

# Using Data Analysis to Choose Performance Measure Targets

Safety Target Setting Workshop

November 14, 2016

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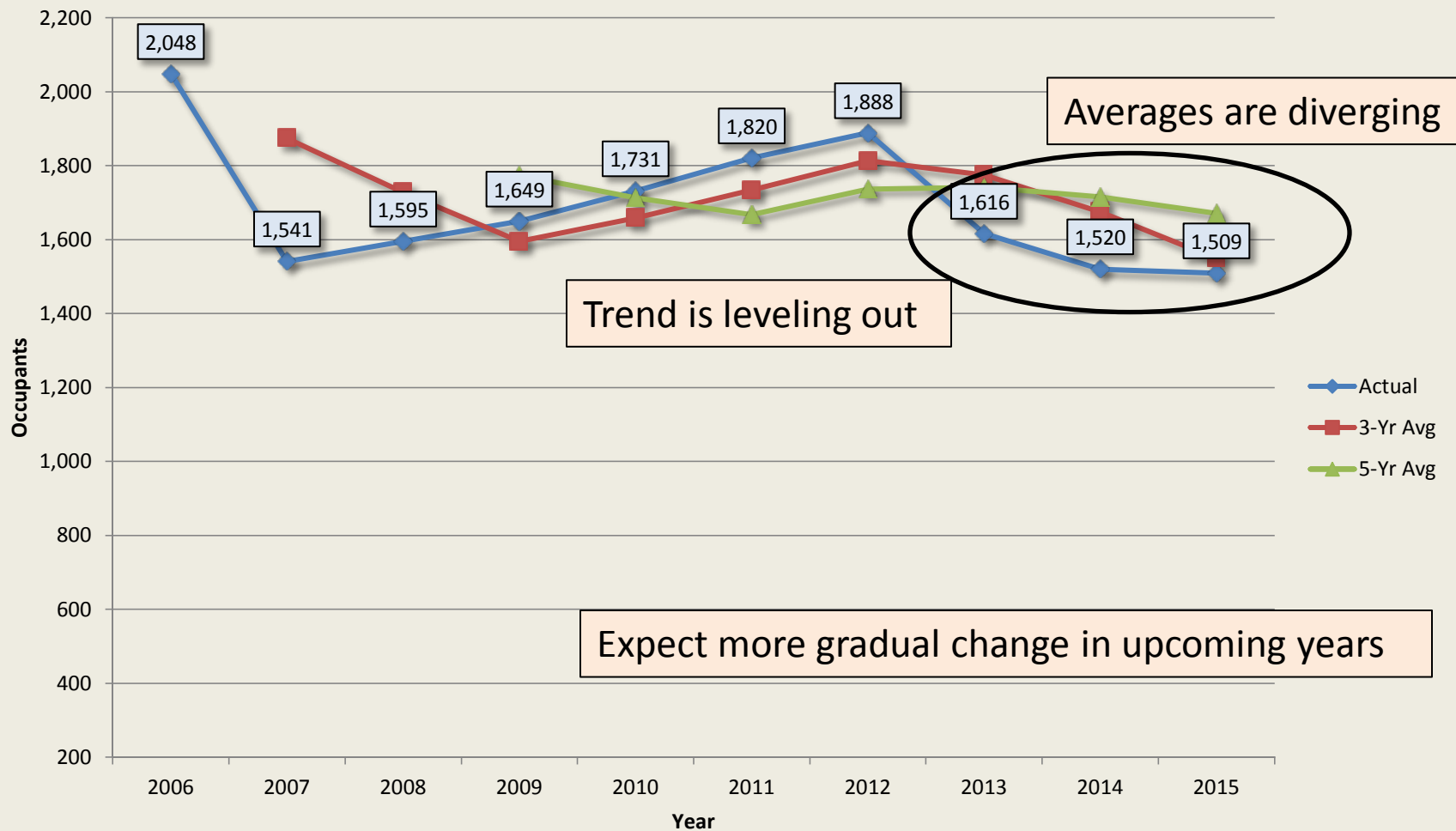
Tennessee Department of Safety and Homeland Security



