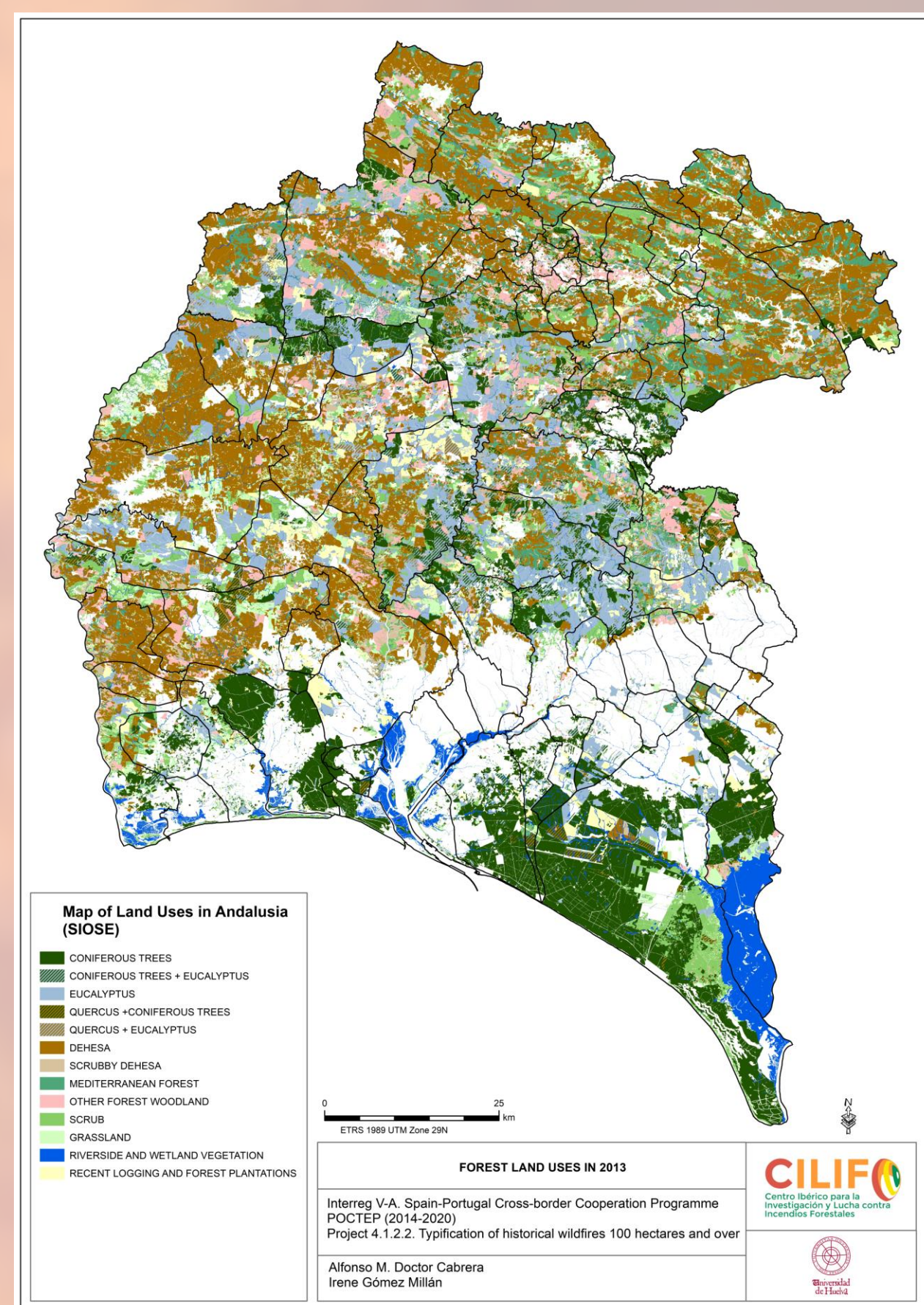
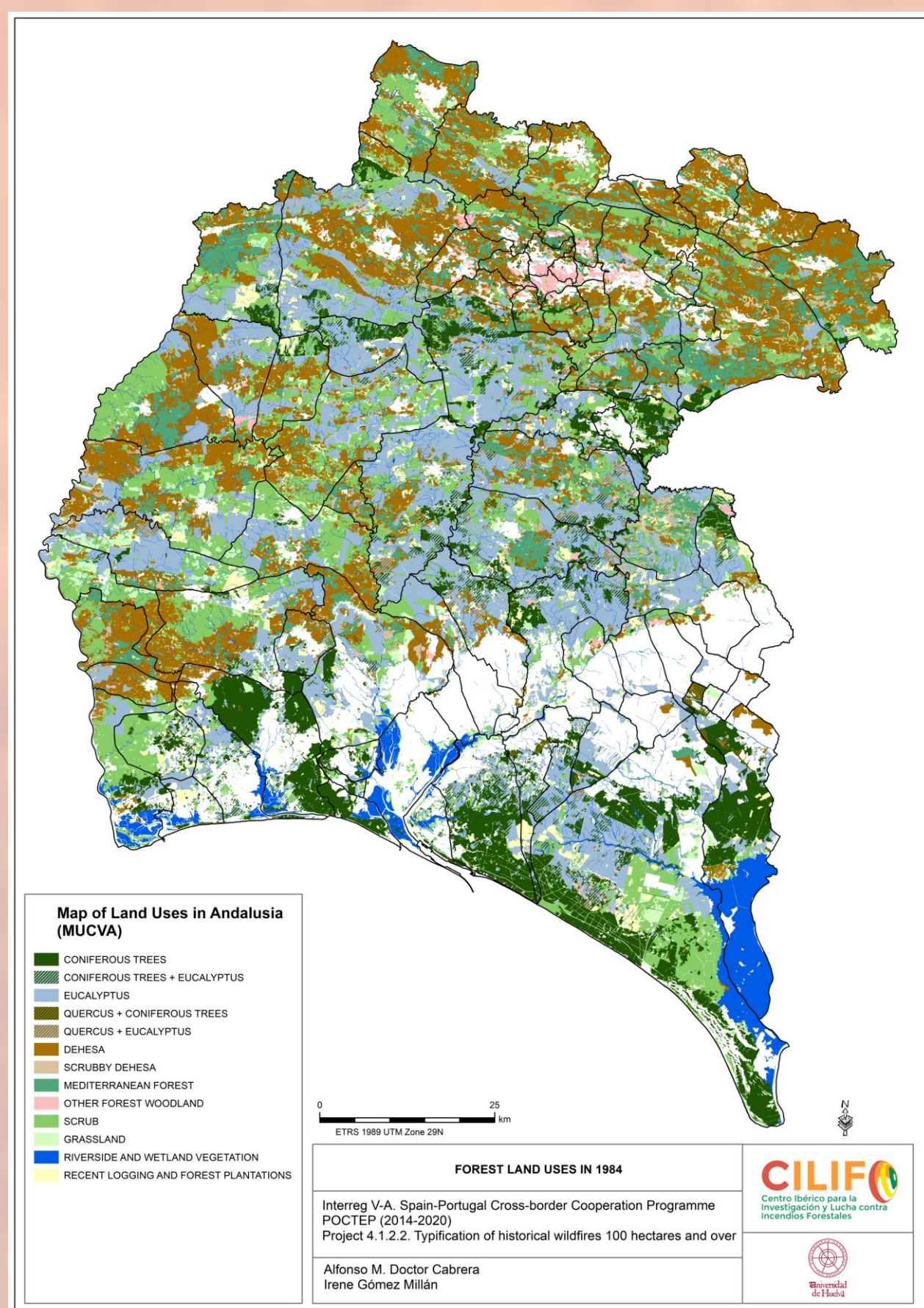


