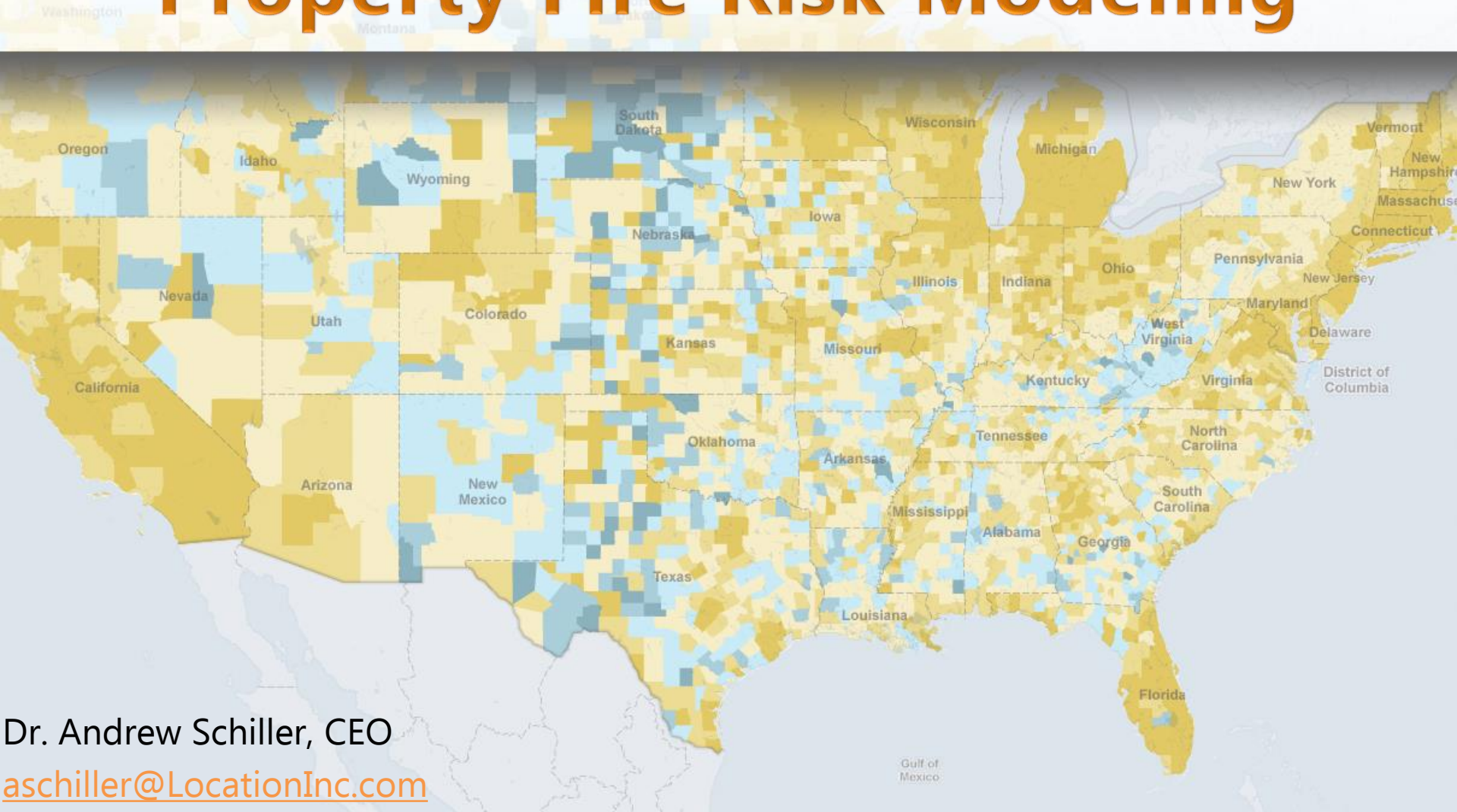# New Advances in Geospatial Property Fire Risk Modeling

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Leading Builder of Advanced Location-Based Analytics

Location, Inc.

October 2015

Why is Fire Important to Insurers?

- Consistently a top 2 loss type in Home and Commercial Property.

- Not the highest frequency, but highest severity

- Costs P&C industry $B per year

- Significant room for loss ratio improvement

What Do Insurers Know Today?

- Historical Loss Experience by Policy (& Zip Code)

- Catastrophic Loss Risk (Wildfire)

- Structure (Wood vs Brick, for example)

- Credit (seen predictive of fire losses like accidental or fraud)

- Distance to Hydrant/Fire Station

- Equipment Age/Type (Electrical, Boiler, etc.)

