# The ANSFR Project

## Workshop 2 - Frederikssund-Halsnæs
## 28th September – 1st October 2009

## "European Exchange of Good Practice in Identification, Assessment and Management of Environmental Fire Risk"

**Report compiled by Frederikssund-Halsnæs Fire and Rescue Department and Northumberland Fire and Rescue Service**

**24th February 2010**

Northumberland
Northumberland County Council

Pelastusopisto
Emergency Services College

*This report documents the sessions and findings of the Frederikssund-Halsnæs Workshop, the second of four workshops to be delivered during the ANSFR Project. The workshop and the ANSFR Project are co-funded by the European Commission Directorate-General for Environment under the Civil Protection Financial Instrument, 2008 Call for Proposals (grant agreement number: 070401/2008/507848/SUB/A3).*

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# Executive Summary

This handbook documents the sessions delivered and the material produced during a European workshop hosted by Frederikssund-Halsnæs Fire and Rescue Department (Denmark) on 28th September – 1st October 2009. The workshop was the second of four workshops to be delivered over the course of the two-year ANSFR Project: ***"Accidental, Natural and Social Fire Risk (ANSFR): The prevention and diminution of the human and financial costs of fire through effective risk assessment and management".***

The ANSFR Project is being managed and coordinated by Northumberland Fire and Rescue Service (UK) working in close partnership with Frederikssund-Halsnæs Fire and Rescue Department (Denmark), Corpo Nazionale dei Vigili del Fuoco – Nucleo Investigativo Antincendi (NIA) (Italy), the Emergency Services College (Finland), South West Finland Emergency Services (Finland) and Kanta-Häme Fire and Rescue Service (Finland). The project is co-funded by the European Commission Directorate-General for Environment under the Civil Protection Financial Instrument, 2008 call for proposals (Grant Number: 070401/2008/507848/SUB/A3). The ANSFR project aims to develop new frameworks for the identification, assessment and management of accidental, natural/environmental and social fire risk. The materials developed during the project will help Fire and Rescue Services in Europe to protect life, property and the environment through the effective assessment and management of fire risks.

The ANSFR Project is divided into three key work themes: accidental fire risk; environmental fire risk; and social fire risk. The aim of the Frederikssund-Halsnæs Workshop was for participants to "develop a good understanding of the environmental fire risk assessment and management practices currently adopted by the partner organisations and to discuss and debate potential synergies and improvements to these practices for effective use in all project countries." The workshop focused on the assessment and management of fires occurring within rural/outdoor environments such as wildfires, forest fires, moorland fires, grassland fires and fires on agricultural land. There was also some discussion and reference to other similar types of outdoor fires such as heathland fires, and fires in coastal locations. The event benefited from the attendance and contribution of a number of specialist operational wildfire officers and research and project specialists.

Based on the evidence presented and analysed in the full Post-Event Evaluation Report, Northumberland Fire and Rescue Service and Frederikssund-Halsnæs Fire and Rescue Service have jointly concluded that the workshop successfully fulfilled all of the predefined learning objectives and delivered all three desirable outputs. Consequently, it was concluded that the event achieved its key aim. The event was even more successful when taking into account that a further unpredicted outcome was achieved. A number of the organisations present at the workshop agreed to collaborate at a later date to deliver and receive theoretical and practical training in risk prediction tools and techniques that can be used to fight wildfires more safely and more efficiently. In addition, wildfire officers from Northumberland Fire and Rescue Service have agreed to provide assistance and advice, based on their professional experience and training in multiple countries across the world, for the planned burn of an area of forest in Frederikssund-Halsnæs in 2010/11. This outcome represents a great example of how cross-border sharing of information and expertise in risk identification, assessment and management can yield significant mutual benefits for European Fire and Rescue Services and the communities that they serve.

The information presented in this handbook will be of interest to all organisations in Europe with a responsibility for fire prevention and fire risk assessment and management. The handbook will be of particular interest to Fire and Rescue Services in Europe, and all public and private organisations involved in work associated with environmental fire risk assessment and management, such as forestry organisations, civil protection authorities and other government agencies in Europe and the wider world.

If you would like further information about the Frederikssund-Halsnæs Workshop or the ANSFR Project, please contact Robert Stacey or Kim Lintrup using the contact details on page 1.

# Overordnet Referat

Denne håndbog dokumenterer de møder og materialer, der blev produceret under et europæisk seminar holdt af Frederikssund-Halsnæs Brand- & Redningsberedskab (Danmark) – fra den 28. september til 1. oktober 2009. Seminaret var det andet af fire seminarer, der vil blive afholdt i løbet af det toårs ANSFR-projekt: ***Utilsigtet, naturlig og social brandrisiko (ANSFR): Forebyggelse og formindskelse af de menneskelige og finansielle omkostninger ved brand gennem effektiv risikovurdering og administration".***

ANSFR-projektet styres og koordineres af Northumberland Fire and Rescue Service (Storbritannien), som er i tæt samarbejde med Frederikssund-Halsnæs Brand og Redningsberedskab (Danmark), Corpo Nazionale dei Vigili del Fuoco – Nucleo Investigativo Antincendi (NIA) (Italien), og Emergency Services College (Finland), South West Finland Emergency Services (Finland) og Kanta-Häme Fire and Rescue Service (Finland). PEuropa-Kommissionens Generaldirektorat for Miljø medfinansierer projektet under det finansielle instrument til civilbeskyttelse, Opfordring til forslag 2008 (Legat: 070401/2008/507848/SUB/A3). ANSFR-projektets mål er at udvikle nye rammer for identificering, vurdering og administration af utilsigtet, naturlig/miljømæssig og social brandrisiko. Materialerne udviklet i dette projekt vil hjælpe Brand- og Redningsberedskaber i Europa med at beskytte liv, ejendom og miljøet gennem den effektive vurdering og administration af brandrisici.

ANSFR-projektet er inddelt i tre nøglearbejdskategorier: utilsigtet brandrisiko, naturlig brandrisiko; og social brandrisiko. Målet med Northumberland-seminaret var for deltagerne "at udvikle en god forståelse for miljømæssig brandrisikovurdering og de administrationspraksisser, der i øjeblikket er indført af partnerorganisationerne, samt at diskutere og debattere potentielle synergier og forbedringer af disse praksisser til effektiv brug i alle projektlandene." Seminaret fokuserede på vurderingen og administrationen af brande i landlige/udendørs omgivelser såsom skovbrande, skovbrande, brande på hedelandskaber, græsmarksbrande, og brande på landbrugsjord. Der blev også diskuteret og refereret til andre typer udendørsbrande såsom hedebrande og brande i kystområder. Arrangementet nød godt af deltagelse og bidrag fra en række kampklare brandmænd med speciale i skovbrande samt forsknings- og projektspecialister.

Baseret på de beviser, der blev fremsat og analyseret i den komplette evalueringsrapport efterarrangementet, konkluderede Northumberland Fire and Rescue Service og Fredrikssund-Halsnæs Brand- og Redningsberedskab i fællesskab, at seminaret opfyldte

alle dets foruddefinerede uddannelsesmål og leverede alle tre ønskværdige udfald. Følgelig blev det konkluderet, at arrangementet opnåede sit hovedformål. Arrangementet var en endnu større succes, hvis man tager i betragtning, at et ekstra uforudset resultat blev opnået. En række af de tilstedeværende organisationer ved seminaret blev enige om at samarbejde på et senere tidspunkt om at levere og modtage teoretisk og praktisk træning i værktøjer og teknikker til risikoprognose, der kan bruges til en mere sikker og effektiv bekæmpelse af skovbrande. Derudover indvilligede brandmænd med speciale i skovbrande fra Northumberland Fire and Rescue Service i at ofre assistance og rådgivning om den planlagte afbrænding af et skovareal i Fredrikssund-Halsnæs i 2010/11, baseret på deres professionelle erfaringer og træning i adskillige lande verden over,. Dette resultat udgør et godt eksempel på, hvordan deling på tværs af landegrænser af information og ekspertise inden for risikoidentifikation, -vurdering og -administration kan være til gensidig fordel for europæiske brand- og redningsberedskaber og de samfund, de tjener.

Oplysningerne fremstillet i denne håndbog vil være af interesse for alle organisationer i Europa med ansvar for brandforebyggelse og brandrisikovurdering og -administration. Håndbogen vil især være af interesse for brand- og redningsberedskaber i Europa, og alle offentlige og private organisationer, der er involveret i arbejde forbundet med miljømæssig brandrisikovurdering og -administration, såsom skovbrugsorganisationer, civilbeskyttelsesmyndigheder og andre regeringsinstanser i Europa og resten af verden.

For yderligere information om seminaret i Fredrikssund-Halsnæs eller ANSFR-projektet kan Robert Stacey eller Kim Lintrup kontaktes via kontaktoplysningerne på side 1.

# Riepilogo esecutivo

Il presente manuale documenta le sessioni, corredate dal materiale prodotto, tenutesi nel corso di un workshop europeo ospitato dal Frederikssund-Halsnæs Fire and Rescue Department (Dipartimento antincendio e di soccorso di Frederikssund-Halsnæs, Danimarca) dal 28 settembre al 1° ottobre 2009. Il workshop in questione si attesta come il secondo dei quattro in programma nell'ambito del progetto biennale ANSFR: ***"Rischio di incendio accidentale, naturale e sociale (ANSFR): la prevenzione e la diminuzione dei costi umani e finanziari dell'incendio attraverso la corretta valutazione e gestione del rischio".***

Il Progetto ANSFR è stato gestito e coordinato dal Northumberland Fire and Rescue Service (Servizio antincendio e di soccorso del Northumberland, Regno Unito), che ha lavorato in stretta collaborazione con Frederikssund-Halsnæs Fire and Rescue Department, Corpo Nazionale dei Vigili del Fuoco – Nucleo Investigativo Antincendi (NIA) (Italia), Emergency Services College (Istituto Servizi di emergenza, Finlandia), South West Finland Emergency Services (Servizi di emergenza Finlandia sud-occidentale) e Kanta-Häme Fire and Rescue Service (Servizio antincendio e di soccorso del Kanta-Häme, Finlandia). Il progetto è co-finanziato dalla Commissione europea, Direzione generale dell'ambiente alla voce Strumento finanziario per la protezione civile, invito alla presentazione di proposte 2008 (numero concessione: 070401/2008/507848/SUB/A3). Il Progetto ANSFR ha lo scopo di sviluppare nuove strutture per l'identificazione, la valutazione e la gestione del rischio di incendio accidentale, naturale/ambientale e sociale. I materiali sviluppati nel corso del progetto saranno di ausilio per i Servizi antincendio e di

soccorso di tutta Europa, al fine di proteggere la vita, la proprietà e l’ambiente attraverso la valutazione e la gestione efficace dei rischi di incendio.

Il Progetto ANSFR è suddiviso in tre aree di lavoro chiave: rischio di incendio accidentale, rischio di incendio ambientale e rischio di incendio sociale. Lo scopo del workshop di Frederikssund-Halsnæs, in accordo ai partecipanti, è stato quello di "sviluppare una buona comprensione delle pratiche di gestione e di valutazione del rischio di incendio ambientale correntemente adottate dalle organizzazioni che operano in collaborazione, nonché discutere e avviare un dibattito sulle potenziali sinergie e sui miglioramenti che è possibile adottare per rendere l'uso di tali pratiche efficace in tutti i Paesi che fanno parte del progetto." Il workshop è stato focalizzato sulla valutazione e sulla gestione degli incendi che si verificano nell'ambito degli ambienti rurali o in spazi all'aperto quali gli incendi violenti, gli incendi boschivi o, ancora, gli incendi riguardanti le brughiere, le praterie e i terreni agricoli. Si è discusso anche di altri tipi di incendio simili che si sviluppano in spazi all'aperto, quali quelli riguardanti i terreni da brughiera o le zone costiere. All'evento hanno preso parte, fornendo il loro contributo, numerosi funzionari responsabili della lotta agli incendi violenti, nonché specialisti della ricerca e del progetto.

Sulla base dei riscontri presentati e analizzati nel Rapporto di valutazione post-evento completo, il Northumberland Fire and Rescue Service e il Frederikssund-Halsnæs Fire and Rescue Department si sono dimostrati concordi nel concludere che il workshop ha raggiunto tutti gli obiettivi di apprendimento predefiniti e ha prodotto i tre risultati desiderati. Ne conviene che l'evento ha raggiunto il suo scopo chiave. È addirittura possibile affermare che l'evento ha avuto un successo maggiore, se si tiene in considerazione il fatto che è stato raggiunto un ulteriore risultato non preventivato. Numerose organizzazioni presenti al workshop si sono dichiarate disponibili a collaborare in futuro nel produrre e nell’acquisire nozioni formative teoriche e pratiche relativamente alle tecniche e agli strumenti di previsione del rischio, utili per combattere gli incendi violenti con maggiore sicurezza e maggiore efficacia. Inoltre, i funzionari responsabili della lotta agli incendi violenti del Northumberland Fire and Rescue Service si sono dichiarati disponibili nel fornire assistenza e consigli, sulla base della propria esperienza professionale e della formazione maturata in numerosi Paesi del mondo, in merito all'incendio programmato di un'area della foresta di Frederikssund-Halsnæs nel biennio 2010/11. Questo risultato rappresenta un grande esempio di come la condivisione di informazioni e di competenze tra vari Paesi in termini di identificazione, valutazione e gestione del rischio possa apportare mutui e significativi benefici ai Servizi europei antincendio e di soccorso e alle comunità che essi servono.

Le informazioni presentate in questo manuale saranno di notevole interesse per tutte le organizzazioni che, in Europa, sono responsabili della prevenzione degli incendi e della valutazione e della gestione del rischio di incendio. Il manuale sarà di particolare interesse per i Servizi antincendio e di soccorso operanti in Europa e per tutte le organizzazioni pubbliche e private coinvolte nel lavoro associato alla valutazione e alla gestione del rischio di incendio ambientale, quali le organizzazioni di silvicoltura, le autorità di protezione civile e le altre agenzie governative dislocate in Europa e nel mondo.

Per ottenere ulteriori informazioni sul workshop di Frederikssund-Halsnæs o sul Progetto ANSFR, contattare Robert Stacey o Kim Lintrup utilizzando i dettagli di contatto a pagina 1.

# Tiivistelmä

Tämä käsikirja sisältää Frederikssund-Halsnæsin Palo- ja pelastusosaston 28.9. – 1.10.2009 isännöimän Euroopan työpajan istunnot, sekä niissä tuotetun materiaalin. Kyseessä oli toinen neljästä työpajasta, jotka pidetään kaksivuotisen ANSFR-projektin aikana. ***ANSFR - Accidental, Natural and Social Fire Risk (onnettomuuksien ja luonnon aiheuttamat sekä sosiaaliset palovaarat): Tulipalojen aiheuttamien ihmishenkien ja taloudellisten menetysten estäminen ja vähentäminen tehokkaan riskien arvioinnin sekä -hallinnan avulla.***

ANSFR-projektia johtaa ja koordinoi Northumberlandin Pelastuslaitos (Iso-Britannia), joka toimii yhteistyössä seuraavien tahojen kanssa: Frederikssund-Halsnæsin Palo- ja pelastusosasto (Tanska), Corpo Nazionale dei Vigili del Fuoco – Nucleo Investigativo Antincendi (NIA, kansallinen onnettomuustutkinta, Italia), Pelastusopisto, Lounais-Suomen Pelastuslaitos ja Kanta-Hämeen Pelastuslaitos. Projekti on saanut osarahoitusta Euroopan komission ympäristösihteeristöltä, perustuen Civil Protection Financial Instrument -osaston (siviilisuojauksen taloudelliset välineet) päätökseen vuonna 2008 (Apuraha no: 070401/2008/507848/SUB/A3). ANSFR-projektin tarkoituksena on kehittää uusia menetelmiä onnettomuuksien ja luonnon aiheuttamien sekä sosiaalisten palovaarojen tunnistamiseen, arviointiin ja hallintaan. Projektin aikana tuotettu materiaali auttaa Euroopan pelastuslaitoksia suojelemaan ihmishenkiä, omaisuutta ja ympäristöä.

ANSFR-projekti on jaettu kolmeen pääaiheeseen: onnettomuuksien aiheuttamat-, luonnon aiheuttamat- ja sosiaaliset tulipaloriskit. Frederikssund-Halsnæsin työpajan tarkoituksena oli “antaa osallistujille tietoa osallistujaorganisaatioiden nyt käyttämistä luonnon aiheuttamien paloriskien arviointi- ja hallintamenetelmistä, sekä keskustella ja väitellä näiden käytäntöjen potentiaalisista yhteisvaikutuksista ja parannuksista niiden soveltamiseksi kaikissa projektimaissa.” Työpaja keskittyi haja-asutusalueilla/ ulkoilmaympäristössä tapahtuvien tulipalojen arviointiin ja hallintaan. Tällaisia ovat maasto-, metsä-, nummi-, ruohikko- ja peltopalot. Keskustelu käsitteli myös osittain eräitä muita ulkoilmapaloja, kuten kanervikko- ja rannikkopaloja. Työpaja hyödynsi tapahtumaan osallistuvien useiden maastopalo- ja projektiasiantuntijoiden asiantuntemusta.

Jälkiarviointiraportin tuloksiin ja analyyseihin perustuen Northumberlandin Pelastuslaitos ja Frederikssund-Halsnæsin Pelastuslaitos ovat yhdessä tulleet siihen tulokseen, että työpaja täytti kaikki ennalta määritellyt oppimistavoitteensa ja saavutti kaikki toivotut tulokset. Tapahtumaa voi kutsua vieläkin onnistuneemmaksi erään odottamattoman tuloksen puolesta. Työpajassa läsnä olleet organisaatiot sopivat myöhemmästä yhteistyöstä, teoreettisen ja käytännön koulutuksen tuottamisesta ja vastaanottamisesta, koskien riskien ennakoimisen työkaluja ja tekniikoita. Näitä voidaan käyttää turvallisemmassa ja tehokkaammassa taistelussa maastopaloja vastaan. Lisäksi Northumberlandin Pelastuslaitos on sopinut antavansa apua ja neuvoja Frederikssund-Halsnæs'sa vuonna 2010/11 suunniteltuun metsäalueen polttamiseen. Tämä on hyvä esimerkki siitä, miten kansalliset rajat ylittävä tiedon ja kokemusten jakaminen voi tuottaa huomattavia yhteisiä etuja Euroopan pelastuslaitoksille ja niiden palvelemille yhteisöille.

Tässä käsikirjassa esitetyt tiedot ovat hyödyllisiä kaikille Euroopassa toimiville tulipalojen estämisestä ja tulipaloriskien arvioinnista ja hallinnasta vastuussa oleville organisaatioille. Tällaisia organisaatiota ovat pelastuslaitokset, sekä eräät julkis- ja yksityisorganisaatiot

kuten metsäorganisaatiot, siviiliväestön suojauksesta vastuussa olevat sekä muut valtionhallinnon viranomaiset.

Mikäli haluat lisätietoja Frederikssund-Halsnæsin työpajasta tai ANSFR-projektista, voit ottaa yhteyttä Robert Stacey:yn tai Kim Lintrup:iin. Yhteystiedot löydät sivulta 1.

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# 1. Introduction

This handbook documents[1] the sessions delivered and the material produced during the European Workshop hosted by Frederikssund-Halsnæs Fire and Rescue Department on 28th September – 1st October 2009. The full title of the workshop was ***"European Exchange of Good Practice in Identification, Assessment and Management of Environmental Fire Risk".*** From this point forward, the workshop will be referred to as the Frederikssund-Halsnæs Workshop.

The Frederikssund-Halsnæs Workshop was the second of four workshops to be delivered during the two year ANSFR Project. A series of handbooks is being produced to document all of the workshops delivered during the project. The full title of the ANSFR Project is: INSERT. The project is co-funded by the European Commission Directorate-General for Environment under the Civil Protection Financial Instrument for 2008 and is currently being delivered by four partners working in four European countries: the United Kingdom, Denmark, Italy and Finland. The project aims to develop new guideline frameworks for the assessment and management of accidental, natural and social fire risk in Europe. The project will do this by facilitating the collaborative exchange of knowledge, experience and good practice between the partner organisations. Further details about the ANSFR Project are presented in Chapter 2 of this handbook.

**The Theme of Environmental Fire Risk**

The Frederikssund-Halsnæs Workshop focused on the key project theme of environmental fire risk. Environmental fire risk is defined by the ANSFR Project as:

> **"The threat, danger or possibility of a fire being started within a rural[2] or rural-urban interface environment[3] as a result of accidental/deliberate human activities or as a result of natural phenomena, such as lightning strikes, volcanic eruptions etc."**

The following types of fires are included within the scope of the environmental fire risk theme: wildfires, grassland fires, heathland fires, moorland fires, forest fires, fires in coastal locations and fires on farmland. The category of environmental fire risk includes both fires started by human activities (deliberate and accidental causes) and those started as a result of natural causes/contributory factors. Experts from numerous organisations with knowledge and experience of fighting and preventing these types of fires were present at the Frederikssund-Halsnæs Workshop.

Additional handbooks will subsequently be produced to document the two remaining workshops to be held in Roma (Italy) and Kuopio (Finland). These workshops will focus on the topics of accidental fire risk and social fire risk respectively. The terms "accidental fire risk" and "social fire risk" are defined on page 18 of this handbook. The series of four

[1] For the sake of brevity, acronyms and abbreviations have been used throughout this handbook. A full list of acronyms, abbreviations and their meanings can be found in Appendix 1 on page 132.

[2] The term "rural environment" is defined by the ANSFR Project as: "Areas of a country with relatively low population densities. Rural environments are characterised by small human settlements (farms, villages etc.), and have few, if any, medium or large settlements (towns etc.)."

[3] The term "rural-urban interface environment" is defined by the ANSFR Project as: "The boundary area between a rural and urban environment." The ANSFR Project subsequently defines an "urban environment" as: "Areas of a country with relatively high population densities. Urban environments are characterised by large settlements (towns and cities)."

handbooks that will be produced during the ANSFR Project will provide a significant source of information concerning fire risk assessment and management. The material will be of interest and importance for all Fire and Rescue Services in Europe and other organisations involved in fire risk assessment and management.

**Structure of the Handbook**

This handbook is separated into seven chapters. The following chapter provides a summary of the ANSFR Project, including a description of the partners, aims, objectives and outputs that will be produced. Chapter three outlines the aim, objectives and outputs of the Frederikssund-Halsnæs Workshop. Chapter four then presents summaries on all of the plenary presentations that were delivered during the workshop. The following chapter then presents specific information about the group work session delivered during the workshop, making specific reference to the feedback and conclusions of this session. The subsequent chapter documents the two field visits that were incorporated into the workshop. The final chapter outlines the conclusions that were formed as a result of the workshop activities, making specific reference to the future activities and workshops that will be completed during the ANSFR Project.

# 2. ANSFR Project Summary

## 2.1 ANSFR Project Partners and Funding

The ANSFR Project will run between 1st January 2009 and 31st December 2010. The project will be coordinated and delivered by Northumberland Fire and Rescue Service[4] (UK) working in close partnership with Frederikssund-Halsnæs Fire and Rescue Department[5] (Denmark), Corpo Nazionale dei Vigili del Fuoco – Nucleo Investigativo Antincendi[6] (NIA) (Italy), the Emergency Services College[7] (Finland), Kanta-Häme Fire and Rescue Service[8] (Finland) and South West Finland Emergency Services[9] (Finland). The project is co-funded by the European Commission Directorate-General for Environment[10] under the Civil Protection Financial Instrument, 2008 call for proposals (Grant Number: 070401/2008/507848/SUB/A3).

**Northumberland Fire and Rescue Service** is the coordinating partner on the project. NFRS provides fire and rescue service cover to the County of Northumberland in North East England. The Northumberland Arson Task Force, a multi-agency department within NFRS, will be responsible for managing and delivering the ANSFR Project, although multiple departments will contribute to and benefit from the project.

**Frederikssund-Halsnæs Fire and Rescue Department** provides fire and rescue services to the municipalities of Frederikssund and Halsnæs in the centre of the island of Sealand (Sjæland), in Denmark. Frederikssund-Halsnæs is a municipal fire and rescue service and its activities, like all fire and rescue services in Denmark are overseen at the national level by the Ministry of Defence.

The **Corpo Nazionale dei Vigilii del Fuoco (CNVVF)** is the Italian Fire Fighters Corps within the Ministry of Interior in Italy. The CNVVF provides fire and rescue services to the country of Italy through various central and local sub-departments and divisions. NIA is the department that will be involved in delivering the ANSFR Project. Nucleo Investigativo Antincendi (NIA) is a department based in Rome within the central technical core of the Italian Fire Fighters Corps and is responsible for fire investigation and other related issues.

The **Emergency Services College** (ESC) is situated in Kuopio in central Finland and provides education, vocational training and further training to the Finnish Rescue Services. The ESC also provides courses and consultancy in preparedness training for disturbances in normal and emergency conditions, international emergencies and civil crisis management. The Research and Development Unit at the ESC will be responsible for coordinating the ESC's contribution to the ANSFR Project. ESC will be assisted by officers from Kanta-Häme Emergency Services and South West Finland Emergency Services.

[4] Website: http://www.northumberland.gov.uk/default.aspx?page=1304
[5] Website: http://www.fh-brand.dk/
[6] Website: http://www.vigilfuoco.it/
[7] Website: http://www.pelastusopisto.fi/
[8] Website: http://www.pelastuslaitos.fi/portal/fi/
[9] Website: http://www.turku.fi/Public/default.aspx?nodeid=8600
[10] Website: http://ec.europa.eu/environment/index_en.htm

## 2.2 ANSFR Project Aim, Objectives and Outputs

The key aim of the ANSFR project is to reduce the human, financial and environmental cost of fires in Europe. This will be achieved by developing innovative tools and techniques for European Fire and Rescue Services. These collaboratively developed tools will aid Fire and Rescue Services to identify, assess and manage fire risks and enable them to be better prepared to prevent and reduce the factors that can contribute to high levels of fire risk in their communities.

In order to achieve this aim, the project team have devised 5 key objectives and plan to produce four key deliverables. The five project objectives are to:

1. **Undertake a comparison of research techniques and tools used by the project partners;**
2. **Develop tools, techniques and procedures for an effective and innovative risk assessment framework capable of being implemented in all European Union Member States;**
3. **Create an innovative, secure access knowledge portal with document library;**
4. **Create and develop a multilingual training tool for fire risk assessment;**
5. **Draw upon, disseminate and implement best practice and expertise in fire prevention techniques and procedures, and fire risk assessment tools from Europe.**

The four key project deliverables are:

1. **Deliver four workshops, one to be hosted by each partner organisation;**
2. **Create an electronic web-based system that will facilitate the EU wide exchange of good practice in effective fire risk assessment and management;**
3. **Create an exemplary online web-based training tool for good practice methods in fire risk assessment and management;**
4. **Deliver a conference for practitioners from across Europe to promote and debate fire risk assessment and management practices.**

The four workshops and the project conference that will be delivered during the course of the ANSFR Project each have their own specific aims, objectives and anticipated outputs. The successful completion of these aims, objectives and outputs, in combination with the completion of the other key activities of the project such as the development of the web based system, will successively contribute towards the successful completion of the project aim, objective and outputs. The specific aim, objectives and anticipated outputs designed for the Frederikssund-Halsnæs Workshop are presented on page 22 of this handbook.

## 2.3 The Three Key Themes of the ANSFR Project

The ANSFR Project is divided into the three key themes of: accidental fire risk, environmental fire risk, and social fire risk. Each of the key themes has its own dedicated workshop. The three fire risk themes, as conceived within the ANSFR Project, are defined overleaf.

**Accidental Fire Risk:** "The threat, danger or possibility of a fire being started as a result of an accident and/or as a result of negligence[11] and/or as a result of lack of knowledge and awareness of common potential causes of fire."

**Environmental Fire Risk:** "The threat, danger or possibility of a fire being started within a rural or rural-urban interface environment as a result of accidental/deliberate human activities or as a result of natural phenomena, such as lightning strikes, volcanic eruptions etc."

**Social Fire Risk:** "The threat, danger or possibility of a fire being started as a result of arson and/or as a result of factors associated with, or factors contributing to, the "high risk lifestyle(s)"[12] of an individual or social group."

The three definitions were collaboratively developed by the ANSFR Partners during the early stages of the project and have been designed to be of relevance to all of the countries involved. There are obviously some overlaps concerning the theme areas. For instance, an accidental house fire (accidental fire risk) may occur within a house occupied by somebody with a high risk lifestyle (social fire risk). All of the partners are aware of these overlaps and none believe that this detracts from the usefulness of deploying the three categories to structure the project into three key work areas.

## 2.4 The ANSFR Project Workshops

One of the key outputs of the ANSFR Project is to design and deliver four workshops, each to be hosted by one of the project partners. As coordinating partners of the project, NFRS decided to host the first workshop in Northumberland. The first workshop provided a general introduction to the project and project themes. Workshop 2 was then themed on Environmental Fire Risk. The remaining workshops will be themed on Accidental Fire Risk and Social Fire Risk, respectively:

- **Workshop 3: Accidental Fire Risk**
- **Workshop 4: Social Fire Risk**

Workshops 2, 3 and 4 have/will involve the collaborative development of fire risk assessment and management guideline frameworks which can be adopted by the partners. These frameworks will later be shared with and promoted to other Fire and Rescue Services in Europe.

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[11] The term "negligence" is defined by the ANSFR Project as: "The trait of neglecting responsibilities and lacking concern and/or failure to act with the prudence that a reasonable person would exercise under the same circumstances."

[12] The term high risk lifestyle is divided into two different types of high risk lifestyle, based on a basic distinction between "choice" and "circumstance":

- The first type of high risk lifestyle is defined as: "Individuals/social groups who choose to engage in high risk lifestyles through regular participation in one or more activities that increase their risk of death, injury or ill health above the normal level of risk experienced by the wider population."
- The second type of high risk lifestyle is defined as: "Individuals/social groups who have not chosen to engage in a high risk lifestyle but who live a high risk lifestyle as a result of personal circumstances which may or may not be beyond their control. Individuals included within this category may be disadvantaged economically, socially, culturally, physically and/or mentally".

# 3. The Frederikssund-Halsnæs Workshop

## 3.1 Overview of the Frederikssund-Halsnæs Workshop

### The Location of the Workshop and Participants

The Frederikssund-Halsnæs Workshop was the second of four workshops to be delivered during the ANSFR Project. The event was organized and hosted by Frederikssund-Halsnæs Fire and Rescue Department, one of four partners working on the project. The workshop was held in Kulhuse near Jærgerspris. The venue was chosen as a suitable site because of its proximity to the town of Frederikssund and its proximity to Copenhagen International Airport. It also provided an ideal base for officers from Frederikssund-Halsnæs to provide delegates with a short tour highlighting some of the key social and environmental characteristics of the surrounding area.

All of the ANSFR Project partners were represented at the event. At least four individuals from each partner organisation were in attendance. All of the partners contributed to the event by delivering presentations and by participating and contributing to the other sessions of the workshop. Representatives from the Dänischen Generaldirektorat für Forst and Natur[13] (Danish Forest and Nature Agency) (Denmark), Monash Sustainability Institute[14] (Victoria, Australia), the Hellenic Fire Service[15] (Greece), and Firexpress[16] (Denmark) also attended and provided contributions to the event.

### Overview of the Municipality of Frederikssund-Halsnæs

Frederikssund-Halsnæs Fire and Rescue Department provides fire and rescue services to approximately 76,000 inhabitants living within a land area of 382 square miles. This area is governed by the municipalities of Frederikssund and Halsnæs. Frederikssund-Halsnæs Fire and Rescue Department has six fire stations, the locations of which are shown in Figure 2 (overleaf).

**Figure 1 – Map of Frederikssund and Halsnæs Municipalities**

Frederikssund Kommune[17] is a municipality with approximately 44,000 inhabitants. The municipality was formed in the amalgamation of the former municipalities of Slangerup, Skibby, Jægerspris and Frederikssund. Halsnæs Kommune[18] covers an area of approximately 120 km², and has a total population of approximately 30,800 (2008).

[13] Website: http://www.skovognatur.dk/International/
[14] Website: http://www.monash.edu/research/sustainability-institute/
[15] Website: http://www.fireservice.gr/pyr/site/home.csp
[16] Website: http://www.firexpress.com
[17] Kommune is Danish for "municipality".
[18] Halsnæs municipality was created on 1st January 2007 through a merger of the former municipalities of Frederiksværk and Hundested. At first the new municipality was referred to as Frederiksværk-Hundested, but its name was changed to Halsnæs Kommune on 1st January 2008.

**Figure 2 – Fire Stations within the Municipalities of Frederikssund and Halsnæs[19]**


[19] Key to Figure 1: The four fire stations in the municipality of Frederikssund are shown as red triangles (Frederikssund, Slangerup, Skibby, and Jægerspris), and the two fire stations in the municipality of Halsnæs are shown as green triangles (Frederiksværk and Hundested).

Frederikssund, the largest town in Frederikssund-Halsnæs, is approximately 50 km north-west of Copenhagen, the Capital City of Denmark. Both Frederikssund and Halsnæs municipalities are located within the Region Hovedstaden[20] (Capital Region). The Region Hovedstaden is an administrative region that was established on 1st January 2007 as part of the 2007 Danish Municipal Reform. This reform replaced the traditional counties in Denmark with five larger administrative regions. At the same time, a number of smaller municipalities were merged into larger units, cutting the total number of municipalities in Denmark from 271 to 98. The Region Hovedstaden provides healthcare mental healthcare, regional development and research for a population of 1.6 million people (approximately 30% of the population of Denmark).

The Frederikssund-Halsnæs area has a diverse natural landscape encompassing fjords, rivers, lakes, farmland, beaches, dunes, forest, meadows and heathland. The low hills on which Frederikssund and Halsnæs are situated were formed from moraines that were deposited during the last Ice Age. These moraines have created very fertile land that is used for mixed farming with an emphasis on cereals, root crops and pigs.

The natural landscape of the area is also a strong asset for tourism, with Frederikssund-Halsnæs a major coastal holiday resort attracting tourists from Denmark and abroad. The area has a large number of houses owned by second home owners who stay in these homes during the summer months and holiday seasons and live elsewhere during other months of the year. Several cultural attractions attract day-trippers and those visiting Denmark's fjord country, including the outdoor Viking Settlement museum[21] in Frederikssund and the house of Arctic explorer Knud Rasmussen on the high north-facing cliffs of Hundested[22].

**Figure 3 – The Frederikssund-Halsnæs Coastline**

[20] Website: http://www.regionh.dk/menu/sundhedOghospitaler/

[21] The museum has free admission and includes five pit houses, a long house and a planked oak pathway leading to a wooden jetty. The pit houses are small houses with the floor below ground level. It is thought that these houses were probably used by the Vikings as workshops or temporary dwellings. Frederikssund-Halsnæs's Viking heritage is further celebrated during the annual Viking plays that are performed by amateur actors on an open-air stage near the Viking Settlement.

[22] Knud John Victor Rasmussen was an explorer and anthropologist who was born in Ilulissat, Greenland in 1879. Rasmussen spent his early years living in Greenland, where he learnt to speak the Greenlandic language. In later years, he was educated in Denmark and spent his adult life sharing time between Greenland and Denmark. He spent time in his house in Hundestad planning for his expeditions in Greenland, Canada and Alaska. The house is now a museum that documents his life and is a very popular tourist attraction.

## 3.2 The Aims, Learning Objectives and Outputs of the Frederikssund-Halsnæs Workshop

The workshop was designed so as to promote the exchange of information and ideas, and to enable the development of a closer working relationship between the officers working on the project from the four partner organisations. With this in mind, the following aim was devised:

> **"The aim of the workshop is for participants to develop a good understanding of the environmental fire risk assessment and management practices currently adopted by the partner organisations and to discuss and debate potential synergies and improvements to these practices for effective use in all project countries."**

The focus of the workshop was to share knowledge and experience of all those present and collectively devise improved techniques and strategies for reducing environmental fire risk. The project team decided that five learning objectives would need to be satisfied in order to successfully achieve the central aim of the workshop[23]. The five learning objectives for the Northumberland workshop stated that all participants attending would:

1. Demonstrate an understanding of the environmental fire risk assessment and management practices currently adopted by the project partners and other invited organisations.
2. Describe and explain the environmental fire risks and challenges that currently face the project partners and project countries (Denmark, Finland, Italy and the United Kingdom).
3. Demonstrate an understanding of some of the national priorities and strategies for environmental fire risk assessment and management and the prevention of environmental fires in the project countries.
4. Demonstrate an awareness and appreciation of examples of good practice in environmental fire risk assessment and management from the project countries.
5. Share examples of good practice in prevention of environmental fires from the project countries.

In addition to satisfying the four learning objectives, the workshop would be evaluated in terms of the production of three key outputs:

1. A list of names and contact details of all individuals participating in the workshop.
2. A handbook documenting the sessions delivered and the specific findings/conclusions of each session.
3. At least three guideline frameworks for the assessment, management and prevention of particular types of environmental fire risk.

[23] The development of learning objectives, as opposed to simply objectives, is deliberate on the part of the project team. The key reason is that all of the ANSFR Workshops will be viewed as a learning exercise. All of the partners will attend the workshops to share and to learn from one another. The learning process will involve learning the processes and techniques that have been both successful and unsuccessful in particular circumstances. The partners will then be able to collaboratively devise improved synergetic frameworks that take into account the knowledge and experiences that have been exchanged.

## 3.3 The Workshop Agenda

The workshop agenda was designed to provide an open forum for the delegates in attendance to exchange ideas, knowledge and experiences regarding environmental fire risk identification, assessment and management. Following from the successful design of the first ANSFR Project Workshop, it was decided that the agenda would include plenary presentation sessions and small interactive group work sessions. The full detailed workshop agenda can be viewed in Appendix 2.

The next section of this handbook now summarises the plenary presentations that were delivered during the Workshop.

# 4. Plenary Presentations

All of the partner organisations contributed to the plenary sessions of the Frederikssund-Halsnæs workshop by delivering at least one presentation. A number of organisations outside of the project team were also invited to deliver presentations based upon their experiences and practices.