POPULATION AND LARGE WILDFIRES (LWF)

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CILIFO Project (Iberian Centre for Research and Fight against Wildfires: <https://cilifo.eu>)

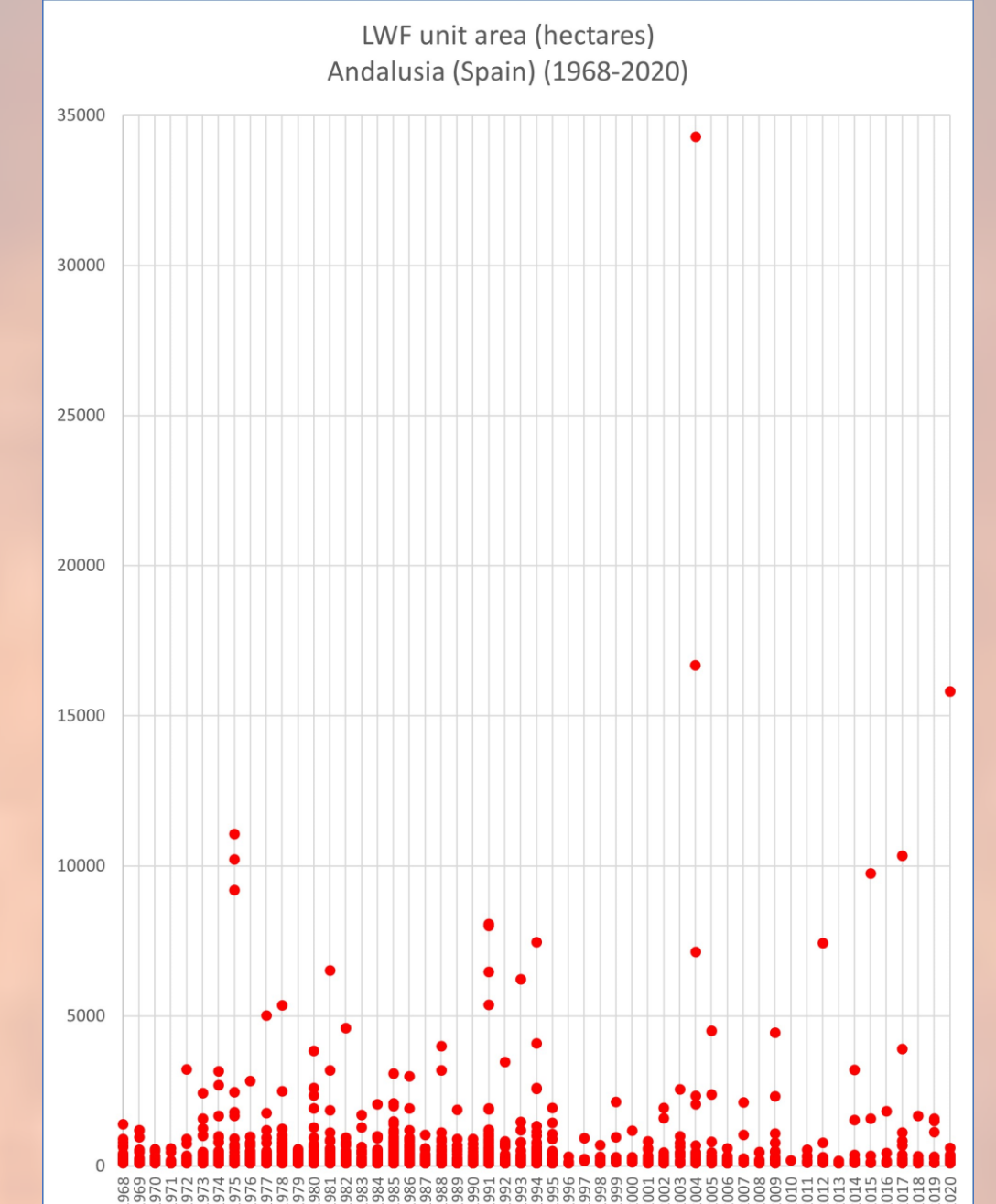
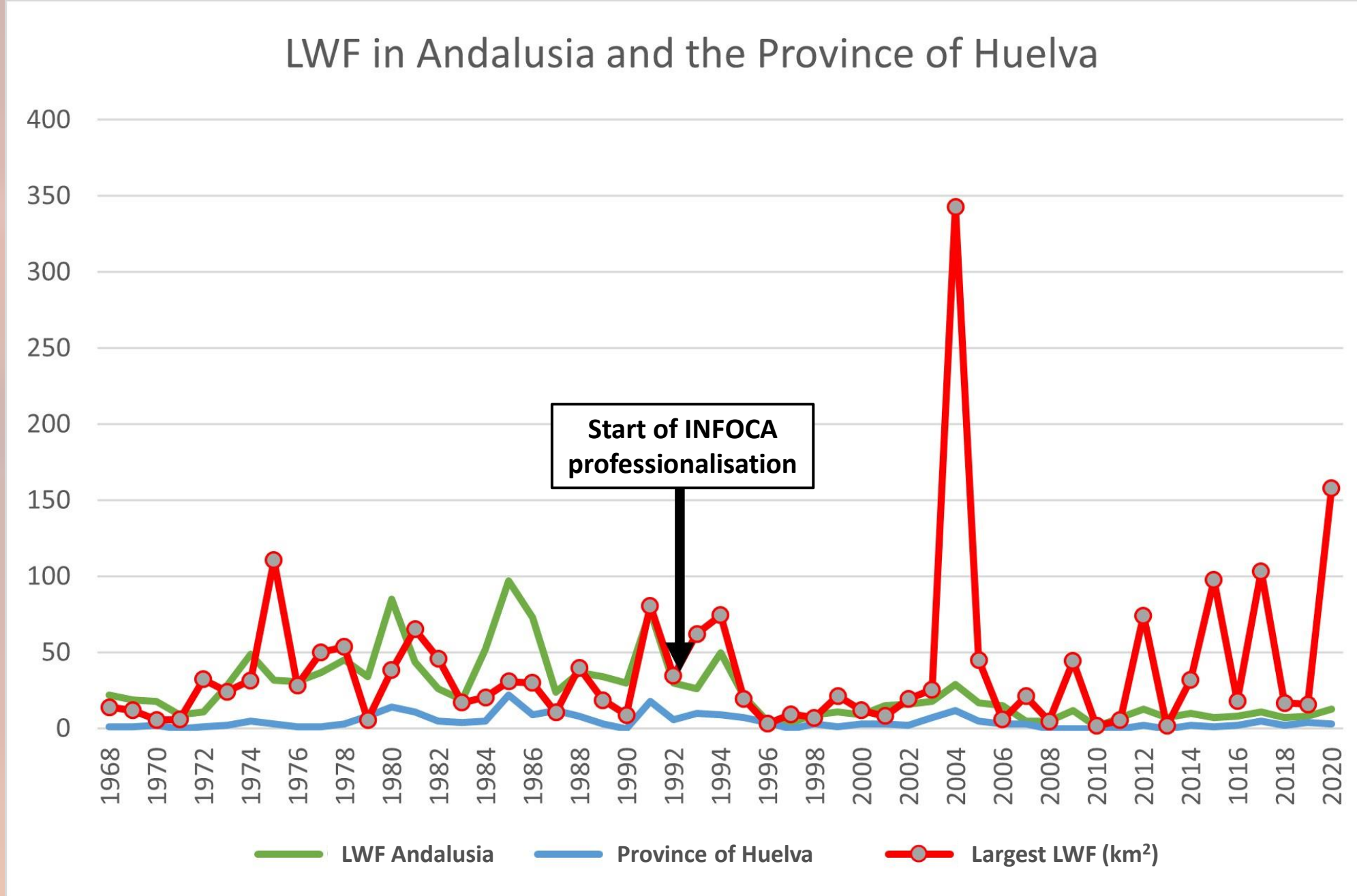
(financed by the European Regional Development Fund, ERDF, Interreg V-A. Spain-Portugal Cross-border Cooperation Programme (POCTEP, 2014-20))



