

Minnesota Fire Loss: What Our Data Tells Us About Fires in Minnesota



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Acknowledgement & Thanks

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 - **State Fire Marshal Division Data Team:**
 - Nora Gierok
 - Joel Paylor
 - Scott Radke
 - **ImageTrend – state’s fire reporting software vendor**
 - **Fire departments in Minnesota who faithfully provide data**

Objectives

- The following are objectives for this session:
 - Review recent state fire loss data
 - Compare national, state, and local fire loss
 - Analyze trends in fire loss
 - Identify causes of structure fires
 - Assess impact of fire protection systems
 - Identify cost of fire department responses

Terminology / Acronyms

- NFIRS – National Fire Incident Reporting System
- MFIRS – Minnesota Fire Incident Reporting System

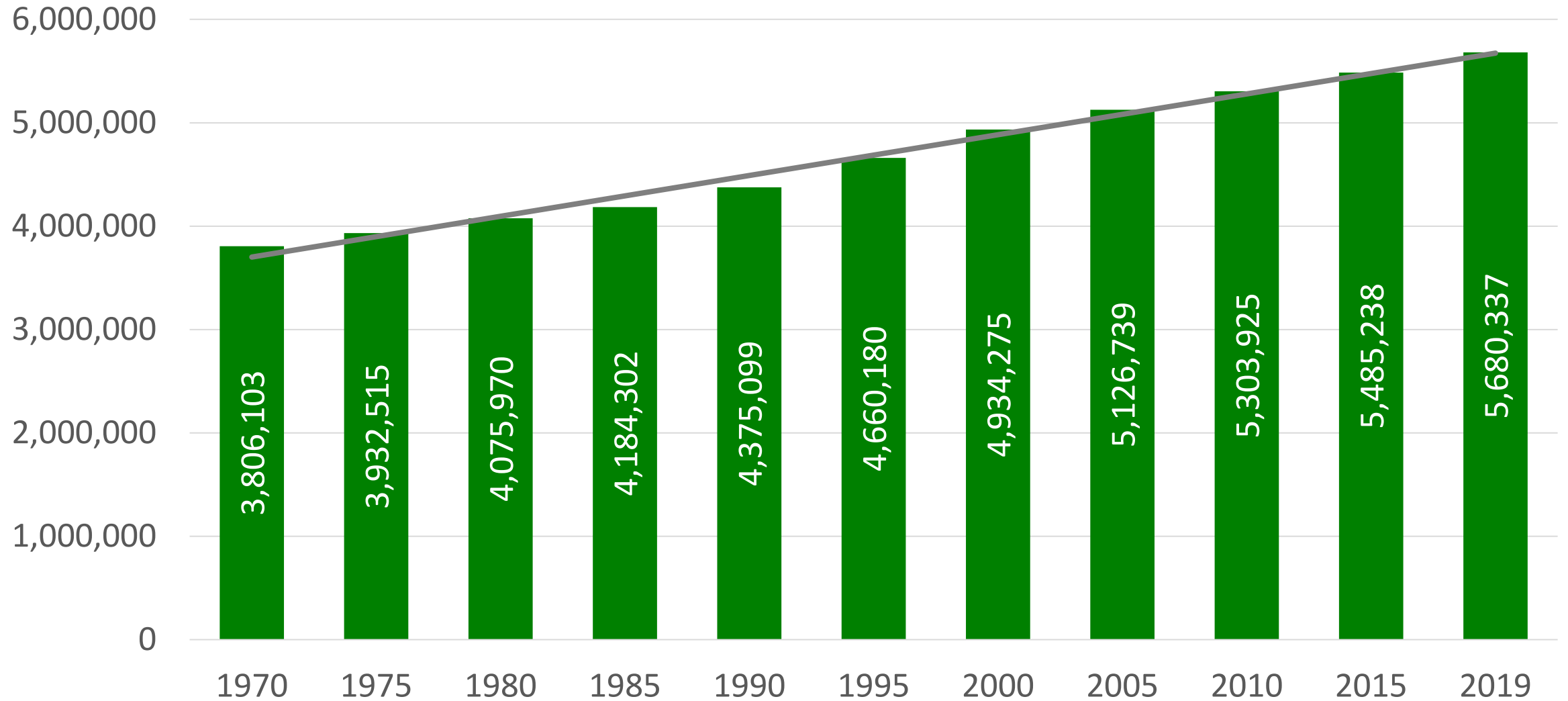
Analytics

- Mathematical and statistical discovery of patterns in data
- Often used to quantify performance
- Provided in visual format
- Since analytics look at past history, they can be used to predict future events

Data Reliability

- Some data is more reliable than other data:
 - Fire deaths (very reliable)
 - Number of fires – pretty good
 - Dollar loss – not so good (subjective)
 - Causes – not so good (we need to do better)

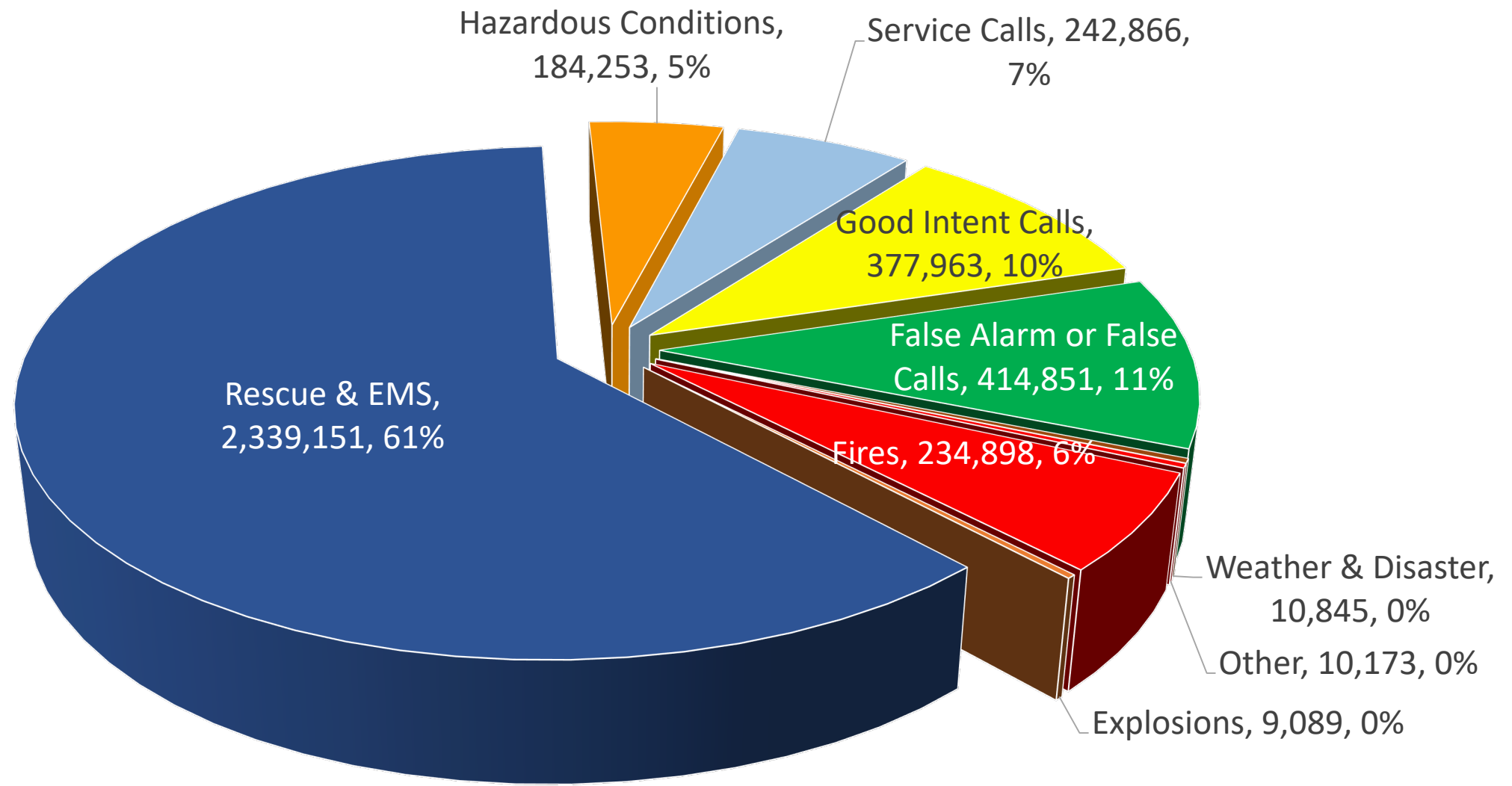
Minnesota Population



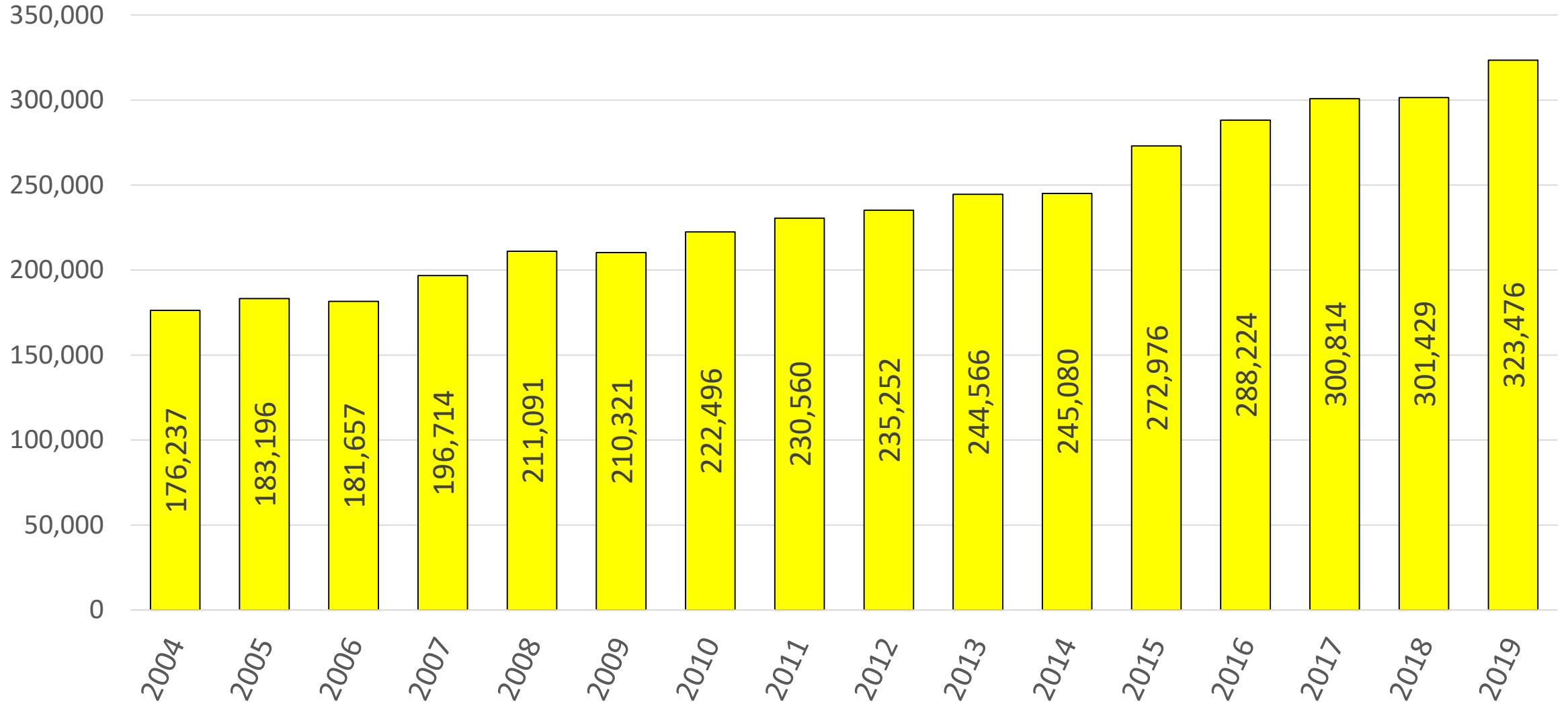
Fire Department Responses

What Types of Incidents Do Fire Departments Respond To?