The following presentations were delivered during the workshop:

- Official Welcome and Opening Presentation by the Mayor of the Municipality of Frederikssund
- “The ANSFR Project and Workshop 2” – presentation by Northumberland Fire and Rescue Service
- “Forest Fires In Italy” - presentation by Corpo Nazionale dei Vigili del Fuoco (Italy)
- “Natural Fire Risk in Finland” - presentation by the Emergency Services College (Finland)
- “Preventing Forest Fires and Wildfires in Finland” – presentation by the Emergency Services College (Finland)
- “Fighting Wildfires in Finland” - presentation by Kanta-Häme Emergency Services (Finland)
- Fighting Wildfires in the Archipelago of South West Finland” - presentation by South West Finland Emergency Services (Finland)
- “Wildfire in Northumberland and the UK” – presentation by Northumberland Fire and Rescue Service.
- “Northumberland Fire and Rescue Service Wildfire Prediction System” – presentation by Northumberland Fire and Rescue Service.
- “The Northumberland Fire Group” – presentation by Northumberland Fire and Rescue Service.
- “Arson and Bushfires in Australia” - presentation by Monash Sustainability Institute, Victoria (Australia)
- “Management of Forest Fires in Greece” - presentation by the Hellenic Fire Service (Greece)

All of the presentations were extremely interesting and informative and the information presented formed the basis for many productive discussions over the course of the workshop. The informal nature of the workshop allowed delegates to ask questions during the presentations and to discuss any emergent issues as they were identified.

The following sub-sections now present summaries of each of the individual presentations delivered at the workshop, beginning with the official welcome by the Mayor of Frederikssund.

## 4.1 Official Welcome and Opening Presentation by the Mayor of the Municipality of Frederikssund

This presentation was delivered by Ole Find Jensen, Mayor of the Municipality of Frederikssund and Chairman of Frederikssund-Halsnæs Fire and Rescue Service.

**English translation**

As Mayor of Frederikssund Municipality and chairman of Frederikssund-Halsnæs Fire & Rescue, I would like to welcome the participants to this exciting workshop.

I am pleased that our organisation for emergency preparedness is participating actively in developing work experience in this field, including work across national borders. Prevention of fires and accidents is a vital task. All organizations for Fire & Rescue services must work more focused with these prevention measures, so that we can avoid the loss of values and in worst case - loss of life. Therefore, it is also important that Frederikssund-Halsnæs Fire & rescue is a part in this work and learns from collaborators, and also distributes the experience we have created ourselves. It is important that we use each other's knowledge and experience when we work with fire prevention, and I know that this type of network is very rewarding.

I understand you have been visiting Knud Rasmussen's house yesterday and I hope the visit has been rewarding, and that you have learned a little about this great Danish Greenland pioneer. Knud Rasmussen was in his time, pioneer and explorer, and therefore a brilliant example of the importance of work outside the local borders, and how foreign language can provide great knowledge, which can subsequently be used in one's own work.

I hope that the participation of Frederikssund Fire & Rescue Emergency in this European collaboration, in the same way as the work of Knud Rasmussen, can provide knowledge and experience which may come to the benefit of society and individual citizens - whether this be in Italy, in Finland, England, Greece, Australia or Denmark.

I see from the program that there awaits you some exciting days, where you can get plenty of time to exchange experiences and work procedures with each other. The program includes a trip to the woods, where you must take a closer look at local plans for fire prevention and firefighting, and the special equipment that we use in Frederikssund/Halsnæs.

Once again I will welcome you all to Frederikssund, and this beautiful area, and give the floor to Kim for the presentation of the further work program.

Welcome

FREDERIKSSUND
KOMMUNE

**Dansk oversættelse**

Som Borgmester i Frederikssund Kommune og formand for Frederikssund-Halsnæs Brand & Redningsberedskab vil jeg gerne byde deltagerne velkommen til denne spændende workshop.

Jeg er glad for at vort beredskab aktivt deltager i arbejdet med erfaringsudveksling, også på tværs af landegrænser. Forebyggelse af brande og ulykker er et essentielt spørgsmål som beredskaberne skal arbejde mere koncentreret og målbart med, således vi undgår tab af værdier og i værste fald tab af menneskeliv. Derfor er det også vigtigt at Frederikssund-Halsnæs Brand- & Redningsberedskab indgår aktivt i dette arbejde og høster erfaringer fra samarbejdspartnere, ligesom vi gerne uddeler de erfaringer vi har skabt os. Det er vigtigt, at vi benytter hinandens viden og erfaringer, når vi arbejder med brandforebyggelse, og denne form for netværk er derfor meget givtigt.

Jeg kan forstå I har været på besøg i Knud Rasmussen s hus i går, og jeg håber besøget har været godt, og I har lært lidt om denne store danske grønlandsforsker. Knud Rasmussen var sin tids pioner og udforsker, og derfor et godt eksempel på at arbejde uden for grænser og ens eget sprog kan give stor viden og store resultater, som efterfølgende kan benyttes i arbejdet

Jeg håber at Frederikssund Brand- & Redningsberedskabs deltagelse i dette europæiske samarbejde på samme måde kan give viden og erfaringer som kan komme samfundet og den enkelte borger til gode, hvad enten det er i Italien, Finland, England, Grækenland, Australien eller Danmark.

Jeg kan se af programmet, at der venter Jer nogle spændende dage, hvor i dels får masser af tid til at udveksle erfaringer og arbejde med hinanden. I skal bl.a. en tur i skoven og se lidt nærmere på de lokale planer, der er for brandforebyggelse og brandbekæmpelse samt det specialudstyr vi råder over.

Jeg vil der igen byde velkommen til Frederikssund og disse skønne omgivelser og give ordet til Kim for det videre arbejde.

Velkommen

FREDERIKSSUND
KOMMUNE

## 4.2 The ANSFR Project and Workshop 2 – Frederikssund-Halsnæs (Denmark)

This presentation was delivered by ANSFR Project Manager Dr. Robert Stacey, Northumberland Fire and Rescue Service (UK)

Robert delivered a presentation that provided a summary of the ANSFR Project. He summarised the funding sources and project partners of ANSFR, the aim, objectives and projected outputs of ANSFR, and the specific aims and objectives devised for the Frederikssund-Halsnæs Workshop. Robert also provided the partners with a progress report concerning key project tasks to date.

**ANSFR Project partners, aims, objectives and outputs**
The information regarding this topic has already been presented earlier in this report (on pages 16 and 17) and, consequently, will not be discussed again here.

**The need for the ANSFR Project**
Robert provided delegates with a brief instruction on the need(s) identified for the ANSFR Project. Robert began by emphasising that, traditionally all fire and rescue services around the world have been reactive, and to a degree remain a reactive emergency service. All fire and rescue services were initially created to fulfil the primary function of responding to fires and other emergencies as they occurred. Once an emergency situation was attended and all necessary fire fighting and/or rescue actions had been completed, fire and rescue personnel would then return to their base and await a call to attend the next emergency incident.

During the last decade, there has been an expansion of the responsibilities of fire and rescue services in the UK and other countries in Europe and across the world. As a consequence, many fire and rescue services are now both reactive and proactive. In the UK, this change in approach was implemented through the creation of new legislation, in the form of the Fire and Rescue Services Act 2004[24], although many UK Fire and Rescue Services were already devising and delivering fire prevention strategies and initiatives. Respective changes have also been driven in other European countries through legislative change (for instance, see presentation by CNVVF-NIA on page 33 of this handbook).

Responding to emergency incidents is still a key activity undertaken by the fire and rescue services in the UK and Europe; however, many are now involved, either through choice or as a result of legislative requirements, in a significant volume of work aimed at preventing and reducing the number of emergencies that occur within their localities. Central to this idea of fire prevention is the idea that fire and rescue services must identify, quantify, and assess fire risks. They must then use this information to manage fire risk and, thus, reduce and prevent fires occurring. The basic theory underpinning this change in approach is that "prevention is better than cure".

[24] The Fire and Rescue Services Act 2004 replaced the Fire Services Act 1947. The Act achieved Royal Assent in July 2004 and came into force on 1st October 2004. According to Communities and Local Government the Act "puts the prevention of fires at the heart of the legislation by, for example, creating a new duty to promote fire safety and by providing flexibility for fire and rescue authorities to work with others in the community to carry out this duty" (Source: http://www.communities.gov.uk/fire/firesafety/fire/) . A full copy of the provisions of the Act can be viewed at the following website: http://www.opsi.gov.uk/Acts/acts2004/ukpga_20040021_en_1

The ANSFR team identified that all of the project partners were delivering fire risk identification, assessment and management work but that there was little or no European cross-border exchange of information on effective practice. The ANSFR Project was therefore designed to facilitate the exchange of detailed information on fire risk identification, analysis and management practices between the partners. This information will be collated and developed into resources of relevance and importance to Fire and Rescue Services across Europe. ANSFR has the potential to provide a stimulus for more frequent and sustained cross-border communication in this field.

**ANSFR Fire Risk Categories**

The ANSFR Project is divided into three key strands of fire risk: accidental fire risk; natural fire risk; social fire risk. These three categories were developed arbitrarily during the planning stage in order to divide the project into three manageable focus areas. The category of "natural fire risk" has subsequently been renamed as "environmental fire risk"[25]. A diagram presenting the three key categories of fire risk, and their subsequent sub-categories, has been devised by the project partners and is presented in Figure 4 (below). A more detailed distinction between the three categories is provided in Figure 5 (overleaf).

**Figure 4 – Key Fire Risk Categories for use during the ANSFR Project**


[25] This decision was decided through unanimous agreement by the project partners during the Northumberland workshop. The term "environmental fire risk" was deemed to be more appropriate because it was more inclusive of all of the types of fires and risks that were included within this category, including both those caused by natural phenomena and those caused by human actions.

The project team have also devised extensive lists of the "Potential Causes/Contributory Factors for Accidental, Environmental and Social Fires" (see Appendix 3), "Potential Location Types for Accidental, Environmental and Social Fires" (see Appendix 4) and "Social Groups "At Risk" of Experiencing/Causing Accidental, Environmental and Social Fires" (see Appendix 5). These lists accompany and compliment Figure 4. The benefit of the partners collaboratively creating these lists is that they form a useful reference point for some, if not most, of the important factors that influence fire risk in Europe. Fire risk identification, assessment and management strategies must incorporate a good understanding of the key characteristics and factors that influence fire risk. This includes an understanding of both those factors that increase fire risk and those factors that can decrease and perhaps protect against fire risk. Without this comprehensive understanding, practitioners cannot develop an effective approach to reducing fire risk. While the lists in themselves will not reduce fire risk, they provide a useful reference point for the project partners and for all practitioners involved in fire risk reduction.

**Figure 5 – Distinction between the Three Key Categories of Fire Risk used during the ANSFR Project**

## Accidental Fire Risk

- Fires as a result of accidents, negligence, lack of awareness
- Is separated into five sub-categories based on location types, including: Domestic, commercial, industrial, public buildings, transport

## Environmental Fire Risk

- Fires occurring within natural/rural environments
- Including: wildfires, grassland fires, heathland fires, moorland fires, forest fires, fires in coastal locations and fires on farmland
- Including fires of human (deliberate/accidental cause and natural causes/contributory factors

## Social Fire Risk

- Arson/fire crime (deliberately set fires)
- Social groups at greatest risk of experiencing a fire, either as a perpetrator or a victim of fire
- This category includes a focus on vulnerable social groups (the elderly, young people, mentally and physically impaired) and specific social groups engaging in more "risky lifestyles".

As will be obvious to all practitioners in this field, there is scope for a significant degree of overlap between the three key fire risk categories. For example, a deliberately set wildfire could be classified as both an environmental fire and a social fire. As a further example, an accidentally started wildfire could be classified as both an accidental fire and an environmental fire. As was mentioned previously, the categories have been arbitrarily created to divide the project into three independent yet closely interrelated and interlinked themes. Some of the project findings developed through the individual fire risk categories may consequently be relevant and applicable to one or more of the other categories. The fact that there may be overlaps does not reduce the value of using this diagram and distinction for organising the activities of the ANSFR Project.

**ANSFR Project Key Task Progress Update**

Robert provided the delegates with a brief progress report regarding the ANSFR Project. The key tasks that were discussed were:

### a) Interim progress reports

Robert informed the partners that the first of the two interim progress reports to be submitted over the life of the ANSFR Project had been accepted by the European Commission Directorate-General Environment, Civil Protection Unit. Robert thanked the partners for their contributions to the report and reiterated that the next interim progress report should be submitted before 1st April 2010.

### b) Publicity and promotion of the project

A key element of the ANSFR Project grant agreement is the dissemination of the project work and findings to a European audience. In essence, the ANSFR Project must have significant European-added value. Robert summarised that the project team were already working towards achieving this aim by producing informative articles about the project and submitting these for publication in relevant fire magazines. As of 28th September 2009, two articles had been published in magazines: one in the UK and one in the Republic of Ireland. In addition, CNVVF-NIA had published an article about the project on their website and the other partners were taking steps to upload information about the project onto their websites. Finally, a copy of the Northumberland Workshop Handbook had been uploaded onto the ANSFR webpage on the Northumberland County Council website. Robert requested that all partners continue to publicise the project through their websites and that they especially consider uploading important project documents onto their sites. Robert also requested that partners provide him and the other partners with copies of all articles published on the project for record keeping purposes.

### c) Project partners collecting relevant documents

Robert reminded the partners that an ongoing task to be completed by all partners throughout the duration of the ANSFR Project is to collect fire risk assessment and management documents from their country. The documents collected by the partners will be shared during the project workshops and at other intervals. In addition, some of the documents collected will be uploaded onto the proposed web-based system so that Fire and Rescue practitioners across Europe can view them for reference purposes.

### d) Internet-based web system

Robert informed delegates that NFRS had developed a detailed specification document to send to prospective suppliers in order to gather quotes for the design and implementation of the system. The basic design for the system will include publicly accessible areas of the site and more secure areas of the site that are only visible to registered individuals. The desired system will allow administrators from one or all of the partner organisations to be

able to upload documents and edit content of the site. Robert sent a copy of the full draft specification to all partners immediately after the Frederikssund-Halsnæs workshop and gathered their opinions/suggestions regarding any required modifications. Once all suggested amendments had been considered and, where appropriate, had been integrated into the specification document, Robert sent the finalised specification document to three prospective suppliers. Robert is currently awaiting the proposals and quotations from these suppliers.

Robert reminded the partners that a key goal is to create a working web system by April 2010. This deadline will ensure that partners have sufficient time to upload documents and other material to the site prior to presentation of parts of the system to a European audience at the ANSFR Project Conference in the summer of 2010. The ANSFR Conference represents an excellent opportunity for the project team to gather feedback on the system and to use this feedback to implement any improvements that may be required prior to the completion of the ANSFR Project on 31st December 2010.

### e) Fire risk definitions exercise

During the first ANSFR Project Workshop held in Northumberland, the project partners began an exercise related to defining fire risk and other terms within the fields of fire risk identification, assessment and management. It became apparent during the Northumberland Workshop that the partners were aware of multiple definitions of risk and terms associated with risk and it was decided that all partners would identify and collect a number of definitions they use within their organisation for fire risk assessment and management. It was decided that Robert would collate all of the definitions and produce a summary document allowing comparison of the definitions used by the project partners/countries. Robert reminded partners that they must submit their definitions by 31st October 2009 to provide sufficient time for collation of the results for the third ANSFR Project Workshop in Roma (Italy).

**Workshop 1 – Northumberland**

The Northumberland Workshop was the first of the four ANSFR Workshops. The event was organised and hosted by Northumberland Fire and Rescue Service, the coordinating partner on the ANSFR Project. The event represented the first opportunity that all of the ANSFR Partners had met face-to-face to work on the project. Consequently, the workshop was designed so that all of the partners could provide a general introduction to their organisation and present some generic information regarding their current approaches to fire risk identification, assessment and management. The event was also designed to include some team building exercises in order to aid the development of a good work relationship between the partners.

The post-event evaluation process concluded that the Northumberland Workshop successfully delivered all of its desired outputs and achieved all of its learning objectives and, consequently, achieved its key aim. It was concluded that those who attended the workshop had gained a good understanding of:

- Fire risk assessment and management practices currently adopted by the project partners.
- Specific fire risks and challenges facing the project partners.
- Some of the national priorities and strategies within the project countries.
- Examples of best/good practice from the project countries.

It was decided by NFRS that the design and implementation of the Northumberland Workshop provided a good template for the design and delivery of future ANSFR Project workshops, and also for future European workshops on other fire-related topics. Delegates in attendance at the Northumberland Workshop were particularly positive about the fire risks tour of South East Northumberland and the small group working exercises. As a result, the project manager has suggested that, where possible, these elements are included within ANSFR Workshops 2, 3 and 4.

For further information regarding the Northumberland Workshop, please download a copy of the Northumberland Handbook from the following website:
http://www.northumberland.gov.uk/default.aspx?page=5596

**Workshop 2 – Frederikssund-Halsnæs**

The aims, learning objectives and desired outputs for the Frederikssund-Halsnæs Workshop were devised to be more specific than those of Workshop 1, with the aim being that Workshops 2, 3 and 4 would build upon the generic information presented and discussed in Northumberland and focus more specifically on one of the three fire risk categories used to structure ANSFR Project work: accidental fire risk; environmental fire risk; and social fire risk. It was decided in Northumberland that Workshop 2 in Frederikssund-Halsnæs would focus on “Environmental Fire Risk”. The actual aims, learning objectives and desired outputs devised for Workshop 2 are presented on page 22 of this Handbook.

## 4.3 Forest Fires in Italy

This presentation was written and delivered by Cristina D'Angelo, Fabio Giovinazzo[26], Fabio Alaimo Ponziani, Luca Ponticelli, Saverio La Mendola and Biancamaria Cristini of Corpo Nazionale dei Vigili del Fuoco[27].

**The Italian System for Fighting Forest Fires**
The presentation began by explaining that according to Italian Law 353/2000, every region in Italy has its own permanent operative room called Sala Operativa Unificata Permanente[28] (SOUP). The SOUP coordinates the fighting of forest fires and can request the intervention of:

- Fire fighters
- Forest rangers (Corpo Forestale dello Stato)
- Volunteers
- The Police (Arma dei Carabinieri[29]; Polizia dello Stato[30]; Polizia Muncipale[31])
- The Army
- Airplanes (by Centro Operativo Aereo Unificato[32] - COAU)

However, if a forest fire involves anthropic activities, then only fire fighters have the responsibility for the intervention. A fire of this type is called an "interface fire" because it occurs within the interface between forest and human activities/settlements.

**Forest Fires in Italy – a National and Regional Perspective**
Statistics on forest fires were presented to the group. According to the Corpo Forestale dello Stato (the Italian State Forestry Service), there were a total of 5,868 forest fires in Italy in 2008, but the number of forest fires per region varied significantly. As Figure 6 shows (overleaf), there were just 2 recorded forest fires in Trentino Aito Adige in the North, but there were 903 forest fires in Campania in the South.

Each forest fire that occurred in 2008 burned on average 76,000 square metres of land. In Sicily the average was significantly higher than the national average: each fire burned on average 215,000 square metres. According to the basic statistics, forest fires are a significant problem in Italy and, when these fires encroach upon the urban-rural interface can be a significant problem for the CNVVF.

Statistics are gathered each year in Italy on the number of forest fires that occur. 2007 was a particularly bad year with regards to wildfires (see Figure 7, overleaf), as was the case in many other countries in the Mediterranean region.

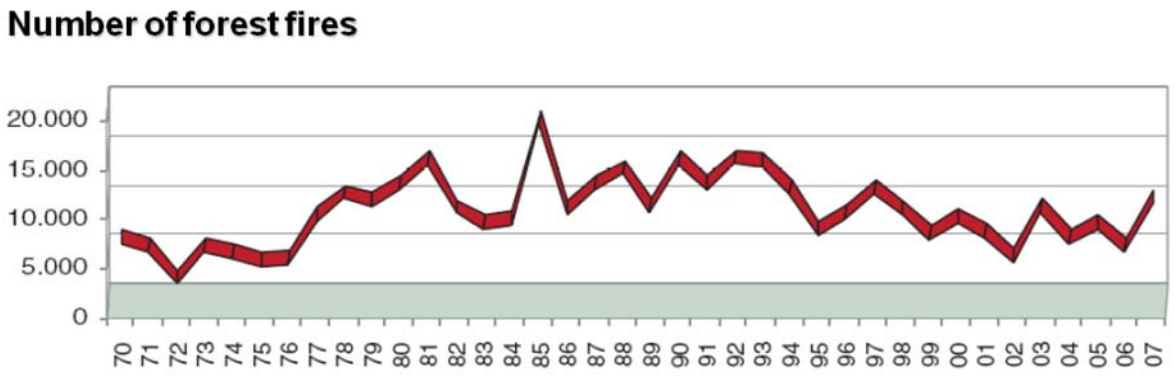
[26] Vigili del Fuoco Regione Valle D'Aosta, in North West Italy.
[27] NIA is the department which has overall responsibility for administering CNVVF's contribution to the ANSFR Project, although a number of other departments have been involved in various aspects of the ANSFR Project, including the design and delivery of the presentation outlined in this section.
[28] English translation: Permanent Unified Operations Room.
[29] Website: http://www.carabinieri.it/Internet/Multilingua/EN/default.htm
[30] Website: http://poliziadistato.it/
[31] Website: http://www.poliziamunicipale.it/aree/home.aspx
[32] English translation: Unified Flight Operations Centre.

## Figure 6 – Forest Fires in Italy in 2008[33]


**Key to Italian Regions**

| Region | No. of Forest Fires |
|---|---|
| Abruzzo | 77 |
| Basilicata | 331 |
| Calabria | 800 |
| Campania | 903 |
| Emilia Romagna | 103 |
| Friuli Venezia Giulia | 60 |
| Lazio | 280 |
| Liguria | 323 |
| Lombardia | 125 |
| Marche | 56 |
| Molise | 132 |
| Picmonte | 213 |
| Puglia | 536 |
| Sardegna | 723 |
| Sicilia | 549 |
| Toscana | 498 |
| Trentino Aito Adige | 2 |
| Umbria | 113 |
| Valle D'Aosta | 10 |
| Veneto | 34 |

## Figure 7 - Total Number of Forest Fires Recorded in Italy 1970 - 2007[34]




[33] Source: Corpo Forestale Dello Stato – http://www3.corpoforestale.it
[34] Source: Corpo Forestale Dello Stato – http://www3.corpoforestale.it

**Factors Affecting Forest Fires**
There are three main factors that affect forest fires:

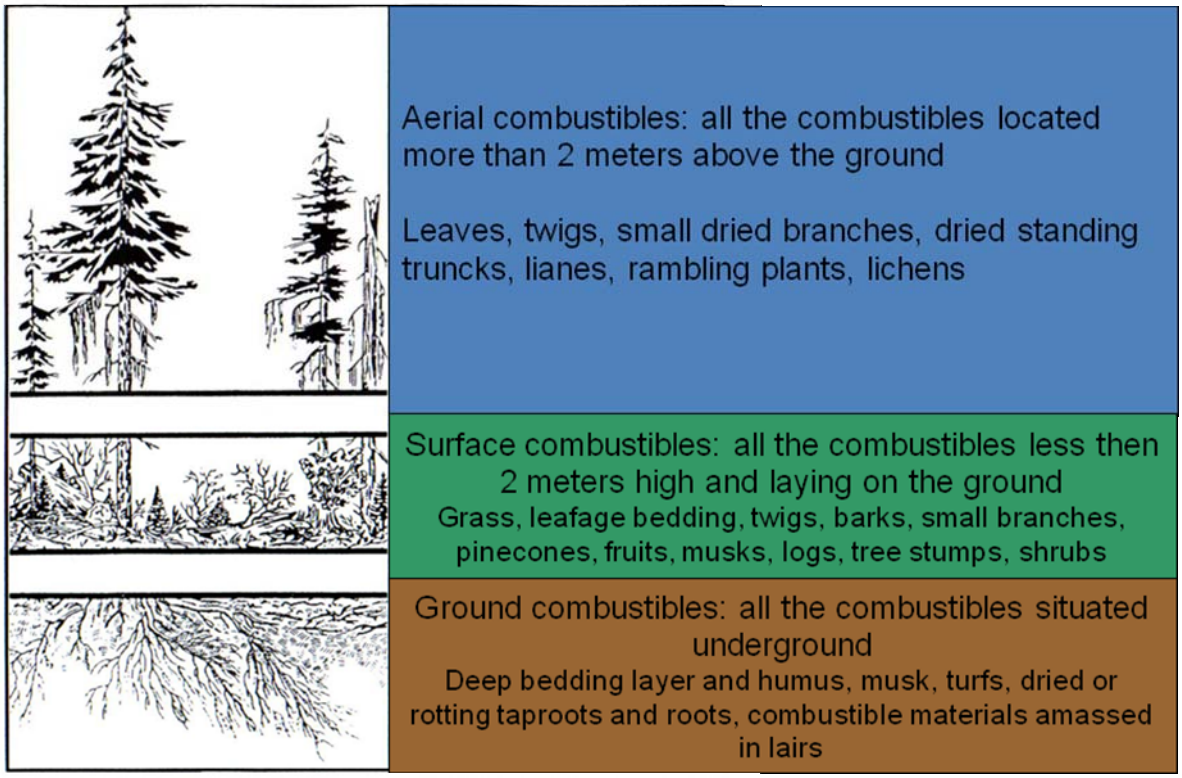
- Vegetative combustibles
- Meteorological and orographic/topological elements
- Forest fire behaviour

These key factors were all described in turn.

Firstly, it was explained that the vertical distribution of vegetation can affect and influence forest fires. Delegates were shown a diagram to illustrate the three different levels of vegetation that occur within forests and the characteristics of the combustibles present in each layer (see Figure 8, below). The vegetation layers present in a particular area will have an influence on the development and progression of a forest fire.

Secondly, it was illustrated how humidity can influence forest fire behaviour. Delegates were shown a table illustrating how humidity can influence ignition and combustion conditions (see Table 1 overleaf). In addition to humidity, wind is another meteorological factor influencing forest fire behaviour. This point was further developed and discussed in Steve Gibson and Ian Long's presentation on the Wildfire Prediction System used by NFRS (see pages 72-74), and during other sessions of the workshop.

**Figure 8 – Vertical Distribution of Vegetation**




**Disegno tratto da "Introduction to Wildland Fire Behavior, S 190" NWCG.**

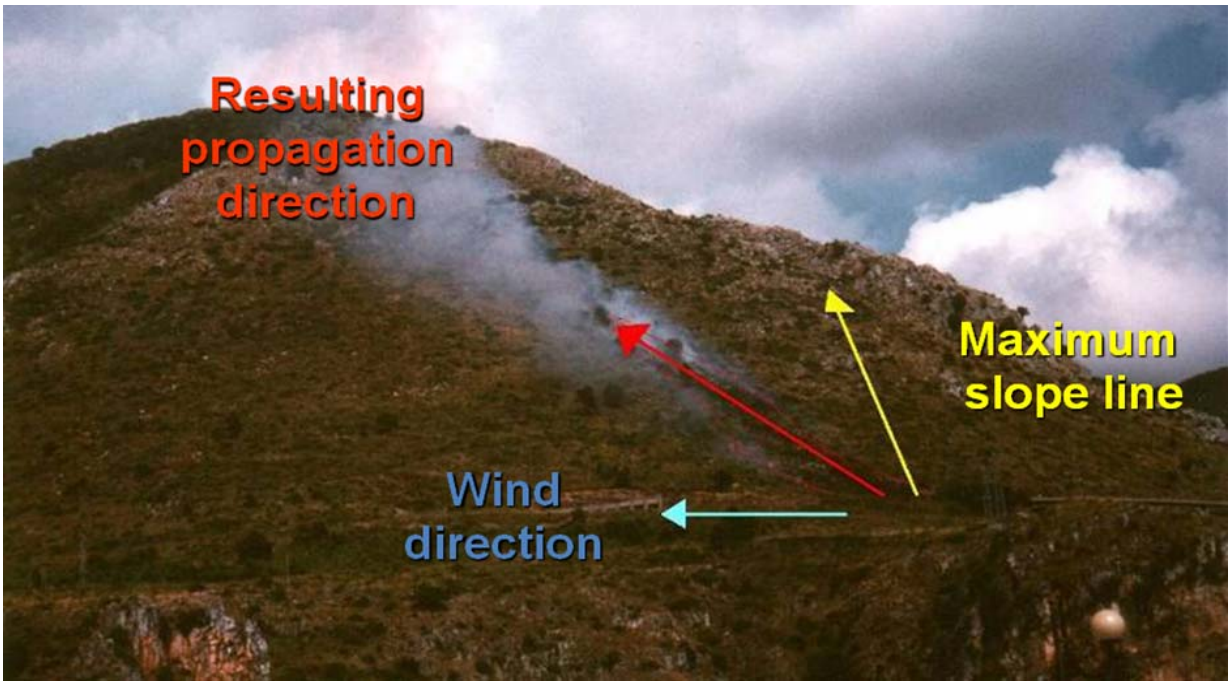
The influence of orographic/topological features were also explained, including the significance of slope in the development of forest fires. In basic terms, fire will burn more easily, and consequently more quickly, uphill than it will downhill and the steeper the slope the greater the propagation of the fire.

Ground slopes influence fire in a similar way to wind, however, their influence is more constant. It is important, however, not to look at factors in isolation as this would mean neglecting how slope and wind can interact to significantly influence the development of a forest fire. For instance, by identifying the maximum slope line and the wind direction, the most likely direction of propagation can be estimated. Predicting the future direction of a forest fire is of key importance for fire fighters trying to safely bring the fire under control and for other authorities who may need to evacuate people from areas that may be threatened by the advance of a forest fire.

**Table 1 – Humidity and Forest Fire behaviour**

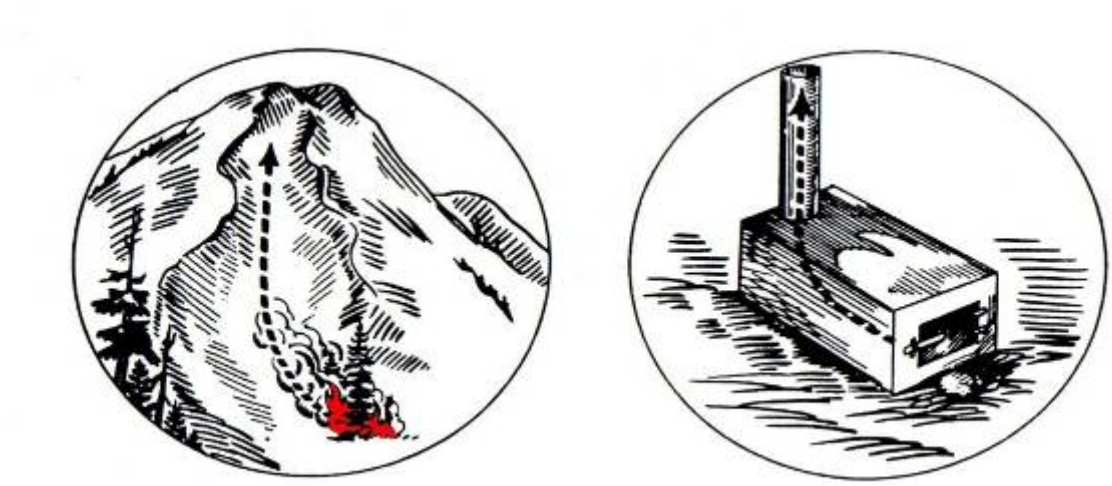
| Relative air humidity | Rapid combustibles water content | Bedding water content | Combustion conditions and possible fire behaviour |
|---|---|---|---|
| **> 60** | **> 15** | **> 20** | Very limited ignitions. Possible limited spotting events with wind higher than 16 km/h. |
| **60 - 45** | **15 - 12** | **19 - 15** | Low ignition risk. Free fires are dangerous. Embers can ignite with rel. hum.< 50%. |
| **45 - 30** | **12 - 10** | **14 - 11** | Medium ignition risk. Small free flames are dangerous. The condition for a complete combustion are present. |
| **40 - 26** | **10 - 7** | **10 - 8** | High ignition risk. Sporadic foliage passages. Possible *spotting* caused by wind gusts or turbulence. Hazard still moderate. |
| **30 - 15** | **7 - 5** | **7 - 5** | Ignitions and quick growth phases. Foliage fire (also extended). Each wind increase can cause spotting, also on long intervals. High Hazard with possible loss of control. |
| **< 15** | **< 5** | **< 5** | Every combustible is hazardous. Frequent *spotting* and possible extreme fire behaviours. Hazard condition extremely critical. |

**Figure 9 – The interaction between slope and wind in development of a forest fire**




In the more mountainous regions of Italy a chimney stack effect can sometimes be observed during forest fires. This effect occurs when forest fires start burning below a hill or mountain. Through radiative heat flux and convective heat flux, the steep slopes surrounding the fire very quickly catch fire which leads to the rapid advance of the fire and a chimney stack type plume of fire and smoke, as shown in Figure 10 (below). The effect can be especially severe and rapid if wind direction and speed interact to provide favourable conditions for forest fire development.

**Figure 10 – Illustration of the Chimney Stack Effect**



**Fire Typologies**
It was explained that in Italy three main typologies are used for forest fires:

- Underground fire
- Skimming fire
- Treetop (leafage) fire

Underground fires affect ground combustibles, in particular the deepest and most decomposed bedding part, as well as the humus or turf layers. In some cases it concerns dried or marcescent roots. When an underground fire also burns at the ground surface it can be easily detected, but when it propagates at depth it can be practically invisible even after careful inspection. As Figure 11 (right) shows, underground fires can be invisible to those at the ground surface and can burn and surface in different locations at different times (dependent upon the combustible materials and other influencing factors such as slope), which makes them a challenge to extinguish. This type of fire is quite unique in the sense that often the only physical indication of the fire for those on the ground surface is that they may be able to see smoke rising through the ground and perhaps feel some heat.

**Figure 11 – An Underground Fire**

Skimming bedding fires involve all of the dead surface combustibles which comprise bedding (normally present in woodland areas). If present, other kinds of combustible can be sporadicly involved (for instance, grass, suffritices etc.). The bedding composition and the factors affecting the propagation of flames are decisive in characterising the fire front. Skimming bedding fires usually have a uniform fire front, although this is dependent upon the distribution of combustibles.

**Figure 12 – Skimming Chestnut Bedding Fire**

**Figure 13 – Skimming Herbaceous Layer Fire**

The third type of fire, treetop fire, involves aerial combustibles such as leaves, small dried branches, creepers, lichens etc. Treetop fires can vary dependent upon wood type, combustible characteristics, density, and on propagation conditions (wind, slope). Treetop fires can be further divided into three categories:

- Passive
- Active
- Independent

Further information about each of these types of treetop fires is presented in Table 2 (overleaf).

**Spotting**

Spotting is a phenomenon that occurs when organic ignited material (grasses, shrubs, trees etc.) becomes seperated, is carried through the air, and lands at variable distance fromthe original fire thus igniting new (secondary) fires. Fires started through spotting can be particularly dangerous for firefighterrs fighting a wildfire as the ignited material may be carried over their head and land behind them, thus starting a secondary fire behind them and possibly reducing their escape route options.

Spotting usually occurs in cases of skimming fire fronts with an intensity of more than 2000 kw/m or during treetop fires. Both short distance and long distance spotting can occur. Long distance spotting can occur if ignited material lifted into the air via a convective column, is then carried by high altitude winds and is then displaced some distance away from the original fire.

**Typical Strategies and Interventions for Forest Fires/Wildfires**

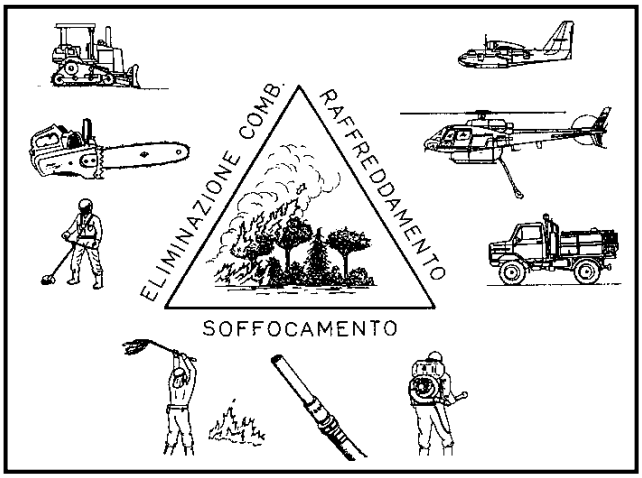
It was explained that firefighting strategies for forest fires/wildfires fall under three categories. Collectively these three categories combine to form the fire fighting triangle (see Figure 14, below).

The three categories within the fire fighting triangle are:

- Eliminazione – Seperation[35]
- Raffreddamento – Cooling[36]
- Soffocamento - Suppresion[37]

During many forest fires/wildfires, a combination of the three techniques (seperation, cooling and suppression) will be implemented in order to bring the fire under control and to ultimately extinguish the fire.

**Figure 14 – The Fire Fighting Triangle**




[35] For instance, cutting down unburned trees or vegetation that might provide fuel for an advancing fire.
[36] For instance, cooling a fire with water from fire appliances and/or from the air via helicopters and aeroplanes.
[37] For instance, using beaters or sand to remove the supply of oxygen to a fire.

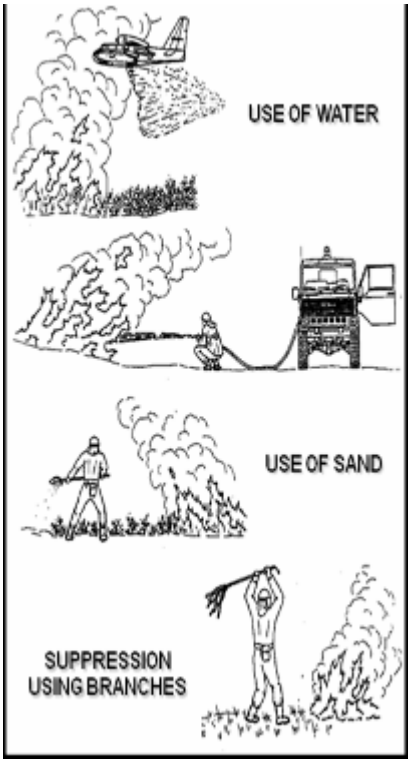
**Table 2 – Typology of Treetop Fires**

| Type of Treetop Fire | Description | Photograph |
|---|---|---|
| **Passive** | Produces an explosive treetop reaction. The explosive reactions are due to the skimming fire front which pre-heats the treetops. Therefore, the propagation velocity coincides with the skimming front velocity. |  |
| **Active** | The front of an active treetop fire is continuous. This fire is so intense that it can be only be controlled in very favourable conditions.<br><br>The photograph on the right shows an active treetop fire in a pine forest. |  |
| **Independent** | Independent fires are the most intense. The fire propagation velocity and the destructive potential are high. Flames propagate directly from one treetop to another, independently from the skimming fire that is surpassed by new fires produced by treetop fire radiation and spotting. |  |

The interventions used by firefighters fighting wildfires/forest fires can be classified into two categories: direct attack and indirect attack. A direct attack involves attacking the fire itself, often by applying water or sand. This group of methods can also include using beaters to attack the fire, as beaters are literally brought down on top of the fire. Indirect attack involves techniques which do not directly attack the fire but which reduce the likelihood of the fire advancing further. These techniques often include removing fuel from in front of the fire. Cutting down vegetation, or perhaps lighting a backfire, a technique described in the next paragraph, are common forms of indirect attack. The two methods of attack are visually presented in Figure 15 (below).

