



net risk work

Managing fire suppression operations into the Mediterranean wildland urban interfaces

“Emergency management and risk governance. Towards resilient societies”

Cagliari, 10 - 13th April 2017

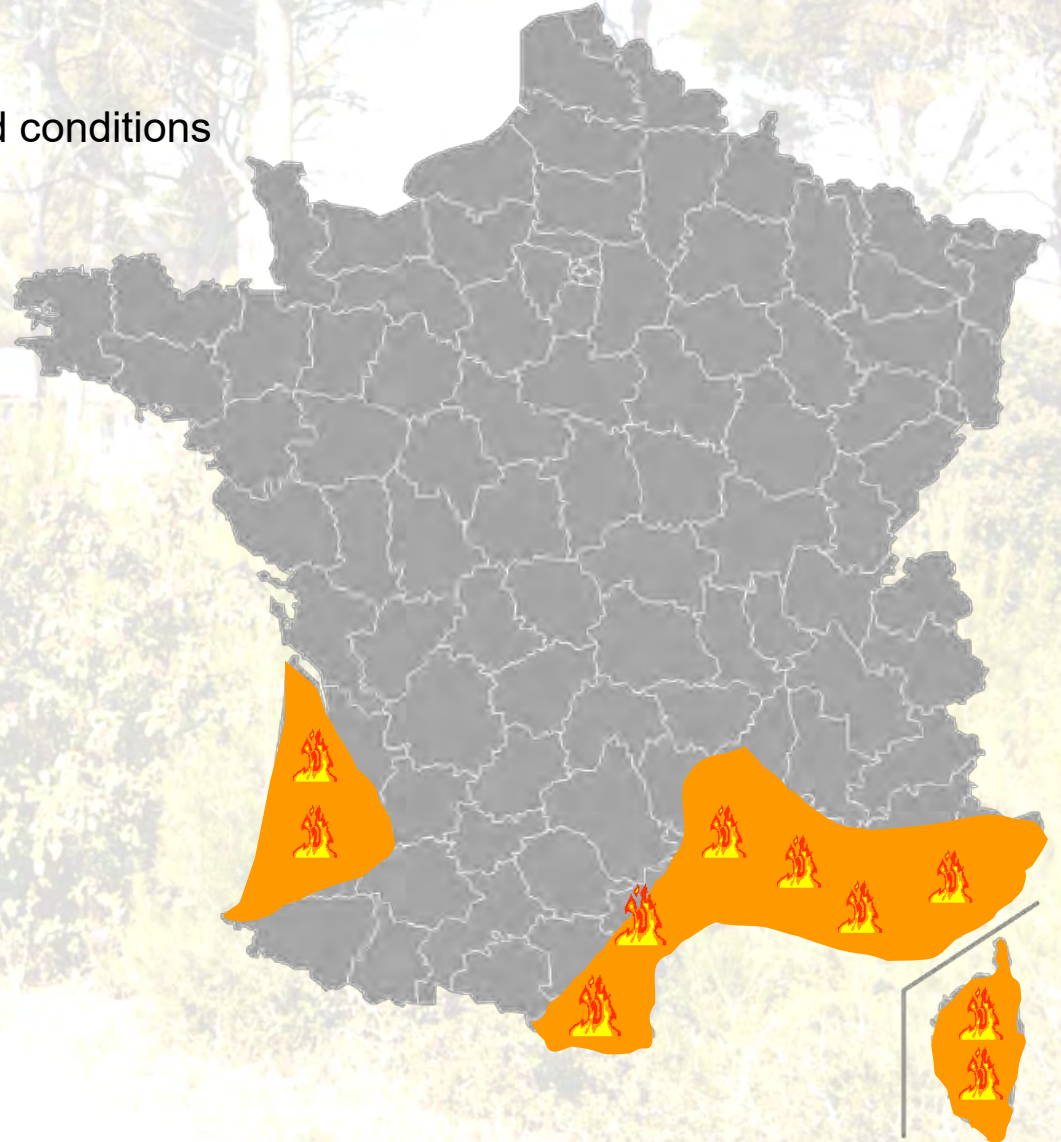
Vincent Pastor – SDIS 13

Joint study with

Direction Des Territoires et de la Mer des Bouches-du-Rhône

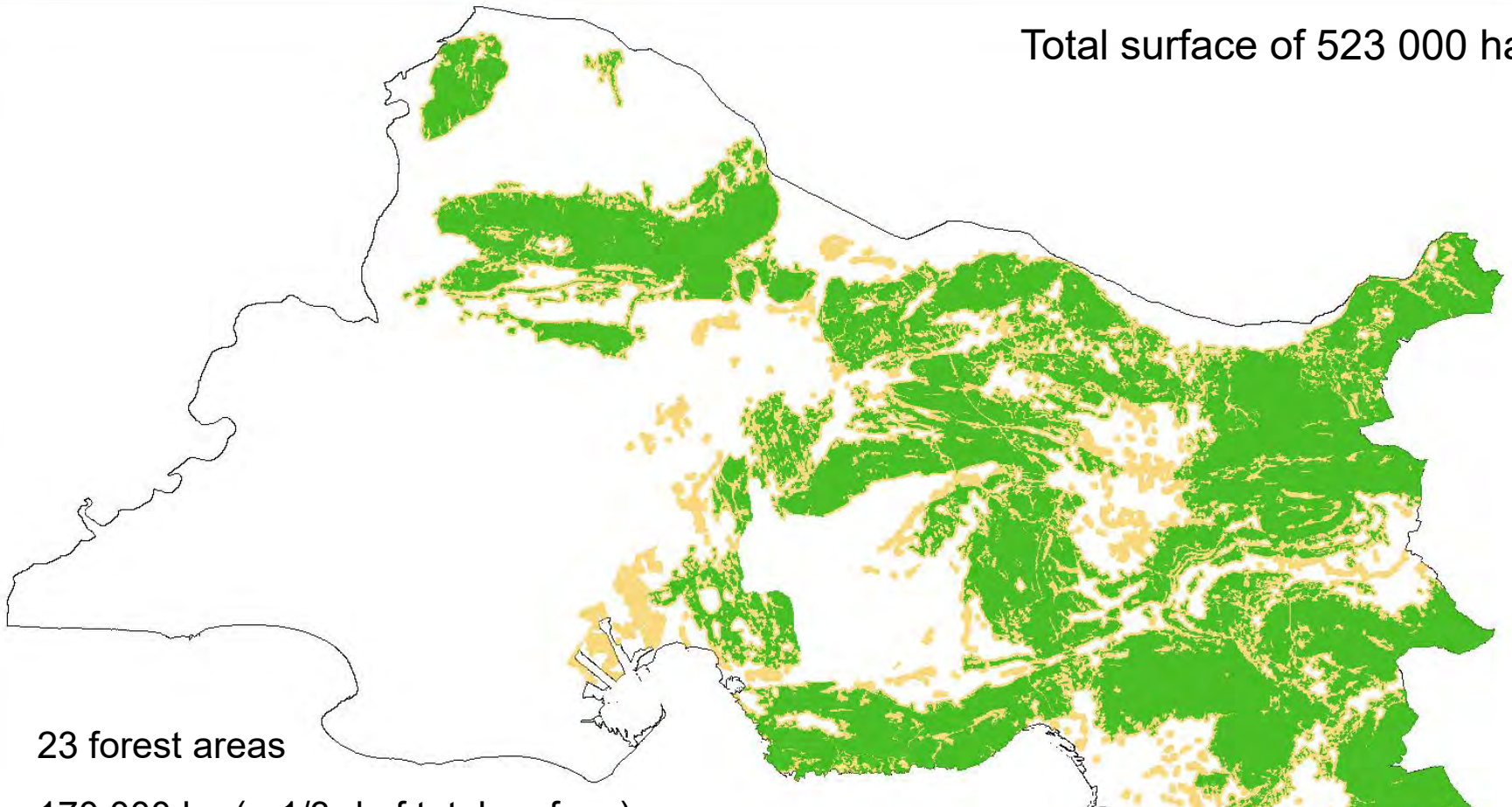
Forest fire risk situation in France

- Southern France mostly
- Mediterranean climate with strong wind conditions