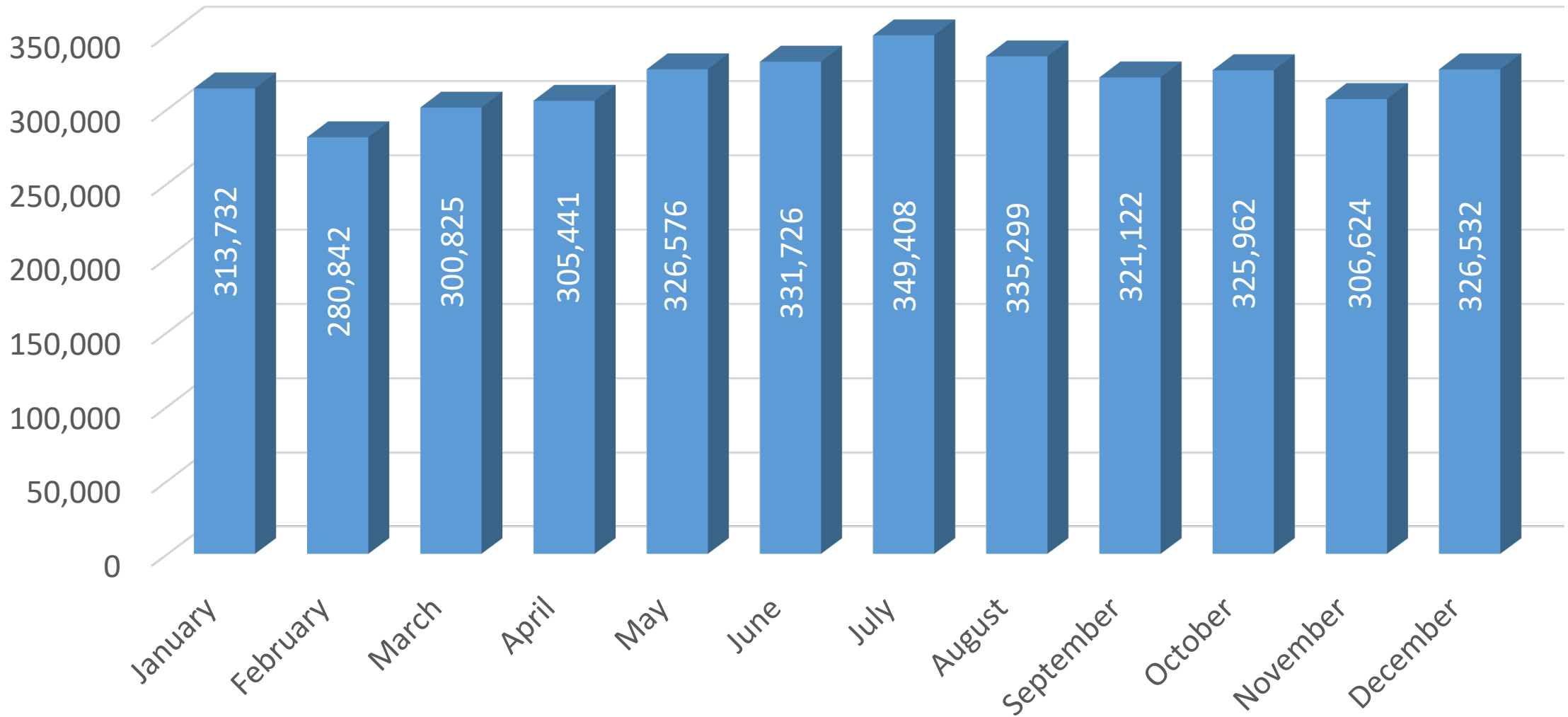
FD Responses – 2004-2019



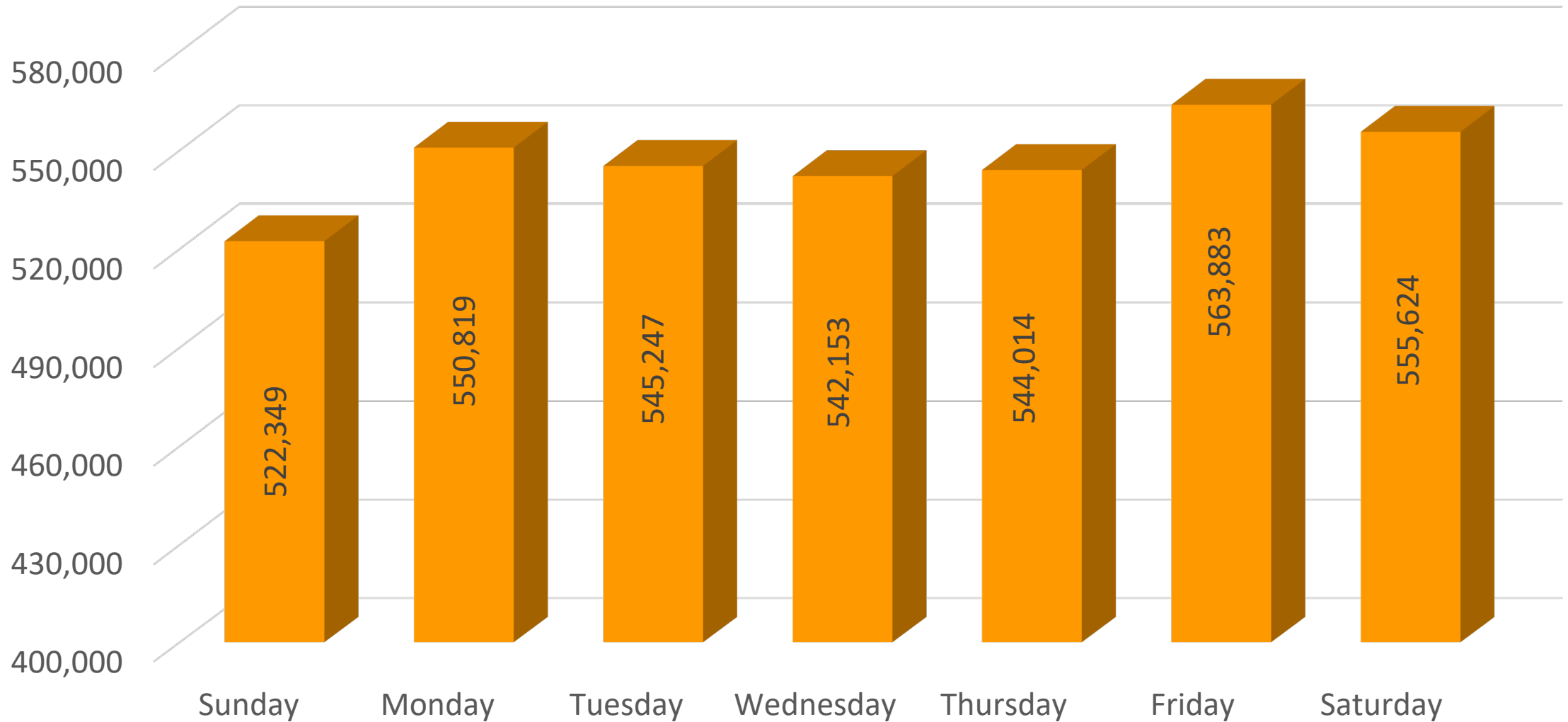
Incidents by Year – 2004-2019



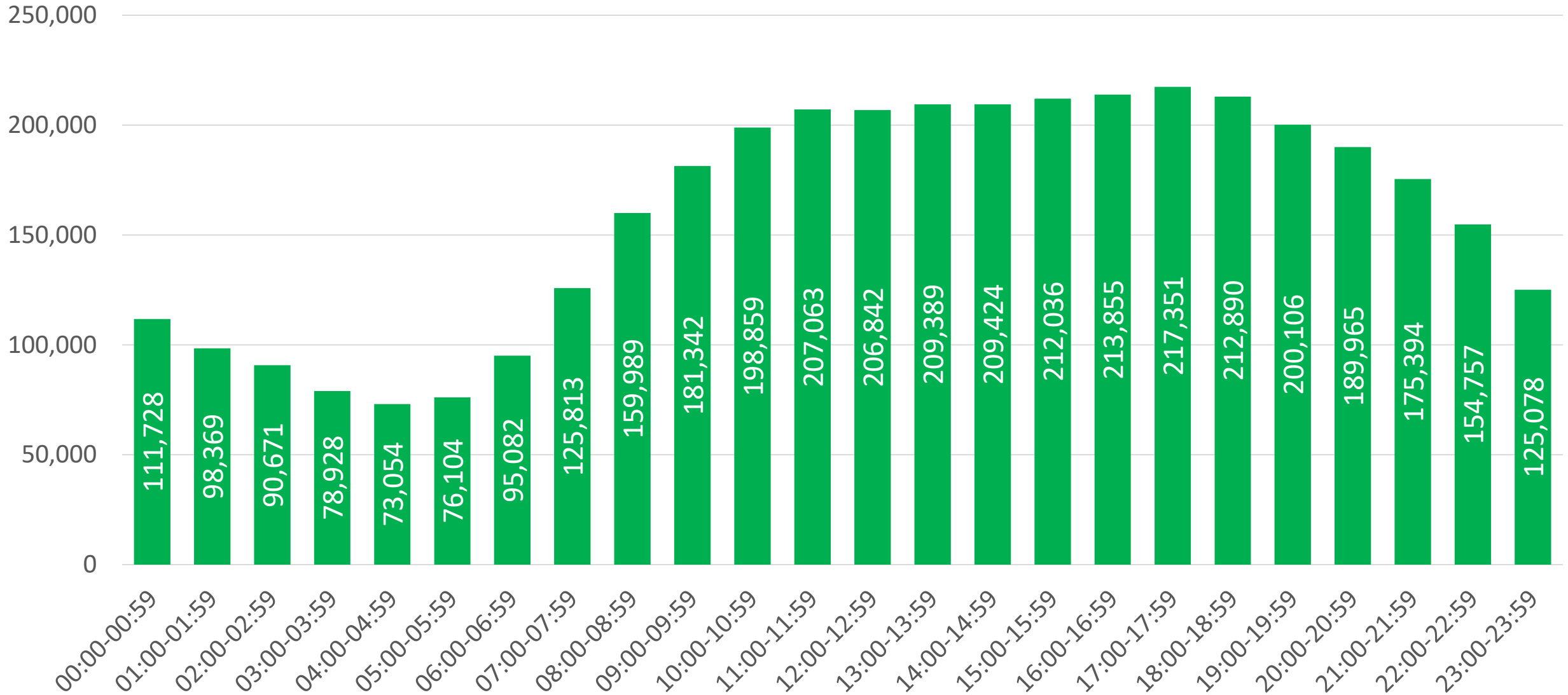
Incidents by Month – 2004-2019



Incidents by Day of Week

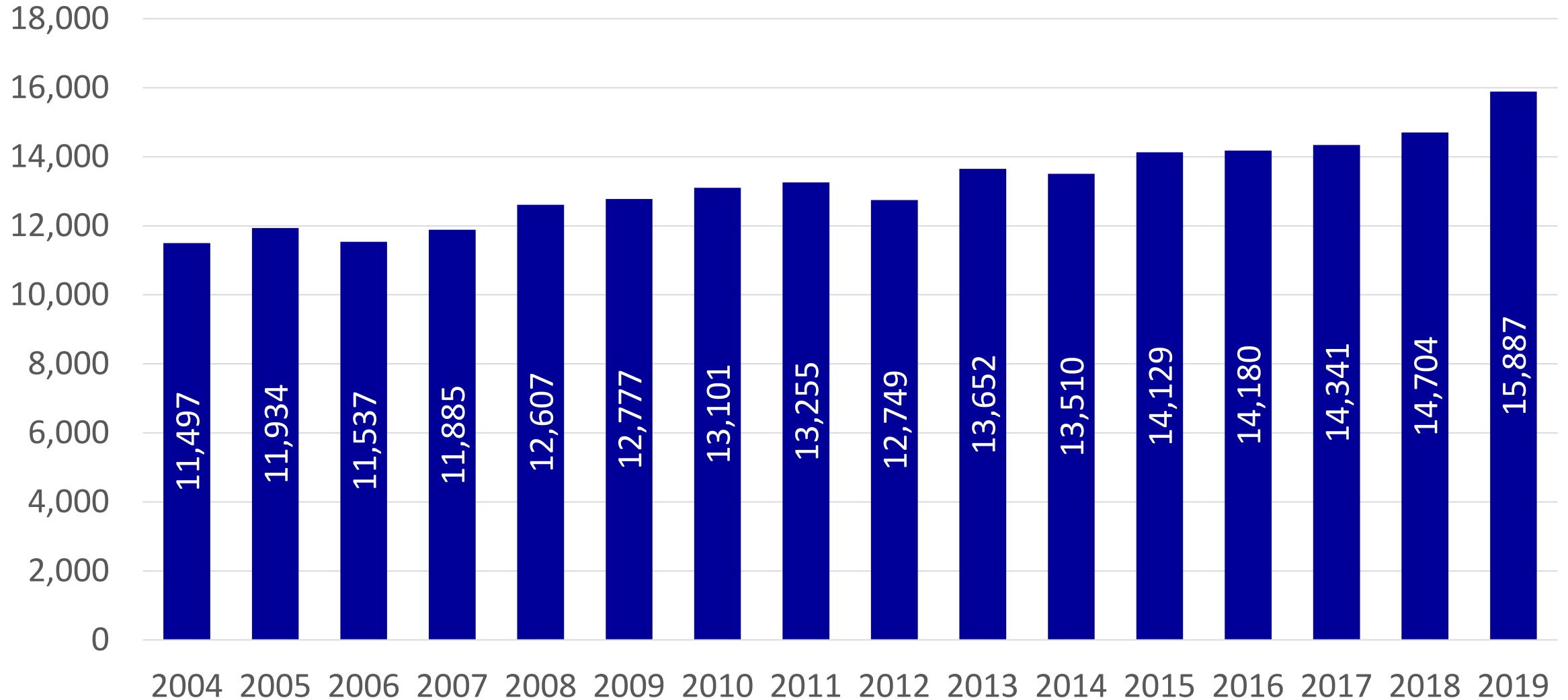


Incidents by Time of Day

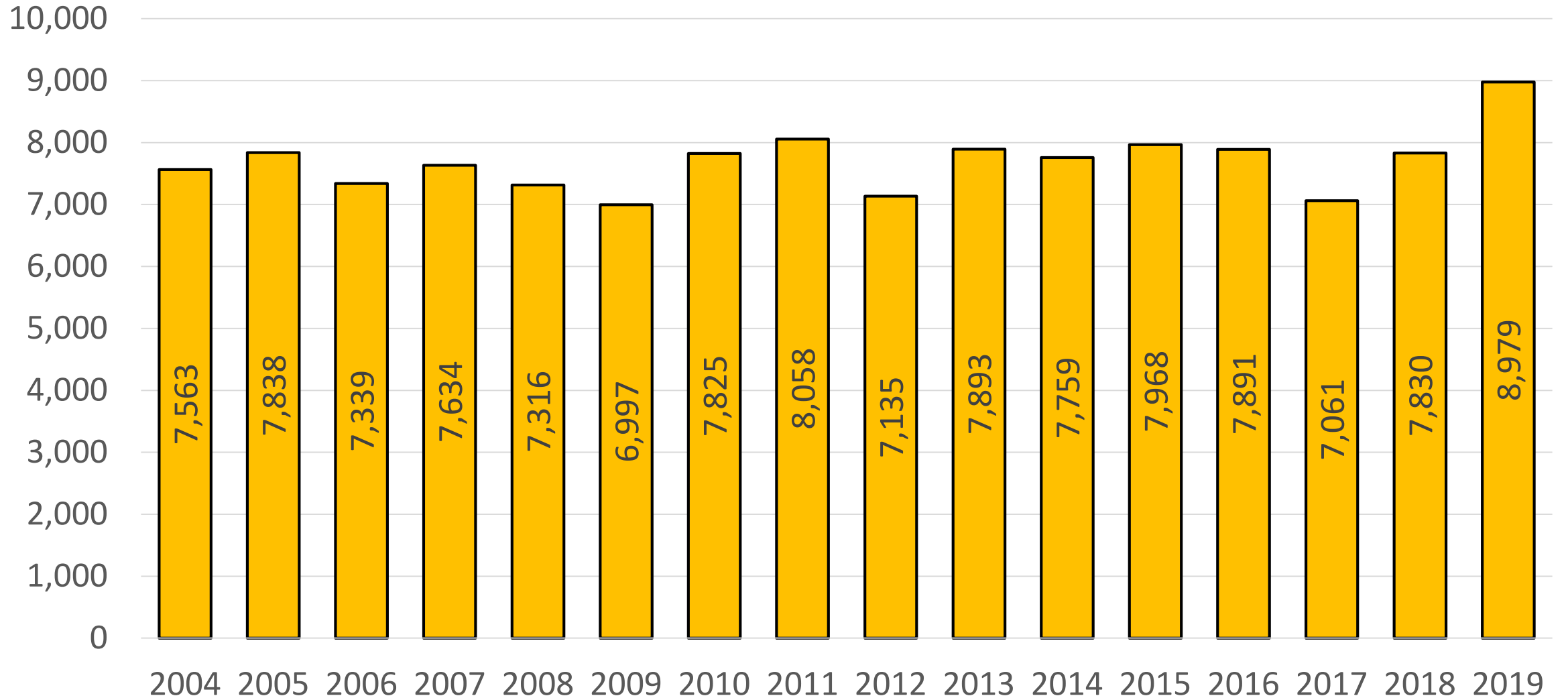


Nuisance Alarms

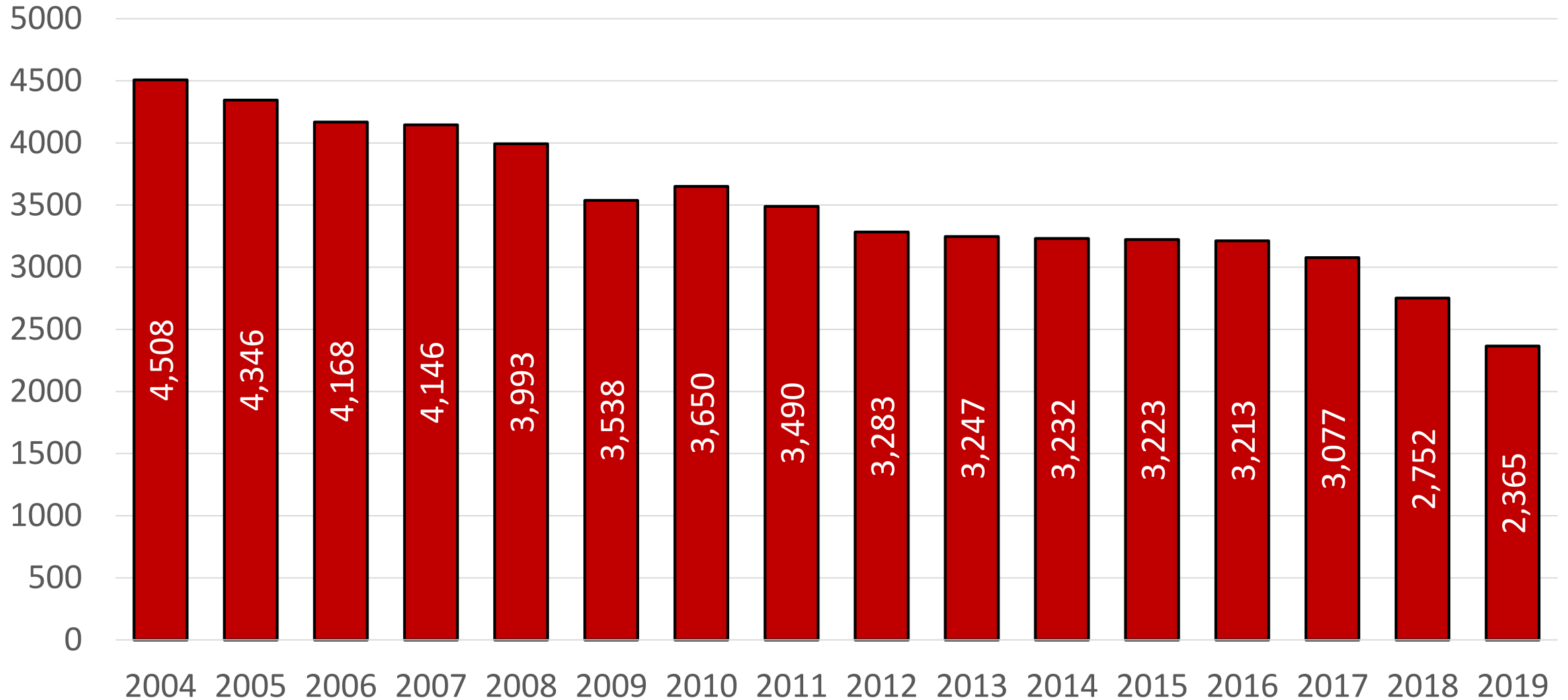
Unintentional Alarms



Alarm Malfunctions

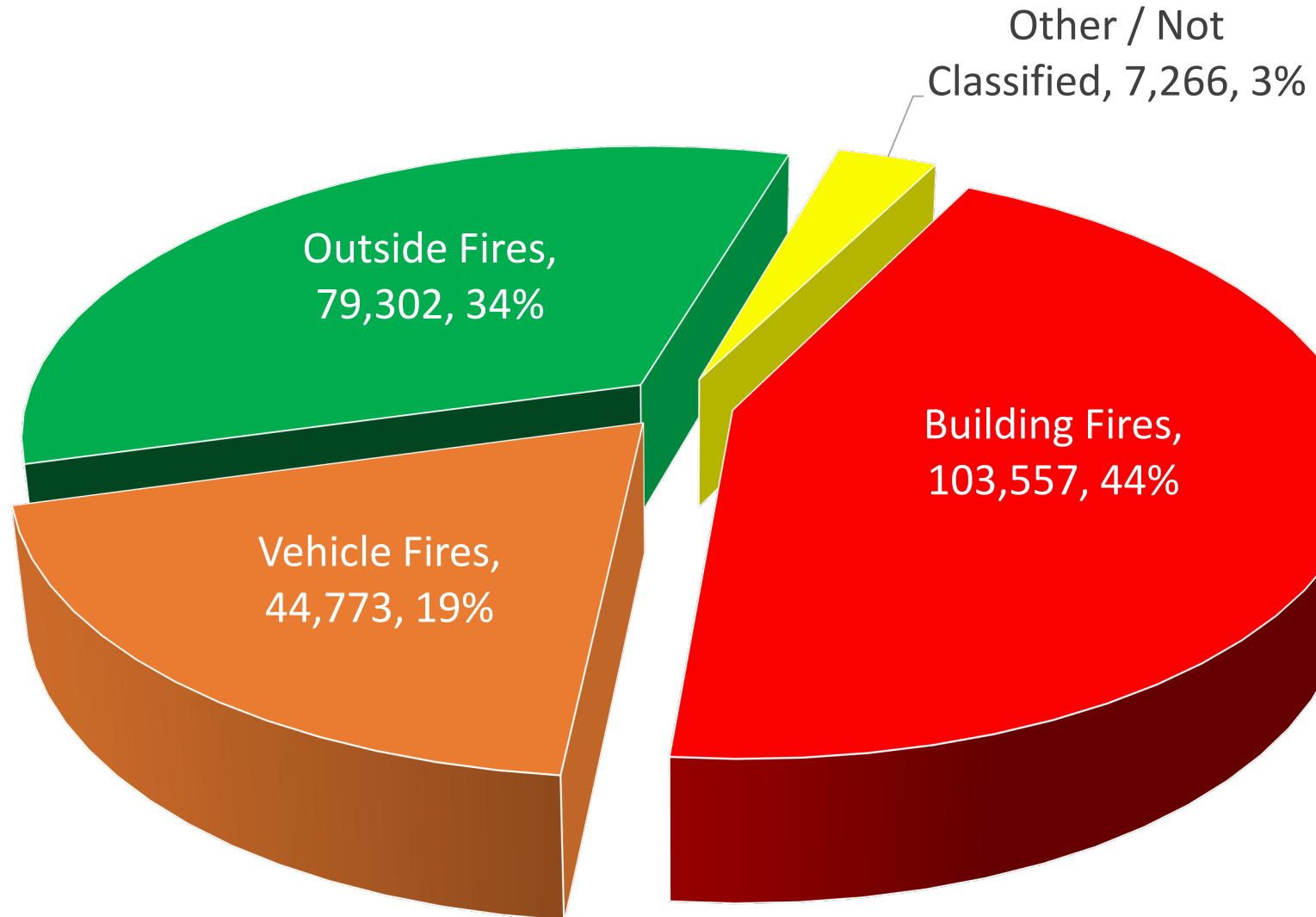


Malicious False Alarms

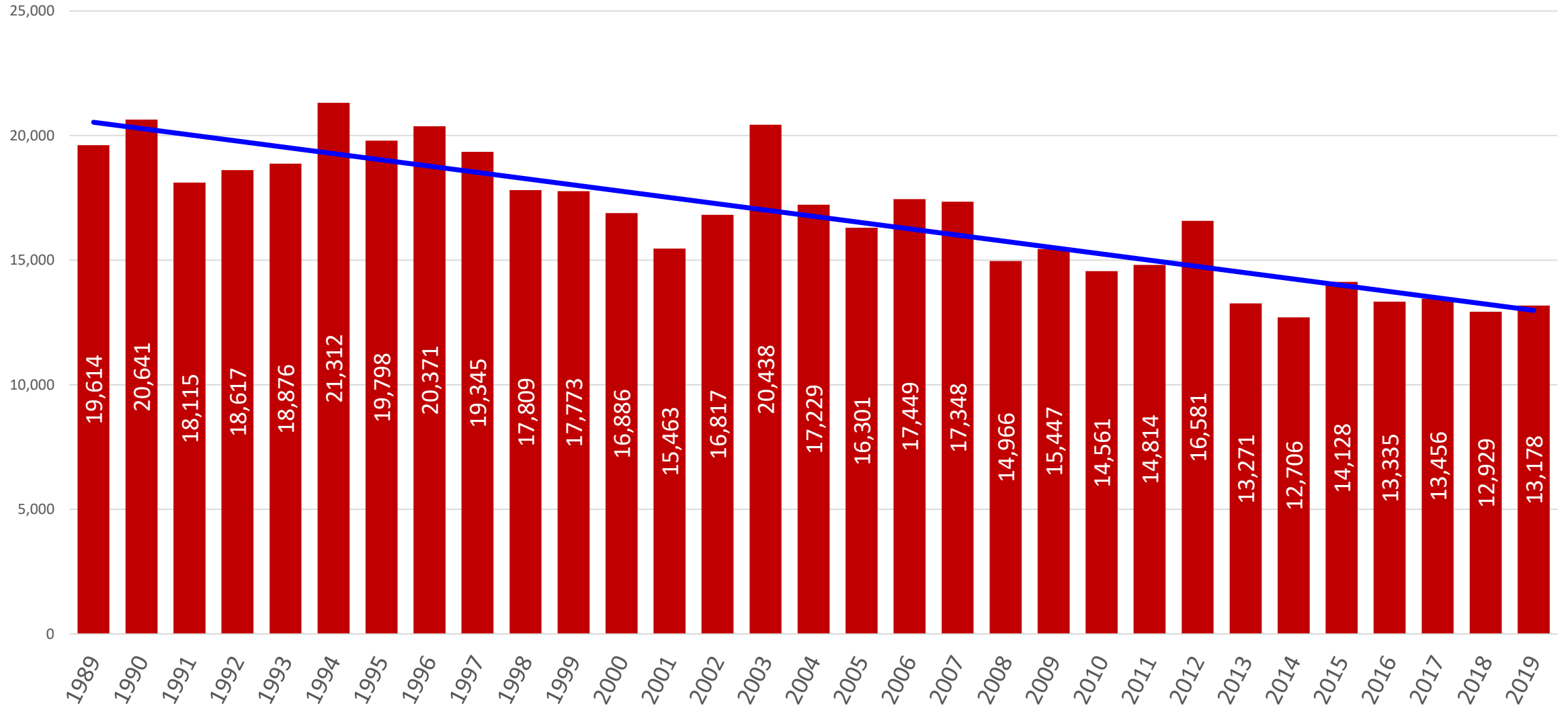


Fires

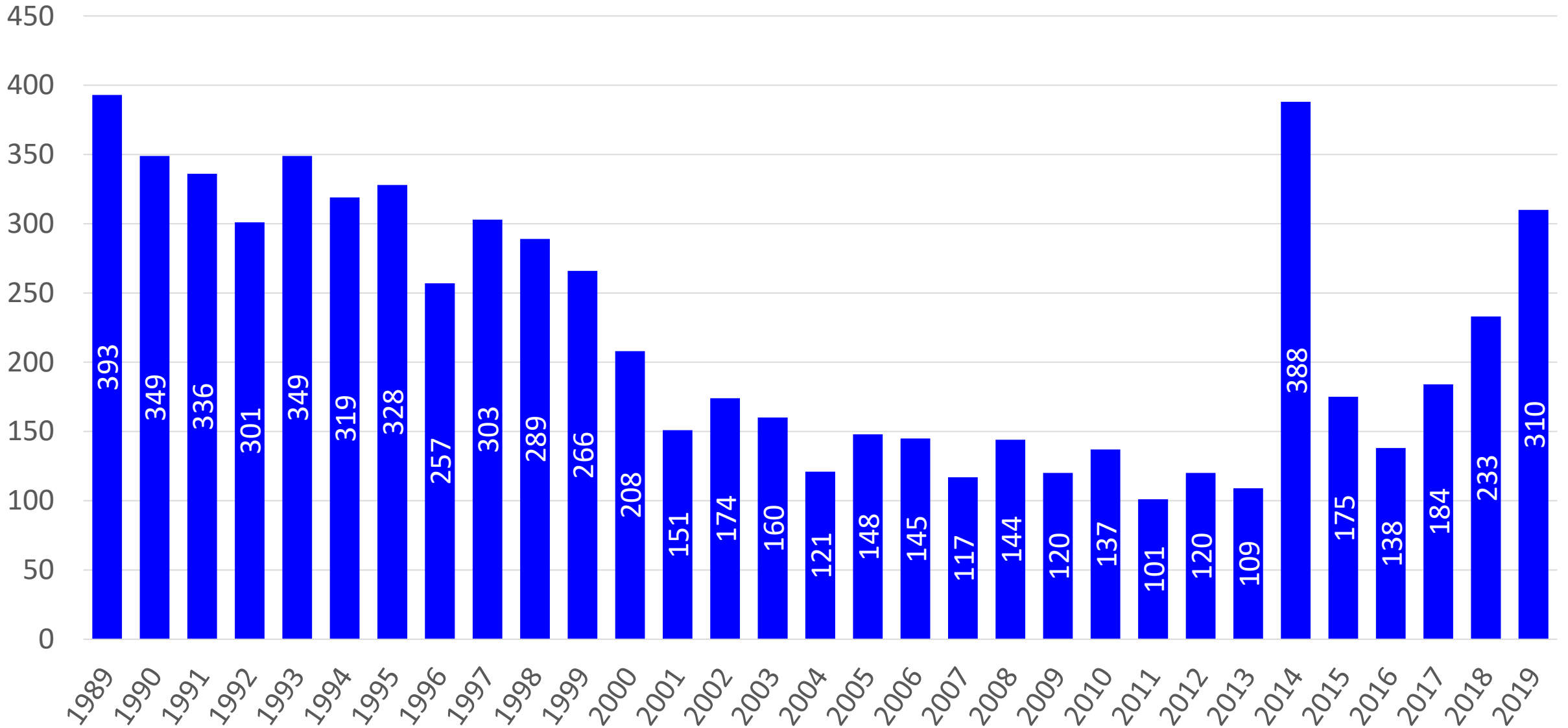
Types of Fires – 2004-2019



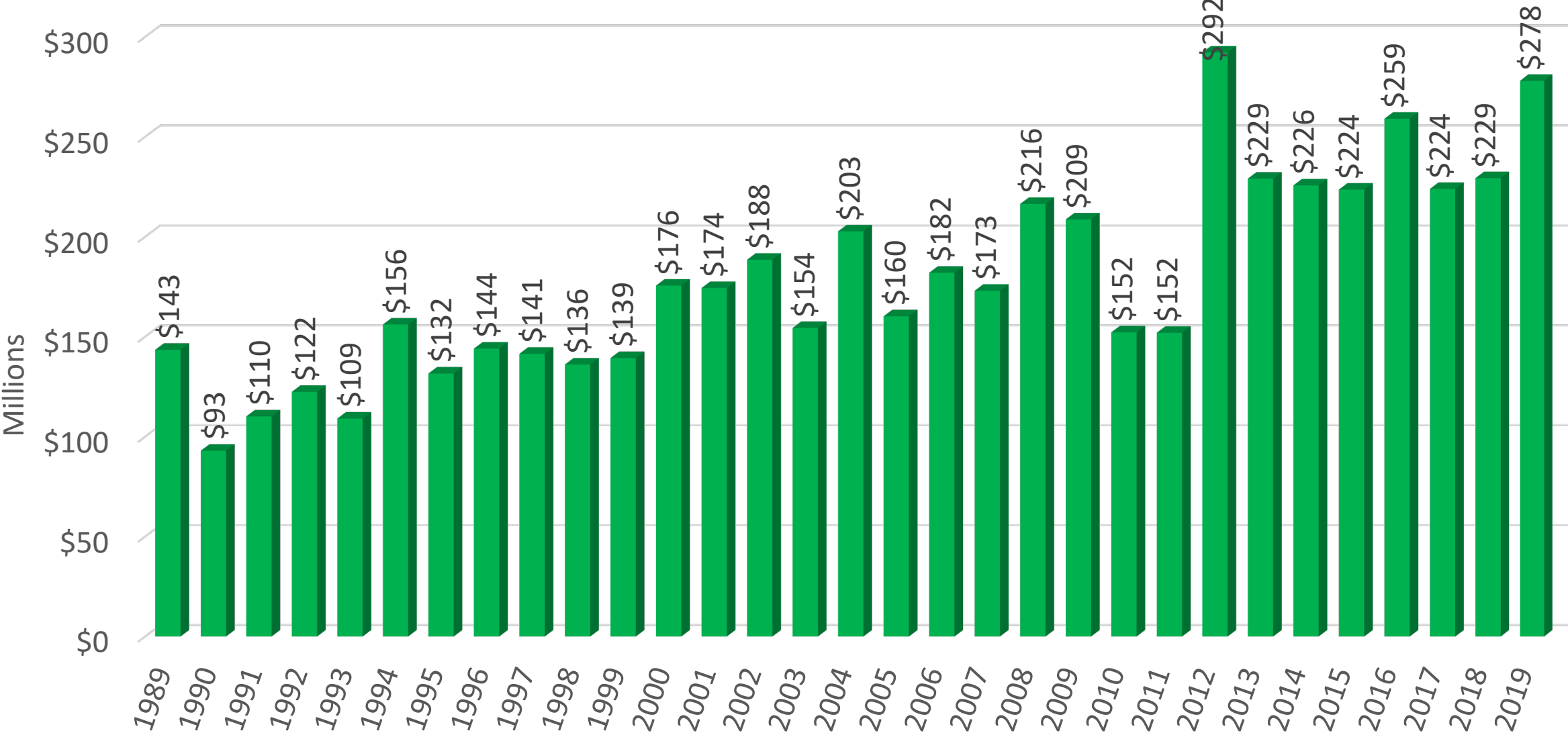
Fires in Minnesota – 1989-2019



Fire Injuries – 1989-2019



