

NIST Special Publication 1236

Large Outdoor Fires and the Built Environment: Summary of Kick-Off Workshop

Sponsored by the International Association for Fire Safety Science (IAFSS)

Samuel L. Manzello
Sara McAllister
Sayaka Suzuki
Raphaela Bianchi
Elsa Pastor
Enrico Ronchi

This publication is available free of charge from:
<https://doi.org/10.6028/NIST.SP.1236>



**THE INTERNATIONAL ASSOCIATION
FOR FIRE SAFETY SCIENCE**

NIST
**National Institute of
Standards and Technology**
U.S. Department of Commerce

NIST Special Publication 1236

Large Outdoor Fires and the Built Environment: Summary of Kick-Off Workshop

Samuel L. Manzello

Fire Research Division, Engineering Laboratory

Sara McAllister

U.S. Forest Service, U.S. Department of Agriculture, Missoula, MT USA

Sayaka Suzuki

National Research Institute of Fire and Disaster, Chofu, Tokyo, Japan

Raphaela Blanche

Commonwealth Scientific and Industrial Research Organization, Melbourne, Australia

Elsa Pastor

Universitat Politècnica de Catalunya, Barcelona, Spain

Enrico Ronchi

Lund University, Lund, Sweden

This publication is available free of charge from:

<https://doi.org/10.6028/NIST.SP.1236>

February 2019



U.S. Department of Commerce
Wilbur L. Ross, Jr., Secretary

National Institute of Standards and Technology
Walter Copan, NIST Director and Under Secretary of Commerce for Standards and Technology

Certain commercial entities, equipment, or materials may be identified in this document in order to describe an experimental procedure or concept adequately. Such identification is not intended to imply recommendation or endorsement by the National Institute of Standards and Technology, nor is it intended to imply that the entities, materials, or equipment are necessarily the best available for the purpose.

The content of the oral presentations reproduced in this workshop report are those of the authors and do not necessarily represent NIST's perspective.

National Institute of Standards and Technology Special Publication 1236
Natl. Inst. Stand. Technol. Spec. Publ. 1236, 21 pages (February 2019)
CODEN: NSPUE2

This publication is available free of charge from: <https://doi.org/10.6028/NIST.SP.1236>

Abstract

The kickoff workshop of the new permanent working group, sponsored by the International Association for Fire Safety Science (IAFSS), entitled *Large Outdoor Fires and the Built Environment* was held from 3:00 pm to 4:30 pm on Sunday October 21, 2018. The workshop was held as a part of the 11th Asia-Oceania Symposium on Fire Science and Technology (AOSFST) in Taipei, Taiwan. The working group is co-led by Sara McAllister of the U.S. Forest Service (unable to come to Taiwan), Sayaka Suzuki of National Research Institute of Fire and Disaster, and Samuel L. Manzello of NIST's Engineering Laboratory. The IAFSS permanent working group consists of three subgroups, with subleaders appointed by Manzello, McAllister, and Suzuki, and these are prioritized into the following topics: Ignition Resistant Communities (IRC – led by Elsa Pastor, UPC, unable to come to Taiwan), Emergency Management and Evacuation (EME, led by Enrico Ronchi, Lund University, unable to come to Taiwan), and Large Outdoor Firefighting (LOFF, led by Raphaele Bianchi, CSIRO). The IRC subgroup is focused on developing the scientific basis for new standard testing methodologies indicative of large outdoor fire exposures, including the development of necessary testing methodologies to characterize wildland fuel treatments adjacent to communities. The EME subgroup is focused on developing the scientific basis for effective emergency management strategies for communities exposed to large outdoor fires. The LOFF subgroup is providing a review of various tactics that are used, as well as the various personal protective equipment (PPE), and suggest pathways for research community engagement, including environmental issues in suppressing these fires. The overall objectives are to bring the full depth of knowledge of the IAFSS community to work on these priority topics. At the kickoff workshop, detailed ideas were presented regarding the planned activities of the working group, especially the large workshop to be held at IAFSS 2020.

Key words

Large Outdoor Fires; Urban Fires; Wildland-Urban Interface (WUI) Fires; Informal Settlement Fires; Wildland Fires

Table of Contents

1. Introduction	1
1.1. Workshop Objectives	1
1.2. Program of the Workshop	1
1.3. List of Registered Participants (Alphabetical Order)	1
2. Summary and Next Steps.....	2
3. Acknowledgments.....	2
References	3
Appendix A: List of Presentations Delivered at the Workshop	4

1. Introduction

1.1. Workshop Objectives

Large outdoor fires present a risk to the built environment. One example are wildfires that spread into communities, referred to as Wildland-Urban Interface (WUI) fires. Other examples are large urban fires, including those that have occurred after earthquakes as well as informal settlement fires. Research into large outdoor fires lags behind other areas of fire safety science research. Common characteristics between fire spread in WUI fires and urban fires have not been fully exploited. For these reasons, the IAFSS has approved the formation of a new permanent working group entitled *Large Outdoor Fires and the Built Environment* [1]. This report details the first official workshop of this permanent working group. At the kickoff workshop, detailed ideas were presented regarding the planned activities of the working group, especially the large workshop to be held at IAFSS 2020 Symposium in Waterloo, Canada.