- Large forest areas
- Densely populated and urbanized area



Bouches-du-Rhône overview

Total surface of 523 000 ha



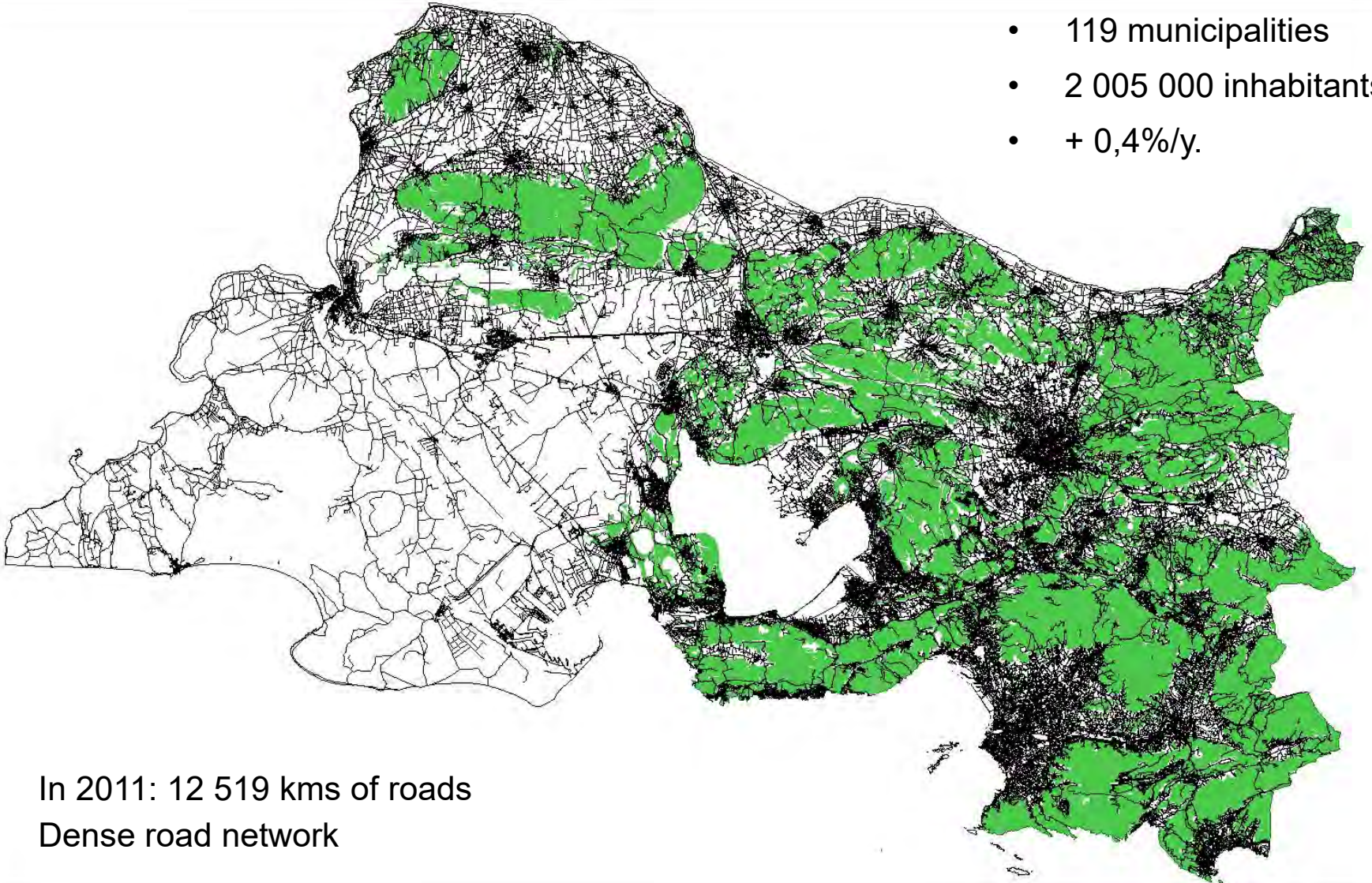
- 23 forest areas
- 170 000 ha (= 1/3rd of total surface)
- Forest fire risk expanded to WUI areas
- 46% of the department total surface is concerned

Two risk periods :
Moderate : mid-January to mid-March
High : June to September



Bouches-du-Rhône overview : demography

- 119 municipalities
- 2 005 000 inhabitants
- + 0,4%/y.