Fire Loss – 1989-2019 (in Millions)



Fires by Population

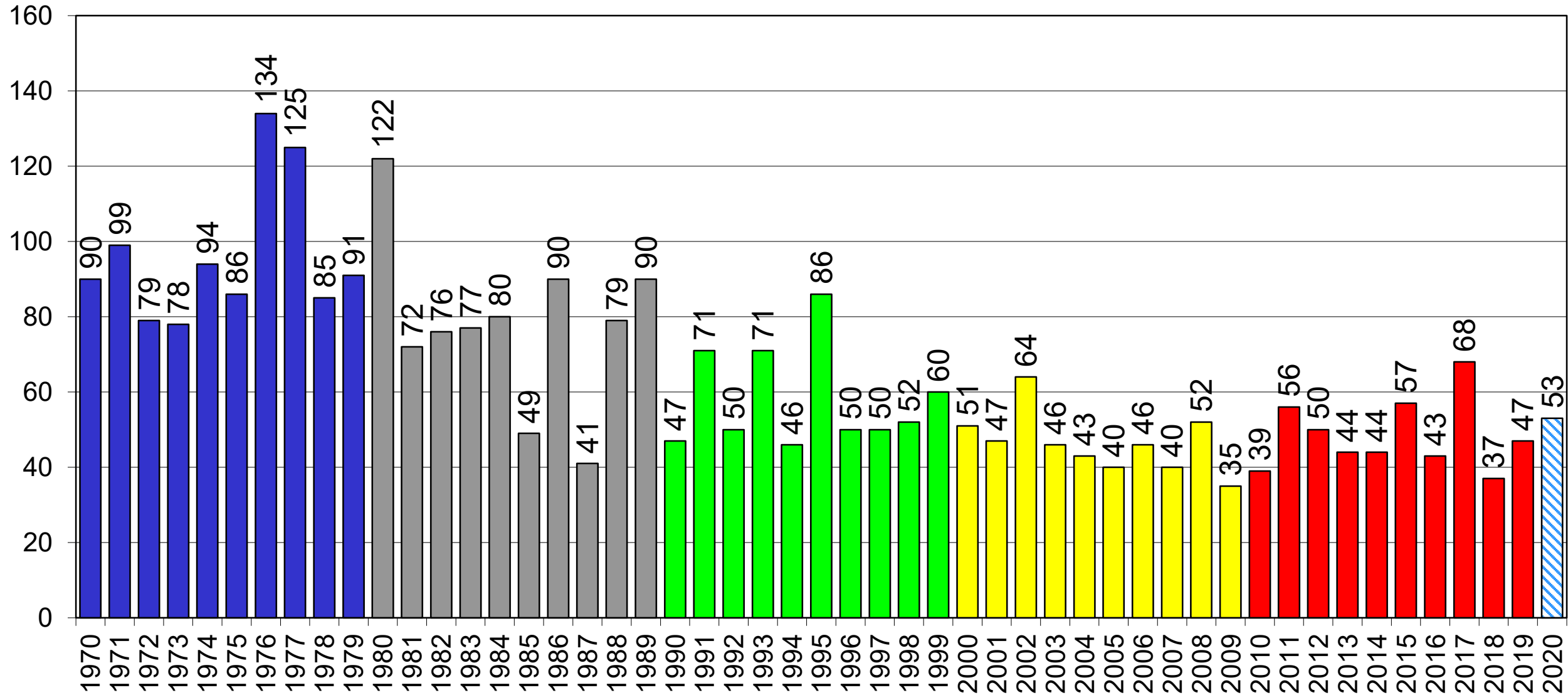
- NFPA:
 - U.S. – 3.9 fires / 1,000 population (2019)
 - Midwest – 4 fires / 1,000 population (2017)
- Minnesota:
 - 2.3 fires / 1,000 population (2019)
 - 2.5 fires / 1,000 population (2010-2019)

How is Your Community Doing?

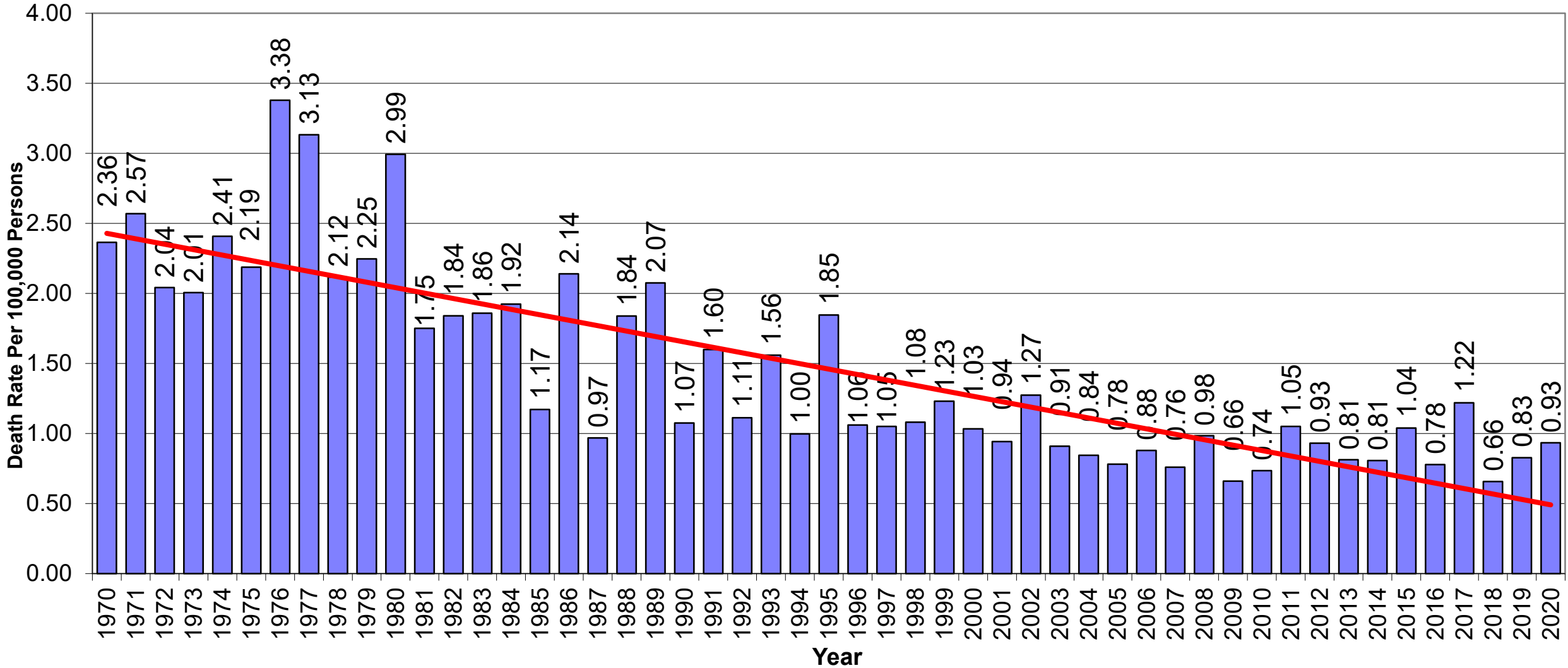
- **2.5 fires / 1,000 population equates to:**
 - **400,000 population = 1,000 fires per year**
 - **300,000 population = 750 fires per year**
 - **100,000 population = 250 fires per year**
 - **60,000 population = 150 fires per year**
 - **40,000 population = 100 fires per year**
 - **25,000 population = 63 fires per year**
 - **20,000 population = 50 fires per year**
 - **10,000 population = 25 fires per year**