1.2. Program of the Workshop

Time*	Title	Speakers (in bold)
3:00-3:15	Introduction	S. Manzello , S. McAllister, S. Suzuki
3:15-3:25	Oceania view	R. Bianchi
3:25-3:35	Asia view	S. Suzuki
3:35-3:50	IRC	E. Pastor/ S. Suzuki
3:50-4:05	EME	E. Ronchi/ S. Manzello
4:05-4:20	LOFF	R. Bianchi
4:20-4:30	Discussion	All participants

* Each presentation (other than discussion) includes 5 minutes Q & A time.

1.3. List of Registered Participants (Alphabetical Order by Surname)

Beline Alianto (Universitas Indonesia, Indonesia)
 Raphaele Bianchi (Commonwealth Scientific and Industrial Research Organization, Australia)
 Thomas Cleary (National Institute of Standards and Technology, USA)
 Bogdan Dlugogorski (Murdoch University, Australia)
 Chow Chan Foon (CPG Consultants Pte Ltd, Singapore)
 Xinyan Huang (Hong Kong Polytechnic University, China)
 Shiori Imai (Central Nippon Highway Engineering Tokyo Company Limited, Japan)
 Mineko Imanishi (Takenaka Corporation, Japan)
 Yeo Swle Khiank (SP Group, Singapore)
 Takeshi Kishino (Central Nippon Highway Engineering Tokyo Company Limited, Japan)
 Yue Tsz Kit (Hong Kong Polytechnic University, China)
 NG Soon Kuan (ASET Engineers Pte Ltd, Singapore)
 Ya-Ting Liao (Case Western Reserve University, USA)
 Samuel L. Manzello (National Institute of Standards and Technology, USA/Japan)
 Chu Che Min (Hualien County Fire Department, Taiwan)
 Yoshikazu Mineghishi (Takenaka Corporation, Japan)
 Taku Nakayama (Central Nippon Highway Engineering Tokyo Company Limited, Japan)
 Yulianto Nugroho (Universitas Indonesia, Indonesia)
 Takumi Ota (Central Nippon Highway Engineering Tokyo Company Limited, Japan)

Pither Palamba (Universitas Indonesia, Indonesia)
 Dennis Pau (University of Canterbury, New Zealand)
 Ling Chu Su (Arup, China)
 Peiyi Sun (Hong Kong Polytechnic University, China)
 Sayaka Suzuki (NRIFD, Japan)
 Wai Cheong Tam (National Institute of Standards and Technology, USA)
 Kuang-Chung Tsai (National Kaohsiung University of Science and Technology, Taiwan)
 Will Tsai (Fire Force, New Zealand)
 Richard Walls (Stellenbosch University, South Africa)
 Yu Wang (University of Edinburgh, UK)
 Chia Lung (Farian) Wu (University of Edinburgh, UK)
 Jiann Yang (National Institute of Standards and Technology, USA)
 Masahiko Yokota (Central Nippon Highway Engineering Tokyo Company Limited, Japan)

2. Summary and Next Steps

A total of 32 global experts participated, representing Australia, China, Indonesia, Japan, New Zealand, Singapore, South Africa, Taiwan, United Kingdom, and USA. The workshop began with an introductory presentation delivered by Samuel Manzello and Sayaka Suzuki on how this topic became a permanent working group with IAFSS sponsorship. After this, Raphaele Blanchi placed the large outdoor fire and built environment problem in the context of the Oceania region. Sayaka Suzuki then placed the problem in the context of why it is also very important to Asia. All three of these presentations provided a solid foundation for the participants to then listen to the detailed subleader presentations.

The subleader presentations went into extreme detail to highlight what each of the three subgroups will undertake and their specific plans as part of the IAFSS 2020 symposium that will be held in Waterloo, Canada. As two of the three subleaders were unable to travel to Taiwan, these presentations were delivered by Sayaka Suzuki and Samuel Manzello. It was noted that the IRC subgroup has the largest number of registered participants, as this topic most closely aligns with the majority of the expertise within the current IAFSS community. As a result, it was stressed that more participation would be helpful in the EME and LOFF subgroups.

