...	1.89903
Rail Trail 2012-April MM 6	[Manage]	...	...	1.89903
Rail Trail 2012-April MM 8.5	[Manage]	...	...	2.04207

Yearly Travel Analysis

- * Yearly Data from TRAFx counters:
 - * Study 1: April 2012 – 432 Preliminary Study (Spring 2012)
 - * Study 2: June and July 2012 - 2012 Summer Study (Summer 2012)
 - * Study 3: September 2012 through January 2013
- * Remaining yearly data calculated using adjustment factors
 - * National Bike and Pedestrian Documentation Project
 - * Alta Planning and Design, 2012

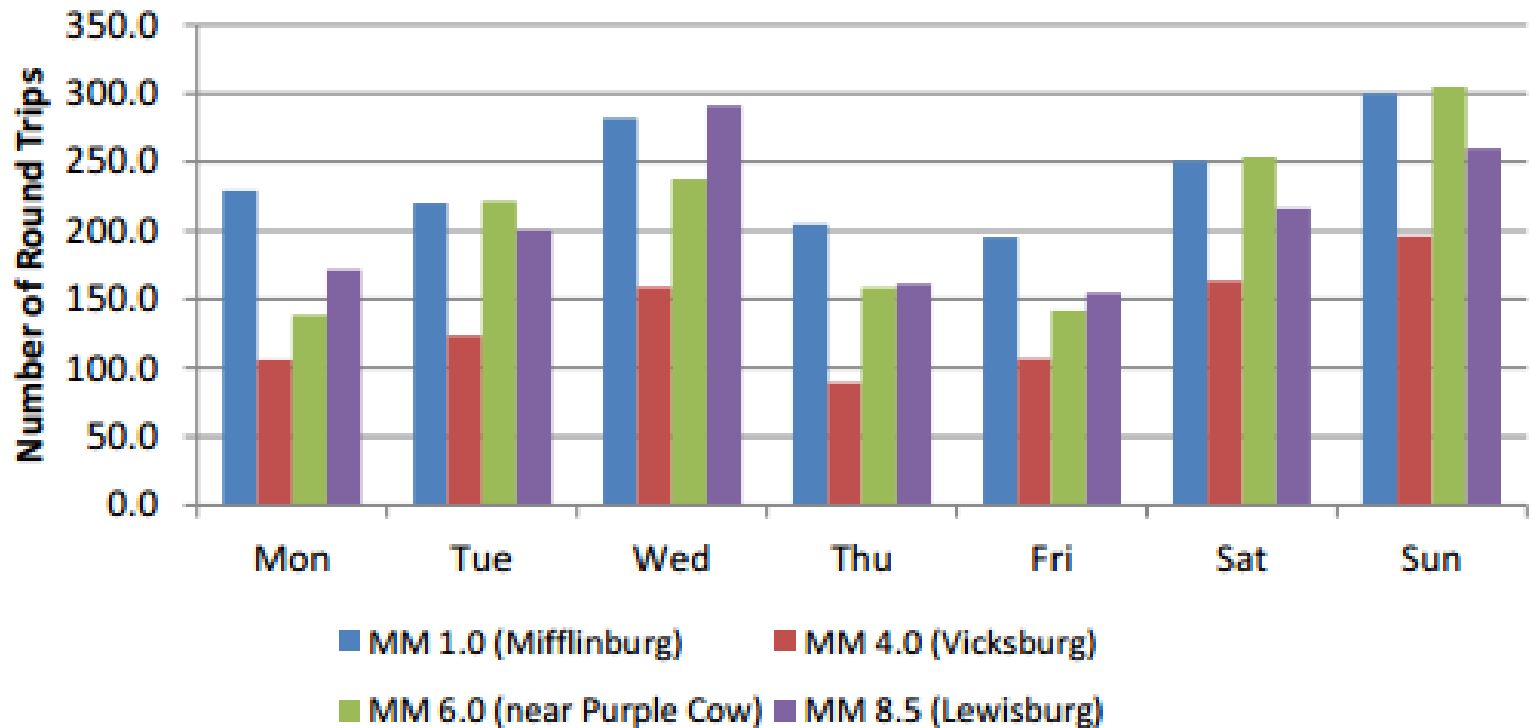
Peak hour travel

Hourly Averages



Day of the Week

Day of the Week Averages



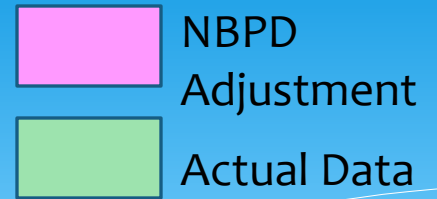
NBPD- Seasonal adjustment

- * Account for Months without data:
 - * February
 - * March
 - * August
 - * May
- * Assumed Long winter and short summer

Seasonal Adjustment Factors

Jan	3%
Feb	3%
Mar	7%
Apr	11%
May	11%
Jun	12%
Jul	13%
Aug	14%
Sept	11%
Oct	6%
Nov	6%
Dec	3%