- Code update status

What Do Insurers Know Today?

- Not a lot is known about human behavior which can reveal information about frequency and severity

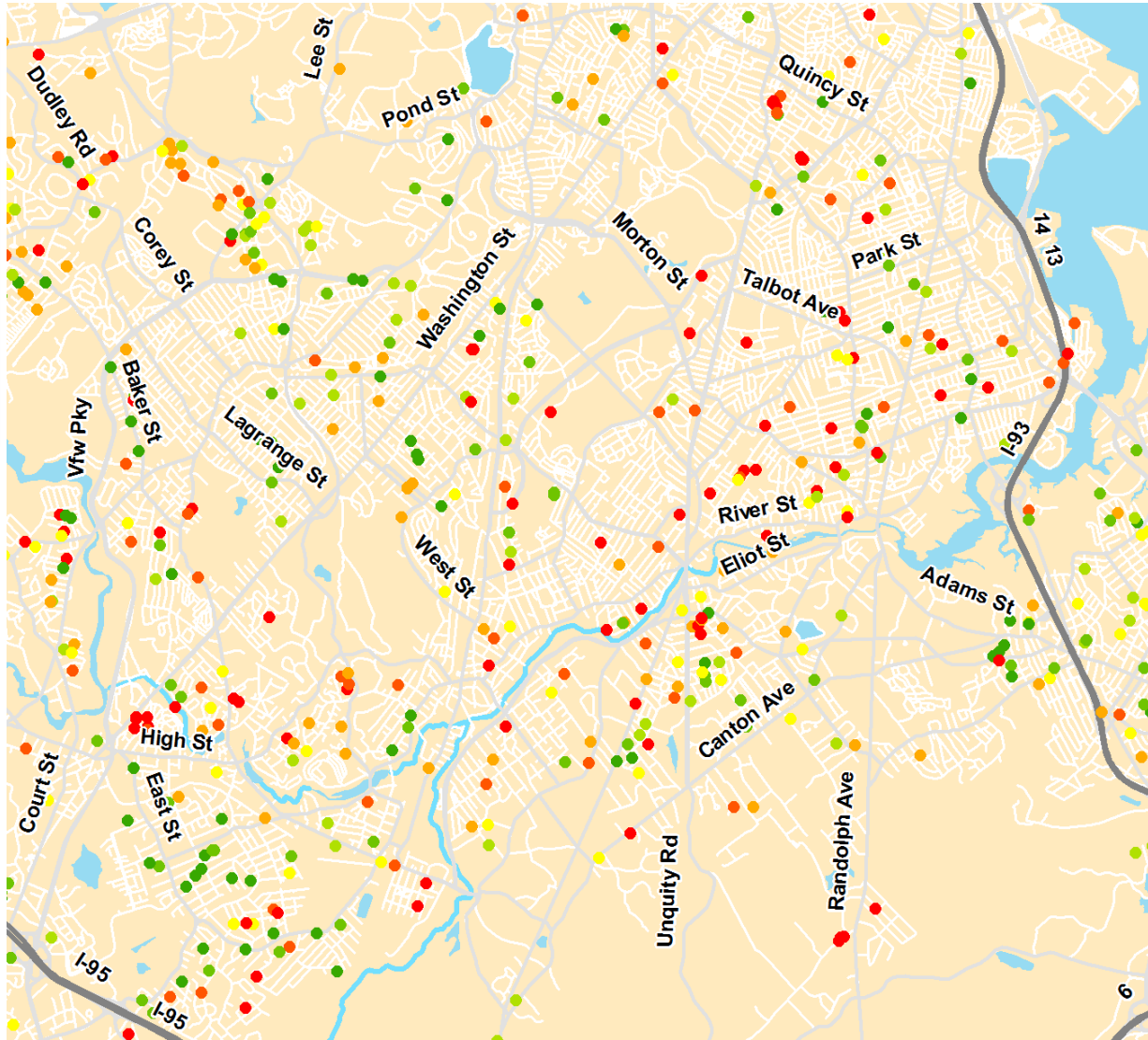- Credit is used with some value, but more about behavior can be revealed

What's New Here?

- Precise Location-based Fire Analytics

- Unique Behavioral Risk Models

    - Not Catastrophic

    - Not Equipment Failure

    - Not Building Structure

    - Not ISO Protection Class

    - Not Credit

- 18,000 Sources

- Over 11 Million Points of Risk for the U.S.

