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ICMPA9 • International Conference on Managing Pavement Assets

Impact of Pavement Performance Models on Strategic Funding Analyses in the NCDOT Pavement Management System

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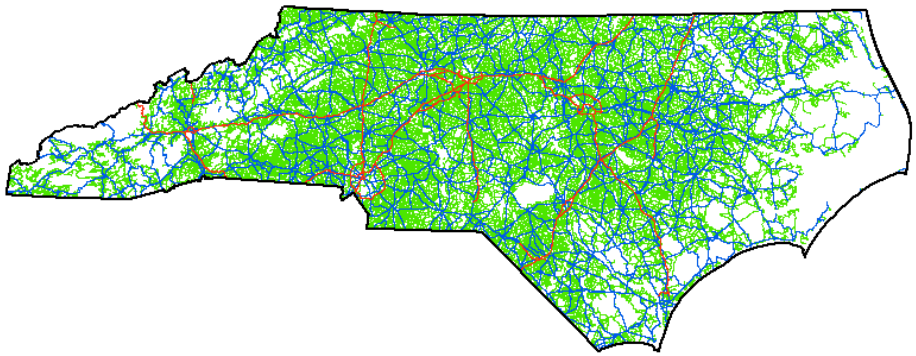
TRB

U.S. Department of Transportation Federal Highway Administration

WORLD ROAD ASSOCIATION MONDIALE DE LA ROUTE 1909-2009

VDOT Virginia Department of Transportation

Background - NCDOT Network



Interstates – 6,000 lane miles

Primaries – 35,000 lane miles

Secondaries – 121,000 lane miles

Rural – 105,000 lane miles
Subdivision – 16,000 lane miles

Background – Current Funding

- STIP - $1.9 Billion (State and Federal)
- Contract Resurfacing – $408 Million
- Preservation - $65 Million
- Maintenance - $404 Million

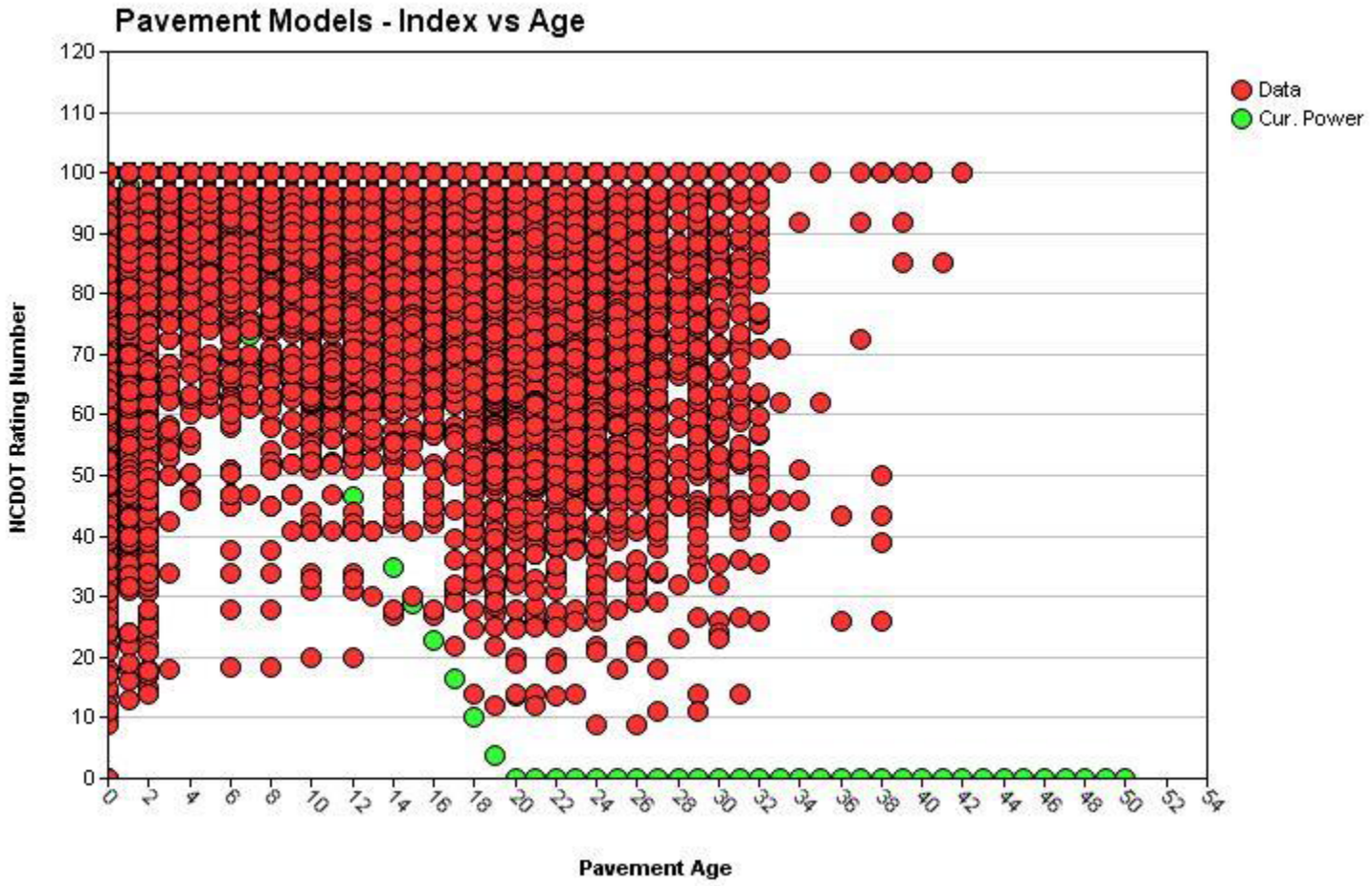
Why Update Models?