Fire Deaths

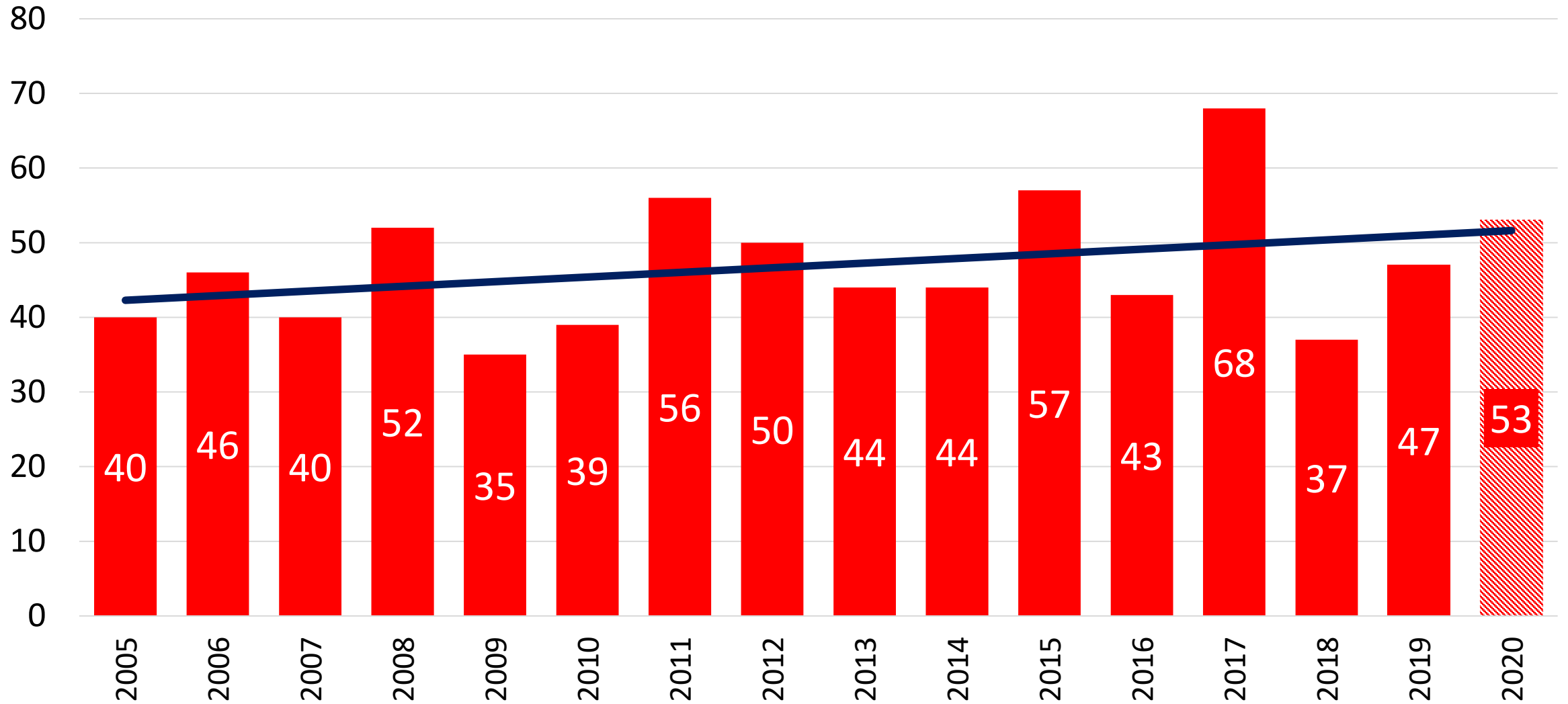
Minnesota Fire Deaths – 1970-2020



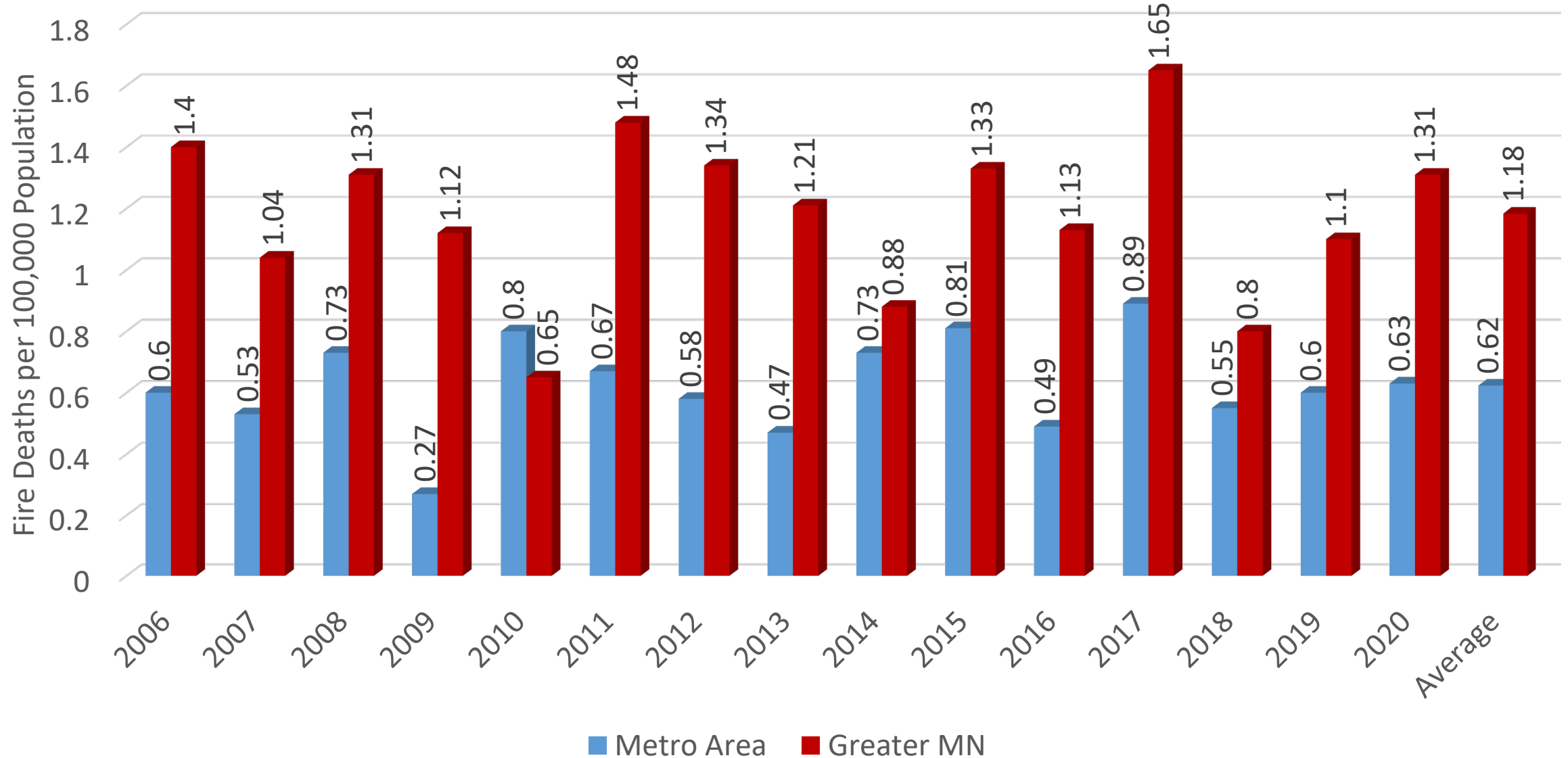
Fire Death Rate (per 100,000 people) – 1970-2020



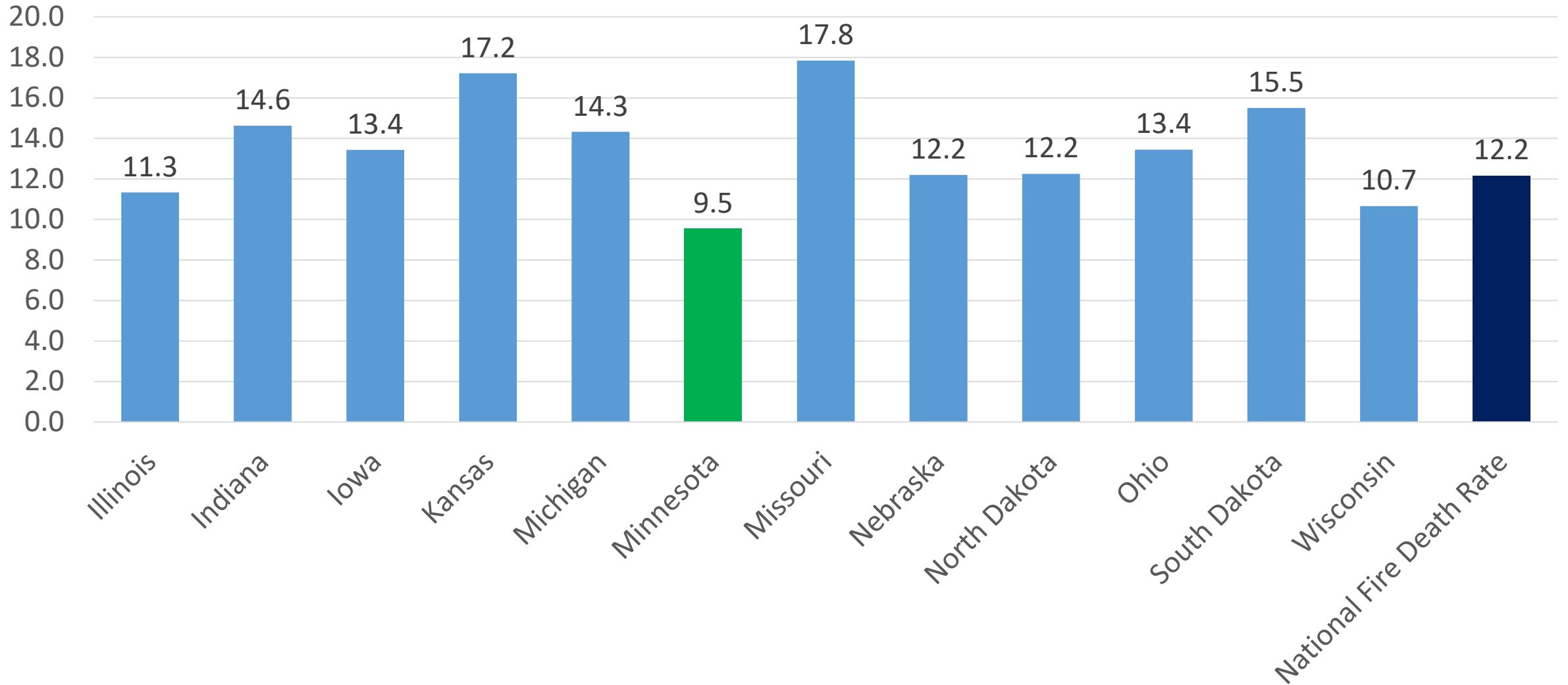
Fire Death Trend – Past 16 Years



Fire Death Rate – Metro vs. Outstate



Fire Death Rates – U.S. & Midwest (2000-2018)



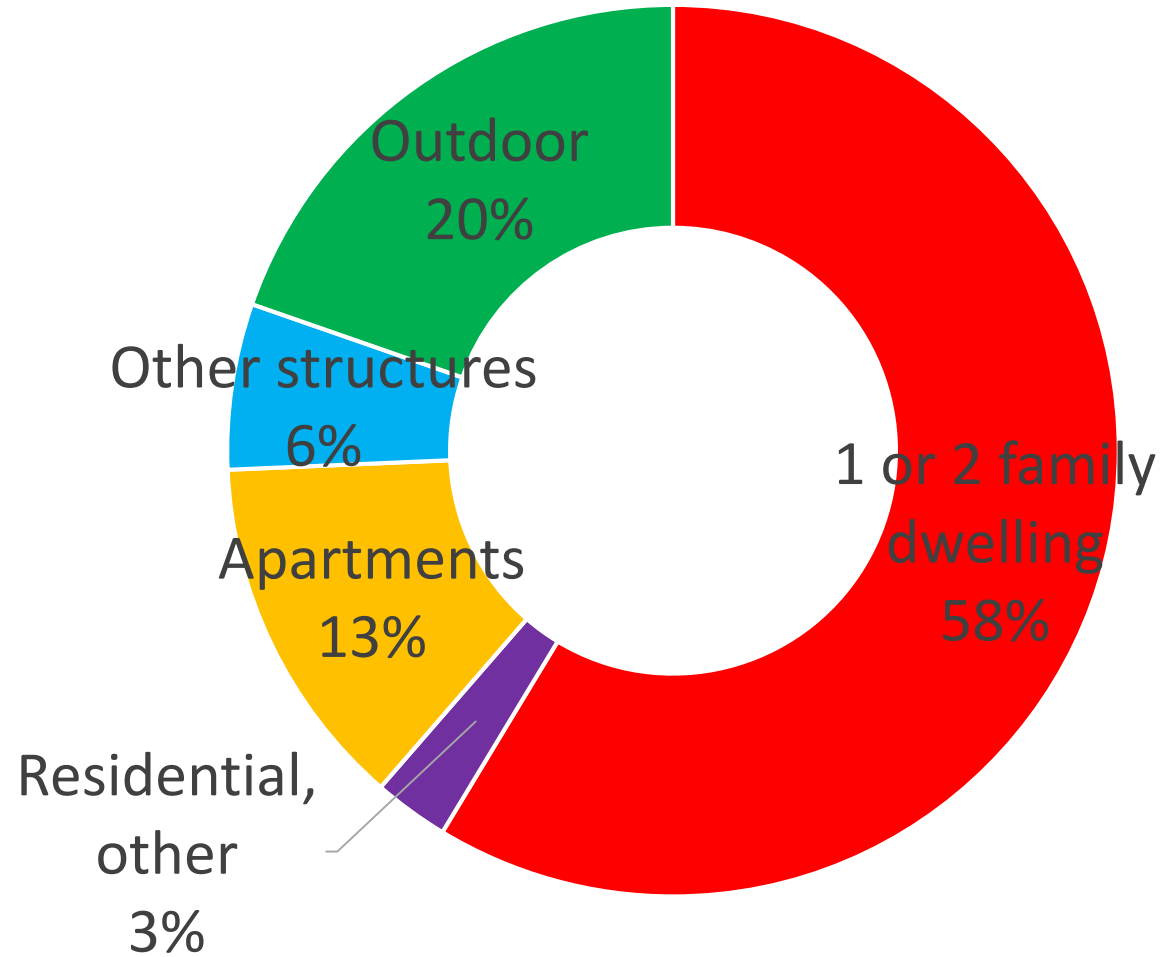
Fire Deaths – U.S. & Minnesota

- Fire Death Rates:
 - **U.S.: 11.3 / Million population**
 - **Midwest: 13.5 / Million population (2000-2018)**
 - **Minnesota: 9.0 / Million population (2000-2019)**
- **9.0 / Million = 0.90 / 100,000**
- **Equals about 1 fire death per 111,000 people**

How is Your Community Doing?

- 1 fire death / 111,000 population equates to:
 - 400,000 population = 3.6 fire deaths per year
 - 300,000 population = 2.7 fire deaths per year
 - 100,000 population = 1 fire death every 13 months
 - 60,000 population = 1 fire death every 22 months
 - 40,000 population = 1 fire death every 2 yrs. 9 mo.
 - 25,000 population = 1 fire death every 4 yrs. 5 mo.
 - 20,000 population = 1 fire death every 5 yrs. 6 mo.
 - 10,000 population = 1 fire death every 11 years

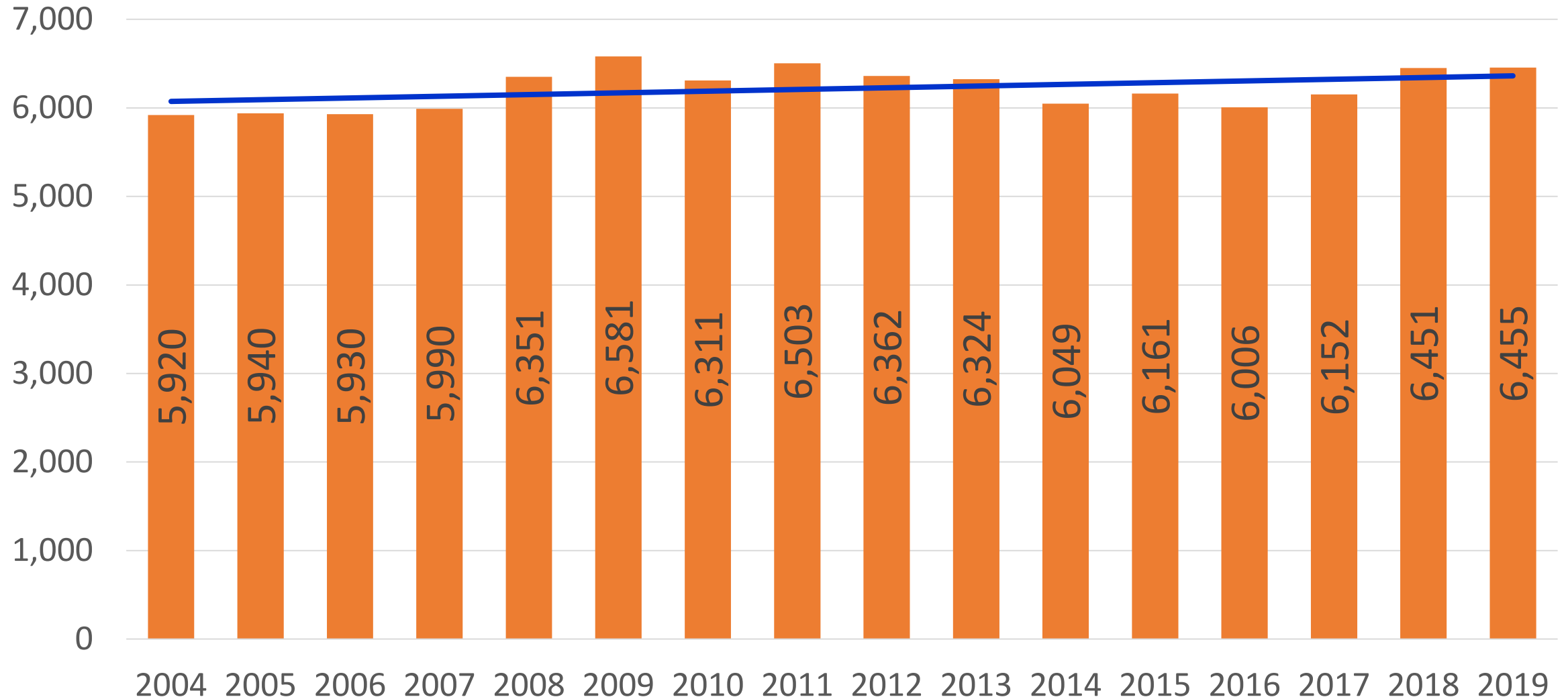
Fire Deaths by Occupancy (2005-2019)



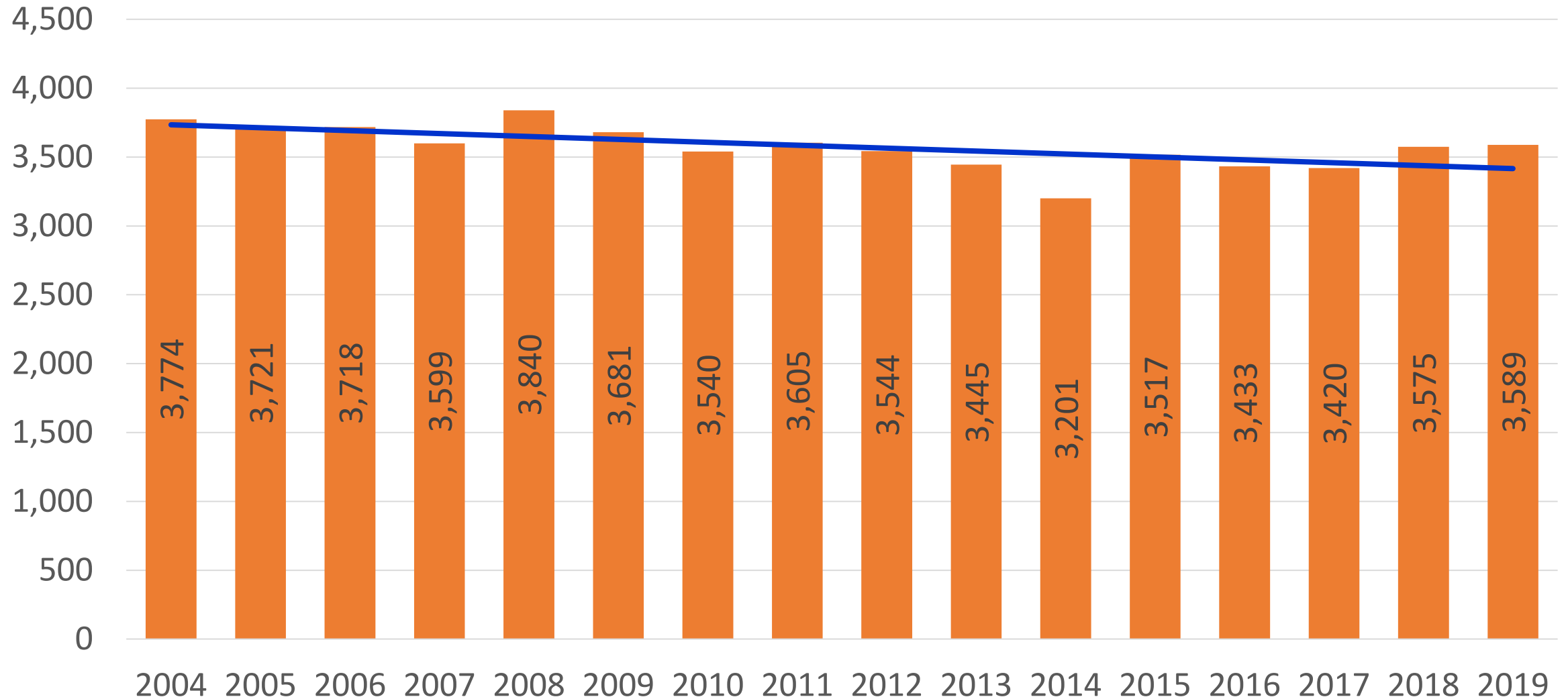
Structure Fires

Includes all structure fires (confined and not confined) and all types (structures, cooking fires, trash fires, portable buildings, etc.)

