

A photograph of a small propeller-driven aircraft flying from right to left, leaving a thick, red smoke or fire retardant trail across a hazy sky. The aircraft has 'ZB' written on its vertical stabilizer and 'N662DB' on its fuselage. Below the aircraft, a hillside is visible with dark smoke rising from its base, suggesting an active wildfire. The overall scene conveys a sense of emergency and firefighting efforts.

# ClassiFire

## Predicting Fire Complexity Levels

### By: Keanan Ginell

# Background

Keanan Ginell - Data scientist

- Summer in Boulder

# Agenda

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- Business Problem
- Data Understanding
- Models
- Evaluation and Next steps

# Business Problem

03

- Risks and Dangers
- Why fire complexity levels
- Our Solution

## CRITERIA

1. SIZE
2. THREAT TO  
LIFE & PROPERTY
3. POLITICS
4. ORGANIZATIONAL  
COMPLEXITY
5. JURISDICTIONS
6. VALUES AT RISK
7. FIRE BEHAVIOR
8. STRATEGY & TACTICS
9. AGENCY POLICY



# DATA UNDERSTANDING

04

Timeline:

2014-2023

Location:

Contiguous USA

Cleaned Size:

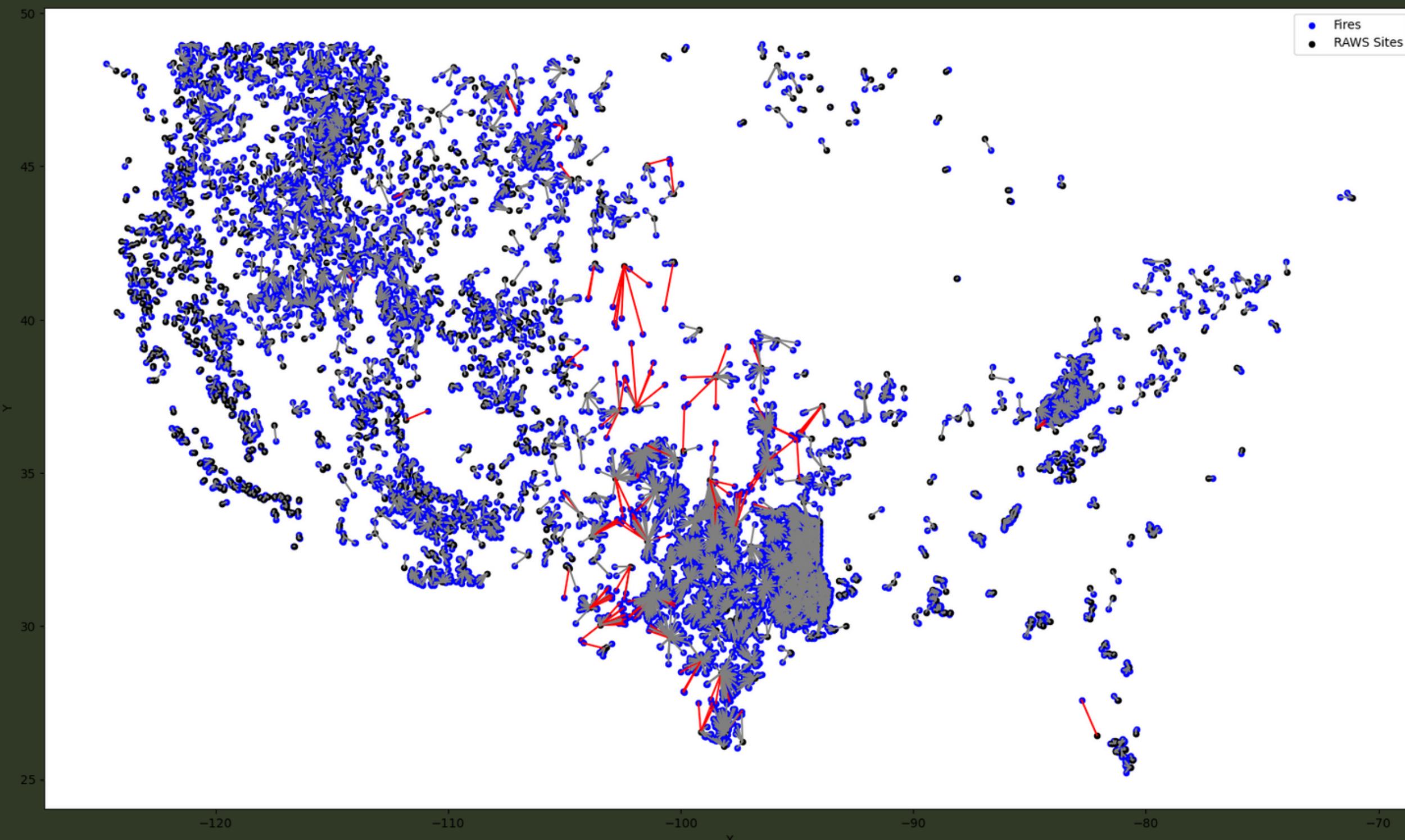
7731 fires

RAWS:

Meteorological features

NIFC:

Wildfire occurrences



Sources:

<https://data-nifc.opendata.arcgis.com/datasets/nifc::wildland-fire-incident-locations/about>

<https://data-nifc.opendata.arcgis.com/datasets/nifc::public-view-interagency-remote-automatic-weather-stations-raws/about>

<https://raws.dri.edu/>

# TARGETS

05

Type 1 Incident - small scale

Type 2 Incident

Type 3 Incident

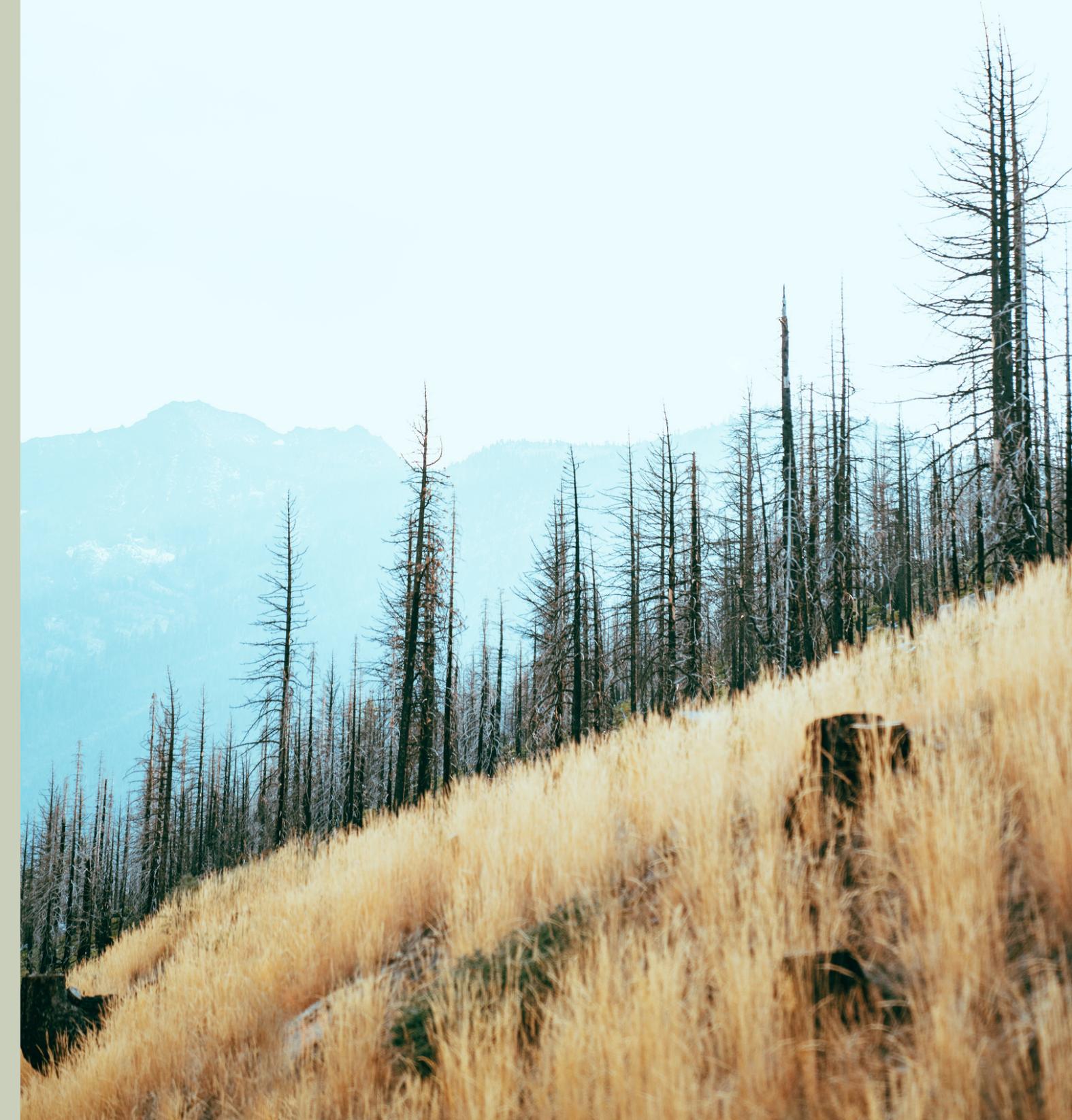
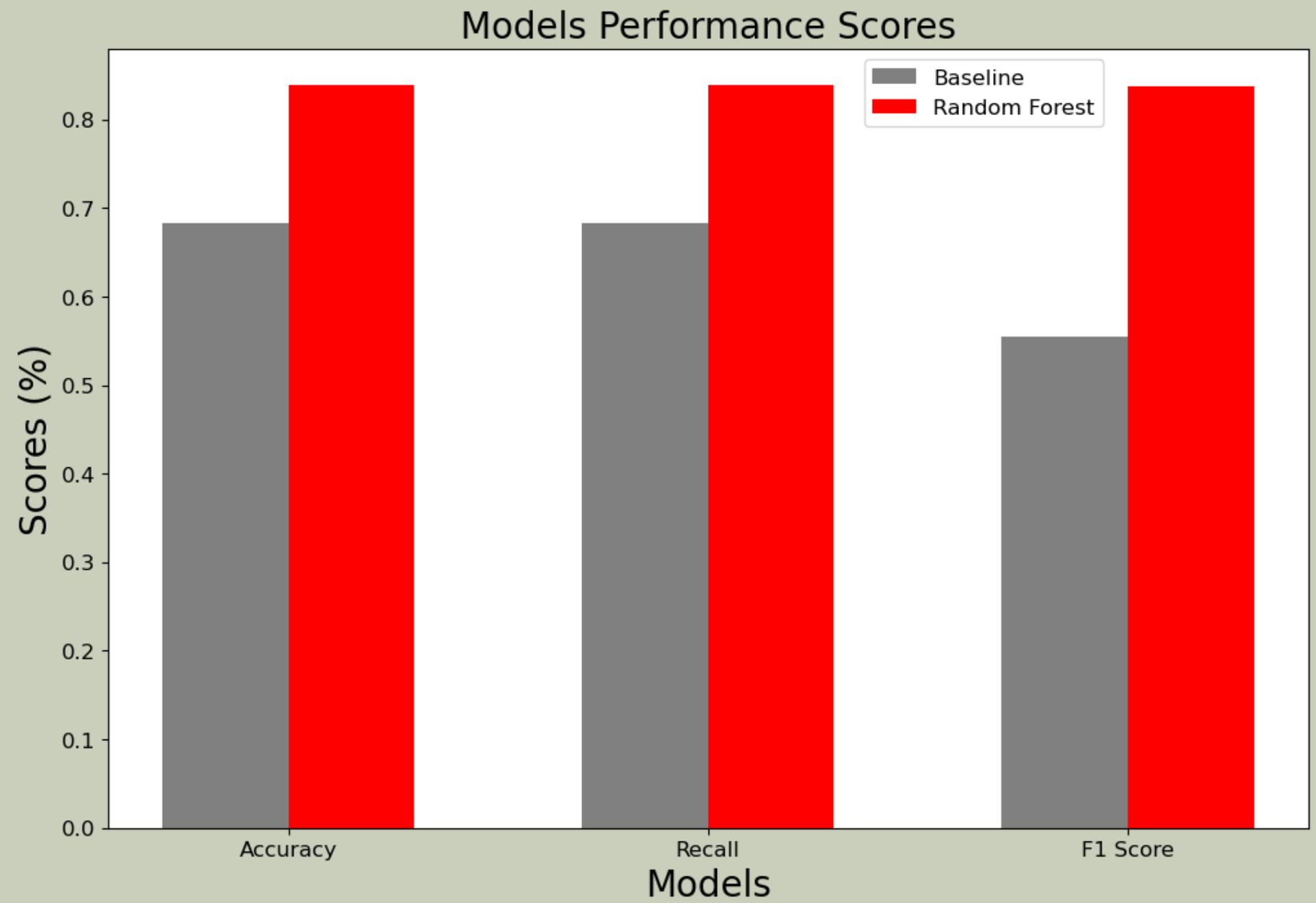
Type 4 Incident

