



Update on Winter Season Resource Adequacy Analysis

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Winter Season Resource Adequacy and Capacity Requirements

Issue Charge is posted at:

<http://www.pjm.com/~media/committees-groups/committees/mrc/20161117/20161117-item-09-winter-reliability-requirement-ps-ic-clean.ashx>

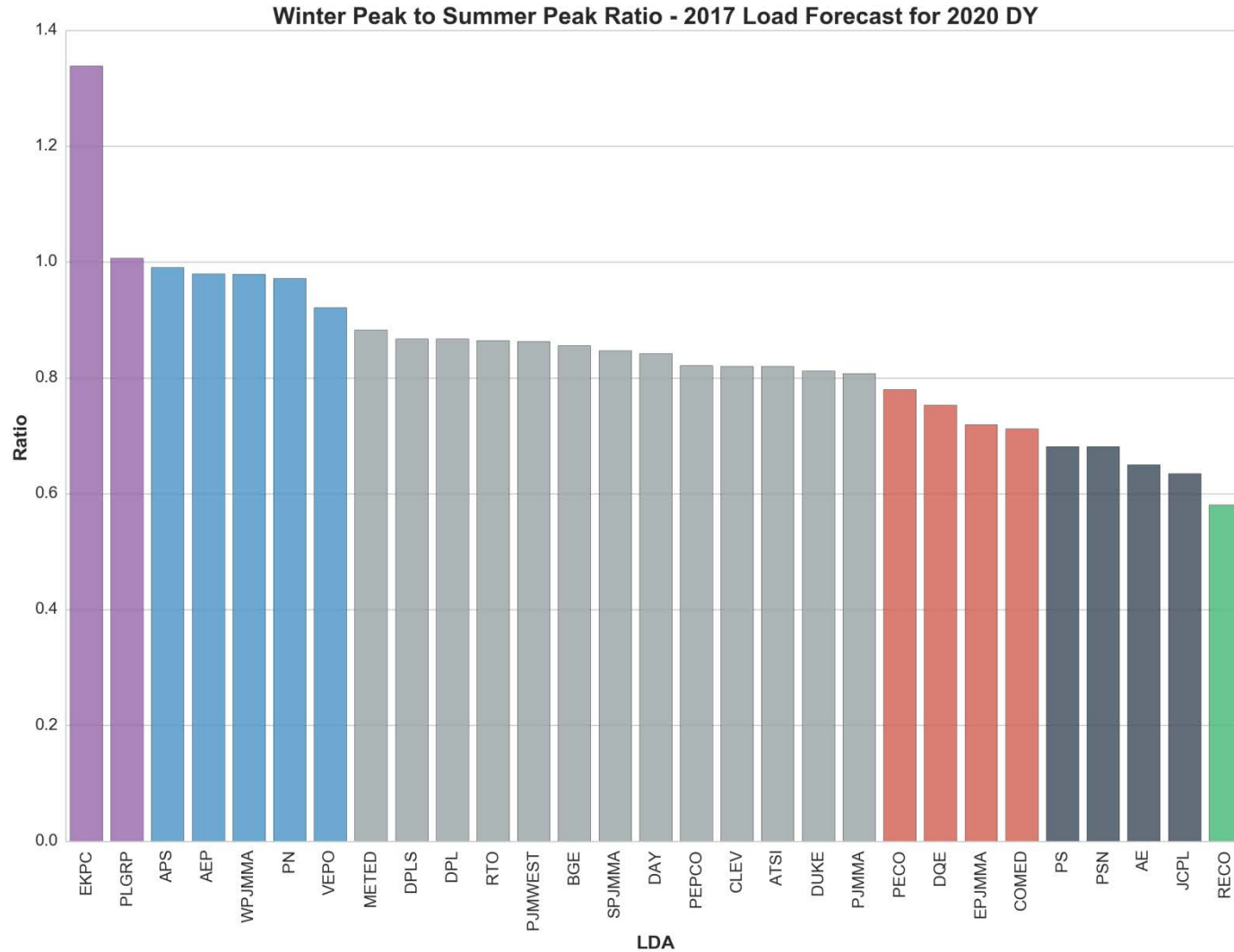
The Issue Charge has three Key Work Activities

- Winter peak load forecasting
- Winter season resource adequacy
- Winter season reliability requirements