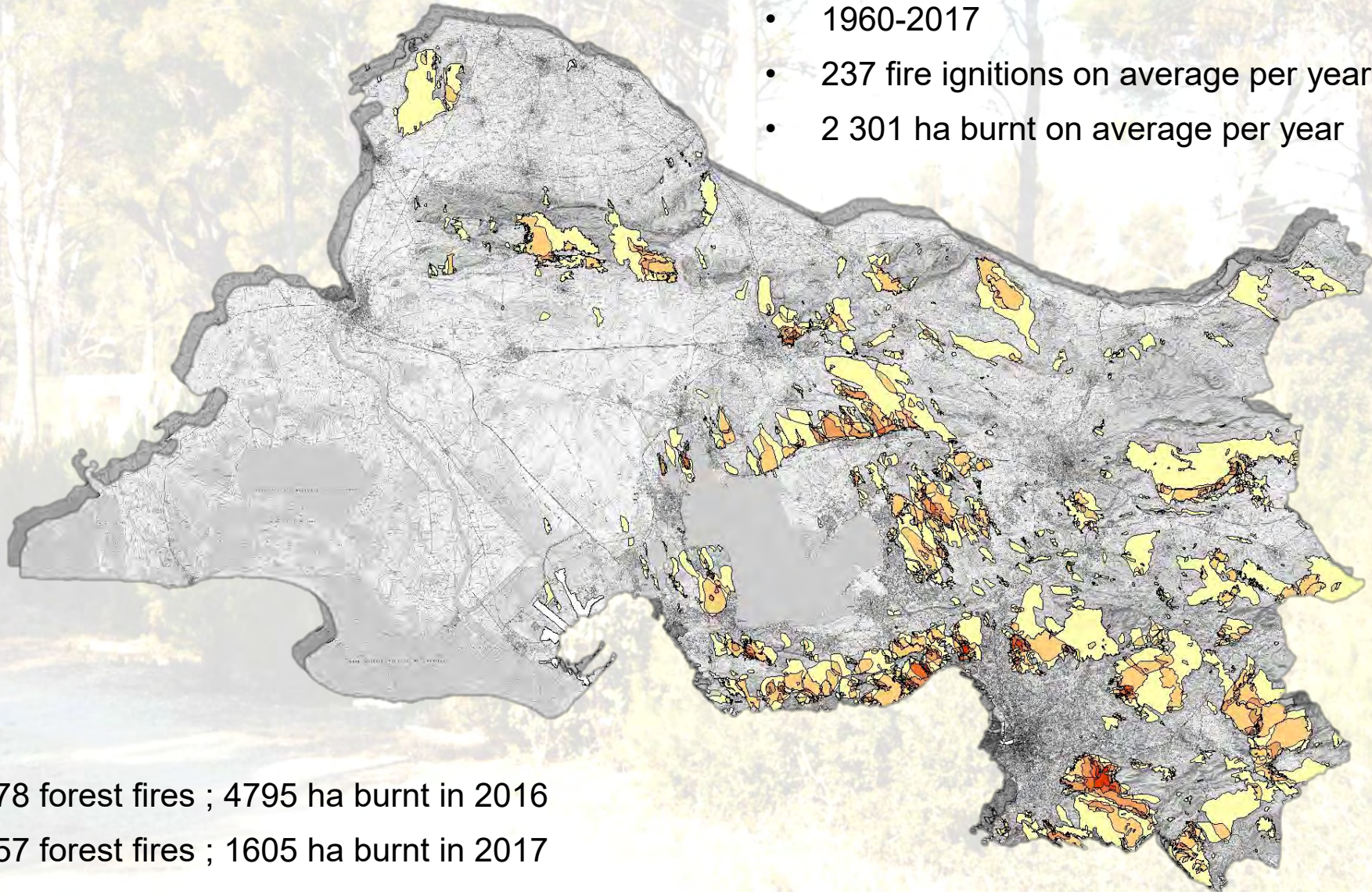


- In 2011: 12 519 kms of roads
- Dense road network

Bouches-du-Rhône overview

Forest fires history since 1960

- 1960-2017
- 237 fire ignitions on average per year
- 2 301 ha burnt on average per year



- 378 forest fires ; 4795 ha burnt in 2016
- 257 forest fires ; 1605 ha burnt in 2017

Exemple : Rognac fire (2016)