Some interesting discussion points worth mentioning here relate to important of mass notifications for large outdoor fires; this is an important topic that should be addressed. There also the mention of SMART firefighting technologies and how this will best integrated into the effort as part of the LOFF subgroup. Finally, participants suggested it would be good to have another workshop prior to IAFSS 2020 Symposium with Inteflam 2019 suggested as a possible venue.

3. Acknowledgments

The support of the organizing committee of the 11th AOSFST is greatly appreciated. In particular, the authors wish to acknowledge the help of Professor Kuang-Chung Tsai of National Kaohsiung University of Science and Technology, Taiwan for setting up the room location for the workshop. Professor Wan-Ki Chow of the Hong Kong Polytechnic University, China and the Taiwan chapter of the Society of Fire Protection Engineers (SFPE; Ms. Emma Liu) are also appreciated. SLM would also like to personally thank Professor

Patrick Van Hees of Lund University, IAFSS President and ISO TC92 Chairman, for his constant support of this effort.

References

- [1] Manzello, S.L., Blanchi, R., Gollner, M., Gorham, D., McAllister, S., Pastor, E., Planas, E., Reszka, P., and Suzuki, S., (2018) Summary of Workshop Large Outdoor Fires and the Built Environment, *Fire Safety Journal* 100: 76-92
<https://doi.org/10.1016/j.firesaf.2018.07.002>

Appendix A: List of Presentations Delivered at the Workshop

Large Outdoor Fire and the Built Environment New IAFSS Permanent Working Group

Samuel L. Manzello^{1,2,3}, Sayaka Suzuki³, and Sara McAllister⁴

National Institute of Standards and Technology (NIST), USA¹

Invited Guest Researcher

Building Research Institute (BRI), Japan²

National Research Institute of Fire and Disaster (NRIFD), Japan³

USDA Forest Service, USA⁴

samuelm@nist.gov; sayakas@fri.go.jp; smcallister@fs.fed.us

Kick-off Meeting

11th Asia-Oceania Symposium on Fire Science and Technology (AOSFST)
October 21, 2018

Large Outdoor Fires and the Built Environment

- Wildfires that spread into communities, known as Wildland-Urban Interface (WUI) fires have destroyed communities throughout the world
- Large outdoor fires that pose risk to built environment are urban fires in Japan

Large Outdoor Fires and the Built Environment

- Over the past several decades, fire safety science research has spent a great deal of effort to understand **fire dynamics within buildings**
- Research into large outdoor fires, and how to potentially mitigate the loss of structures in such fires, lags behind other areas of fire safety science research
- Fire spread in **large outdoor fires is very complex**, interaction of topography, weather, vegetation, and structures
- At the same time, common characteristics between fire spread in WUI fires and urban fires have not been fully exploited
- Once a wildland fire reaches a community and ignites structures, structure-structure fire spread can occur under similar mechanisms as in urban fire spread

Large Outdoor Fires and the Built Environment

2017 IAFSS workshop – look at problem from global perspective

Large Outdoor Fires & the Built Environment include :

wildfires, wildland-urban interface (WUI) fires, urban fires, and informal settlement fires, which **pose a threat to people**.



Permanent Working Group Underway

Workshop Summary paper published in **Fire Safety Journal**

Overview of the large outdoor fire risk to the built environment from each region presented

Critical research needs for this problem in the context of fire safety science are provided

Seeks to develop foundation for an international research needs roadmap to reduce the risk of large outdoor fires to the built environment



Permanent Working Group Underway

The executive committee of the IAFSS has formally approved **Large Outdoor Fires and the Built Environment** as permanent working group

Samuel Manzello (NIST, EL), Sara McAllister (USFS, USA), and Sayaka Suzuki (NRIFD, Japan) are co-leaders

The overall objectives are to bring **full depth of knowledge of the IAFSS community** to work on these priority topics

Poster at European IAFSS Kick-off meeting at AOSFST

Large Outdoor Fires and the Built Environment: Objectives and Goals of Permanent IAFSS Working Group

1. Purpose/Scope of the Working Group

Large outdoor fires present a risk to the built environment. Large outdoor fires include wildfires that spread into communities, urban fires, and informal settlement fires. The workshop was held in Gaithersburg, MD, USA, from October 21-23, 2017.

The workshop was held in Gaithersburg, MD, USA, from October 21-23, 2017. The workshop was held in Gaithersburg, MD, USA, from October 21-23, 2017. The workshop was held in Gaithersburg, MD, USA, from October 21-23, 2017.

