

Perkins to Lahoma: Lessons in
calibrating the COSMOS rover over
long distances in Oklahoma

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Tuesday, June 2, 2015
MOISST Workshop

How can we create (and automate)
a high resolution map of soil
moisture for Oklahoma?

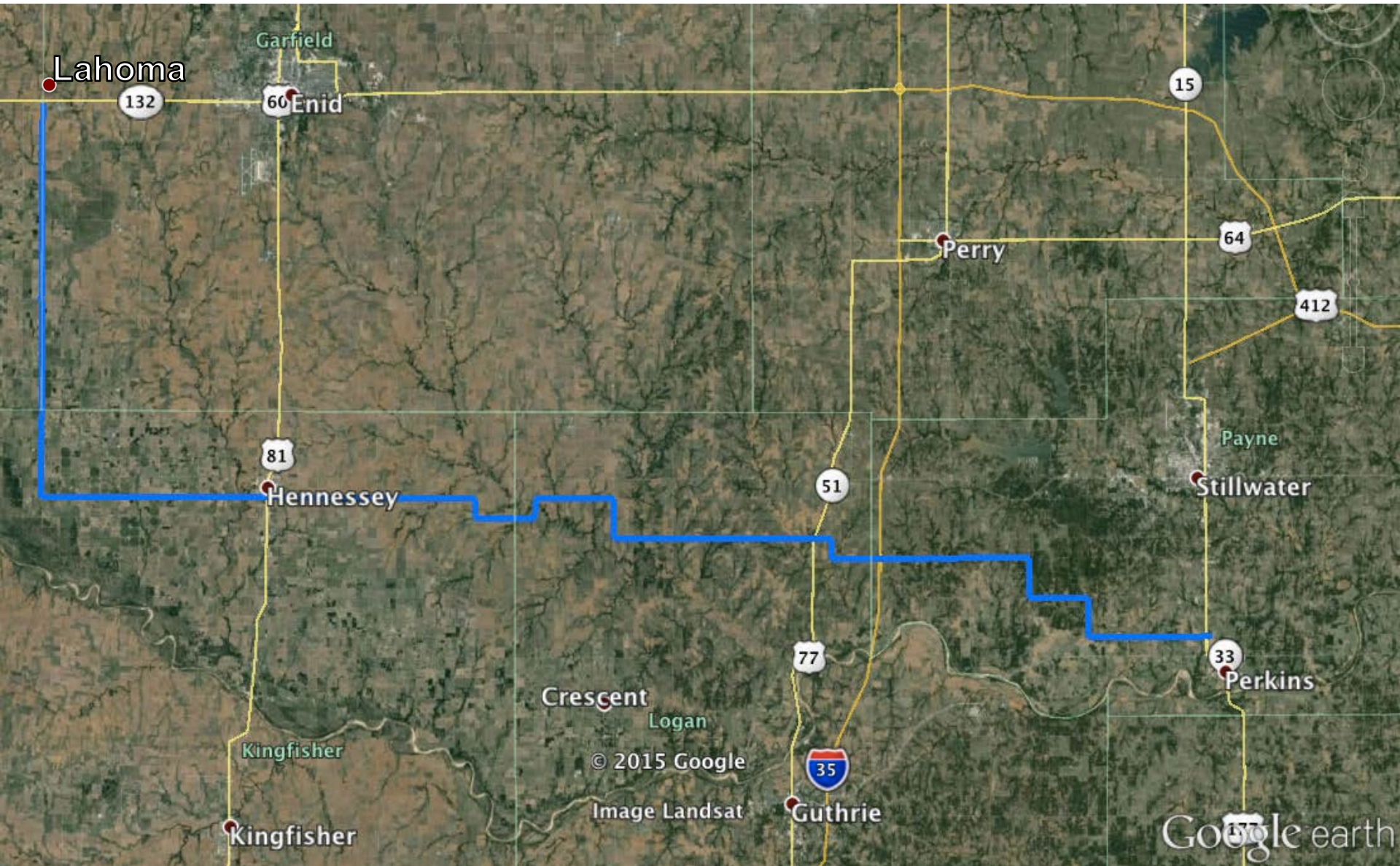
How can we create (and automate)
a high resolution map of soil
moisture for Oklahoma?

What controls soil moisture
variability in Oklahoma?

Rules of the Rove

1. Be safe and abide by the law
2. Maximize overlap with calibration locations
3. Minimize driving on heavily trafficked roads
4. Minimize turns
5. Be prepared to adjust,
Google Maps can be wrong!





