



# Model Development Status -- SE Region



*presented to*

**Model Task Force**

*presented by*

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**March 6, 2012**





# SE Region Model Development Status



- **SERPM – Miami-Dade, Broward, and Palm Beach Counties**
  - **SERPM 6.52: 2035 LRTP Cost Feasible Plan**
  - **SERPM 6.7: Calibrated and Validated for Transit**
  - **SERPM 7.0:**
    - **ABM, based on the San Diego CT-RAMP**
    - **under construction, for 2040 LRTP developments and other applications**
  
- **(G)TCRPM – Martin, St. Lucie, Indian River, S. Brevard, (and Palm Beach)**
  - **GTCRPM 3: 2035 LRTP Cost Feasible Plan**
  - **TCRPM 4: to be completed by December 2013**



## SERPM 6.52:

# Workhorse for Major Highway Projects

- **I-95 Managed Lane PD&E Projects**
- **I-75/SR-826 Managed Lane Assessment**
  - 2010 Subarea calibrations for each corridor
  - Applying latest corridor O-D surveys
  - Reduced TAZ household workers on the production side to reflect the higher unemployment rate



## SERPM 6.7:

# *A Florida Transit Model FTA Believes!*



- **Model Development Objective:**
  - Be a solid technical tool for multi-modal planning analysis, long-range transit planning and New/Small Starts analysis
  - Understand key transit travel patterns and behaviors
  - Reflect all major findings of recent transit on-board surveys
  - Be reviewed and discussed with Federal Transit Administration staff



## **Highlights of SERPM 6.7** -- excerpts from a presentation to SE Florida FSUTMS Users Group by Dave Schmitt, AECOM

- [http://www.fsutmsonline.net/images/uploads/southeastfloridafsutms/SERPM\\_67\\_Presentation\\_for\\_SEFL\\_FSUTMS\\_UG\\_2-2012.pdf](http://www.fsutmsonline.net/images/uploads/southeastfloridafsutms/SERPM_67_Presentation_for_SEFL_FSUTMS_UG_2-2012.pdf)



# Comprehensive Florida Transit Survey (in chronological order)

System / Survey Year	Weekday Boardings during Survey	Sample Rate (Expandable Surveys)	Sample Rate (Geocodable Surveys)
Metrobus 2004	229,164	4.3%	1.4%
Tri-Rail 2008	15,358	40%	18%
Metrorail 2009	58,908	18%	13%
I-95 Express Bus 2010	2,990	39%	n/a *
Broward County Transit 2010	119,624	6.5%	6.5%
Palm Tran 2010	34,019	9.9%	9.8%

An expandable survey has been reviewed for reasonableness (e.g., does not reflect home-to-home trip, etc.) contains a minimum amount of basic information (e.g., auto ownership, trip purpose, boarding location).

A geocodable survey is a subset of the expandable survey that includes geocodable origin and destination information.

\* The I-95 Express Bus survey did not request detailed origin and destination information.

**First ever comprehensive picture of transit patterns & behavior in Southeast Florida!**



# Key Survey Findings

- There are two major types of transit markets in the South Florida region:
  1. Mobility-dependent market using local services for all trip-making
  2. Commuter market utilizing premium transit service for longer work trips



# Summary of Differences between Mobility-Dependent & Commuter Markets

Trip Characteristic	Mobility-Dependent Market	Commuter Market
Dominant market segment(s)	Zero-car households	Car-owning households
Travel patterns	Dispersed travel patterns; no meaningful CBD market	Primary destinations are Miami CBD area and suburban employment areas
Primary access modes	90+% Walk	57% Walk (Metrorail); 70+% Auto (I-95EX, Tri-Rail)
Average trip length	~6.5 miles	Ranges from 7.6 miles (Metrorail) to 28.7 miles (Tri-rail)
Dominant trip purpose(s)	No dominant trip purpose	Work