- No Redlining

Existing Carrier Fire Pure Premiums

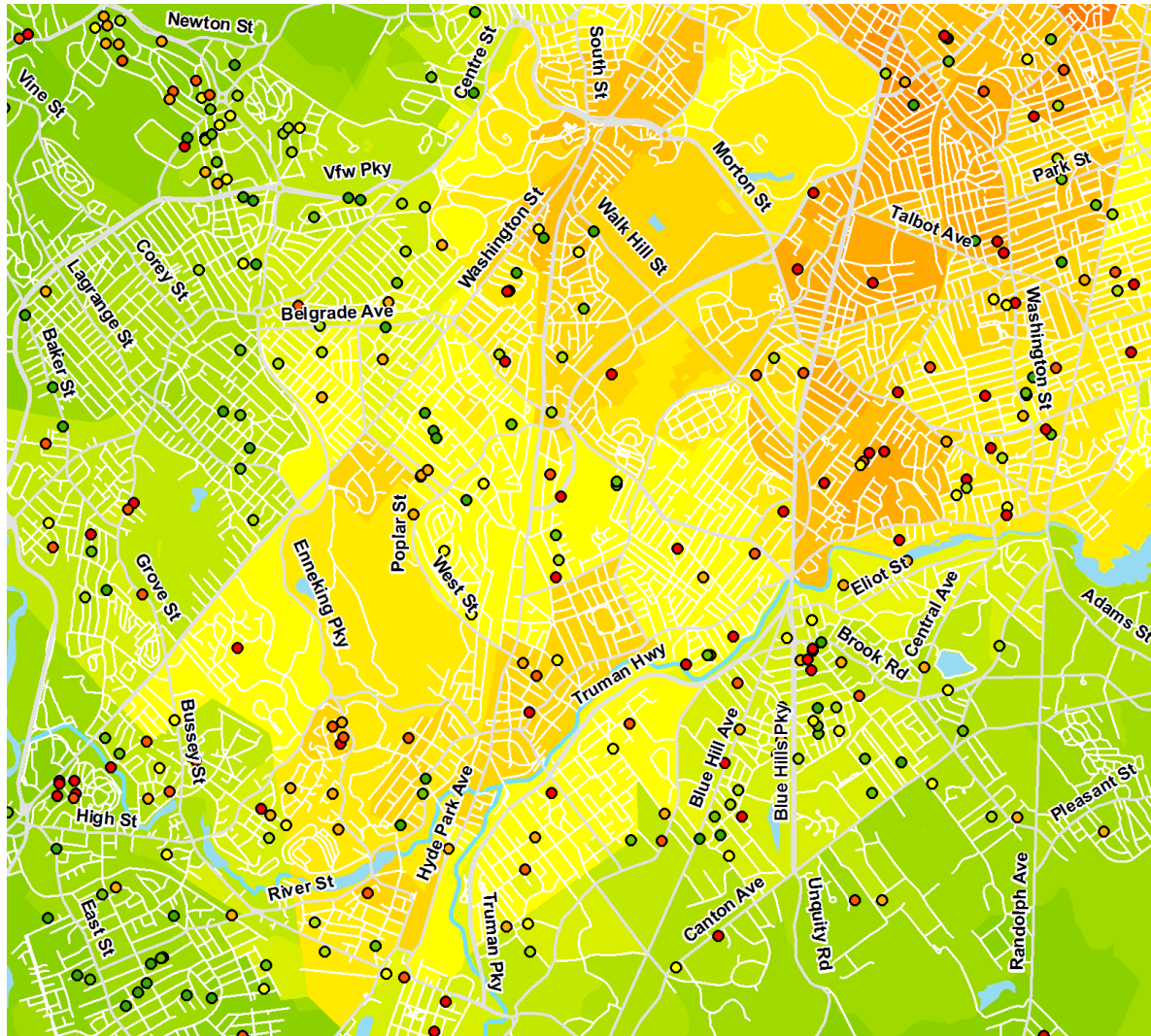# FireRisk Layer Added (Premium Adjustments)

Fire Pure Premium Legend

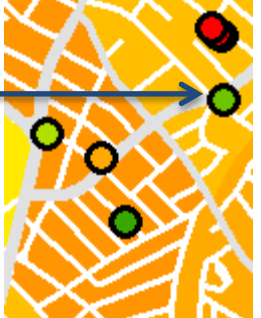- 🔴 Highest
- 🟠 Medium-High
- 🟡 Medium
- 🟢 Low-Medium
- 🟢 Lowest