Lahoma

Garfield

60 Enid

15

64

412

Perry

81

Hennessey

51

Payne

Stillwater

Kingfisher

Crescent

Logan

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Image Landsat

77

35

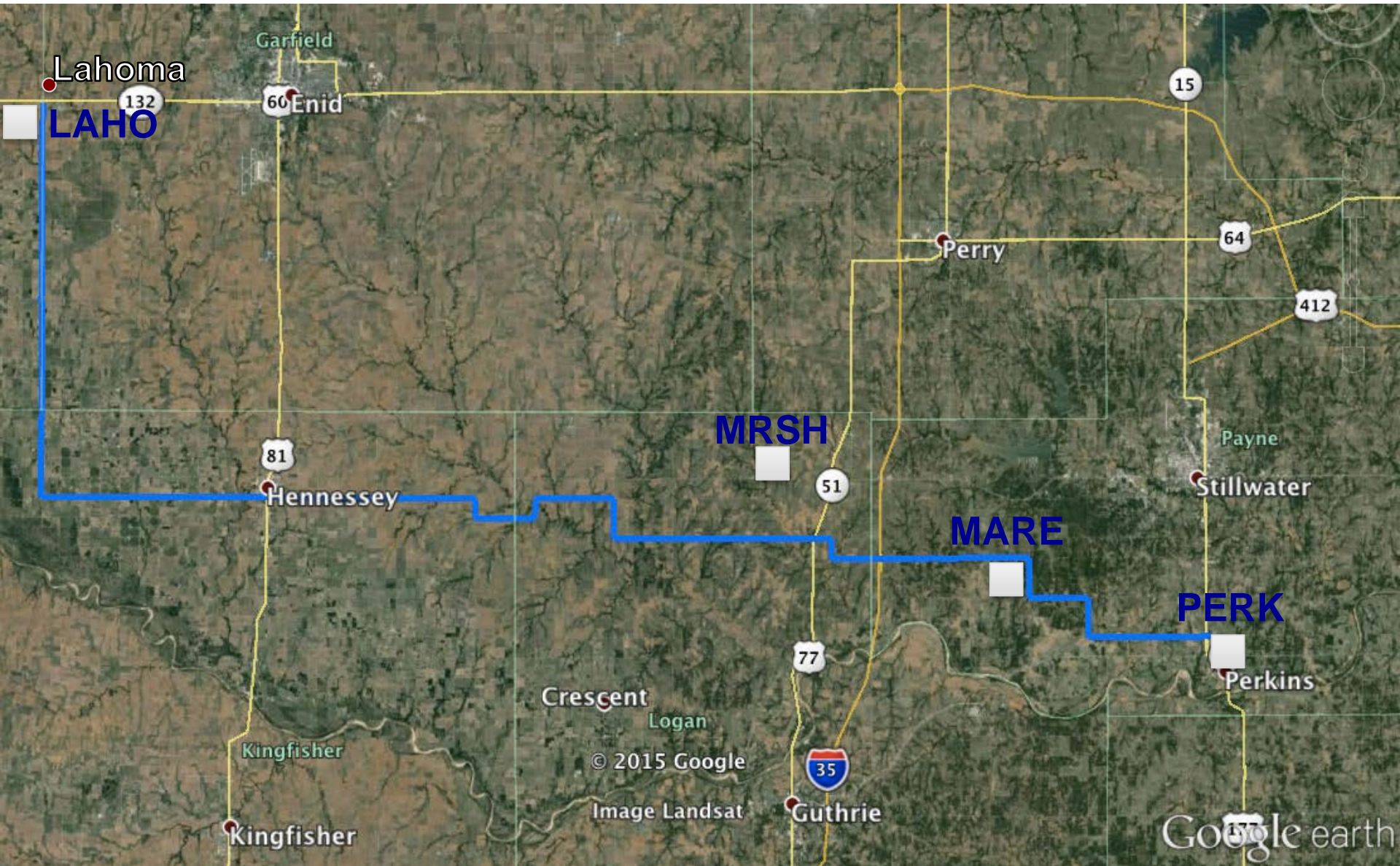
Guthrie

33

Perkins

Kingfisher

Google earth



Lahoma

LAHO

Garfield

60 Enid

15

Perry

64

412

MRSH

51

Payne

Stillwater

81

Hennessey

MARE

PERK

Perkins

77

Crescent

Logan

Kingfisher

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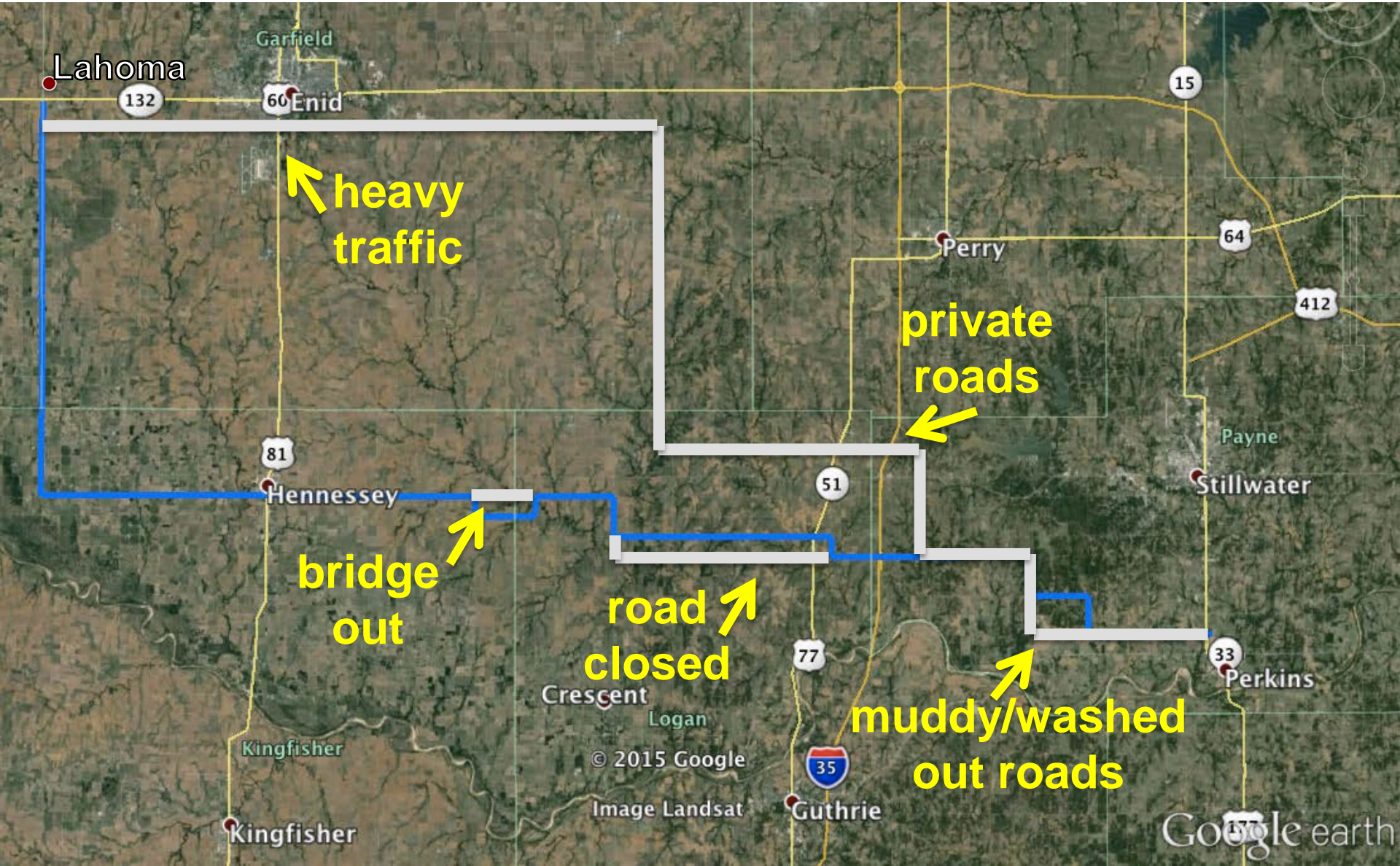
Image Landsat