# Key Survey Findings

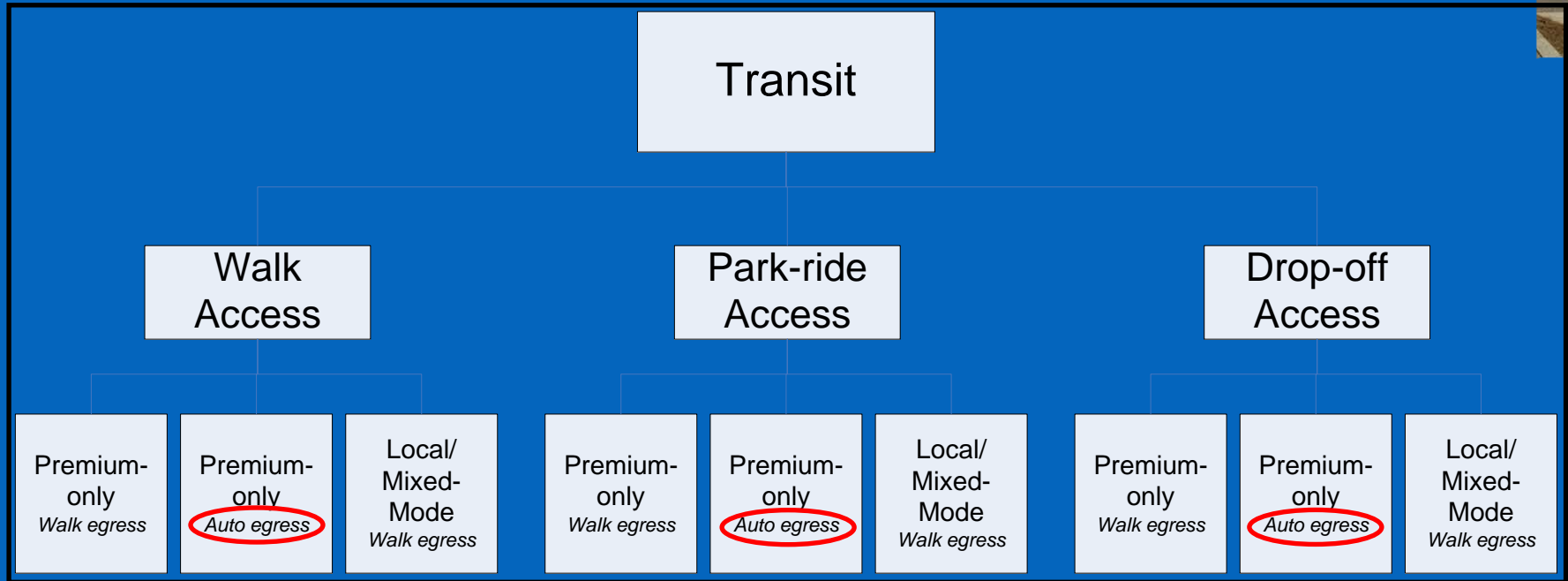
- While work trips from car-owning households comprise the commuter market, the market itself consists of three distinct sub-markets:
  1. Traditional commuter market utilizing urban rail to distribute Miami-Dade workers to jobs in and around the Miami CBD
  2. Second traditional commuter market utilizing express bus service to connect Broward County workers to jobs in and around the Miami CBD
  3. Non-traditional inter-county market utilizing commuter rail to connect workers with jobs throughout the 3-county region, with these trips beginning and ending in different counties with no dominant destination



# Summary of Differences among Commuter Sub-Markets

Trip Characteristic	<u>Traditional Commuter #1</u> Miami-Dade County to Miami CBD	<u>Traditional Commuter #2</u> Broward County to Miami CBD	<u>Non-Traditional Commuter</u> Inter-County Movements
Dominant origin/ production	Miami-Dade County	Broward County	No dominant origin/production
Dominant destination/ attraction	Miami CBD and surrounding area		No dominant destination/attraction
Primary access mode(s)	57% walk, 43% auto	~75% auto, ~25% walk	
Average trip length	7.6 miles	Ranges from 12-20 miles depending on route	28.7 miles
Primary egress mode(s)	Walk		77% walk, 23% auto