Fire ignition



DFCI work behavior



Fire behavior right flank



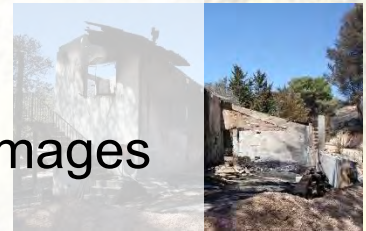
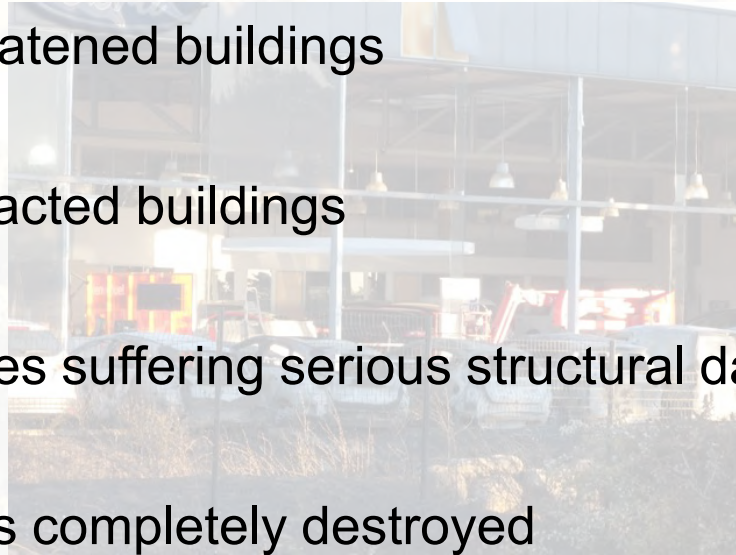
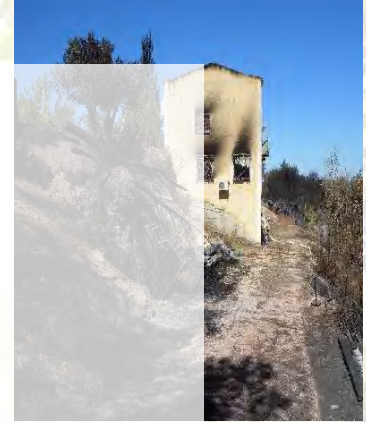
Rognac forest fire

August 10th, 2016 17:45 CEST

Credits : Oleg Skripochka from ISS

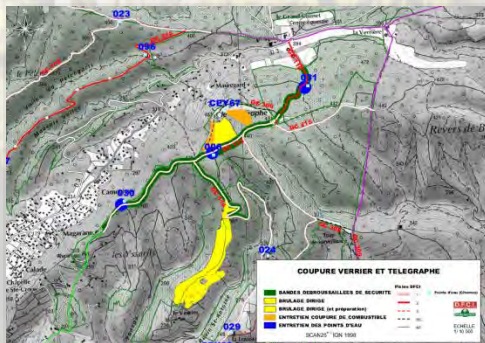
Exemple : Rognac fire (2016)

- Fire perimeter : 110 km - 37km WUI
- 4500 threatened buildings
- 1932 impacted buildings
- 180 houses suffering serious structural damages
- 26 houses completely destroyed



Management of forest areas

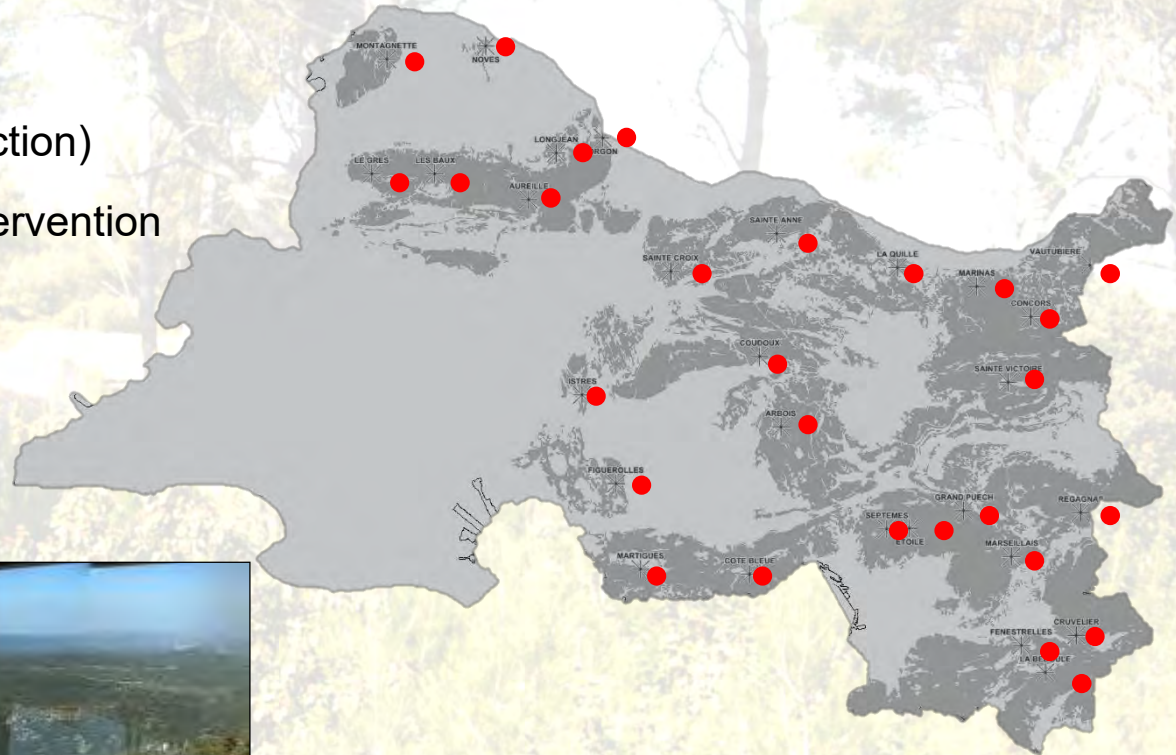
- Bouches du Rhône forest areas are not left unmanaged.
- Forestry work are realized in compliance with management plans.