35

Guthrie

Kingfisher

Google earth



Lahoma

Garfield

Enid

15

132

81

Hennessey

Perry

private roads

64

412

Payne

Stillwater

bridge out

51

road closed

77

muddy/washed out roads

33

Perkins

Kingfisher

Crescent

Logan

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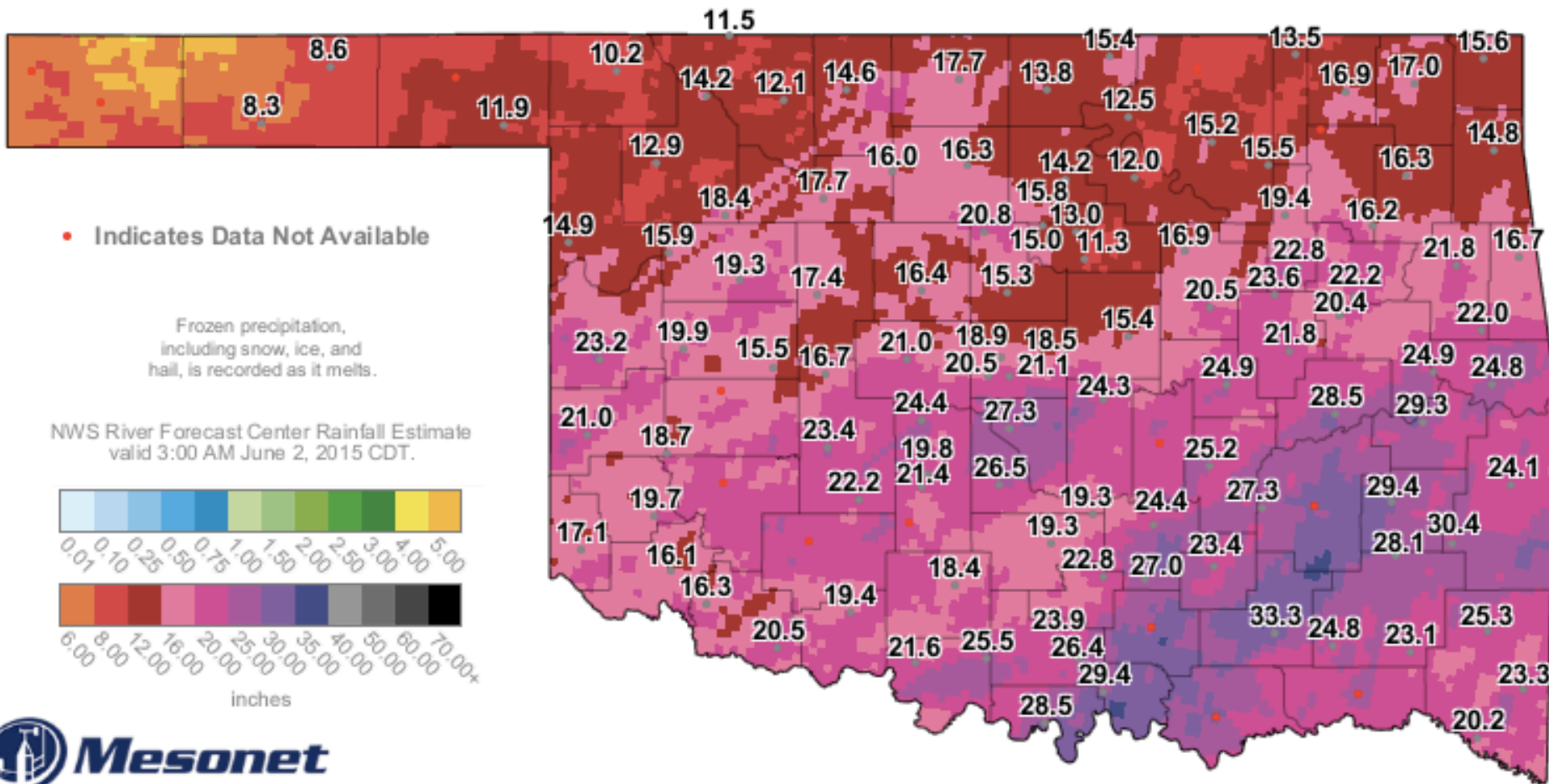
Image Landsat

35

Guthrie

Kingfisher

Google earth



60-Day Rainfall (inches)

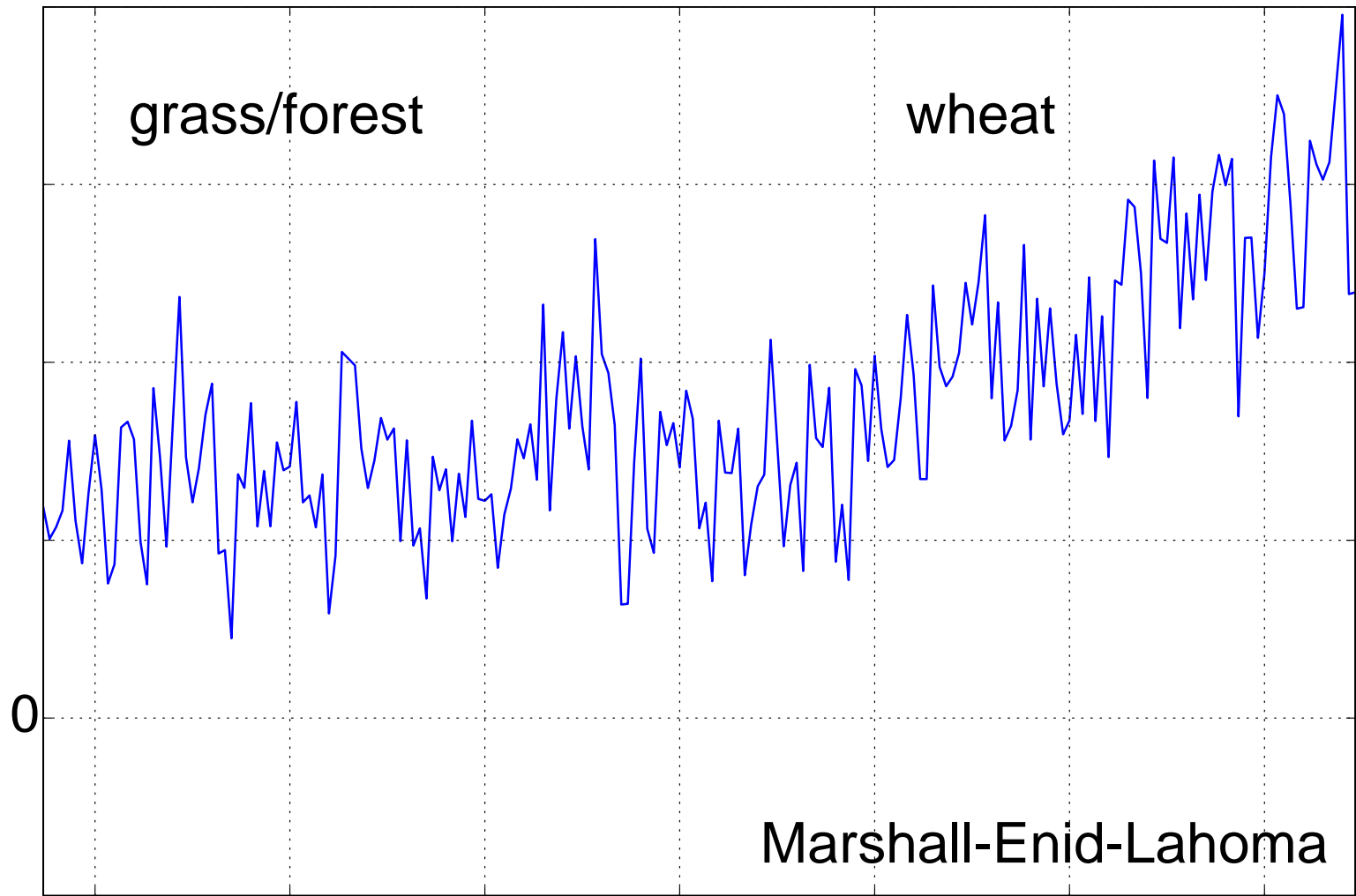
$\theta = f(N_{\text{corr}},$ corrected counts
 $N_0,$ Desilets calibration parameter
 $W_{\text{lat}},$ lattice water
 $W_{\text{som}},$ soil organic matter water
 W_{veg} vegetation water
)