Type 5 Incident - large scale

# — Models

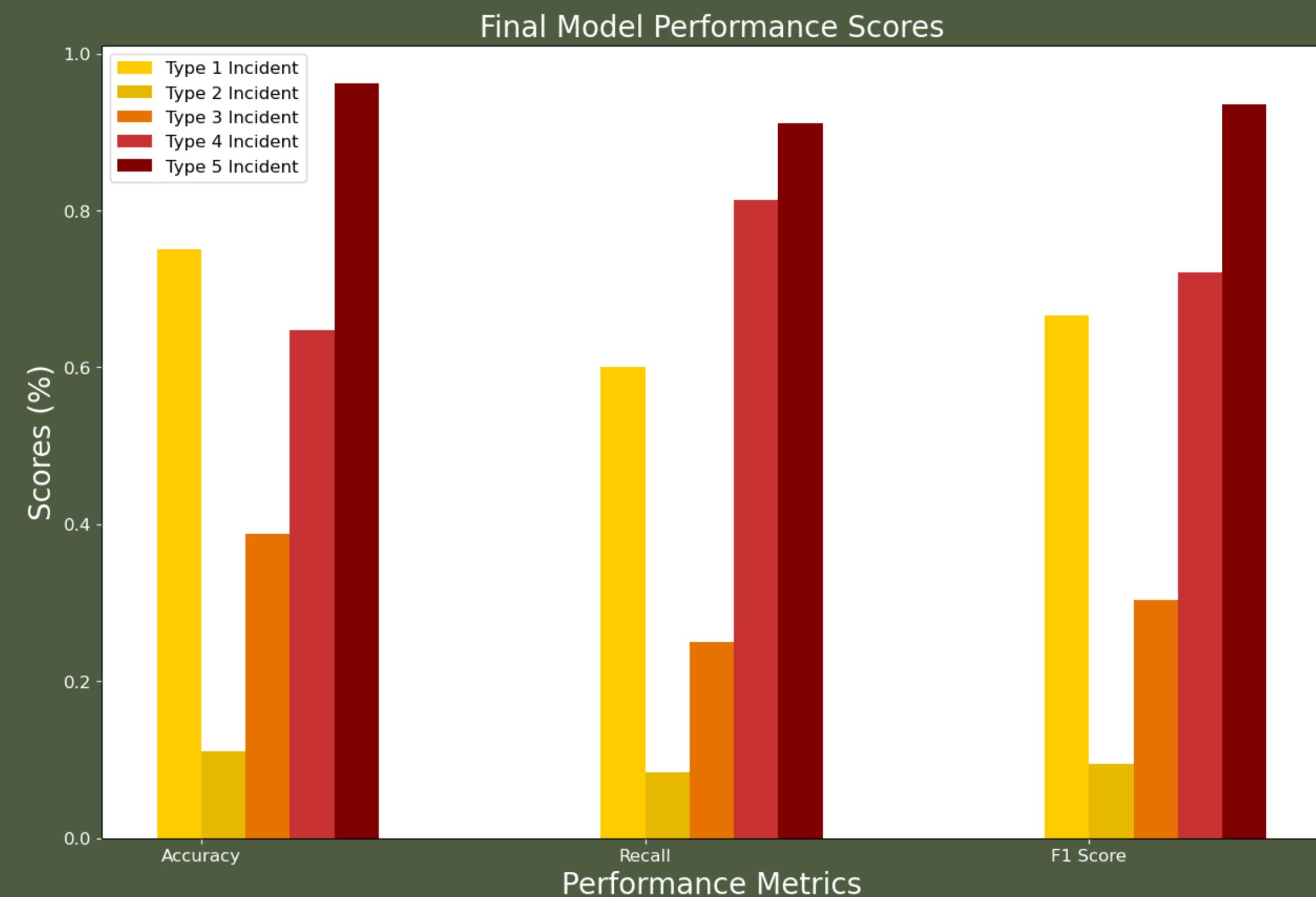
06

- Dummy Classifier
- Decision Tree
- Random Forest

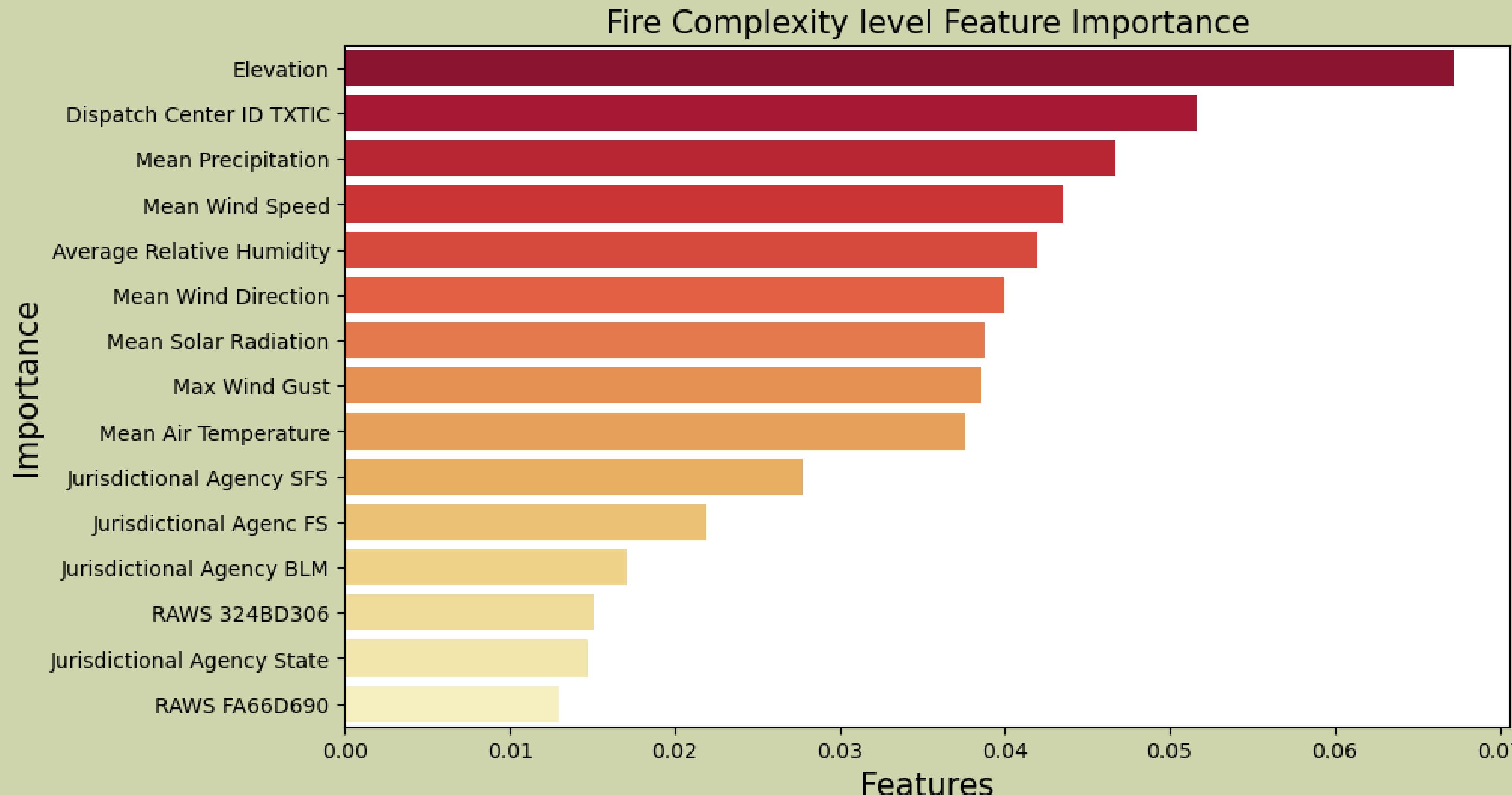


# Model

Complexity level	precision	recall	f1-score	support
Type 1 Incident	0.75	0.60	0.67	10
Type 2 Incident	0.11	0.08	0.10	12
Type 3 Incident	0.39	0.25	0.30	124
Type 4 Incident	0.65	0.81	0.72	467
Type 5 Incident	0.96	0.91	0.94	1320
accuracy			0.84	1933
macro avg	0.57	0.53	0.54	1933
weighted avg	0.84	0.84	0.84	1933