- PMS Analysis results (rapid deterioration over time) did not agree with the real world results (stable or small variance over time)
- Existing power form models were often too aggressive when compared to data, especially on the secondary system.
- Needed a repeatable and defendable method to consistently update models

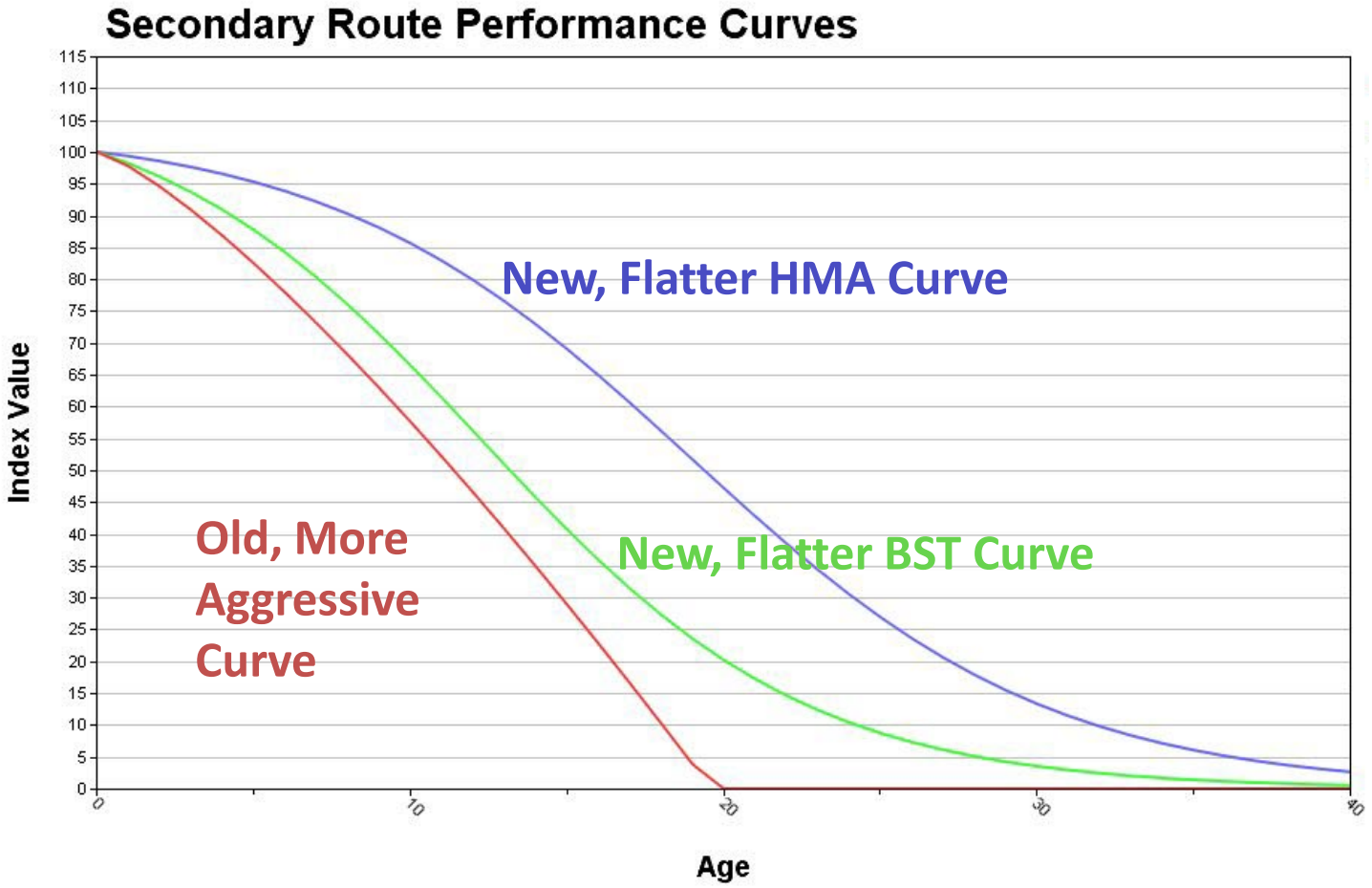
Initiated New Research Project

- Research project with UNC-Charlotte (Don Chen, Ph.D.) began in 2012
- Goals
  - Update and improve the pavement distress performance curves in the PMS
  - Original curves developed in-house in 2007
  - Increase number of model families to better understand and predict performance of a highly variable highway network.

Outliers


Pavement Models - Index vs Age
HCDOT Rating Number
Pavement Age
Data
Cur. Power
0
10
20
30
40
50
60
70
80
90
100
110
120
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
50
52
54