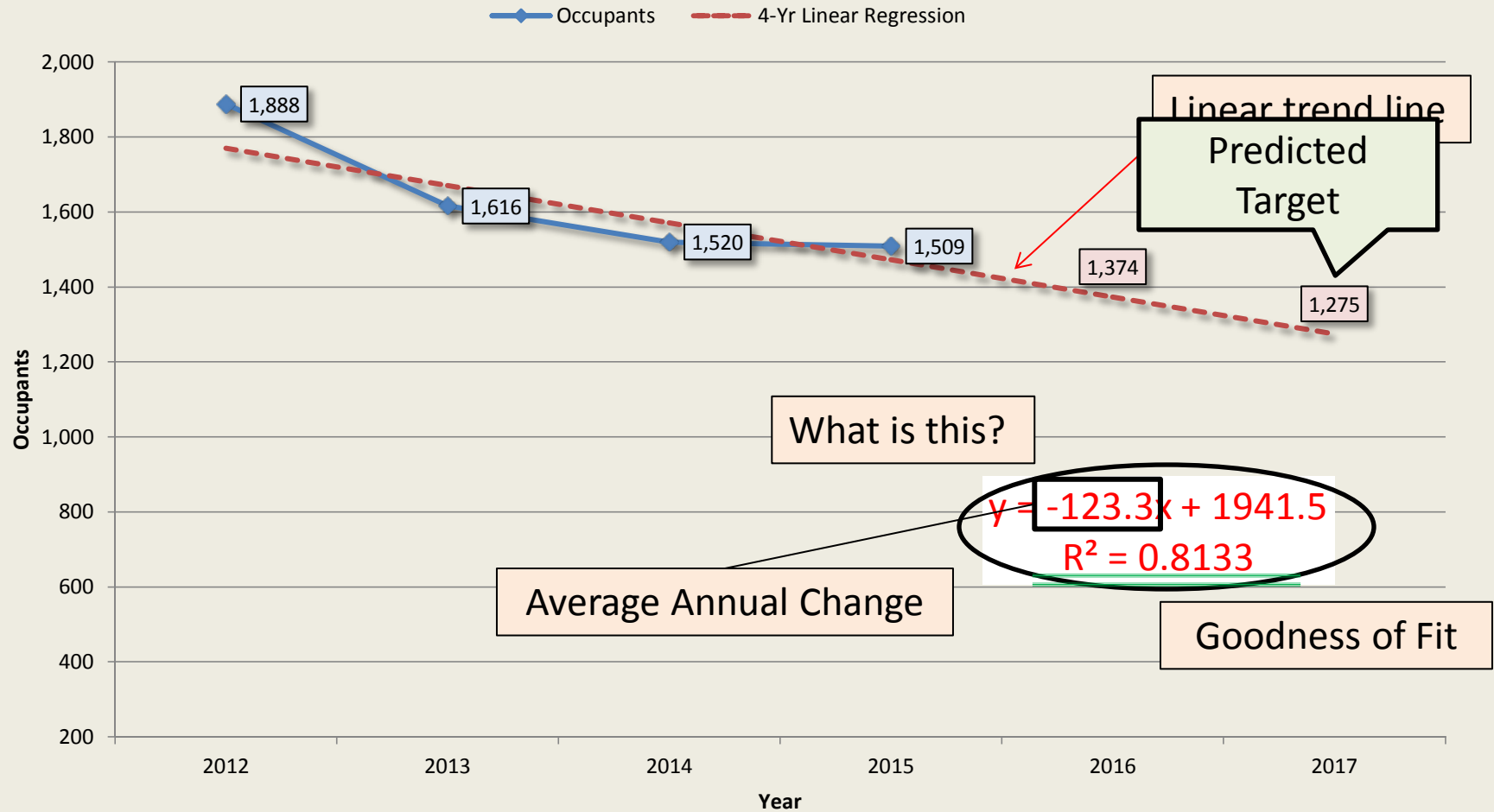
# Some Trend Analysis Examples

- 1) Moving Averages
- 2) Four year linear trend analysis
- 3) Five year linear trend analysis
- 4) Alternate baseline analyses