Prevention framework

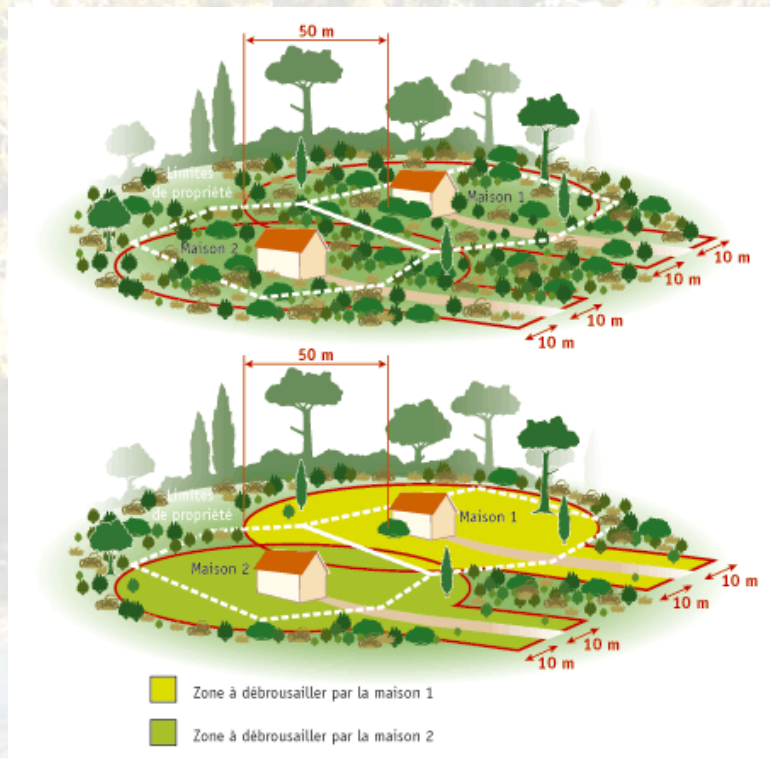
Prevention measures:

- Watchtowers & lookout (detection)
- Pre-positioned forest fires intervention teams



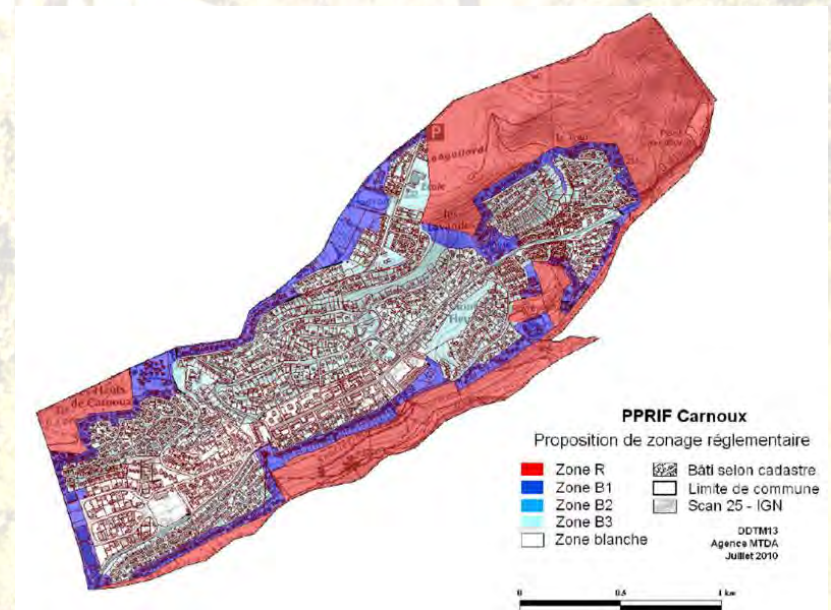
Establishment of regulatory instruments

Legal Brushing Obligations (owner's responsibility)



Urban planning measures that are effective against third parties :

- Public information obligation (PAC)
- Forest fire risk prevention plan



Towards better risk assessment and prevention in the WUI

- Observation : difficulty to monitor the compliance with the brushing obligation
- Study on built environment classification in the WUI (2012, 2015) - 3 main objectives:
 1. Prioritize control operations on the most vulnerable areas
 2. Decision support system for the incident commander : clear picture of the major issues threatened by a wildfire
 3. Guide urban planning services for future construction projects