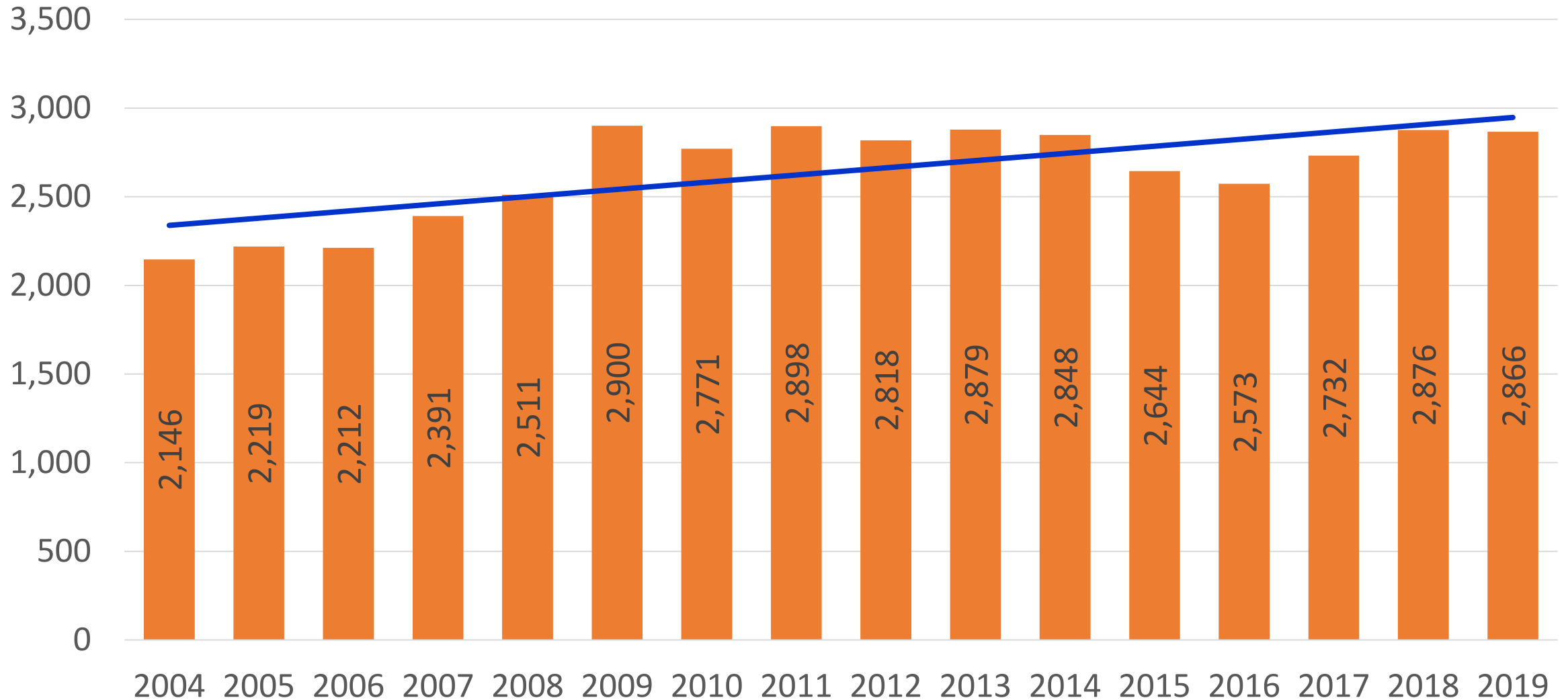
Structure Fires – All Types (2004-2019)



Structure Fires – Metro – 2004-2019



Structure Fires – Nonmetro – 2004-2019



Minnesota Structure Fire Rate

- NFIRS incident codes 111-123 (minus mutual aid)
- From 2010-2019 (10 years):
 - Number of structure fires: 62,774 (average = 6,277 per year)
 - Average population per year: 5,474,936
 - $6,277 / 5,474,936 = 0.001146$ fires per person per year
 - or-
 - Structure fire rate of 11.5 fires per 10,000 population

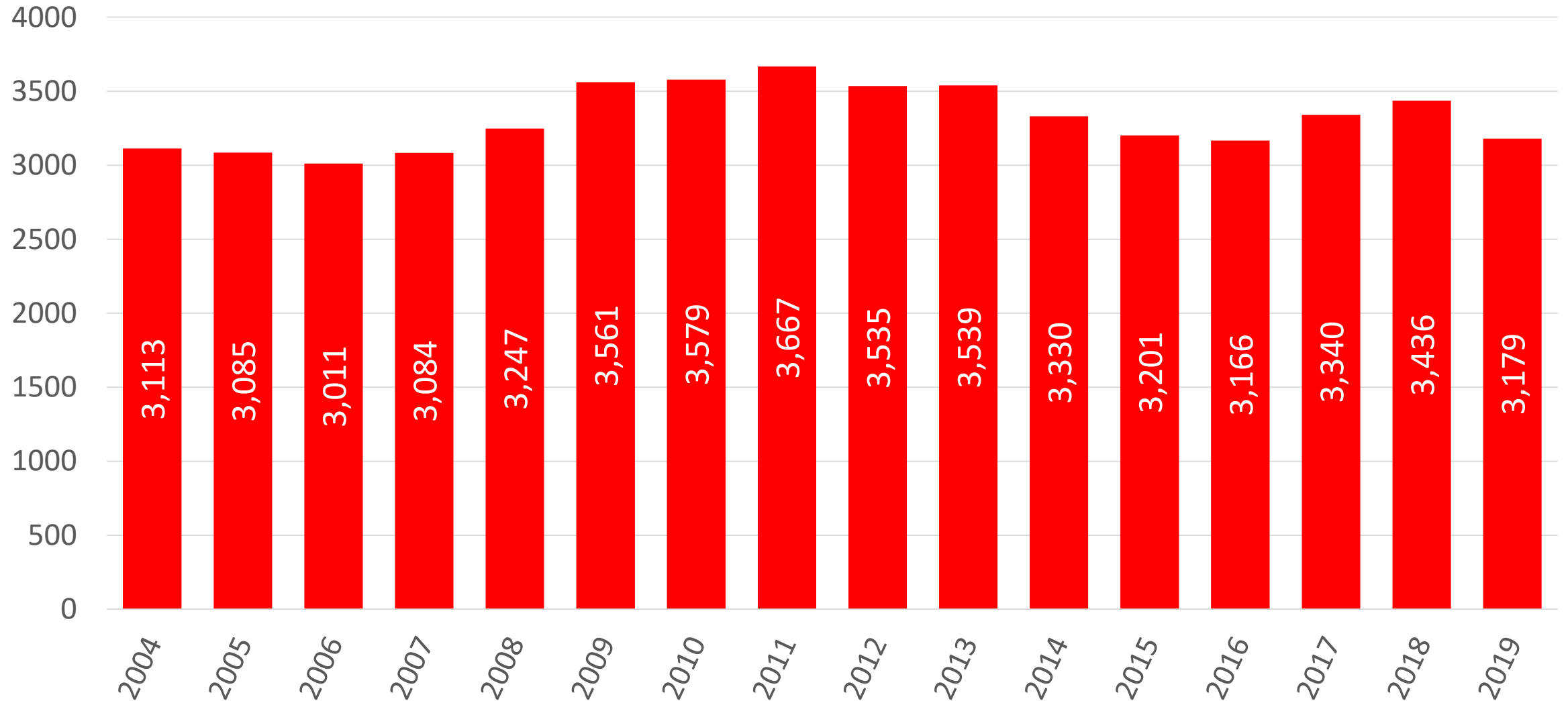
How is Your Community Doing?

- 11.5 fires / 10,000 population equates to:
 - 400,000 population = 460 fires per year
 - 300,000 population = 345 fires per year
 - 100,000 population = 115 fires per year
 - 60,000 population = 69 fires per year
 - 40,000 population = 46 fires per year
 - 25,000 population = 29 fires per year
 - 20,000 population = 23 fires per year
 - 10,000 population = 12 fires per year

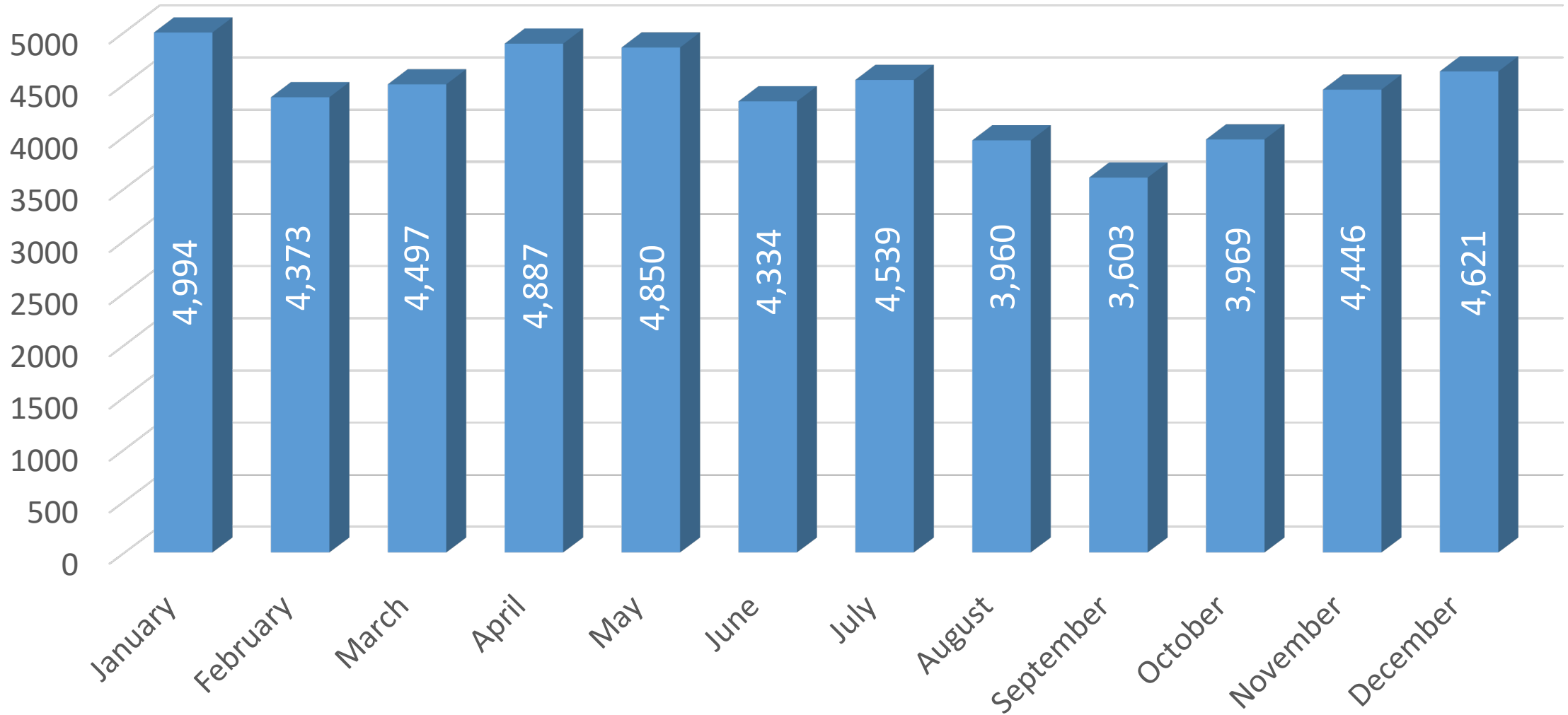
Structure Fires

Fires in a building or structure that spread or were not confined or contained

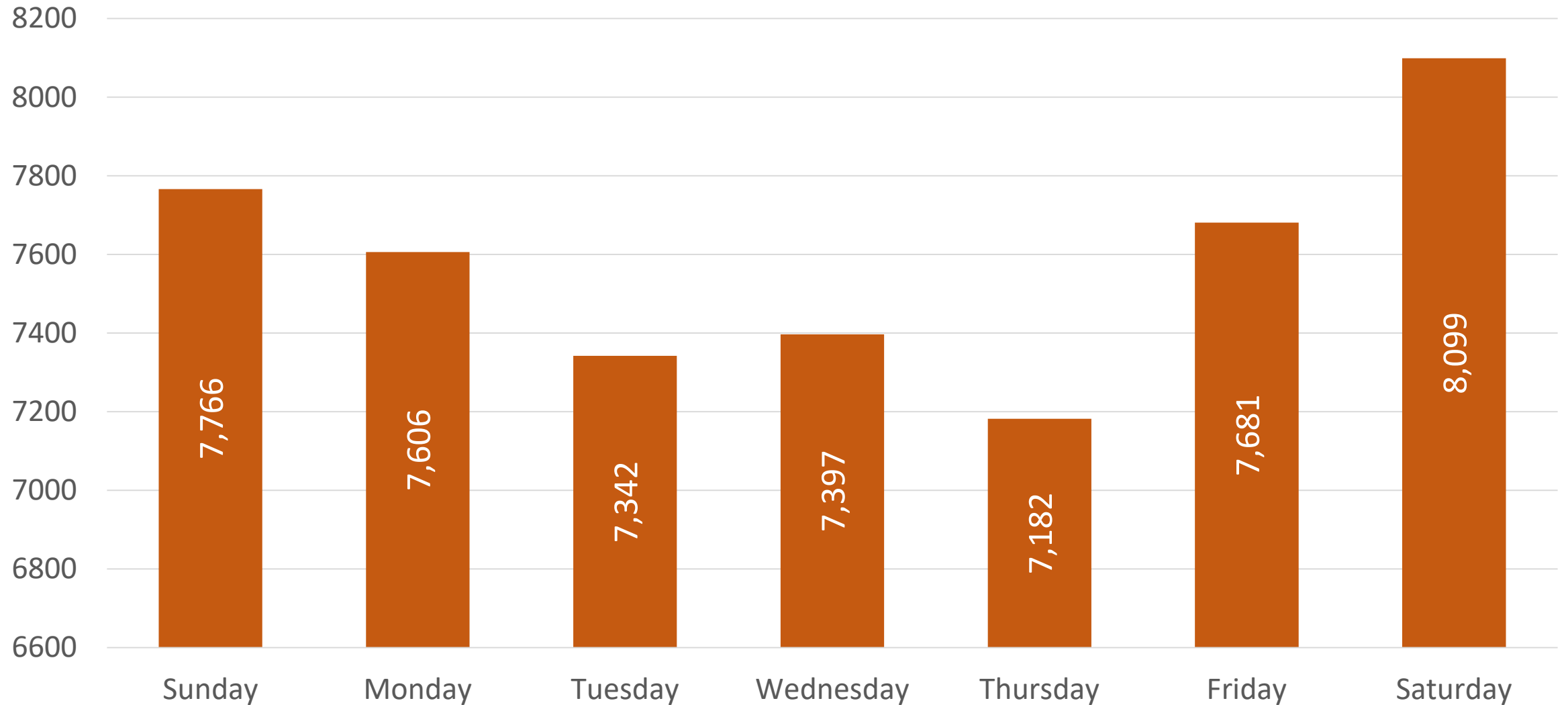
Structure Fires – Not Confined (2004-2019)



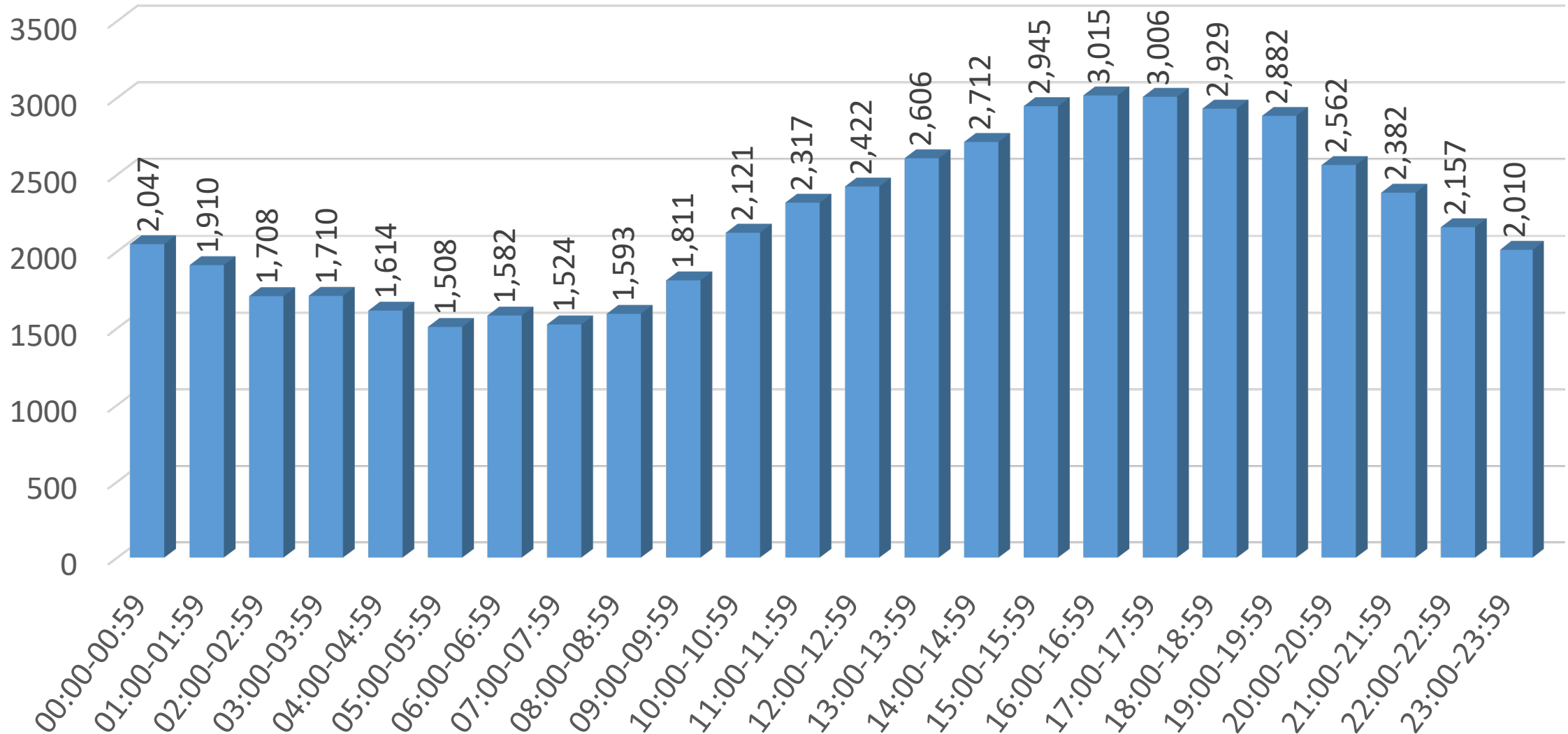
Structure Fires by Month (2004-2019)