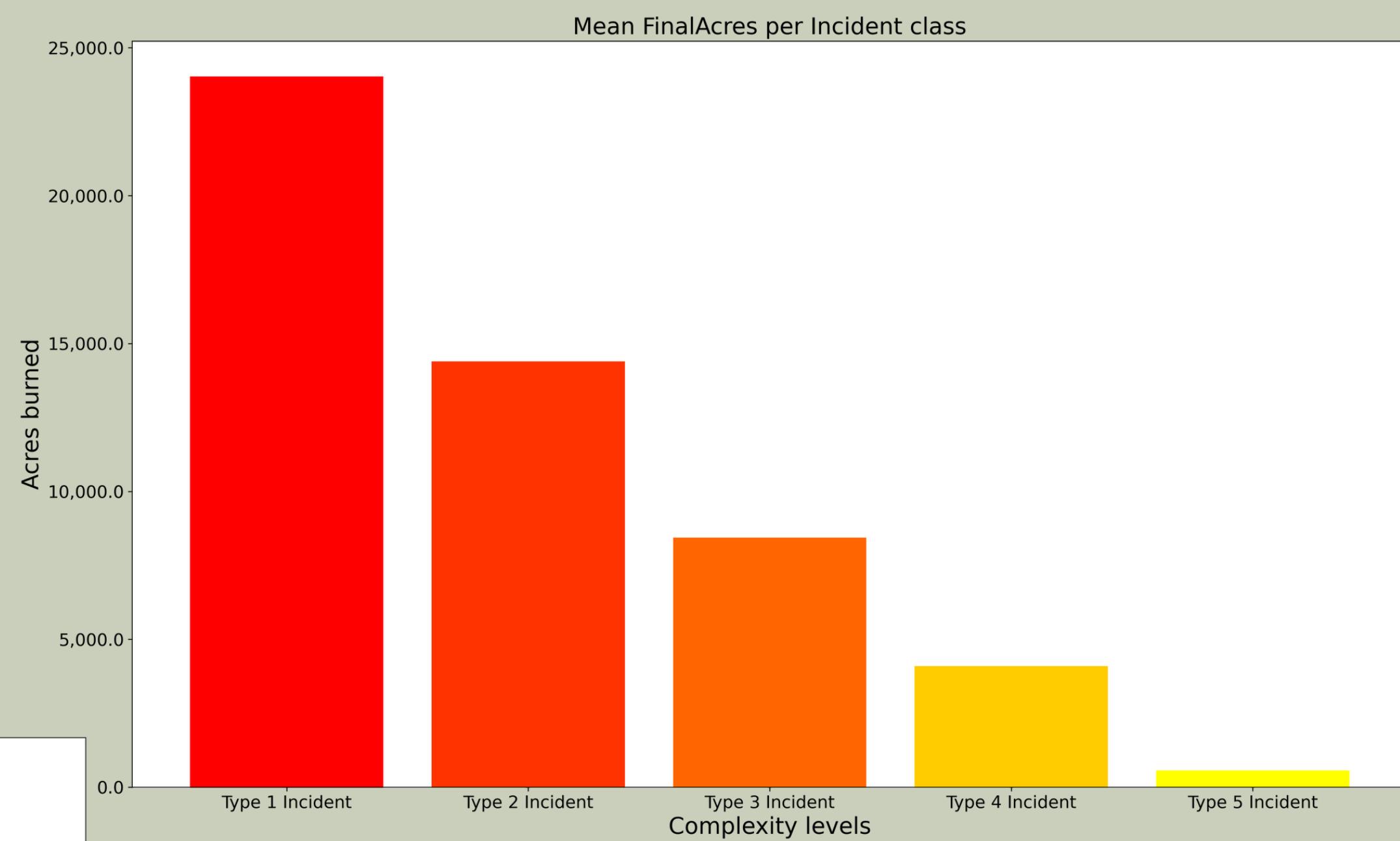
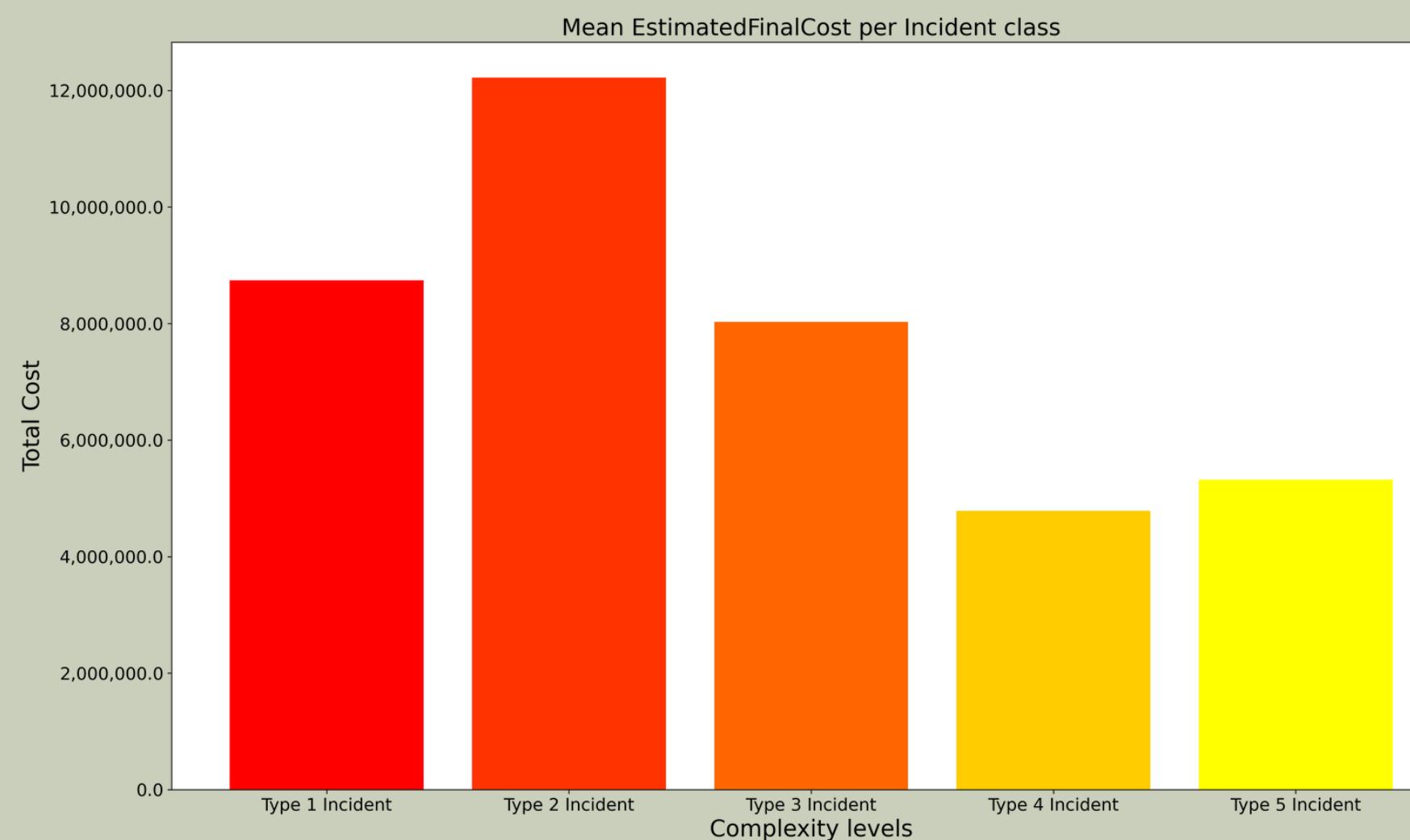