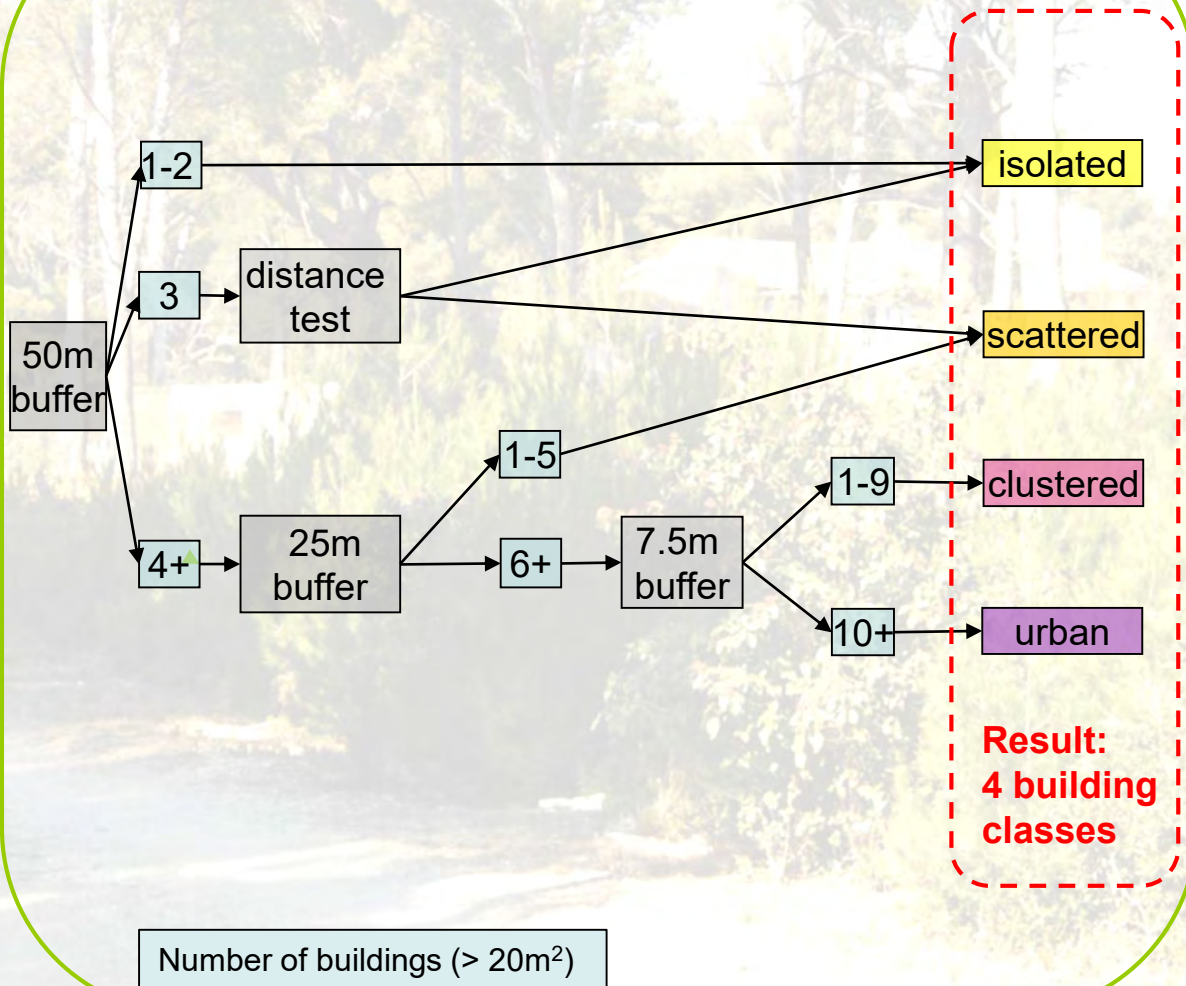


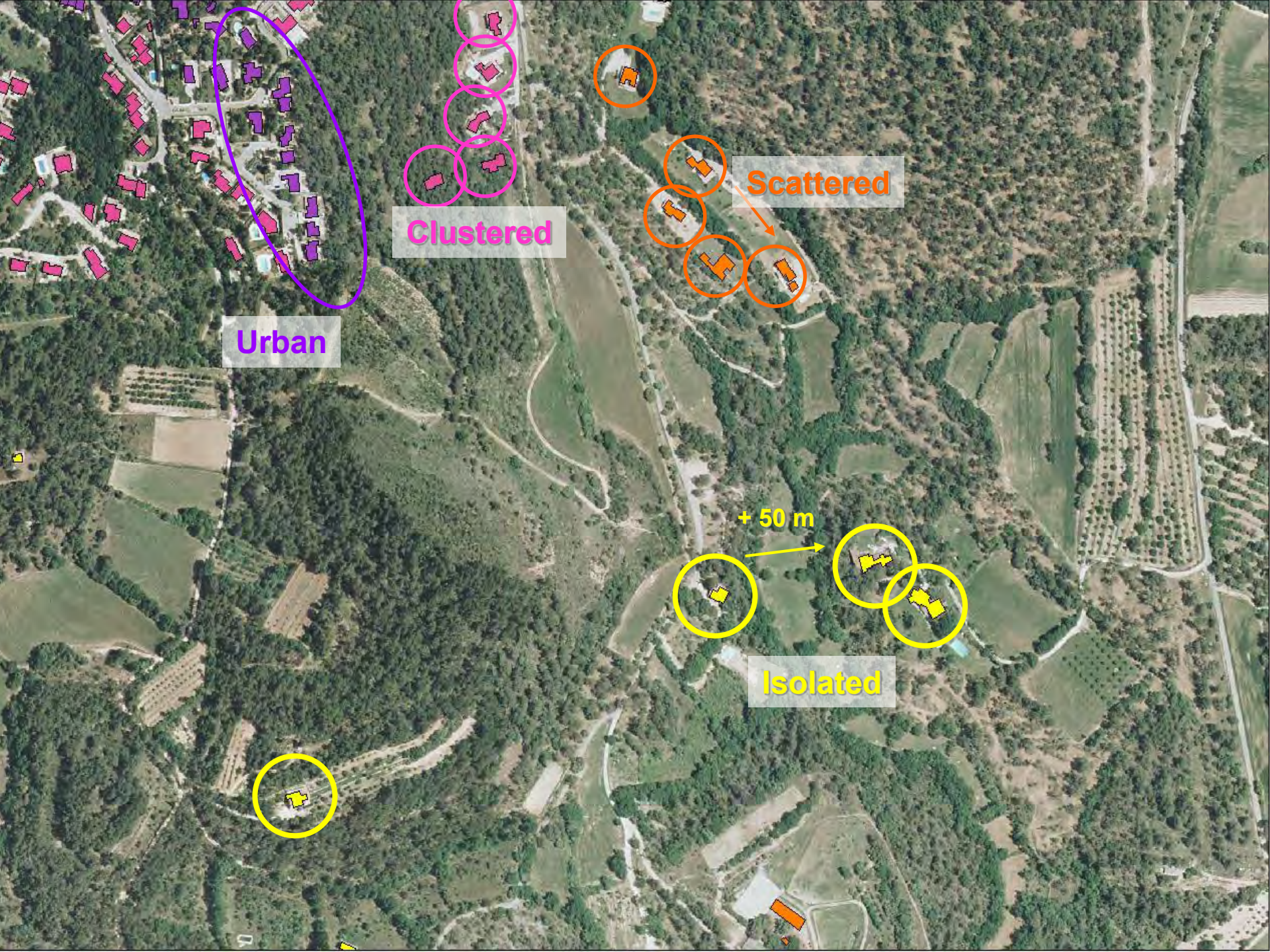
Database for the study



Buildings classification method - 1

2012





Urban

Clustered

Scattered

Isolated

+ 50 m

Buildings classification method - 2

2012

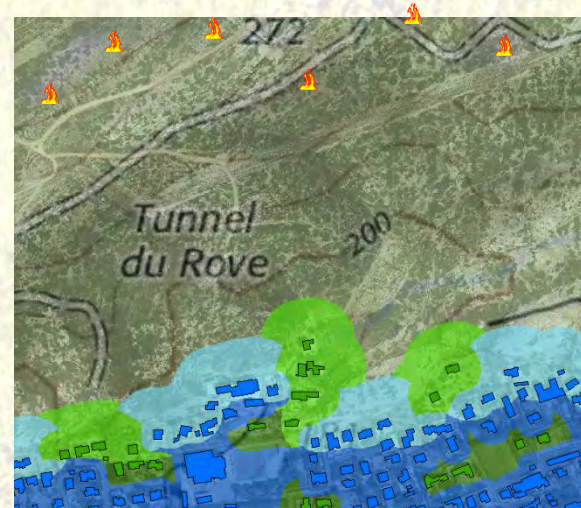
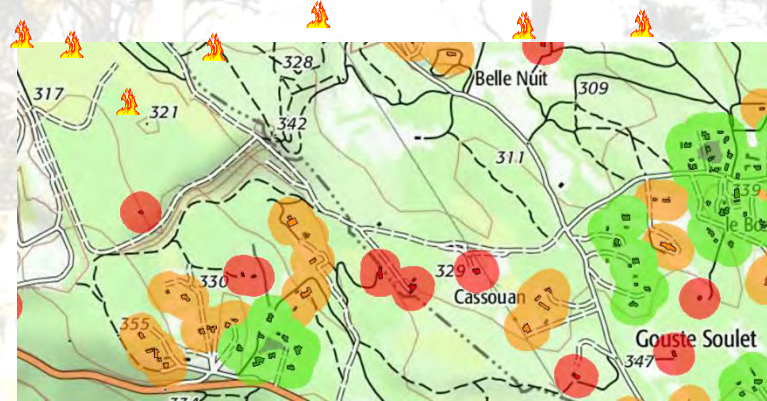
isolated

scattered

clustered

urban

2015 – notion of **permeability to forest fires**



WU