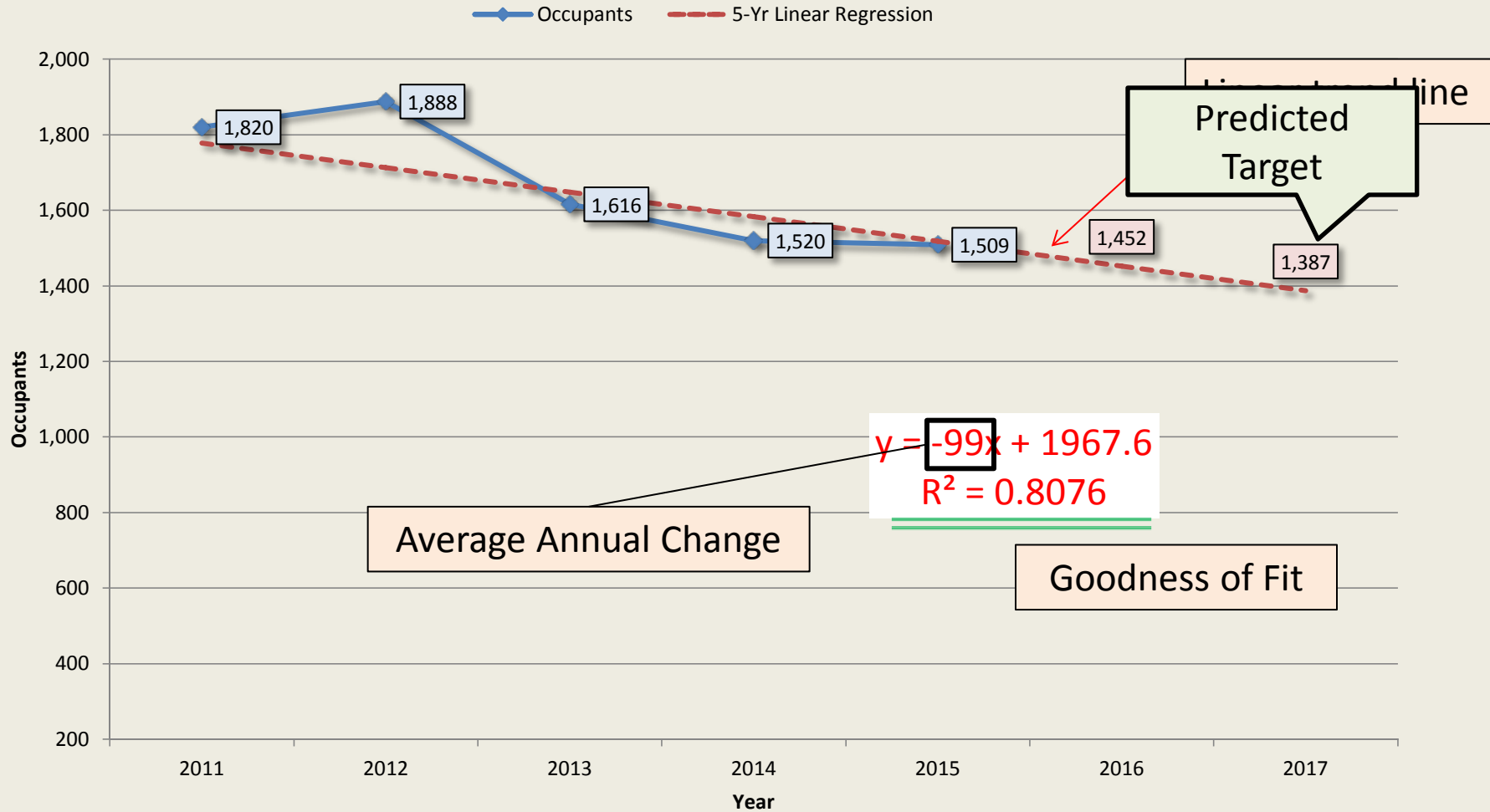
# Unrestrained Deaths and Serious Injuries: Moving Averages Nashville MPO