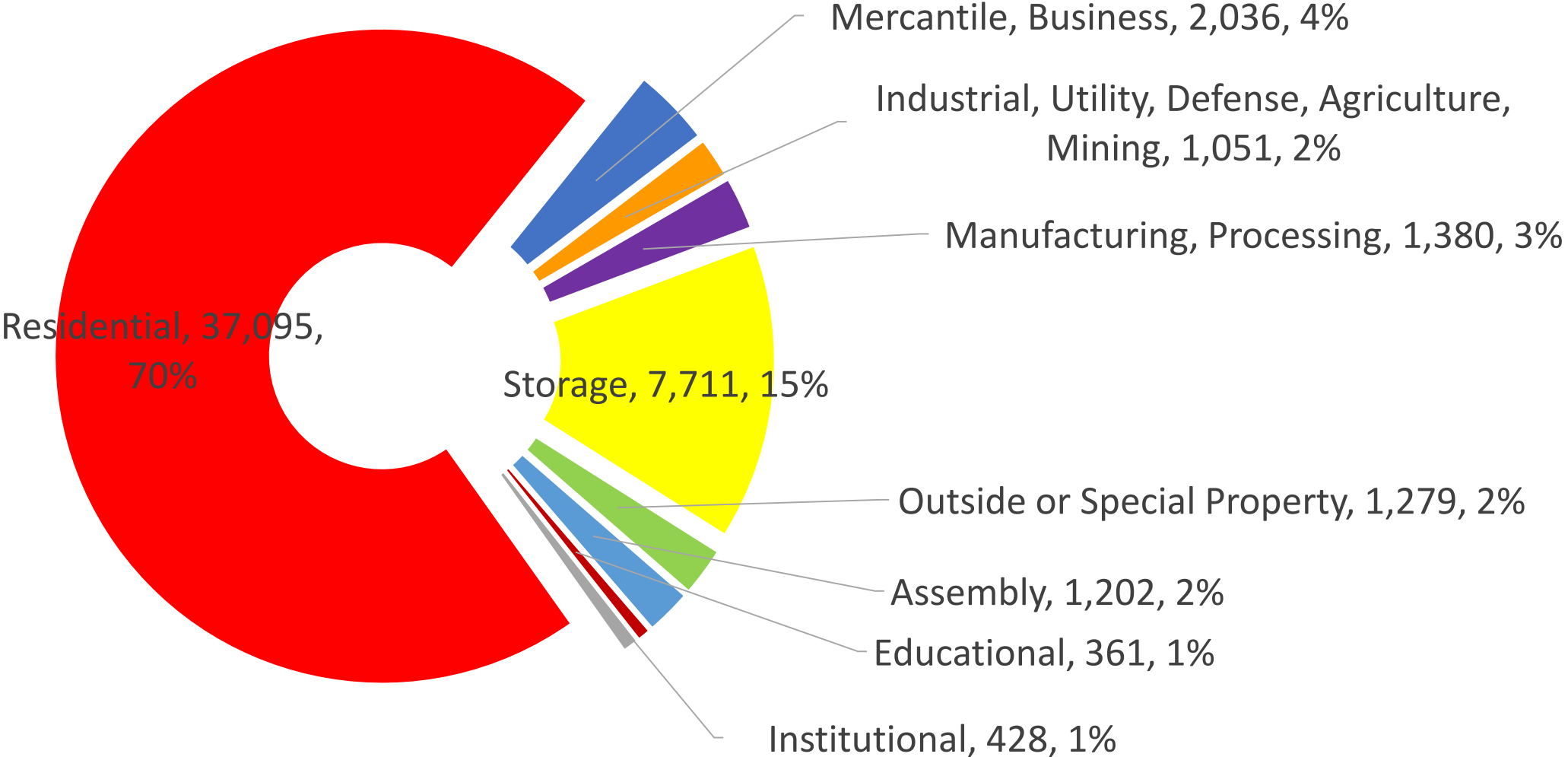
Structure Fires by Day of Week (2004-2019)



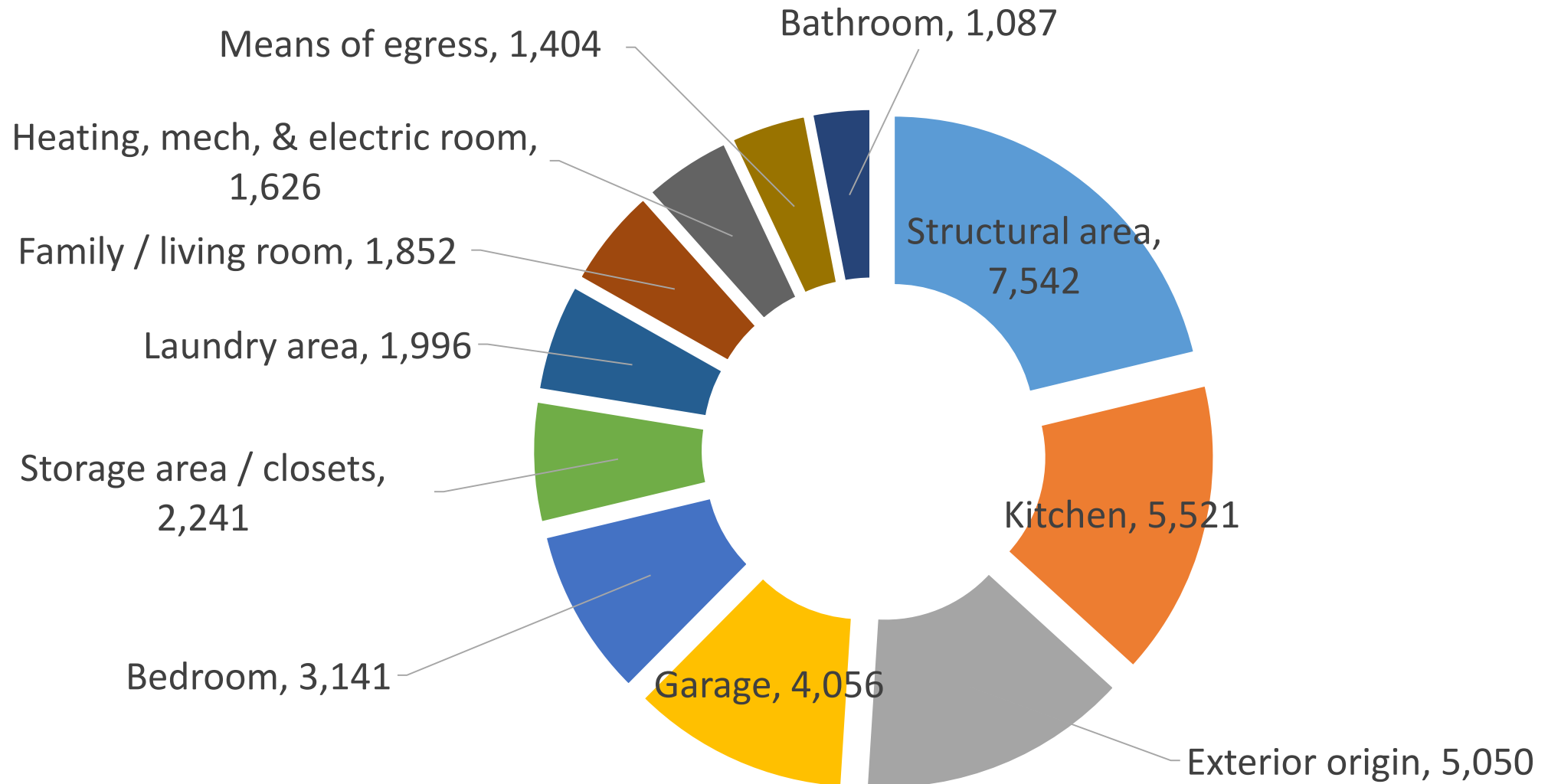
Structure Fires by Time of Day – 2004-2019



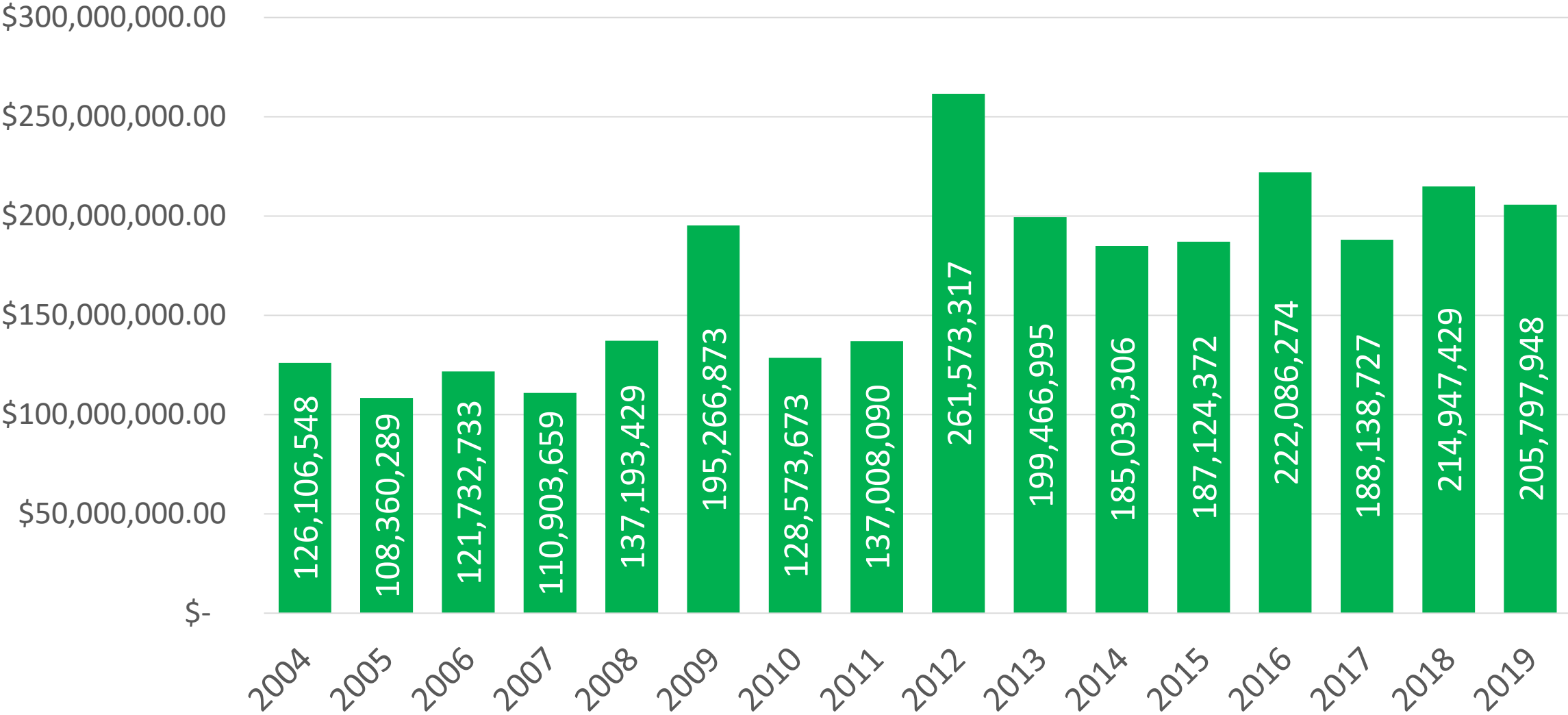
Structure Fires by Occupancy – 2004-2019



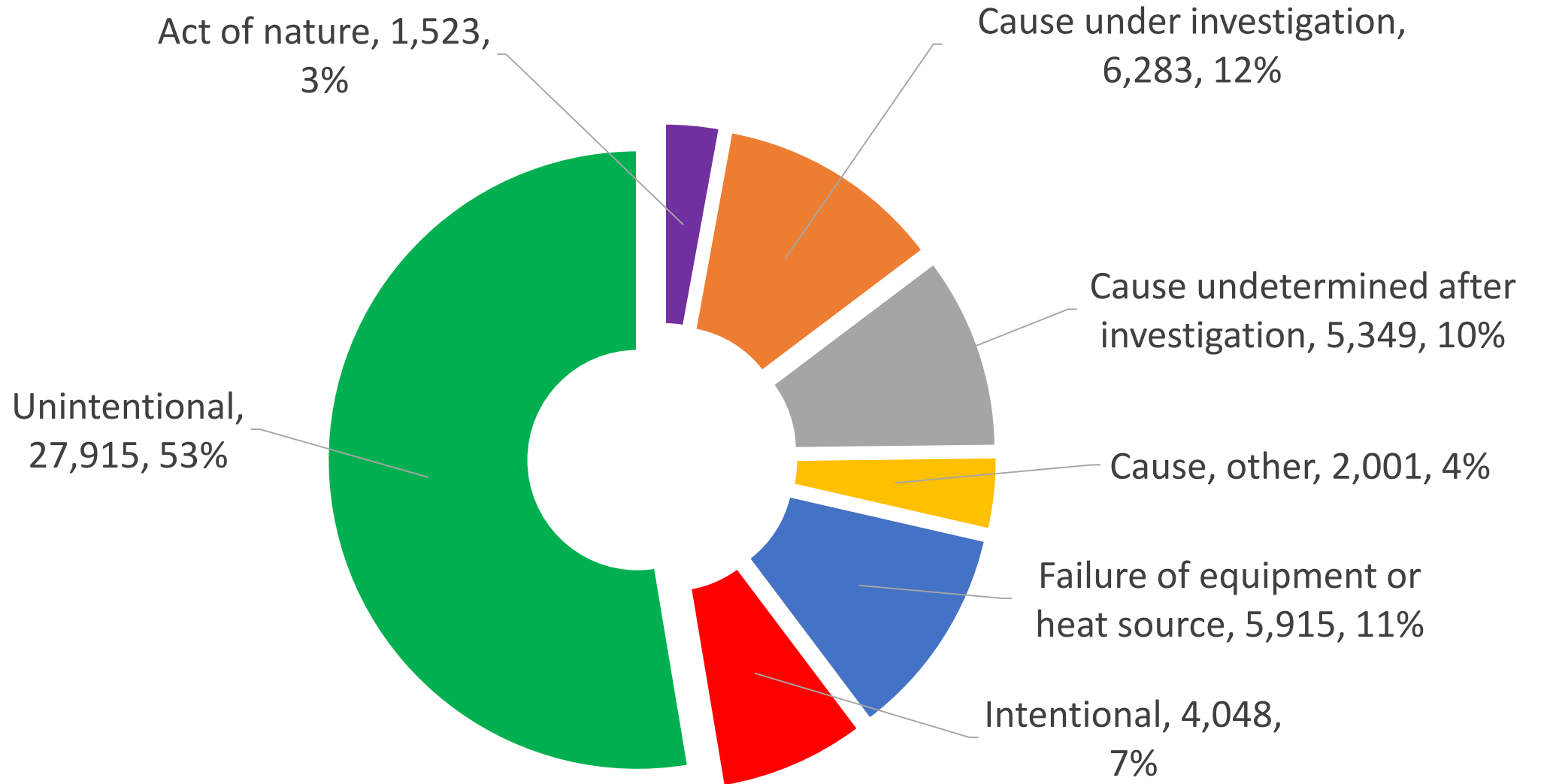
Structure Fires – Area of Origin – 2004-2019



Structure Fire Loss – 2004-2019



Structure Fire Causes



Summary – Structure Fires – 2004-2019

- 53,073 in 16 years (2004-2019)
- 3,317 per year (average)
- \$ 36,081.59 – average property loss per fire
- \$ 15,344.18 – average contents loss per fire
- \$ 51,425.77 – average total loss per fire
- \$ 1.9 Billion in total property loss
- \$ 814 Million in total contents loss
- \$ 2.7 Billion in total fire loss in structure fires

Minnesota Structure Fire Rate

- NFIRS incident code 111 (minus mutual aid)
- From 2010-2019 (10 years):
 - **Number of structure fires: 33,972 (average = 3,397 per year)**
 - **Average population per year: 5,474,936**
 - **$3,397 / 5,474,936 = 0.00062$ fires per person per year – or-**
 - **Structure fire rate of 6.2 fires per 10,000 population**

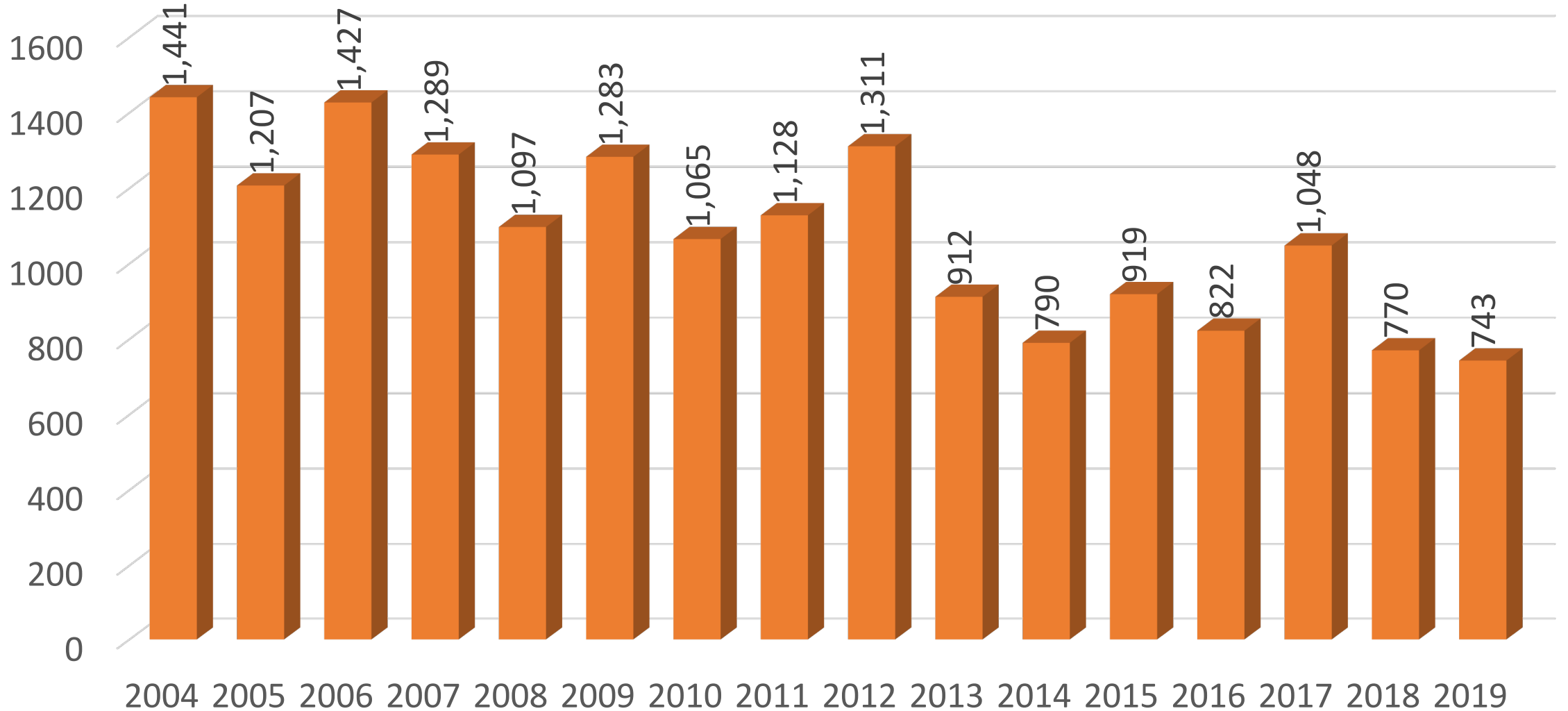
How is Your Community Doing?