Results



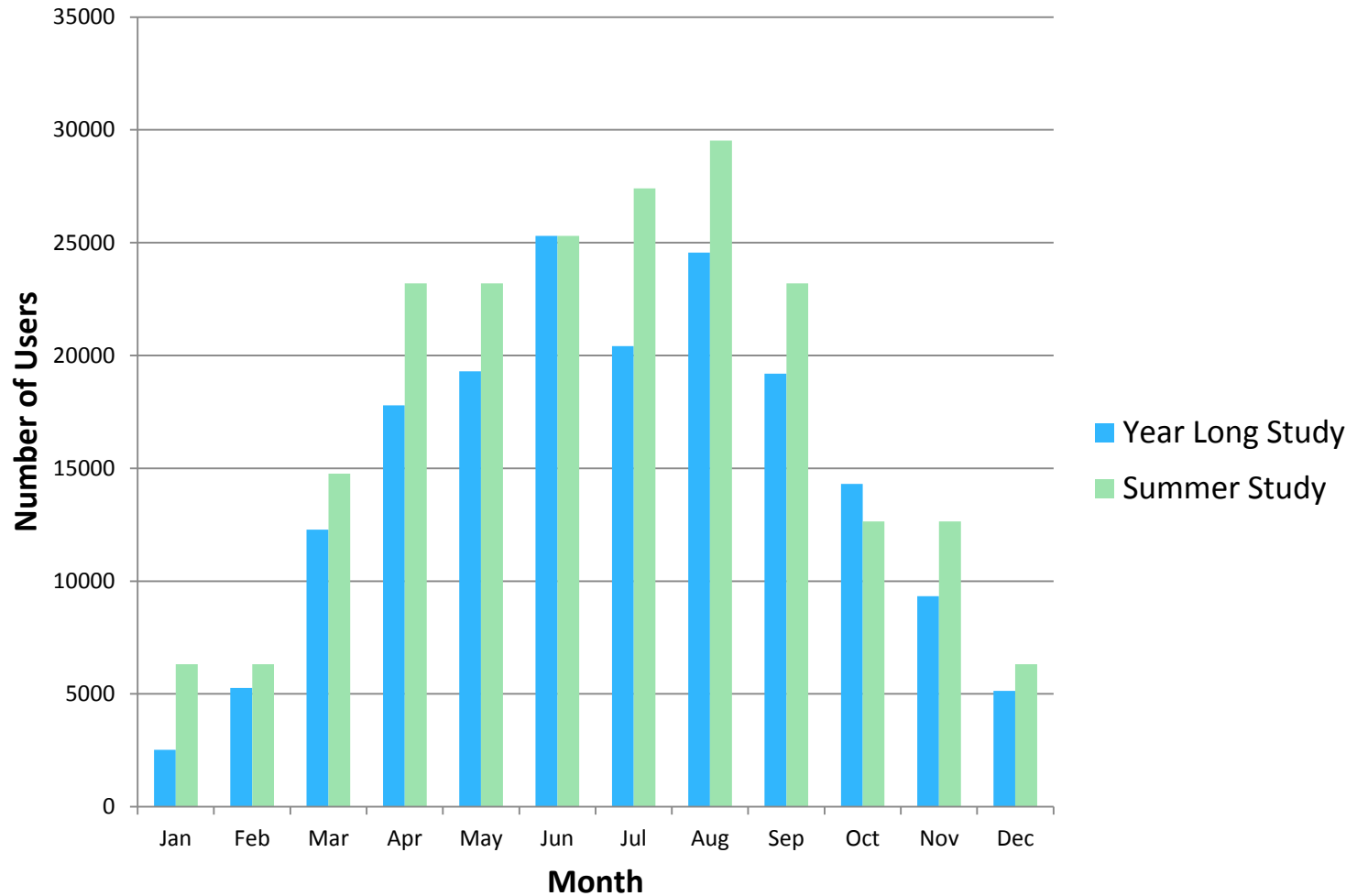
2012 Summer Study

June & July Data												
Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MM 1.0	1877	1877	4380	6883	6883	7508	8134	8760	6883	3754	3754	1877
MM 4.0	1096	1096	2558	4020	4020	4385	4751	5116	4020	2193	2193	1096
MM 6.0	1621	1621	3782	5944	5944	6484	7024	7565	5944	3242	3242	1621
MM 8.5	1731	1731	4039	6347	6347	6924	7501	8078	6347	3462	3462	1731
Season Factor	3%	3%	7%	11%	11%	12%	13%	14%	11%	6%	6%	3%