intermix

WU
interface

Buildings classification method - 2

2012

isolated

scattered

clustered

urban

2015 – sub classification based on
proximity to natural environment

→ Inner interfaces vs contact interfaces

WU
intermix

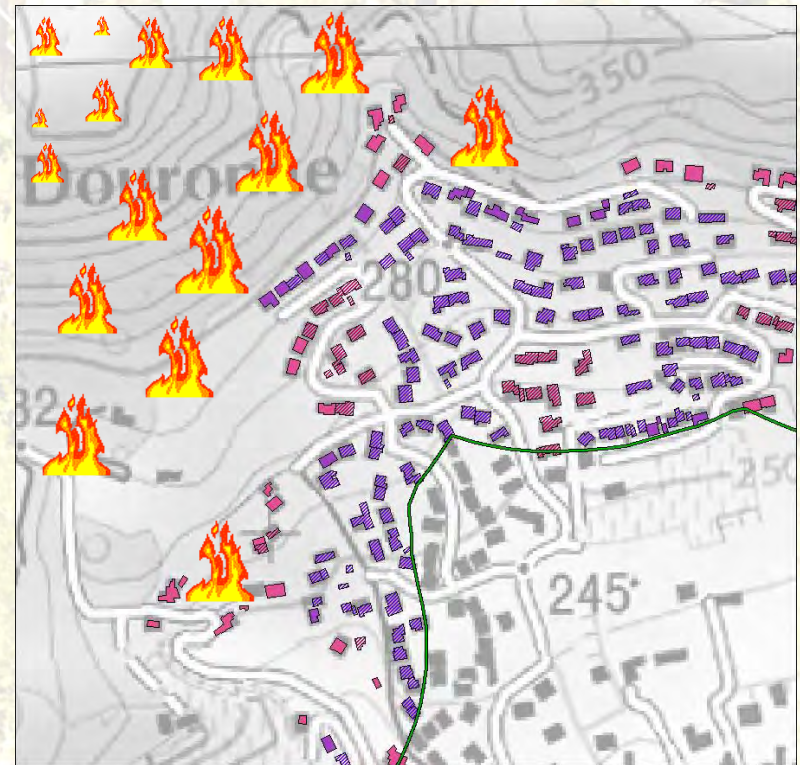
clustered-inner

clustered-contact

urban-inner

urban-contact

WU
interface

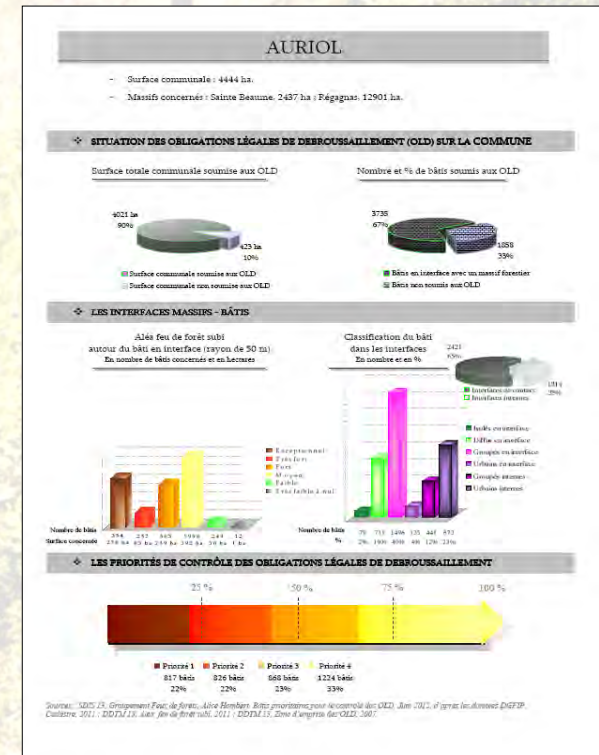
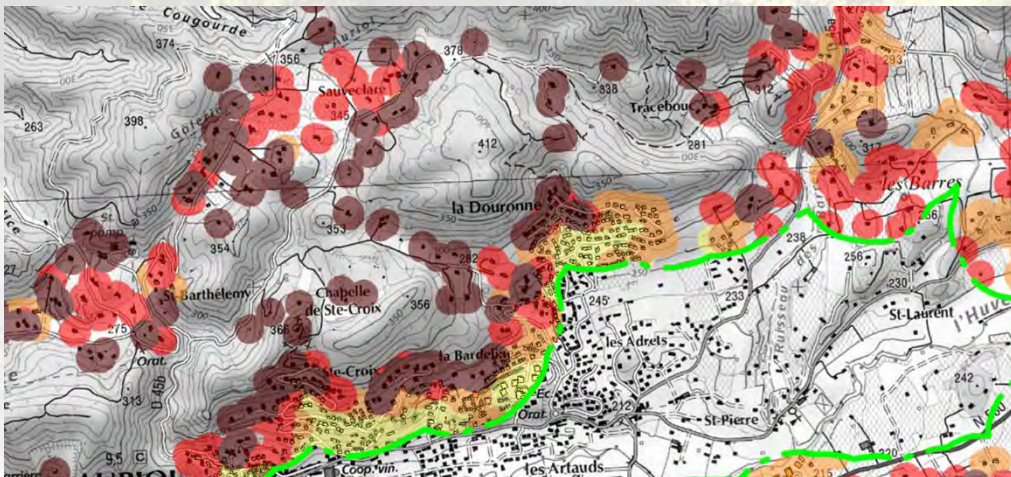