The workshop was held in Gaithersburg, MD, USA, from October 21-23, 2017. The workshop was held in Gaithersburg, MD, USA, from October 21-23, 2017. The workshop was held in Gaithersburg, MD, USA, from October 21-23, 2017.

<https://iafss.org/2018/03/25/large-outdoor-fires-and-the-built-environment-objectives-and-goals-of-permanent-iafss-working-group/>

Working Group Structure

The working group consists of three subgroups focused:
Ignition Resistant Communities (IRC)
Emergency Management and Evacuation (EME)
Large Outdoor Firefighting (LOFF)

At some points each subgroup will cooperate each other as all related!



IAFSS 2020 Plans

- We will have the **workshop**
- WG (sub-groups) efforts on Phase 1 will be presented
- We hope to get feedback from you! (which we call a part of Phase 2)

If you would like to join WG, please sign up from the link below;

<https://goo.gl/forms/OTMW2SbWi7mmHYiv1>




Kick-off Program

Time: October 21st 2018 3:00 to 4:30 PM
Location: Room 403

Time*	Title	Speaker
3:00-3:15	Introduction	S. Manzello, S. McAllister, S. Suzuki
3:15-3:25	Oceania view	R. Bianchi
3:25-3:35	Asia view	S. Suzuki
3:35-3:50	IRC	E. Pastor/S. Suzuki
3:50-4:05	EME	E. Ronchi/S. Manzello
4:05-4:20	LOFF	R. Bianchi
4:20-4:30	Discussion	All Participants

*Each presentation (other than discussion) includes 5 minutes Q & A time



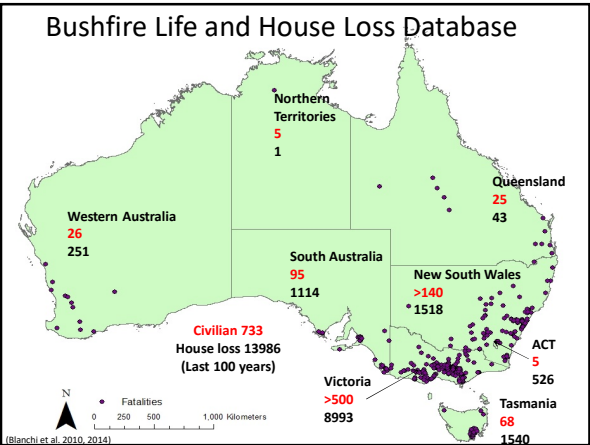
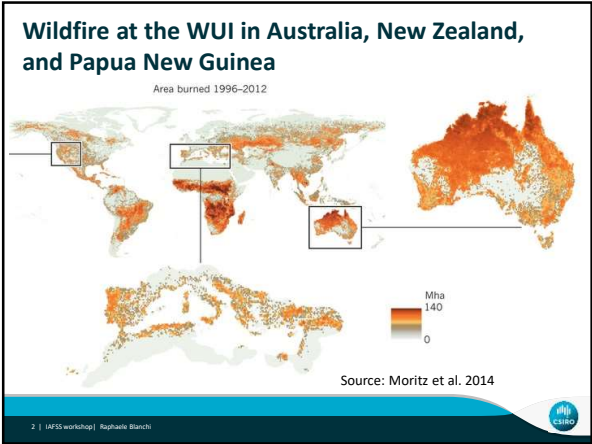
Large Outdoor Fires and the Built Environment
working group
- Oceania view

Raphaelae Blanchi (CSIRO)


LAND & WATER
www.csiro.au

CSIRO

AOFST - WS



Fire	Burnt area	Number of house loss	Number of houses surveyed	Fatalities	State	Weather	Cost
Ash Wednesday (Australia)							
16/02/1983	210,000 ha	1511 VIC	1153 (in Victoria)	47 (Vic) 28 (SA)	VIC SA	FFDI 130	\$400M



(Ramsay et al. 1987)

Canberra (Australia)	Burnt area	Number of house loss	Number of houses surveyed	Fatalities	State	Weather	Cost
18/01/2003	160,000ha	519	226	4	ACT	FFDI 100	\$350 M



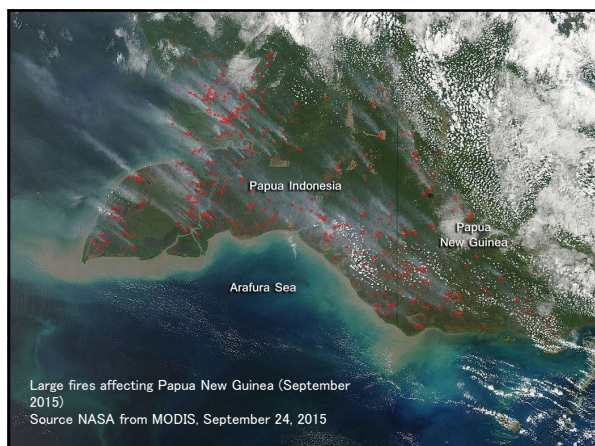
~80-90% of house destroyed in absence of direct radiant heat and flame from the fire front