WILDFIRE FRAMEWORK

Province of Huelva: the most forested and the most affected by LWF in Andalusia (increasing).

Professionalisation of INFOCA: from 97 LWF in 1985, no more than 29 since 1995, and less than 14 since 2012; But area affected by LWF has been increasing steadily.



CONCEPTS AND SOURCES

Large wildfire (LWF): 100 hectares or larger (but Tedim et al., 2013: assessing fire severity only with the extent of the affected area is "simplistic" and even "inconsistent").

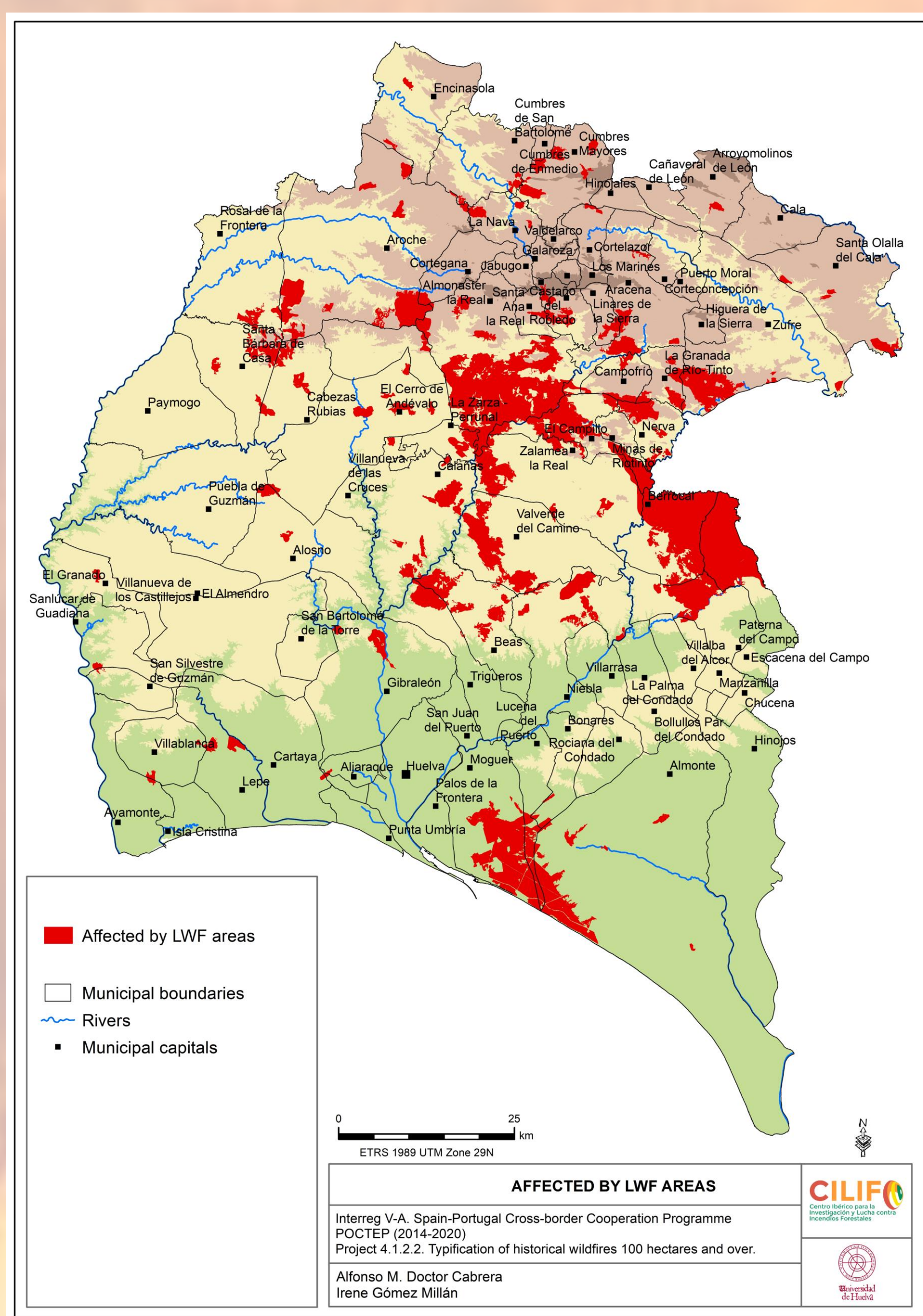
Wildfires: General Forest Fire Statistics (EGIF), and Database of the Emergency Plan for Forest Fires in Andalusia (INFOCA): 80.236 fires until 2020.

Cartographic databases: INFOCA, and Andalusian Environmental Information Network (REDIAM). Differences in affected areas, and outbreaks outside perimeter of its LWF; differences between Statistical and cartographic databases too. Starting year 1986.

Population: National Statistics Institute (INE): www.ine.es. Census, and Sites Catalogue. Intercensal 1940-2011.

PROVINCE OF HUELVA. Land use in 1984 & 2013. Forest units from north to south:

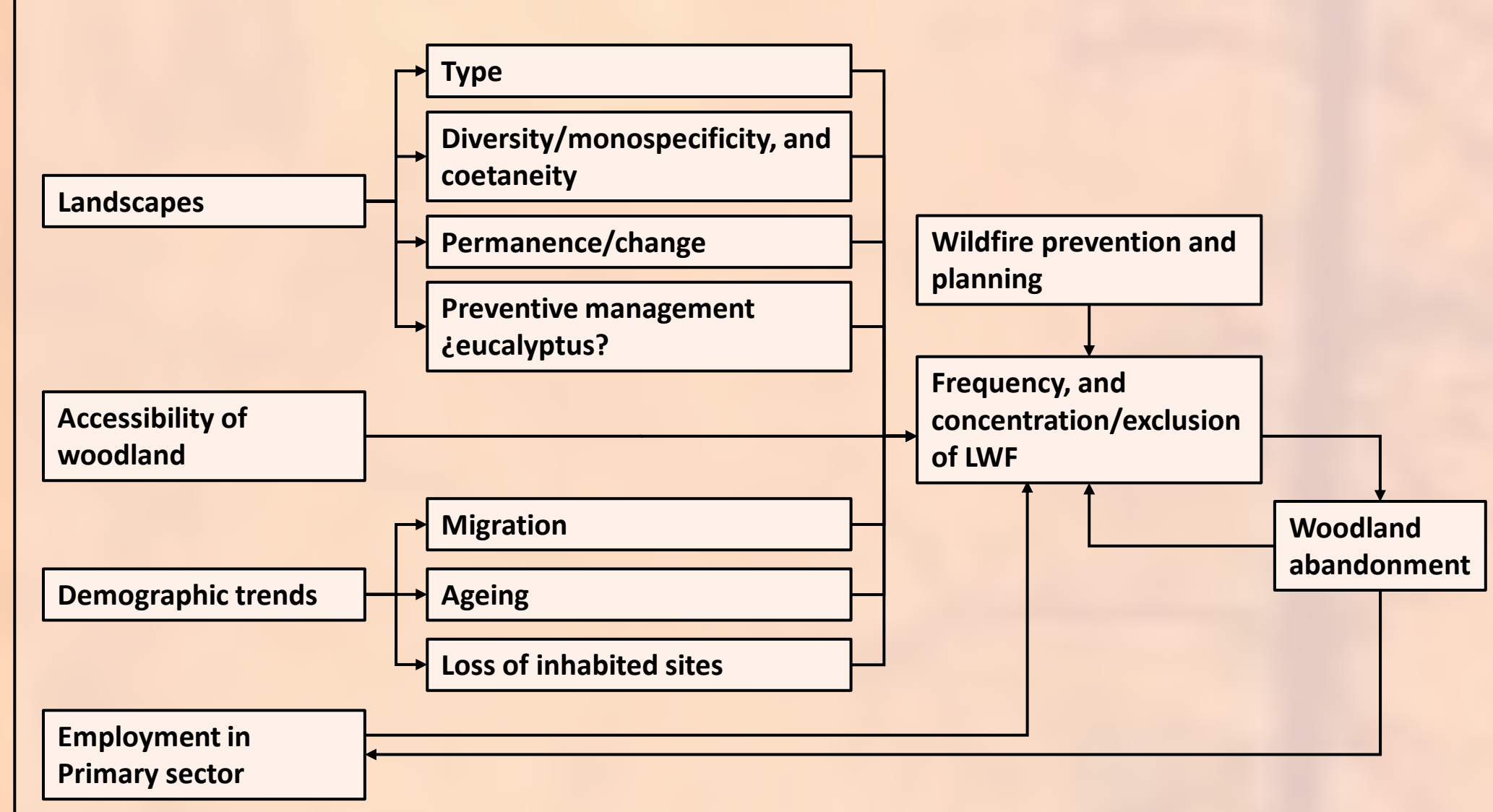
- Sierra: up to 1.055 m. *Quercus ilex* and *Quercus suber* predominate. *Castanea sativa* in humid areas with calcareous soils over 600 m.
- Andevalo: highly mineralised by contact metamorphism (Pyritic Belt of southwestern Peninsula). Historical deforestation by mining. Predominance of dehesa to the west, and eucalyptus to the east.
- Coast-Doñana. Reforestation of *Pinus pinea* for expansion of the merchant ships (*Carrera de Indias*) and Navy, and for establishing coastal dunes.



LARGE WILDFIRES IN THE PROVINCE OF HUELVA

Concentration of LWF in NW-SE strip which crosses Sierra and Andevalo, and in western Doñana, where reforestation predominates (eucalyptus in Andevalo, pine in Doñana): predominance of the landscape resilience factor.