Areas of Investigation

- Winter Load Forecast Accuracy
 - Monthly load profile and forecast distribution
- Winter Generation Performance
 - Common mode failures
 - Correlation with load level
 - Maintenance scheduling
- Transmission System
 - Planned and forced outages

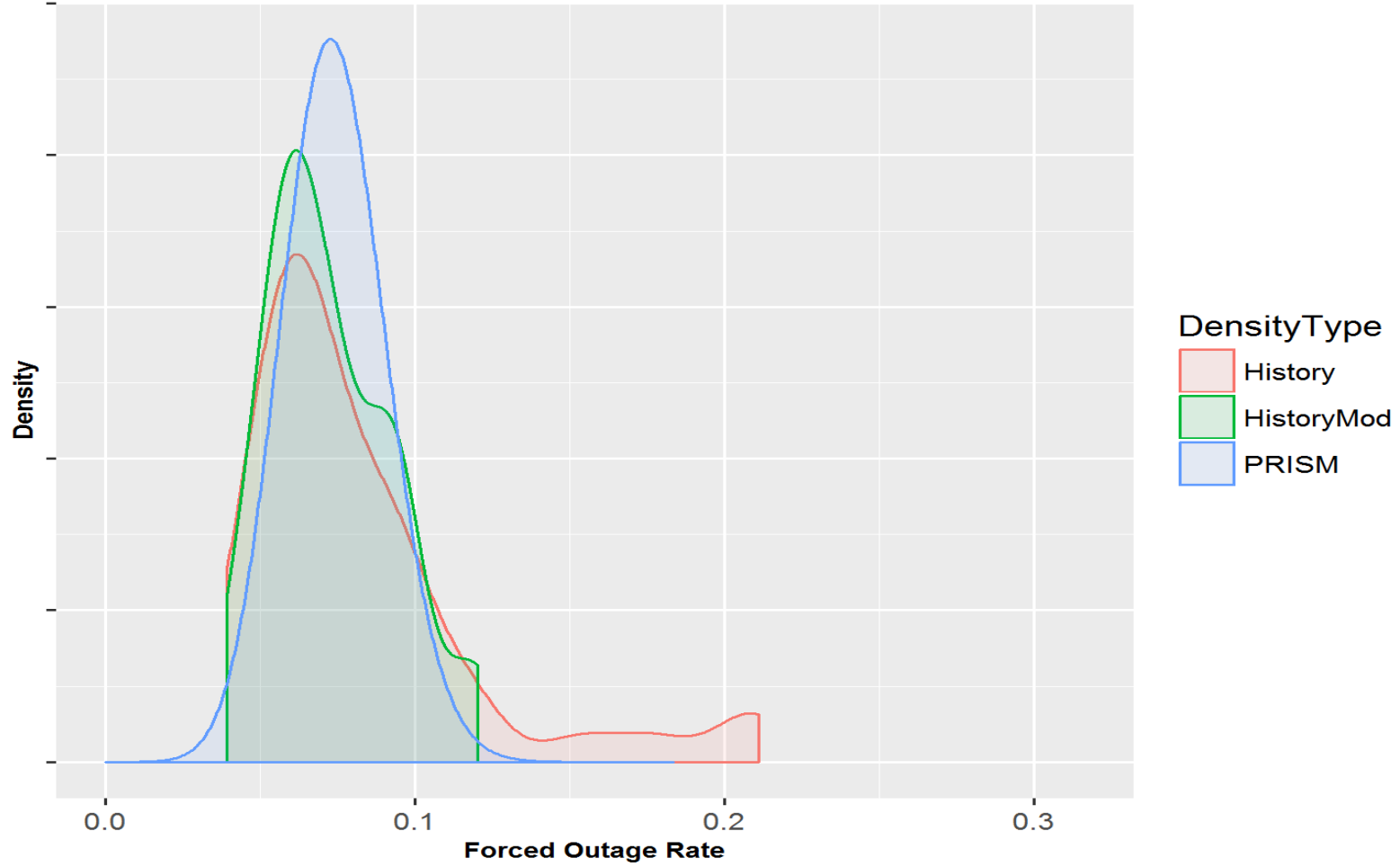
Winter Peak to Summer Peak Ratio – RTO and LDAs