Overall results of the study

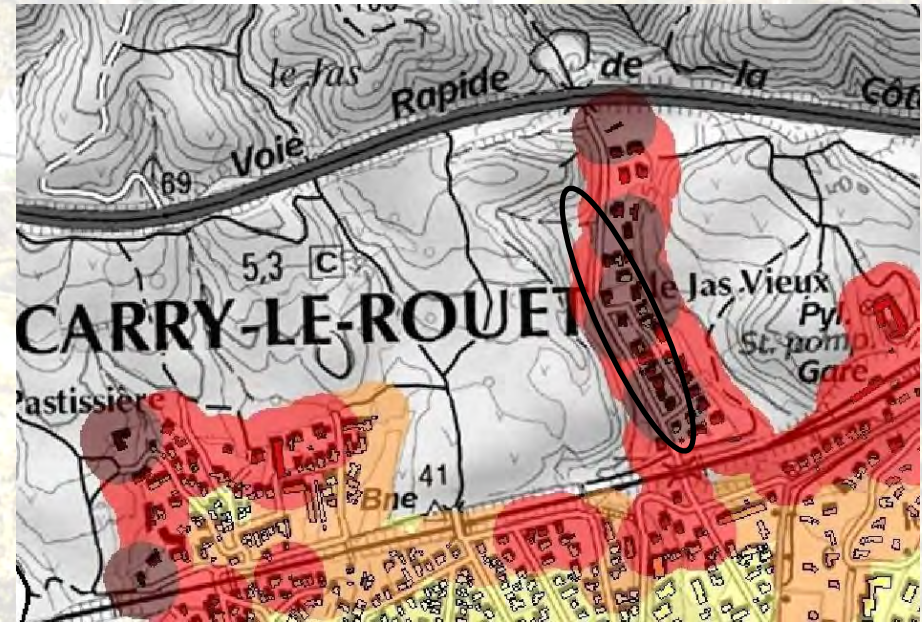
- Prioritizing brushing control operations

Building classification	Hazard class						Priority 1 +
	Very low	Low	Moderate	High	Very High	Exceptionnal	Priority 2
Isolated	30	21	14	8	4	1	Priority 3
Scattered	31	23	15	10	5	2	Priority 4
Clustered - contact	33	24	17	11	7	3	
Urban - contact	34	27	19	13	9	6	
Clustered - inner	35	29	25	20	16	12	
Urban - inner	36	32	28	26	22	18	

- Mapping of the WUI for each municipality to assess risks and prioritize brushing control operations

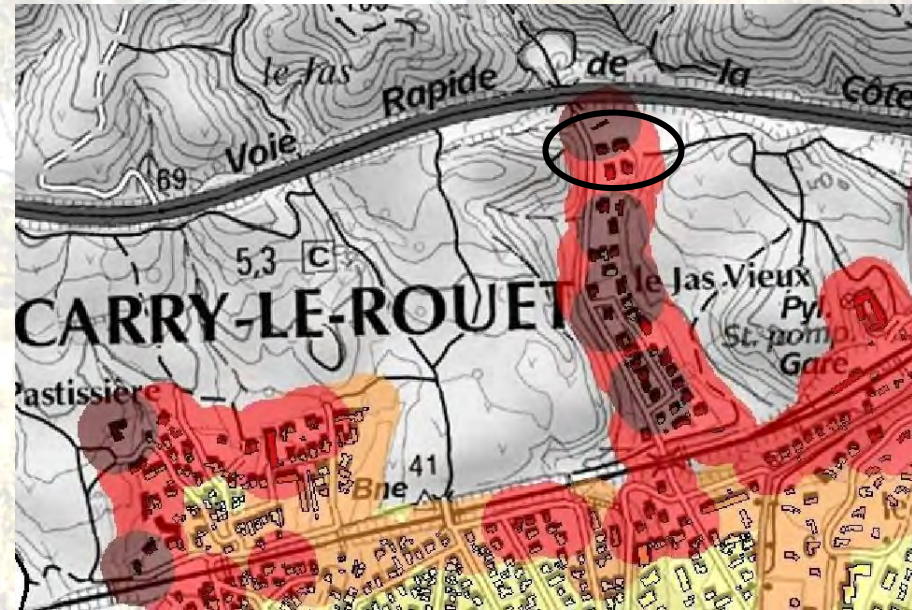


Comparison between theoretical results and ground truth (ex. Châteauneuf les Martigues)



**Compliance with brushing obligations :
Preserved housing**

Comparison between theoretical results and ground truth (ex. Châteauneuf les Martigues)



No compliance with brushing obligations : destroyed housing

Implementation during response phase



Outcomes

- 200 000 buildings are at risk from forest fires in the Department
 - 90 000 buildings are directly in contact with a forest area
- Common methodology and tool for management and response organisations
 - Automatic update (GIS script)
- Awareness-raising support for the elected representatives and the public
- Food for thoughts for future urban development in the WUI
- Towards further exploration of the leverage actions in the area of influence



Thank you for you attention

Vincent Pastor, Alice Clémenceau



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