# Unrestrained Deaths and Serious Injuries: 4-Year Linear Trend Nashville MPO



# Unrestrained Deaths and Serious Injuries: 5-Year Linear Trend Nashville MPO



# Unrestrained Deaths and Serious Injuries: Alternate Baseline Nashville MPO

Three Year Alternative Baseline Analysis

Baseline Period		Comparison Year		% Change
2008 - 2010 Avg.	1,658	2013	1,616	-2.6%
2009 - 2011 Avg.	1,733	2014	1,520	-12.3%
2010 - 2012 Avg.	1,813	2015	1,509	-16.8%
Current Mutli-Year Base		Target Year	Estimate	Avg % Change
2013 - 2015 Avg.	1,548	2017	1,385	-10.5%

Baseline Averages

Comparison Years

Five Year Alternative Baseline Analysis

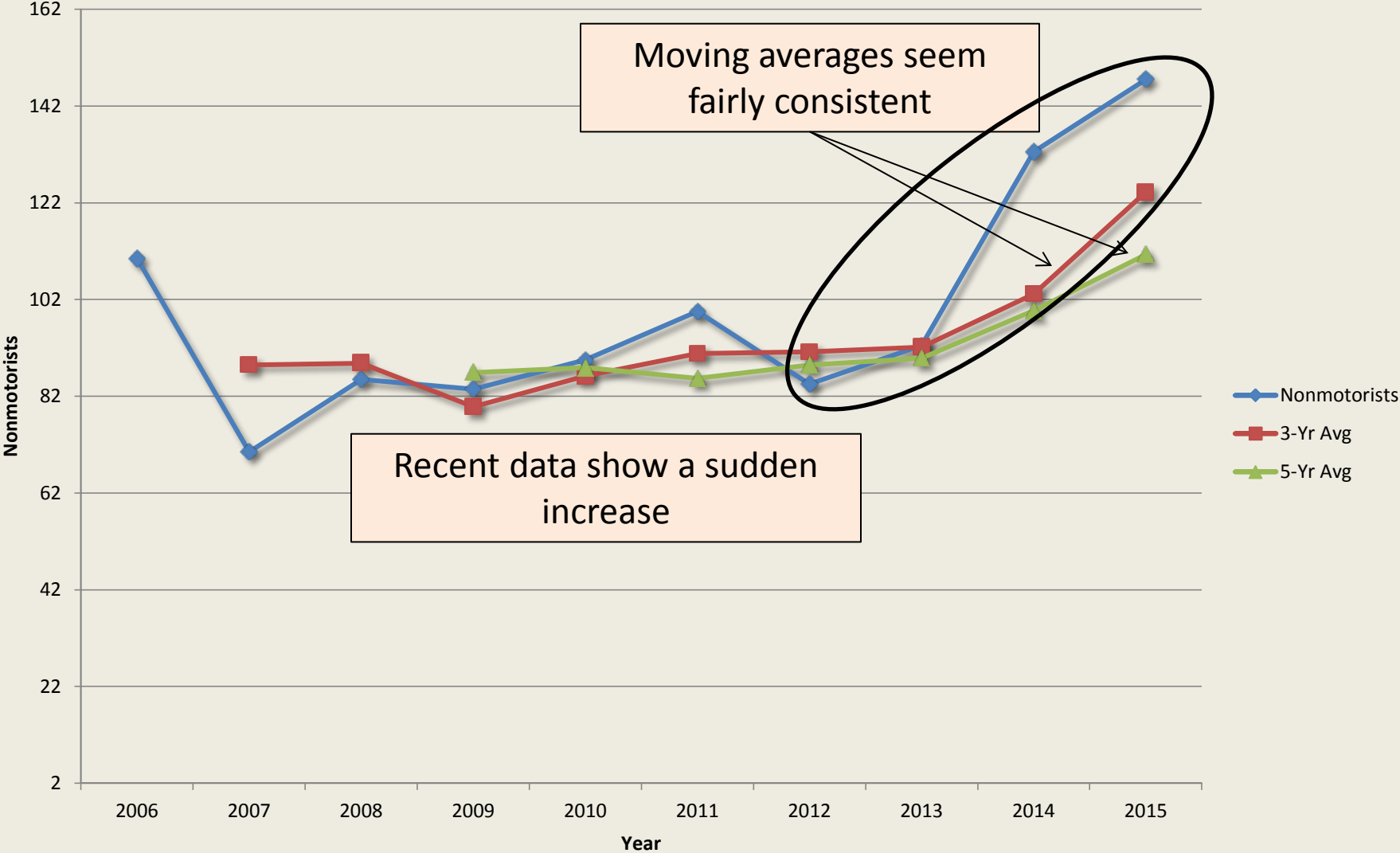
Baseline Period		Comparison Year		% Change
2006 - 2010 Avg.	1,713	2013	1,616	-5.6%
2007 - 2011 Avg.	1,667	2014	1,520	-9.4%
2008 - 2012 Avg.	1,737	2015	1,509	-13.1%
Current Mutli-Year Base		Target Year	Estimate	Avg % Change
2011 - 2015 Avg.	1,671	2017	1,517	-9.2%