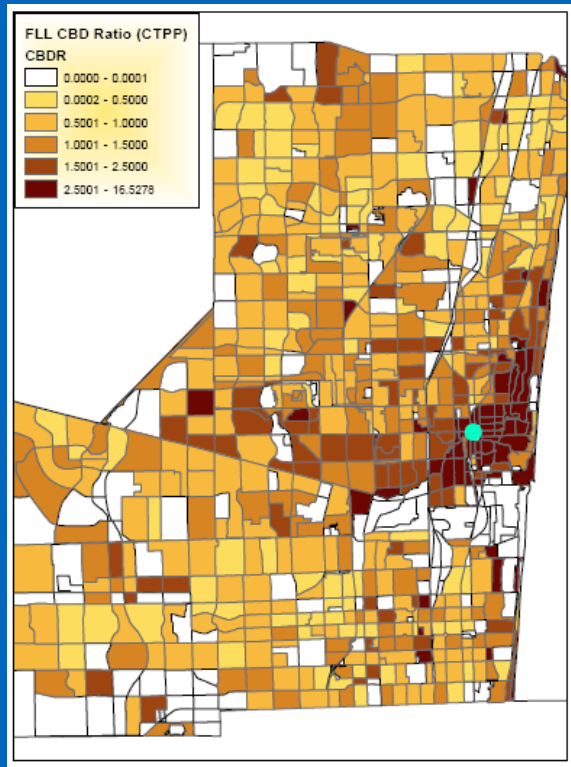
# SERPM 6.7 Path/Mode Choice Structure



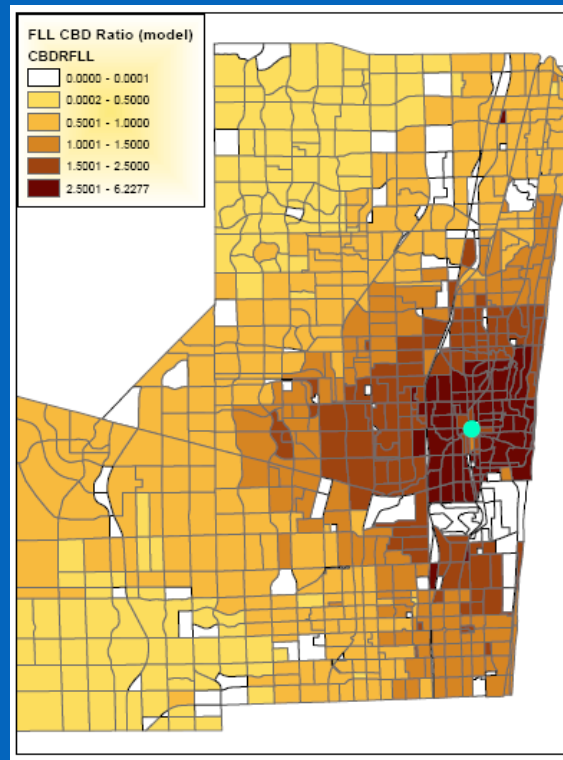
- Premium services – not generally subject to auto signals and/or traffic delays (95 Express, 95X, Metrorail, Tri-Rail)
- Local services – generally subject to auto signals and/or traffic delays (Metrobus, BCT, Palm Tran)
- Mixed-mode – path utilizing both local and premium services



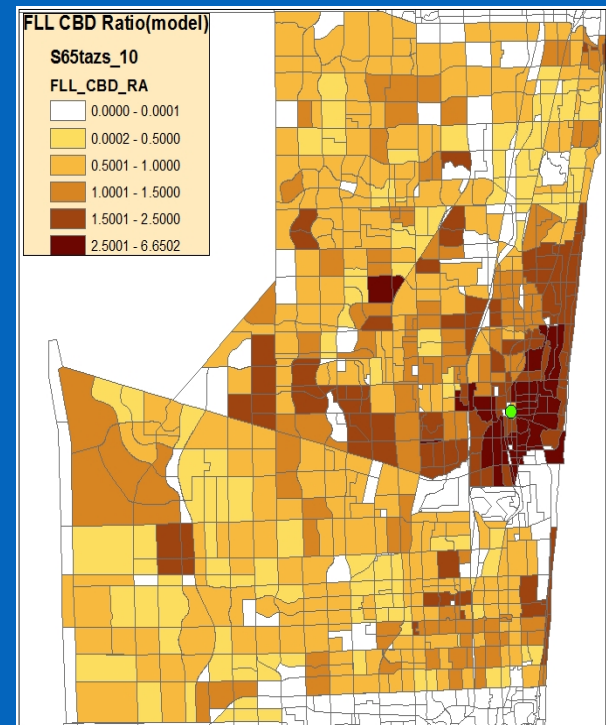
# Using CTPP Journeys for Work Distribution Results – Journeys to downtown Ft. Lauderdale