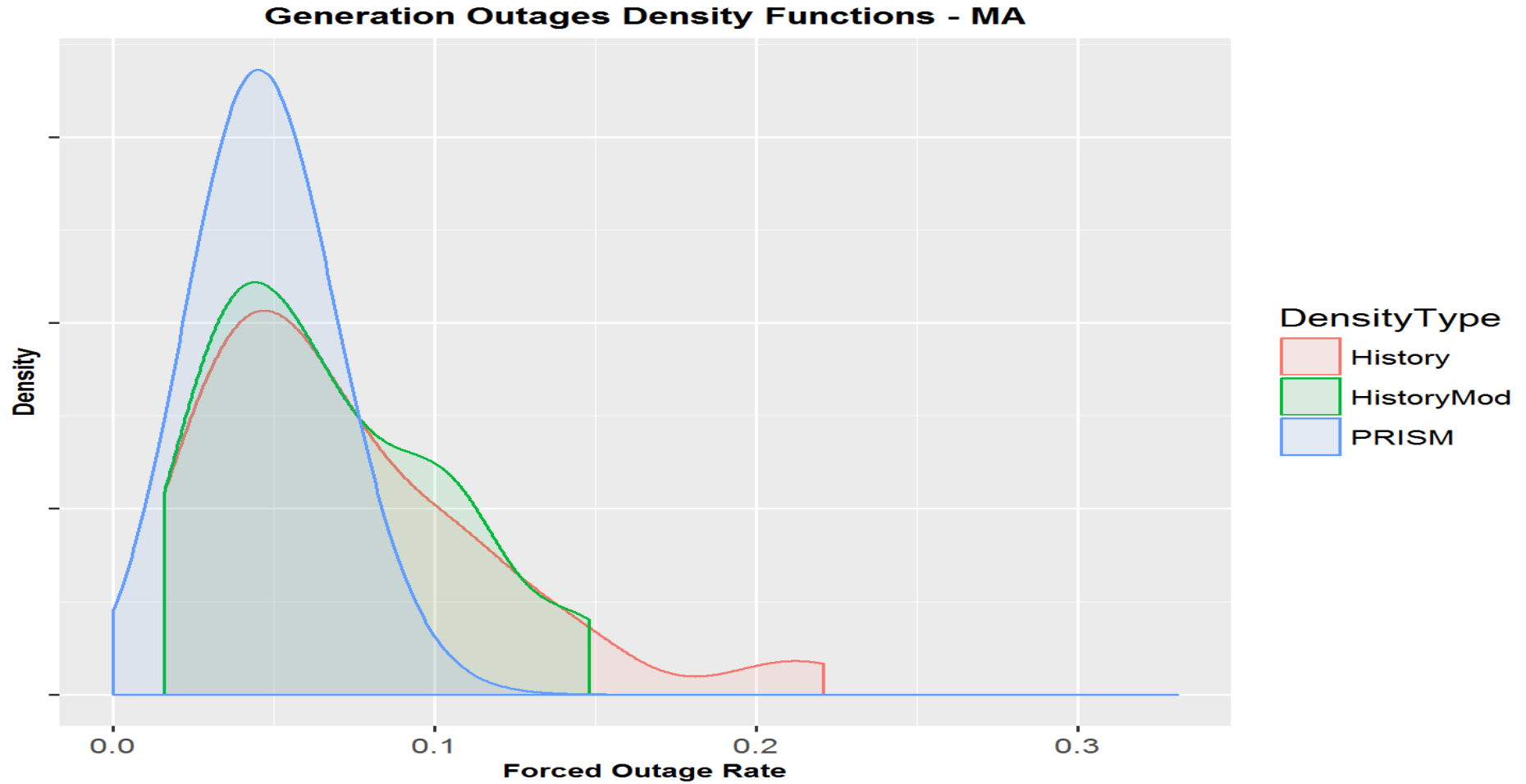


Description of Curves Plotted on Slides 6 and 7

- **PRISM Curve** - Based on individual unit EFORd's that are assumed to be mutually independent.
- **History Curve** – Based on system-wide forced outages from the five weekdays of the peak load week of each of the winters over the 9-yr period (DY2007/08-DY2015/16). (45 data points.)
- **History Mod Curve** – Same as History Curve but removes Winter 2014/15 peak week data (first polar vortex) and replaces it with Winter 2015/16 peak week data (second polar vortex).