- **6.2 fires / 10,000 population equates to:**
 - **400,000 population = 248 structure fires per year**
 - **300,000 population = 186 structure fires per year**
 - **100,000 population = 62 structure fires per year**
 - **60,000 population = 37 structure fires per year**
 - **40,000 population = 25 structure fires per year**
 - **25,000 population = 16 structure fires per year**
 - **20,000 population = 12 structure fires per year**
 - **10,000 population = 6 structure fires per year**

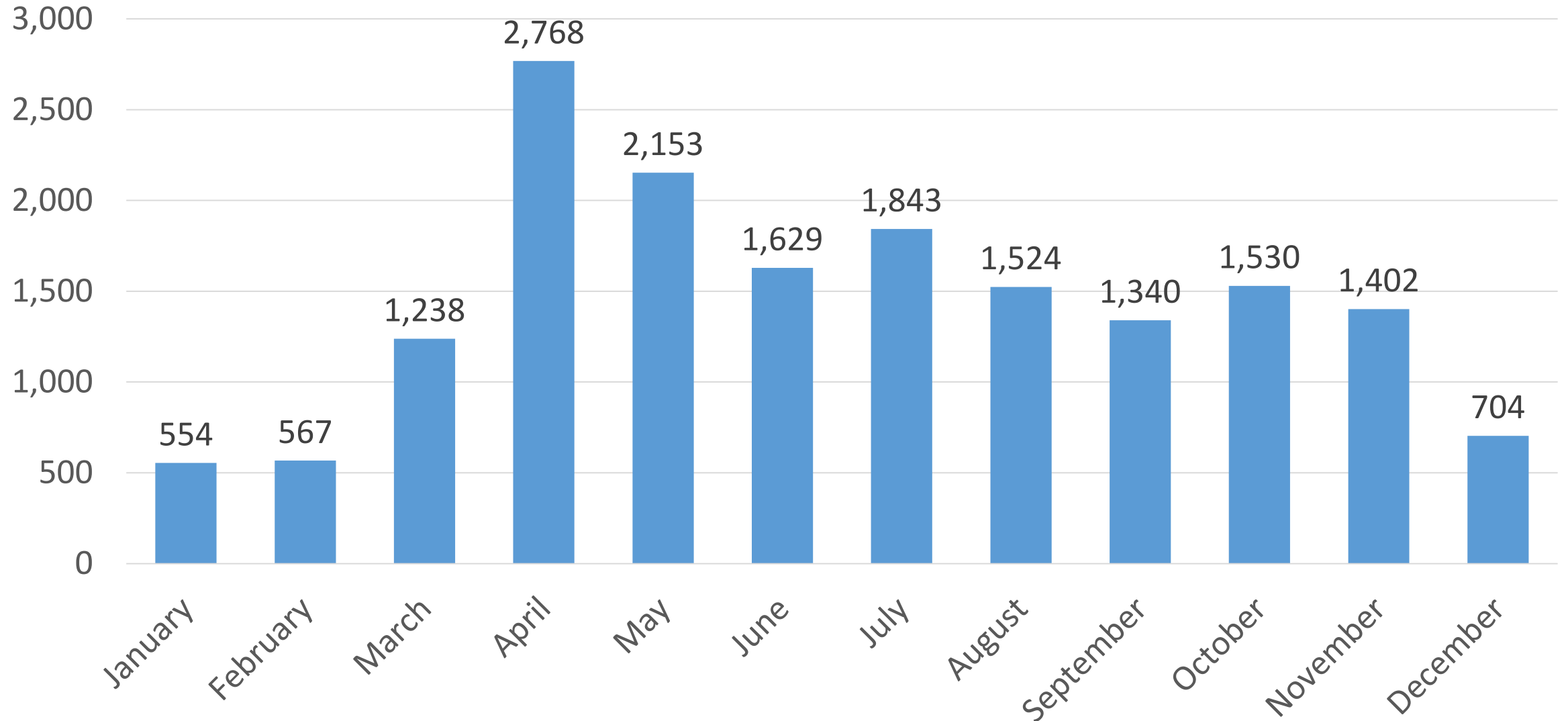
Intentional Fires

All Fires – Building, Vehicle, and Outdoor

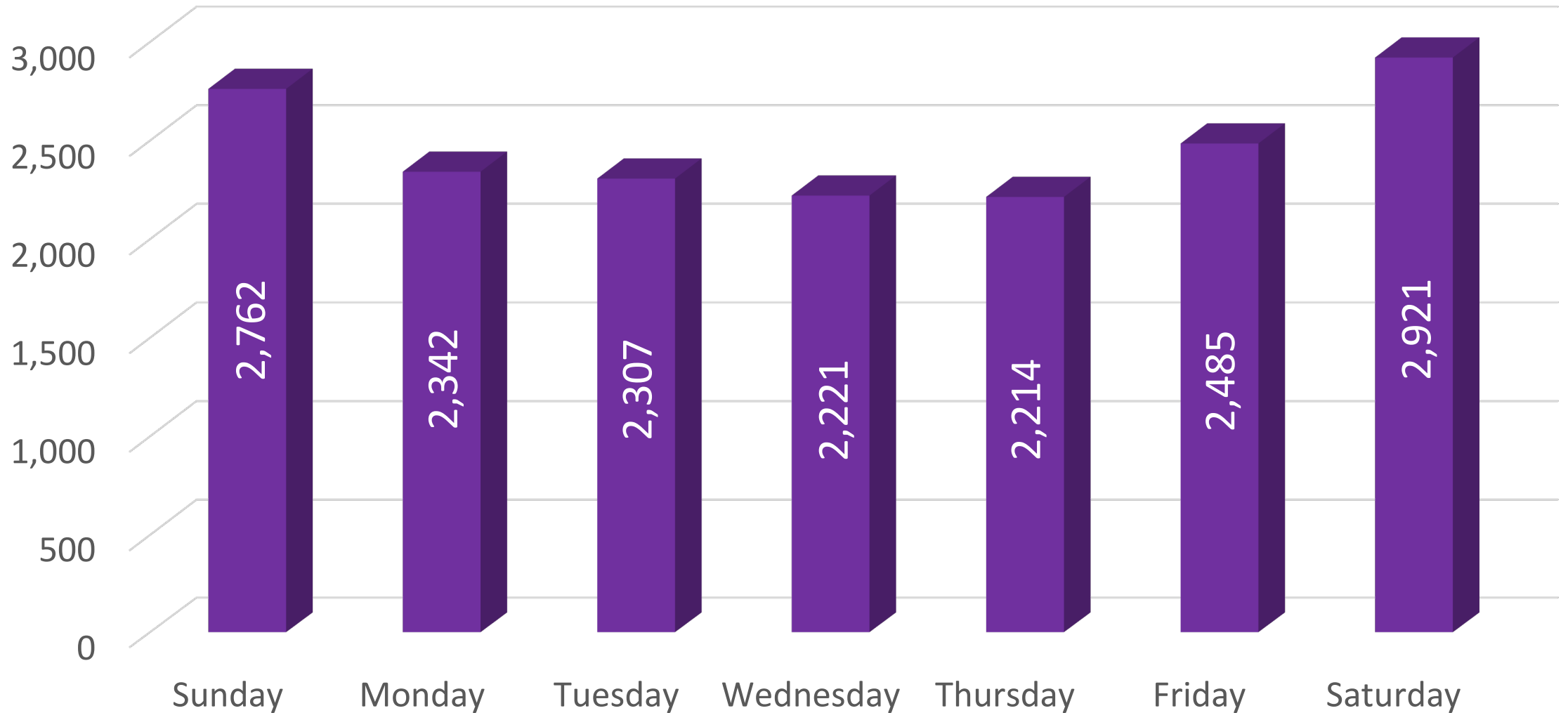
Intentional Fires by Year (2004-2019)



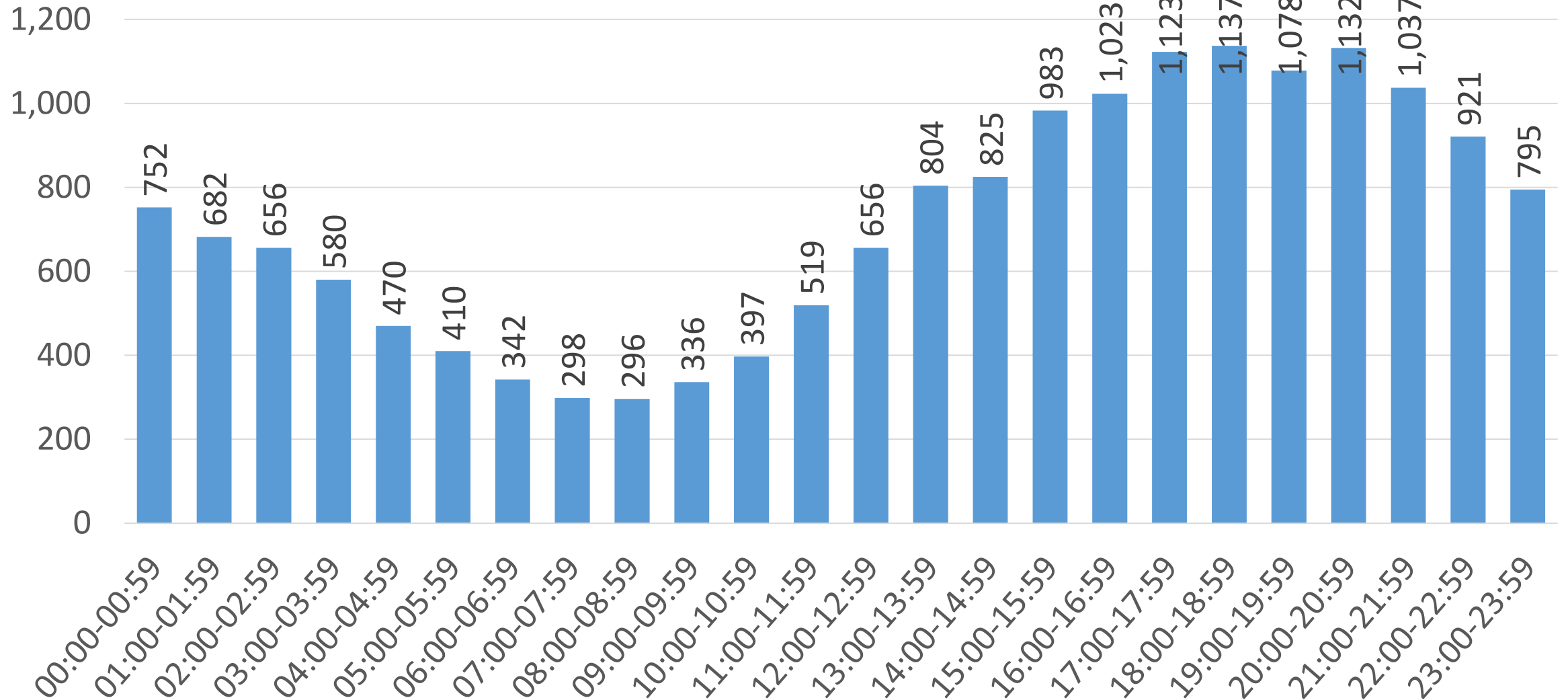
Intentional Fires by Month



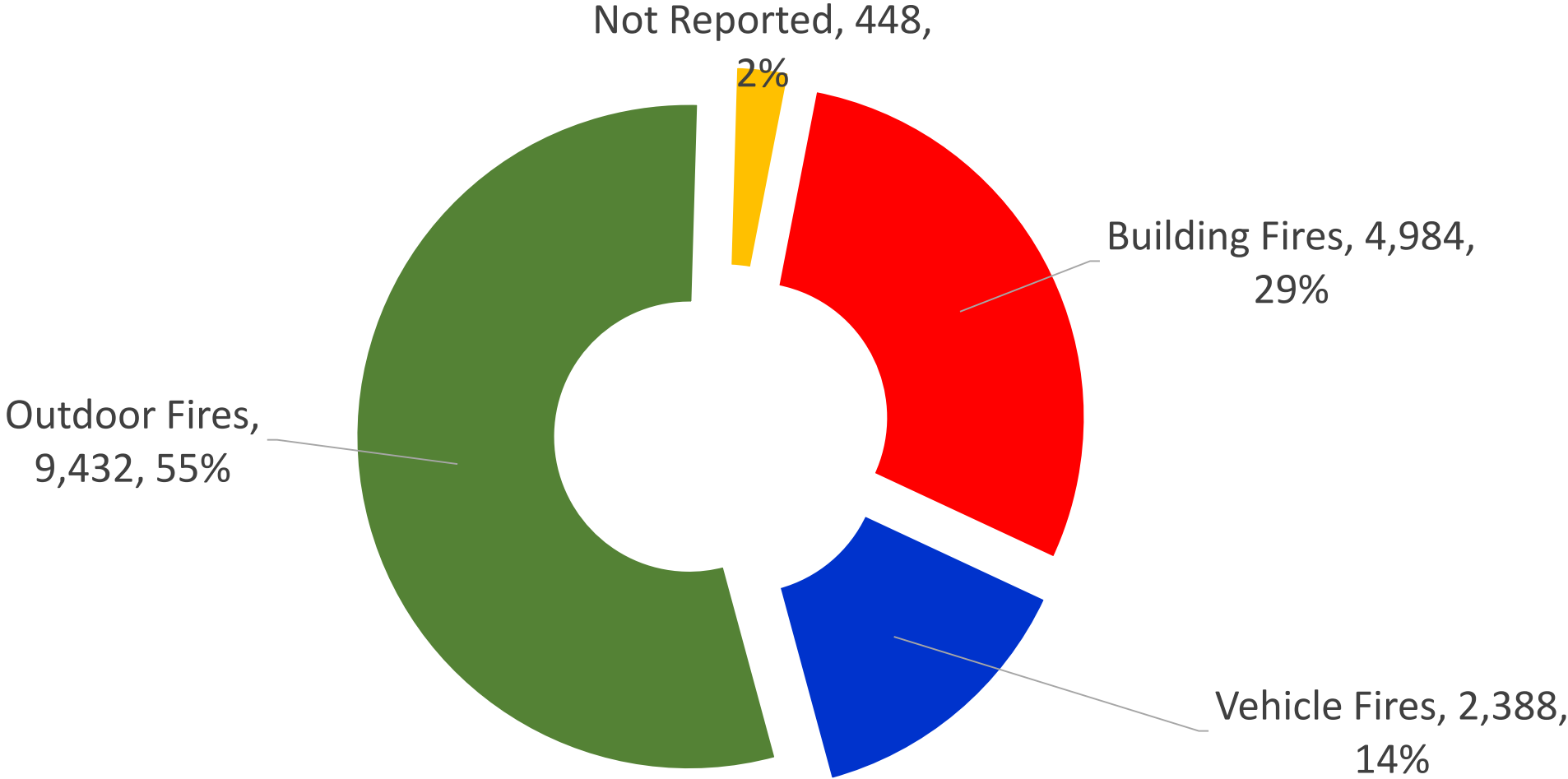
Intentional Fires by Day of Week



Intentional Fires by Time of Day



Intentional Fires by Type of Fire



Intentional Motives – All Fires (2004-2019)

Personal / Revenge	219
Thrills	200
Fireplay / Curiosity	175
Intimidation	100
Crime concealment	116
Domestic violence	70
Insurance fraud	25
Other suspected motivation	25
Suicide	15
Attention / sympathy	14

Burglary	13
Hate crime	10
Void contract / lease	7
Labor unrest	3
Extortion	2
Foreclosed property	2
Institutional	2
Societal	2
Protest	2
Homicide	2

Intentional Fire Motives – Structure Fires (2004-2019)

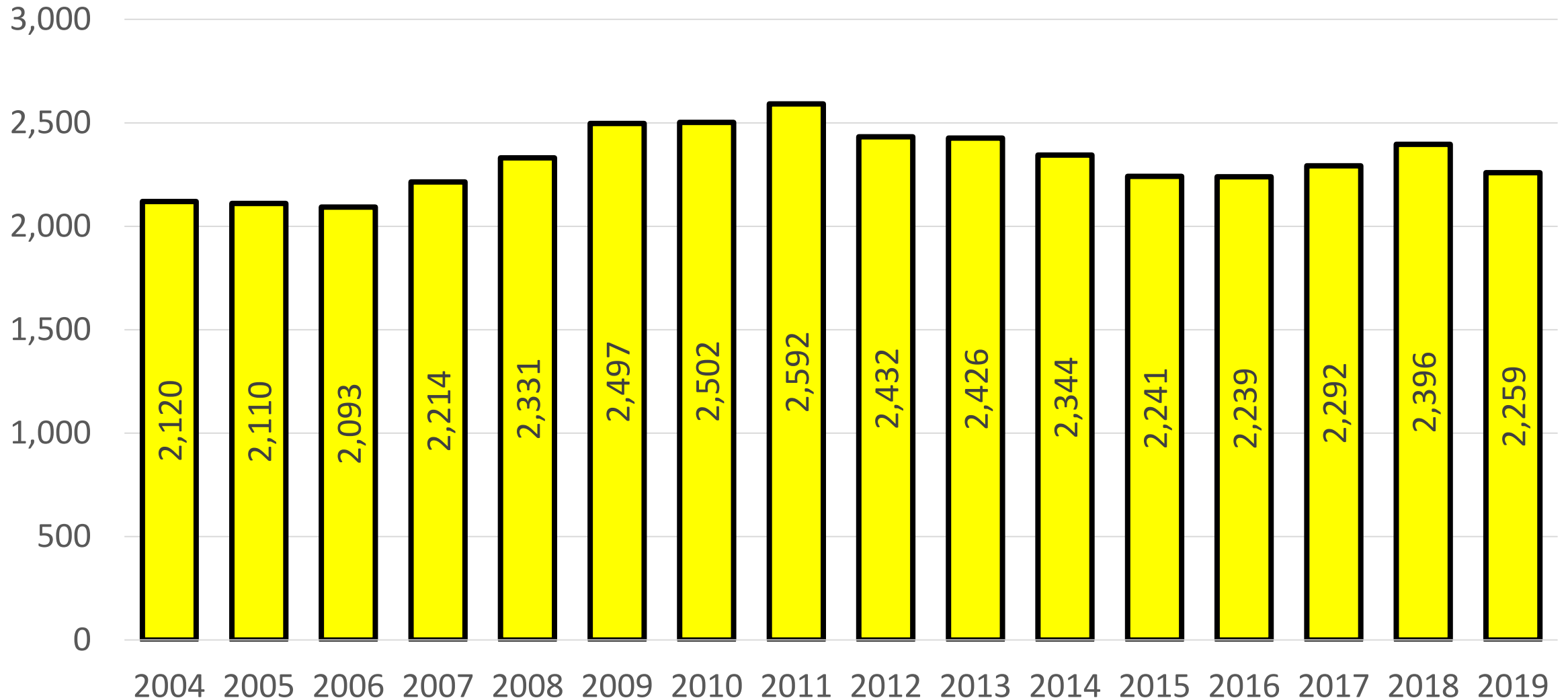
Personal / Revenge	108
Fireplay / Curiosity	93
Thrills	75
Intimidation	61
Domestic violence	38
Other suspected motivation	15
Insurance fraud	15
Crime concealment	15
Attention/sympathy	11
Suicide	11

Burglary	7
Void contract / lease	6
Hate crime	4
Labor unrest	2
Foreclosed property	2
Homicide	2
Extortion	1
Institutional	1
Societal	1