CTPP



SERPМ 6.5

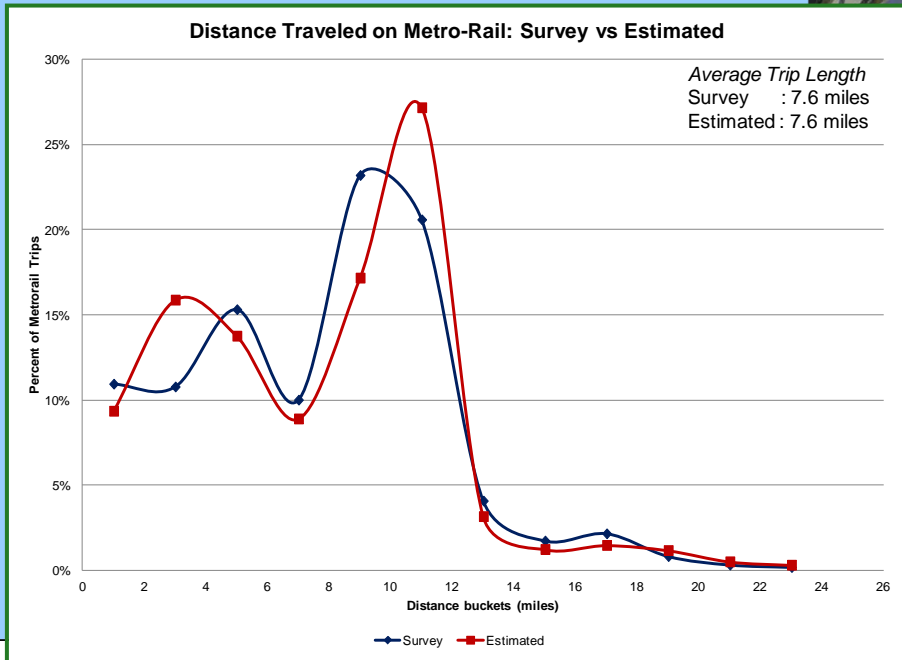


SERPМ 6.7

# Metrail trip length: Survey v/s Estimated

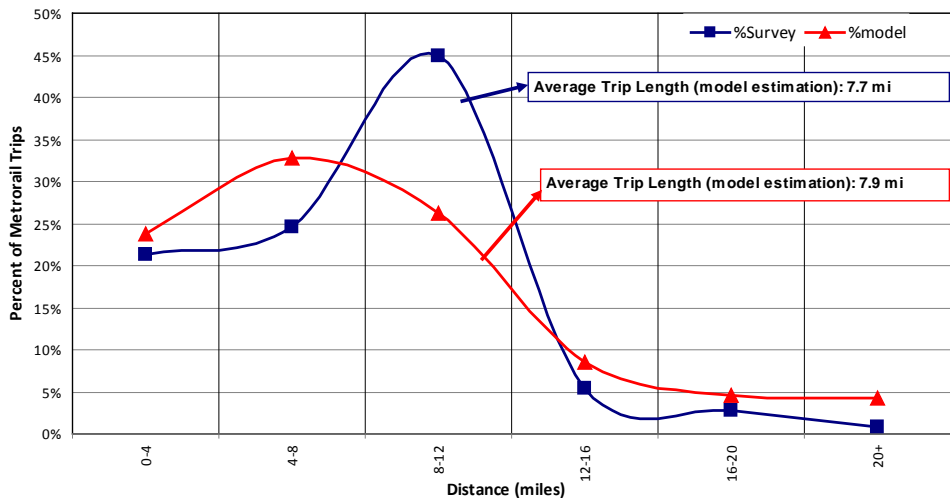
- Much improved representation of Metrorail trip lengths and station-to-station patterns!