# Feature Importance

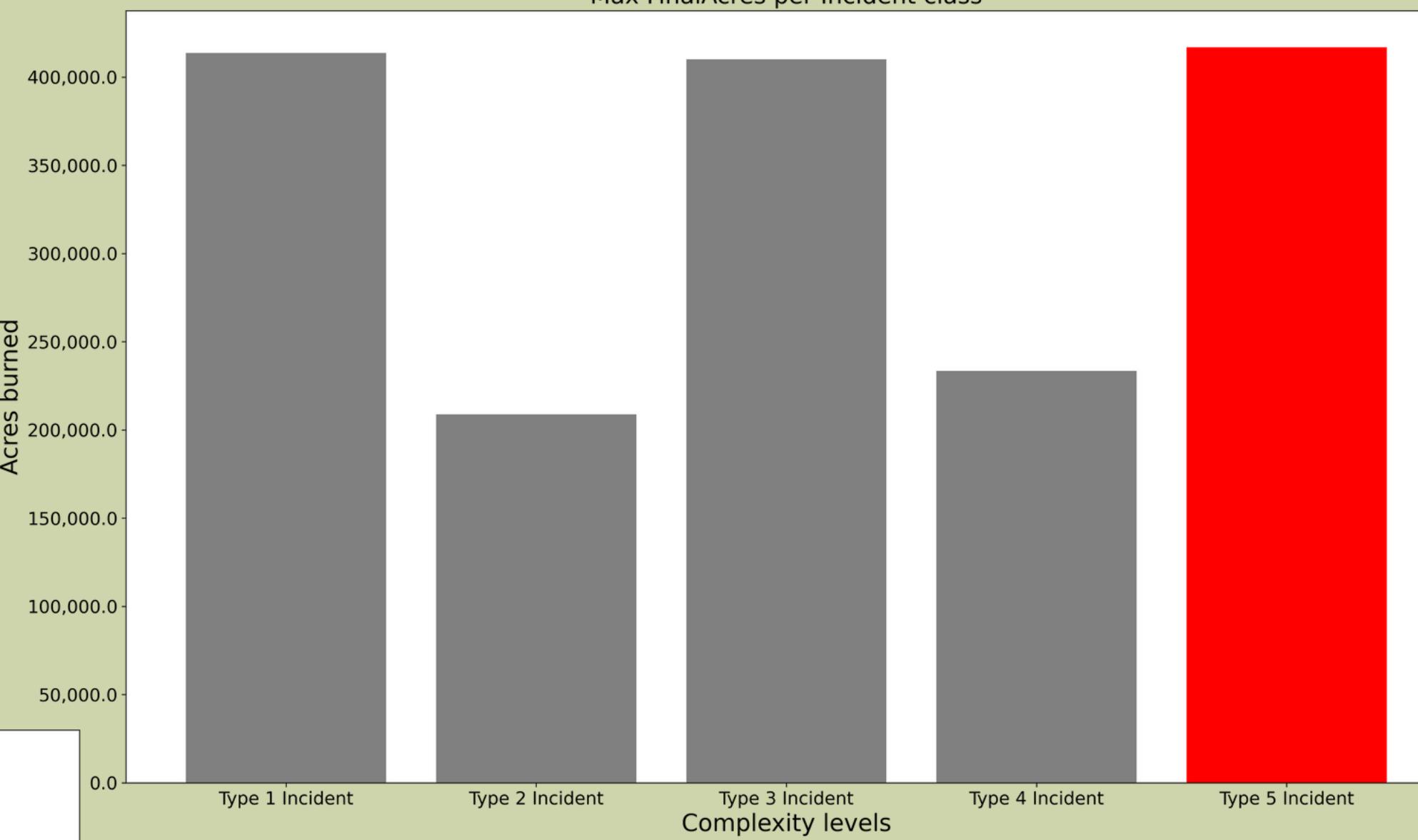
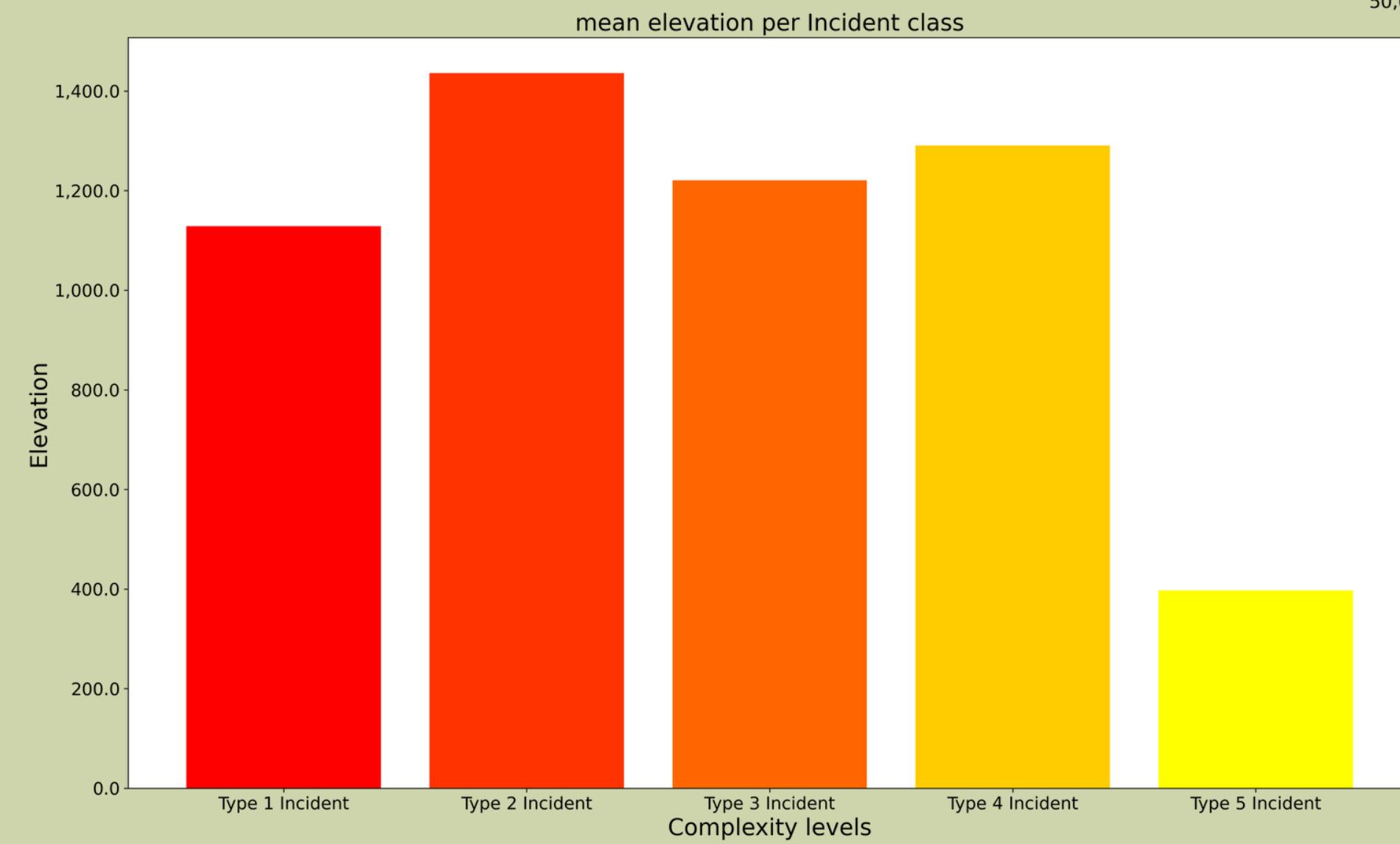


# Conclusion

- Effective at levels 1, 2, and 5
- Risks associated with the target



# Conclusion



# NEXT STEPS

- Deployment
  - Improving RAWS selection
  - Collect more data
  - Model implementation
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A wide-angle photograph of a landscape at sunset. The foreground is a lush green grassy field with some low-lying wildflowers. In the middle ground, there's a cluster of dark evergreen trees. Beyond them, a range of mountains is visible against a sky filled with dramatic, colorful clouds. The clouds are illuminated from below by the setting sun, showing shades of orange, yellow, and pink. The overall atmosphere is peaceful and scenic.

THANK YOU