(e.g. Leonard et al. 2005)

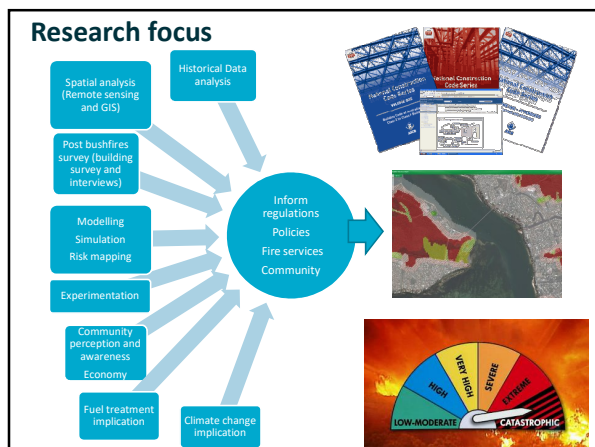


(e.g. Leonard et al. 2009)

Black Saturday (Australia)	Burnt area	Number of house loss	Number of houses surveyed	Fatalities	State	Weather	Cost
07/02/2009	390,000ha	2100	1100	173	VIC	FFDI 155	>\$4B



Port Hills Fire (New Zealand)	Number of house loss	Number of houses surveyed	Fatalities	Annual burnt area
13/02/2017	11	Inquest in progress	none	Fire season 15-16: 3500 ha Fire season 14-15: 3250 ha Fire season 13-14: 2000 ha Fire season 12-13: 4400ha



Thank you

Raphael Blanchi

t +61 3 95458194
e raphael.blanchi@csiro.au
w www.csiro.au/forem

LAND & WATER
www.csiro.au

LARGE OUTDOOR FIRES AND THE BUILT ENVIRONMENT

-Asia view-

Sayaka Suzuki

National Research Institute of Fire and Disaster, Japan
sayakas@fri.go.jp

AOSFST@ Taipei, Taiwan

October 21st 2018

Large Outdoor Fires & the Built Environment – Asia view

Where is Asia??



Large Outdoor Fires & the Built Environment – Asia view

Asia

- Asia is large
 - 44,579,000 m²
 - Large Continent & Islands
- Population
 - 4.4 billion people
 - Densely or barely populated
- Variety of climate
- Variety of developments
 - even within counties
 - codes & standards
- Variety of culture
 - Different construction



Large Outdoor Fires & the Built Environment – Asia view

How much is forest in Asia?



Large Outdoor Fires & the Built Environment – Asia view

Large outdoor Fires in Asia

1987 Black Dragon Fire @ China & Russia

2010 Mount Carmel Fires @ Israel

Peat fires @ Indonesia

2016 Urban Fires @ Japan

2017 Shanty Town Fires @ Philippine

2000 Gangwon Wildfire @ Korea

Large Outdoor Fires & the Built Environment – Asia view

Large Outdoor Fires in Asia

- **Forest fires, Wildland fires, Wildfires or Mountain fires**
 - A lot of forest, and wildland
- **Wildland-Urban Interface (WUI) fires**
 - WUI area does exist
- **Urban fires**
 - Some countries have really-densely-populated areas
 - **Lots of research going on in Asia**

Disaster-related

- Earthquake
 - Post-earthquake fires
- Tsunami
 - Tsunami fires
- Flood, Cyclone, Typhoon
 - Less common for fires...

Mainly in Japan, and Japanese researchers have worked on those issues.

Large Outdoor Fires & the Built Environment – Asia view

Forest & Peat Fires in Asia

- **Peat Fires** - mainly Indonesia & Russia in Asia
 - Long & Slow flame spread (smouldering)
 - Producing lots of CO₂
 - Peat fire could cause another forest fires
- **Forest Fires**
 - 1987 Black Dragon Fire showed 'the difference of making effort on forest fires'
- **What we should do?**
 - **Early Detection is the key** – Airplane & Satellite
 - Mitigation
 - By understanding ignition & fire spreads
 - not only effective but also 'eco-friendly' or cost-effective
 - Haze issue
 - Causing health problem globally - for example from Indonesia to South-East Asia region