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 $I,$ neutron flux at NMDB
 $p,$ surface air pressure
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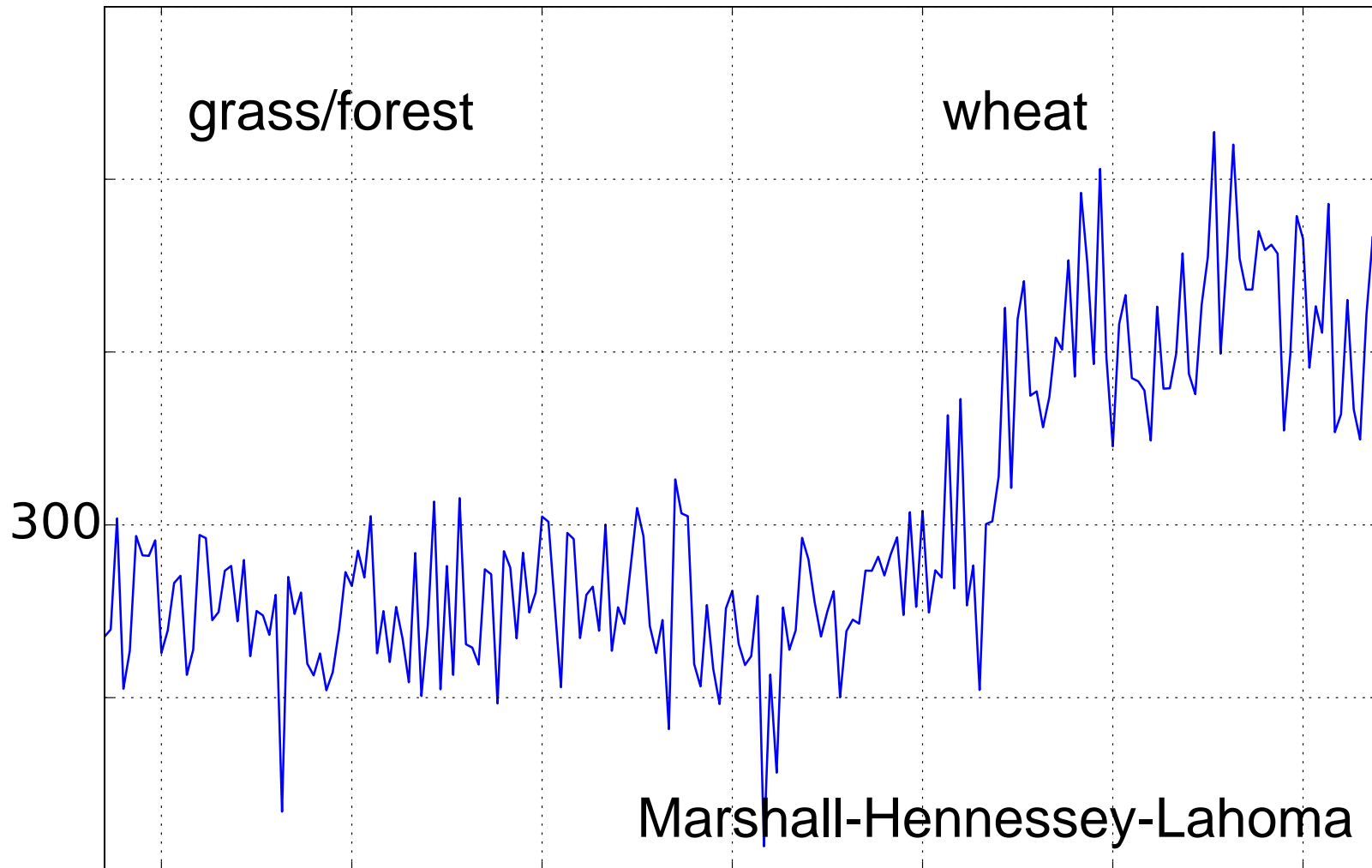