Average Percent Change

# Choose A Performance Measure Target

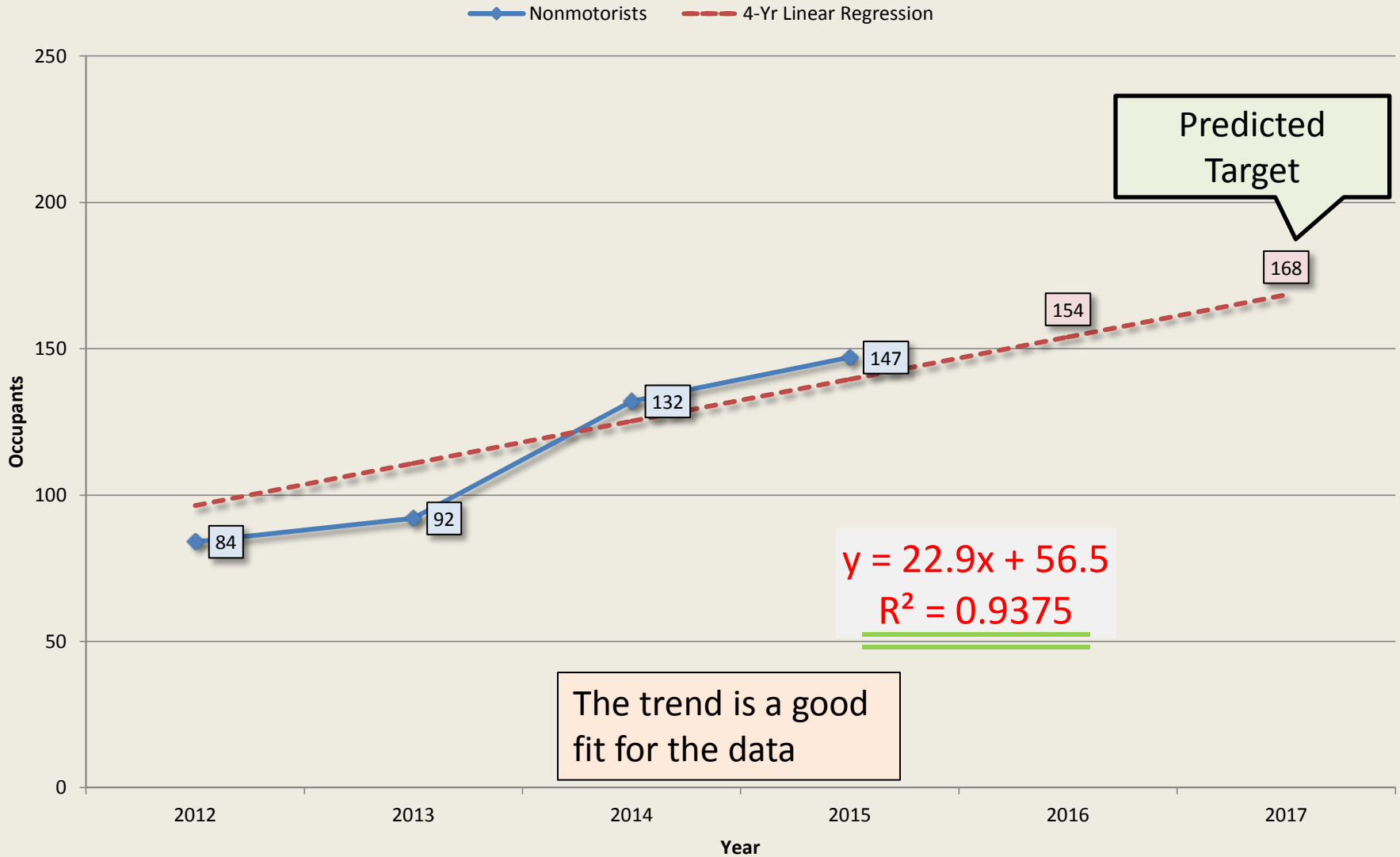
- Moving Averages
  - Suggest the decreasing trend is leveling off
- 4 Year Linear Trend
  - Decent fit, but perhaps an optimistic estimate
- 5 Year Linear Trend
  - Also a decent fit, but a more conservative estimate
- Alternative Baselines
  - Do we think recent trends are leveling off, or will the recent decreases continue?