Large Outdoor Fires & the Built Environment – Asia view

WUI fires in Asia

- **WUI area & fires?**
 - More problems as people have more interaction with forest/wildland
 - 2010 Russia **wildfires** – 150 structures and settlements
 - 2010 Mount Camel **Forest Fire** - several village & people evacuated
 - Korea designated the 'WUI' area
- Korea had 2 WUI fires in one day (2013)
- Japan's first two WUI fires happened in one day (2017)
 - Forest to residential fires & Residential to forest fires

Large Outdoor Fires & the Built Environment – Asia view

Urban fires in Asia

- Recent developments
 - **Co-existing New buildings & Old buildings**
 - New buildings follow (new) Codes & Standards
 - Old buildings – weaker to fire or any ignitions
 - Buildings under construction – weak to fire
 - Informal settlements exist in Asia
 - 2017 Shantytown fires in Philippines
- **Applying** new Codes & Standards to new buildings
 - Take times
 - Strengthening firefighter technology is also a key
- **Retrofitting** the codes and standards
 - Existing buildings
 - Weaker to fire (old, or just following old regulation, or not following at all)

Large Outdoor Fires & the Built Environment – Asia view

What is needed?

- **Statistics** – how we consider all different aspects in Asia into statistics?
 - Definition of 'Large fire'? Cost? burned area? Loss of life?
- **Urban Planning & Fire problem**
 - How we solve the fire problem while waiting to have better urban planning or better fire-resistance technology applied (that takes time)
- **Real-time simulation – important in WUI & Urban Fires**
 - Predict fire spread within communities
 - Applying firefighting resources
 - Firefighters may use those simulations
 - Adjustable to simultaneous fires

Large Outdoor Fires & the Built Environment – Asia view

Acknowledgement

- Kuibin Zhou (Nanjing Tech University, China)
- Yulianto Nugroho (University of Indonesia, Indonesia)

Large Outdoor Fires & the Built Environment – Asia view

IGNITION RESISTANT COMMUNITIES (IRC)

Sayaka Suzuki, Ph.D.
National Research Institute of Fire and Disaster, Japan

Elsa Pastor, Ph.D.
Universitat Politècnica de Catalunya, Spain

Large Outdoor Fires & the Built Environment

Outline

Background
Why we work on Ignition Resistant Communities?

Objectives
What we want to achieve?

Discussion
What we are going to do by 2020?

Call for participation

Ignition Resistant Communities (IRC)

Background

- Hardening structures is essential to decrease homes losses by outdoor fire exposures.
- Building codes and standards already exist, providing requirements to reduce risk of structural ignition.
- The devastating power of current large outdoor fire events is revealing weaknesses in our current knowledge



Mati (Greece) WUI fire, July 2018. Source: David Cabotero

- Are levels of hardening adequately established?
- Are large outdoor fire exposures properly captured in codes and standards?
- Do we know what's coming/how much coming from wildfires and within communities?

Ignition Resistant Communities (IRC)

Objectives

To develop the scientific basis for **new standard testing methodologies** indicative of **large outdoor fire exposures**, including the development of necessary testing methodologies to characterize **wildland fuel treatments** adjacent to communities



Regulatory Framework and standards



Fire exposure/flame characterization

For both **exposure to structures & communities**
exposure from wildland

Image Source: Valérie Gache, AFP, Greece WUI Fires 2018

Ignition Resistant Communities (IRC)

What's in codes & standards ?



Regulatory Framework and standards

Identify needs on codes & standards (both local & international) and any rules



- What is working/not working in current regulatory framework in large outdoor fire prone areas?
- What is missing in current codes and standards for large outdoor fires if not working?
- What is the difference of codes & standards among areas?

Summary of worldwide regulatory framework
Comparison among regulatory framework

Ignition Resistant Communities (IRC)

What we know or not?



Fire exposure/flame characterization

Identify & quantify **real fire exposures** (heat flux, flame contact, firebrands) to the communities (from wildland and within communities)



- What kind of data do we have? From experiments & from actual fire
- What kind of data we don't have but we need?
- What we know from our own data?

Summary of large outdoor fire exposures
Summary of experiments & modellings for fuel treatments
Set of parameterized large outdoor fire exposure scenarios

Ignition Resistant Communities (IRC)

Discussion

13th IAFSS Symposium – Waterloo, Canada

What we are going to do by 2020

- Summary of worldwide regulatory framework
- Summary of large outdoor fire exposures
- Summary of experiments & modellings for fuel treatments

What we are looking for in 2020 workshop

- Finding the gap/the difference/the missing link in regulatory framework, between regulatory framework and real fire scenarios, in experimental/numerical/modelling work

Any feedback is appreciated!