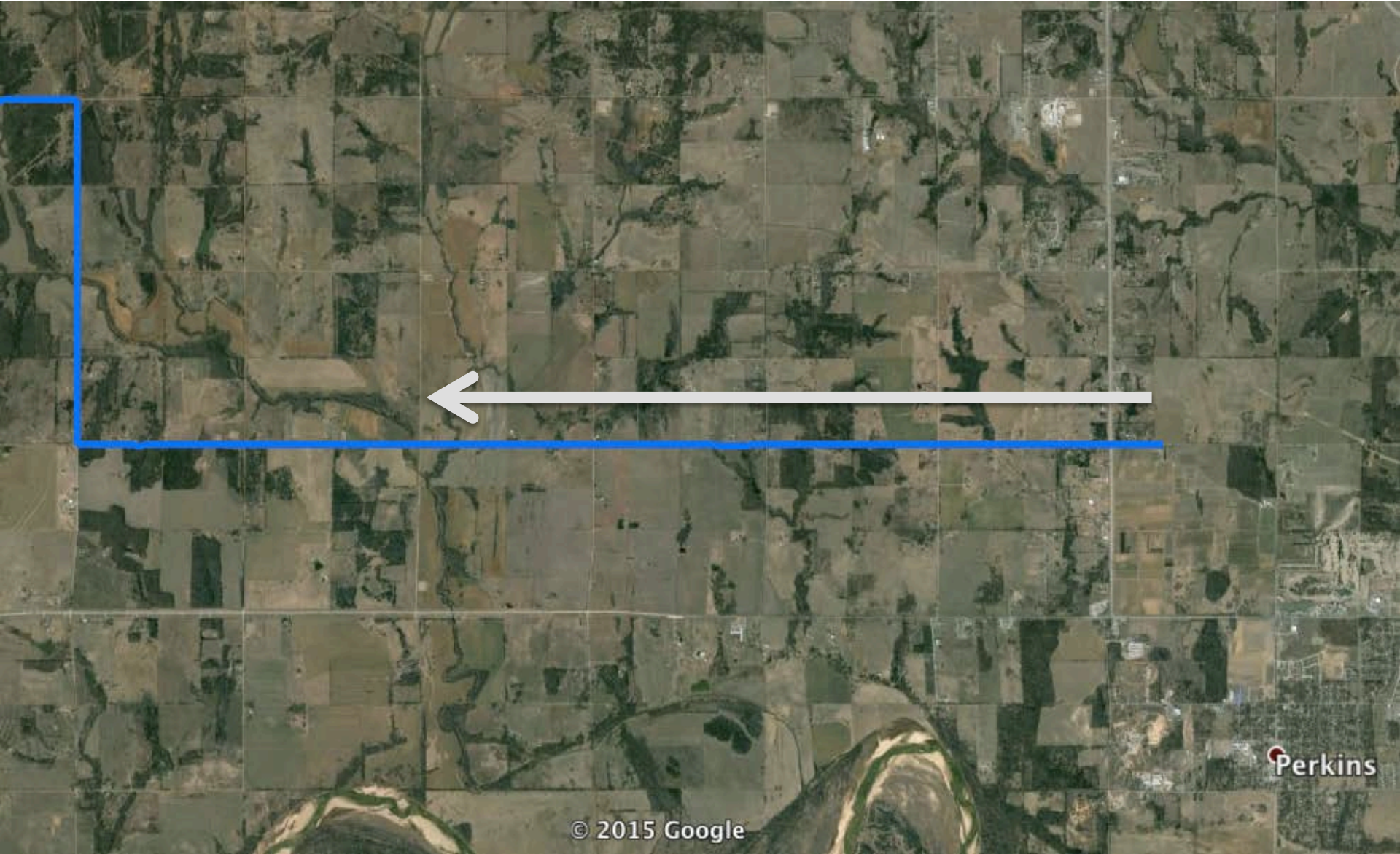
grass/forest

wheat

0

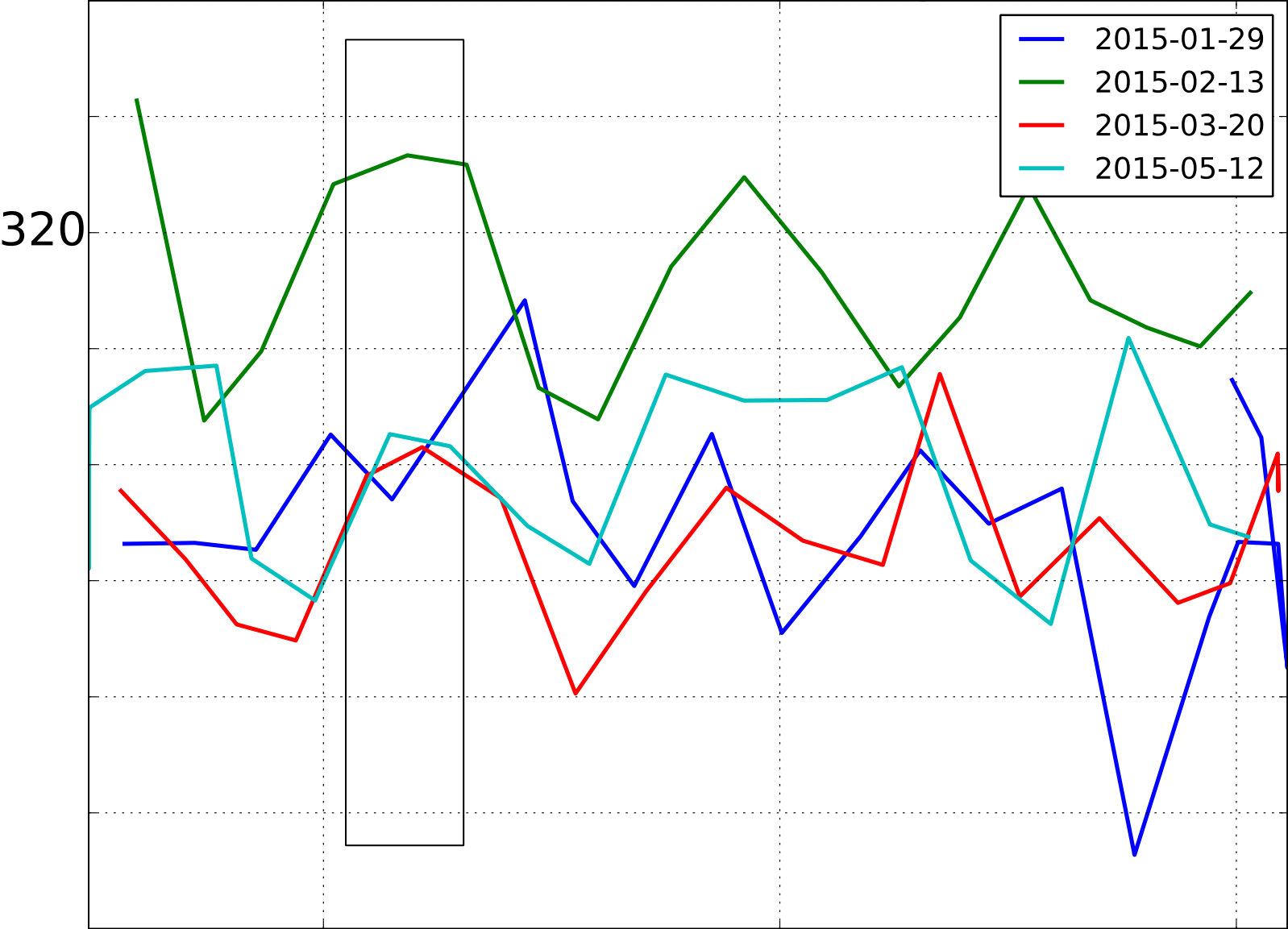
Marshall-Enid-Lahoma