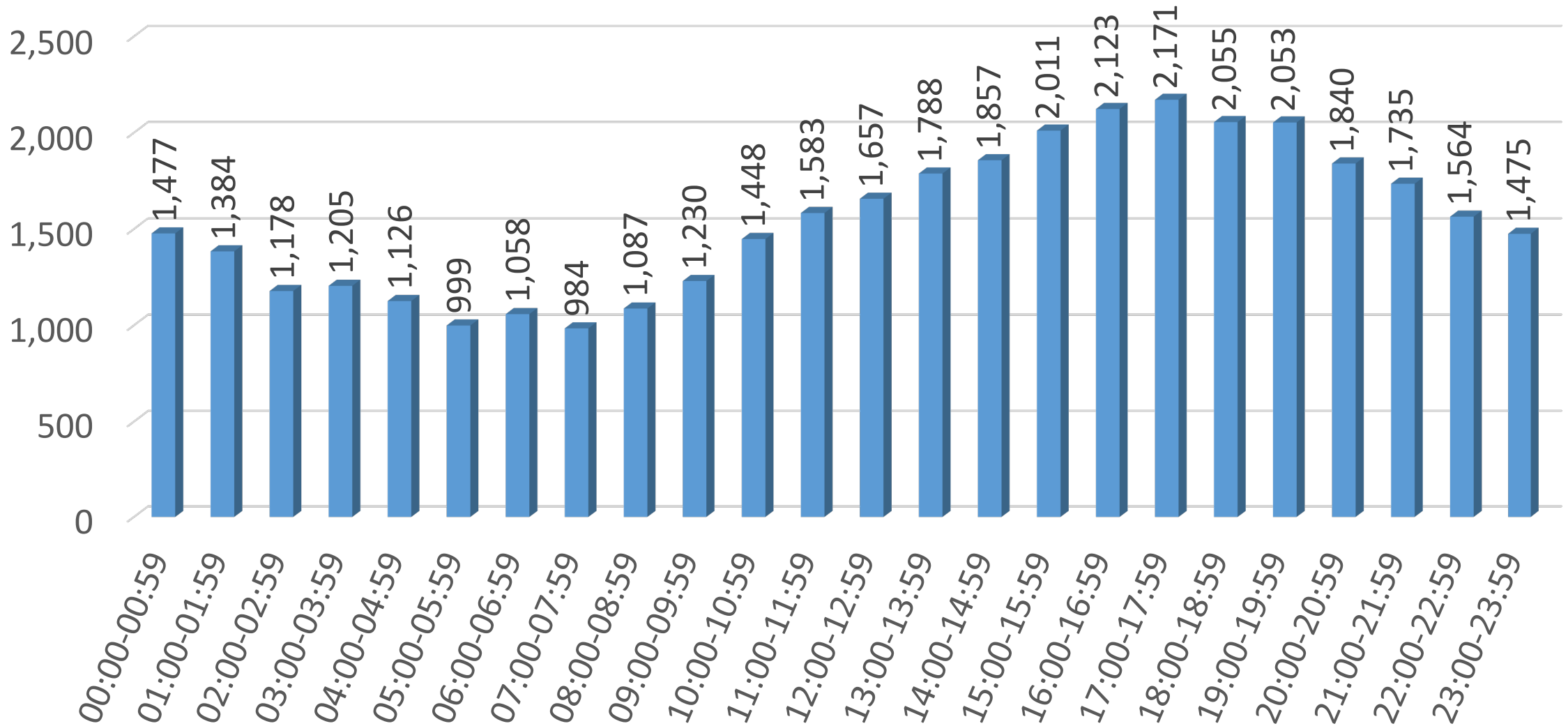
Fire Protection Saves

Smoke Alarms and Sprinkler Systems

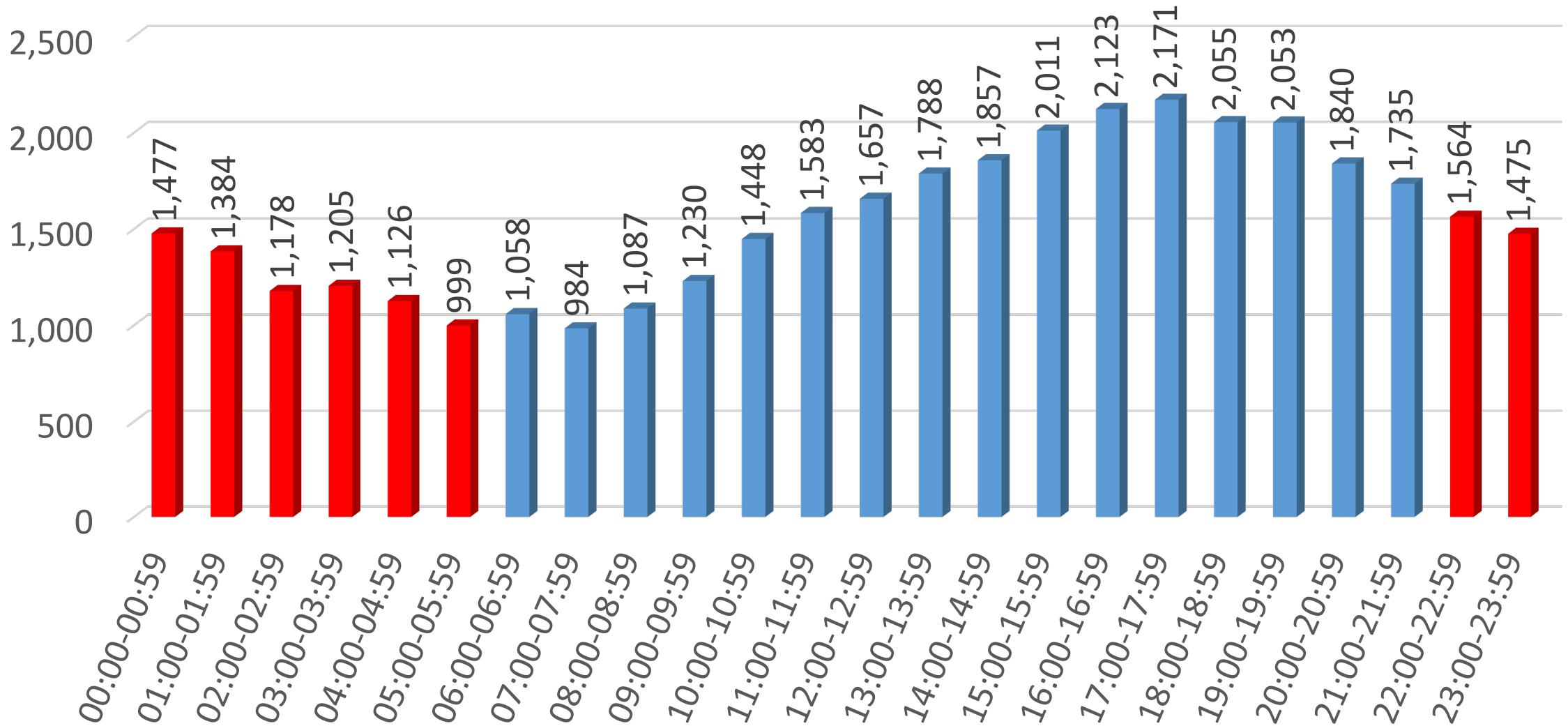
Smoke Alarm Activations by Year



Smoke Alarm Activations by Time of Day



Smoke Alarm Activations by Time of Day



Smoke Alarm Effectiveness – 2004-2019

- Smoke alarms activated & occupants responded

Type of Occupancy	Number
1 or 2 family dwelling	5,600
Apartments	3,159
Hotel / Motel	153
Residential Board & Care	75
Boarding / Rooming House	58
Residential, Other (dorms, barracks, frats, etc.)	175

Smoke Alarm Effectiveness – 2004-2019

- Smoke alarms activated & occupants failed to respond

Type of Occupancy	Number
1 or 2 family dwelling	174
Apartments	197
Hotel / Motel	13
Residential Board & Care	3
Boarding / Rooming House	2
Residential, Other (dorms, barracks, frats, etc.)	10

Smoke Alarm Effectiveness – 2004-2019

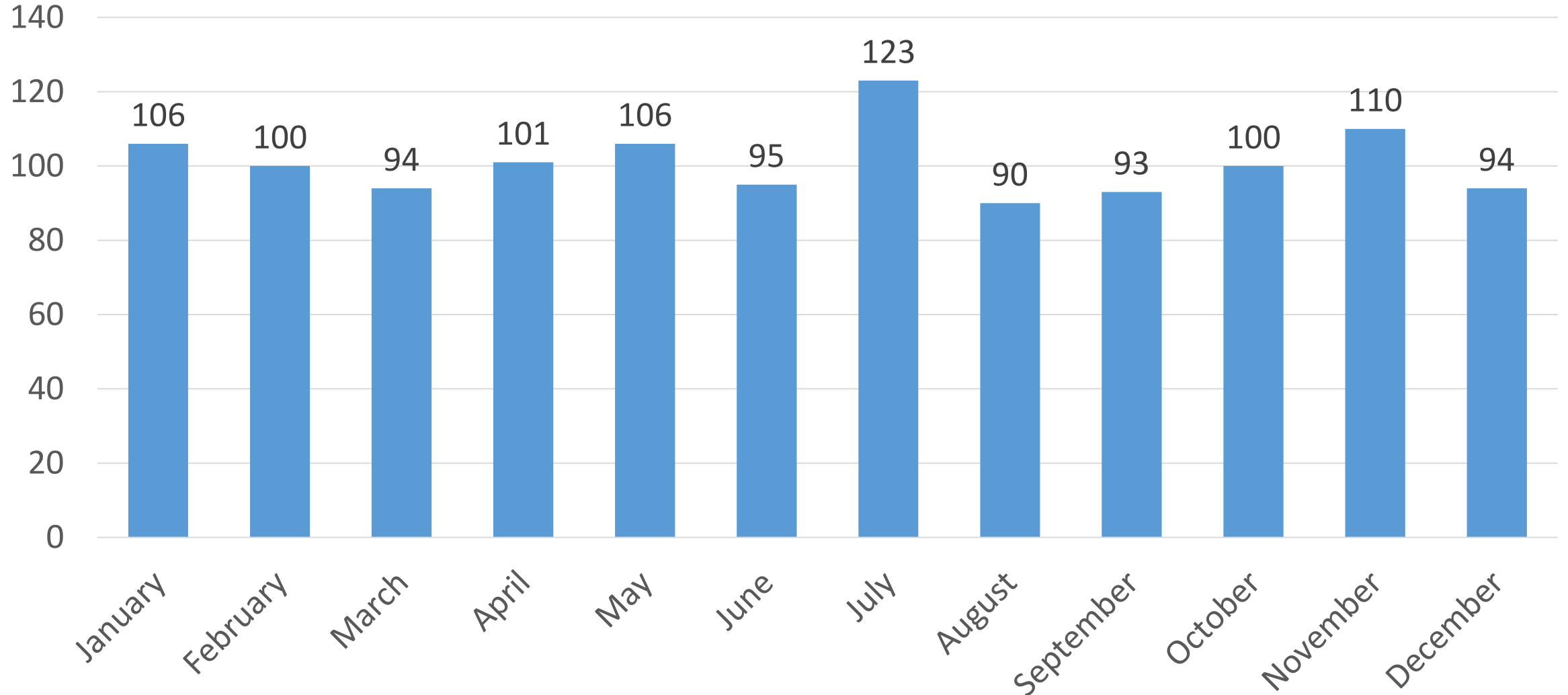
- Detector or alarm failed to alert occupants

Type of Occupancy	Number
1 or 2 family dwelling	199
Apartments	48
Hotel / Motel	4
Residential Board & Care	0
Boarding / Rooming House	1
Residential, Other (dorms, barracks, frats, etc.)	2

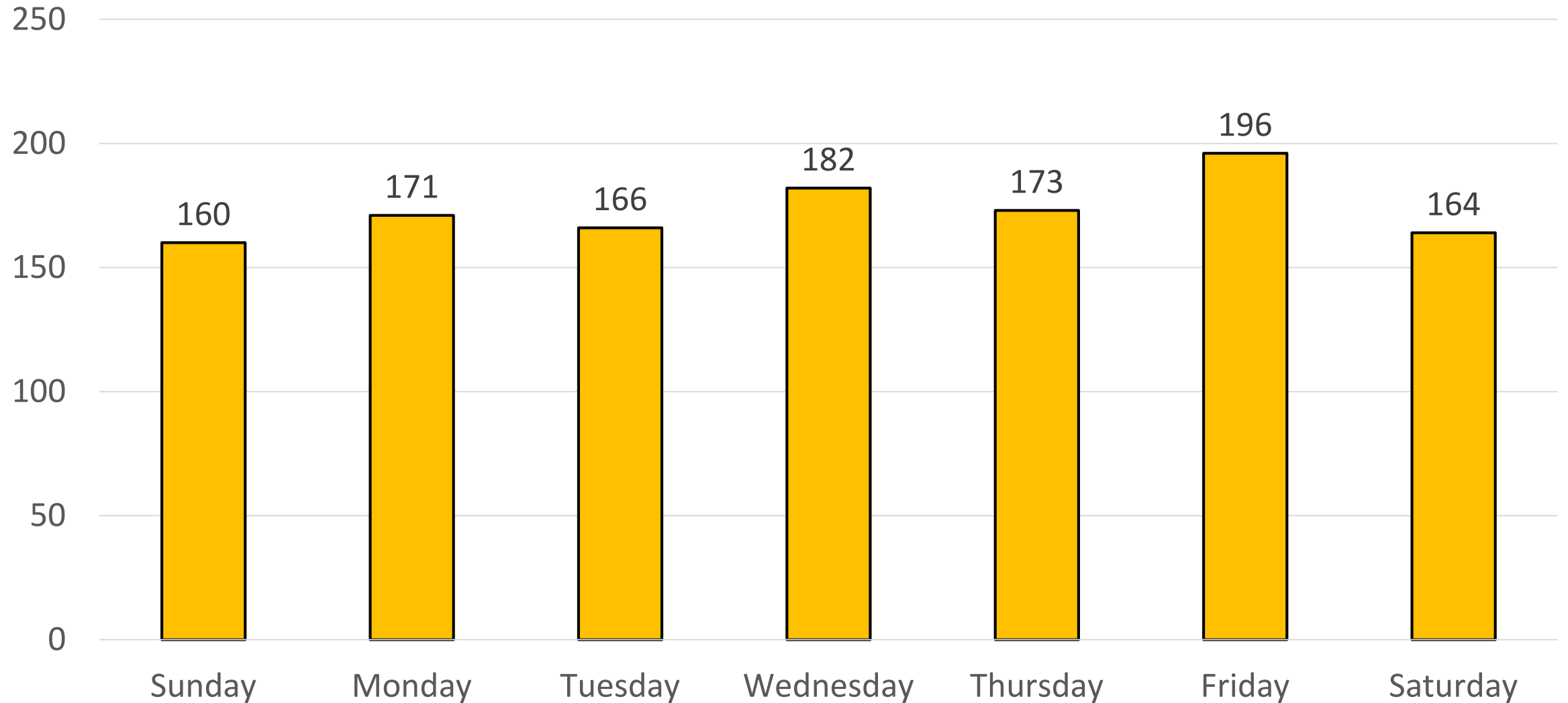
Sprinkler Activations by Year



Sprinkler Activations by Month



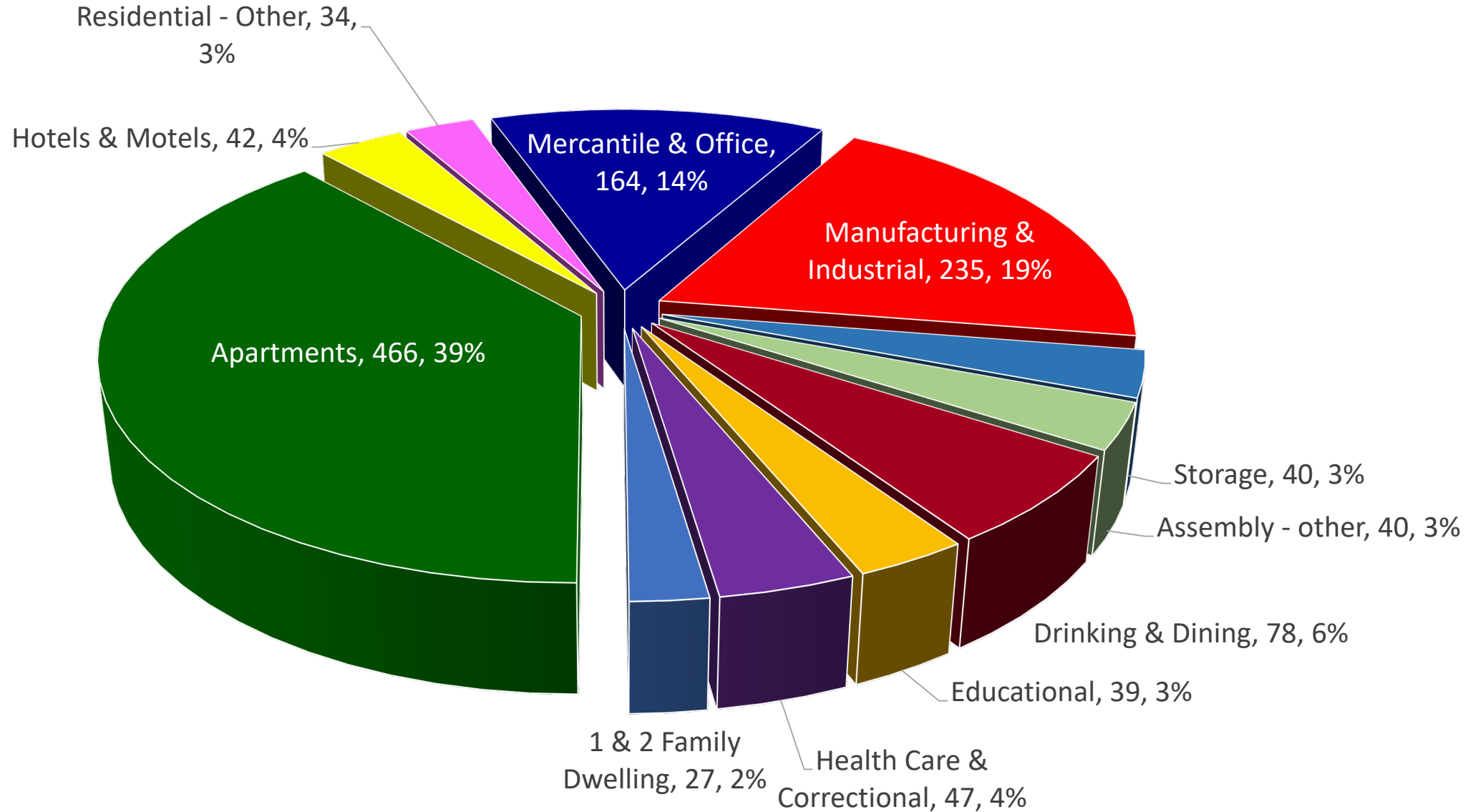
Sprinkler Activations by Day of Week



Sprinkler Loss vs. Fire Loss w/o Sprinklers

Type of Occupancy	Average Loss – Sprinklers	Average Loss – No Sprinklers	Loss Reduction - Sprinklers
Assembly – other	\$ 13,468.09	\$ 126,499.13	89.4%
Drinking and dining	\$ 39,771.01	\$ 131,445.36	69.7%
Educational	\$ 13,719.70	\$ 260,512.85	94.7%
Health care and correctional	\$ 62,549.33	\$ 62,078.37	-0.8%
1- and 2-family dwelling	\$ 22,937.04	\$ 63,866.50	64.1%
Apartments	\$ 37,976.47	\$ 51,623.74	26.4%
Hotels and motels	\$ 26,570.00	\$ 93,831.49	71.7%
Residential – other	\$ 20,419.35	\$ 60,928.14	66.5%
Mercantile and office	\$ 101,604.29	\$ 147,549.22	31.1%
Manufacturing and industrial	\$ 65,196.66	\$ 208,477.29	68.7%
Warehouses	\$ 121,394.74	\$ 276,348.50	56.1%

Sprinkler Activations by Occupancy



Cost of Fire Department Operations

**Includes personnel, benefits, training,
facilities, apparatus, equipment**

Cost of Fire Service & FD Operations

- Minnesotans spent \$233 per household on fire service operations in 2016 (note 1)
- There were 2,185,172 households in 2016
- $\$233 \times 2,185,172 = \$509,145,076$
- $\$509,145,076 \div 332,202 \text{ incidents} = \$1,533$ per response
- Roughly \$1,500 per incident or response

Note 1: www.fiscalexcellence.org



Questions

Website: <https://sfm.dps.mn.gov>



Thank you

MINNESOTA STATE FIRE MARSHAL DIVISION

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