FireRisk Geospatial Index

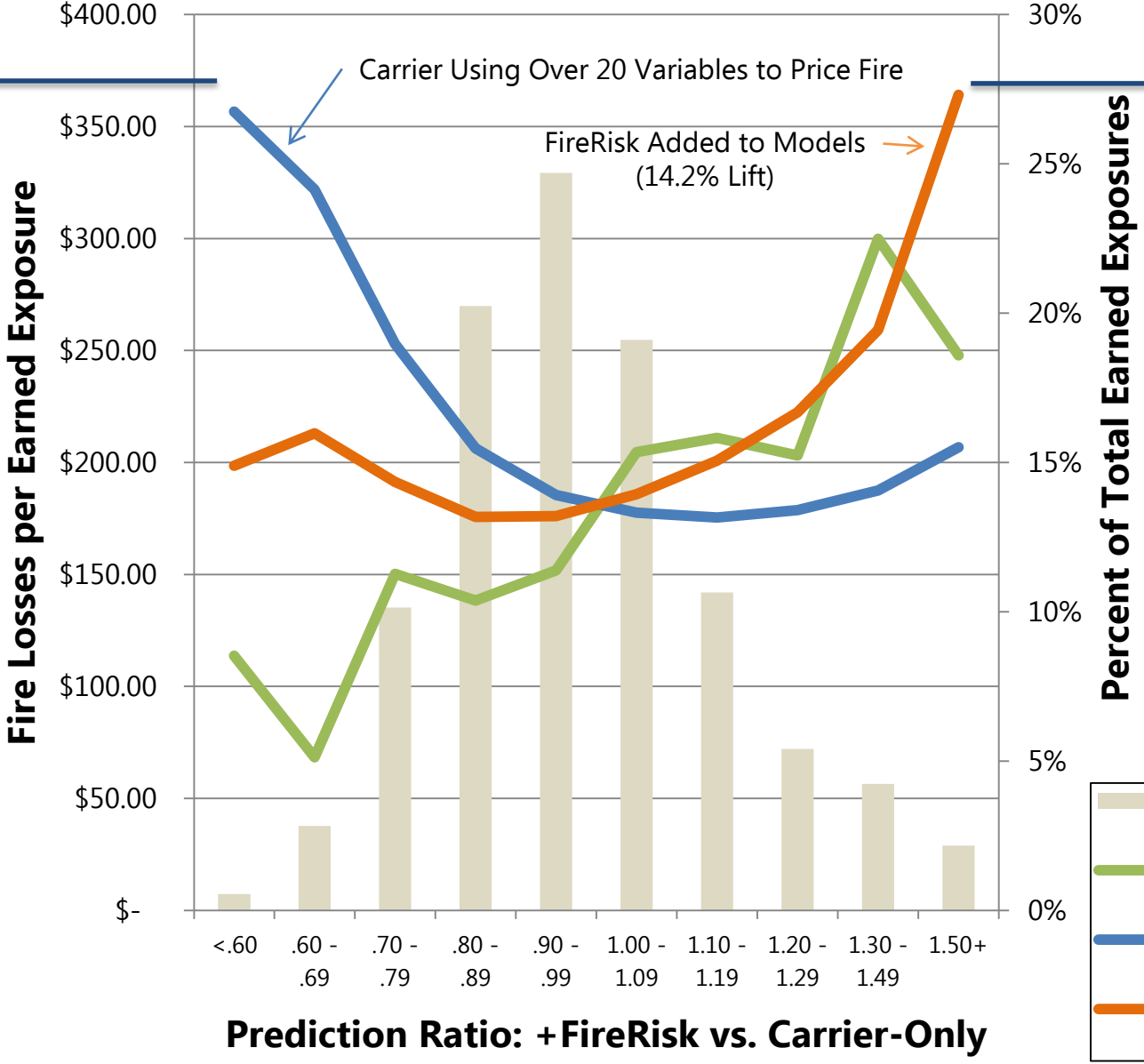|	
10	9% of Premiums / 18% of Fire Losses
9	10% of Premiums / 14% of Fire Losses
8	10% of Premiums / 12% of Fire Losses
7	10% of Premiums / 12% of Fire Losses
6	10% of Premiums / 11% of Fire Losses
5	10% of Premiums / 9% of Fire Losses
4	10% of Premiums / 6% of Fire Losses
3	10% of Premiums / 7% of Fire Losses
2	10% of Premiums / 6% of Fire Losses
1	10% of Premiums / 5% of Fire Losses

What's Behind the Maps?