**Figure 15 – Direct and Indirect Attack for Forest Fires/Wildfires**

**Direct Attack**
**(directly on the fire)**




**Indirect Attack**
**(not directly on the fire)**


The final technique used by the Italian Fire Service when fighting wildfires/forest fires is backfire. This technique literally involves using fire to fight fire. During a backfire, firefighters deliberately set another fire that burns towards the existing fire, thus burning and removing the fuel in front of the fire. Specific safety zones are identified to ensure that the backfire is controlled and does not burn out of control and increase the risk and intensity of the original fire(s). Backfire is a very dangerous technique that is only used when absolutely necessary and only by those with specialist training. To light a backfire safely, firefighters need a comprehensive knowledge of the dynamics that influence wildfire direction and development, as outlined throughout this presentation and other presentations delivered during the workshop. The danger involved means that firefighters in Italy will use all other interventions available before deciding to light a backfire to tackle a wildfire/forest fire.

## 4.4 Natural Fire Risks in Finland

This presentation was delivered by Dr. Esa Kokki of the Emergency Services College, Finland.

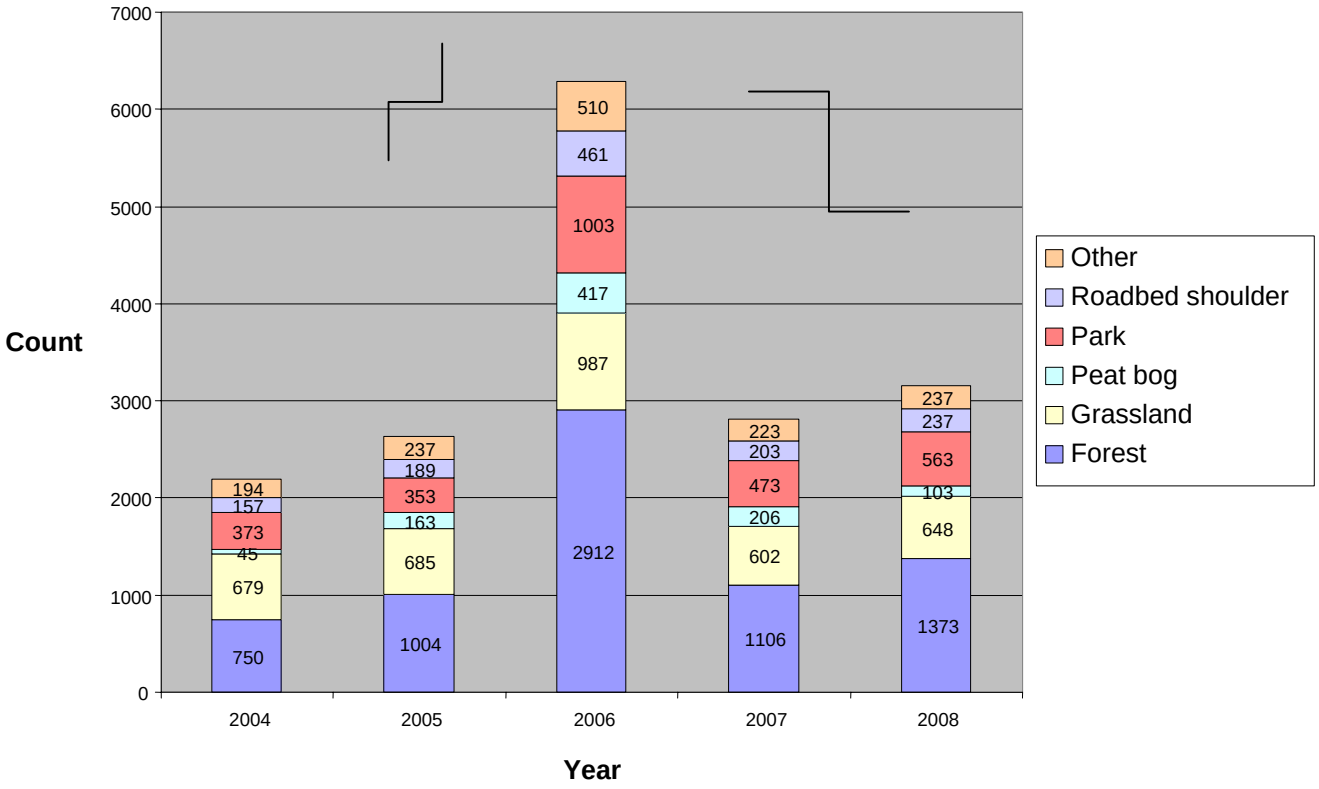
Esa provided a statistical overview of the characteristics of natural/environmental fires in Finland.

**Types of wildfires in Finland**

Esa presented data on wildfires in Finland between 2004 and 2008. 25% of all fires in Finland are wildfires. As Figure 16 shows (below), forest fires were consistently the most frequent type of natural fire that occurred in Finland during the period 2004-2008. In 2008, forest fires accounted for 44% of all natural fires. The remainder of the natural fires that occurred in 2008 were grassland (21%), parks[38] (18%), road bed shoulders (7%), other (7%), peat bog (3%).

Figure 16 also shows that there were a very high number of wildfires in Finland in 2006. Esa explained that this was a very dry year with little rainfall. This was a key factor that made 2006 a bad year for wildfires in Finland.

**Figure 16 – Wildfires in Finland 2004 - 2008**




[38] All references to "parks" within this presentation relate to public parks within villages, towns and cities. This category does not include National Parks.

**The cause of wildfires in Finland**

In Finland a report is completed for every fire that is recorded/reported. The report will record the cause of the fire. According to analysis of fire reports for 2008, 68% of wildfires were caused by "humans", 5% by "natural phenomena", 4% by "other", 2% by "failure of machine", 1% by "animals"[39]. In addition, the cause of 20% of wildfires was recorded as "unknown".

When "human caused" wildfires are analysed in terms of intent (see Table 3, below), it is clear that "negligence or carelessness" was the main cause of wildfires in all location types in Finland in 2008. Consequently, a large proportion of wildfires in Finland are preventable. Another basic pattern is also evident when comparing the location type and intent of wildfires set in Finland in 2008: a greater percentage of "intentional" wildfires were set in "parks" and "roadbed shoulders" compared to "forest" and "grassland", whereas a greater percentage of "accidental" wildfires were set in "forest" and "grassland" compared to "parks" and "roadbed shoulders".

**Table 3 – Intent of Human-Caused Wildfires in Finland in 2008**

| | **Forest** (N=880) | **Grassland** (N=511) | **Park** (N=461) | **Roadbed shoulder** (N=149) |
|---|---|---|---|---|
| **Intentional** | 19 % | 8 % | 34 % | 23 % |
| **Negligence or carelessness** | 40 % | 42 % | 40 % | 45 % |
| **Accident** | 23 % | 36 % | 8 % | 11 % |
| **Unknown** | 19 % | 14 % | 18 % | 20 % |

**Table 4 – Reason for Wildfires in Finland in 2008**

| | **Forest** (N=1 373) | **Grassland** (N=648) | **Peat bog** (N=103) | **Park** (N=563) | **Roadbed shoulder** (N=237) |
|---|---|---|---|---|---|
| **Open fire** | 58 % * | 77 % + | 5 % | 79 % # | 62 % ↑ |
| **Spark, over heating** | 6 % | 4 % | 48 % → | 0 % | 9 % |
| **Explosion, self-ignition** | 1 % | 0 % | 25 % ϒ | 0 % | 0 % |
| **Natural phenomena** | 7 % | 2 % | 8 % | 0 % | 1 % |
| **Electric** | 3 % | 4 % | 1 % | 1 % | 3 % |
| **Other known reason** | 4 % | 2 % | 4 % | 2 % | 2 % |
| **Unknown** | 21 % | 10 % | 10 % | 19 % | 23 % |

*Key to additional information (indicated by symbols) within Table 4*: * Camp fire, matches. + Burning of trash, prescribed burning. # Matches, camp fire. ↑ Cigarette, matches. → Spark from machine. ϒ Self ignition.

[39] An additional category of "combustible materials" was not attributed as the cause for any wildfires recorded in Finland in 2008.

The main reason for wildfires in Finland in 2008 was “open fires” (see Table 4, on previous page). Open fires can be a significant problem in Finland. Specific national legislation and more localised municipal regulations have been developed in order to reduce the occurrence of wildfires resulting from open fires. Further information concerning Finnish legislation on open fires can be found in Northumberland Workshop Handbook produced during the ANSFR Project (a copy of which is available from the authors of this report), or from the following website: www.pelastustoimi.fi/aihe/neuvontapalvelu .

The other reasons given in 2008 for wildfires in forests, grassland, parks and roadbed shoulders were only recorded in a small number of cases. By contrast, there was a greater degree of variation in the reasons for wildfires in peat bogs, with “open fires” not a common reason for this type of wildfire. “Spark, overheating” and “explosion, self-ignition” were the most common reason for peat bog wildfires in 2008. Peat bogs form a significant part of the landscape of Finland; they cover 7 million square hectares of land. The peat is ploughed and extracted as an important resource for fuel, with large industrial operations deploying numerous large vehicles and machines to extract large quantities of peat (see Figure 17, below). The very factor that makes peat a good fuel also increases the risk of peat bog wildfires. Peat is easily ignitable so sparks from machines can cause wildfires. The risk of a peat bog fire developing as a consequence of an explosion is also extremely high. Peat bog fires are particularly challenging fires to extinguish (see Figure 18, overleaf). Once a peat bog fire starts it can be very difficult to extinguish because it may burn below the ground and resurface a significant distance away from the fire origin. A peat bog fire can also burn for days without anybody realising it is burning. Prevention of this type of fire is therefore very important.

**Figure 17 - Peat Bog Excavation in Finland**

**Figure 18 - Extinguishing Wildfires in Peat Bogs in Finland**

**The impact of wildfires in Finland**

Esa then presented some statistics on the property losses caused by wildfires in Finland. In 2006, the largest property loss recorded was for forest, accounting for 63% of the total property losses. This was followed by grassland (19%), peat bogs (15%), and other (3%). There were only minor property losses recorded for parks and road bed shoulders. It should be noted, however, that the property losses recorded here only refer to losses to buildings, vehicles, machinery etc. and not to losses of nature/natural habitat (such as losses to forest).

During most years between 2004 and 2008, the area of land burned during wildfires exceeded the area of forest burned (see Figure 19, overleaf), however, this trend was reversed in 2008. In 2006, the area of land burned by wildfire was far in excess of the area of forest burned. The general pattern, however, is that the area of land burned by wildfire is usually relatively small when taking into account the total size of the country. In combination with this, the wider impact of wildfires on the human population in Finland tends to be limited. The impact on life and physical health is very low, with only a small number of deaths and injuries caused by wildfires each year (see Figure 20, overleaf). The cost of wildfires to buildings tends to be low and, at least during most years, the total cost caused by wildfires is not substantial (see Figure 21 on page 47). It should be noted, however, that calculations of the costs of wildfires presented in Figures 21 and 22 (on page 47) only include the cost to property and do not include any calculable costs to the environment.

**Figure 19 – Total Land Area and Total Forest Area Burned in Wildfires in Finland, 2004 - 2008**

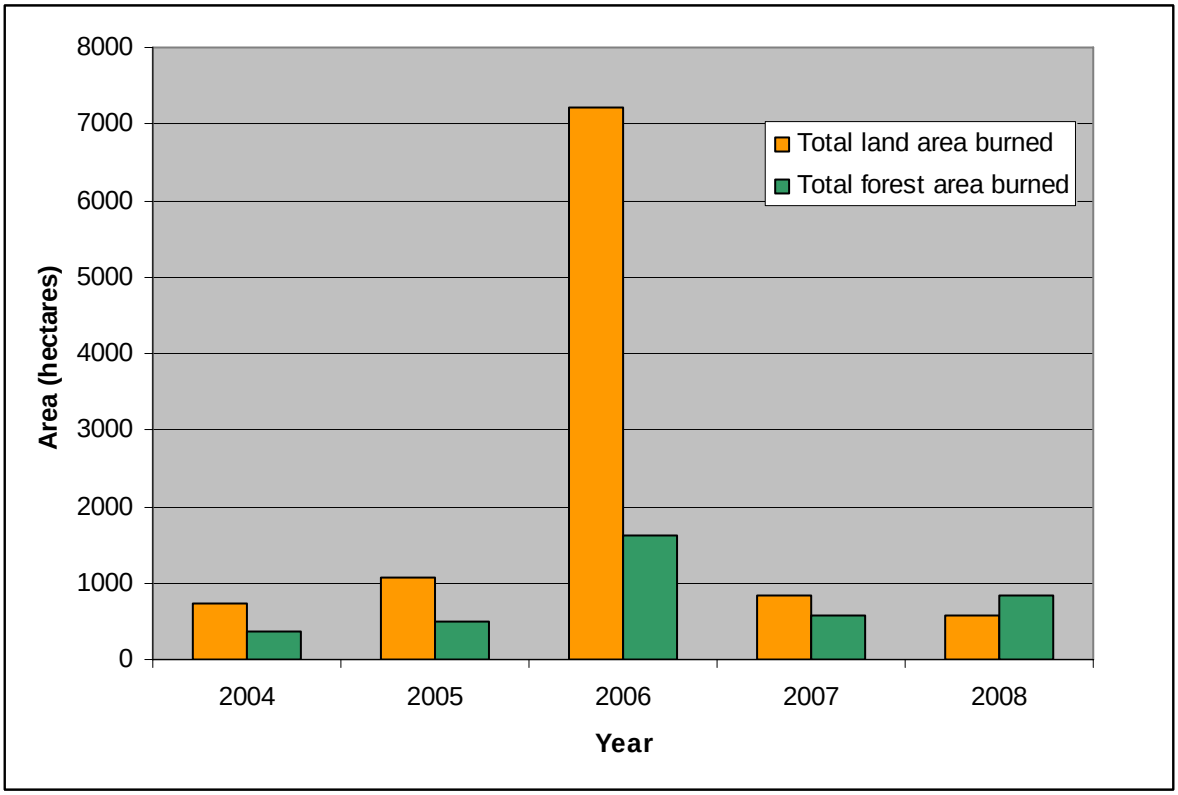



**Figure 20 - Impact of Wildfires on Life and Health in Finland, 2004 - 2008**

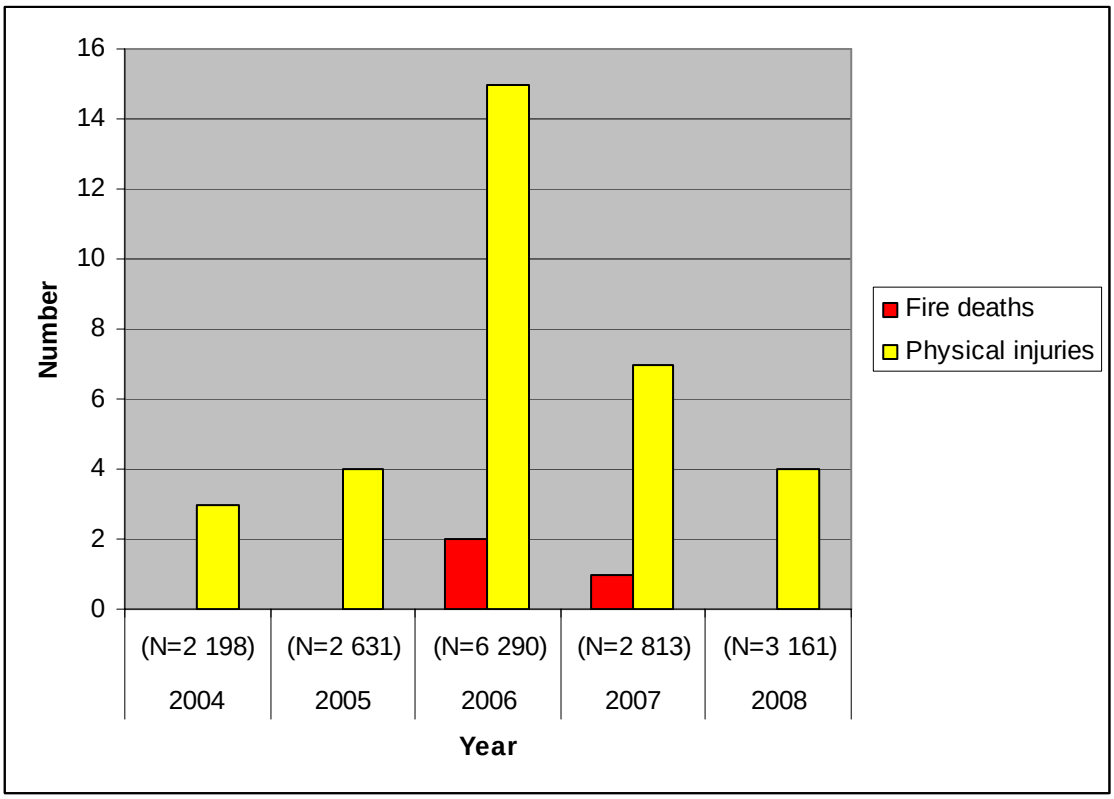
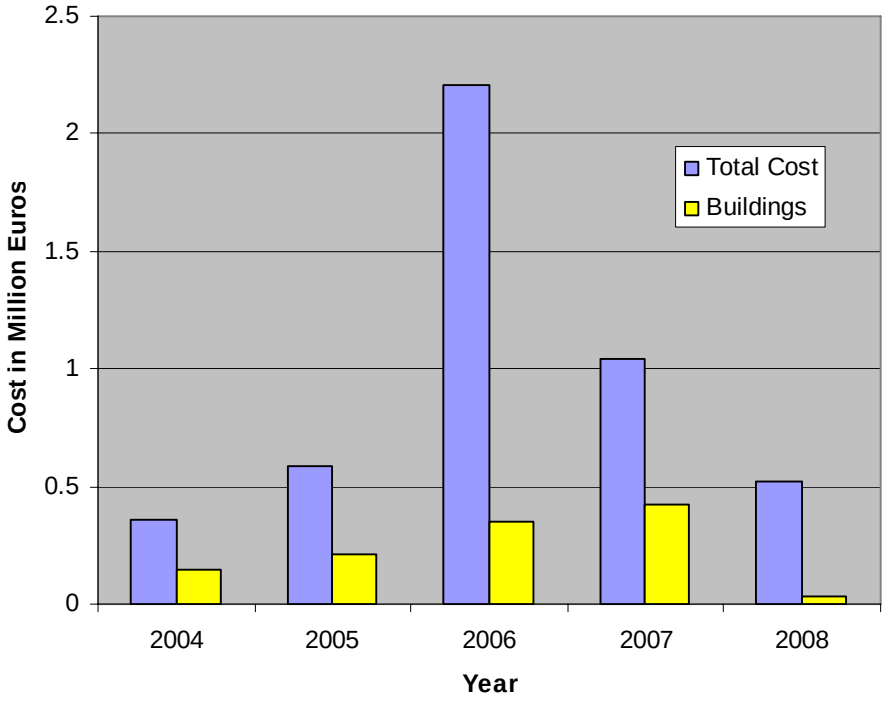
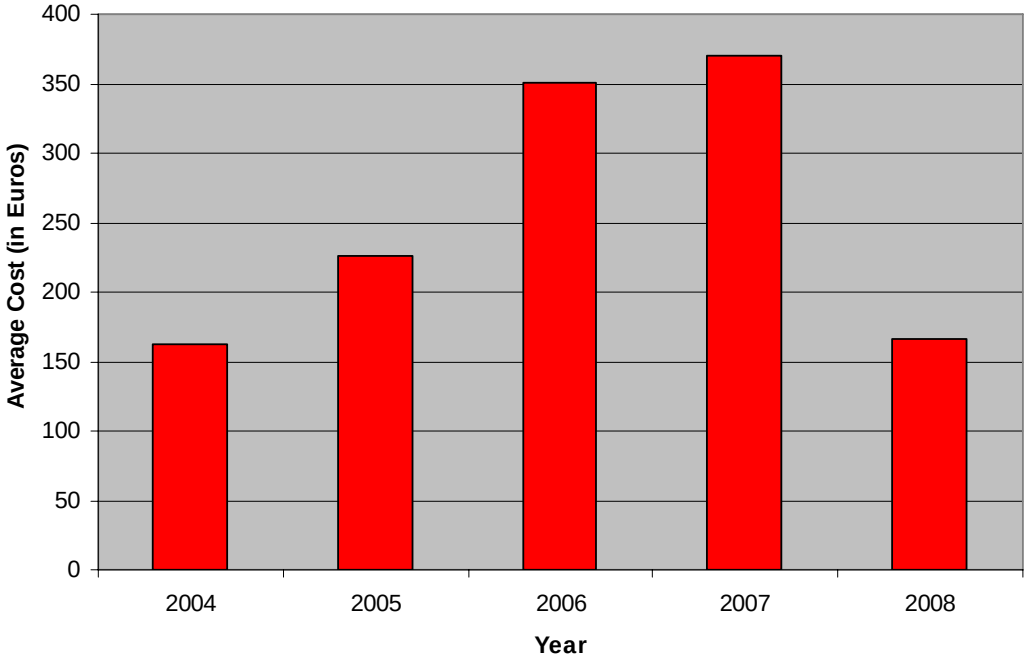


**Figure 21 – Total Cost and Cost to Buildings of Wildfires in Finland, 2004 – 2008**




According to Figures 19, 20 and 21, the impact of wildfires in 2006 was greater than the impact of wildfires during other years between 2004-2008 with a greater number of wildfires, a greater area of land and forest burned, more fatalities, more physical injuries, higher total cost and a higher cost to buildings. However, despite this, the highest average cost of wildfires for this period was recorded for 2007 (see Figure 22, below).

**Figure 22 – Average Cost[40] of a Wildfire in Finland, 2004 – 2008**




[40] The calculated average costs refer to costs to human property. The costs do not include economic costs to nature/the environment. If these costs were calculated and incorporated, then the average cost would be significantly higher.

## 4.5 Preventing Forest Fires and Wildfires in Finland

This presentation was delivered by Timo Loponen from the Emergency Services College (Finland).

Timo followed Esa's statistical overview with a description of the strategies and techniques used in Finland to prevent wildfires and forest fires. Specifically, Timo described the Finnish Forest Fire Index and the system of Forest Fire Observation Flights that is used to identify and locate forest fires.

**Finnish Forest Fire Index**
The Finnish Meteorological Institute compiles a forest fire index for Finland (see Figure 23, overleaf) and gives forest fire warnings. A ban on lighting open fires is imposed when the forest fire index is calculated as high (further details on the grading of fire risk is presented overleaf).

**Forest Fire Observation Flights**
In addition to predicting the risk of wildfires/forest fires, an early warning system has been set up in Finland to help identify potential wildfires/forest fires early in their development. Finland is a large country with large sparsely populated areas. Identification of forest fires and wildfires that are in progress can sometimes be slow, particularly for fires that start in very isolated locations. In order to improve the speed at which wildfires/forest fires are identified, and to allow the Fire and Rescue Services to get to the fire sooner and begin extinguishing the fire earlier in its development, Forest Fire Observation Flights (FFOF) are coordinated during the days of the year classified with a high forest fire index.

There are 26 pre-planned observation flight routes that provide aerial cover of the whole of Finland (see Figure 24, overleaf). Each flight takes approximately 1- 2 hours and is completed by members of local Aero Clubs that are part of the Finnish Air Rescue Society (in Finnish: Lentopelastusseura).

The Finnish Air Rescue Society was set up nationwide in 2006 to assist the emergency services in Finland. The organisation trains volunteers to help the authorities search for missing persons and provides training to help prevent forest fires. In 2006, aero clubs flew over 5000 hours of FFOFs and Search and Rescue (SAR) missions.

The Finnish Air Rescue Society has: 43 member associations; 26 fire-control flight routes; more than 80 aircraft; 1,300 pilots and navigators; more than 1,400 volunteers.

The Finnish Air Rescue Society operates in cooperation with:

- The Finnish Ministry of the Interior
    - Police Forces
    - Fire and Rescue Departments
    - Emergency Response Centres
- Finland's Slot Machine Association
- Finavia Flight Rescue Centres
- Finnish Aeronautical Association
- Finnish Red Cross
- Voluntary Rescue Service
- The National Defence Training Association of Finland
- The Finnish Lifeboat Society

**Figure 23 - Finland Meteorological Institute Forest Fire Index**

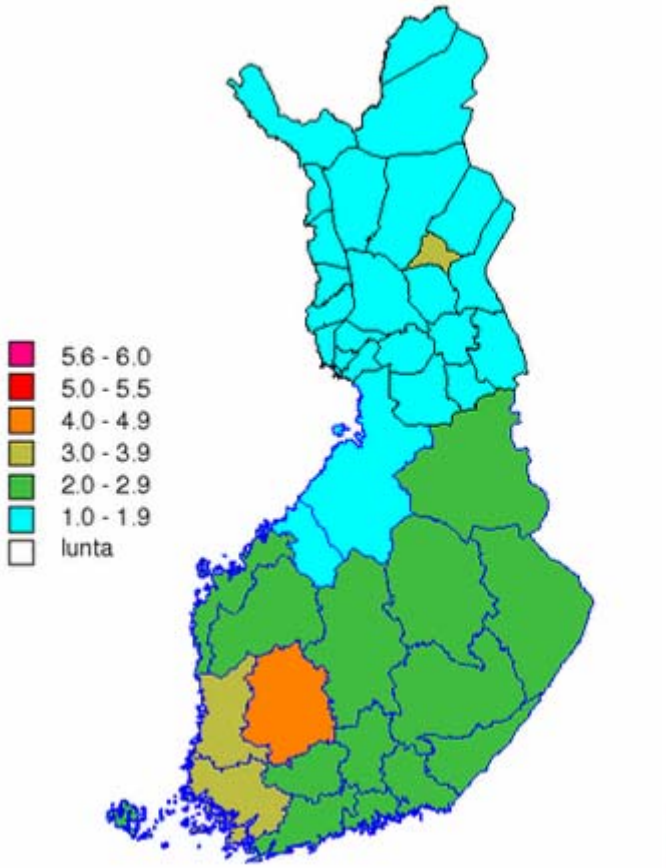
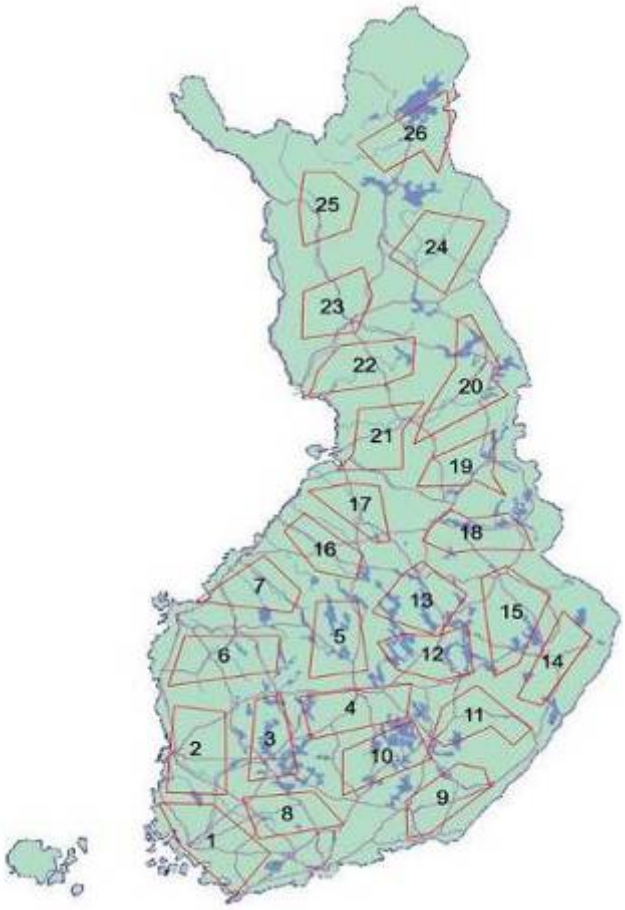



**Figure 24 – Forest Fire Observation Flight Routes**




Each flight operated by the Finnish Air Rescue Society has a crew consisting of a pilot, a mission commander and, during SAR missions, two observers. The pilot concentrates on flying the aircraft and the mission commander handles Global Positioning System (GPS), maps and communication with the relevant authorities. Observers joining the crew during SAR missions are responsible for finding targets. All crew members receive special training to complete their duties.

In addition to identifying potential forest fires and informing the Fire and Rescue Services, FFOF pilots can also be requested to assist in other operations related to the incident. Forest fires can often be difficult to find on the ground so an aerial view can be of significant benefit. FFOF can contact directly (and also be contacted by) the Regional Fire and Rescue Services on the ground through the VIRVE radio system[41]. Fire Incident Commanders will sometimes request that FFOF pilots remain in the area of an identified forest fire to assist fire fighters on the ground to locate the fire. The actual location of a forest fire can often be difficult to determine from the ground, particularly in very isolated locations. The aerial view and instructions relayed by an FFOF pilot can increase the speed at which fire fighters on the ground are able to locate and begin extinguishing a

[41] Please see page 59 within Knut Lehtinen's presentation for more information on the VIRVE Radio System used in Finland.

forest fire. In addition, an FFOF pilot can circle immediately above a forest fire to give a quick reference point for the fire fighters on the ground.

**Funding for Forest Fire Observation Flights**

The majority of funding for FFOF flights comes from the Finnish Government, although there are also some other minor financial supporters. The Finnish Government actually owns and manages gambling establishments through the Finnish Slot Machines Association (Raha-automaattiyhdistys, usually referred to as RAY). RAY was established in 1938 to raise funds to support Finnish health and welfare organizations through gaming operations. RAY has an exclusive right in Finland to operate slot machines, casino table games and to run casinos[42].

**Coordinating the Finnish Forest Fire Index with Forest Fire Observation Flights**

FFOFs are coordinated with the Finnish Forest Fire Index:

- If the Forest Fire Index is greater than 4.0 (or greater than 3.5 during a grass fire warning), the aero clubs will operate one forest fire observation flight per day.
- If the Forest Fire Index is greater than 4.0 for two days, the aero club will operate two forest fire observation flights per day.

The Ministry of Interior of Finland produces a short guide that provides instructions on how to recognising different types of forest fires. All pilots flying the FFOFs are given a copy of this guide. With a better knowledge and understanding of the different types of forest fires, pilots can provide more detailed information to the Fire and Rescue Services and other emergency services on the ground. Occasionally, forest fires are also identified by pilots on passenger flights. In this scenario, pilots radio the fire location to Air Traffic Control (ATC). The ATC will then relay the information to the Emergency Response Centre[43].

**Figure 25 – Logo of Lentopelastusseura (The Finnish Air Rescue Society)**

**Figure 26 – A Finnish Forest Fire Observation Flight**

[42] Further information about Ray can be found at the following website: http://www.ray.fi/inenglish/avustustoiminta/

[43] The regional Emergency Response Centres (ERCs) in Finland are operated by the Finnish Government. The ERCs receive and manage all emergency calls for all of the Finnish Emergency Services. See page 60 within Knut Lehtinen's presentation for more information about ERCs in Finland.

**National and local guidance on prevention of wildfires in Finland**

Timo concluded the presentation by providing delegates with a list of sources for national and local guidance on the prevention of wildfires in Finland.

National guidance:

- The Finnish Ministry of Interior on open fires and preventing peat land fires at www.pelastustoimi.fi/aihe/neuvontapalvelu
- The Finnish National Rescue Association[44] provides advice on civic enlightenment at www.spek.fi

Local guidance:

- Fire and Rescue Departments provide advice on:
    - Local regulations on burning waste
    - Local regulations that are in place when there is a possible risk of fire

**Final summary comments concerning presentations by the Emergency Services College**

According to calculated statistics on economic cost and impact on life and health (as presented in Dr. Esa Kokki's presentation), forest fires and wildfires are not a serious problem in Finland. The majority of wildfires and forest fires are controlled at an early stage before they pose too much danger to life and property.

While the average costs of individual wildfires/forest fires are calculated to be low (ranging from approximately €150 - €370 between 2004 and 2008), the calculations only include property costs and do not include any associated costs to the environment. If the costs to the environment were calculated, then the cost of wildfires would be higher. The workshop did not come to a conclusive answer to this question, although most delegates agreed that the environmental damage caused by wildfires should be recorded because of its importance as an indicator measurement.

[44] The Finnish National Rescue Association (SPEK) is a fire and rescue, civil protection and preparedness expert that educates and provides training materials, manuals and general public guidance. SPEK provides education to help citizens to prevent, prepare for and act correctly in the occurrence of hazardous situations and accidents. The mission of SPEK is to create a safer society for all Finns. In order to achieve this, SPEK is seeking to develop a safety culture in Finland which will increase Finns' interest in both their personal safety and the safety of the environment. (Source: the SPEK website: www.spek.fi).

## 4.6 Fighting Wildfires in Finland

This presentation was delivered by Heikki Harri of Kanta-Häme Regional Fire and Rescue Service, Finland.

Heikki's presentation covered a number of core themes, including: statistics about the dominant natural environments in Finland; details about some of the most recent and highly destructive forest fires in Finland; an overview of the incident command system used by the Fire and Rescue Services during wildfire incidents; and, some of the common challenges and problems faced by Fire Fighters fighting wildfires in Finland.

**The natural environment in Finland**
Heikki explained that Finland has a land area of 338,420 km² and that 76% of the land (219,000 km²) is covered in woodland/forest. In addition, there are 34,340 km² of lakes. Finland is the 29th most forested country in the world. If you compare the size of the country to the area of forests, Finland is the 10th most forested country in the world. Finally, Finland is the most forested country in the European Union (EU).

The natural environment in Finland has a significant impact on:

- the types of wildfires that are commonly experienced;
- the techniques that are deployed to extinguish these wildfires;
- and the challenges and problems faced by the organisations responsible for identifying, extinguishing and preventing wildfires across the country.

Heikki then explained the types of wood that are commonly found in Finnish forests/woodland and the forest ownership structure in Finland (see Tables 5 and 6, below).

**Table 5 – Type of Trees Grown in Finnish Forests**

| Type of Tree | % of total forested area |
|---|---|
| Pine | 65% |
| Spruce | 26% |
| Birch | 8% |
| Others | 1% |

**Table 6 – Forest Ownership in Finland**

| Type of Tree | % of total forested area |
|---|---|
| Private Owners | 62% |
| The State | 25% |
| Paper & Lumber Companies | 8% |
| Others | 5% |

**Serious Forest Fires in Finland**
Heikki presented delegates with a list of some of the most serious wildfires to have occurred in Finland since 1959. The general trend (as shown in Table 7, overleaf) is that the area burned during serious wildfires has been decreasing since 1959. This is, at least in part, due to improved techniques and better equipment for fighting wildfires.

**Table 7 – Some of the Serious Forest Fires in Finland, 1959 – 1997**

| Year | Location of Fire | Area Burned (in Hectares) |
|---|---|---|
| 1959 | Isojoki- Honkajoki | n. 1700 ha. |
| 1960 | Salla, Tuntsa | n. 20,000 ha.[45] |
| 1970 | Kalajoki | n. 1,600 ha. |
| 1970 | Liminka | n. 500 ha. |
| 1992 | Lieksa | n. 150 ha. |
| 1997 | Laihia | n. 150 ha. |
| 1997 | Tammela | n. 250 ha. |

**Fighting forest fires in Finland**

Although the Fire and Rescue Services, forest managers/rangers and other organisations (such as the Police) may join a joint command post, the Fire and Rescue Services are always in charge during a wildfire incident. Legislation gives fire incident commanders a significant amount of power in an emergency situation. These powers include the authority to commandeer assistance from members of the public in the locality of a wildfire the authority to commandeer machinery and equipment to use to fight the wildfire.

A standard incident command system is used for any incident attended by the Fire and Rescue Services in Finland. This means that firefighters attending a structural/building fire will use the same command system as those attending a wildfire. In Finland there are no specialist teams/departments/organisations for fighting wildfires. All firefighters in Finland will fight all types of fire, including wildfire (see Figure 29, on page 55).

According to this standard incident command system (see Figure 27, overleaf), the incident commander will order more fire units, as required, up until the “company stage” (see Figure 28, overleaf). Beyond the level of the “company stage”, the incident commander will order the creation of a “command post within the fire area” which is within vision of the fire. Other fire officers/chief fire officers will then create a “command post outside the fire area” to provide support to the onsite incident commander. The command post within the fire area will take charge and responsibility for the areas/sections and units at the scene.

In some circumstances, the Finnish Rescue Services request the assistance of helicopters from the Finnish Border Guard. The helicopters are used to dump water onto the fire and help extinguish fires more quickly. Canadair craft are used in some countries for this purpose (as will be explained in the presentation by the Hellenic Fire Service in Greece); however, the lakes in Finland are too small for these aircraft to operate.

[45] This estimate is for the area burned on the Finnish side of the border. This estimate does not include the area that was burned on the Russian side of the border.