# Nonmotorist Deaths and Serious Injuries: Moving Averages Nashville MPO

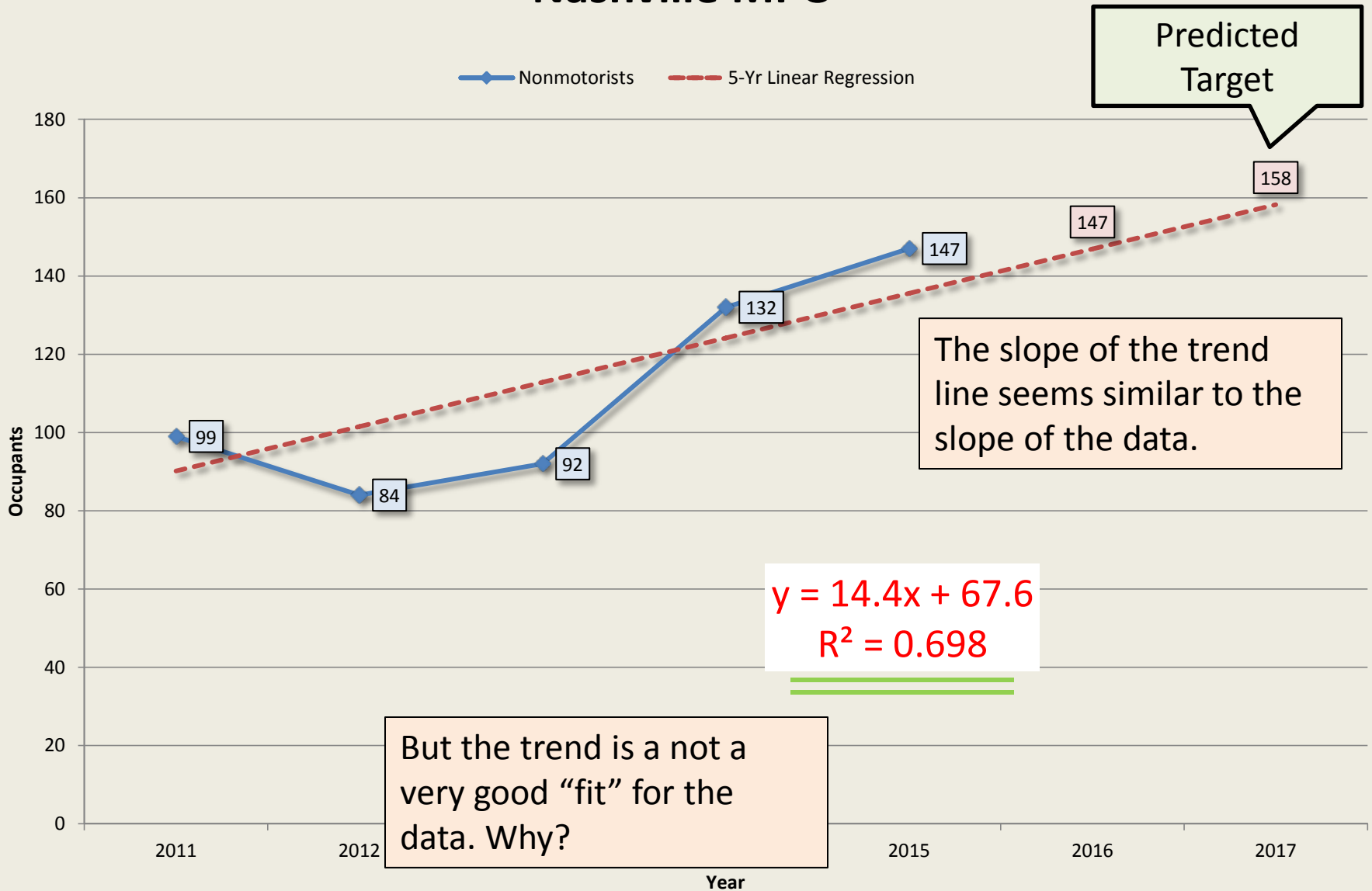




# Nonmotorist Deaths and Serious Injuries: 4-Year Linear Trend Nashville MPO



# Nonmotorist Deaths and Serious Injuries: 5-Year Linear Trend Nashville MPO



# Nonmotorist Deaths and Serious Injuries: Alternate Baseline Nashville MPO

Three Year Alternative Baseline Analysis

Baseline Period		Comparison Year		% Change
2008 - 2010 Avg.	86	2013	92	7.4%
2009 - 2011 Avg.	90	2014	132	46.1%
2010 - 2012 Avg.	91	2015	147	62.1%
Current Mutli-Year Base		Target Year	Estimate	Avg % Change
2013 - 2015 Avg.	124	2017	171	38.6%

Five Year Alternative Baseline Analysis

Baseline Period		Comparison Year		% Change
2006 - 2010 Avg.	87	2013	92	5.3%
2007 - 2011 Avg.	85	2014	132	54.9%
2008 - 2012 Avg.	88	2015	147	67.0%
Current Mutli-Year Base		Target Year	Estimate	Avg % Change
2011 - 2015 Avg.	111	2017	158	42.4%

# A Predicament

What if *every* analysis shows an increase?

- Choose a small reduction as the performance target
- Choose to maintain or decrease the current value
- Choose the limit the increase to some reasonable amount below the expected value

# Other Estimation Methods

- Non-linear regression models
- Other traditional statistical models
- Time series analysis