Ignition Resistant Communities (IRC)

Call for participation



➤ 38 members from 14 different countries have signed in: Europe: (11), Asia (7), North America (17), Oceania (2), South America (1)

We still need more people to cover all the worldwide LOF-prone areas and topics!

Joint effort between standardization community and wildland-WUI fire research community

Ignition Resistant Communities (IRC)

Thanks for your attention!

If you have any questions specifically related to this sub-group,
Please contact the sub-group leader,

Elsa Pastor Universitat Politècnica de Catalunya

 elsa.pastor@upc.edu

Ignition Resistant Communities (IRC)

Emergency Management and Evacuation Subgroup

Samuel L. Manzello^{1,2,3} and Enrico Ronchi⁴

National Institute of Standards and Technology (NIST), USA¹
Invited Guest Researcher
Building Research Institute (BRI), Japan²
National Research Institute of Fire and Disaster (NRIFD), Japan³
samuelm@nist.gov

Lund University, Sweden⁴
enrico.ronchi@brand.lth.se

Large Outdoor Fires and the Built Environment Working Group

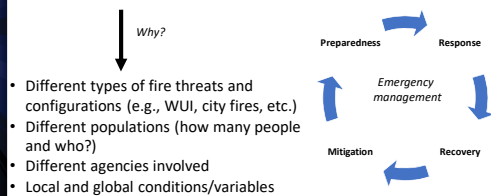
Outline

- Background
Why an Emergency management and evacuation sub-group?
- Objectives
What do we want to achieve?
- Discussion
What we are going to do by 2020?
- Call for participation

Background

Why an Emergency management and evacuation sub-group?

National and international organizations may adopt different strategies for emergency management in case of large outdoor fires



Background

Why an Emergency management and evacuation sub-group?

Mass fire evacuations involve thousands of people every year

https://en.wikipedia.org/wiki/November_2016_Israel_fires

Recent examples

- 2016 Fort McMurray wildfire, Canada (≈90,000 people)
- 2016 Haifa, Israel (>40,000 people)
- 2017 British Columbia, Canada (total of ≈35,000 people)
- ... and many more



Need to investigate **strategies around the world** for evacuation scenarios involving different resources, evacuation types, etc.

Background

Why an Emergency management and evacuation sub-group?

- Limited knowledge on human behaviour in evacuation
- Scarce number of data-sets on human behaviour during evacuation emergencies
- Great variability in data-set types*: qualitative vs quantitative (e.g., post-disaster analyses/interviews, behavioural intention questionnaires, Laboratory experiments on human behaviour, etc.)

*Human Behaviour data → Need to assess what can be shared



Need to make collected data-sets more accessible

Objectives

What do we want to do?

- Inventory of strategies and regulatory frameworks
 - Share and review strategies adopted around the world
 - Collect and categorize regulatory frameworks

<http://idahofirewise.org/>



- Inventory of tools
 - Tools exist for different scopes
 - Categorize and review existing tools currently used in EMEvac such as risk assessment tools, mapping tools, evacuation models (e.g. WUIVAC, DynaMIT, VISSIM, and others)

Objectives

What do we want to do?


- Gaps, research roadmap and strategy/tool assessment

Identification of research roadmap

Analysis of existing tools

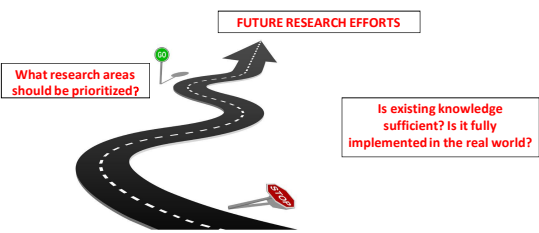
- How can we evaluate existing tools?
- Development of testing case studies

- What we know we do not know?
- What is missing in current codes/regulations?
- What data do we need?
- What tools we need to develop?



Objectives

Why a research roadmap on Emergency Management and Evacuation?



FUTURE RESEARCH EFFORTS

What research areas should be prioritized?

Is existing knowledge sufficient? Is it fully implemented in the real world?

Discussion

Possible final "products" (in red planned activities by IAFSS2020)

- Development of a standard template for the analysis of regulatory frameworks and summary of key regulatory frameworks available worldwide
- Development of a standard template for the analysis of emergency management tools (e.g. risk assessment tools, mapping tools, pedestrian models, traffic models, etc.) and summary of inventory of existing tools for aiding emergency management
- Summary of well-documented large outdoor fire real cases involving evacuation according to a standardized template
- Development of test case scenario(s) to evaluate the capabilities and limitations of existing tools to aid emergency management
- Enhancement of accessibility of existing and future evacuation data-sets
- Research roadmap

Call for Participants

WE NEED YOUR HELP!