**Figure 27 – The Incident Command System Used in Finland**

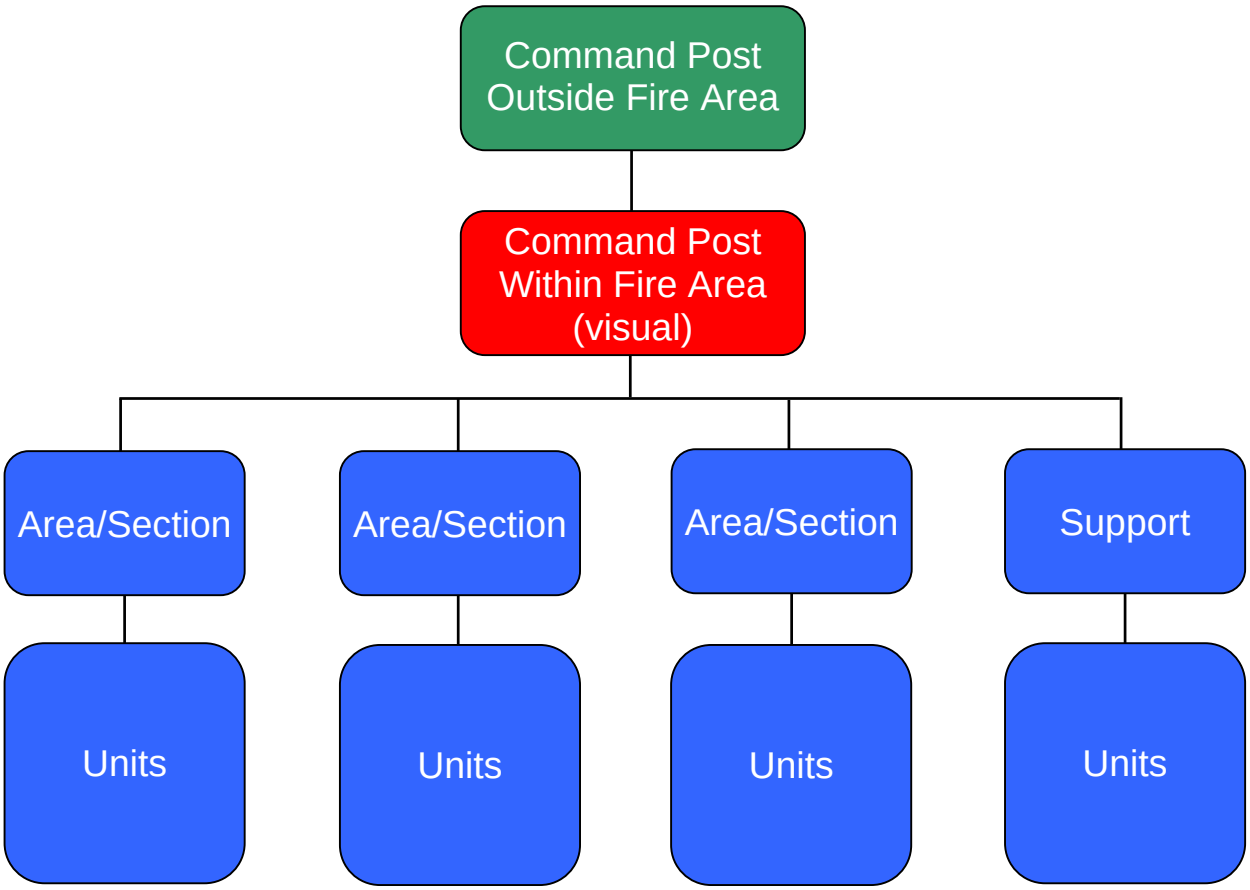



**Figure 28 –Terms Used in the Finnish Rescue Services Incident Command System**

| | |
|---|---|
| **Unit** = | one fire engine and maybe one additional unit, for instance a water unit. It could also include one ambulance, if this is required. |
| **Platoon**[46] = | at least 3 fire engines and additional water and lifting units, for instance a ladder or sky lift. It will include at least one ambulance, but sometimes more. |
| **Company** = | at least 6-9 fire engines and additional water and lifting units, for instance a ladder or sky lift. It will include 3 or more ambulances. |

[46] The actual number and types of units within a platoon and company will depend on the type of incident. For instance, different units will be required at a fire compared to those required at a road accident. These descriptions are provided to give a general idea of the number of units that may attend an incident but should not be taken to be accurate for all types of incidents. The number and type of units required to attend different types of incidents is outlined in Rescue Service plans.

**Figure 29 – Images of Finnish Firefighters Tackling Wildfires**

A common technique that Finnish firefighters use during a wildfire is to “roll” the fire from the sides to minimize the top of the fire. An alternative term for this is called “fighting the flanks of the fire”. Firefighters will also use roads and natural obstacles to prevent fire spread (as shown in Figure 30, below). These obstacles, which are sometimes created artificially by cutting down trees and vegetation, are sometimes called ”fire stopping lines” or ”fire breaks”. Firefighters in some countries ”back burn” vegetation in order to create fire breaks and ”fight fire with fire”, however, the Finnish Rescue Services have had bad expeirences in the past and usually avoid using these techniques. It should be recognised that the tactics employed by firefighters during a wildfire will vary and depend upon the type of fire in progress. A number of different tactics may be used during one wildfire.

**Figure 30 – Finnish Firefighters Fighting a Wildfire at Fire Stopping Lines/ Fire Breaks**

**Fighting Wildfires in Finland: a summary**

Wildfires provide Finnish firefighters with a number of challenges to overcome. While Finland is not very mountainous, and thus the influence of slope on wildfire progression and development is not as pronounced as in some countries, it is not uncommon for wildfires to occur in very remote areas with no road/vehicle access. An example of the challenging terrain experienced by firefighters is shown in Figure 32, overleaf.

In summary terms, fighting wildfires in Finland requires:

- Lots of firefighters
- Lots of water
- Time

Consequently, wildfires can lead to significant economic losses in terms of: a) the destruction they cause to forest and property (see Figure 31, below); and, b) the cost of extinguishing.

**Figure 31 – Destruction Caused by a Wildfire**

**Figure 32 – Finnish Firefighters Extinguishing a Forest Fire in Challenging**

## 4.7 Fighting Wildfires in the Archipelago of South West Finland

This presentation was delivered by Knut Lehtinen of the South West Finland Emergency Services.

Knut's presentation included a description of two case study wildfires that occurred in the archipelago in South West Finland. The first case study was of a wildfire that occurred in a large forest and the second case study was of a wildfire that occurred on a small island.

**South West Finland Emergency Services**

Figure 33 (below) shows a map of the South West Finland region. The region is actually a province and the area covered by the South West Finland Emergency Services corresponds to the same region as the Emergency Response Centre (ERC). The name of the province is "Egentliga Finland" which means "Actually Finland) or the "Real Finland". The Swedes gave the name to the province hundreds of years ago. When Finland grew in size, the Swedes had to give a new name to the region they had earlier called Finland. The region is approximately 150km wide and is composed of a large archipelago. Knut believes it is the largest archipelago in the world.

The blue dots on Figure show the South West Finland Emergency Services Fire Stations. The red dots are volunteer fire stations that have a contract with South West Finland Emergency Services.

The archipelago causes the Emergency Services significant challenges for fighting wildfires. As you can see in Figure 34 (overleaf), there are lots and lots of small islands and the time it takes to travel between islands can take a significant amount of time. For example, if you were to travel from Pargas to Houtskär (left to right across the map) it could take more than two hours because of travel on ferries.

**Figure 33 – Fire Stations within the South West Finland Rescue Service Area**

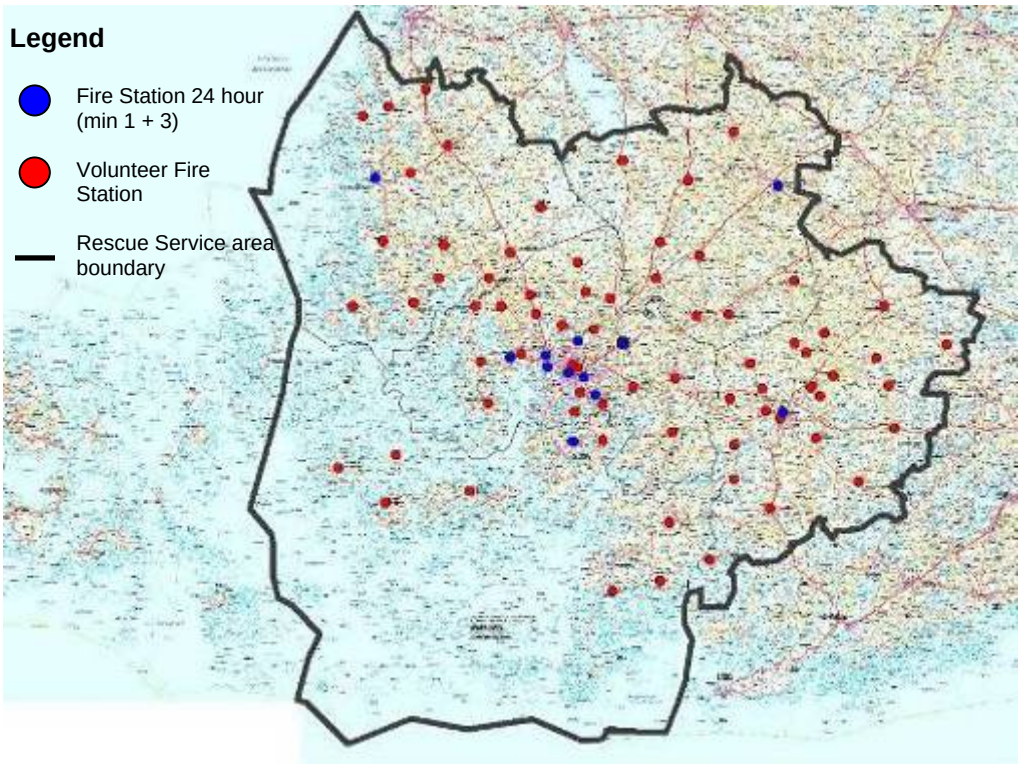
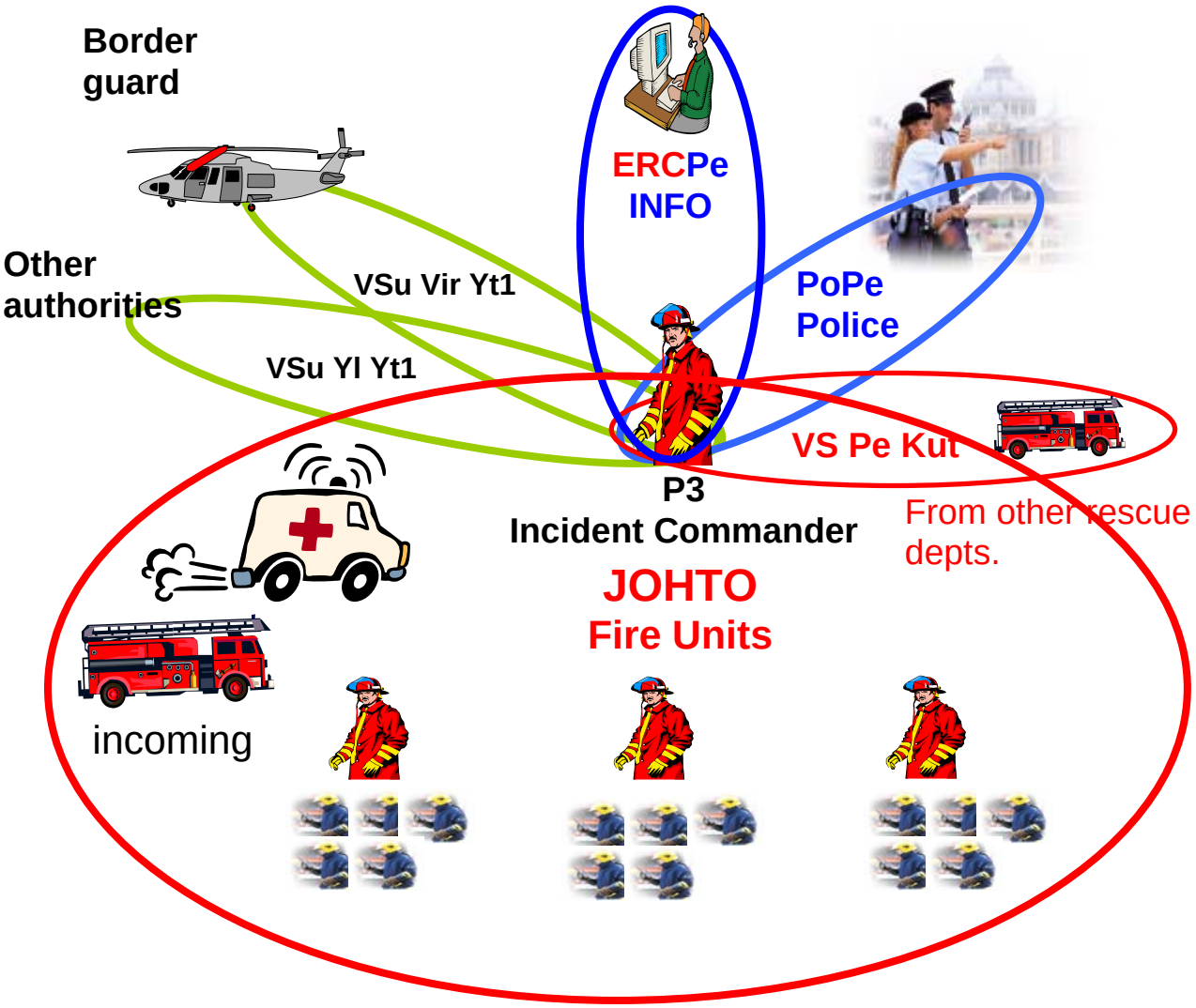


**Figure 34 – Location of the Two Wildfire Case Studies from South West Finland**

**The VIRVE Radio System in Finland**

Knut gave a brief overview of the VIRVE radio system which is used throughout Finland (see Fiure 35, below). VIRVE is a digital radio system that is now used by all authorities in Finland. It is the first nationwide TETRA (TErrestrial Trunked Radio) network in the world with all authorities sharing one digital radio network. The old radio network used in Finland, called fireradio, had several problems, including audibility and scope. The radio was often unreliable. In addition, the emergency services in Finland all operated on their own networks and there was no ability to communicate with one another directly. Knut believes the new VIRVE radio system that has been adopted in Finland is much better than the old system in almost all possible ways. All individuals have a radiotelephone that they can use as a radio and as a mobile telephone. The one drawback to the new system is that the radiotelephone has more buttons than the old one, which makes it a little more complicated to use. However, after some training and hands-on experience, most people are able to use the radiotelephone correctly.

**Figure 35 – Visual Representation of the VIRVE Radio System in Finland**



As you can see in Figure 35 (on the previous page), there are a number of different authorities and channels/call groups using the VIRVE system. One of the key benefits of the VIRVE system is that individuals can listen to several radio call groups at the same time, although you can only speak in one call group at a time. Knut explained the basic functioning of VIRVE using the analogy of a computer. Imagine a computer with several folders and in the folders you have several call groups. Depending on what kind of incident you are attending, you can choose the correct folder for that particular type of incident and access the call groups you need. Usually the Fire Service operates in one folder/call group, but on occasions Fire Service personnel will change folders. For example, during a SAR (Search and Rescue) operation, the Border Guard are the lead organisation, so the Fire Service will change call group to be able to listen to and talk to the Border Guard. In other situations the Fire Service will listen to and talk to the Police etc.

The VIRVE system has great benefits for incident commanders compared to the old radio system. During an emergency incident, an incident commander has immediate radio access to all other emergency services/authorities that may be involved in the incident. Unlike in other radio systems used across the world, the incident commander does not need to send a message to his/her ERC to request access to other call groups as he/she can do this from their own radiotelephone. The new VIRVE system improves the response to and coordination of emergency incidents, and enables closer cooperation between the different emergency services.

**Emergency Response Centres (ERC) in Finland**

In Finland, the government operates ERCs to receive and monitor calls for all emergency services. Alarm operators receive emergency calls from the standard emergency telephone number (112), determine the location of an incident, evaluate the risk, alert the appropriate units and provide the necessary information for the deployed units such as details concerning occupational safety.

Incident monitoring operators update and monitor the overall situation, support units deployed during the incident and manage non-urgent tasks. All communication and information is relayed through the VIRVE system.

## Case Study 1 – Forest Fire near Tervesund, Stortevolandet

During mid-summer in 2006, there was a thunder storm in the area around Pargas, as is often the case. The summer was very dry and a fire warning was in force all of the time. A lightning strike caused a fire to start in a large forest[47]. The area that began to burn was not near to or accessible by road.

**Fire identification and emergency call**

The fire was identified by a large passenger plane that reported it to flight control. Unfortunately, as the plane was a passenger plane, it could not deviate from its course. If it had been a forest fire observation plane it would have circled the area to assist the emergency services in finding the location of the fire and complete other tasks delegated by the incident commander. Incidentally, forest fire observation planes also use the VIRVE system.

Flight control made an emergency call to the emergency response centre and reported a fire with lots of smoke and flames. The position of the fire was reported with coordinates.

**Figure 36 – Photograph of the Wildfire near Tervesund**

Unfortunately, the location was not specific enough to allow the firefighters to easily find the fire on the ground. Because of the inexact address the fire units drove in different directions to see if they could find the fire from the road. Some firefighters also searched the area on foot to try to locate the fire, but they were unable to find it. Smoke was detected in Tervesund, so the firefighters knew that something was burning. At this stage, the incident commander made a call for further assistance to help determine the location of the fire. The forest fire observation planes were not available and flight control reported that there were no airplanes in the area to assist.

[47] This was a large forest in relation to forests in South West Finland, however, it may not seem large to those working in other areas of Finland and Europe.

**Support from the Border Guard helicopter**

The border guard helicopter was requested and made its way to the area. Just as the border guard helicopter arrived, one of the firefighters on the ground found the fire. The incident commander did, however, use the border guard's helicopter to assist firefighting operations on the ground. Using the information relayed from the air by the border guard, firefighters we able to decide the best direction to lay hose lines. Once the hose lines were laid, the border guard helicopter then started to extinguish the fire from the air with the use of a "bambi" bag (see Figure 37, right).

**Figure 37 – A Border Guard Helicopter with "Bambi Bag"**

**Creating a water supply network on the ground**

Creating a water supply network was logistically quite complex, because the site of the fire was inaccessible by road. A nearby ferry quay was identified as a good place to pump water. The water was pumped into four water tenders that then drove shuttle traffic to an unloading place nearer to the site of the fire (see Figure 38, below).

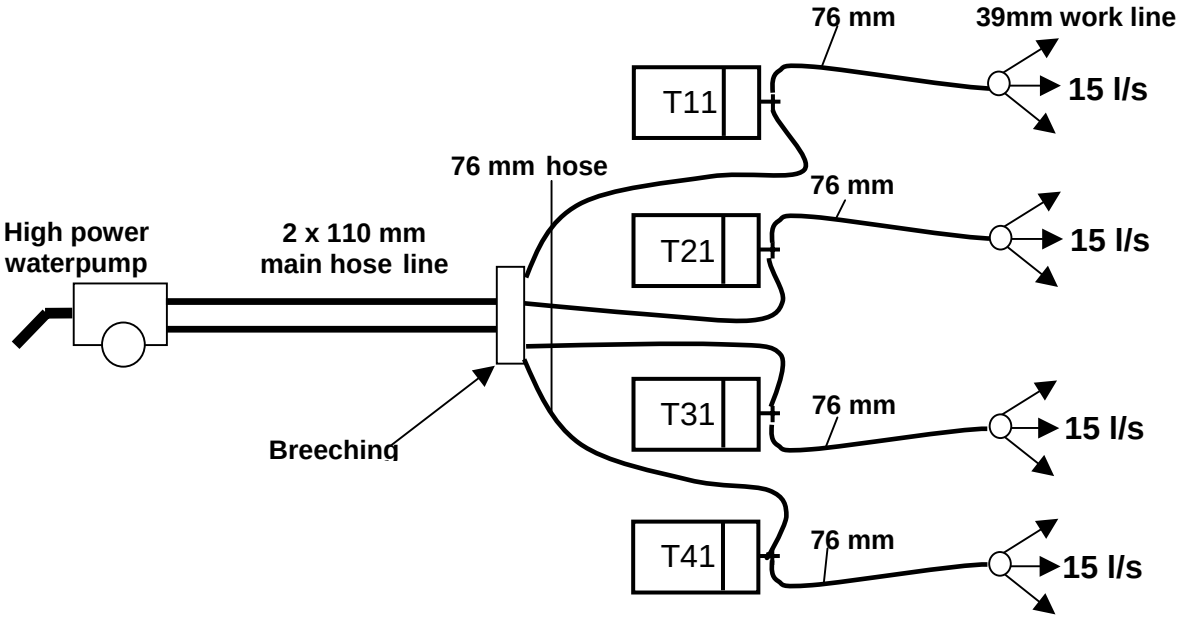
**Figure 38 – Water Tender Units**



The water supply unit was alerted early during the incident by the incident commander. The water supply unit is a voluntary unit that can be used across the whole region. It has a high effect water pump that pumps about 3,600 litres per minute. It also has other useful equipment. A tracked water pump can be driven to a pumping place. The pump weight is about 200kg so it is easier to drive than to carry it. The All Terrain Vehicle (ATV) is very useful for laying hose lines. The trailer can then be connected to the ATV and the trailer loaded with hose and other equipment. Examples of some typical incidents that involve the water unit include: wildfires, large building fires, hazardous chemical incidents, sinking vessels etc.

A hose laying unit, which is part one part of the water supply unit, then laid hose from the water unloading area to an area near to the fire. This unit is equipped with 1km of 110mm hose (4 inches) and 1km of 76mm hose (3 inches). The water supply unit is the only unit that uses 4 inch hose; the standard for the main hose line is 3 inches and 1.5 inches for work hose lines. Consequently, a suitable water supply clearing system is required (see Figure 39 overleaf).

**Figure 39 – Water Supply Clearing System**




The hose line laid for this incident was so long that firefighters had to pump the water using several pumps in what is called “serial driving”. In this case, a four-wheel drive vehicle was used to drive the hoses as far as possible into the forest.

**Figure 40 - The South West Finland Water Supply Unit[48]**



[48] The photographs are of different pieces of equipment that form part of the South West Finland Water Supply Unit. Above – the water supply unit pumping water from the sea; below left – the hose laying unit; below centre – tracked water pump; below right – ATV with trailer.

**Damping down**
At the end of the incident when the fire was under control, firefighters used wet water for damping down. In order to make wet water, pine soap is added to water. The soap and water penetrates deeper into the ground than water does. The benefit of using pine soap is that it can more quickly dampen down the scene and it is quite inexpensive.

**At the close of the incident**
It had taken two hours from the initial alarm, and one hour from when the helicopter began carrying water to the fire, in order to extinguish the fire. During the one hour, the helicopter dumped 50,000 litres of water which helped to successfully limit the fire.

## Case Study 2 – A Small Island South West of the Town of Nagu

Knut played a short video taken of Fire Fighters travelling to and extinguishing a wildfire on a small island South West of the town of Nagu. The video showed delegates the dominant landscape and vegetation of the region, while also showing the difficulties experienced by the Fire and Rescue Services in terms of travel between islands. In this scenario, Fire Fighters had to take a ferry between islands to get to the wildfire. In normal circumstances, ferries will be held at port until the Fire and Rescue Services arrive and they will be loaded onto the ferry so that they can disembark as soon as the ferry arrives into port. Knut reiterated that it can take more than two hours to travel across the archipelago from Pargas to Houtskär. Forward planning is essential when the Fire and Rescue Services are called to attend wildfires on smaller, less accessible and more distant islands. Incident commanders need to decide what equipment they may need and mobilise units as soon as possible as it may take time for additional units to arrive.

**Successful Techniques and Methods used to Fight Wildfires in Finland**
Knut ended his presentation with a bullet list summary of the elements that he thinks are used successfully in South West Finland to fight wildfires:

- The Finnish Meteorological Institute gives fire warnings
- Forest Fire Observation Flights
- VIRVE – enabling the cooperation of all emergency services and authorities
- The water supply unit, which can be used at different kinds of emergencies
- There are lots of voluntary fire brigades which means that the first units to arrive at a scene can get there quite quickly

**Final comments**
Direct attack using water is the primary method used for extinguishing forest fires and wildfires in the South West Finland archipelago. The landscape of this region is very rocky with little vegetative material at ground level. This contrasts significantly with the landscapes of most other regions of Finland which are very densely forested. While control lines and fire break lines can be constructed and cut with machinery and hand tools in some areas of Finland, the rocky landscape of South West Finland makes this method of attack difficult, if not impossible.

South West Finland are one of the only (if not the only) Regional Fire and Rescue Services in Finland with a water supply unit. The unit is extremely useful and important for tackling wildfires, forest fires and other serious fires requiring large quantities of water.

## 4.8 Wildfire in Northumberland and the UK

This presentation was delivered by Steve Gibson of Northumberland Fire and Rescue Service (UK).

Steve's presentation began by providing some context to the issue of wildfire in the United Kingdom and, more locally, in Northumberland. Northumberland Fire and Rescue Service (NFRS) has the lead on wildfire within the Fire Service from the Chief Fire Officers' Association (CFOA) and chairs the English Wildfire Forum[49]. The latter parts of Steve's presentation discussed some of the substantial and significant improvements that NFRS has made to its policies and procedures relating to fighting and preventing wildfire since 2005. In particular, Steve outlined NFRS's new Wildfire Incident Management System (WIMS), its close partnerships with the GRAF Bombers in Catalonia and with other members of the Northumberland Fire Group (NFG), and its new wildfire training courses.

**Does the UK have a wildfire problem?**
Steve posed the question to the group: does the UK have a wildfire problem? To answer this he stated that on the surface it does not seem that the UK has a significant problem. However, Steve added that there are several problems concerning the Fire and Rescue Service's standard approach to wildfire, including a:

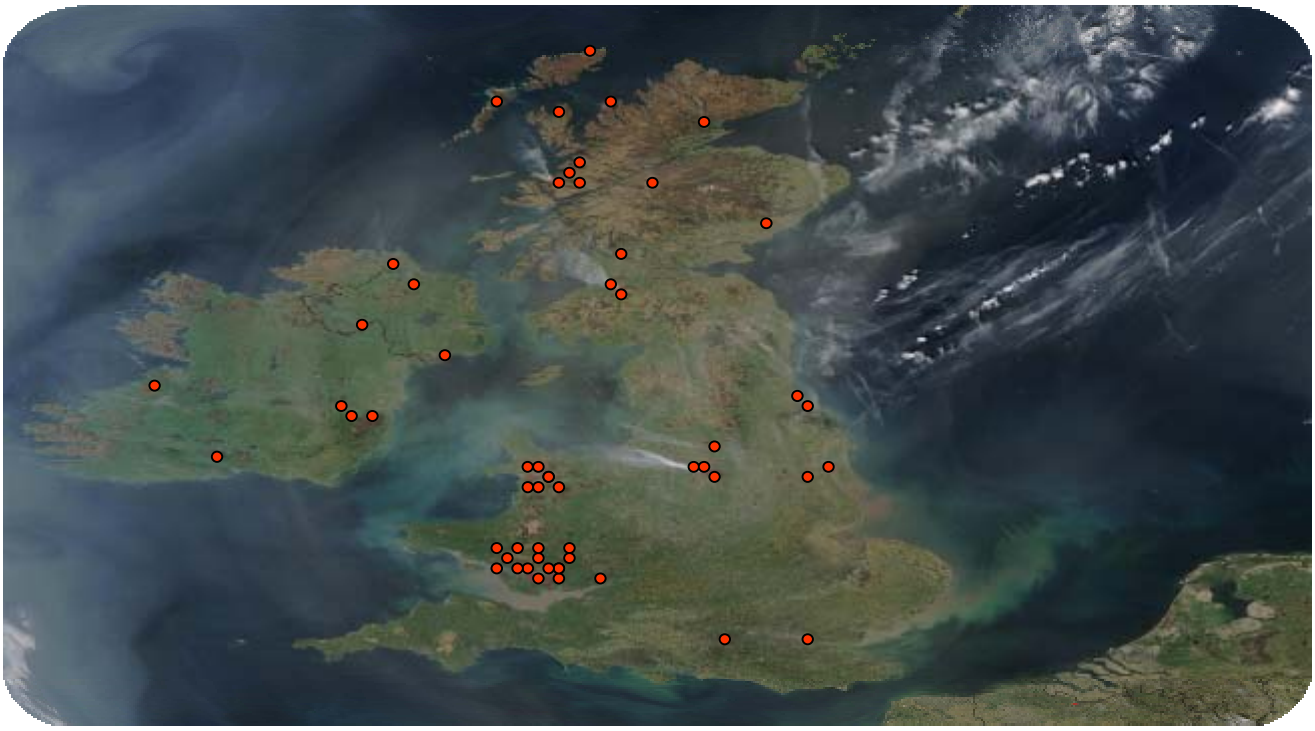
- Reliance on structural firefighting techniques (i.e. techniques to extinguish fires in buildings).
- Lack of specialist wildfire knowledge, understanding and training.
- Lack of resources for addressing wildfires and risk of wildfires.

Wildfires may have a particularly serious impact if they encroach upon the rural-urban interface and threaten human settlements, as was the case during a recent wildfire in Essex in southern England where people's homes were evacuated. While it is comparatively rare for wildfires in the UK to enter the rural-urban interface, if conditions are supportive then wildfires have the potential to threaten life and property and cause significant destruction. There is also the potential that significant numbers of wildfire could burn simultaneously across the country, as has been seen in the past during more severe fire seasons. Figure 41 (overleaf) shows a snapshot in time with at least 54 wildfires burning simultaneously at the same time in the UK and Republic of Ireland. Some of the wildfires are particularly serious. These more serious wildfires can be identified through visible smoke plumes on the image.

Steve answered the question "does the UK have a wildfire problem?" by stating that wildfire may not be a high risk at all points in time but, when conditions are supportive, the UK has a huge problem with wildfire. The problem is further exacerbated by problems associated with the UK Fire and Rescue Service's approach to tackling wildfire, an issue Steve returned to later in the presentation.

[49] There is a separate wildfire forum in Scotland, called the Scottish Wildfire Forum. The 2005 Annual report of the Scottish Wildfire Forum can be accessed at: http://www.confor.org.uk/Upload/Documents/25_swfannreport0506.pdf

**Figure 41 – Wildfires in the United Kingdom and the Republic of Ireland**



**Wildfires in Northumberland**

On Saturday 7th April 2007 a very large wildfire started in the village of Harbottle in the Northumberland National Park. The fire burned for days and destroyed 1,000 hectares of forest and moorland. It was probably the largest wildfire in Northumberland for five years with more than 40 firefighters and 35 soliders (from the nearby Army Camp at Otterburn) involved in tackling the blaze. A Royal Airforce (RAF) Sea King helicopter was also deployed to dump water onto the fire from above. The fire burned extremely closely to the village of Harbottle and posed a threat to buildings and communication links.

The Harbottle wildfire involved the destruction of substantial areas designated as being of Sites of Special Scientific Interest (SSSI)[50]. This point led Steve to the next section of his presentation on damage and destruction caused by wildfires.

**Is property just buildings?**

Steve then posed to the group the following rhetorical question: is property just buildings? He continued by then asking the group, what value to we put on the environment, rare habitats etc. What should we do to protect the environment and limit the destruction that wildfires cause to the environment?

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[50] According to the Natural England website (http://www.sssi.naturalengland.org.uk/Special/sssi/index.cfm ): "There are over 4,000 Sites of Special Scientific Interest (SSSIs) in England, covering around 7% of the country's land area. More than 70% of these sites are internationally important for their wildlife. The unique and varied habitats of SSSIs have developed over hundreds of years and include some of the most spectacular and beautiful habitats in the country – large wetlands, chalk rivers, heathland, meadows, shingle beaches and remote moorlands and peat bogs."

Most wildfires in the UK occur in areas with low population densities, in typically very rural and more isolated locations. As a consequence there is usually very limited risk to buildings; however, there is often substantial risk to land owners and the rural economy. Forestry, grouse moors and farm land can all be threatened by wildfire and, if they burn, the rural economy can be severely damaged and individual livelihoods can be affected.

In addition to the human costs of wildfire, there are substantial costs to the environment, including:

- The loss of habitat (often rare habitats like the areas of SSSI destroyed in the Harbottle fire in Northumberland)
- Damage to the landscape
- Damage to the soil structure and ecosystem

**What are the main risks of wildfire?**
Steve briefly discussed some of the key risks of wildfire in the UK. The main risks associated with wildfire are as a result of suppression activities. The Fire and Rescue Services Act 2004 states that the Fire and Rescue Services in the UK have statutory responsibility for suppressing wildfires. However, this statutory duty brings with it some significant risks, particularly because:

- There is no national wildfire guidance in the UK.
- There is little understanding of wildfire behaviour within many UK Fire and Rescue Services and land agencies.
- Prior to Northumberland's development of wildfire training systems, there was no specific wildfire training easily available to Fire and Rescue Services in the UK.

In the past, firefighters and fire managers have tended to use experience gained at structural fires in order to tackle wildfires. These systems are used because they have been successfully deployed at structural fires, however, many of these procedures and techniques may be ineffective at best and at worst unsafe when used at wildfires. The reliance upon structural firefighting techniques and procedures represents one of the main risks to firefighters at wildfire incidents.

**How high is the risk?**
In simple terms the risks of wildfire in the UK are real. Wildfire incidents require specialist skills and equipment. Some of the specialist skills required for fighting wildfires are basic, such as map reading. Other skills required for fighting wildfires are more advanced, such as being able to predict where a wildfire will move and develop and the knowledge and practical application of alternative fire suppression strategies. Some firefighters attending wildfire incidents did not have the basic skills required, let alone more advanced skills. Consequently, the risk of wildfire is not just to people, buildings and the environment but there is also significant risk for firefighters working to extinguish the fire, particularly those without the necessary skills for doing this work safely. Steve believes the situation in the UK must be changed before there are serious injuries and fatalities to firefighters during wildfire incidents.

**Identifying and Addressing the Risk of Wildfire in Northumberland**
In 2005, NFRS identified the problem of wildfire and a number of problems associated with NFRS's standard approach to fighting wildfire. NFRS identified that its firefighters lacked the skills, understanding and equipment to be able to safely and effectively fight wildfires. In order to address these problems, NFRS forged a partnership with the Catalonian GRAF

Bombers in Catalonia, southern Spain. The GRAF are considered to be one of the leading experts on wildfire in the World. The GRAF have significant experience of forest fires with approximately 10,000 square hectares of forest burning in Catalonia every year (approximately 0.75% of the total forest surface of the region each year)[51]. Furthermore, there are particularly devastating fire seasons once every decade where considerably larger areas of forest are burned.

In addition to forming the close partnership with the GRAF, NFRS also sent officers to Spain, France, Greece, Portugal and the USA to receive training and develop their experience of fighting wildfires. All of these countries experience significant numbers of wildfires each year and, as a result, have developed good practice strategies and techniques for fighting wildfires. After collecting information and developing experience of methods specific to wildfire, NFRS has adopted best practice from successful agencies around the World to develop an appropriate and effective approach to tackling wildfire in Northumberland and the UK. One of the new tools that have been developed has been the use of fire as a tool. This literally means to fight a wildfire by starting another fire deliberately and in a planned manner. This technique is used successfully in other countries in the World. Members of the delegation were mixed in their opinions about using fire as a tool. Some members of the delegation had witnessed negative experiences of using this strategy in the past. Steve responded that it is one of several tools that can be used by firefighters at a wildfire incident and that a fire is never set without considering all the options. He also emphasised that fire should only be used as a tool by highly trained specialists and that only members of the specialist Wildfire Team in Northumberland would use fire as a tool at a wildfire incident. Steve added that using fire as a tool can be a safe and effective method for bringing a wildfire under control and that it should not be discounted as a possible strategy. The use of fire as a tool was discussed at length by the delegates both during this session and during other sessions of the workshop.

Another tool developed by NFRS has been its wildfire prediction system (WPS) which can be used by all firefighters on a wildfire ground to proactively identify risk. More details about Northumberland's WPS are presented in a later presentation by Steve Gibson on pages 72-74.

The new procedures and protocols that have been developed by NFRS are appropriate to the UK but may be easily adapted and implemented by Fire and Rescue Services in other European countries.

**NFRS Wildfire Training**

Over recent years, wildfire training has been a key focus for improvement. NFRS now delivers wildfire training to all supervisory managers and to a number of firefighters throughout the Service. NFRS's wildfire training includes the following modules:

- The use of maps as a navigation tool
- The use of maps as a safety and planning tool
- Wildfire behaviour
- Fuel types and fire characteristics
- Fire development
- Wildfire Prediction

[51] Mogas, J. and Riera, P. (2001) "The Economic Value of Risk Reduction of Forest Fires in Spain" Paper presented at the *IUFRO conference* in Solsona, June 7-10. (a copy of the paper is available online at: http://www.medforex.net/research/publications.htm#2._Forest_management_ )

- Wildfire safety (LACES)
- Weather and its effect on fire development
- Suppression Tactics (Indirect and Direct)
- Incident Management (Wildfire Incident Management System)

In addition to delivering basic training to a large number of operational personnel, NFRS has formed a specialist team of 40 individuals who have received more advanced wildfire training. 10 members of this specialist team have been recruited from the Northumberland Fire Group (NFG) and are not members of NFRS (i.e. they are employed by other organisations and within other professions, for instance as foresters or land managers). The 10 personnel from the NFG provide additional specialist skills to the team which are of significant importance at a wildfire incident.

NFRS is now assisting other Fire and Rescue Services in England, Scotland, Wales, Northern Ireland and the Republic of Ireland. NFRS has already provided a number of wildfire training courses for other Fire and Rescue Services and has other courses planned in future. NFRS has developed some standard training courses that can be delivered to any organisation, but can also develop more bespoke training courses, dependent upon the needs and requirements of the organisation. After discussing the wildfire training courses that NFRS currently designs and delivers, the other ANSFR partners discussed that they may also be interested in sending officers to attend one of these courses.