- Machine learning algorithms
- Geo-spatial analytics

# Other Sources of Crash and Roadway Data

For understanding crash and roadway data:

- MMUCC (<http://www.mmucc.us/>)
- ANSI D-16  
(<https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/07D16>)
- MUTCD (<http://mutcd.fhwa.dot.gov/> )
- MIRE (<http://safety.fhwa.dot.gov/rsdp/mire.aspx>)

For accessing crash and roadway data:

- TN Safety (<http://tn.gov/safety/article/crashdata>)
- THSO (<https://tntrafficsafety.org/>)
- FARS Encyclopedia (<https://www-fars.nhtsa.dot.gov/Main/index.aspx>)
- NHTSA (<http://www.nhtsa.gov/Data>)

# Other Sources of Crash and Roadway Data

For accessing crash and roadway data:

- CDC (<https://www.cdc.gov/motorvehiclesafety/>)
- OHPI (<https://www.fhwa.dot.gov/policyinformation/>)
- FMCSA (<https://ai.fmcsa.dot.gov/default.aspx>)
- Census Bureau (<https://www.census.gov/>)
- TDOT HPMS (<https://www.tn.gov/tdot/article/longrange-travel-data-hpms>)
- TDOT Smartway (<https://smartway.tn.gov/traffic>)

# Choose A Performance Measure Target

- Addresses an issue in the community
- Optimistic, but realistic
- Data driven
- Makes sense
- Use context and experience
- Remember, some choices are obviously bad, but there is no *right* choice.



QUESTIONS?

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