Dramatic Result: Subdivision Curves



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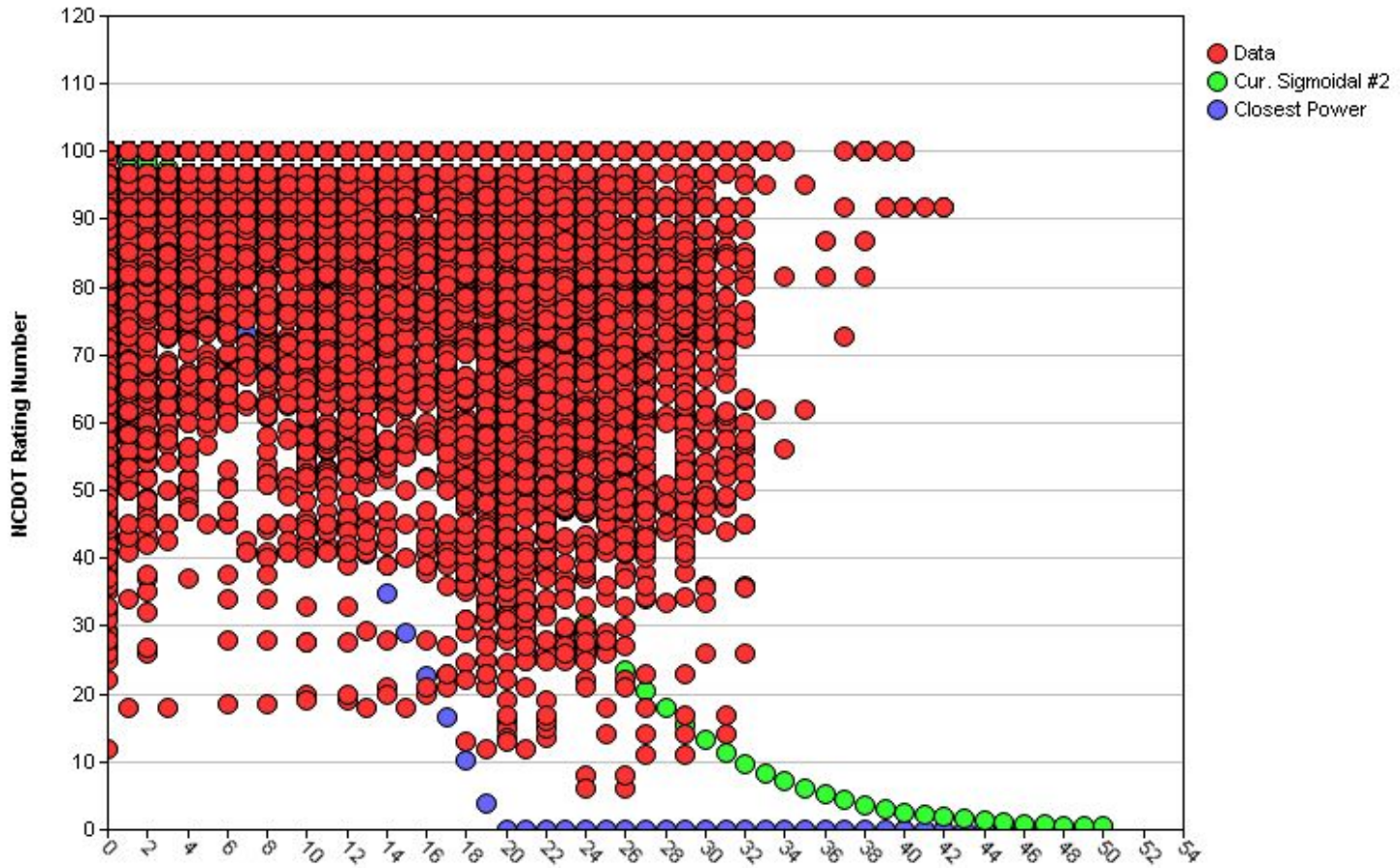
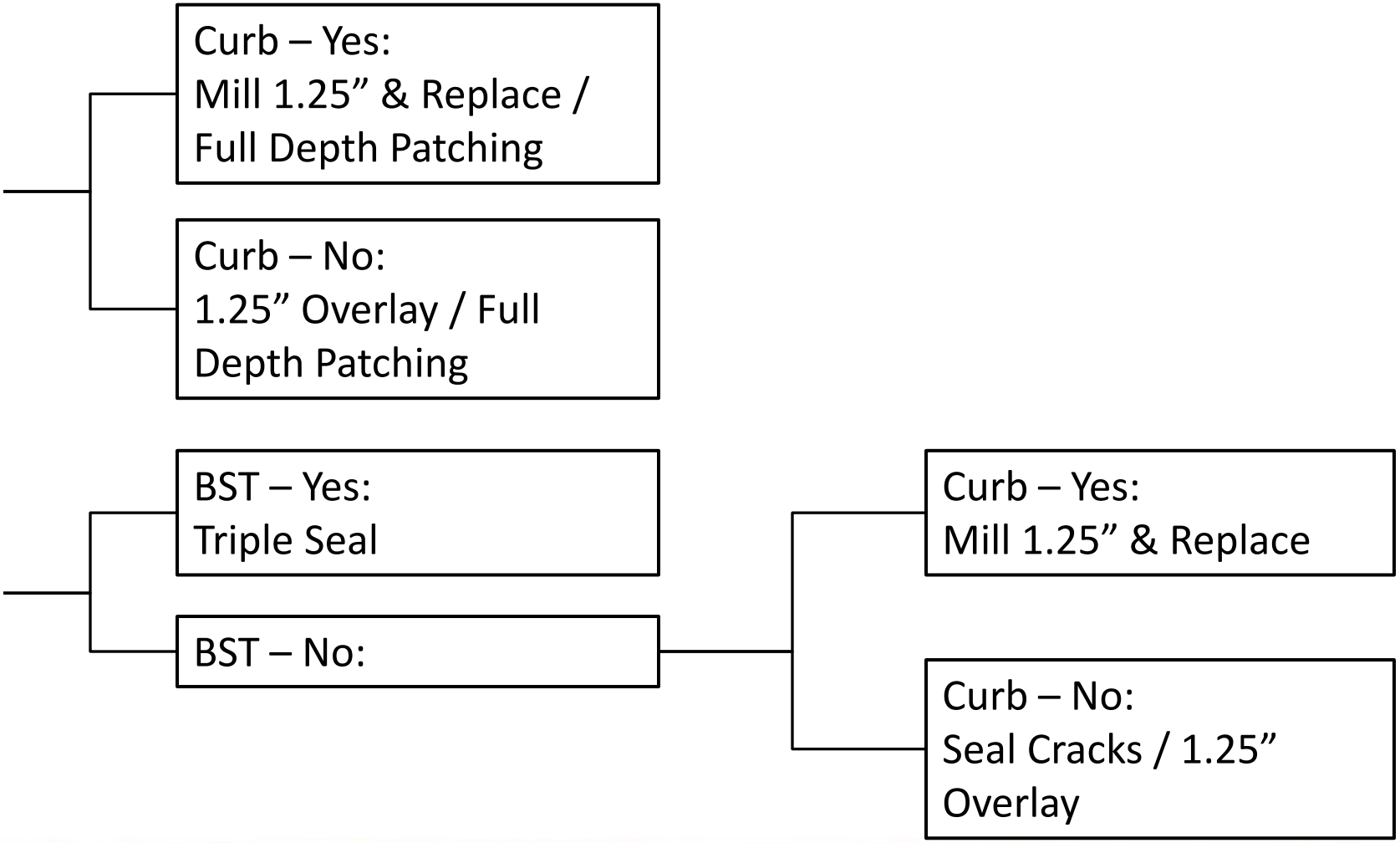