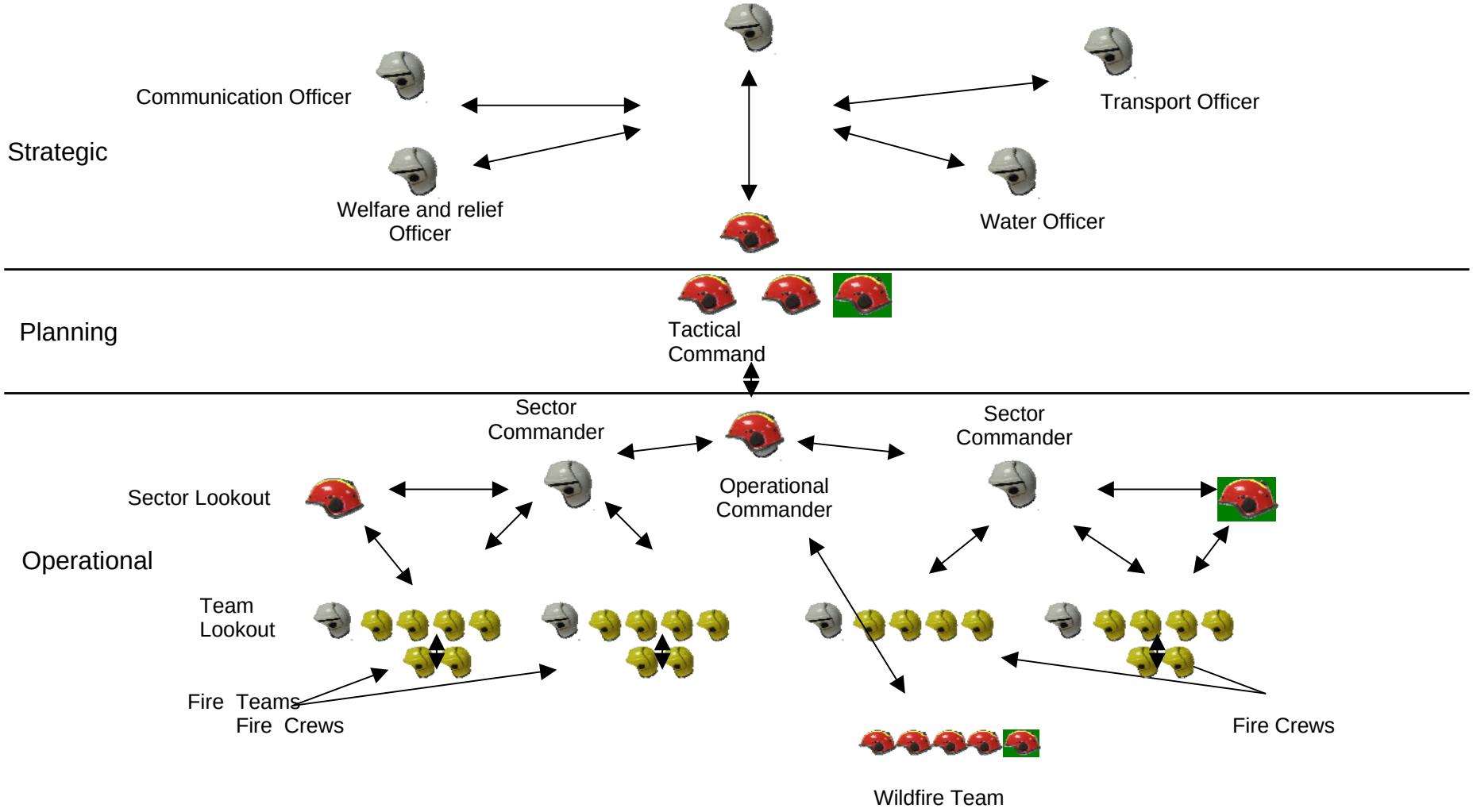
**Northumberland Wildfire Incident Management System**

Another key element of NFRS's critical look at its approach to fighting wildfire was the critique of the incident management system deployed at wildfire incidents, which in the past has been the same incident management system used for fighting structural fires. NFRS decided that the traditional incident management system was inappropriate and ineffective for use at wildfire incidents and decided to create a more specific and specialised Wildfire Incident Management System (WIMS) (see Figure 42, overleaf).

The development of the new WIMS involved the modification of some key areas of the traditional incident management system used at other incidents. The first key modification was to incorporate additional specialist wildfire officers into the command structure to provide specialist strategic, tactical, planning and operational support. The second key modification was to incorporate non-Fire and Rescue Service personnel into the command structure with the inclusion of members of the Northumberland Fire Group (NFG).

Another adaptation to the traditional incident management system has been the change in the number of individuals brought together to work as a team on the fire ground. During normal firefighting operations, it is standard procedure for teams of firefighters to be formed from appliances that attend the scene. This means that a team will usually consist of four firefighters. Wildfire incidents, however, can often cover large areas of land, some of which may be a considerable distance from the incident command post. Deployment of lots of small teams of four people at a wildfire presents significant problems for incident management, not least the fact that there are too many teams for sector commanders and the overall incident commander to direct and keep safe. In addition, some suppression work may require considerably more individuals to be involved. NFRS's new wildfire incident management system is an adaptation and improvement upon the traditional incident management system deployed at other fire and rescue incidents. It includes the creation of larger teams of firefighters and Fire Group personnel (i.e. combining firefighters

**Figure 42 – Northumberland's Wildfire Incident Command System**




**Key to Helmet Colours**

Wildfire Officer

Supervisory Officer

Fire fighter

Fire Group Officer

from multiple appliances with NFG personnel into teams) to facilitate more efficient and safer management of the fire ground.

**Planned future improvements to NFRS's approach to wildfires**
NFRS is now working to develop a Wildfire Manual to provide detailed information about techniques and protocols for fighting and preventing wildfires. This Manual will supplement the smaller pocket-sized "Wildfire Operational Handbooks" that have been provided as reference resources for all individuals from NFRS and other organisations who attend the wildfire training courses.

**Developing an effective operational strategy for wildfire**
NFRS's aim is to develop an effective and safe operational strategy for wildfire. The reliance on structural firefighting techniques for tackling wildfires by NFRS and other Fire and Rescue Services represented a disaster waiting to happen and one which other Fire and Rescue Services in the UK (and perhaps in other countries) must address swiftly by developing and implementing new training and operational systems.

It is NFRS's perspective that an effective operational strategy for wildfire will include:

- understanding and training systems in place to ensure that suppression tactics are safe and effective; and
- the Fire and Rescue Service working with partners to reduce the impact of wildfire on the community, environment and the Fire and Rescue Service.

More specifics about NFRS's wildfire intervention strategy were presented in a later presentation by Steve Gibson on the Northumberland Fire Group (see pages 75-82).

**Conclusion – the need to reduce risks associated with wildfire in the UK**
Steve concluded his presentation by going back to earlier parts of his presentation concerning the potential risks of wildfire for life, property and the environment. He again strongly emphasised the risk that wildfire poses to firefighters involved in extinguishing wildfires. Even those who are leading experts in fighting wildfires have been killed while working to extinguish wildfires. If the experts are at risk, then those currently deploying structural firefighting techniques and protocols at wildfire incidents are at extremely high risk. This level of risk is unacceptable, especially considering that there are practices and protocols that can be implemented to significantly reduce the level of risk that firefighters are put under at wildfire incidents. Some of the delegates present in the room replied by stating that wildfire could in fact be a serious risk in their country and that their firefighters and communities may also be at risk.

While NFRS has made some significant improvements in the way it tackles wildfires and is driving improvements to the techniques and procedures used by other Fire and Rescue Services in the UK, there is still room for improvement. Wildfire poses a serious risk that must be addressed in the UK and in other countries in northern Europe. Steve completed his presentation by stating that the NFRS wildfire team will continue to work with its partners, most notably the NFG, to further develop its knowledge and understanding of effective strategies for fighting and preventing wildfire.

## 4.9 Northumberland Fire and Rescue Service Wildfire Prediction System

This presentation was delivered by Steve Gibson and Ian Long of Northumberland Fire and Rescue Service (UK)

**Summary**
This presentation described the development of a new and more appropriate wildfire prediction system (WPS) for use at wildfire incidents by fire fighters and fire officers from Northumberland Fire and Rescue Service. This WPS can be used as an effective management tool to predict fire behaviour, predict rate of spread, predict fire intensity and identify windows of opportunity. The WPS can also be used to improve and manage the safety of fire fighters deployed at wildfire incidents.

**Wildfire Prediction Systems (WPS)**
There are a number of existing WPS:

- Campbell Prediction System
- Rothermell Prediction System (1973)
- Farsite Prediction System
- Byrrams Prediction System

While each of the above systems has its merits, none of them are particularly suitable for use on a fire ground, primarily because they all incorporate complex mathematical equations. NFRS wanted to develop a WPS that could help Wildfire Incident Commanders and fire fighters to quickly and accurately predict the behaviour of a wildfire. Such a prediction system was needed in order to predict the best places to attack a wildfire. Predicting development of a wildfire is extremely important in terms of ensuring the safety of fire fighters and other individuals working within the wildfire command structure. Incident Commanders do not, for instance, want to place individuals in areas where a wildfire will develop and become uncontrollable.

In order to develop a more appropriate and workable WPS, NFRS completed some research into the various factors that affect wildfire behaviour and development. NFRS decided that there were actually three key factors, and one additional overarching factor, that have the most significant influence on wildfire behaviour and development. These factors were analysed in detail and incorporated into a relatively simple, yet very powerful, risk prediction tool. While the tool is relatively simple to understand in theory, in practice it can only be effectively used by individuals with significant knowledge and experience of wildfire. However, unlike the other complex risk prediction systems already mentioned above, the Northumberland WPS is a tool that can be used effectively at wildfire incidents by incident commanders and fire fighters as it does not rely upon complex mathematical formulas.

**Using the Northumberland WPS as an Effective Management Tool**
The Northumberland WPS can be used as an effective management tool to:

- Predict fire behaviour
- Predict rate of spread
- Predict fire intensity
- Identify windows of opportunity[52]

By understanding how and when changes will take place an understanding will be reached on where, when and how a fire should be fought. Fire fighters are taught to appreciate that change is often for the worse and taught to understand when suppression plans are likely to/will fail. Students are taught that wildfire is dynamic and that they should interpret the behaviour of the whole fire and not just the head of the fire. Fire fighters on the ground can easily see the danger presented by the head of the fire but, without using an adequate prediction system, they may not see the potential danger represented by other areas of the fire.

Training by NFRS emphasises the importance of utilising and maximising windows of opportunity that are identified and predicted through the WPS system. There are some places when fire fighters will not be able to suppress a wildfire, but there will be others where the fire can be safely and effectively suppressed. Consequently, the WPS system can be used to assist in understanding when and where to commit resources safely and effectively.

**Important disclaimer**
The information presented within this document will not provide an individual with enough information to go out and safely and effectively use this Wildfire Prediction System. While the system is very basic and can be understood by non-fire service personnel, wider knowledge and understanding of wildfire behaviour is essential to compliment and support the use of the system at a wildfire incident. Practitioners wishing to use this WPS system need to receive more comprehensive training to use it safely and effectively. If you would like more information about the WPS system then please contact the ANSFR Project Manager (contact details on page 1).

[52] i.e. when there is an opportunity to bring the fire under control, as opposed to a situation where fire fighters stand no chance of bringing the fire under control.

## 4.10 The Northumberland Fire Group

This presentation delivered by Steve Gibson of Northumberland Fire and Rescue Service (UK).

Steve provided delegates with an overview of the Northumberland Fire Group (NFG). Steve explained what the NFG is and why it was created. He also compared how wildfires were tackled prior to the existence of the Fire Group and how they are now tackled, emphasising the importance and success of the NFG. The Fire Group's innovative multi-agency partnership approach to fighting and preventing wildfire is now considered best practice in the UK. Steve suggested that the general principles of the Northumberland Fire Group can be considered a good foundation for the creation of similar successful Fire Groups in other areas of the UK and in other European countries.

**What is the Northumberland Fire Group?**
The NFG seeks to improve Northumberland's resiliency to wildfire by delivering activities that address both wildfire prevention and wildfire response. At a practical level, the NFG establishes firm lines of communication, increases the public's wildfire awareness, provides relevant wildfire training and provides a structure for wildfire response that facilitates a safe and effective response to wildfire.

The NFG has two key aims:

1. To contribute to the sustainable development of rural Northumberland through the protection of its economy, environment, heritage and rural communities by minimising the growing risk of the devastating impacts of wildfire due to the influence of global climate change:

    a) to reduce the occurrence of wildfire by promoting fire prevention to land managers, local communities and visitors;

    b) improve moorland burning practices to improve habitats and biodiversity and reduce the risk of wildfire;

    c) to reduce the scale and impact of wildfires when they do occur.

2. To maintain a strong network that encourages collaboration and allows rural communities to take an active role in protecting their environment, local economy and cultural heritage.

NFRS is a member of the Northumberland Fire Group in order to:
1. Improve NFRS's response to wildfire.
2. Establish a cooperative approach to wildfire.
3. Work with rural partners within the Northumberland Fire Group.

**Identifying the need for the Northumberland Fire Group**
In 2005, NFRS's Integrated Risk Management Plan (IRMP) identified that in Northumberland there was:

- A lack of understanding and appropriate systems to effectively suppress wildfire
- A lack of understanding within the rural sector

- Little cooperation with regards to wildfire
- A shortage of specific equipment and resources to respond to wildfires
- Skill gaps for wildfire fighting
- Lack of planning between the Fire Service and land sector for wildfire

Prior to the creation of the Fire Group, there were some clear disadvantages to the way that wildfires were being fought. The key problems were:

- Fire fighters were using structural fire-fighting techniques to try to contain and extinguish wildfires. These techniques are largely ineffective and inefficient for fighting wildfires, not to mention the fact that use of these techniques to extinguish wildfires poses high risks to the safety of fire fighters on the ground.
- In connection with the previous point, during previous wildfires there had been a tendency for fire fighters to chase the fires around rather than actually tackle and control them. This meant that a significant number of personnel were tied up at each wildfire incident which put a strain on the whole service in terms of maintaining resilience to attend other emergency calls across the County.
- Lack of appropriate personal protective equipment (PPE) or other equipment suitable for fighting moorland fires.
- No provision of specialist wildfire training to fire fighters.
- Fire fighters were only infrequently attending wildfires, so they were not building up their experience.
- The rural sector was relatively isolated from the Fire and Rescue Service. This meant that there was little or no communication between land managers and the Fire and Rescue Service. When a wildfire occurred, the fire fighter did not know who the landowners, land managers and game keepers were so they could not draw upon their specialist knowledge of the area. Keepers and land managers in Northumberland have a vast knowledge of heather burning experience and knowledge of the terrain which could be used to identify opportunities for bringing wildfires under control quicker. This resource was not, however, being utilised.
- Lack of prevention and planning.

**Formation and Development of the Northumberland Fire Group**

After recognising the serious problems listed above, NFRS decided that improvements needed to be made to improve NFRS's response to wildfires. The risk of this type of fire had been identified and more was needed to be done to assess and effectively manage that risk.

The NFG was formed as a result of several factors that combined at the same time:

- NFRS's recognition of its lack of understanding of wildfire and the increasing risk of wildfire occurrence in Northumberland through climate change and other variables.
- NFRS's honesty that it needed to improve its response to wildfire
- Commitment of NFRS's management to initiate and support change and improvement to NFRS's wildfire response.
- The rural land sector's willingness to be involved and to share responsibility.
- Northwoods[53] was available as a suitable host – a kind of intermediary – to take forward the development of the NFG.

[53] Website: http://www.northwoods.org.uk/fire-group-northumberland

The creation and development of the NFG took a considerable amount of time. After identifying the need for the group in August 2005, it was not until August 2007 that the NFG was fully funded and ready to operate.

**Membership of the Northumberland Fire Group**
The following groups have joined the NFG:

- Northwoods[54] (http://www.northwoods.org.uk/)
- Northumberland Fire and Rescue Service
- Forestry Commission (http://www.forestry.gov.uk/)
- Northumberland National Park (http://www.northumberlandnationalpark.org.uk/ )
- Ministry of Defence (http://www.mod.uk/DefenceInternet/Home/)
- Natural England (http://www.naturalengland.org.uk/)
- Country Land and Business Association (http://www.cla.org.uk/)
- National Gamekeepers Organisation (http://www.nationalgamekeepers.org.uk/)
- Moorland Association (http://www.moorlandassociation.org/)
- National Farmers Union (http://www.nfuonline.com/)
- Landowners
- Game keepers/land managers

The NFG currently has over 40 members drawn from local and national government, private and public landowners, national associations and other interested agencies.

NFRS is just one member of the group. NFRS plays a very strong 'behind the scenes' role in the group and its commitment is important for ensuring its success; however, NFG is structured so that the group is not just a Fire Service-led group. The majority of members of the NFG are, for example, estate and landowners, or representatives of these groups such as game keepers etc.

**Activities of the Northumberland Fire Group**
Initially, the key activities of the NFG were meetings and engaging potential stakeholders. This took a considerable amount of time and effort, but it has reaped its rewards. The group is now engaged in a number of key activities, some of which are presented in Figure 45 overleaf.

**Fire Plans**
The creation of fire plans has been a key activity of the NFG. Each plan contains key details for assisting both land managers and NFRS with wildfire suppression operations. Each fire plan contains the following details:

- Estate contact details
- Neighbouring landowner contact details
- Access points
- Water sources
- Rendezvous points
- Available resources

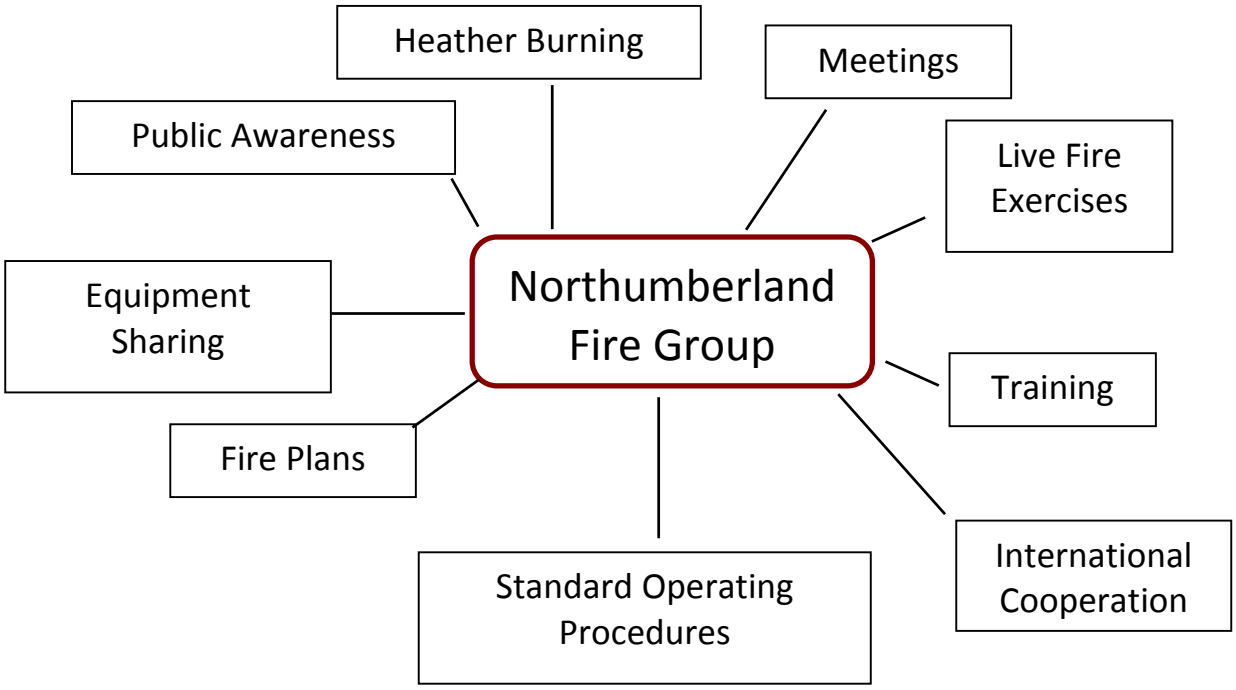
[54] Northwoods does not lead the group but acts as a facilitator and project manager. Northwoods is responsible for finding funding and uses its experience of engaging with the rural community to link all of the partners together. Northwoods is managed by Rural Development Initiatives Ltd (http://www.ruraldevelopment.org.uk/), a not-for profit company.

- Priority areas
- Important Hazards
- Communications capabilities
- Insurance coverage

Completed fire plans are held by the individual estates and by NFRS. By having direct access to the fire plans, NFRS can quickly make contact with necessary individuals and identify key information about the land which will help fire officers make effective decisions to extinguish the wildfire as quickly and as safely as possible.

The NFG aims for every area at risk to be covered by a fire plan. Fire plans have now been created to cover 40 high risk areas covering over 200,000 hectares of land.

**Figure 45 – Activities of the Northumberland Fire Group**




**Training by the Northumberland Fire Group**

Training is another key activity of the NFG. The NFG currently delivers two types of courses:

1. Basic Wildfire Course
2. Advanced Wildfire Course

The basic wildfire course is aimed at any individual who may be asked to assist on a fire ground. The course covers the basics of fire behaviour, fire suppression techniques, health and safety, and personal protective equipment (PPE). Northwoods delivers the majority of this course, but Northumberland Fire and Rescue Service delivers a session on Command and Control procedures. This session looks at how the rural community can fit into the Fire and Rescue Command and Control system to share their priorities and experience most effectively with the Fire and Rescue Service. A mixture of public and private participants is always ensured on the courses. The organisers especially aim to ensure that fire service personnel are in attendance at every course.

Feedback gathered from the participants who have attended the courses so far has been very good. Individuals from the rural community have welcomed the opportunity to discuss issues with Northumberland Fire and Rescue Service. The courses provide an open forum for participants to express their opinions and concerns. These forums improve the relationship between the Fire and Rescue Service and the rural community, which will be of great benefit on the fire ground during a wildfire incident and in the development and implementation of prevention initiatives.

The advanced course involves more practical and tabletop exercises and looks in more detail at how weather can affect wildfire. The advanced course sometimes includes guest speaks, including combustion experts and representatives of the Forestry Commission. The advanced course is aimed at higher level managers and training officers, both working for the Fire Service and Land Managers.

**International Cooperation**

NFRS has developed close links with a number of different Fire and Rescue Services in other countries. In particular, NFRS has developed strong collaborative links with the Graf Bombers in Catalonia (Spain) through the Fire Paradox Project[55]. NFRS personnel have travelled to Catalonia and received wildfire training from the Graf Bombers who have a significant level of knowledge and experience of fighting wildfires. Also, personnel from the Graf Bombers have travelled to Northumberland to lead live burn exercises and share their knowledge and experience with NFRS and other individuals from .

NFRS personnel have also received training and exchanged expertise with colleagues in the USA and continually look to share knowledge and expertise with colleagues working to prevent and respond to wildfire in other countries. By collaborating with colleagues in other countries, NFRS and the NFG can further enhance its response to wildfire and further improve upon its approach to preventing wildfires.

**Live Fire Exercises**

The NFG has held a number of live fire exercises in Northumberland. These have been extremely successful events that have been attended by a number of stakeholders. The events have provided the opportunity for NFRS and the other partners to share experience and knowledge in the field. During one of the live burn exercises, colleagues from the Graf Bombers in Catalonia led the training and shared their skills and techniques with the group.

**Standard Operating Procedures (SOPs)**

Northumberland Fire and Rescue Service have produced a pocket-sized “Wildfire Operational Handbook”. This handbook is given to all individuals who attend the Wildfire training courses.

**Equipment Sharing**

In the past, NFRS would turn up to a wildfire with its traditional fire appliances; however, these were ineffective and were often not able to get to the location of the fire. The other significant problem with this approach was that each wildfire was attended by a high number of appliances which strained NFRS’s ability to attend emergency calls elsewhere in the County, thus impacting upon NFRS’s resilience.

[55] Website: http://www.fireparadox.org/

NFRS has now been able to purchase wildfire specific equipment, including a number of 4 x 4 fogging units (Figure 46, right). These 4 x 4 utility vehicles can quickly be converted to carry a range of specialist equipment. The units can carry specialist cutting and extrication equipment for use at Road Traffic Collision (RTC) incidents, but can also be easily converted to carry Fire Fogging Units (FFU) which can hold 400 litres of water. The special fire-fogging technology is designed to use a small amount of water which is transformed into a water fog or mist. The tiny water droplets that are produced quickly turn into steam (and therefore the droplets significantly expand in size) which rapidly replaces or reduces the oxygen around the fire area. By removing the oxygen, the FFUs can quickly extinguish fires with minimal water and a reduction in the spread of burning debris. In the flick of a switch the FFUs can also use foam to tackle more complex fuel fires. This is an extremely useful resource for less accessible locations, particularly for tackling wildfires in the more remote areas of Northumberland.

**Figure 46 – NFRS 4 x 4 Fire Fogging Unit**

For larger incidents, NFRS and land managers may need access to additional specialist equipment. There are now agreements in place for the use of soft-track vehicles (Figure 47, below left) with pumps and fogging units and Landmark has now purchased an Argo cat (Figure 48, below right) to be used by NFRS and the NFG during wildfire incidents in Northumberland. The specialist equipment now available further enhances NFRS's and the NFG's response to wildfire incidents.

**Figure 47 – Soft track vehicle with fogging unit**

**Figure 48 – Argocat**

**Public Awareness and Prevention**

The NFG has also been involved in initiatives aimed at raising public awareness of wildfires and in initiatives aimed at preventing wildfires occurring. The NFG has produced Extreme Fire Risk Warning Signs (see Figure 49, overleaf), on waterproof paper, that can be placed at relevant access points on NFG members' land during times of high fire risk. It was decided that the signs should only be placed out during times of extreme risk and that they should be removed as soon as the risk level has been lowered. The theory behind this approach is that if the signs remain in place all the time then members of the public

may not take notice of them and may not take note of the warnings during periods of extreme fire risk. The NFG has also produced educational videos that outline the risk and dangers of wildfire for those visiting the county. These videos are shown at some of the Tourist Information Centres within the County.

**Figure 49 - Northumberland Fire Group Extreme Fire Risk Warning Notice**

**The success of the Northumberland Fire Group**
As a result of the work of the NFG over the previous few years, the response to and prevention of wildfires in Northumberland has been greatly improved. There is now:

- Effective communication
- Effective preventative measures
- Specialist knowledge
- Improved effectiveness
- Shared equipment
- Shared skills
- Common systems
- Improved understanding
- Safer and more effective tactics
- Shared responsibility

Since its creation on 19th December 2005, the Northumberland Fire Group has successfully achieved the following:

- Better communication and understanding between partners and stakeholders;
- High skills levels – for both NFRS and the rural community;
- Greater access to and availability of equipment (millions of pounds worth of specialist equipment);
- Better planning and preparation for wildfire – through fire plans, research and exercises;
- Shared and agreed Goals;
- Commitment to improve;
- Effective incident command;
- Funding for development;
- Multiple opportunities for 'getting to know each other' - enabling the development of trust and understanding between the partners;
- Links with national and international bodies.

The Northumberland Fire Group model has now been adopted by 12 other Fire and Rescue Services in the UK. The work of the Northumberland Fire Group is contributing towards a better shared understanding of wildfire at the local and national level and a greater degree of cooperation between different regions in the UK.

As a result of the successes of the group, Northumberland Fire and Rescue Service and the NFG are now assisting in the development of a national rural fires/wildfire strategy in the UK.

## 4.11 Arson and Bushfires in Australia

This presentation was written and delivered by Dr Janet Stanley, Chief Research Officer at the Monash Sustainability Institute[56], Clayton, Victoria, Australia.

**The Monash Sustainability Institute**

Janet began her presentation by providing an introduction to the work of her organisation, the Monash Sustainability Institute (MSI). The MSI is located in Clayton, in the State of Victoria in South East Australia (Figure 50, below right). The Director of MSI is Dave Griggs, who is also vice-chair of the World Climate Research Assessment Unit. The MSI is part of Monash University, however, it sits outside the faculty structure. MSI is geared towards research, education and action. MSI aims to:

- Promote research on major sustainability issues by forming interdisciplinary teams at the university, in collaboration with other institutions and industry.
- Embed sustainability throughout the education curriculum of the university and the wider education sector.
- Promote sustainable practices throughout the university, the community, industry and government.

**Figure 48 – States of Australia**


**The extent of Bushfires in Australia**

Bushfires[57] are a very serious problem in Australia (see Figure 51, below). Since 1851, bushfires have:

- caused 561 deaths
- approximately 10,000 injuries
- affected 1.4 million people
- made 32,000 people homeless

**Figure 49 – A bushfire in Australia in February 2009**

Source: http://home.iprimus.com.au/foo7/firesum.html

[56] Website: http://www.monash.edu/research/sustainability-institute/

[57] Bushfires are fires that occur within the bush. The bush is a collective term for scrub, woodland or grassland and is used in Australia and New Zealand. In Europe and the USA, the term wildfire is used to describe this kind of fire.

Bushfires were particularly destructive during the following years:

- 1939 – 71 deaths, 2 million hectares burnt
- 1983 – 6,100 hectares burnt, 47 deaths
- 2006 – over 1 million hectares burnt
- 2009 – 173 deaths, 411,239 hectares burnt

As shown in Table 8 (below), the bushfires that occurred in Australia in February 2009 were some of the most deadly bushfires to have occurred in the world in recent times.

**Table 8 – International Comparison of Deaths Caused by Bushfires**

| Year | Location | Deaths |
|---|---|---|
| 1871 | Peshtigo, Wisconsin, USA | 1200 |
| 1918 | Cloquet, Minnesota, USA | 453 |
| 1894 | Hinckley, Minnesota, USA | 418 |
| 1881 | Thumb region, Michigan, USA | ~300 |
| 1916 | Matheson, Ontario, Canada | 282 |
| 1997 | Sumatra, Kalimantan, Indonesia | 250 |
| 1987 | Greater Hinggan, China | 213 |
| **2009** | **Victoria, Australia** | **173** |

Source http://home.iprimus.com.au/foo7/firesum.html

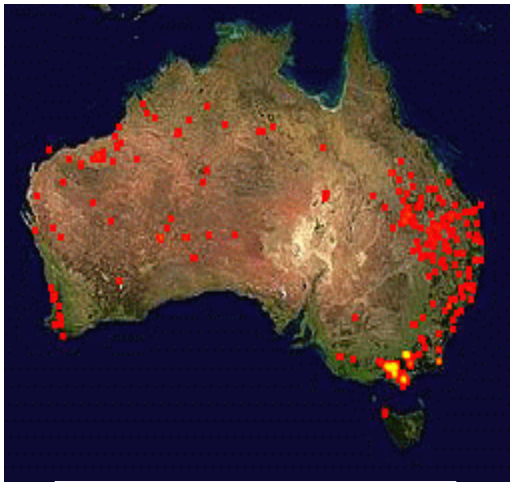
**The February 2009 Bushfires**

During the February 2009 bushfires:

- 173 people died
- 2,029 homes lost
- 61 businesses lost
- 5 schools lost
- A number of other properties including a small number of towns were lost
- 400,000 hectares of land was burned

Figure 52 (right) shows a satellite view of the bushfires in Australia from 31st January to the 9th February 2009. The fires covered a significant proportion of the land area of the country, and a significant proportion of eastern Australia in particular.

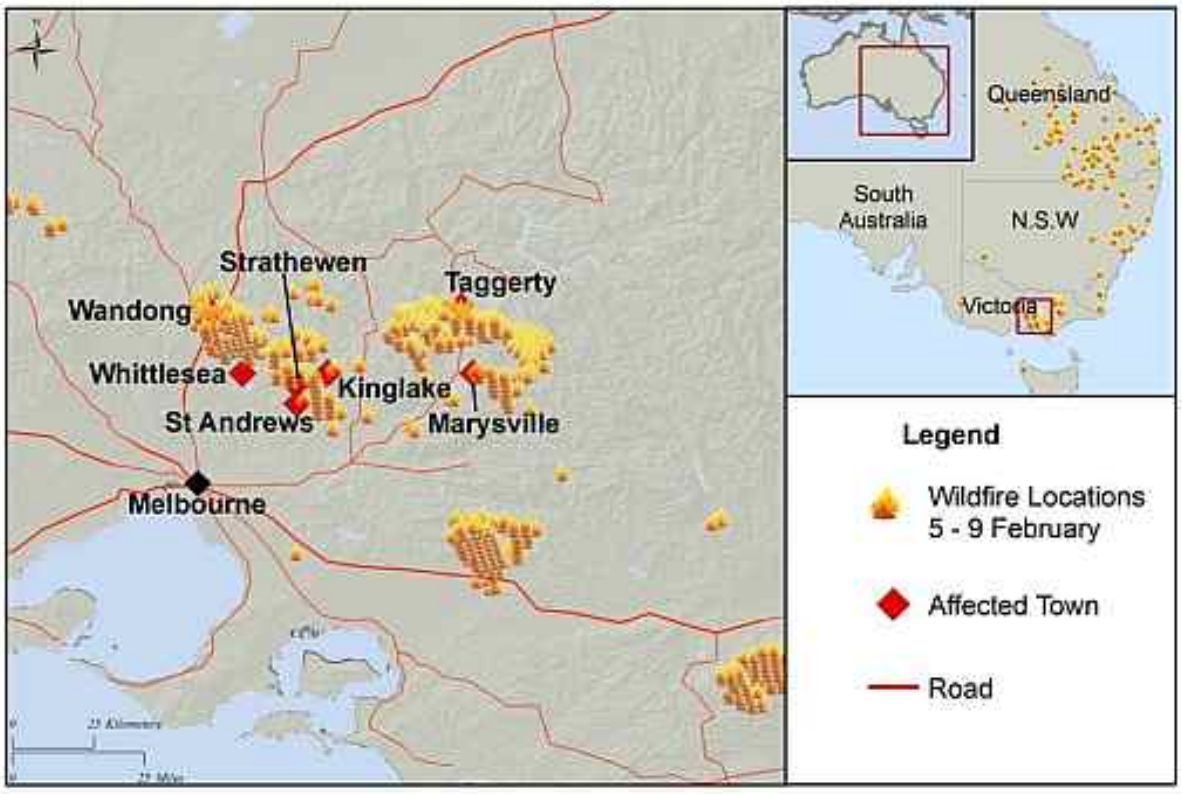
**Figure 50 - Fires in Australia from 31-01-09 to 9-02-09**



Source: NASA Satellite

The State of Victoria was very badly hit by the 2009 bushfires, with a number of towns and roads affected (See Figure 53, below).

**Figure 51 – February 2009 Bushfires in Eastern Australia**




Source: Victoria Bushfire Royal Commission

The 2009 bushfires had a significant economic impact on many sectors of the Australian economy.

- 30% of homes destroyed had no insurance
- 8,150 insurance claims have been made
- As of 5th March 2009, there had been $1.2 million worth of claims and $160 million had been paid to policy holders in emergency payments

The devastation of the bushfires has had, and will have, a lasting impact on the people of south-east Australia. This is especially the case for those who lost friends and family in the bushfires, those who had no insurance and for those from towns that were completely destroyed in the bushfires, for instance Marysville, Victoria.

**Marysville, Victoria**

38 people died in the bushfires affecting a small town called Marysville in Victoria. The police investigation of this bushfire was enormous – it involved 250 investigators taking more than 4,000 statements. The police investigation determined that the fire had been deliberately lit.

The image overleaf on the left (within Figure 54) shows Marysville before the bushfire. It is quite clear from this image that the town is surrounded by dense vegetation and forest. The image overleaf on the right was taken during the bushfire. This image quite clearly shows how the bushfire completely surrounded the town, blocking escape to those who

remained. Figure 55 (below) shows Marysville after the bushfire, with trees and homes burned.

**Figure 52 – Marysville Prior to and During the 2009 Bushfire**


**Figure 53 – Marysville after the Bushfire in February 2009**

**Impact of the 2009 Bushfires on Animals**

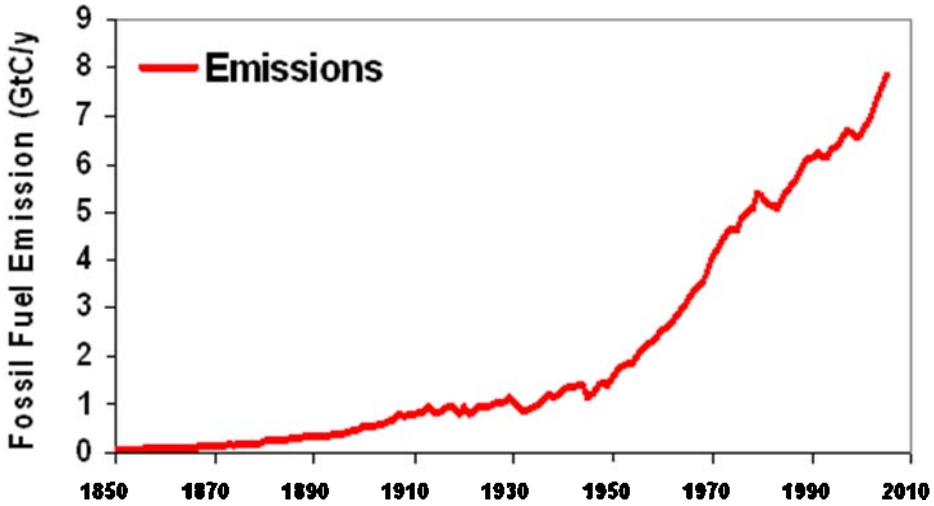
The bushfires also had a serious impact on the animal population. While some animals were obviously killed in the bushfires, animals that survived the bushfires were under extreme risk of death even after the bushfires had extinguished. So much of the vegetation had been burnt that no food or water was available. Individuals and organisations did their best to try to provide food and water to try to keep surviving animals alive.

**Figure 54 – Trying to Keep Animals Alive After the Bushfires**


**Climate Change Emissions from Fossil Fuels and Cement**

In summary, scientists believe that the likelihood of severe bushfires occurring in south eastern Australia is likely to increase if climate change continues on its current trend. The atmospheric concentration of CO2 (Carbon dioxide[58]) in 2007 was 383 parts per million, which is 37% higher than pre-industrial levels of CO2 (i.e levels prior to the industrial revolution) (see Figure 57, below). Australia alone annually produces 552 million tonnes of CO2.

**Figure 55 – World Fossil Fuel Emissions 1850 – 2009**




Anthropogenic $CO_2$ emissions are growing four times faster since 2000 than during the previous decade, and are rising above the worst case emission scenario of the Intergovernmental Panel on Climate Change (IPCC):

- The growth rate of carbon emissions from fossil fuels and cement averaged 3.5% per year for the period 2000-2007, almost four times faster than the previous decade.