SERPM 6.5



SERPM 6.7

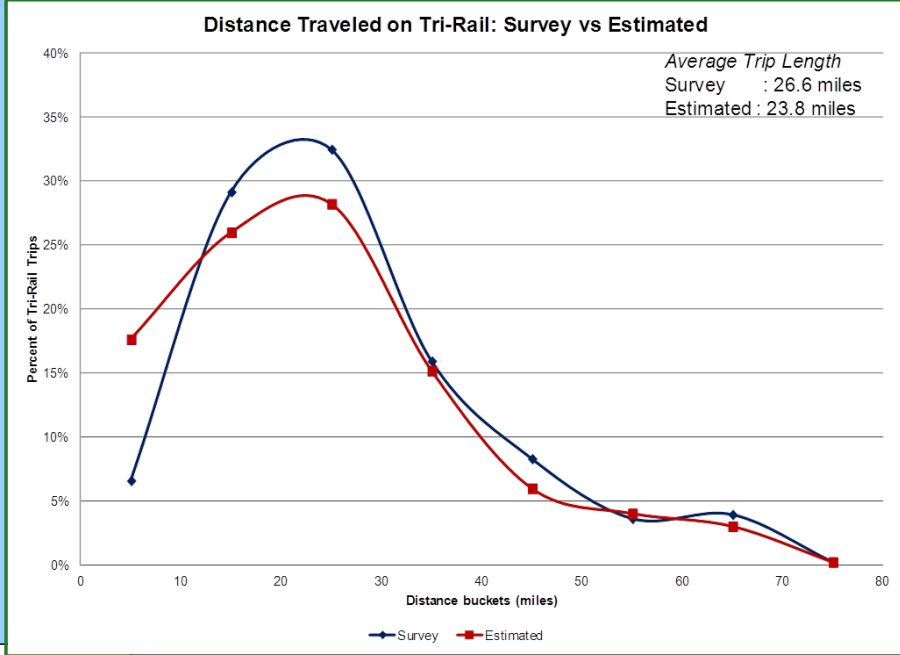
Comparison of distance traveled on Metrorail (survey vs model)



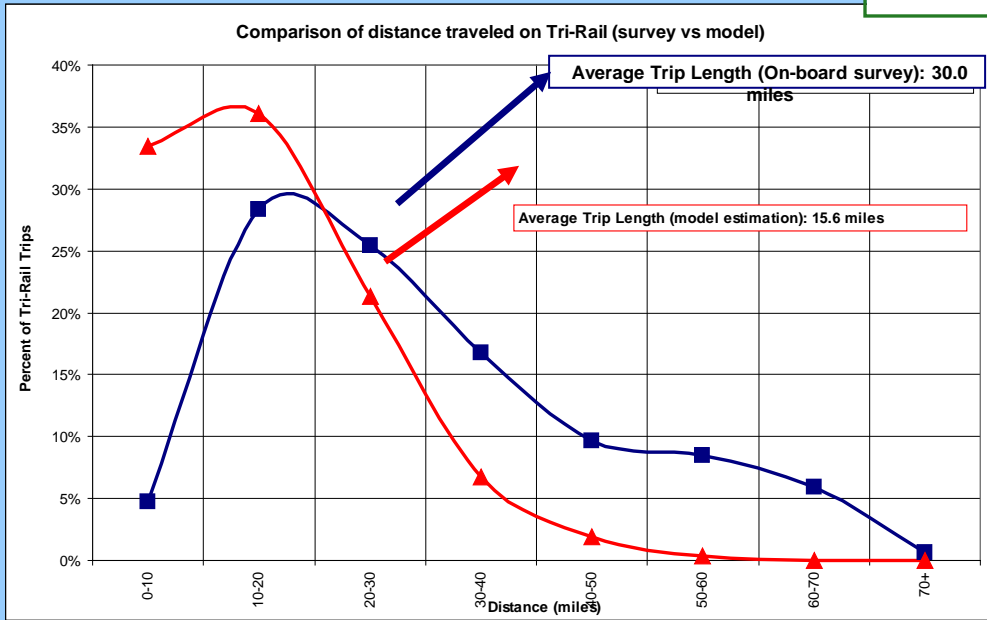


# Tri-Rail Trip Length: Survey vs. Estimated

- Much improved representation of Tri-Rail trip lengths and station-to-station patterns!