**Overpriced Policies
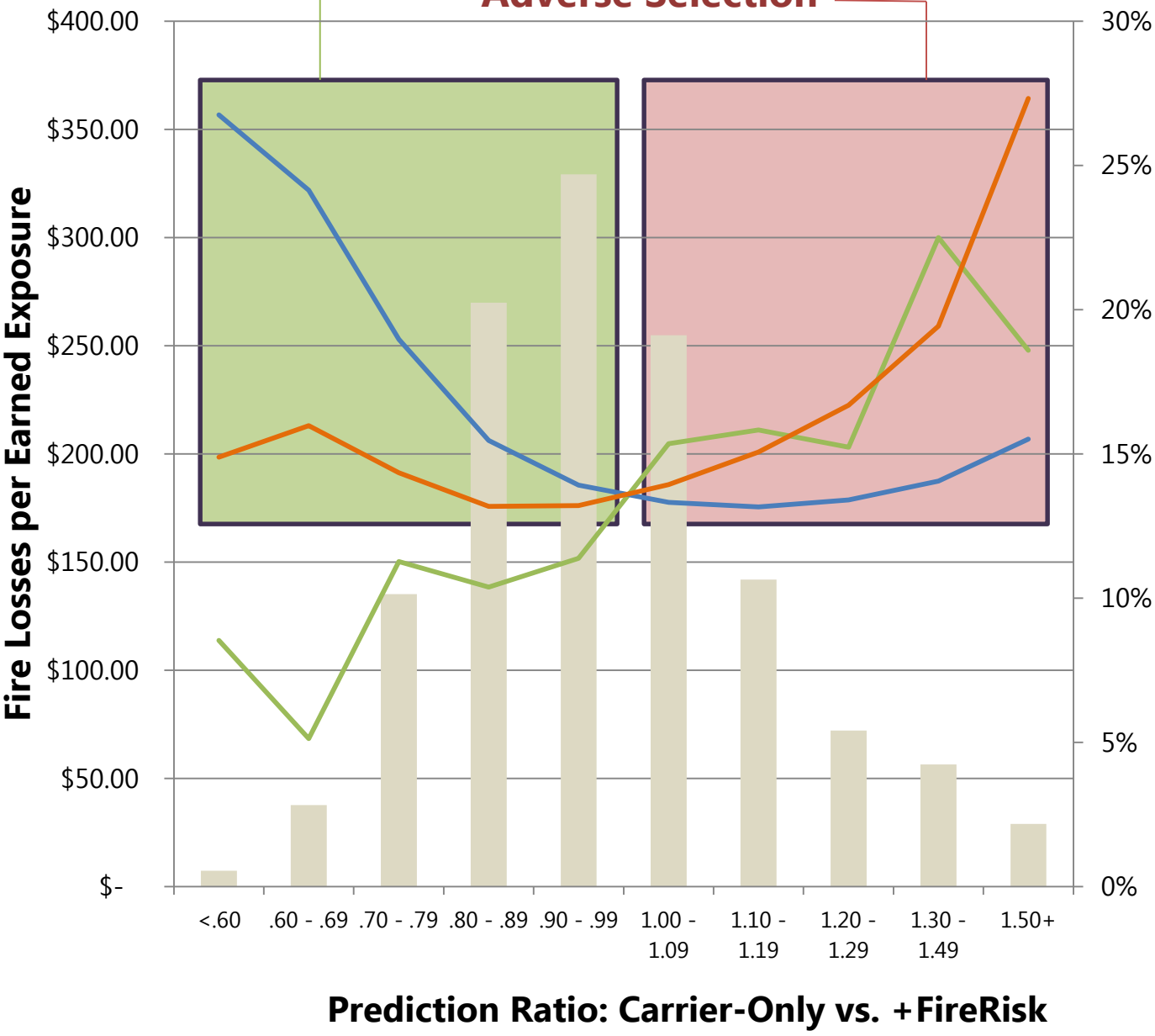Agents Not Binding
Competitive Risk**

**Underpriced Policies
Agents Binding
Adverse Selection**

Carrier Using Over 20 Variables to Price Fire

FireRisk Added to Models
(14.2% Lift)

Y-axis (left): Fire Losses per Earned Exposure — $400.00, $350.00, $300.00, $250.00, $200.00, $150.00, $100.00, $50.00, $-

Y-axis (right): Percent of Total Earned Exposures — 30%, 25%, 20%, 15%, 10%, 5%, 0%

X-axis: Prediction Ratio: +FireRisk vs. Carrier-Only — <.60, .60 - .69, .70 - .79, .80 - .89, .90 - .99, 1.00 - 1.09, 1.10 - 1.19, 1.20 - 1.29, 1.30 - 1.49, 1.50+

Legend:
- Percent of Exposures
- Actual Fire Losses
- Model Prediction: Carrier-Only
- Model Prediction: +FireRisk