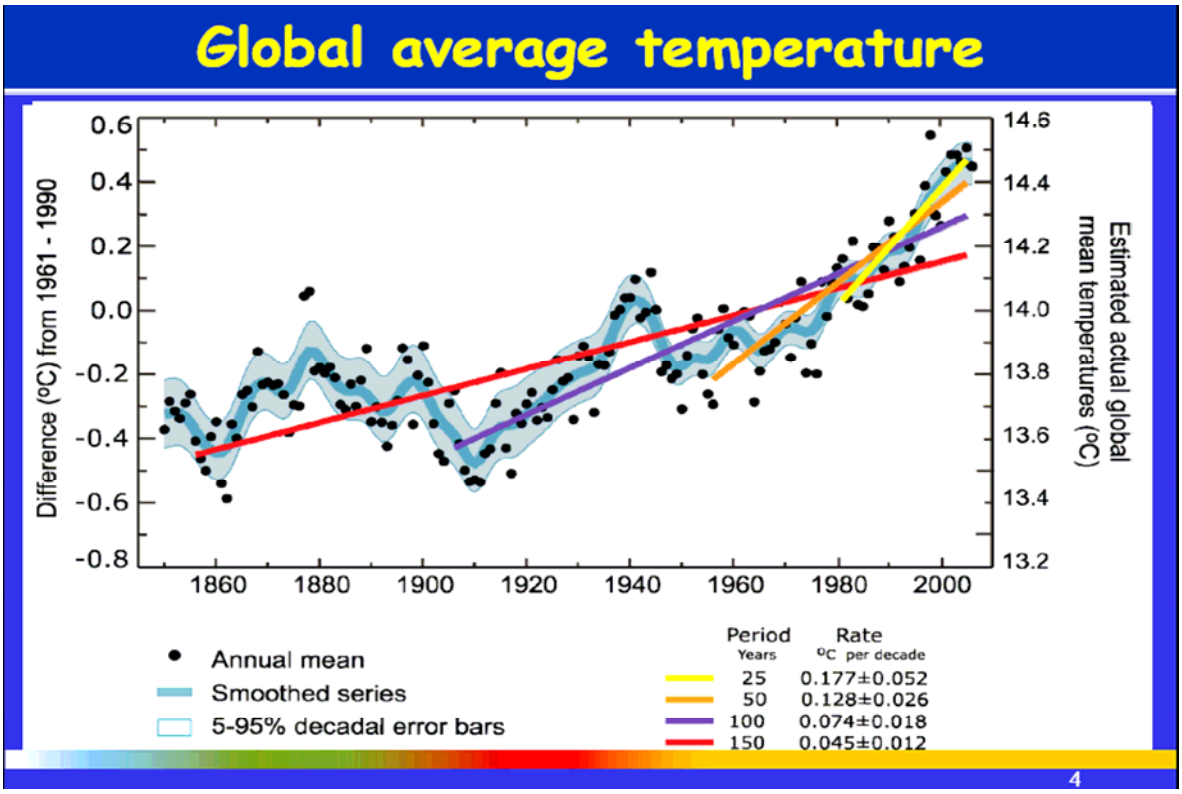
- At a concentration of 383 parts per million, this is, the highest level of CO2 in the last 650,000 years.

[58] Carbon dioxide is one of the main gases linked to global warming and climate change.

- The annual mean increase in CO2 was 2.2 ppm in 2007, up from 1.8 ppm in 2006. This shows that CO2 emissions continue to rise year on year.
- Human-generated emissions reached 10 billion tonnes of carbon in 2007.

In correspondence with increased CO2 emissions, there is evidence of a rise in average global temperature between 1850 and 2009 (see Figure 58, below). Increases in temperature obviously increase the likelihood and severity of bushfires.

**Figure 56 – Global Average Temperature 1850 – 2009**




**How did Climate Change affect the Bushfires of Saturday 7th February 2009 in Australia?**

A number of factors related to climate change had a significant impact on the number of and spread of bushfires on Saturday 7th February 2009. The specific factors are outlined in Figure 60 (overleaf). It is now accepted that the February 2009 bushfires were a disaster waiting to happen because antecedent climate conditions provided the ideal situation for a severe bushfire event. It should not have been a surprise to the authorities that these extreme bushfires occurred when they did.

In Australia, the risk of bushfires is measured and presented using the MacArthur Forest Fire Danger Index (FFDI). The fire danger ratings and FFDI ranges are presented in Figure 59, (right). The FFDI was developed so that the Black Friday fires of 1939 had an FFDI of 100. The FFDI on 7 February 2009 for a number of sites in Victoria reached unprecedented levels in the range of 120 – 190 and some sites were over 300. Increased fire danger should have been expected.

**Figure 57 - MacArthur Forest Fire Danger Index (FFDI)**

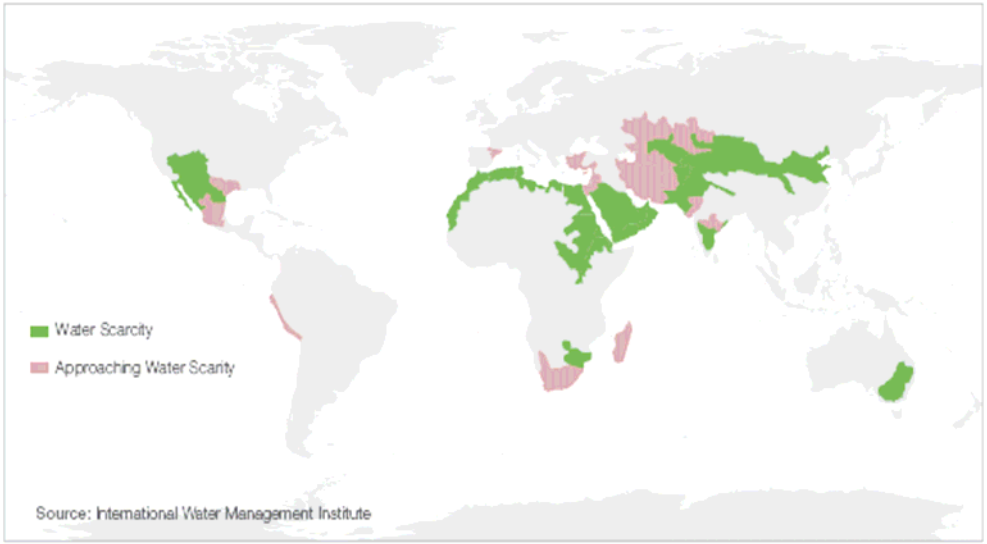
| Fire Danger Rating | FFDI range |
|---|---|
| High | 12 to 25 |
| Very High | 25 to 50 |
| Extreme | >50 |

**Figure 58 – Climatic Factors Providing Suitable Conditions for the Bushfires on Saturday 7th February 2009**

- **Maximum temperature**
  Record high Melbourne temperature on the day of the fires, 46.4C
  Record setting heat wave the previous week, three days over 43C
- **Relative humidity**
  Record low relative humidity on the day of the fires, 5%,
- **Wind speed**
  Very strong northerly winds on the day of the fire, up to 100 km/hr
- **Drought factor**
  Record low rainfall from start of the year, 35 days no rain up to the day of the fire, second longest period ever with no rain, driest start to the year on record
  Preceded by 12 years of much below average rainfall, contributed to extremely low fuel moisture, 3-5% on the day of the fire.

According to the IPCC Fourth Assessment Report, an increase in fire danger is likely to be associated with a reduced interval between fires, increased fire intensity, a decrease in fire extinguishments and faster fire spread. In south-east Australia, the frequency of very high and extreme fire danger days is likely to rise 4-25% by 2020 and 15-70% by 2050. According to these predictions, fire danger will be a significant problem in south-east Australia for the foreseeable future. The problem will be further compounded by water scarcity which increases the likelihood of bushfires occurring (with very dry and easily combustible vegetation) and, when they do occur, reduces the water supply available to use to extinguish the bushfires. South-east Australia is one of several locations around the World suffering from water scarcity (see Figure 61, below). Water scarcity had a significant influence on the occurrence and spread of the bushfires in Australia in 2009.

**Figure 59 - World Water Scarcity**




Source: Head, P. 2008 Entering the Ecological Age: The Engineer's Role p. 29

**Outcomes of the 2009 Bushfires**
The key outcomes of the 2009 bushfires were:

- Short term action, at least from authorities. For instance, a large bushfire fund was established, temporary homes were created, large scale clearing of rubble was initiated.
- Significant distress to individuals and communities – particularly through the loss of whole towns
- Numerous debates have begun about the bushfires
- Many of the problems experienced during the February 2009 bushfires had been experienced during previous fires, yet they had not been addressed. These problems included:
  - Lack of clear responsibilities among public/statutory agencies
  - Communication failures
  - Equipment failures (for instance, different hose fittings used by different fire fighting organisations)
  - Warnings were too late and conveyed insufficient information to the public

A number of bodies were created and tasks initiated in order to investigate the bushfires, begin to repair the damage that was caused, and produce recommendations to reduce the impact and devastation caused by future bushfires:

- Operation Phoenix was established to:
  - Investigate the causes of the bushfires
  - Apprehend offenders who deliberately set bushfires
  - Inquest for the Coroner for fire-related deaths

- The Victorian Bushfire Royal Commission (VBRC)was formed:
  - To examine factors that lead up to, during and after the bushfires
  - An Interim Report was produced on 17 Aug 2009, and the Final Report is due on 31 July 2010
  - The State supports all recommendations of the VBRC, including:
    - The establishment of building design regulations
    - Much greater tree clearing
    - The creation of a new fire danger rating scale

- Creation of a National Forum to reduce deliberate bushfires in March 2009:
  - This forum will be responsible for drafting new consistent laws on bushfire arson.

- The Australian Federal Government has dedicated funds of $400 million for national reconstruction, with a possible additional $200 million +. Federal funding is also going to be used to support a National Emergency Warning System to provide future warnings to landlines and mobile phones.

Another significant outcome of the 2009 bushfires has been the creation of a new Fire Danger Rating Scale (see Figure 62, overleaf). This new scale replaces the MacArthur Rating Scale used prior to the 2009 bushfires. Using the new scale, during the summer of 2009 there were 5 days that would have been classified as Code Red – Catastrophic.

**Figure 60 – The New Fire Danger Rating Scale in Australia**

| Fire Danger Rating | FFDI range |
|---|---|
| Catastrophic (code red) | 100+ |
| Extreme | 75-99 |
| Severe | 50-74 |
| Very High | 25-49 |
| High | 12-24 |
| Low to moderate | 0-11 |

**Key Challenges Regarding Future Bushfires in South East Australia**

While lessons have been learned and improvements will be made to classification and response to bushfires, there are still a number of challenges regarding future bushfires in South East Australia. These include:

- Climate change – particularly the greatly reduced rainfall and temperature increases in the region
- Increased population growth and urbanisation near forest areas
- Disturbed and dislocated behaviour which increases the likelihood that individuals within society will be motivated to set bushfires. Contributing factors include:
  - Increase in child abuse plus inadequate response to the problem
  - High levels of youth unemployment
  - Possibly the increase in press reporting about fire
- Governance
  - Co-ordination of responses to fire
  - Communication and who should be make the decisions during a fire?
  - Reconstruction, the decision about rebuilding should be made by the community or controlled by government policy (?)
- Planning which is presently largely short term and not strategic
- Co-ordination between authorities
  - Data collection which is uniform and available
- Putting in place the best prevention programmes
- Lack of treatment facilities for arsonists and potential fire-lighters
- Lack of research to understand the best programmes
- The subject is complicated by being an emotive/political area
- High financial implications – blame, insurance
- Lack of water (water scarcity)
- Often limited access and exit routes
- Preparedness of the community
- Tourism in many areas and how to communicate dangers
- Old buildings without fire protection

**Causes of Bushfires in the State of Victoria**

Analysing the causes of bushfires in Victoria over the last 20 years, it is apparent that deliberate ignitions (arson) are a significant cause (Figure 63, overleaf).

It is known that arsonists are:

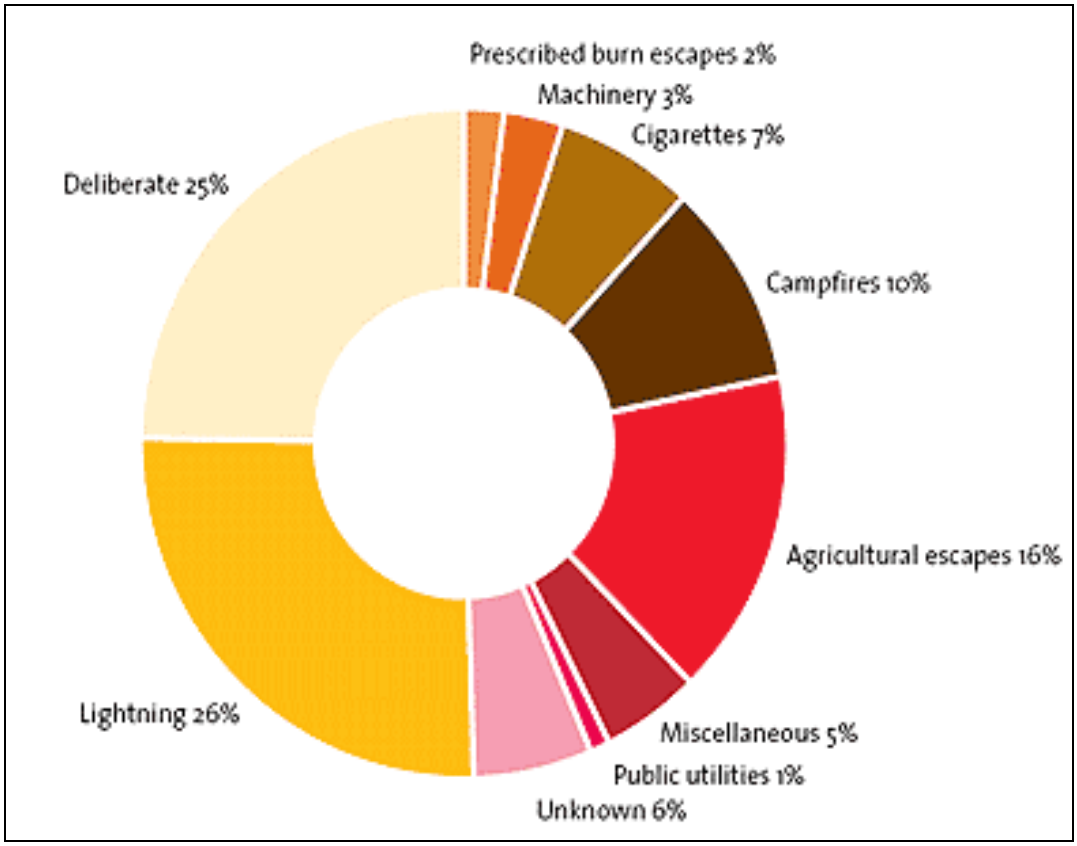
- Commonly children and adolescents, but some are adults.
- Usually male

Arson recidivism[59] rates vary between 4% and 60%. It is thought that arsonists commit multiple crimes.

Arsonists tend to fall into two categories. Their fire setting behaviour will either be expressive or instrumental:

- Expressive – psychopathology or unresolved trauma
- Instrumental – to achieve a goal, such as revenge, to destroy evidence of another crime.

**Figure 61 - Causes of Bushfires in Victoria: Past 20 year average**




Source http://home.iprimus.com.au/foo7/firesum.html

**Challenges to Reducing Bushfires in Australia**

There are a number of significant challenges to reducing the number of arson fires set each year in Australia. Janet explained a few of these challenges:

- **20,000 to 30,000 fires are lit by arsonists in Australia each year**
  - Most don't progress beyond fire-setting
  - However, ¼ to ½ of the bushfires are started this way

- **Societal response to bushfires**
  - Reported arson is increasing

[59] Recidivism rate literally means the percentage of individuals who re-offend by setting another arson fire.

  - Few individuals are identified and charged with the offence
    - The clearance rate in Victoria is relatively low at about 16%
  - Few who are charged are found guilty
  - Few who are found guilty receive a custodial sentence
  - Few who receive a custodial sentence receive the maximum sentence

- **Lack of research**
  - Very little research has been completed on the socio-demographic and psychological characteristics of arsonists and recidivism in Australia. Most research comes from the UK and Europe.
  - As a consequence, little is known about the extent, cause, prevention and treatment of bushfire arson in Australia

- **Current samples and statistics may be skewed**
  - Current data on arsonists is based on criminal justice and mental health statistics. What about 'unsuccessful arsonists', or perhaps highly successful arsonists, who are not recorded in these official statistics?

- **There is some international research on urban arson – usually adolescents**
  - However, there is less international research to draw from on rural arson and arsonists, which is where and by whom bushfires are usually set.

- **Work by the emergency services and fire services in Australia**
  - There are about nine psycho-educational and safety focused programmes aimed at juveniles, only.
  - Education about fires and safety is commonly undertaken by local fire brigades in schools – there is no national or State-level guidance and there are no standard requirements

**Australasian Centre for the Prevention of Bushfire Arson**

The Australasian Centre for the Prevention of Bushfire Arson (ACPBA) has been created with the aim of reducing the incidence of deliberate bushfires in Australia by one third in 5 years and by 50% in 10 years. The centre has been given establishment funding by a major Australian insurance company (RACV Insurance) for one year, which reflects the importance that the insurance industry is placing on bushfire prevention work.

The ACPBA will achieve its aim through a coalition of all interested parties, including: researchers, practitioners, emergency personnel, legal representatives, government and the community.

Work by the centre will be undertaken in three key streams:

- **Stream 1** - Prevention programs in the major bushfire risk areas

- **Stream 2** – Understanding behaviour and treatment for juvenile and adult arsonists

- **Stream 3** - Legal response - police and courts/punishment

The ACPBA has three key principles. These are to be:

- **Comprehensive**
  - Expertise from Australia and overseas on: bushfire behaviour and management, fire-fighting, climate change, law, policing, criminology, psychology, community engagement and development, policy and governance, government, economics, business and agriculture, insurers and emergency management.

- **Inclusive**
  - It will ensure that special need/interest groups, such as Indigenous Australians and those at risk of social exclusion, are included.

- **Strategic and operational**
  - A strategic and planning ‘top-down’ perspective, and a community, business and interest groups engagement and action, ‘bottom-up’ perspective.

There are a number of specific objectives that the ACPBA aims to address in order to achieve its overall aim of reducing the incidence of bushfire arson. These objectives include:

- Collection and review of current knowledge about bushfire arson.
- Establish communication and knowledge sharing between researchers, and between researchers, practitioners, government and other stakeholders.
- Initiate short to longer term research projects to address identified knowledge deficits, such as the psychology of arson and the additional risks posed by climate change and their location.
- Develop models of prevention approaches, field test and evaluate their effectiveness.
- Establish an Australian arson knowledge centre or virtual clearinghouse which:
  - facilitates national data collection and knowledge development and has strong links with international people in the field,
  - promotes communication between stakeholders,
  - Provides a strong funding base for the prevention of arson
  - Develops risk assessment models, predictive models of fire-setting and management protocols
  - facilitates the establishment of prevention and treatment programs

The substantial work that will be completed by the ACPBA over the coming few years will inform prevention strategies in Australia. The findings of the various research programmes to be completed by the ACPBA will also of interest and significance at a wider global scale.

## 4.12 Management of Forest Fires in Greece

This presentation was written and delivered by Efstratios Anastasopoulos, Forestry Fire Lieutenant, Senior Instructor of the Hellenic Fire Service and Air Tactical Group Supervisor (ATGS).

**Greece**
Efstratios gave the group a brief introduction to Greece by presenting some key facts. These facts are summarised below:

- Capital: Athens
- Population: 10.9 million people
- Population density (per sq km): 80
- Population living in urban areas: 60%
- Area: 131.957 sq km
- Coordinates: 39 00 N, 22 00 E
- Language: Greek
- Major religion: Orthodox Christian

**The Mission and Objectives of the Hellenic Fire Service**
The Hellenic Fire Service is the national fire and rescue service in Greece. In recent years, the Service has experienced a significant change in governance. Prior to 2007, the Hellenic Fire Service was the responsibility of the Ministry of Public Order in Greece; however, in 2007 the Hellenic Fire Service became the responsibility of the Ministry of the Interior of Greece.

The key mission of the Hellenic Fire Service is to save/guard and protect the life and property of the citizens and the State from the risks of fires and calamities.

In order to achieve this mission, the Hellenic Fire Service must achieve a number of specific objectives:

- To extinguish fires during peace and war times, to take and impose preventive measures in order to avoid their expansion and to help those at risk.
- To deal with technological and industrial accidents and to rescue people and goods in peril.
- To take and impose preventive measures, in order to deal with the risks and losses due to earthquakes, floods, break - downs or other calamities and also, to assist in the rescue of the people and properties at risk.
- To assist people who have been trapped in elevators or in a car after an accident.
- To deal with forest fires.
- To recommend, impose and follow - up preventive and suppressive fire protection measures according to the existing legislation.
- To investigate the causes of fires.
- To train and advise the public on the issues of prevention and immediate extinction of fires at an early stage.

Every year the Hellenic Fire Service responds to a total of 80,000 incidents: 31.5% (n=25,000) of these incidents are urban fires; 30% (n=24,000) are other rescue incidents; 22.5% (n=18,000) are offers of assistance for people trapped in elevators; and, 16.25% (n=13,000) are forest fire incidents.

**Personnel and Equipment of the Hellenic Fire Service**

The Hellenic Fire Service employs approximately 9,000 professional fire fighters, 5,500 seasonal forest fire fighters (29%), 3,000 volunteer fire fighters (16%) and 140 civilians (1%). The personnel structure is therefore: 54% professional fire fighters; 29% seasonal forest fire fighters; 16% volunteer fire fighters; and 1% civilians. While volunteer fire fighters form a large proportion of the total fire fighting personnel in some European countries, only a relatively small proportion of fire fighters in Greece are volunteers.

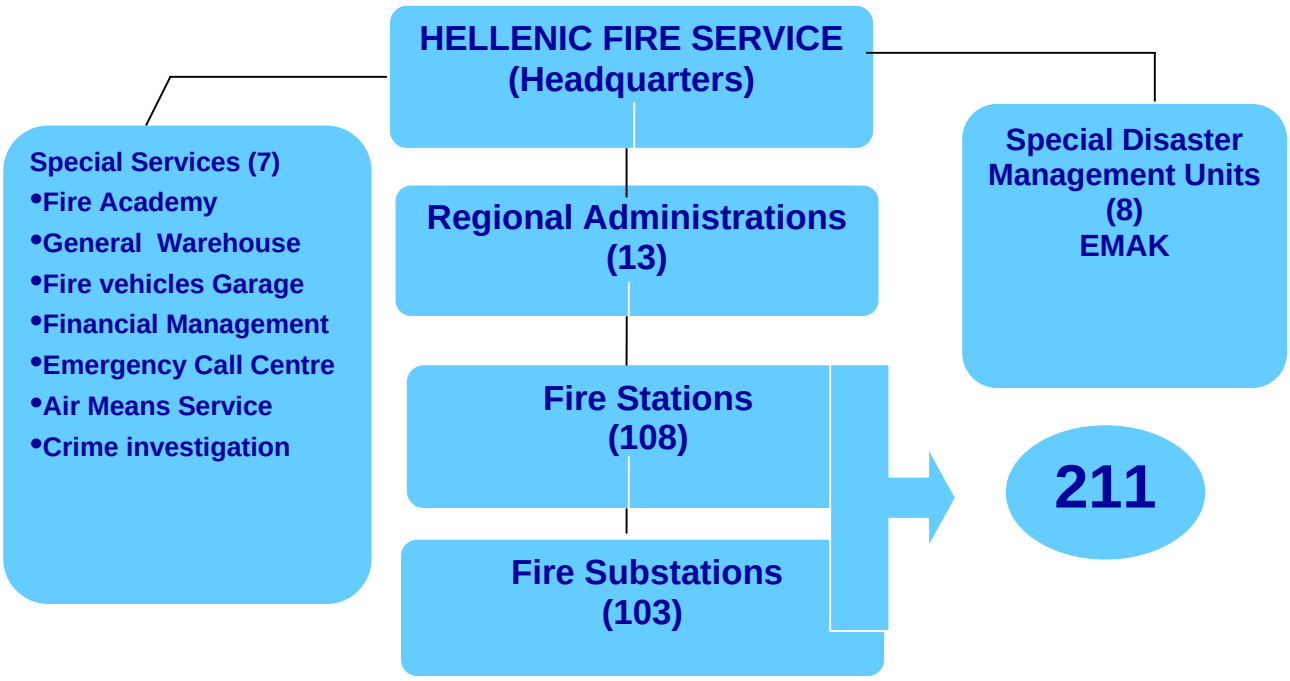
The Hellenic Fire Service has the following equipment available to deploy to incidents:

- Fire engines: ~1400 (of all kinds)
- Articulated fire fighting vehicles: 19
- Ladder trucks: 23
- Snorkels: 56
- Special vehicles: 40
- Auxiliary vehicles: 975
- Fire boats: 11
- Firefighting aircrafts: 10 CL 415, 14 CL 215, 18 PZL, 3 Grumman
- Firefighting helicopters: 3 BK 117, 2 SUPER PUMA
- Hired helicopters (forest firefighting): 12 (2 ERICCSON, 4 MI 26, 6 CAMOV)

**The Organization Structure of the Hellenic Fire Service**

The Hellenic Fire Service is a national fire and rescue service which comes under the administration of the Ministry of the Interior. The Hellenic Fire Service operates under the command of the Fire Brigade Headquarters in Athens, which is headed by the Chief of the Fire Service. As shown in the organization diagram in Figure 64 (below), 13 regional administrations (see Figure 65, overleaf), 8 Special Disaster Management Units (EMAK) and 7 special services operate under the Fire Service headquarters.

**Figure 62 – Organization Diagram of the Hellenic Fire Service**



The Regional Administrations of the Hellenic Fire Service contain administrative staff and planning services. They represent an intermediate level of command between the Fire Corps Headquarters and its operational Services with the aim being a more effective co-ordination of firefighting work and a more facile resolution of local problems.

Within each regional Administration there are other administrations that are located within large towns that have at least two fire stations. These local administrations are attached to the Regional Administration and their task is to coordinate and control activities of the fire stations within their jurisdiction.

Fire Stations within the Hellenic Fire Service are operational units and are classified into the following categories:

1. **City Fire Stations**, A', B', C' or D' class (A' being the higher risk group), depending on the population density and the risk factor of the area, in which they are located.
2. **Ports Fire Stations**.
3. **Military Airports Fire Stations**, A', B' or C' class.
4. **Civil Airports Fire Stations**, A', B' or C' class.
5. **Volunteer Fire Stations and Sub-stations**.

**Figure 63 – The Thirteen Regional Administrations of the Hellenic Fire Service**

**Special Disaster Management Units (EMAK)**
The Hellenic Fire Service has 8 Special Disaster Management Units (EMAK). They are highly trained professional units that are stationed across the country and which can be called to respond to incidents in Greece as well as abroad. They are trained to respond to serious incidents, such as major fires, earthquakes, industrial, technological and environmental hazards.

The 8 EMAK Units are:

- 1st Unit: Athens (Elefsina)
- 2nd Unit: Thessaloniki
- 3rd Unit: Heraklion
- 4th Unit: Komotini
- 5th Unit: Ioannina
- 6th Unit: Patra
- 7th Unit: Lamia
- 8th Unit: Larissa

**Education System**
The theoretical and practical training for fire-fighting personnel in Greece is provided by the Fire Academy, located in Kifissia, which is 18 km from Athens. Education is organized as follows:

- School of cadet fire officers - duration 4 years
- School of cadet sub-officers - duration 6 – 9 months
- School of cadet firefighters - duration 4 – 6 months
- Foreign languages school

**Fire Service Coordination Centres (199 SEKYPS) and Forest Fire Coordination Centres (SKED)**
The Co-ordination and Operational Centre of the Hellenic Fire Service is an independent Service with an operational, coordinating and informative role. Its main task is to receive, on a 24-hour basis, emergency calls and, subsequently, to mobilize and co-ordinate fire and rescue units.

**Figure 64 – The Fire Service Coordination Centre in Athens, Greece**

Under the administration of the Co-ordination and Operational Centre also comes the Forest Fires Co-ordination Centre, which operates during the forest fire season. Its mission is to mobilize and co-ordinate aerial firefighting units (aircrafts and helicopters).

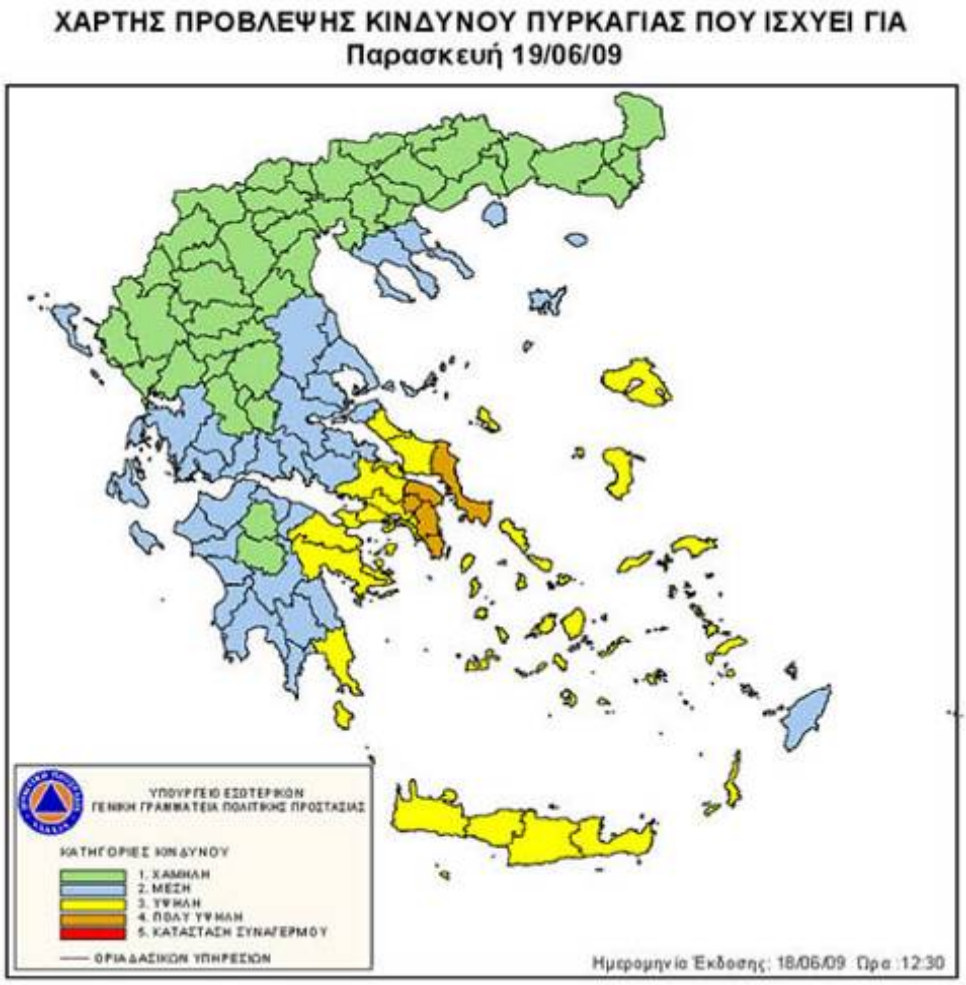
**Forest Fire Management**

The fire season in Greece begins on the first day of May and ends on the 31st October each year. Each District across Greece is required to develop an intervention plan for the fire season. Fire prevention and fire suppression methods are outlined in the intervention plan.

**Figure 65 – Greek Fire Fighters Suppressing a Wildfire**

On a daily basis during the fire season, the General Secretariat of Civil Protection (GSCP) distributes a map of Greece which presents the calculated Forest Fire Index. An example of one of these maps is shown in Figure 68 (overleaf). Those areas of Greece that are coloured in yellow and orange are at higher risk of forest fires than those in blue and green. This index indicates the possibility of forest fires starting and developing in any area across the country. The Forest Fire Index is always calculated the day before for the day ahead. This provides enough time for the fire service to locally implement its intervention plans, based on the information contained within the Forest Fire Index.

**Figure 66 - The Forest Fire Risk Index in Greece**




**Forest Fire Prevention**

Forest fires prevention is a complex matter which forms part of wider forest management procedures.

Certain measures can be implemented within a forest management schedule to reduce the risk and likelihood of forest fires. These measures include:

- Creation of fire break zones
- Development of a forest road system
- Regular removal of fuel from the forest
- Completion of forest management studies

The Greek Forest Service are legally responsible for the fire prevention activities listed above, however, in practice they do not have a very large workforce so some of this work is not completed. This is particularly a problem when fire break zones are not cleared. In addition, there is not a lot of partnership working between the Forest Service and the Fire Service. In Attica Region (see page 102), in 2010 seasonal fire fighters will be employed to work longer working from April to November (rather than March to October, which is the main fire season). The extra work they will complete will include make and maintaining fire breaks.

**Figure 67 – A Forest Road in Greece**

**Observation and Identification of Forest Fires**

Different observation techniques are used by the Hellenic Fire Service to identify the location of any forest fires that have started. There are two key methods of observation that are deployed by the Hellenic Fire Service:

- Aerial Observation (see Figure 70, below) – helicopters and airplanes
- Ground Observation (see Figure 71, overleaf) - Fire Warden Stations, Patrol Vehicles, Operational Officers, Army, Police, and Volunteers

**Figure 68 - Aerial Observation and Fire Fighting in Forests in Greece – Helicopters and Airplanes**

**Figure 69 – Ground Observation Methods for Forest Fires in Greece**


## Attica Region Case Study

During the presentation, Efstratios presented information about the Attica region in order to provide a specific case study to describe the forest fire observation and suppression activities completed by the Hellenic Fire Service.

The forest fire observation methods that are actually deployed by the Fire Service on a given day will depend upon the daily calculated Forest Fire Index. Figure 72 (overleaf) is a diagram showing the operational readiness levels of fire fighting units in the Attica Region, as dictated by the Forest Fire Index. The Attica Region is a peninsula in southern Greece which contains Athens, the capital city.

**Attica Region Forest Activity Plans**

For each of the forest areas in the Attica Region, activity plans have been created which contain important information for fire service personnel. The information included in these plans includes:

1. Basic road lines and forest roads
2. Designated meeting areas for fire units to gather and await instructions on how and where to advance to a fire front.
3. First ground forces
4. Locations of other points of interest for fire fighting operations:
    - Hydrant
    - Ground tank water
    - Military camps

**Figure 70 - Forest Fire Index and Levels of Operational Readiness in the Attica Region**

## Forest Fire Risk Index 1,2, and 3
## 1st Operational Readiness Level

- Aerial observation lasting 1hrs 30mins to 2hrs 30mins from 12:00hrs to 17:00hrs (CL215 and CL-415 carrying water)
- Ground observation: 31 Fire warden stations; 82 fire vehicles; 7 operational officers

## Forest Fire Risk Index 4
## 2nd Operational Readiness Level

- Aerial observation lasting 1hrs 30mins to 2hrs 30mins from 12:00hrs to 17:00hrs (CL215 and CL-415 carrying water)
- Aerial observation also by the Air Force, Navy and Coastguard
- Ground observation: 31 Fire warden stations; 100 fire vehicles; 28 operational officers

## Forest Fire Risk Index 5
## GENERAL ALERT
## 3rd Operational Readiness Level

- Aerial observation lasting 1hrs 30mins to 2hrs 30mins from 12:00hrs to 17:00hrs (CL215 and CL-415 carrying water)
- Aerial observation also by the Air Force, Navy and Coastguard
- Ground observation: 31 Fire warden stations; 100 fire vehicles; 28 operational officers
- Also, all fire fighters called to fire stations and remain there until the operational readiness level is reduced. This allows rapid deployment and response to any incidents

**Forest Fire Extinguishing Methods used by the Hellenic Fire Service**
Figure 73 (on following page) illustrates the process from the initial alarm call about a forest fire through to fire fighting actions that are taken to extinguish the fire. This process involves a risk assessment process and procedure which is used by commanding officers to decide what resources to commit to a forest fire incident and where these resources should be deployed. If a forest fire occurs near to an urban area, then specialist air tactical and ground tactical commanders are brought into the incident command structure.

When fire fighters are deployed to an incident, there are two key types of forest fire extinguishment methods they can use:

- Direct attack
- Indirect attack

***a) Direct Fire Attack***
During direct fire attack, fire fighters work directly on the fire front by putting out the fire and separating burnt areas from areas that were not burnt.

Direct fire attack is only applied under the following circumstances:

- **Working time:** Limited, due to favorable circumstances
- **Thermal radiation:** Thermal radiation levels must be minimal
- **Smoke:** The amount of smoke should allow safe working
- **Ground structure:** There should be suitable physical features to enable the operation.