Generation Outages Density Functions - PJM

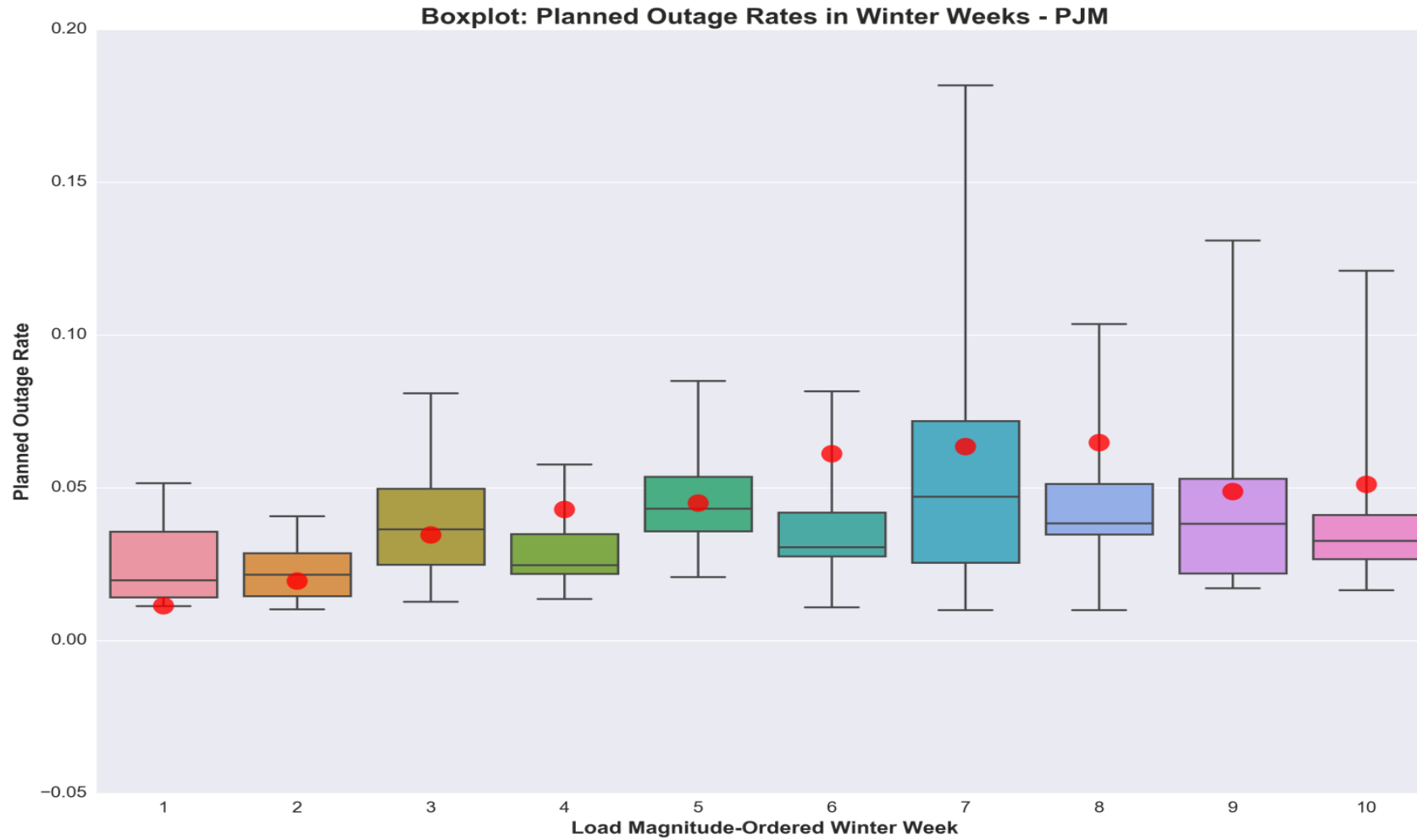




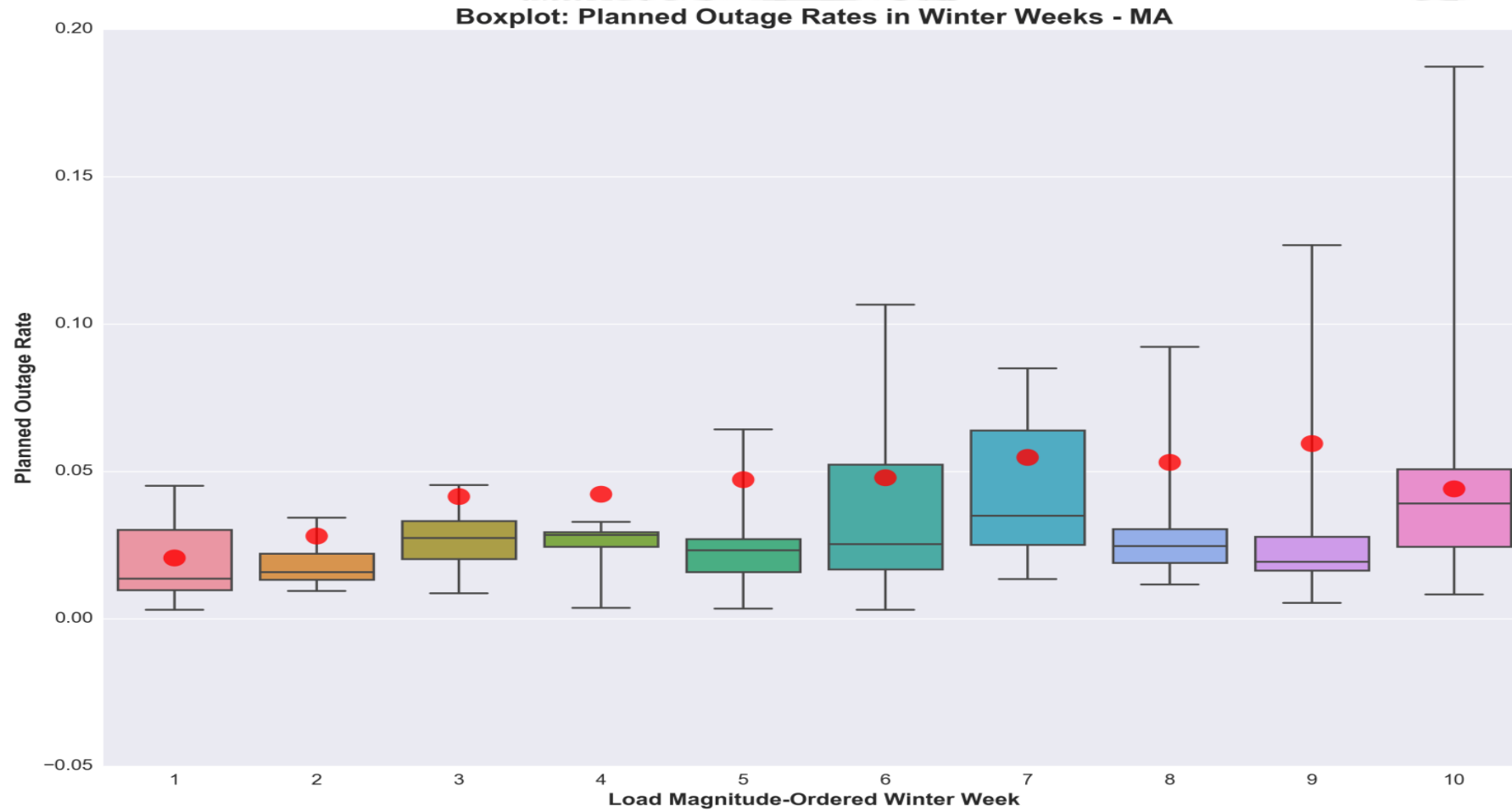
Description of Data Plotted on Slides 9 and 10

- Planned Outages are observed values from the five weekdays of each week in each winter over the 9-yr period (DY2007/08-DY2015/16). The winter weeks are combined based on load magnitude, not calendar order.
- The box plot shows the range of historical planned outage rates on each of the top ten load weeks of the winter.
- The red dots are the planned outage rates modeled by PRISM in each of the top ten load weeks of the winter.

PJM - Planned Outages (Top Ten Winter Weeks)



MAAC - Planned Outages (Top Ten Winter Weeks)



- PJM examined all transmission outage tickets entered in eDART over the last four winters (total of 360 days)

Total Outage Tickets	6,128
Market Sensitive Outage Tickets*	302
Peak Day Market Sensitive Outage Tickets**	46

* The designation “Market Sensitive” indicates the outage may impact the deliverability of a generator(s)

** Peak Day is any winter day with an RTO peak load of 129,700 MW or greater (20 days over the last four winters qualify as Peak Days)

- Compute summer and winter reliability requirements for the RTO and for selected LDAs.
- Continue investigation of winter load forecast model.
- Upcoming RAAS conference calls:
 - Friday, Aug. 4 (9:30 AM – 11:30 AM)
 - Thursday, Sept. 7 (1:30 PM – 3:30 PM)
- Deliverables to the MRC
 - September - October meetings