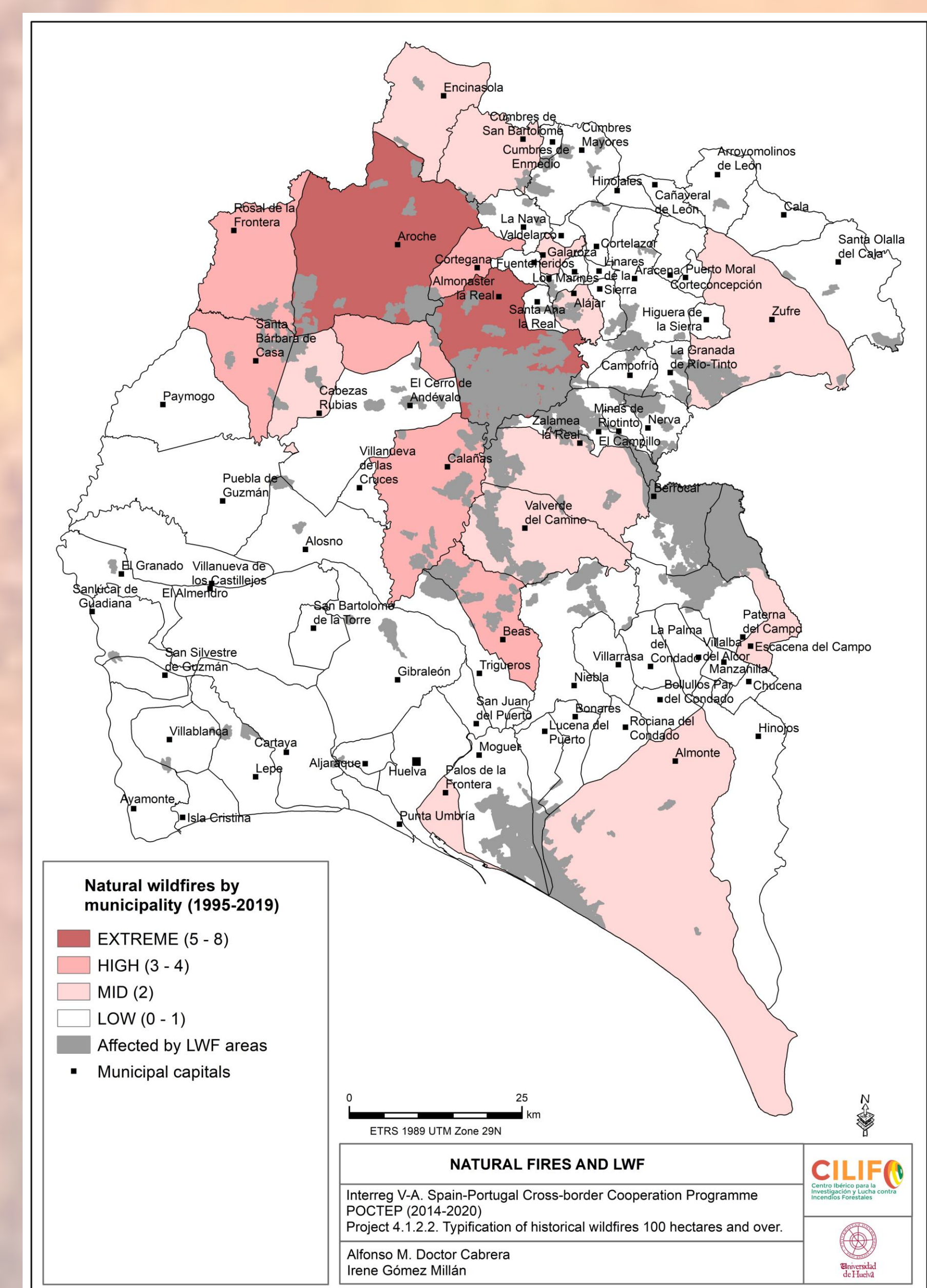