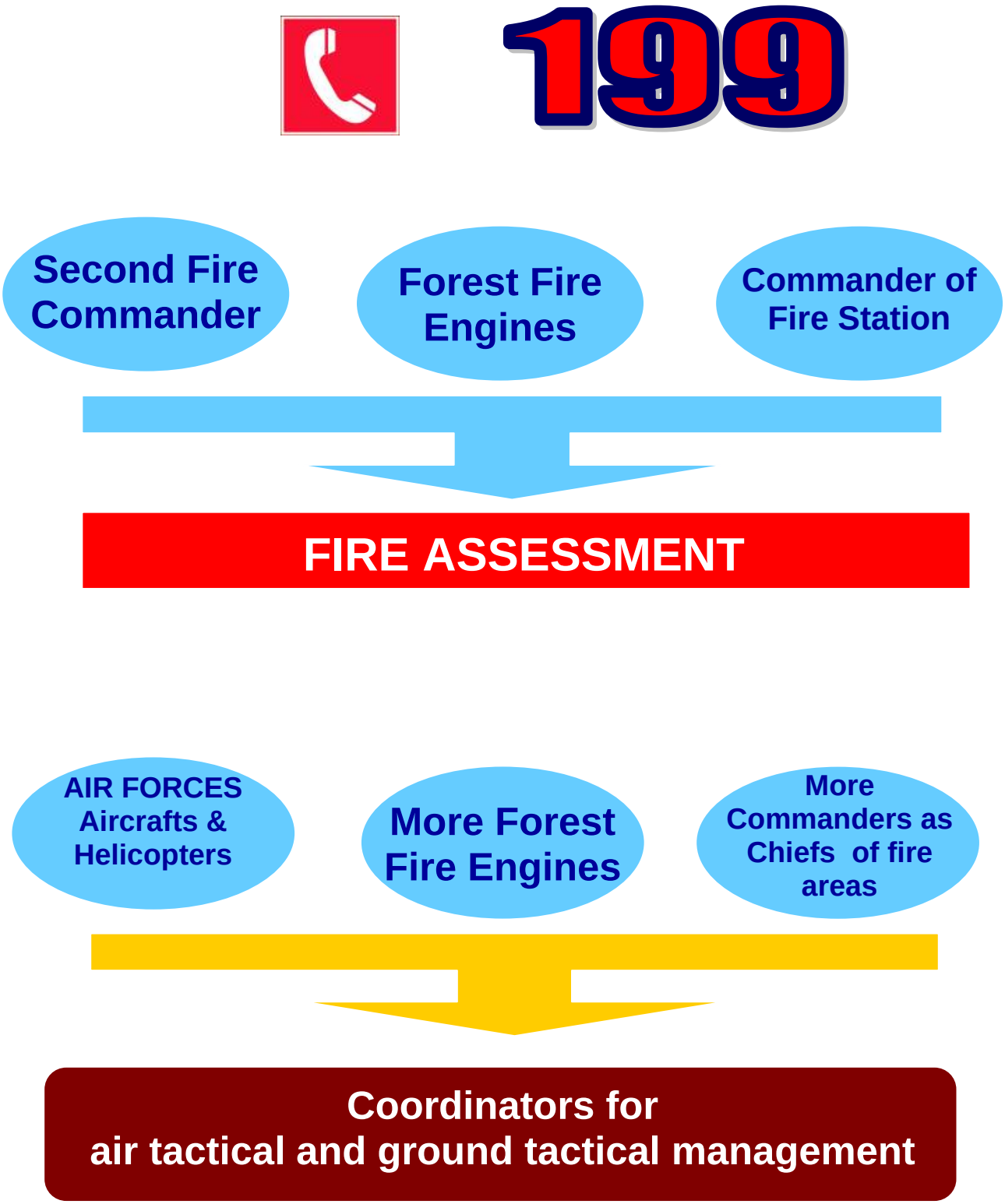
The advantages of direct attack can be:
- Sometimes juts a small area is burned
- Small fires do not spread
- Only a small number of fire fighters are required
- There are no doubts about the course of action to take

The disadvantages of direct attack can be:
- Creates a rough fire perimeter
- Difficulty in supervision of the fire front between two thermal points
- Personnel work under raw and difficult circumstances
- There is often inadequate exploitation of natural breaks in the vegetation

***b) Indirect Fire Attack***
Indirect Fire Attack (see Figure 74 on page 106) is used when:
- Heat and smoke prevent fire fighters from approaching the fire front
- The ground structure is defective or vegetation composition does not allow direct cutting of a fire break zone.
- Natural obstacles are present
- Fire spread rate is fast

The advantages of indirect attack can be:
- Better personnel safety
- Exploitation of natural breaks in vegetation
- Easy use of mechanical means to create fire breaks
- Better and more efficient distribution of resources

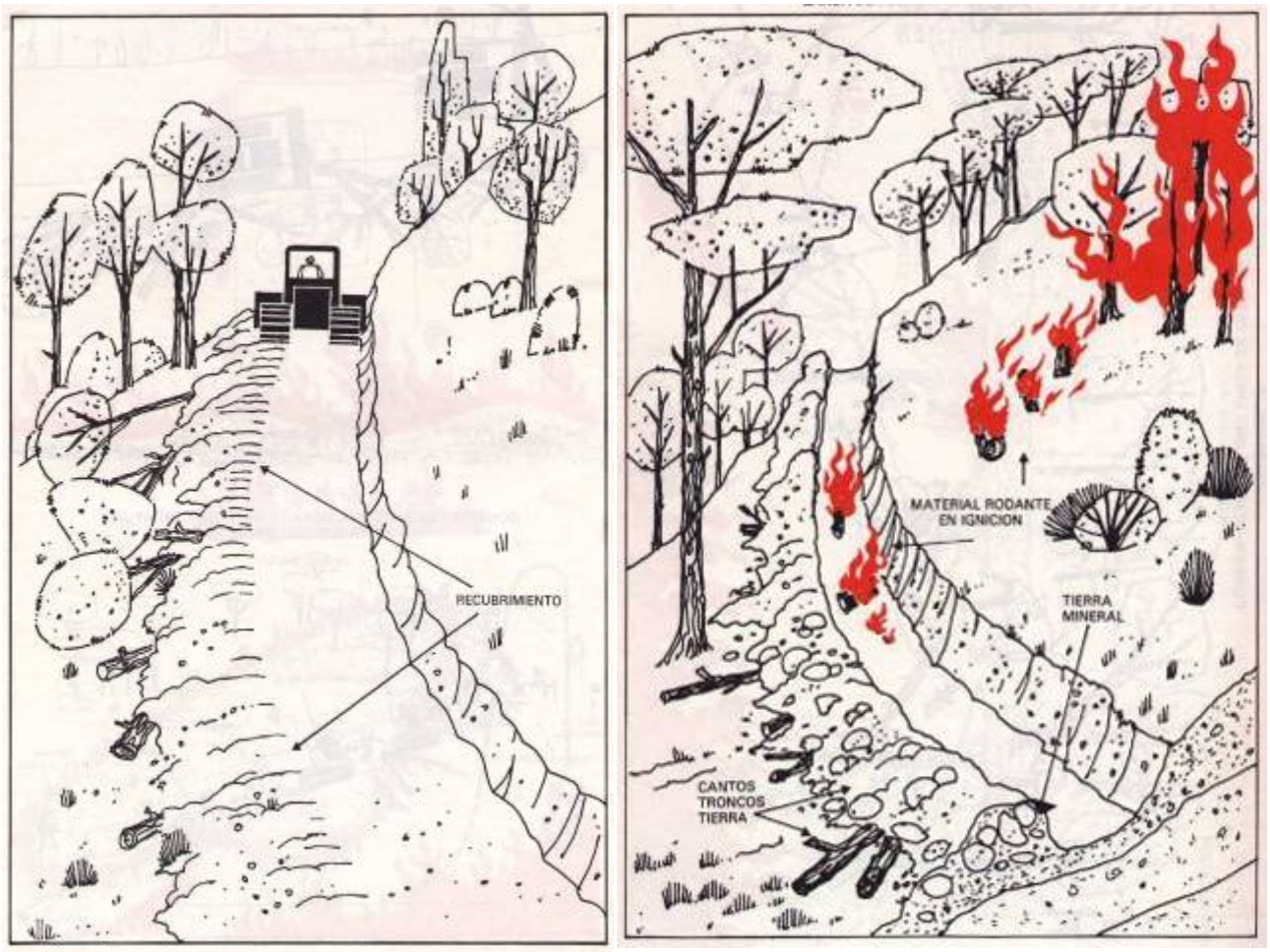
**Figure 71 – Forest Fires in Greece – The Process from Initial Alarm to Fire Fighting Activities**



The disadvantages of indirect attack are:

- More areas are burned
- Requires an experienced commander
- Requires excellent coordination of heads of sections
- There is a risk that the fire will jump over control zones

**Figure 72 – Diagram Showing Creation of a Fire Break Zone (an example of indirect fire attack)**




## Wildfires around Athens 23rd August 2009

Efstratios completed the presentation by showing delegates a video of the wildfires around Athens in August 2009. The video showed the devastation and the seriousness of these fires. Wildfires are a serious issue in Greece and are a serious issue for the Hellenic Fire Service.

Link to the video: http://www.youtube.com/watch?v=o4jiLVvOEdc

# 5. Group Work Exercise

## 5.1 Overview of the Group Work Sessions

One session was designed by the workshop organisers to facilitate small group working. This themed session was designed to facilitate the interactive exchange of information and experiences between the partners and to produce outputs to contribute towards the aims of the workshop and the wider ANSFR Project. The group work session was included in the schedule as a result of the positive feedback received during the post-event evaluation exercise concerning similar group work sessions delivered in the ANSFR Workshop in Northumberland.

**General aim of the group work sessions delivered during ANSFR**
The general aim of all of the group work sessions delivered during the ANSFR Project is:

> **"To facilitate and develop a good working relationship and understanding between all project personnel."**

In addition to this generic aim, the project team have designed a specific aim(s), learning outcomes and desired outputs for each individual group work session delivered during the workshops. The following sub-section of this chapter will now present specific details about the small group work session delivered during the Frederikssund-Halsnæs Workshop.

## 5.2 Data Gathering and Recording for Environmental Fires

This session was designed and developed by Dr. Robert Stacey, Northumberland Fire and Rescue Service, and Rob Gazzard, South East England Forest District at the Forestry Commission for England and Wales.

**Aim, learning objectives and desired output of the session**
The aim of this session was for participants to share knowledge and experience of techniques and processes for gathering and recording data on incidents of environmental fires and to discuss and debate potential synergies and improvements.

The learning objectives of the session stated that participants would:

- Obtain a basic understanding of who gathers data on environmental fires in the project countries.
- Obtain a basic understanding of what data is gathered on environmental fires in the project countries.

The desired output of the session was:

"To produce a list of the current challenges, and some suggested improvements, to data gathering and recording practices currently adopted in the project countries."

**Group Exercise**
Robert introduced the aim, learning objectives and desired outputs for the session. Delegates were then divided into three groups and each group was given a specific list of questions to discuss and answer (each group was given different questions). The

individual members of each small group were selected using a quota selection system, whereby each of the three small groups contained at least one individual from each of the four ANSFR partner organisations. This system had proven successful in the first ANSFR Workshop in Northumberland in May 2009.

The three groups were tasked with the following questions:

**Group 1 – questions about the organisations who currently collecting data on environmental fire incidents from the project countries.**

**Group 2 – questions about the current challenges to collecting data on environmental fire incidents in the project countries.**

**Group 3 – questions about what data should/could be recorded, collected and analysed on environmental fire incidents in the project countries? (Irrespective of what is actually collected and analysed)**

The questions were presented on a large piece of paper with space for delegates to provide answers in respect of all of the project countries. The groups were instructed that they would be required to provide feedback on the task to the whole group at the end of the exercise.

The exercise was designed so that each group would provide a unique and specific contribution to the learning objectives and desired output for the session. According to the design of the session, the session aim would be successfully achieved through combining the data generated by the three individual groups and through collective discussions of the each groups' findings during the feedback session.

**Findings and feedback from the session**

The findings presented by the individual groups during the feedback session are presented in Tables on pages 9, 10 and 11 (pages 99-104). Some very detailed information was gathered during the exercise and delegates felt that they had gained a very good understanding of the data gathering processes adopted in the four project countries. After completing the feedback session, a short open discussion was initiated to discuss some of the issues raised during the feedback. The idea of the open discussion was to try to develop ideas for how improvements can be made to current data recording, gathering and analysis practices for environmental fire incidents.

Two key questions were posed to the group during the open discussion:

1. Does the data currently gathered in your country provide an adequate basis for environmental fire risk assessment, management and prevention?
2. How could the data currently gathered in your country be improved to assist in risk assessment, management and prevention for environmental fires?

Current recording systems used by the Fire and Rescue Services in the project countries are mostly very good, having been improved numerous times over the past few years. However, there are still shortcomings with all of the systems regarding data recording for environmental fires. All of the project partners stated that their incident recording systems do not include all of the information that is necessary for complex and detailed data analysis regarding the short- and long-term impacts of environmental fires. Environmental fires can be catastrophic in their destruction and alteration of the environment and can

sometimes threaten human populations. Within most of the project countries (UK, Denmark and Finland), wildfires rarely threaten human life and buildings, but it should not be neglected that there is significant potential for substantial environmental damage and even loss of life in all of the project countries. The true impact of wildfires can only be ascertained if all damage caused to life, property and the environment is calculated. This, in turn, is vitally important for ensuring that the risk of environmental fires is accurately and meaningfully assessed and evaluated. Consequently, the group decided that one of the key areas for improving all of the existing recording systems is the calculation and recording of the impacts and costs associated with environmental fires.

Continuing the discussion on required improvements to data recording systems, the group suggested that similar systems could in theory be adopted across all of the project countries. Group 3 were able to collaboratively devise a list of data fields required to adequately analyse individual wildfire incidents. They concluded that the data required to assess and evaluate the impact of wildfires, and to subsequently feed into risk reduction and prevention strategies, is essentially the same, irrespective of country. Collaborative development of better data recording processes and procedures within all European countries would allow more reliable comparisons of wildfire incidents between and within different European countries, allowing for more accurate assessment and management of risk at the European, regional and local scale. The group believes there is scope for future projects to be completed to develop more comprehensive environmental fire recording systems and practices within European countries.

**Conclusions of the session**

The desired output of the session was to produce two lists: one containing a list of current challenges to recording of data on environmental fires; and the other outlining a list of data fields to be included in new and improved data recording systems for environmental fires. Both of these outputs were delivered successfully during the workshop session. The list of current challenges is presented in Table 10 (page 103), while the list of desirable data fields is presented in Table 11 (page 104). Table 11 will be used as a basis for one of the environmental fire risk guidelines frameworks to be developed during the ANSFR Project, which is currently being developed by the ANSFR project team and will later be made available in a separate document.

Observation of the discussions that took place during the exercise, the feedback session and the open session indicated that the exercise was of interest to all of the partner organisations. All of the discussions were very productive and unfortunately some were cut short due to time constraints. With this in mind, and taking into account the fact that the two desired outputs were clearly and concisely produced, the organisers concluded that the session was successful in satisfying its two objectives. Those present gained an understanding of what data is actually collected on environmental fires and who collects the data within each of the project countries. Consequently, the session also successfully achieved its aim of providing a suitable setting and context for participants to share knowledge and experience of techniques and processes for gathering and recording data on incidents of environmental fires and to discuss and debate potential synergies and improvements. Indeed, the discussions that were held during this session were some of the most productive and insightful during the ANSFR Project so far.

# Table 9 – Data Gathering Session: Feedback from Group 1

| Question | UK | Denmark | Italy | Finland |
|---|---|---|---|---|
| **Which organisations in your country gather data on environmental fires?** | • Fire Service Incident Recording System (IRS)<br>• Local Fire and Rescue Service databases<br>• The Environment Agency<br>• National Park Authorities<br>• Natural England | • Fire and Rescue Service<br>• DEMA - Danish Emergency Management Agency<br>• Insurance industry<br>• Police<br>• ODIN<br>• Statistikbanken | • Fire and Rescue Service<br>• Departments<br>• Forest Rangers (Corpo Forestale dello Stato)<br>• Regional Government Departments | • Fire and Rescue Services, through the national PRONTO recording system<br>• VTT (Technical Research Centre of Finland)<br>• Forestry organisation<br>• Ministry of Interior<br>• Perhaps the Police |
| **Do these organisations share data? If so, what data do they share? Also, is there a national database of information on environmental fire incidents?** | 1. Yes – there is sharing of information on a local basis.<br>2. The Fire and Rescue Service IRS is quite comprehensive and is used by the Northumberland Fire Group.<br>3. There is a national database in the IRS, but there is no process established for sharing information in this system with other organisations. | 1. Yes there is sharing of information locally and nationally.<br>2. Statistics are shared between the listed organisations. | 1. There is some/partial sharing of information between the listed organisations. There has been an improvement in this area in recent years, although more might be need to be done. | 1. Yes there is sharing of information locally and nationally.<br>2. Statistics are shared between the listed organisations.<br>3. PRONTO is a national system. |
| **What, if any, formal arrangements are in place for data sharing between organisations mentioned above?** | Formal arrangements for information/data sharing are outlined in:<br>• The Civil Contingencies Act 2004<br>• The Incident Recording System Guidelines<br>• Fire and Rescue Service Integrated Risk Management Plans (IRMPs) | Law on the Emergency Act describes that data must be recorded electronically, but there is no formal agreement on the sharing of information | Law 353 of 2000 highlights the formal arrangements for data sharing in this field. | PRONTO is an open system (for government organisations). For instance, some police officers have direct access to the PRONTO system from their own computer workstations. |

**Glossary to accompany the material presented in Table 9 (on previous page)**

## United Kingdom

***Fire Service Incident Recording System (IRS)*** - The Incident Recording System (IRS) enables data on all incidents attended by Fire and Rescue Services to be collected electronically and verified at source, improving on the timeliness and accuracy of the previous recording system. Further information about the IRS is available at:

http://www.communities.gov.uk/fire/researchandstatistics/firestatistics/newincidentrecording/

***Environment Agency*** – The Environment Agency (EA) is an Executive Non-Departmental Public Body responsible to the Secretary of State for Environment, Food and Rural Affairs and is an Assembly Sponsored Public Body responsible to the National Assembly for Wales. The principal aims of the Environment Agency are to protect and improve the environment, and to promote sustainable development. The EA plays a central role in delivering the environmental priorities of central government and the Welsh Assembly. Further information about the EA is available at: http://www.environment-agency.gov.uk/

***National Park Authorities*** –There are 9 National Parks in England, 3 in Wales and 2 in Scotland. Each National Park is administered by its own National Park Authority (NPA). The NPAs are independent bodies funded by central government to: conserve and enhance natural beauty, wildlife and cultural heritage; and, to promote opportunities for understanding and enjoyment of the special qualities of the National Parks by the public. All 14 National Park Authorities work together through the Association of National Park Authorities (ANPA). Further information about the UK NPAs can be found on the following website: http://www.nationalparks.gov.uk/index.htm

***Natural England*** - Natural England is an independent public body whose purpose is to protect and improve England's natural environment and encourage people to enjoy and get involved in their surroundings. Natural England works with people such as farmers, town and country planners, researchers and scientists, and the general public on a range of schemes and initiatives. In simple terms, its aim is to create a better natural environment that covers all urban, country and coastal landscapes, along with all animals, plants and other organisms. Further information can be found on the following website: http://www.naturalengland.org.uk/

***Civil Contingencies Act 2004*** – The Civil Contingencies Act 2004, and accompanying non-legislative measures, delivers a single framework for civil protection in the United Kingdom capable of meeting the challenges of the twenty-first century. The Act is separated into two substantive parts: local arrangements for civil protection (Part 1) and emergency powers (Part 2). A copy of the Civil Contingencies Act 2004 can be viewed at: http://www.opsi.gov.uk/Acts/acts2004/ukpga_20040036_en_1 . Further descriptive information about the Civil Contingencies Act 2004 can be found at:
http://www.cabinetoffice.gov.uk/ukresilience/preparedness/ccact.aspx

***Integrated Risk Management Plans (IRMPs) –*** IRMPs were discussed during the ANSFR Project Northumberland Workshop. Further details about IRMPs are available in the Northumberland Workshop handbook (available from the ANSFR Project manager, contact details on page 1 of this Handbook) and from the following website:
http://www.communities.gov.uk/fire/developingfuture/integratedriskmanagement/

## Denmark

***Danish Emergency Management Agency (DEMA) –*** DEMA's mission is to cushion the effects of accidents and disasters on society and to prevent harm to people, property and the environment. DEMA has a series of operational, supervisory and regulatory functions concerning emergency management and preparedness. DEMA is responsible for the Danish National Fire and Rescue Service, which consists of six national rescue centres with permanent employees, conscripts and volunteers. The fire and rescue centres are able to assist local fire and rescue services, the police and other authorities during major or prolonged accidents or disasters. Further information about DEMA can be found at the following website: http://www.brs.dk/uk/

***ODIN –*** ODIN is the rescue preparedness online data recording and reporting system. ODIN is developed and operated by the Danish Emergency Management Agency. The purpose of ODIN is to provide consistent, timely and effective collection of information on emergency preparedness task performance. ODIN is used for recording and reporting information on rescue and preparedness activities, and, as of 2005, it has been mandatory for all municipal emergency planning organisations to record required information into ODIN. ODIN is accessible from the following website: www.odin.dk

***Statistikbanken*** – Statistikbanken contains data on emergency incidents. The purpose of Statistikbanken is to provide:

- An overview of damage evolution during emergency situations
- Provide data to analyse and evaluate preparedness measures to ensure that they correspond with the risks present within each municipality
- Provide data to support preventive action in the field of preparedness

Statistikbanken contains data from emergency preparedness stakeholders i.e., the municipal emergency preparedness agencies and the Danish Emergency Management Agency emergency centres. Statistikbanken is accessible from the following website: www.statistikbank.brs.dk/sb/main/

## Italy

***Corpo Forestale dello Stato*** - The Corpo Forestale dello Stato (CFDS) was established in 1822 and is a police service which specializes in the protection of natural heritage and landscape and in preventing crimes related to the environment and food processing. The CFDS initial responsibility was simply to defend the forests in Italy, however, this has now evolved to include a responsibility for

protecting and policing all activities related to agri-environmental resources. The CFDS is responsible for monitoring and conducting research within the 130 State Natural Parks in Italy. Uncontrolled landfills, illegal spills, pollution of aquifers, destruction and disfigurement of natural beauty, fires and illegal buildings are just some of the phenomena covered and investigated by officers within the regional and specialist units of the CFDS. The CFDS is also responsible for preventing and investigating poaching and hunting and in controlling the fishing of inland waters. Further information about the CFDS is available at (only in Italian):
http://www3.corpoforestale.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/1

## Finland

***PRONTO*** – The system contains accident/fire statistics by municipality going back as far as 1996. The purpose of the system is to enhance monitoring and development of rescue administration and response. The system is used by the Finnish Regional Rescue Services, Emergency Response Centres (ERCs), the Department for Rescue Services within the Ministry of Interior, the Emergency Services College (ESC), and the Ministry of the Environment. Further information about PRONTO can be found at: http://www.pelastustoimi.fi/en/in-brief/

***Technical Research Centre of Finland (VTT)*** – VTT Technical Research Centre of Finland is the biggest multi-technological applied research organisation in Northern Europe. VTT provides high-end technology solutions and innovation services. VTT is a part of the Finnish innovation system under the domain of the Ministry of Employment and the Economy. VTT is a non-profit-making research organisation. Further information about the VTT can be found at: http://www.vtt.fi/

***Ministry of Interior of Finland -*** - The Ministry of the Interior is responsible for internal security and migration in Finland. The Ministry's vision is to make Finland the safest country in Europe – one in which people feel that they live in a fair and equal society regardless of how they identify themselves. There are four departments within the Ministry: the Police Department, the Department for Rescue Services, the Migration Department and the Border Guard Department. Further information about the Ministry of Interior can be found at: http://www.intermin.fi/intermin/home.nsf/pages/index_eng

***Ministry of the Environment of Finland*** – The Ministry of the Environment promotes sustainable development. Its missions is to ensure a good, safe living environment and biological diversity, to prevent environmental damage and to improve housing conditions. Further information about the Ministry of the Environment can be found at: http://www.vn.fi/ministeriot/ym/en.jsp

# Table 10 – Data Gathering Session: Feedback from Group 2

| Question | UK | Denmark | Italy | Finland |
|---|---|---|---|---|
| **Are there any challenges to recording and gathering data on environmental fires in your country?** | • Consistency of data input into IRS system and other databases<br>• Lack of training and awareness in recording procedures<br>• Difficult to extract accurate information from all organisations<br>• Limited data fields on the current IRS system<br>• UK Fire and Rescue Services have different responses to environmental fires (no nationally agreed response) | The Fire and Rescue Department shall collect information about interventions, which are recorded electronically, but there could well be a better exchange of this information between different authorities. | There is no central database in Italy containing details of all environmental fire incidents. Separate databases are maintained by the Fire Service and the Forest Rangers.<br><br>A big problem is how to logistically collect and analyse data on all environmental fire incidents | The PRONTO web based system is very good. This has been proven especially for fire investigation, with fire and police investigators able to access and share information about particular incidents very freely.<br><br>The key challenge is for the officers who are responsible for submitting the incident reports to PRONTO. Sometimes there is a lack of understanding concerning what needs to be entered etc. |
| **If there are challenges, please list and describe them. If there are no current challenges, please explain why you there are none.** | • Do not think this is seen as a significant priority by the government<br>• No central database for public agencies that own and manage the land (for instance, the Forestry Commission, Department for Environment, Food and Rural Affairs (DEFRA)<br>• Fire and Rescue Services are not called to attend all wildfires – limited recording<br>• There is currently not enough information to support what we know<br>• Missed opportunities | • There is a clear need for a better integrated system. This is a significant undertaking though.<br>• There is also a need for better training for fire officers on how to complete incident reports. This will improve the data collected by the Fire Service. | • There is a clear need for a better integrated system. This is a significant undertaking though.<br>• There is also a need for better training for fire officers on how to complete incident reports. This will improve the data collected by the Fire Service. | • Perhaps there needs to be better and/or more frequent training on the completion of reports. This will improve the information entered and stored in the PRONTO system. |

# Table 11 – Data Gathering Session: Feedback from Group 3

| Question | Collective Response from the UK, Denmark, Italy and Finland |
|---|---|
| **In an ideal world, what data should/could be recorded for all environmental fire incidents (wildfires etc.).**<br><br>**Think about the fields of data that would be required to adequately analyse the characteristics and trends of incidents. Approach this question from the point of view of developing risk assessment, management and preventative activities.** | The group thought that across Europe there should be the ability to develop similar environmental fire recording systems within all countries. Some of the current problems and shortcomings in environmental fire incident data recording systems are the same in all the project countries. In addition, the development of similar data recording systems would allow a more accurate analysis of environmental fires across the whole continent and a more reliable comparison of environmental fire risk experienced in different European countries.<br><br>The group believed that recording of the factors listed below could help Fire and Rescue Services and other agencies to evaluate the effectiveness of their response to individual wildfire incidents and inform future policies, practices and strategies. Without a good information base, Fire and Rescue Services cannot adequately and appropriately learn from past experiences.<br><br>• Time of detection<br>• Time fire was extinguished<br>• Who detected the fire<br>• What has burnt and how much (area) has burnt<br>• Ownership of the land – who owns the land (public, private etc.)<br>• Access to the land (was the access good? How was access achieved?)<br>• Weather conditions (relative humidity, wind strength and direction)<br>• Topography<br>• Height above sea level<br>• Type of fire (for instance, was it a crown fire, underground fire etc.)<br>• Amount of water used to extinguish the fire<br>• Vehicles and equipment used to extinguish the fire (with a view to being able to evaluate the effectiveness of using particular pieces of equipment in particular wildfire situations)<br>• Cause of the fire (if known)<br>• Total costs of the fire, including:<br>  • Labour costs (and costs of using equipment etc. by the Fire and Rescue Service and other responsible public organisations, where appropriate)<br>  • Environmental costs<br>  • Costs of any private assistance (i.e. borrowing of equipment or personnel from private organisations) |

# 6. Field Visits

The Frederikssund-Halsnæs workshop involved two field visits, one organised for each day of the event. During the first field visit, delegates were taken to a forest located within the Frederikssund-Halsnæs area. A serious fire occurred within the forest only a few years previously and, in response to this incident, Frederikssund-Halsnæs Fire and Rescue Service and the Danish Forest and Nature Agency collaboratively developed a detailed fire plan of the forest. During the second field visit, delegates were taken to Frederikssund Fire Station to provide delegates with first hand experience of the fire safety education sessions delivered to Danish children by Frederikssund-Halsnæs fire fighters.

The two field visits will now be discussed in more detail.

## 6.1 Field Visit to Tisvilde Forest

On the first day of the workshop, the workshop delegates were taken on a field visit to view the settlements and countryside of Frederikssund and Halsnæs municipalities. The visit was designed to provide delegates with first-hand experience of the landscape of the area and to allow officers from Frederikssund-Halsnæs Fire and Rescue Service to be able to discuss with delegates their daily activities regarding fire risk assessment and management.

One of the key stops during the field trip was a visit to Tisvilde forest which is located on the northern coast of Halsnæs municipality. Tisvilde is one of the largest forests in Frederikssund Halsnæs Fire & Rescue District and has multiple types of vegetation, such as coniferous forest, heather, and heathland. Furthermore, the area is a very popular holiday destination because of the varied and scenic natural environment, with the forest situated adjacent to large sandy beaches. Consequently, there are many homes, particularly second home/holiday homes located inside the forest.

Søren Agerlund, Forest Ranger in Tisvilde Forest, met the delegation at edge of the forest and provided an audio tour of the forest. Søren works in Tisvilde Forest and is employed by the Danish Forest and Nature Agency[60]. During the tour of the forest, the delegation were taken through an area that had been previously barred to the public as it was once used by the Danish military as a practice field for firing ammunition. Søren also showed delegates an area of 16 hectares that was burned during a forest fire in August 2003. The event provided a warning that serious forest and wildfires can occur in this area and that they pose significant risk to life, property and the environment.

Søren explained that the risk of fire in the Tisvilde forest is particularly high due to a number of factors:

- The area is popular for a variety of different leisure pursuits, many of which are actively encouraged.
- The area contains multiple different types of vegetation. If a fire does occur it is challenging for the Fire and Rescue Services to bring it under control because it may burn different vegetation types, each of which will have different influences on the development and behaviour of the fire.
- The area contains a large number of holiday homes/second homes with varying levels of occupancy throughout the year. Traditionally, Danish holiday homes are built with wood, which obviously poses a higher fire risk than other building materials.

[60] Website: http://www.skovognatur.dk/International/

Fire is not necessarily just a negative force in Tisvilde Forest. The forest rangers are currently looking to increase the size of the rare heathland environment in the area and this requires burning woodland to promote the re-growth of heathland and earlier stages of succession. The forest rangers and Fire and Rescue Service are currently developing detailed plans for safely completing this burn, perhaps with the assistance of other external partners such as the NFRS Wildfire Team.

Once the tour of the forest had been completed, delegates were taken to a classroom where Søren showed delegates the fire plan that has been recently created for Tisvilde forest (shown in Figure 76, on page 118). This plan has been developed in order to better prepare the emergency services and Forest Rangers for future wildfire incidents. The plan was collaboratively created by the Fire and Rescue Service and the Forest Rangers. This joined-up working means that the plan incorporates specialist knowledge of the Fire and Rescue Service and the knowledge and experience of the Rangers who work in the forest everyday.

The Tisvilde Forest Plan divides the forest into easily identifiable sectors to assist the Fire and Rescue Service in planning where to allocate resources during a forest fire incident. The plan includes designated meeting places where Fire Service vehicles must meet. Once units are assembled at the designated meeting places, the incident commander will then instruct the units when and where to advance to the fire ground. The plan also indicates important route ways into, out of and through the forest. The Tisvilde Forest Plan ensures a planned and coordinated approach to tackling forest fires in Tisvilde, ensuring that fires can be brought under control quickly. It also ensures that life and property are kept as safe as possible. This includes protecting the life and property of members of the public and the life and equipment of the fire fighters and forest rangers involved in suppression.

**Forest Fire in Jytland, Denmark in 2004**

Søren Agerlund also talked to delegates about a forest fire that occurred in June in 2004 in Jytland, Denmark. This was a very serious fire that burned for several days. This fire was also difficult to fight, because the wind changed direction during the second day and because the area contained many different types of vegetation. The images below (Figure 75) show the development of the Jytlund fire, with images taken during the 2nd June on the top line and images from the 3rd June on the line below. The red marker shows where the fire began and how the fire reacted during the wind conditions.

**Figure 73 – Development of the Wildfire in Jytland, Denmark in June 2004**


**2nd June 2004 at 15:15 hrs**


**17:00 hrs wind from East**


**23:00 hrs wind still from East**


**3rd June 2004 at 10:00 hrs**


**16:00 hrs wind changed to south/west**


**20:00 hrs wind from south/west. Wind changed to south.**

**Figure 74 – Tisvilde Forest Plan**

**Demonstration of Firexpress Fire Fogging Technology**

After the presentation from Søren Agerlund, the delegates were taken to an area of the forest where the Danish company Firexpress[61], a company based in Frederikssund, had set up a demonstration (see Figure 77, below) of their Fire Fogging Units (FFU).

**Figure 75 – Images of the Firexpress Demonstration[62]**

Both NFRS and Frederikssund-Halsnæs Fire and Rescue Service currently use FFUs supplied by Firexpress. FFUs can hold 400 litres of water and utilise a special fire-fogging technology that is designed to use a small amount of water to quickly extinguish small fires. The system transforms water into a fog or mist by forcing it under high pressure through a specially designed nozzle. The tiny water droplets that are produced are rapidly turn into steam and therefore significantly expand in size. This leads to a rapid reduction in oxygen around the fire area. By removing the oxygen, the FFUs can quickly extinguish fires with minimal water and reduce the spread of burning debris[63]. In the flick of a switch the FFUs can also use foam to tackle more complex fuel fires. The FFUs can be mounted on a variety of different vehicles (as shown in Figure 78, below), which makes them an extremely useful resource, particularly for fires in less accessible areas.

**Figure 76 – Firexpress Fire Fogging System Mounted on Multiple Vehicles[64]**

[61] Website: www.firexpress.com

[62] The image on the left shows the vegetation fire that was staged by Firexpress, under permission of the Forest Rangers. The image on the right shows the fire once it had been quickly extinguished using the Firexpress Fire Fogging Unit. This particular fire was extinguished using less than 200 litres of water.

[63] Powerful updrafts and fire suppression activities can carry fire brands to areas remote from the original fire. If fire brands land on unburnt material, a new fire may develop, thus accelerating and expanding the area that is on fire. This process is known as “fire spotting”. The design of the FFU technology reduces the likelihood that spotting will occur as a direct result of fire fighting activities.

[64] Photographs by Ole Lindblad, Frederikssund-Halsnæs Fire and Rescue Service.

## 6.2 Field Visit to Frederikssund Fire Station

On the second day of the Frederikssund-Halsnæs Workshop, delegates were taken to Frederikssund Fire Station to observe a Rescue Day organised for children from the local area. Delegates were given the opportunity to observe some of the sessions delivered and to learn about how Frederikssund-Halsnæs Fire and Rescue Service deliver key safety messages to children. The remainder of this section now describes the national and local context behind the delivery of Child Rescue Days and specific details concerning the design and delivery of the Frederikssund-Halsnæs Child Rescue Days.

**Rescue Days for Children**
Each year during week 40, all Fire and Rescue Services in Denmark dedicate a week to special events aimed at improving fire and accident prevention week for all younger people in nursery class (ages 6-7 years old) and for other classes in older forms. This year the Danish Emergency Management Agency, in cooperation with the Danish Pedagogy University and TrygFonden, prepared a teaching aid to assist Fire and Rescue Services to host special events aimed at children in nursery classes. Frederikssund-Halsnæs Fire and Rescue Service participated in this campaign. A total of 480 children aged 6-7 years old attended specially designed rescue days held at the six fire stations in Frederikssund-Halsnæs.

The key purpose of delivering the Frederikssund-Halsnæs Rescue Days is to communicate the following seven core messages to all children who attend:

1. Children should save themselves first if a fire starts.
2. Children need to call an adult if they see a fire.
3. Children must be confident that adults will help, not punish, if they alert them to a fire.
4. Children must be aware of how to call the emergency services – to dial 1-1-2.
5. Children must be very careful with a fire rather than try to be a hero.
6. Children should know that fires should only be started when adults are around.
7. Children should know that it is acceptable and normal to be fascinated by flames, but the use of fire must only be undertaken with adults.

**Session 1 – Welcome and Distribution of Fire Helmets**
The Rescue Days are carefully planned and delivered by fire fighters and fire officers from Frederikssund-Halsnæs Fire and Rescue Service. The summary schedule of the Rescue Day is presented in Figure 80 (on page 123). When children arrive they are given a red plastic helmet with the Frederikssund-Halsnæs crest on the front. They are told that they are going to be “Little Fire Fighters” for the day and that they are going to learn how to be safe and learn about what the Fire and Rescue Service does when an emergency occurs.

**Session 2 – Activity Stations**
For the second session of the day, the children are separated into small groups and are taken around a number of different activity stations. At the end of each activity, the children migrate to the next station and they will continue to follow this pattern until their group has completed all of the individual stations. Each session is timed so that the children spend the same amount of time on each activity. The four activity stations used during the Frederikssund-Halsnaes Rescue Day are as follows:

- **Station 1 –** Children are shown a fire fighter in full fire suit and breathing apparatus. The fire fighter sits inside a specially constructed glass house and sets fire to some disposable plastic mugs. Children see the smoke given off from the fire and how

smoke rises to the top of the room during a fire, slowly filling the room up with smoke. The children are shown why they should crawl on the floor if there is a fire/smoke in a room. The dangers of toxic smoke are explained to them. A smoke alarm inside the glasshouse is set off by the fire, and the children are taught in basic terms how smoke alarms work and that they should be regularly tested.

- **Station 2 –** Children are given the opportunity to extinguish a fire in a house (a fictitious fire) using a bucket of spray. This is a fun exercise, but it emphasises how it can often be difficult to extinguish even small fires.

- **Station 3 –** Children are able to examine and sit in some of the fire appliances used by Frederikssund-Halnæs Fire and Rescue Service. Fire fighters explain how all the equipment works and what the equipment can be used for.

- **Station 4 –** Children sit in a classroom and watch a narrative ballad called “When the playhouse burned”. During the course of the ballad, the seven key safety messages of the event are presented and discussed. Fire fighters are also present to explain the messages in further detail and to develop dialogue with the children. The aim is for the session to be fun to ensure that the messages are effectively communicated and understood.

**Figure 77 – Frederikssund-Halsnæs Vehicles Shown to Children attending Rescue Days**

**Session 3 – Real Fire Fighting Demonstration**
Real fire fighters from Frederikssund-Halsnæs Fire and Rescue Service stage a small fire. They use different fire fighting equipment to extinguish the fire and explain that water is not always the best way to put out all fires. During the demonstration, the fire fighters show children why they should never use water to extinguish a fire in a pan of oil. The dramatic demonstration shows children how water makes this type of fire significantly worse and puts people in even more danger of being severely burned.

**Session 4 - Conclusion of the Rescue Day**
At the end of the Rescue Day, all of the children who attended are given a secret gift bag that includes: a water bottle, home fire safety checklist (see Figure 81 on pages 124 and 125 for an English translation of the checklist, and Appendix 6 for the original Danish document),

a colouring book featuring Bruno the Fire Fighter (produced and sponsored by a Danish damage control firm)**,** some stickers of a cartoon firefighter, a story book called “Da legehuset brændte” (which translates as “When the playhouse burned”) and a diploma certifying that they attended the event (see Figure 82, on page 126). Below are further details about each of these items:

- **The home fire safety checklist** – the purpose of this is to get children thinking about fire and general safety within their own homes. They are asked to go home and answer the questions on the checklist with their parents. If they have answers within the grey boxes on the checklist then they are instructed that they should ask their parents to remedy the situation.

- **The colouring book** – this book depicts a story involving a fire that Bruno and his fellow fire officers are called to attend. It summarises the typical working day of a firefighter in Denmark. The book can be used both as a colouring book and a signing book, with verses to sing included on each page.