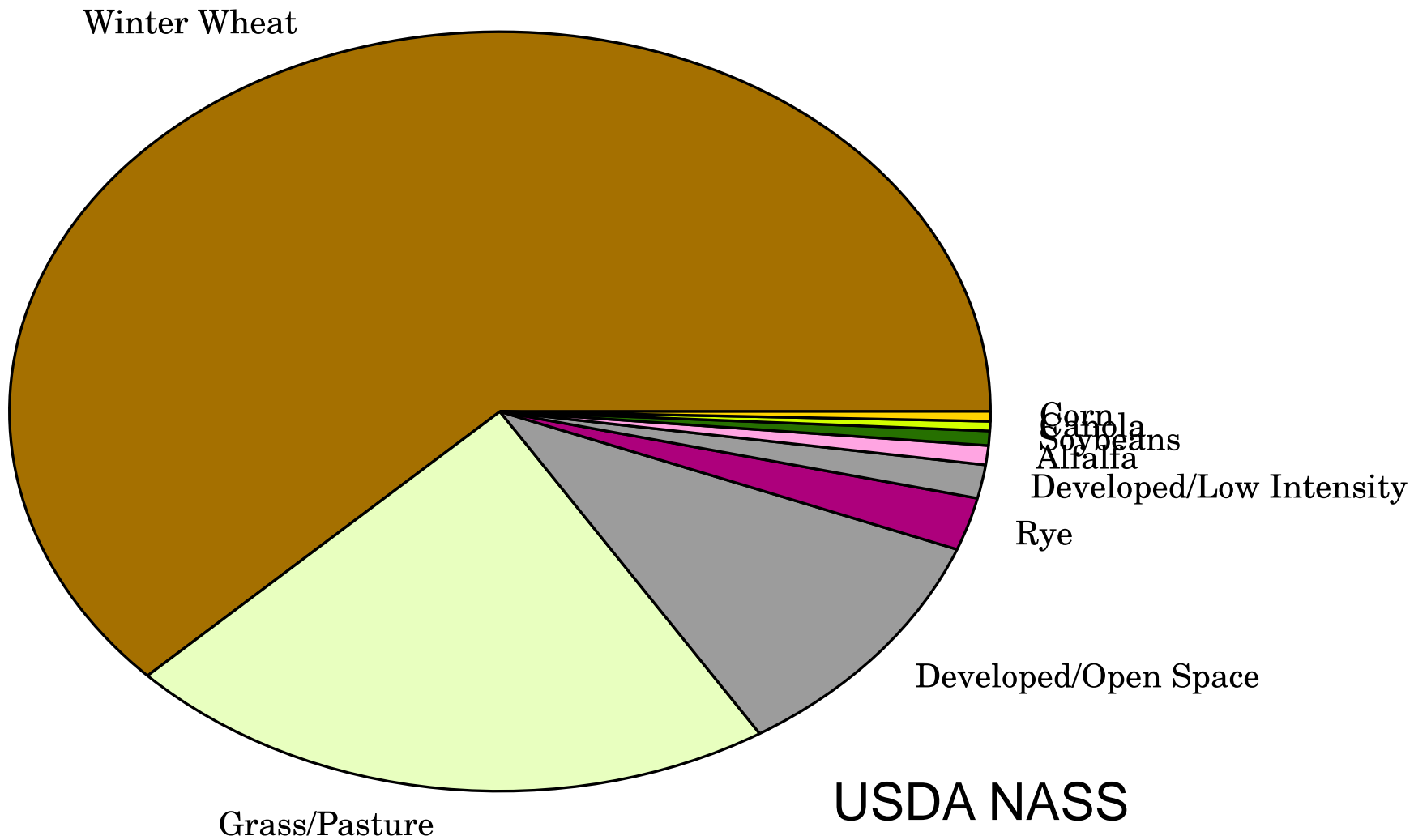


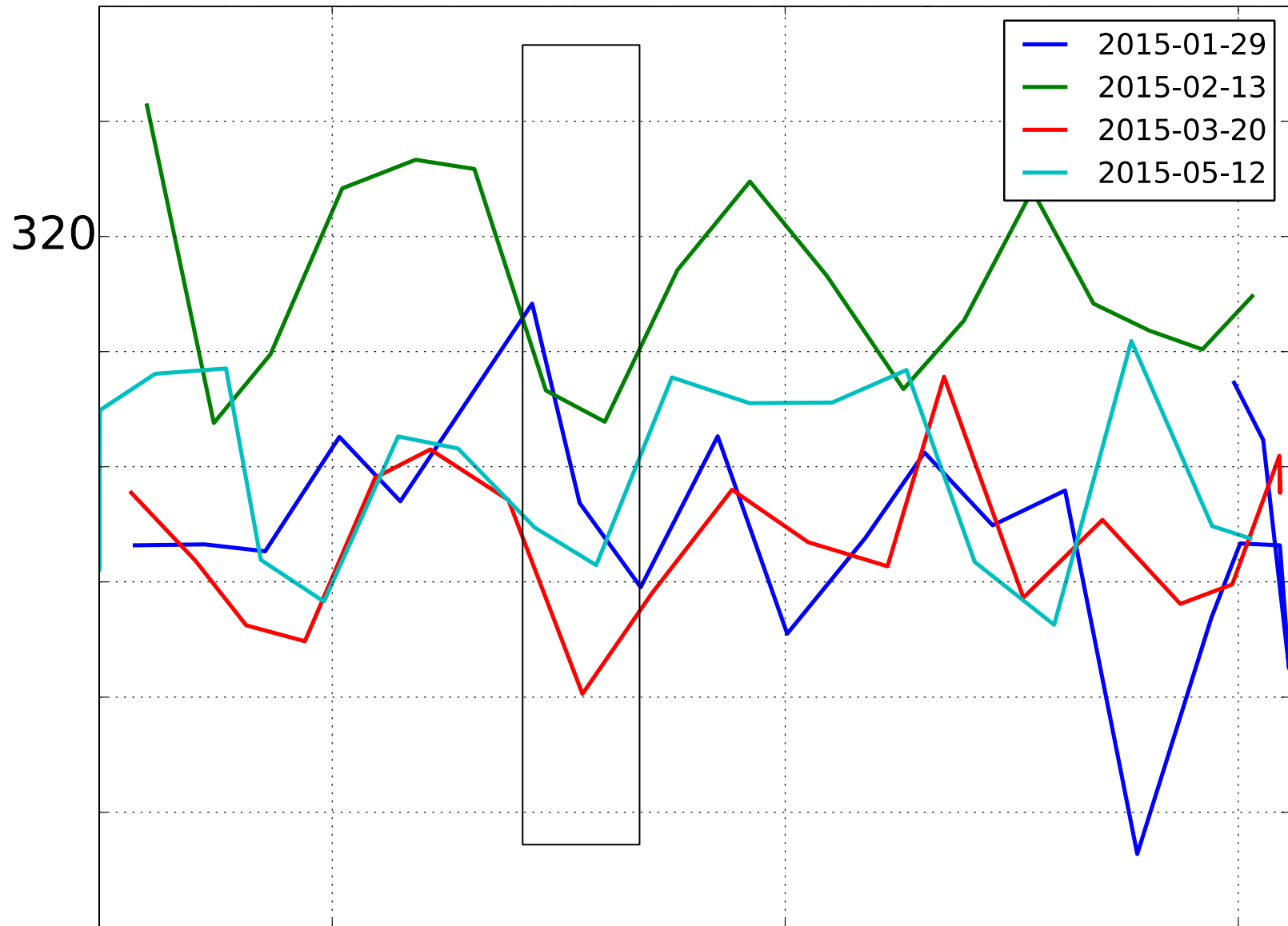


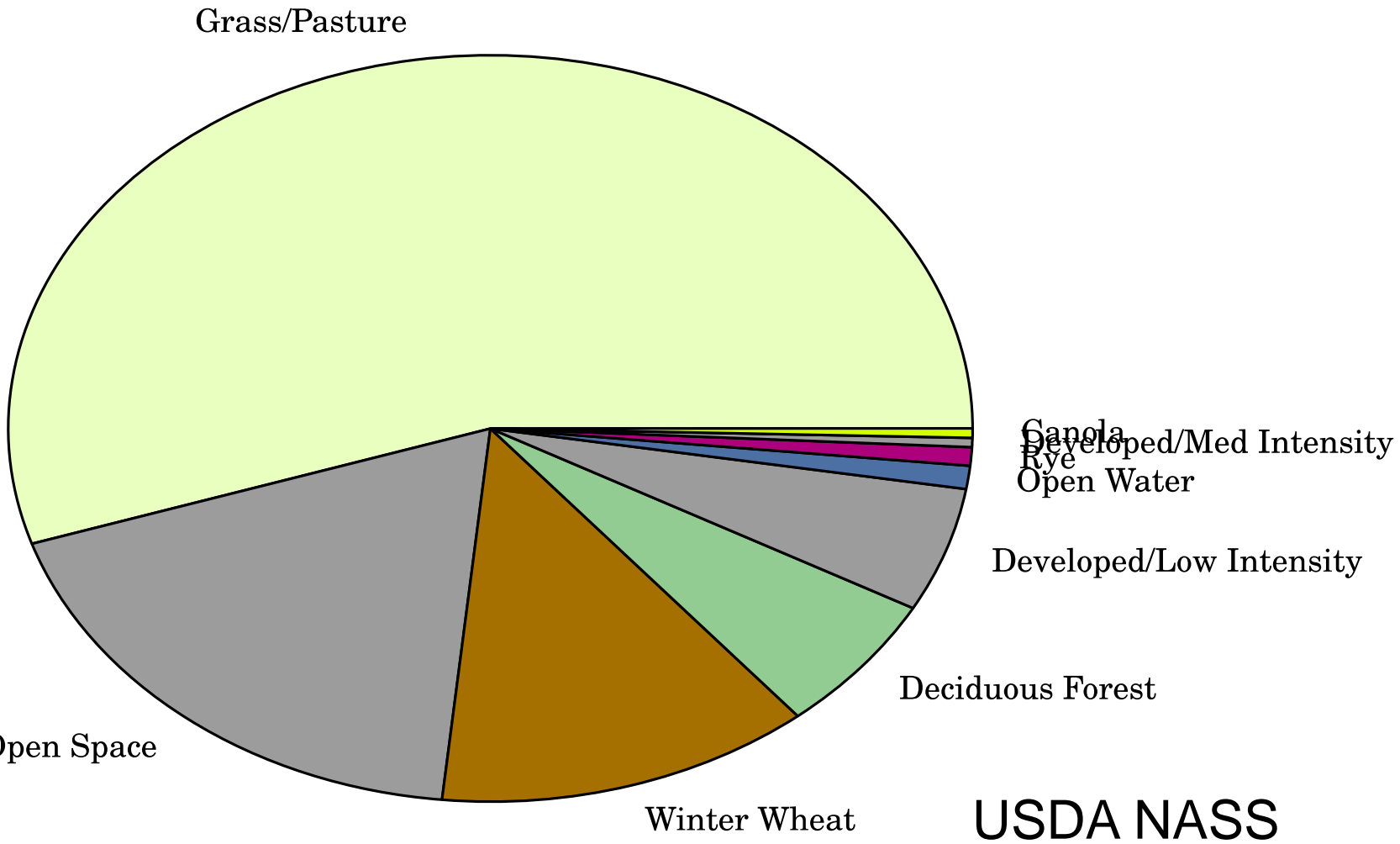