2013 Spring Study

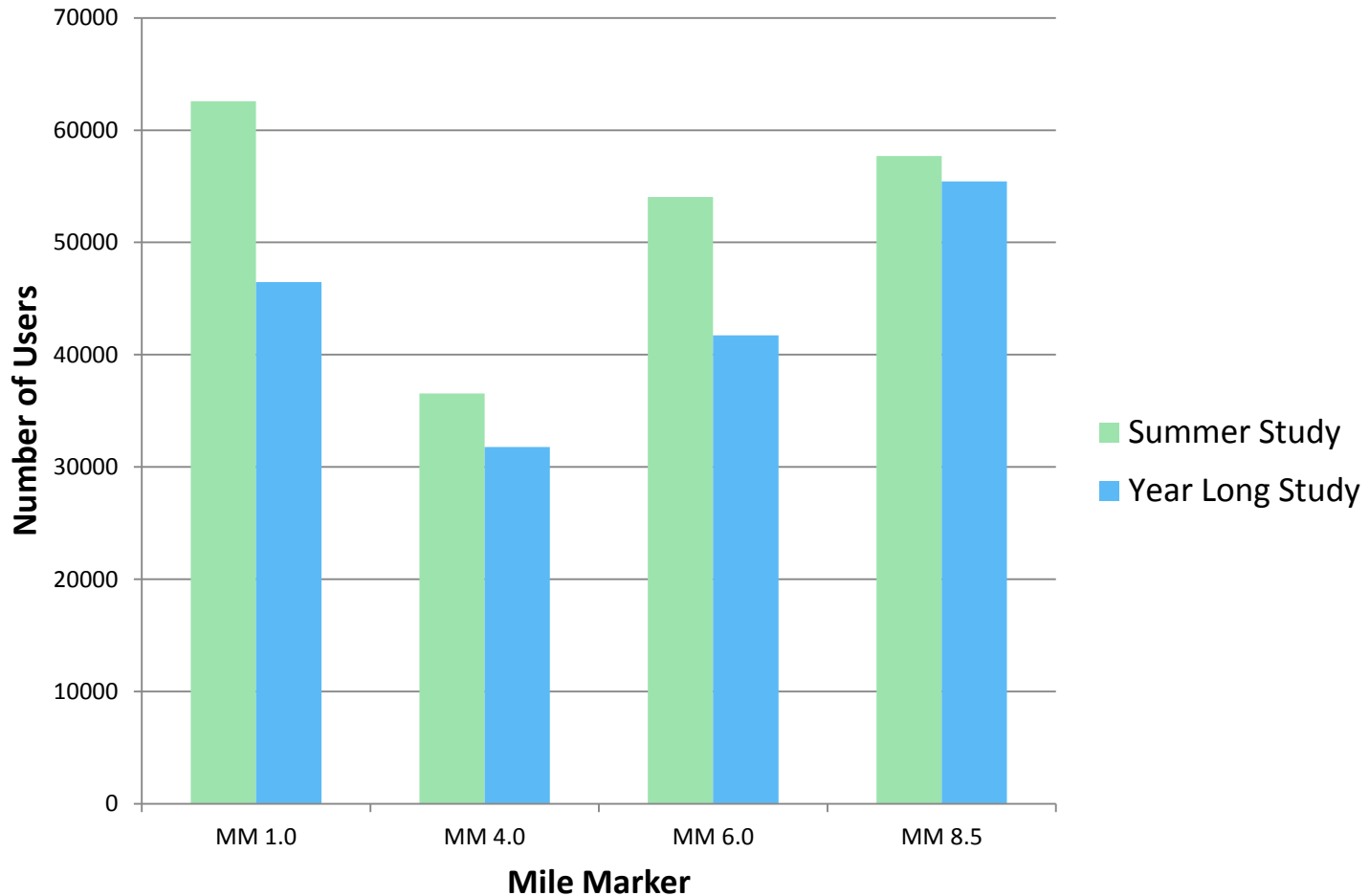
Full Year Data												
Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MM 1.0	548	1394	3252	5111	5111	7508	6671	6504	3938	3005	2140	1279
MM 4.0	785	953	2224	2613	3495	4385	3317	4448	4054	2856	1736	904
MM 6.0	300	1252	2922	3935	4591	6484	5999	5844	4568	3195	1859	793
MM 8.5	889	1663	3881	6131	6098	6924	4430	7762	6641	5259	3603	2159
Season Factor	3%	3%	7%	11%	11%	12%	13%	14%	11%	6%	6%	3%