Opportunity for New Business

Adverse Selection

Fire Losses per Earned Exposure (left axis): $400.00, $350.00, $300.00, $250.00, $200.00, $150.00, $100.00, $50.00, $-

Percent of Total Earned Exposures (right axis): 30%, 25%, 20%, 15%, 10%, 5%, 0%

Prediction Ratio: Carrier-Only vs. +FireRisk

X-axis categories: <.60 | .60 - .69 | .70 - .79 | .80 - .89 | .90 - .99 | 1.00 - 1.09 | 1.10 - 1.19 | 1.20 - 1.29 | 1.30 - 1.49 | 1.50+

Legend:
- Percent of Exposures
- Actual Fire Losses
- Model Prediction: Carrier-Only
- Model Prediction: +FireRisk

Ratio	Lift w/ FR
<.60	$ 1,258,195
.60 - .69	$ 4,475,146
.70 - .79	$ 9,100,892
.80 - .89	$ 8,991,477
.90 - .99	$ 3,398,468
1.00 - 1.09	$ 2,284,548
1.10 - 1.19	$ 3,929,320
1.20 - 1.29	$ 402,617
1.30 - 1.49	$ 4,414,557
1.50+	$ (2,384,761)
Total	$ 35,870,458 (14.2%)
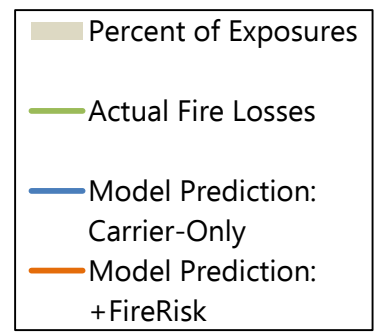
Loss Ratio Analysis – 3 Carriers – 4M Policy Years

$R^2 = 0.9543$

Fire Loss Ratio

FireRisk Rating
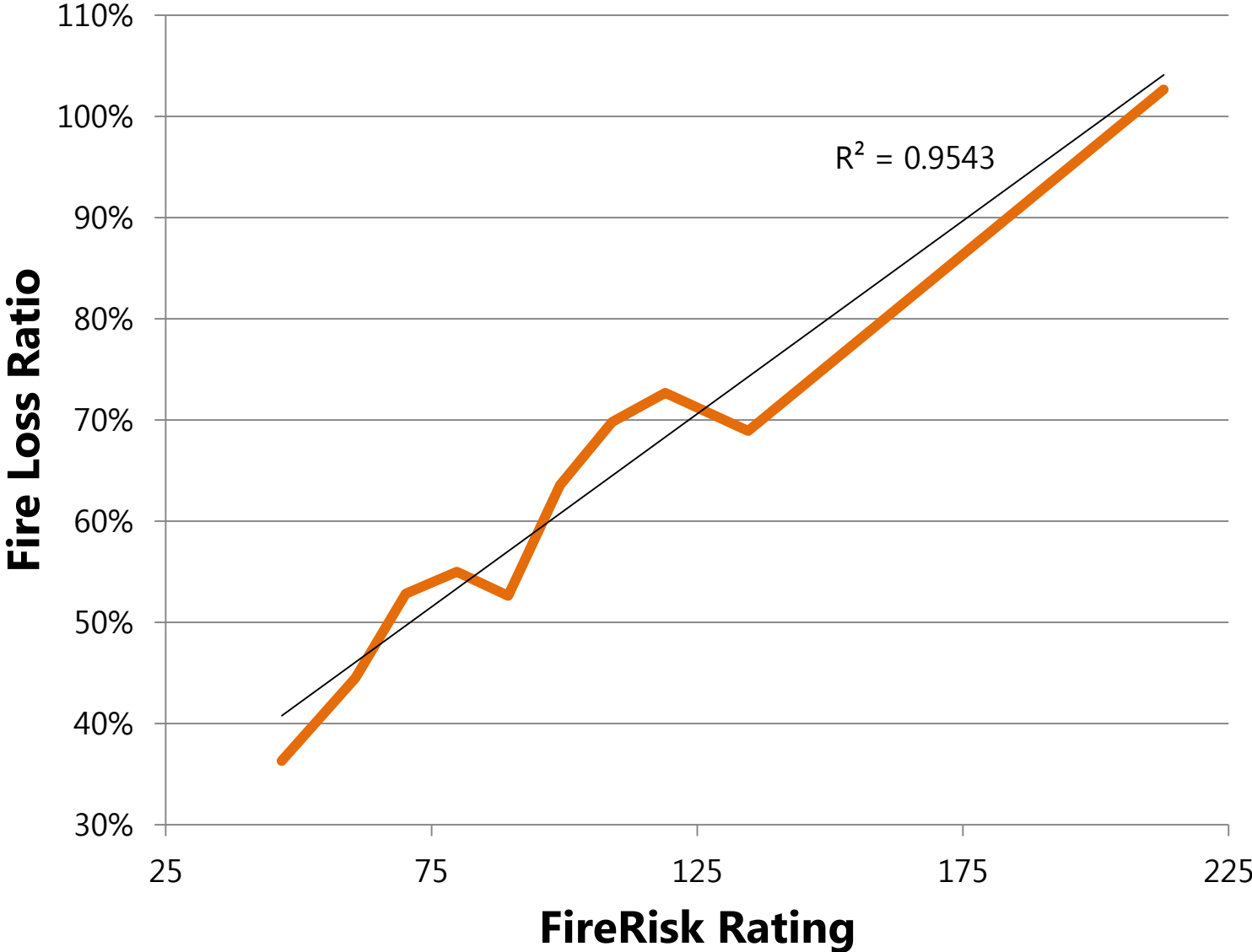
Loss Ratio Analysis – Commercial Lines