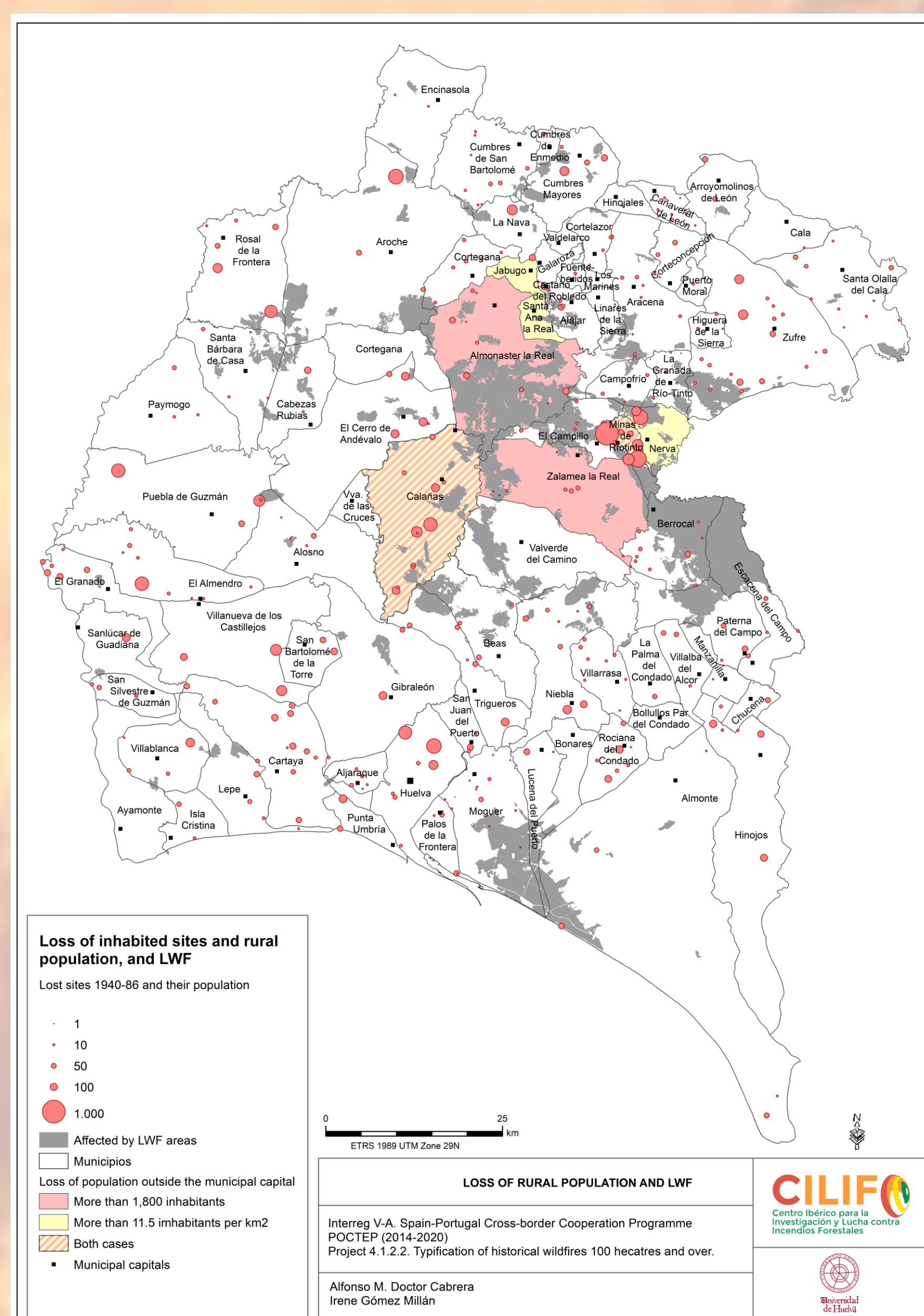
ANTHROPOGENIC TERRITORIAL FACTORS