Monthly Trail Usage



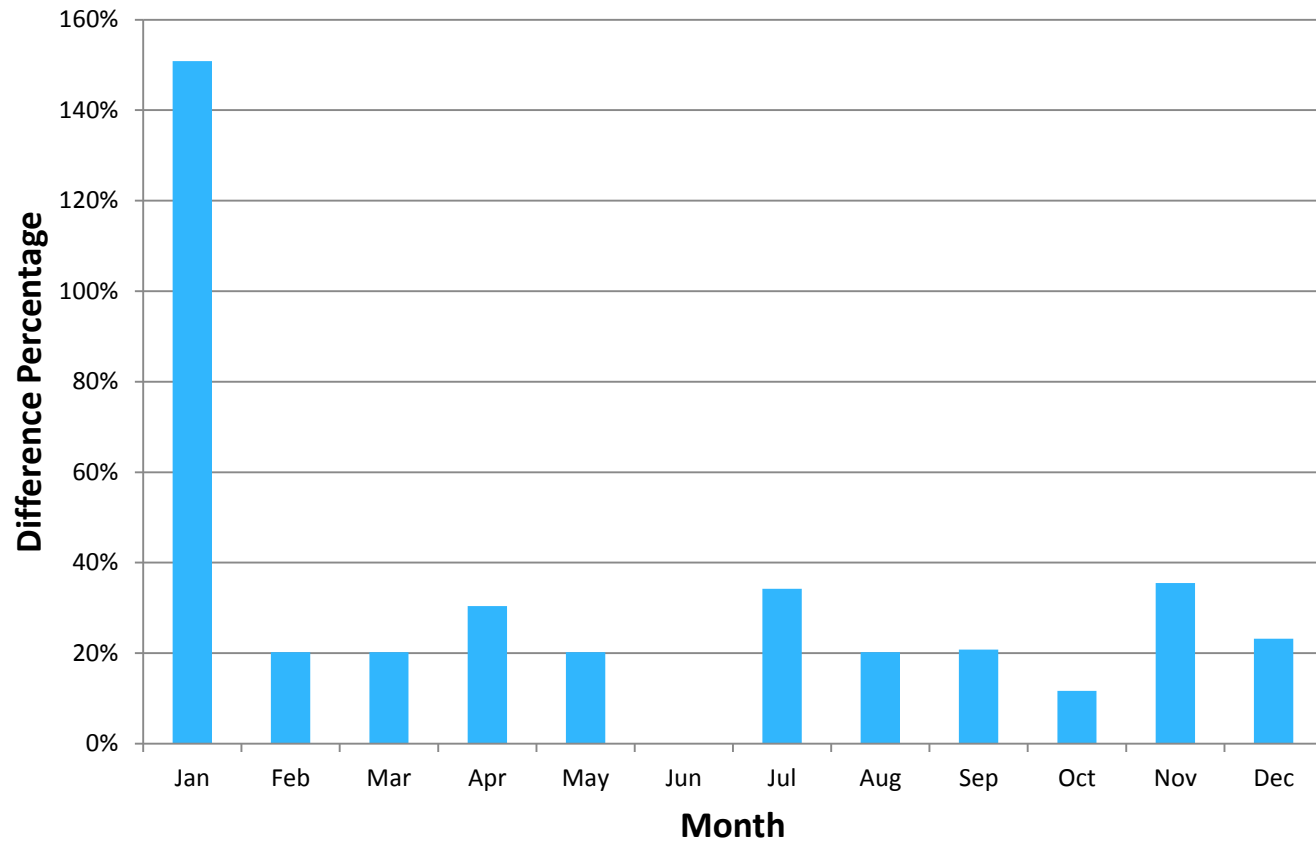
Travel by Mile Marker

Mile Marker Usage



Summer versus yearly study

Study Data Comparison



Highlights

- * BVRT approximately **85,000-100,000** trips annually (9.2 miles)
 - * Based on the following assumptions:
 - * Each traveler passes either the 1.0 and 8.5 mile marker
 - * Using the 2.4 counter hits per trip (1.0 and 8.5 surveys)
 - * NBPD seasonal adjustment values for months without data
 - * Based on Spring 2012 to Spring 2013