## SERPM 6.5

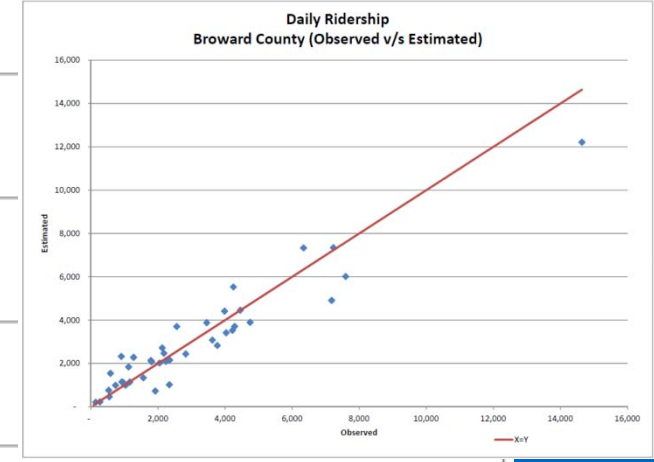
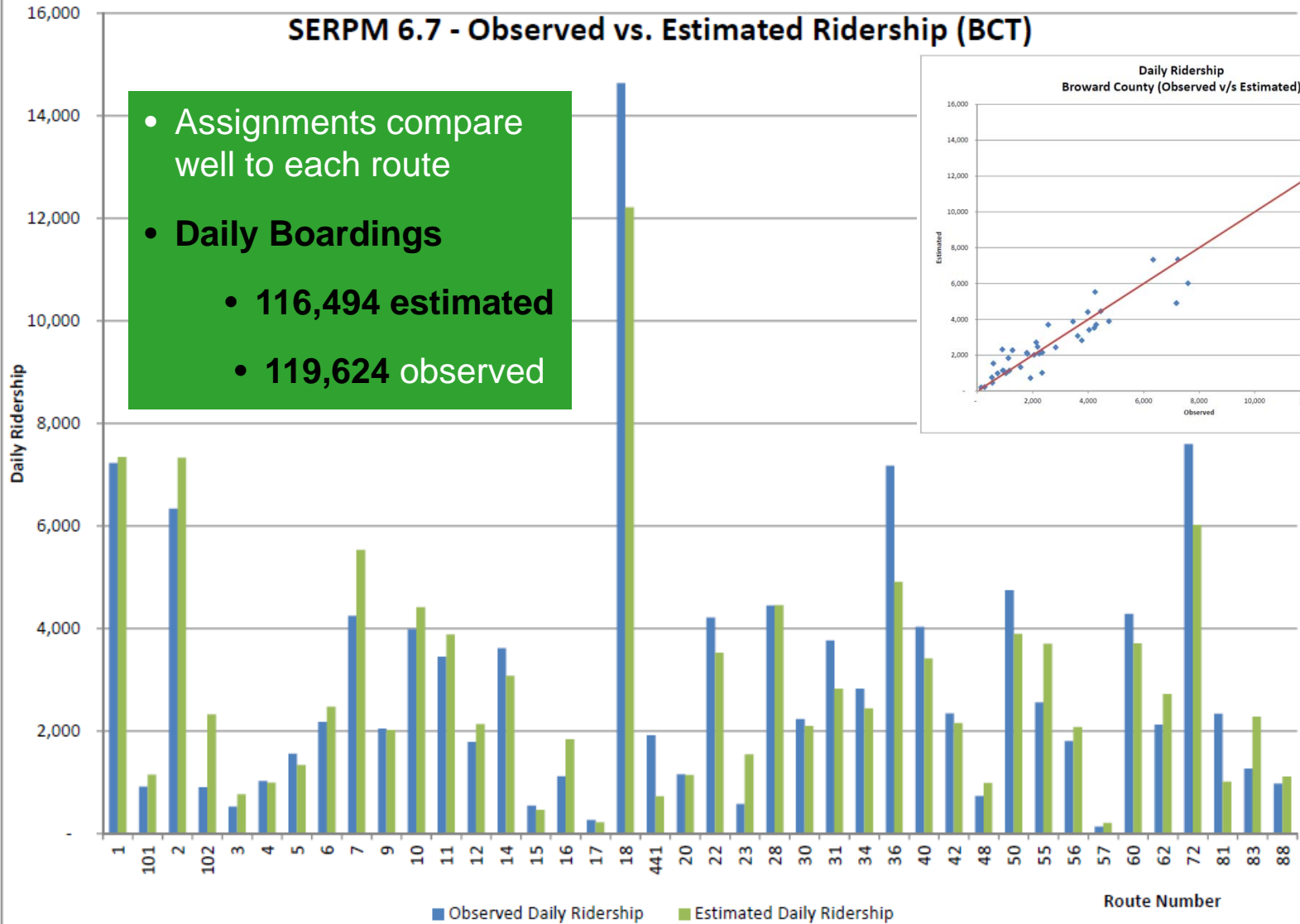