$R^2 = 0.9926$
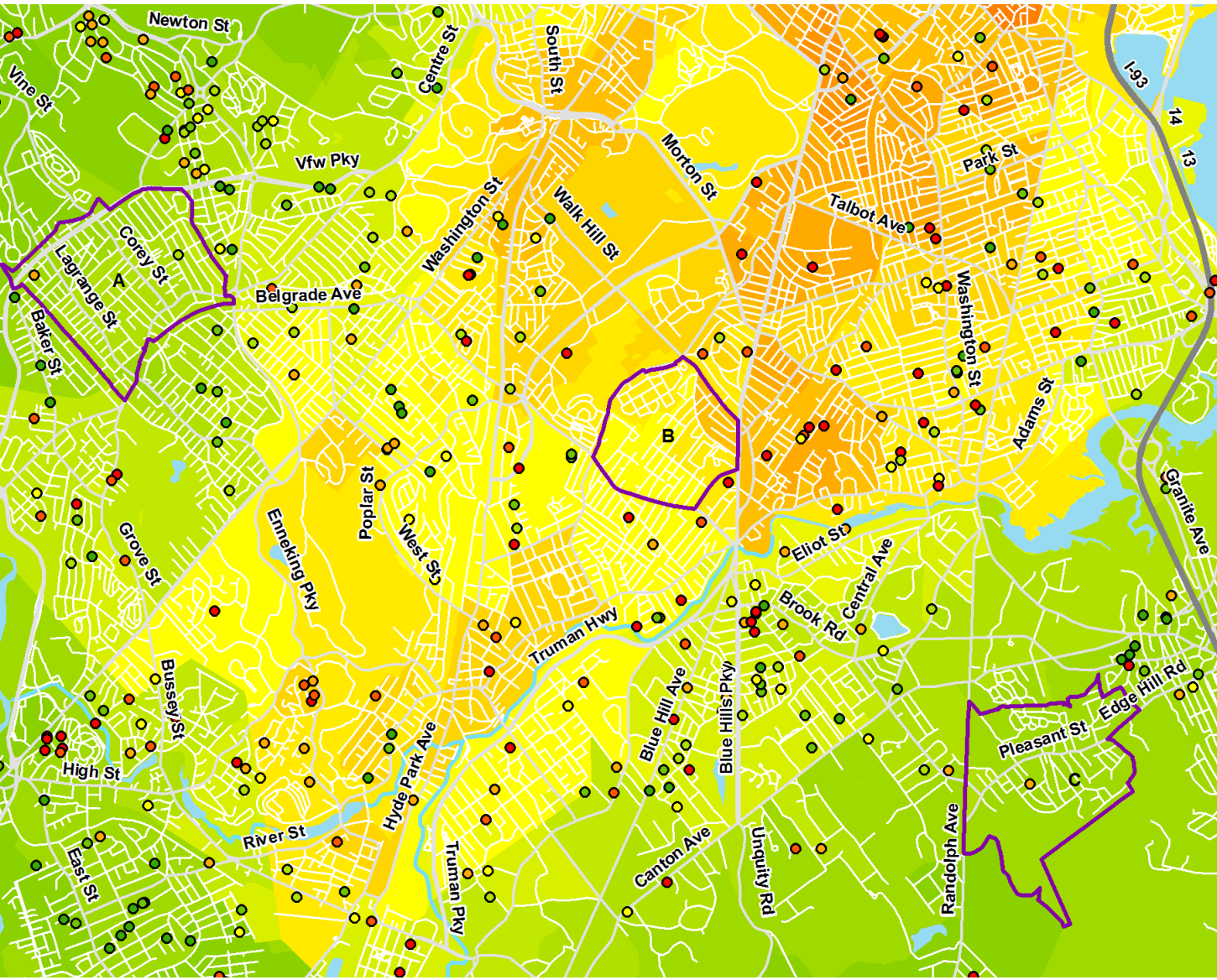
$R^2 = 0.8429$

- ▇ All Perils Loss Ratio
- ✕ Fire Loss Ratio

FireRisk Rating
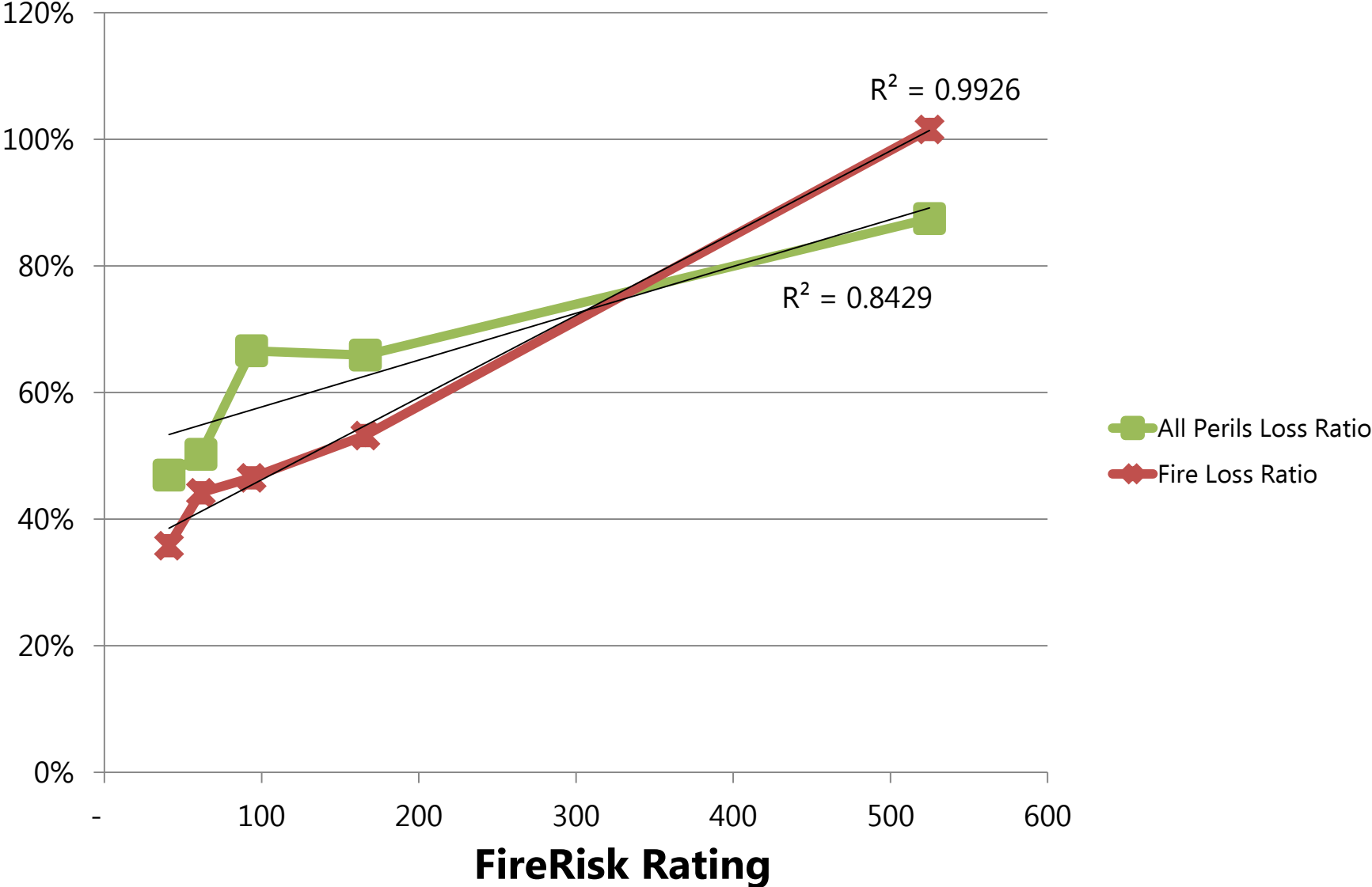
Discovering New Pockets of Opportunity

Deep Segmentation   Block Level (11 million spatial data points)

Fire Risk

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