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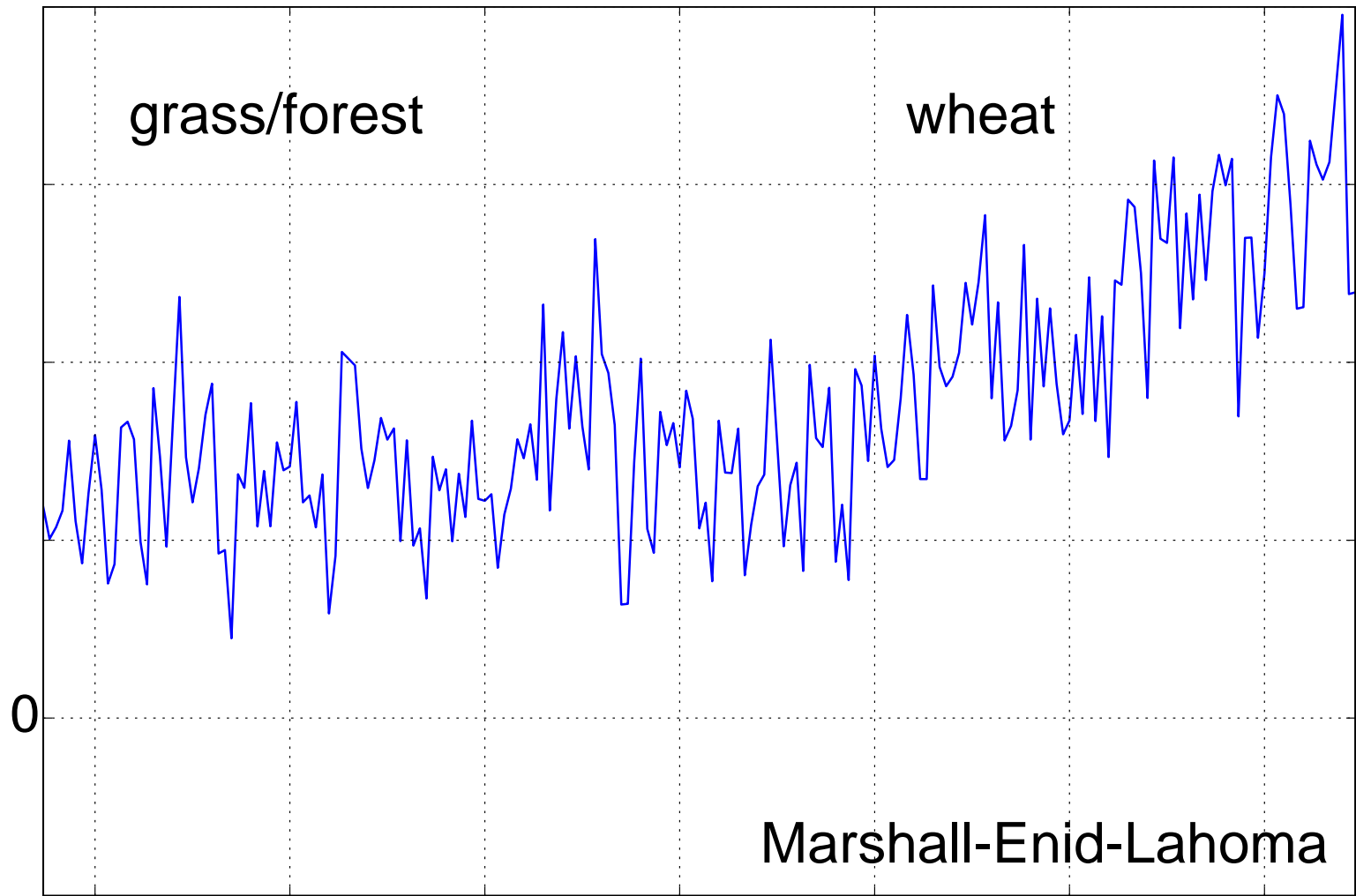
Perkins