- **The story book “Da legehuset brændte” (“When the Playhouse Burned”)** – this book describes a story about two children who are playing with their playhouse and they decide to cook on a toy stove with real fire. They find out that this was a bad idea because suddenly there is a fire in the playhouse. Initially, they are too scared to get help from an adult although, fortunately, after some time they did alert an adult to the fire. When the fire was extinguished they were afraid that their rabbit had been injured but fortunately they found out that the rabbit had escaped without being hurt. In the end the situation was not too bad as nobody was injured, although the playhouse was damaged. The children are taught through the story that they should not play with matches and that they must not be afraid to contact an adult in the case of a fire or other emergency.

- **Diploma** – The diploma includes the name of the individual child who attended. The diploma also lists the key safety messages that the children were taught during the day, to provide them with a reminder of what they learned and what they need to remember regarding fire and general home safety. The diploma gives the children a sense of achievement that they have attended the event and learnt something very important and worthwhile.

Frederikssund-Halsnæs Fire and Rescue Service believe that the Child Rescue Days are a successful and effective way to communicate fire and general home safety information to children. The added benefit of these days is that children take the information home with them and discuss safety messages with their parents. This can have the knock-on effect of making parents more aware of some of the situations that they should try to avoid to make their homes safer places to live. The safety information may also be cascaded to other relatives and neighbours, thus enabling the Fire and Rescue Service to educate a broad section of the local population.

**Figure 80 – Schedule for Children's Visit to Frederikssund Fire Station**

# Today's Rescue Content.

**First lesson, from 0900 to 0915.**

Welcome and distribution of red fire helmets to the children.

**Second lesson, from 0915 to 1100.**
Students are divided into 4 teams where we've made 4 stations.

**1. Station is:** where you can experience a fire fighter in full action suit (fire suit) sit in a specially constructed glasshouse. The fireman will set fire to some disposable plastic mugs, so you can see how a smoke detector works and see why you should crawl in case of fire.

**2. Station is:** where the children have the opportunity to extinguish a fire in a house (fictitious fire) with a bucket of spray. (Water)

**3. Station is:** is the examination of fire engines and try to sit in them.

**4. Station is:** Narrative ballad "When playing house burned" on power point in the garage, focusing on the 7 core messages* and hopefully a fun dialogue with the children.

**The 7 core messages.*

1. Children should save themselves first if it burns
2. Children need to call an adult if it burns
3. Children must be confident that adults will help, not punish, in case of fire
4. Children must be aware how to call 1-1-2
5. Children must be careful with a fire rather than to be a hero
6. Children should know that fire can only be lighted on with adults
7. Children should know that it is acceptable and normal to be fascinated by flames, but the use of fire must only be undertaken with adults.

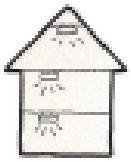
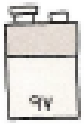
**Third lesson, from 1115 to 1130**
A real fire fighter will show different fire fighting equipment by extinguishing a small fire. Also, the fire fighters will demonstrate why you must never use water to extinguish a fire in a pan with oil.

**Fourth lesson, from 1130 to 1200**
Distribution of secret gifts for our new small "fire fighters". Recess will be held regularly, so as to fit today's program After completion of the program, the children have the opportunity to eat their packed lunches in the garage. We will supply a soda.

**Figure 79 – Home Fire Safety Checklist**

**Fill out the Schedule together with your father and mother.**

# Do you live fire safe?

| | | Yes | No |
|---|---|---|---|
| 1 | Do you Have at least one smoke detector at home?  | ☐ | ☐ |
| 2 |  Is there a smoke detector near the room where you sleep?. And is there at least one smoke detector on each floor? | ☐ | ☐ |
| 3 | Howl your smoke detector(s) when you press the test button?  | ☐ | ☐ |
| 4 |  Do you regularly test your smoke detector(s) and always when you get home from vacation? | ☐ | ☐ |
| 5 | Do you have a new battery in your house, so you immediately can change the old when it is used up?  | ☐ | ☐ |
| 6 |  Do you ever Thrown ashtrays out in the trash? | ☐ | ☐ |
| 7 | If you use candles: are they placed safely? And not close to anything that can burn  | ☐ | ☐ |
| 8 |  If you use tealights: Are they in secure holders? | ☐ | ☐ |
| 9 | Do you always remember to extinguish the candles when you leave a room?  | ☐ | ☐ |

**Fire Brigade moves out to a fire in houses in Denmark at least once an hour round the clock! You can help it not happen that often**

# Do you live fire safe?

| | | Yes | No |
|---|---|---|---|
| 10 | Are there things on your electric stove there can burn?  | ☐ | ☐ |
| 11 |  Do you always turn off electrical appliances when you don't use them? | ☐ | ☐ |
| 12 | Is the toaster under or close to something there can burn easily?  | ☐ | ☐ |
| 13 |  Do you have to strong lightbulbs in any of your lamps? | ☐ | ☐ |
| 14 | Are any of your lamps covered with fabric, paper or similar?  | ☐ | ☐ |
| 15 |  Is there tablecloths, newspapers, magazines, videotape, candles or flowers on your television? | ☐ | ☐ |
| 16 | Do you have any firefighting equipment standing ready?  | ☐ | ☐ |
| 17 |  Have you talked about how you can come out of the house, if there is any fire in it during the night? | ☐ | ☐ |
| 18 | Do you know how to call for help if it burns?  | ☐ | ☐ |

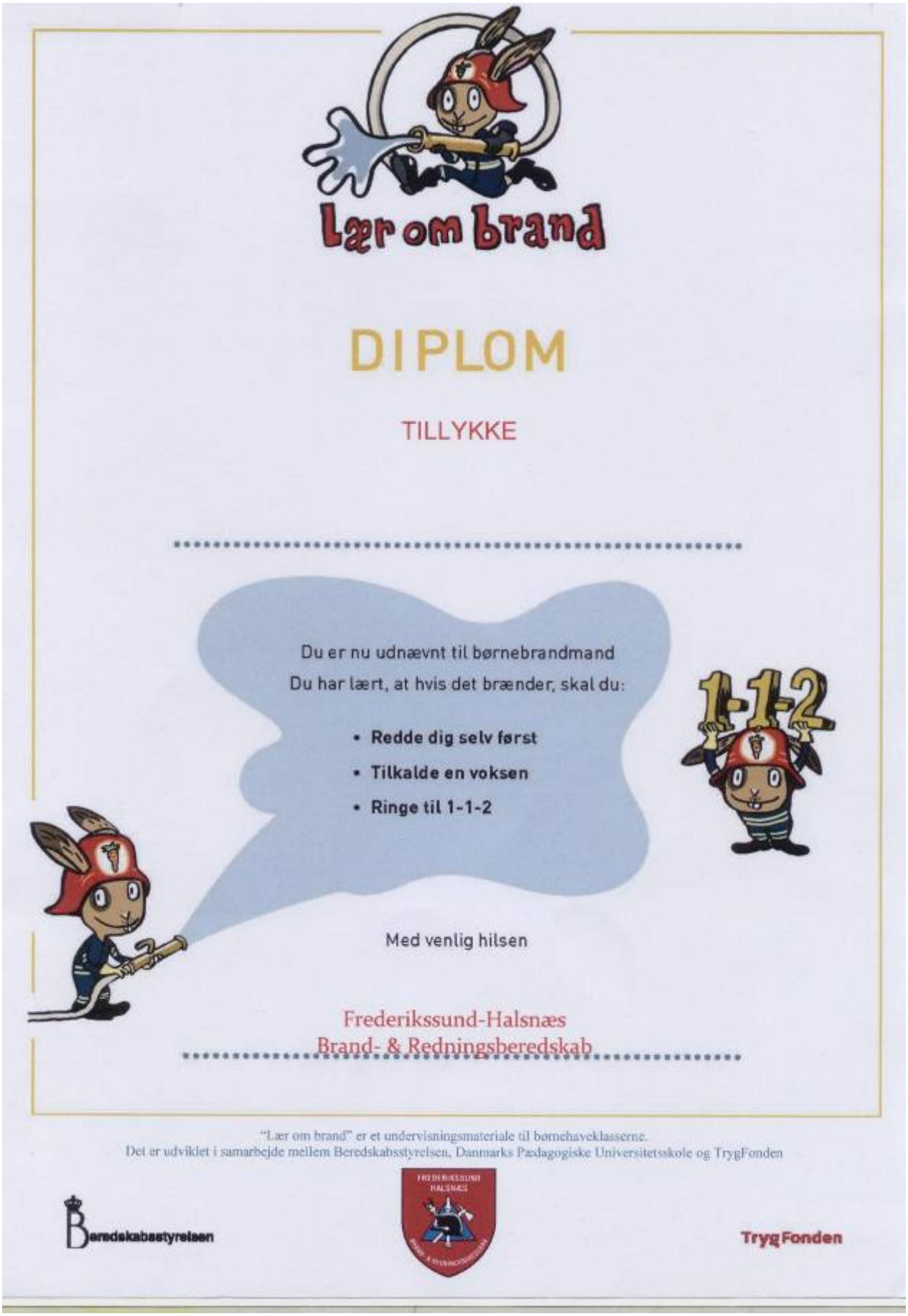
You probably have crosses in white and gray squares. Try if you can change things at home so you can put several crosses in the white squares.

Because it means that your home becomes more fireproof.

**Produced by Danish firetechnique Institute in cooperation with the Emergency Management Agency, the Association of Municipal Emergency Managers, National Hospital Clinic for Plastic Surgery and Burns Treatment and the Insurance & Pension.**

**Translated into English by Frederikssund - Halsnæs Fire & Rescue Department.**

**Figure 80 – Diploma for Children Attending the Rescue Day Event**



# 7. Conclusions

## 7.1 Concluding comments of the Frederikssund-Halsnæs workshop

Kim Lintrup and Rob Stacey provided some concluding comments at the end of the workshop. Kim thanked all of the delegates for coming to the workshop and for the excellent contributions that were made over the two days. He also thanked delegates for their enthusiastic and constructive approach to the topic of environmental fire risk. A significant amount of knowledge and experience was exchanged over the course of the two days providing partners with significant amount of information to digest and consider over the remaining year of the ANSFR Project and beyond. Kim was proud to have organised this workshop and really hoped that the workshop would represent a significant catalyst for future collaboration and information exchange between the partner organisations and countries.

Rob Stacey also provided some concluding comments about the workshop. He mentioned that a significant amount of information was discussed and debated during the event and that the project had really benefited from the attendance of a number of experts from across the World. He summarised that everybody present will have learned a lot from the presentations, group work sessions and informal discussions. One of the strengths of the ANSFR Project is the degree of mutual trust developed by the project partners over the course of the project activities. This has allowed the partners to openly discuss their successes and failures, which has been a real asset to the project. By looking critically at what has been successful and what has not been so successful, the project partners are collaboratively developing ideas for improving current fire risk assessment and management techniques and strategies. The work that has been completed, and the work which remains to be completed over the course of the project, will be of significant value to the project team and to other Fire and Rescue Services in Europe.

Rob also provided some concluding comments regarding one of the spontaneous key topics for debate over the course of the workshop. Some of the delegates present at the event posed the following thought-provoking question: “should the total cost of damage caused by wildfires only be recorded as cost to human life and damaged property?”. This was a complex issue that stimulated significant discussion and debate. All of the project partners stated that their incident recording systems did not include all information that might be necessary for complex and detailed data analysis regarding impact of wildfires. For instance, at present there is little or no work currently done to calculate the approximate economic cost of environmental fires. The partners all noted that it was a common preconception within all of the project countries that the term “property” is usually used to refer to buildings/structures and does not often encompass the natural landscape, despite the fact that on one level the land and environment are the property and responsibility of all human beings. When buildings catch fire the approximate cost of the fire is often calculated and this is used to inform fire risk assessment and management strategies. This same process is not widely completed for environmental fires.

In very simple terms, current risk assessment processes adopted by the ANSFR partners state that a high calculated likelihood and impact/cost (economic and health) of a particular type of fire usually requires that more resources must be utilised to try to reduce the risk of this type of fire occurring. This logic stands to reason and is a good foundational premise. However, this logic is only currently applied to structural fires because the economic costs of wildfires (and indeed other costs associated with wildfires) are not comprehensively calculated. Environmental fires can be catastrophic in their destruction and alteration of the

environment and can sometimes threaten human populations. Within most of the project countries (UK, Denmark and Finland), wildfires rarely threaten human life and buildings, but it should not be neglected that there is potential for significant environmental damage and even loss of life in all project countries. Wildfires can also destroy rare habitats of significant scientific interest, as has been the case in recent years in Northumberland. The true impact of wildfires can only be ascertained if all damage caused to life, property and the environment is calculated. This in turn is vitally important for ensuring that the risk of environmental fires is accurately and meaningfully assessed.

The core conclusion of the workshop was that, in order to protect people, property and the environment, preventative actions and fire fighting techniques must be informed by high quality data and systems. Current recording systems used by Fire and Rescue Services are very good, having been improved numerous times over the past few years, however, there are still shortcomings regarding data recording for environmental fires. During the workshop, delegates devised a list of data fields that could be created to record more comprehensive information about all environmental fire incidents. This list is by no means exhaustive, but it does provide a good foundation for the development of more detailed and comprehensive data recording systems for wildfires. All of the partners need to consider areas of improvement for their current data recording procedures regarding environmental fires. There also needs to be some conceptual rethinking among European Fire and Rescue Services to ensure that the term “property” is used to incorporate land (public and privately owned) as well as buildings.

## 7.2 Results of the post-event evaluation

An important element of the workshop was the completion of a post-event evaluation. This thorough evaluation looked at all key elements of the workshop design and delivery to assess whether the conference aim and objectives had been achieved. The full post-event evaluation report is available upon request from the project manager (details on page 2 of this handbook), however, it is useful to summarise the findings of the report here.

**Evaluation of the event by the workshop participants**

A key part of any workshop event is to collect feedback from the delegates who attend and participate. In order to collect this feedback, the workshop organisers gave each delegate a one page evaluation form to complete (see Appendix 7 for a copy of the event evaluation form). The form presented participants with 7 statements to respond to and provided a space for any additional comments and suggestions. Participants were requested to rate the degree to which they agreed with each statement using an attitudinal measurement scale. The responses available to them were: unsure; strongly agree; agree; disagree; strongly disagree. Evaluation forms were completed anonymously to ensure that participants felt secure providing their true opinions about the event. The strategy employed for this evaluation process is widely regarded as good practice for obtaining constructive feedback on this type of event.

Evaluation forms were completed by 19 individuals who attended the workshop. Responses were provided by delegates from the United Kingdom, Italy and Finland, and by individuals attending from Greece and Australia. Workshop participants from Frederikssund-Halsnæs Fire and Rescue Department did not complete and return evaluation forms because they were all directly involved in the event planning and delivery.

In general terms, all of the responses were very positive, with most participants either “agreeing” or “strongly agreeing” with the statements presented to them on the form.

According to the data collected via the evaluation forms, it is reasonable to conclude that those who attended the event believed that:

- The workshop aims and objectives were clearly outlined
- The workshop presenters were engaging and informative
- The activities were stimulating and relevant
- Their interest was held throughout the workshop
- The workshop was relevant to their roles
- They had learnt something from the event
- They would recommend the workshop to others

The evaluation forms completed after the first ANSFR workshop in Northumberland revealed that one respondent did not agree that the workshop aims and objectives had been clearly outlined. While the organisers were not concerned that this represented a significant flaw (this was one negative response out of all of the evaluation forms completed), it was decided that the presentation of the aims and objectives of the Frederikssund-Halsnæs workshop would be modified to acknowledge and address this constructive criticism. The results of the evaluation forms completed for the Frederikssund-Halsnæs workshop indicate that all delegates completing the evaluation forms “agreed” or “strongly agreed” that the aims and objectives had been clearly outlined. The ANSFR Project team have consequently addressed this issue and made some progressive improvements in the design and delivery of the project workshops.

**Conclusions of the post-event evaluation**

With the assistance of those who attended the event, Frederikssund-Halsnæs Fire and Rescue Department and Northumberland Fire and Rescue Service determined that all four of the learning outcomes were successfully achieved to a satisfactory level during the event. Consequently, it was decided that those who attended can:

1. Demonstrate an understanding of the environmental fire risk assessment and management practices currently adopted by the project partners and other invited organisations.
2. Describe and explain the environmental fire risks and challenges that currently face the project partners and project countries (Denmark, Finland, Italy and the United Kingdom).
3. Demonstrate an understanding of some of the national priorities and strategies for environmental fire risk assessment and management and the prevention of environmental fires in the project countries.
4. Demonstrate an awareness and appreciation of examples of good practice in environmental fire risk assessment and management from the project countries.

In addition, all of those who attended shared examples of good practice in identification, assessment and management of environmental fire risk.

The workshop also delivered all of its three anticipated outputs:

- A list of names and contacts of all of those who attended the workshop was produced and circulated to all who participated. Those who attended the workshop are now able to contact any or all of the other participants directly.
- A handbook documenting the workshop has been collaboratively produced by Northumberland Fire and Rescue Service and Frederikssund-Halsnæs Fire and

Rescue Service. All workshop participants have agreed for their documents and presentations to be included in this document.

- The workshop produced a framework and basis for the development of three framework guidelines on the identification, assessment and management of environmental fire risk. The project team agreed during the workshop that the three documents should cover three logical topic areas:

    - Preventative Work
    - Identification of Wildfires
    - Strategies/Tools for assessing and managing risk during a Wildfire

The three documents will incorporate information from all of the project partner organisations and, where appropriate, information from the other organisations represented at the event. The documents will provide a basic summary outline of good practice approaches to the identification, assessment and management of environmental fire risk. The documents will be of significant value to European Fire and Rescue Services wishing to appraise and improve upon their current techniques for preventing and tackling wildfires.

Based on this evidence, the conclusion of the organisers is that the Frederikssund-Halsnæs Workshop was successful in achieving its key aim. The workshop successfully ensured that "participants developed a good understanding of the environmental fire risk assessment and management practices currently adopted by the partner organisations and involved discussions and debates concerning potential synergies and improvements to these practices for effective use in all project countries". The synergies that are achievable by combining and improving the approaches, ideas and experiences of the individual partners will be produced in a format that can be of benefit to the project team and other Fire and Rescue Services in Europe. Through the initial work completed in the workshop and the subsequent follow-up work to be completed by all of the partners, the ANSFR Project team will be able to produce concise and meaningful documents that can be utilised by Fire and Rescue Services to make a real difference to their communities by reducing the risk of loss of life and damage caused to property and the environment as a result of environmental fires.

In addition to fulfilling the aim, learning objectives and outputs outlined in the pre-event plan, the workshop also achieved two additional positive outcomes. Firstly, the organisers invited representatives from a number of organisations outside of the ANSFR Project team and project countries to contribute to the event. This approach further enhanced the European-added value of the workshop content and outputs. By incorporating information and experiences from multiple countries, the project team are more aware of the similarities and contrasts between the environmental fire risk challenges and opportunities that exist within different countries. The summary guideline documents that will be produced will, as a result, be more comprehensive and inclusive than they would have been if contributions had only been incorporated from the project partners.

Secondly, the workshop helped to stimulate a much closer working relationship between the project partners. At least three of the four partner organisations agreed during the workshop to collaborate at a later date to deliver and receive theoretical and practical training in risk prediction tools and techniques that can be used to fight wildfires more safely and more efficiently. In addition, Northumberland Fire and Rescue Service has agreed to provide assistance and advice, based on their professional experience and training in multiple countries across the world, for the planned burn of an area of forest in Frederikssund-Halsnæs in 2010/2011. This outcome represents a great example of how cross-border

sharing of information and expertise in risk identification, assessment and management can yield significant mutual benefits for European Fire and Rescue Services and the communities that they serve.

## 7.3 The Remaining ANSFR Project Workshops

The remaining two ANSFR Project Workshops will cover the two remaining project themes of accidental and social fire risk:

- **Workshop 3: Accidental Fire Risk**
  To be hosted by Corpo Nazionale dei Vigili del Fuoco – Nucleo Investigativo Antincendi (NIA) on 30th November – 3rd December 2009 in Rome, Italy.

- **Workshop 4: Social Fire Risk**
  To be hosted by the Emergency Services College on 19th – 22nd April 2009 in Kuopio, Finland.

Each of the remaining workshops will involve the collaborative development of new fire risk assessment and management frameworks which can be adopted by the partners. These documents will later be shared with and promoted to Fire and Rescue Services in Europe.
Frederikssund-Halsnæs Fire and Rescue Department and Northumberland Fire and Rescue Service will now provide advice and assistance to Corpo Nazionale dei Vigili del Fuoco – Nucleo Investigativo Antincendi (NIA) who will be organising and hosting the third ANSFR Project workshop in November 2009 in Rome. Buona fortuna per il gruppo di lavoro di Roma!

# Appendix 1 – List of Abbreviations

| | |
|---|---|
| ACPBA | Australasian Centre for the Prevention of Bushfire Arson |
| ANPA | Association of National Park Authorities |
| ANSFR | Accidental, Natural & Social Fire Risk Assessment & Management |
| ATC | Air Traffic Control |
| ATF | Arson Task Force |
| ATGS | Air Tactical Group Supervisor |
| ATV | All Terrain Vehicle |
| CFOA | Chief Fire Officers Association (UK) |
| CNVVF | Corpo Nazionale dei Vigili del Fuoco |
| COAU | Centro Operativo Aereo Unificato (Unified Flight Operations Centre) |
| CO2 | Carbon Dioxide |
| DEFRA | Department for Environment, Food and Rural Affairs (UK Government Department) |
| EA | Environment Agency |
| EMAK | Special Disaster Management Unit (Greece) |
| ERC | Emergency Response Centre |
| ESC | Emergency Services College (Finland) |
| FFDI | MacArthur Forest Fire Danger Index |
| FFOF | Forest Fire Observation Flights |
| FFU | Fire Fogging Unit |
| GSCP | General Secretariat Civil Protection |
| IPCC | Intergovernmental Panel on Climate Change |
| IRMP | Integrated Risk Management Plan (UK) |
| MSI | Monash Sustainability Institute (Clayton, Victoria, Australia) |
| NFG | Northumberland Fire Group |

| | |
|---|---|
| NIA | Nucleo Investigativo Antincendi (a central department within the CNVVF) |
| NFRS | Northumberland Fire and Rescue Service |
| NPA | National Park Authority |
| PPE | Personal Protection Equipment |
| RAF | Royal Air Force (UK) |
| RAY | Raha-automaattiyhdistys (Finnish Slot Machine Association) |
| RTC | Road Traffic Collision/Road Traffic Accident |
| SAR | Search and Rescue |
| SEKYPS | Fire Service Coordination Centres (Greece) |
| SKED | Forest Fire Coordination Centres (Greece) |
| SOPS | Standard Operating Procedures |
| SOUP | Sala Operativo Unificata Permanente (Permanent Unified Operations Room) |
| SPEK | Suomen Pelastusalan Keskusjärjestö (Finnish National Rescue Association) |
| TETRA | Terrestrial Trunked Radio |
| UK | United Kingdom |
| VBRC | Victorian Bushfire Royal Commission |
| VTT | Technical Research Centre of Finland |
| WPS | Wildfire Prediction System |

# Appendix 2 – The Frederikssund-Halsnæs Workshop Schedule

## The ANSFR Project

**Accidental, Natural and Social Fire Risk Assessment and Management**

## Workshop 2 – European Exchange of Good Practice in Identification, Assessment and Management of Environmental Fire Risk

**Hosted by Frederikssund-Halsnæs Fire & Rescue, Denmark, 28th September - 1st October 2009**

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## *Workshop Schedule*

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### Monday 28th September 2009 – Arrival into Frederikssund

**Times to be confirmed with partners (dependent upon flight arrival times) –** Officers from Frederikssund Fire & Rescue will meet workshop participants arriving into Copenhagen International Airport and provide transport between the airport and Hotel near Frederikssund. This will be the venue for the workshop. Delegates travelling from England, Italy and Finland have rooms and breakfast reserved for the nights of 28th, 29th and 30th September 2009.

**1600 -** Visit Knud Rasmussen's house.
Knud Johan Victor Rasmussen (June 7, 1879 - December 21, 1933) was a Danish / Greenlandic polar scientist who explored Greenland in several expeditions.

**1900 -** Evening meal for overseas delegates (arrangements to be made by Frederikssund-Halsnæs Fire & Rescue).

### Tuesday 29th September 2009 – Day One of the Workshop

**0700 – 0900 –** Breakfast served.

**0900 –** The workshop begins. Housekeeping and name badges to be distributed.

**0910 -** Workshop participants will be welcomed to Frederikssund by Ole Find Jensen, Mayor of the municipality Frederikssund and political chairman of Frederikssund-Halsnæs Fire & Rescue.

**0930 –** Following the first Workshop.
What is status?
What is missing?
Get Rob the feedback which is necessary for the project?

delivered by Rob Stacey (NFRS).

**1000 –** Summary of the aims of the 2nd workshop – to be delivered by Rob Stacey (NFRS).

**1015 –** Exercise to be devised by Kim Lintrup. Project Officers to meet and discuss progress on the project (20 minutes).

**1045 –** *tea/coffee break*

**1100 -** Delivery of presentation by Corpo Nazionale dei Vigili del Fuoco – NIA.

**1130 -** Delivery of presentation by Emergency Services College.

**1200 -** Delivery of presentation by Northumberland Fire and Rescue Service.

**1230 -** Lunch

**1400 – 1700 (approximately) -** Fieldtrip to view towns and countryside of Frederikssund-Halsnæs – look at the area's natural fire hazards, as well as demo star production of Fire Express (Danish product used by example NFRS).

**1930 –** Evening meal for overseas delegates.

## Wednesday 30th September 2009 – Day Two of the Workshop

**0700 - 0900 -** Breakfast served.

**0900 -** Workshop begins

**0910 -** Visiting Frederikssund Fire Station where children aged 6-8 years are introduced in fire prevention, etc. The event will be covered by the press.

**1030 -** Transportation to hotel.

**1115 -** Presentation by Mr. Efstratios Anastasopoulos - Fire Lieutenant – Senior Instructor at Hellenic Fire Service
Lessons learned from large fires around Athens.
- How to prevent fires?
- How to fight fires?
- How to use the experience in future work?

**1200 -** Lunch.

**1300 -** Presenting some case studies and practices in case of wildfires by Emergency Services College.

**1330 -** Bushfires and preventative measures in Australia presenting by Janet Stanley Chief Research Officer at Monash Sustainability Institute, Clayton, Australia.

**1400 -** Northumberland special forest firefighting unit gives a presentation.

**1500 -** *tea/coffee break*

**1530 -** Data Gathering and Recording Session – to be led by Rob Stacey (NFRS).

**1630 -** Concluding comments concerning the workshop. Discussion about future workshops, the project conference and other key project tasks – to be led by Rob Stacey (NFRS).

**1700 –** The workshop ends.

**1900 –** Evening meal for overseas delegates (arrangements to be made by Frederikssund-Halsnæs Fire & Rescue).

## Thursday 1st October 2009 – Departure from Frederikssund

**Times to be confirmed with partners (dependent upon flight departure times) –** Officers from Frederikssund-Halsnæs Fire & Rescue will meet workshop participants at the hotel and provide transport to Copenhagen International Airport for departure.

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This workshop is co-funded by the European Commission Directorate-General for Environment, under the 2008 Call for Proposals in Civil Protection. The workshop forms an important part of the "ANSFR Project", Grant No. 070401/2008/507848/SUB/A3.

# Appendix 3 – Potential Causes/Contributory Factors for Accidental, Environmental and Social Fires

- Access to fire safety knowledge and education
- Alcohol consumption
- Animals and pets (e.g. rodents biting through cables)
- Ash
- Biological (e.g. peat)
- Boredom
- Buildings of multiple occupancy
- Building ownership (e.g. owner occupier or rented to tenants)
- Buildings of sole occupancy
- Burning of waste/rubbish
- Camping
- Candles
- Civil unrest (e.g. riot)
- Controlled burning
- Coal and wood burning stoves
- Chemical
- Cigarettes and smoking materials
- Chimneys and flues
- Climate
- Cooking (inside and outside)
- Deliberate fire-setting (arson/fire crime)
    - a) Organised arson
        - Crime concealment
        - Extremist motivated
        - Profit motivated
        - Revenge motivated
    - b) Disorganised arson
        - Crime concealment
        - Excitement motivated
        - Revenge motivated
        - Serial arson
        - Spree and mass arson
        - Vandalism motivated
- Drug taking
    - a) Illegal drugs
    - b) Prescription drugs
- Electricity/Electrical
- Empty/void properties
- Excluded members of society
- Explosions/explosives (e.g. gas explosions, nuclear explosions etc.)
- Failure to apply common sense
- Fascination with fire/play with fire
- Fire work (i.e. welding)
- Fireworks
- Frictional heat
- Hazardous substances (e.g. flammable and explosive substances)
- Heat
- Human error
- Lighting (artificial)
- Maintenance of equipment
- Marital status
- Mechanical
- Mental health difficulties
- Misuse of equipment/machinery
- Negligence
- Non-compliance with building regulations
- Non-compliance with health and safety regulations
- Open fires
- Overheating of an object (for instance, of a machine and/or electrical appliance)
- Ownership of fire safety measures
- Personal/domestic crises
- Physical impairment
- Poor (or no) maintenance (i.e. of machines, of chimneys/fire places, saunas etc.)
- Prescribed burning
- Racial/hatred
- Recession (economic downturn)
- Re-ignition of earlier fire
- Religious practices
- Saunas and steam rooms
- Self-excluded members of society (e.g. hermits, some homeless people etc.)
- Self immolation
- Smoking materials (cigarettes, tobacco, lighter, matches etc.)
- Spark (for instance, from fire place or machine)
- Suicide
- Sunlight (refracted)
- Terrorism and Extremist groups
- Weather conditions (including: storms and high winds, lightning, volcanic eruptions, earthquakes, draught, cold)
- Other

# Appendix 4 – Potential Location Types for Accidental, Environmental and Social Fires

## Property Types

- Agricultural buildings (barns etc.)
- Care homes for the elderly
- Caravans
- Camp sites
- Club rooms
- Community centres/buildings
- Day care centres
- Dormitories/other residential properties
- Electricity sub stations
- Empty/void properties
- Festivals/events
- Holiday/summer homes
- Hospitals
- Hotels/Guest Houses
- Homes/dwellings
- Illegal drug farms (cannabis farms etc.)
- Leisure centres/sports halls
- Libraries
- Museums
- Oil rigs/extraction plants
- Offices
- Entertainment venues (cinemas, theatres, dance halls/discos and nightclubs)
- Petrochemical processing plants
- Places of worship (for instance, churches, synagogues, mosques etc.)
- Power plants
- Prisons
- Pubs and restaurants
- Shops
- Storage facilities (other than warehouses)
- Temporary/mobile homes
- Transport centres (airports, bus stations, train stations, ports)
- Warehouses
- Waste centres (for instance, waste storage sites, recycling facilities etc.)
- Other

## Landscapes/Environments

- Coastland
- Grassland
- Heathland
- Moorland
- Peat
- Wildland (Wildfire)
- Woodland/forest (both natural and man-made/managed)
- Other

## Modes of Transport

- Aeroplanes
- Bicycles
- Bulk carrier ships (for instance, container ships, oil tankers etc.)
- Buses/coaches
- Car transporters
- Cars
- Construction vehicles (i.e. excavators, cranes etc.)
- Cross-country vehicles (snowmobile, quad bike etc.)
- Ferries/Cruise Ships
- Fishing boats
- Inshore boats/ canal boats
- Jet ski
- Lorries/heavy goods vehicles
- Motorbikes
- Offshore pleasure boats
- Tractors and farm vehicles (including combine harvesters)
- Trains
- Trailers
- Other

# Appendix 5 – Social Groups "At Risk" of Experiencing/Causing Accidental, Environmental and Social Fires

- Alcohol/drug abusers
- Divorced
- Economically/socially deprived
- Landowners and land managers
- Mentally impaired
- Migrant workers[65]
- Neo-unskilful[66]
- Physically impaired
- Single
- Smokers
- Elderly
- Very young (infants, children)
- Working in high risk occupations (for instance, steel smelting/production, oil rig workers, quarry workers, miners (particularly those blasting for stone or other minerals) etc.
- Unemployed
- Widowed

[65] The term "migrant worker" refers to a person who is to be engaged, is engaged or has been engaged in a remunerated activity in a State of which he or she is not a national" (UN Convention on the Rights of Migrant Workers, 1990. Last accessed on 3.07.09 at http://www2.ohchr.org/english/law/pdf/cmw.pdf).

[66] The category "neo-unskilful" refers to a group of individuals who have not learnt and/or are not interested in learning the knowledge and skills required to act and behave safely particularly (although not solely) around fires, the safe use of fire and fire prevention. The knowledge and skills that were traditionally passed on from generation to generation, and to a degree via closer contact with fire during everyday life (for instance, cooking on open fires, open fires for heating etc.), are no longer widely possessed by the general public. This social group has been identified as 'at risk' in Finland and also in other European countries.

# Appendix 6 – Bor du Brand sikkert?

## Side en

**Udfyld skemaet sammen med din mor eller far**

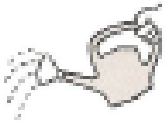
### BOR DU BRANDSIKKERT?

| | | JA | NEJ |
|---|---|---|---|
| 1 | Har I mindst én røgalarm derhjemme?  | ☐ | ☐ |
| 2 |  Er der en røgalarm tæt på de rum, hvor I sover, og er der mindst én røgalarm på hver etage? | ☐ | ☐ |
| 3 | Hyler jeres røgalarm(er), når man trykker på test-knappen?  | ☐ | ☐ |
| 4 |  Afprøver I jævnligt jeres røgalarm(er) - og altid når I kommer tilbage fra ferie? | ☐ | ☐ |
| 5 | Har I et nyt batteri liggende klar, så I straks kan skifte det gamle ud, når det er brugt op?  | ☐ | ☐ |
| 6 |  Tømmer I nogensinde askebægre ud i papirkurve? | ☐ | ☐ |
| 7 | Hvis I bruger stearinlys: Står lysene sikkert, og ikke for tæt på noget der kan brænde?  | ☐ | ☐ |
| 8 |  Hvis I bruger fyrfadslys: Står de i sikre holdere? | ☐ | ☐ |
| 9 | Husker I altid at slukke de levende lys, når I forlader et rum?  | ☐ | ☐ |

Brandvæsenet rykker ud til en brand i et hjem i Danmark mindst én gang i timen - døgnet rundt ! Du kan hjælpe med til, at det ikke sker så tit.

# På side to

## Bor du brandsikkert ?

| | | JA | NEJ |
|---|---|---|---|
| 10 | Ligger der ting på jeres el-komfur, som kan brænde?  | ☐ | ☐ |
| 11 |  Slukker I for elektriske apparater, når I ikke bruger dem? | ☐ | ☐ |
| 12 | Står brødristeren under eller tæt på noget, der let kan brænde?  | ☐ | ☐ |
| 13 |  Har I for stærke el-pærer i nogen af jeres lamper? | ☐ | ☐ |
| 14 | Er nogen af jeres lamper dækket med stof, papir eller lignende?  | ☐ | ☐ |
| 15 |  Er der duge, aviser, blade, videobånd, levende lys eller blomster oven på jeres fjernsyn? | ☐ | ☐ |
| 16 | Har I nogen form for slukningsudstyr stående parat?  | ☐ | ☐ |
| 17 |  Har I snakket om, hvordan I kommer ud af huset, hvis der skulle opstå brand midt om natten? | ☐ | ☐ |
| 18 | Ved du, hvordan du ringer efter hjælp, hvis det brænder?  | ☐ | ☐ |

Du har sikkert både sat krydser i hvide og grå felter. Prøv om I kan ændre på noget derhjemme, så du kan sætte flere krydser i de hvide felter. Det betyder nemlig, at jeres bolig bliver mere brandsikker.

Udarbejdet af Dansk Brandteknisk Institut i samarbejde med Beredskabsstyrelsen, Foreningen af Kommunale Beredskabschefer, Rigshospitalets Klinik for Plastikkirurgi og Brandsårsbehandling samt Forsikring & Pension.

# Appendix 7 – Workshop Evaluation Form

## Workshop Evaluation Form
## Frederikssund-Halsnæs Fire and Rescue Service

| Event title: The ANSFR Project Environmental Fire Risk Workshop – hosted by Frederikssund-Halsnæs Fire and Rescue Service | Date: 28th September – 1st October 2009 |
|---|---|

Please answer the following as honestly as possible, rating areas of the workshop from 1-4
1 – Strongly Disagree, 2 - Disagree, 3 – Agree, 4 – Strongly Agree

The workshop aims and objectives were clearly outlined

Unsure 1 2 3 4

The workshop presenters were engaging and informative

Unsure 1 2 3 4

The activities were stimulating and relevant

Unsure 1 2 3 4

My interest was held throughout the workshop

Unsure 1 2 3 4

The workshop was relevant to my role

Unsure 1 2 3 4

I have learnt something from the workshop

Unsure 1 2 3 4

I would recommend this workshop to others

Unsure 1 2 3 4

Please provide any additional comments or suggestions below e.g., suggested changes about particular sessions?

Northumberland Fire and Rescue Service (NFRS) provides fire and rescue cover to the County of Northumberland in northern England. The County covers an area of almost 2,000 square miles (approximately 500,000 hectares) and is home to approximately 310,000 residents. NFRS has a long term strategic aim of improving the social, economic and environmental well being of the residents of the county it serves. Central to this is "preventing fires and other emergencies happening" and in doing so "reducing death, injury and damage to property". It is NFRS's aim to share knowledge and expertise, and to learn from the successful practices and initiatives implemented by other organisations, in order to improve the safety of residents living and working in Northumberland.

Frederikssund-Halsnæs Fire and Rescue Service provides fire and rescue cover to Frederikssund and Halsnæs Municipalities. Frederikssund and Halsnæs Municipalities cover an area of almost 382 square miles (approximately 98,935 hectares) with approximately 75,000 inhabitants. Frederikssund-Halsnæs Fire and Rescue Service has a strategic aim to "prevent fires and other emergencies happening" and in doing so to "reduce death, injury and damage to property". It is Frederikssund-Halsnæs Fire and Rescue's aim to share knowledge and expertise, and to learn from the successful practices and initiatives implemented by other organisations, in order to improve the safety of residents living and working in Frederikssund and Halsnæs Municipalities.

NORTHUMBERLAND
Northumberland County Council

FREDERIKSSUND HALSNÆS

CORPO NAZIONALE VIGILI DEL FUOCO
NIA
NUCLEO INVESTIGATIVO ANTINCENDI
MELIOR DE CINERE SURGO

PELASTUSOPISTO
EMERGENCY SERVICES COLLEGE