Decision Tree Changes Needed

- Creation of a new composite Pavement Condition Rating (PCR) tree
- Adjusting the alligator cracking tree due to the new index calculation
- New decision points based on curb and gutter vs shoulder

Decision Tree Changes



$ Needs by System

Change in Need by System			
System	**FY 2014**	**FY 2015**	**Change**
Interstate	$ 135,000,000	$ 80,000,000	$ 55,000,000
Primary	$ 270,000,000	$ 225,000,000	$ 45,000,000
Secondary	$ 485,000,000	$ 290,000,000	$ 195,000,000
Total	**$ 890,000,000**	**$ 595,000,000**	**$ 295,000,000**

Note that the reduce total need calculations still represented a greater level of funding than what is being annually allocated

$ Needs by Treatment Type

Change in Need by Treatment Type			
Treatment Type	**FY 2014**	**FY 2015**	**Change**
Reconstruction	$ 80,000,000	$ 7,000,000	$ 73,000,000
Rehabilitation	$ 200,000,000	$ 183,000,000	$ 17,000,000
Resurfacing	$ 418,000,000	$ 250,000,000	$ 168,000,000
Other Preservation	$ 14,000,000	$ 12,000,000	$ 2,000,000
Chip Seal	$ 100,000,000	$ 88,500,000	$ 11,500,000
Interstate Maintenance	$ 70,000,000	$ 54,000,000	$ 16,000,000
Interstate Preservation	$ 8,000,000	$ 500,000	$ 7,500,000
Total	**$ 890,000,000**	**$ 595,000,000**	**$ 295,000,000**

Conclusion

- The project was successful
  - PMS Analyses more closely matched observed performance
  - Decision tree updates combined with new models yield analysis results and project selection that better aligned with the needs of field engineers to create work plans

More Work to Be Done

- Regionalized/Localized Cost information
- Regionalized/Localized models for certain classes of roadway
- Tighter integration of STIP projects with maintenance and resurfacing
- Improve feedback loop of work accomplished vs work recommended.

Questions?