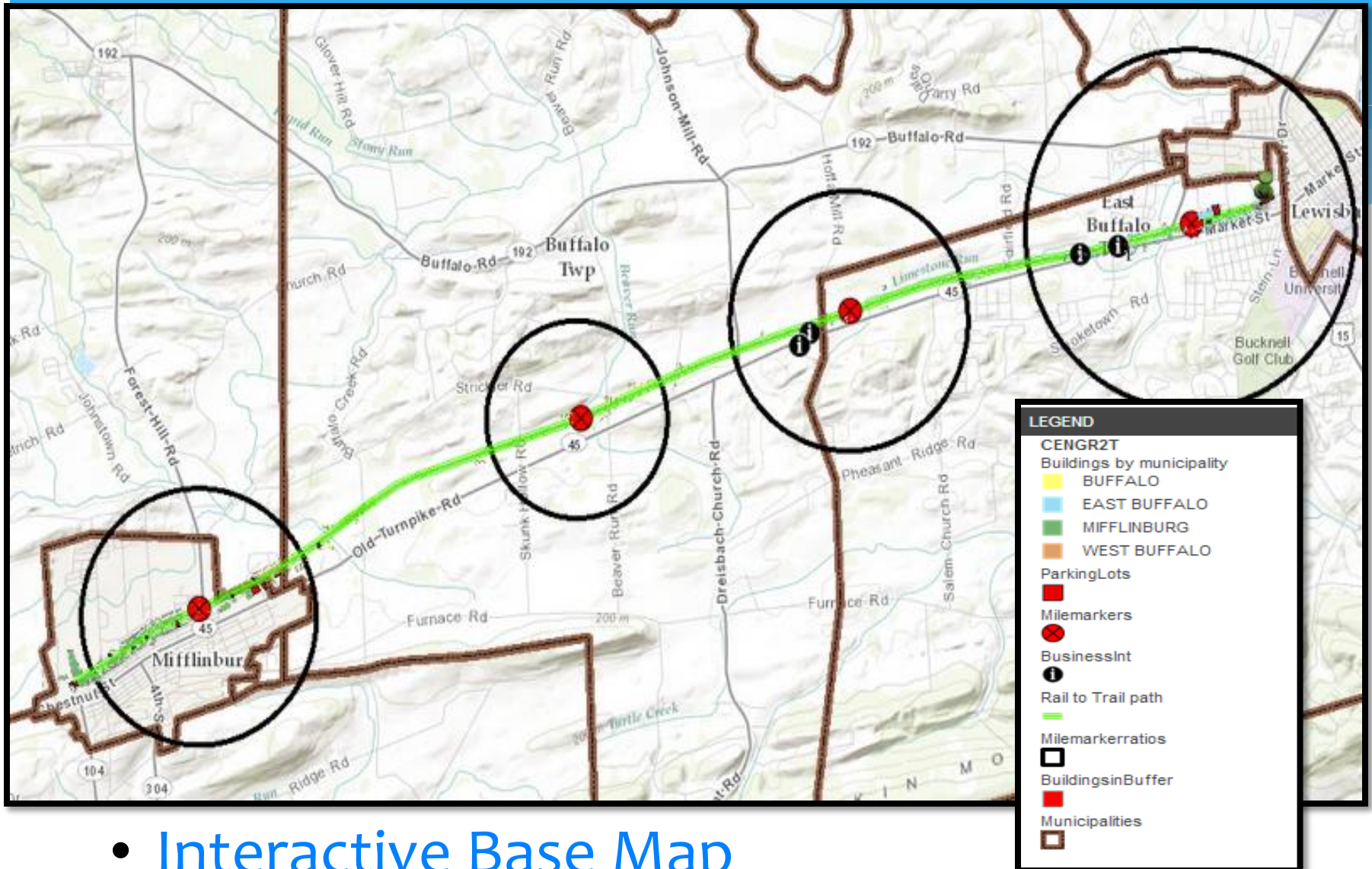
Comparison to other studies

- * BVRT approximately **85,000-100,000** trips annually (9.2 miles)

compared to.....

- * Virginia Creeper Rail Trail (34 miles) located in Southwestern Virginia, has just over 130,000 visitors annually
- * Heritage Trail (26 miles) in Eastern Iowa attracts 134,000 users annually

GIS Applications and Web Map



- [Interactive Base Map](#)

References

- * Alta Planning & Design and the Institution of Transportation Engineers. (2012). National Bicycle and Pedestrian Documentation Project. Retrieved from bikepeddocumentation.org.
- * Oswald, M., Kinnaman, T., Burkhart, K., and Nicholson, M. (2012). *Buffalo Valley Rail Trail 2012 User Survey and Economic Impact Analysis*.
- * TRAFx, Ltd. *TRAFx Infrared Counters and DataNet Software*.

Contact Information

Michelle Oswald, Ph.D., LEED AP

Assistant Professor at Bucknell University

Department of Civil & Environmental Engineering

michelle.oswald@bucknell.edu

Shawn McLaughlin, AICP, CPRP

Planning Director

Union County Planning Commission

smclaughlin@unionco.org

QUESTIONS?

Buffalo Valley Rail Trail 2012
User Survey and Economic
Impact Analysis



FULL REPORT Available at: www.bvrt.org