## SERPM 6.7

# Broward County Transit (BCT) Line-by-Line Boardings

SERPM 6.7 - Observed vs. Estimated Ridership (BCT)

- Assignments compare well to each route
- **Daily Boardings**
  - **116,494 estimated**
  - **119,624 observed**





# Longitudinal Validation Tests

- Longitudinal tests are correlational comparisons across periods of time
- Powerful tests because they validate model's ability to forecast
  - Robust model validation → does model replicate existing patterns?
  - Longitudinal tests → does model correctly react to key variables?
- For SERPM 6.7, verify the model's sensitivity of Tri-Rail boardings to:
  - Introduction of 95E inter-county express bus service on managed lanes
  - Higher fuel prices
  - Tri-Rail and Tri-Rail shuttle service changes







# Longitudinal Validation Tests

## Introduction of 95E Express-Bus Service

- Inter-county bus service introduced in early 2010 in conjunction with opening of 95 Express on managed lanes
- Tri-Rail survey used for calibration conducted in 2008
- 95E bus surveys showed that 434 trips previously used “other transit” before switching to 95E service
- New transit model → introduction of 95E service decreases Tri-Rail boardings by 603 boardings per weekday
- Conclusion: model effectively replicates impact of 95E bus service on Tri-Rail ridership




# Longitudinal Validation Tests

## Higher Fuel Prices

- Fuel prices experienced strong increases in 2008, which impacted Tri-Rail ridership
  - March 2008           \$3.34 monthly average
  - June 2008           \$4.16 monthly average
  - June 2010           \$2.72 monthly average
- Test: adjust auto operating cost to reflect higher fuel prices and assess impact on Tri-Rail ridership
  - Observed elasticities → +0.43-0.48
  - Estimated elasticities → +0.17-0.21
- Conclusion: model results are consistent with other research, observed elasticities heavily influenced by macroeconomic impacts



# Longitudinal Validation Tests Tri-Rail Service Changes

- Tri-Rail service increased from 32 trains/day in 2005 to 50 trains/day in 2010
  - Tri-Rail shuttle service, which provides distribution service for Tri-Rail riders, increased nearly 300% in 2005-2010
  - Test: compare impacts of service increases on Tri-Rail boardings
    - Observed elasticities  $\rightarrow +0.61$
    - Estimated elasticities  $\rightarrow +0.57$
  - Conclusion: model effectively replicates ridership changes from service increases
- 