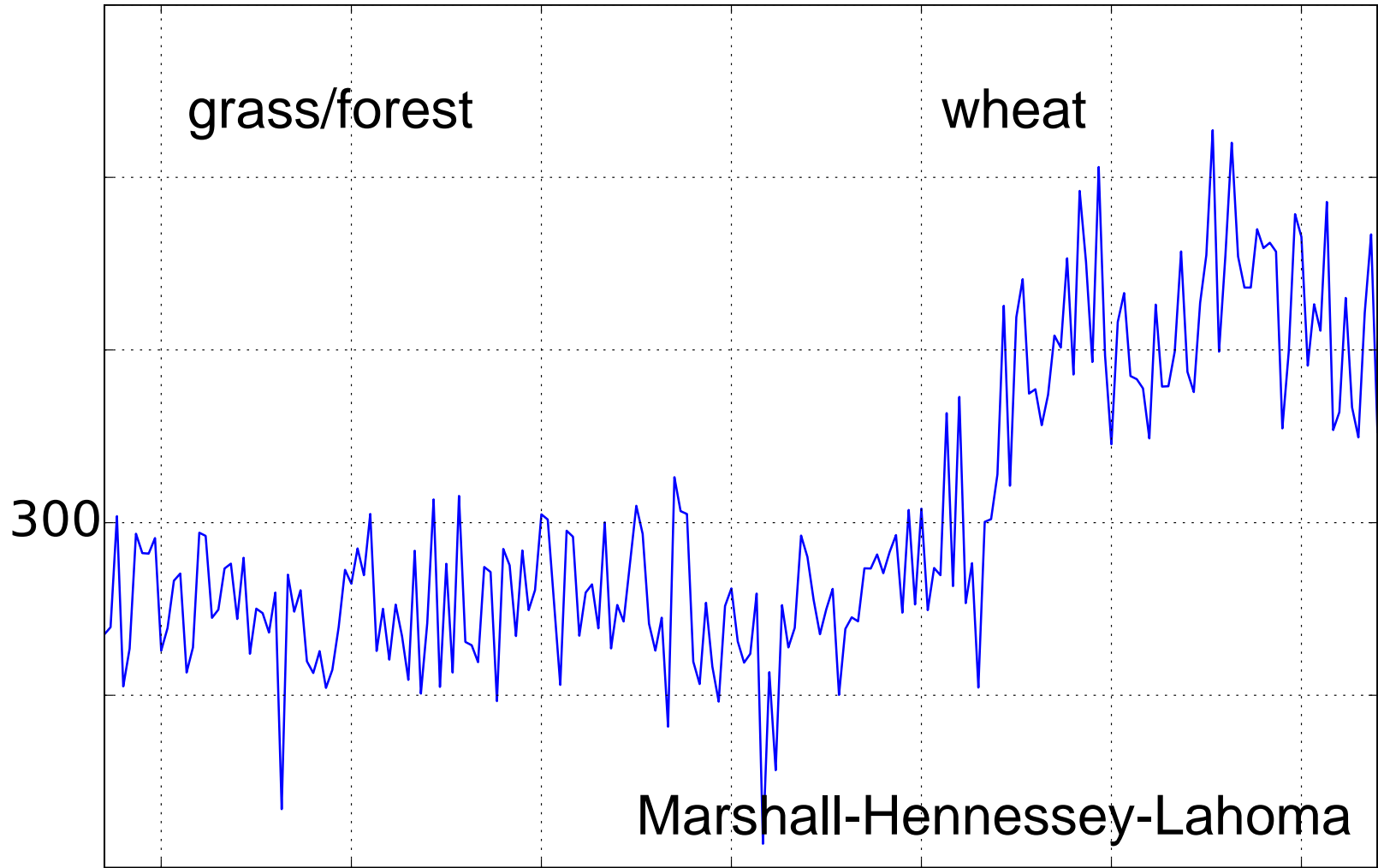


grass/forest

wheat

Marshall-Enid-Lahoma

0



A pattern emerging?

- Initial calibrations at Perkins and Marena sites:
 - Perkins (mostly wheat): $N_0 = 608$
 - Marena (grass/forest): $N_0 = 451$
- Without looking at soil properties (clay%, lattice water, organic matter, etc.), cannot draw conclusions about patterns in N_{corr} or differences in N_0 .

Summary

- Weather, roads, and mapping inaccuracies can seem to conspire to make rover transects difficult.
- While progress slow on the calibration front, still see patterns (of yet unknown cause) in corrected neutron counts.

Thank you

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