The Emergency Management and Evacuation sub-group is intended as a multi-disciplinary group bridging expertise in a variety of areas

We include at the moment 22 members with expertise in engineering, psychology, sociology, modelling, and simulation... but we need more!

Current member countries

Australia, Canada, United Kingdom, Japan, Italy, USA, Poland, Sweden, New Zealand

If you are interested in this area and you want to share your expertise and experience within this IAFSS sub-group, just join us!



Large Outdoor Fires and the Built Environment working group

- Large Outdoor Firefighting – LOFF

Raphael Blanchi (CSIRO)

LAND & WATER
www.csiro.au

AOFST – Workshop 21/10



Large Outdoor Firefighting – LOFF

- General aim

To develop the scientific basis for various **Firefighting** tactics that are used, as well as the various personal protective equipment (PPE), and suggest pathways for research **community engagement**, including **environmental and health** issues in suppressing these fires



Protection of firefighters - PPE and crew protection system

Background

- Protection of firefighter is an important aspect of firefighter safety in a WUI fire where both the wildlands and the structures are involved
 - How to combine Wildfire and structure fire protection needs? What implication for PPE and protection of fire crew in vehicles?


Objectives

- Develop a framework for this new combined wildland/structure fire exposure, to assess PPE requirements, to assess the performance of crew vehicles
- Establish a network between fire researchers and fire managers for discussion and exchange

How?

- ✓ Develop a repository for inventories of PPE (both international and local Standards)
- ✓ Develop a repository for fire fighting vehicle crew protection systems
- ✓ Conceptualize a risk framework/ best practices that underpin the development of standards and test methods for firefighter protection

3 | Presentation title | Presenter name



Protection of firefighters (cont'd) - Firefighting tactics

Background

- Various firefighting tactics are used globally to respond to large outdoor fires (wildfires or fires that have reached the WUI) depending on each country unique approach to fire-fighting.


Objectives

- What are the tactics used globally?
- Summary of knowledge and support for collaboration, exchange

How?

- ✓ Define a repository to develop inventories of various tactics that are used globally to respond to large outdoor fires
- ✓ Develop a framework for resources and strategies optimization for fire suppression in the WUI

4 | Presentation title | Presenter name



Pathways for community engagement

Background

- Community engagement is an essential part of people safety in large outdoor fires
 - Why and how to engage community?

Objectives

- Provide scientific research on preparedness and mitigation measures
- Establish a multi-disciplinary network of researcher and practitioners to promote discussion on shared responsibility model and reflection on what is a fire-adapted community

How?

- ✓ Develop a framework and repository on preparedness and mitigation research
- ✓ Define community engagement pathways

5 | Presentation title | Presenter name



Health and Environmental impacts

Background

- The impact of large outdoor fires smoke on the environment and health is an increasing concern
 - How to manage the risk on firefighters?


Objectives

- Better understanding of smoke contents and smoke dispersion to inform potential human exposure (for people at risk). Consider smoke impact for fire suppression strategies and mitigation measures (such as prescribed burning)
- Environmental effect of suppressing those fires

How?

- ✓ Develop a repository presenting a summary of knowledge on smoke exposure and health impact on fire fighters in different scenarios (urban fires, wildfires, WUI fires, prescribed burning).
- ✓ Develop a repository and review of smoke dispersion models for impact at the interface
- ✓ Inform government bodies, relevant bodies to define criteria for health impact

6 | Presentation title | Presenter name



Discussion

- Discuss objectives and timeframes for phase 1 “collecting information”
- Define a framework to develop inventories and repositories of
 - PPE (both international and local Standards),
 - Fire fighting vehicle crew protection systems, and
 - various tactics that are used globally to respond to large outdoor fires
- Define repository for community engagement pathways
- Define repository to develop a summary of knowledge on smoke exposure and health impact on fire fighters

7 | Presentation title | Presenter name



Call for participation

- Current participation

	Number people	Countries	
WG member	29	Europe, USA, China, Japan, Canada, Australia, UK, Korea	19 IAFSS members 10 non members
Keep me informed	26	USA, Denmark, Sweden, Malaysia, France, Japan, India, Australia	11 IAFSS members 15 non members

- IAFSS community, Research community
- Organisation in charge of risk/Fire services/practitioners

Collaborate with different disciplines to create integrate solutions and community behavioural change

8 | Presentation title | Presenter name



Thank you

Raphaelle Blanche

t +61 3 95458194
e raphaelle.blanche@csiro.au
w www.csiro.au/lorem

LAND & WATER
www.csiro.au