# FTA Coordination and Reaction

- 4 face-to-face meetings with FTA Planning staff in Washington DC
  - 2010 July: reviewed SERPM 6.5 attributes, **discussed model improvement strategy**
  - 2010 December: **reviewed transit survey findings and model development process**
  - 2011 July: **reviewed model development activities, discussed calibration/validation process**
  - 2011 October: **reviewed calibration/validation results**
- Very positive reaction to development and calibration/validation process
  - Development **based on transit survey data, not pre-conceived ideas**
  - Calibration **meant adding previously unknown travel behaviors, not adjusting constants**
  - Validation **based on replicating key behaviors, not “number matching”**
  - Longitudinal checks extremely helpful in **assessing model’s forecasting abilities before planning analysis begins**
- FTA agrees that SERPM 6.7 can be used for multi-modal planning and New/Small Starts analysis





# Summary



- **SERPM 6.7's transit model:**
  - Meets all stated objectives
  - Captures key transit travel behaviors
  - Reasonably reacts to changes to transportation variables
- **FTA has reviewed SERPM 6.7 and agrees its use for New/Small Starts analysis**
- **SERPM 6.7 is currently being used for multi-modal projects:**
  - South Florida East Coast Corridor Study, Phase 3 (FEC)
  - Central Broward Transit Study
  - Oakland Park Boulevard AA
  - Broward Boulevard AA
- **Future Findings from new transit surveys will be incorporated as those results and findings become**



## Key to the Success

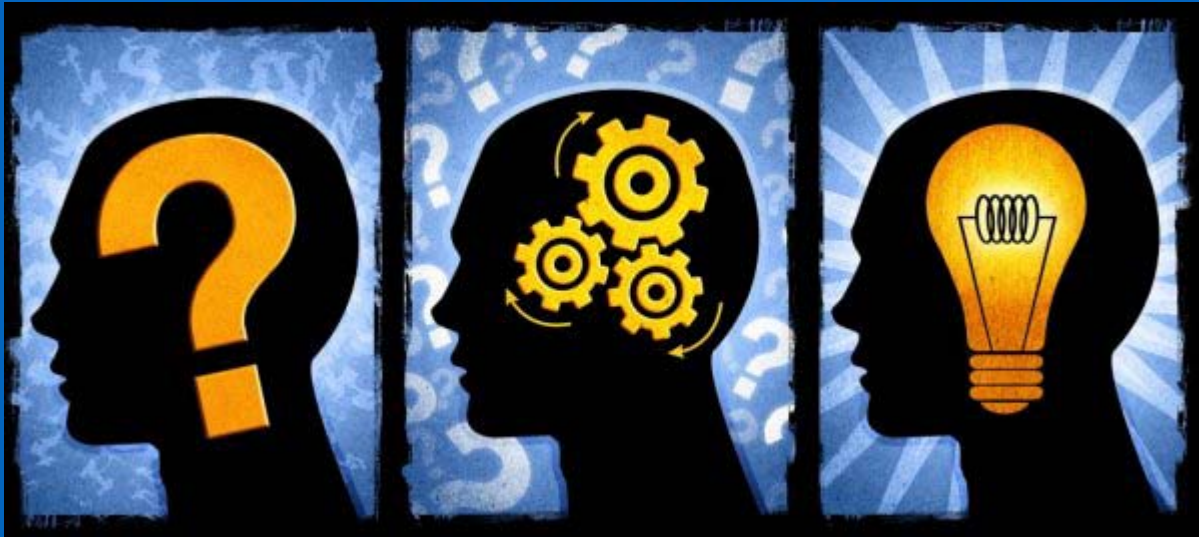


- **Comprehensive picture of transit patterns & behavior**
- **Robust calibration/validation based on replicating key behaviors**
- **Validation of pathbuilding structure**
- **Calibration/validation based on detailed transit survey data**
- **Use of longitudinal tests to assess forecastability**



# Conclusion on SERPM 6.7 Transit Model Development

- **Example of a Successful (but lengthy/stressful?) experience**
- **Data Collection – multi-agency collaboration efforts, takes time and \$**
- **Learn Insights from Data Analysis and Inform the model**
- **Avoid over-specifications and test model well**
- **Have FTA involved (modelers only)**



***Thanks!***