FACTORS OF LARGE WILDFIRES

Climate change (Carnicer et al., 2022) + anthropogenic modification of traditional forest fire regimes = increase in the number of large wildfires (LWF) and unit area affected by each, and extension of fire period within the year (Fernandes & Lourenço, 2019).

Wildfires as complex phenomenon: high diversity of physical and anthropogenic factors, their multiple non-linear interactions, and because their separate knowledge is not enough to explain their behaviour (Ghermandi et al., 2016): difficult to conclusively establish a statistical relationship between this multiplicity of factors and frequency and magnitude of wildfires.



POPULATION AND LARGE WILDFIRES

Rural migration to large urban areas (since the 1950s): depopulation, ageing (Collantes & Pinilla, 2011; Del Molino, 2016), and abandonment of traditional productive activities and farms, which contribute to more and larger LWF (Bento et al., 2018; Calvo, 2020). Sierra: 76,149 inhabitants in 1930 to 37,634 today. Andevalo: 60,740 in 1960 to 37,800 today. Only the two county capitals, Arcena and Valverde, did not lose population in 1950-2011, but they did until 1970. Smaller losses in the Sierra Morena step (9.1% in Paterna, and 14.2% in Escacena) and larger in the northern border (74.8% Encinasola, 73.6% Cumbres de San Bartolomé). On the other hand, positive demographic balance 1950-2011 in the whole Costa-Doñana.

Fonseca and Freire (2003): causal relationship between public repopulation policies and rural migration.

Rural socio-economic-demographic crisis and public and private repopulation policies have produced a transformation of traditional landscapes; a "desestructuración do mundo rural" or "ruptura das estruturas rurais tradicionais (que) transformou territórios em equilíbrio em territórios dotados de grandes vulnerabilidades" (Bento et al., 2010); or the transition from highly resilient landscapes to a low resilience one, characterised by rewilding (Fernández-Manso, 2020). It has increased the frequency and severity of LWF.

More frequent wildfires the higher the nearby population, although smaller the area affected, and less but larger the lower the population (Doctor, 2004; Nunes et al., 2013 & 2014; Lourenço, 2018).

Municipalities with more population loss in lost sites, and in general outside the municipal capital (1940-86), are more affected by LWF.

NATURAL FIRES AND LWF

High percentage of fires started by lightning is indicative of the process of rural migration-depopulation-ageing-abandonment-increase of ground fuel, which is at the basis of the production of mega-fires.

Natural wildfires concentrate in same NW-SE strip where most of LWF are, due to accumulation of ground biomass of reforestation woodlands, especially eucalyptus, which favours both natural wildfires and progression of outbreaks to LWF. Conversely, low or zero frequency in western Andevalo, due to predominance of dehesa, which produces less ground fuel due to livestock.

CONCLUSIONS

Determinant of LWF is not the mere population loss -because it takes place in areas both not affected and heavily affected by them- but loss of inhabited places and resident population outside the municipal capitals. Anyway, its influence is only relative, because landscapes and their resilience is the most important human factor of LWF.

The policy to prevent LWF must integrate common measures with the policy to combat rural depopulation, helping not only to create the conditions (coverage of public and private services, and improvement of telecommunications network) to keep or increase the population of municipal capitals, but secondary settlements too.